



Final “Tech-Neutral” credit regulations – Clean Electricity Production Credit & Clean Electricity Investment Credit Tax Alert

Overview

Section 45Y provides a technology-neutral production tax credit for clean electricity production from qualified facilities and section 48E provides a technology-neutral investment tax credit for clean electricity investment for qualified facilities or energy storage technology (EST). On January 15, 2025, Treasury and the IRS published in the Federal Register final regulations under sections 45Y and 48E (together, “Tech-Neutral Credits”) ([T.D. 10024](#), the “Final Regulations”). This guidance considers over 1,800 written comments in response to the proposed regulations published on June 3, 2024 ([REG-119283-23](#), the “Proposed Regulations”) and testimony provided by 36 speakers during public hearings held in person and telephonically on August 12, 2024, and August 13, 2024, respectively. In developing the Final Regulations, Treasury and the IRS consulted with various scientific and technical experts across the Federal government, including personnel from the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the US Department of Agriculture (USDA).

The Final Regulations generally adopt the rules proposed in the Proposed Regulations but provide clarifying changes on several key topics. The main issues addressed in the Final Regulations are:

- The definition of qualified facility and EST;
- The types or categories of qualified facilities that meet the greenhouse gas (GHG) emissions rate, along with guidance on how other facilities can petition for a provisional emissions rate (PER);
- The incremental production and 80/20 rules;
- The one-megawatt exception applicable to the prevailing wage and apprenticeship (PWA) requirements;
- The requirements for metering devices;
- The concept of related and unrelated persons;
- The application of the Tech-Neutral Credit requirements for hybrid systems that include a qualified facility and EST;
- The rules regarding costs incurred for qualified interconnection property;
- The rules related to recapture; and
- The rules related to incremental cost.

Background – Tech-Neutral Credits

Section 45Y provides a clean electricity production credit (“45Y Credit”) in an amount equal to 0.3 cents per kilowatt hours (kWh) of electricity produced at a qualified facility and sold by the taxpayer to an unrelated person or that is equipped with a metering device which is owned and operated by an unrelated person. The credit amount is increased to 1.5 cents per kWh if the qualified facility meets PWA requirements, the one-megawatt exception, or the beginning of construction exception (collectively, “increased credit requirements”). The 0.3 cent and 1.5 cent amounts are adjusted for inflation.

For any qualified facility that satisfies the domestic content requirement, or that is located in an energy community, the credit is increased by 10 percent. If the qualified facility meets both requirements, the credit is increased by 20 percent.

Under section 45Y, the term “qualified facility” means a facility owned by the taxpayer (i) which is used for the generation of electricity, (ii) which is placed in service after December 31, 2024, and (iii) for which the GHG emissions rate is not greater than zero.

Under section 45Y(b)(1)(D), a qualified facility does not include any facility for which a credit under section 45, 45J, 45Q, 45U, 48, 48A, or 48E is allowed for the taxable year or any prior taxable year.

Section 48E provides a clean electricity investment credit (“48E Credit”) in an amount equal to 6% (or 30%, if increased credit requirements are met) of the qualified investment for the taxable year with respect to any qualified facility and EST. The credit is increased by an additional 2 percentage points (or 10 percentage points if increased credit requirements are met) for any qualified facility or EST that meets the domestic content requirement or that is located in an energy community. If the qualified facility or EST meets both requirements, the credit is increased by 4 percentage points (or 20 percentage points if increased credit requirements are met).

Under section 48E(b)(1), a qualified investment with respect to any qualified facility for any taxable year is the sum of:

1. The basis of any qualified property placed in service by the taxpayer during such taxable year which is part of a qualified facility, plus,
2. The amount of any expenditures which are paid or incurred by the taxpayer for qualified interconnection property.

Section 48E(b)(3) provides that the term “qualified facility” means a facility which is used for the generation of electricity, which is placed in service after December 31, 2024, and for which the anticipated GHG emissions rate is not greater than zero.

Under section 48E(b)(3)(C), a qualified facility does not include any facility for which a credit under section 45, 45J, 45Q, 45U, 45Y, 48, or 48A is allowed for the taxable year or any prior taxable year.

Observation: For certain qualified facilities or energy properties that began construction before January 1, 2025, and are placed in service after December 31, 2024, taxpayers may be eligible for the credits under sections 45 or 48 (“Legacy ITC/PTC”) or the Tech-Neutral Credits. Although the credit rates do not differ between the Legacy ITC/PTC and the Tech-Neutral Credits, there are other differences that may warrant close analysis to determine eligibility for each credit. In particular, the concept of “energy

Description of provisions

Consistent with the Proposed Regulations, the Final Regulations are divided into the following sections:

- Treas. Reg. §§ 1.45Y-1 and 1.48E-1 provide generally applicable definitions and rules applicable to the Tech-Neutral Credits, including rules for calculating the credits.
- Treas. Reg. §§ 1.45Y-2 and 1.48E-2 provide the rules relating to qualified facilities and § 1.48E-2 also provides the rules relating to a qualified investment, qualified property, and EST.
- Treas. Reg. §§ 1.45Y-3 and 1.45Y-3 provide the rules relating to the increased credit amount for PWA.
- Treas. Reg. §§ 1.45Y-4 and 1.48E-4 provide the rules of general application to the Tech-Neutral Credits. Treas. Reg. § 1.45Y-4 provides rules specific to the 45Y Credit, including rules to attribute production to the taxpayer, for the expansion of an existing facility and incremental production, and for retrofits of an existing facility. Treas. Reg. § 1.48E-4 provides rules specific to the 48E Credit, including rules regarding the inclusion of qualified interconnection costs in the basis of certain low-output qualified facilities, for the expansion of an existing facility and incremental production, for retrofits of an existing facility, for ownership of a qualified facility or an EST, and for recapture.
- Treas. Reg. §§ 1.45Y-5 and 1.48E-5 provide the rules for determining GHG emissions rates for qualified facilities.

The Final Regulations provide the following applicability dates:

- Treas. Reg. §§ 1.45Y-1, 1.45Y-2, 1.45Y-4, 1.45Y-5, 1.48E-1, 1.48E-2, 1.48E-4, and 1.48E-5 apply to qualified facilities or EST placed in service after December 31, 2024, and during a taxable year ending on or after January 15, 2025.
- Treas. Reg. § 1.45Y-3 (related to PWA) generally applies to qualified facilities placed in service in taxable years ending after January 15, 2025, and the construction of which began after January 15, 2025. Taxpayers may choose to apply Treas. Reg. § 1.45Y-3 to qualified facilities placed in service in taxable years ending on or before January 15, 2025, and qualified facilities placed in service in taxable years ending after January 15, 2025, the construction of which begins before January 15, 2025, provided the taxpayers follow this section consistently and in its entirety.
- Treas. Reg. § 1.45Y-3(b)(1) (related to the one-megawatt exception to PWA) applies to qualified facilities placed in service in taxable years ending after January 15, 2025, and the construction of which begins after March 17, 2025. Taxpayers may choose to apply Treas. Reg. § 1.45Y-3, including Treas. Reg. § 1.45Y-3(b)(1), to qualified facilities placed in service in taxable years ending on or before January 15, 2025, the construction of which begins before January 15, 2025,¹ provided the taxpayers follow this section consistently and in its entirety.
- Treas. Reg. § 1.48E-3 (related to PWA) applies to qualified facilities and ESTs placed in service in taxable years after January 15, 2025, and the construction of which begins after March 17, 2025. Taxpayers may also choose to apply Treas. Reg. § 1.48E-3 to qualified facilities and EST placed in service in taxable years ending on or after January 15, 2025, the construction of which begins before January 15, 2025,² provided the taxpayers follow this section consistently and in its entirety.

The Final Regulations largely follow rules proposed in the Proposed Regulations but provide clarification on certain provisions. Notable comments and changes are described below.

Rules for both sections 45Y and 48E

Qualified facility definition

The Proposed Regulations provided a definition of “qualified facility” that is consistent with the statute. The Final Regulations retain this definition but clarify that the facility must be a “net generator of electricity taking into account electricity consumed by the facility.” Therefore, if a facility produces electricity and consumes 100% of such electricity, the facility is not a qualified facility for purposes of the Tech-Neutral Credits.

Under the Final Regulations, a “qualified facility” generally includes a unit of a qualified facility and property that is owned by the taxpayer that is an integral part of the unit of a qualified facility. A “unit of qualified facility” includes all functionally interdependent components owned by the taxpayer that are operated together and that can operate apart from other property to produce electricity, or, in the case of a combined heat and power (CHP) property, useful thermal energy and electricity. Components of property are “functionally interdependent” if the placing in service of each of the components is dependent upon the placing in service of each of the other components to produce electricity. A component of property owned by a taxpayer is an “integral part” of a qualified facility if it is used directly in the intended function of the qualified facility and is essential to the completeness of such function.

C&G and non-C&G facilities

The Final Regulations provide rules and definitions for determining emissions rates for any qualified facility that produces electricity through combustion or gasification (“C&G Facility”) and for any qualified facility that does not produce electricity through combustion or gasification (“non-C&G Facility”).

C&G Facility: The Final Regulations adopt the definitions of C&G and non-C&G Facilities in the Proposed Regulations, providing that the term “C&G Facility” means a facility that produces electricity through combustion or uses an input energy source to produce electricity, if the input energy source was produced through a fundamental transformation of one energy source into another using combustion or gasification.

Non-C&G Facility: The Final Regulations provide a list of non-C&G Facilities with a GHG emissions rate that is not greater than zero as follows:

- (i.) Wind (including small wind properties);
- (ii.) Hydropower (including retrofits that add electricity production to non-powered dams, conduit hydropower, hydropower using new impoundments, and hydropower using diversions such as a penstock or channel);
- (iii.) Marine and hydrokinetic;
- (iv.) Solar (including photovoltaic and concentrated solar power);
- (v.) Geothermal (including flash and binary plants);
- (vi.) Nuclear fission;
- (vii.) Fusion energy; and
- (viii.) Waste energy recovery property that derives energy from a source described in paragraphs (i) through (vii) above.

The facilities identified in the above list are consistent with the list provided in the Proposed Regulations, with certain clarifying modifications.

Concentrated solar power (CSP): In response to a comment, the preamble to the Final Regulations states that a CSP facility with auxiliary burners that uses combustion exclusively for the purposes of cold starts or freeze protection of thermal working fluids would not be categorized as a C&G Facility. However, a CSP facility that uses auxiliary burners to generate electricity in hybrid configurations would be considered as C&G Facility.

Fusion energy: The Final Regulations replaced the term “nuclear fusion” (provided in the Proposed Regulations) with “fusion energy” to avoid confusion with nuclear fission.

Waste energy recovery property (WERP): The Final Regulations define the term “WERP” as property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity.

Observation: The preamble to the Final Regulations provides examples of facilities that are not considered WERP included in the list described above in the Final Regulations. They are:

- facilities using exothermic reactions because they may release energy into the environment in the form of heat via combustion;
- pressure drop technologies because they convert pressure, rather than heat, directly to electricity; and
- facility that uses waste heat to create thermal energy.

Section 45Y(b)(2)(C)(i) requires Treasury to annually publish a table (“Annual Table”) that sets forth the GHG emissions rates for types or categories of facilities. The first Annual Table was released concurrently with publication of the Final Regulations in [Revenue Procedure 2025-14](#). The Annual Table provides the types of categories of facilities that are described in the Final Regulations as having a GHG emissions rate of not greater than zero.

Observation: The first Annual Table is effective beginning on January 15, 2025, and until the effective date of a subsequent Annual Table. The first Annual Table is helpful for determining which types of non-C&G Facilities can qualify for the Tech-Neutral Credits but does not provide any guidance for determining which types of C&G Facilities can qualify. The Annual Table may be updated in the future to provide such guidance and, as described in the preamble to the Final Regulations, if Treasury and the IRS add or remove any types or categories of facilities from the Annual Table or change emissions determinations included in the Annual Table, they will also publish an expert analysis supporting such change.

Lifecycle analysis for C&G Facility

The Final Regulations generally adopt the rules proposed in the Proposed Regulations for determining the GHG emissions rate for a C&G Facility. The GHG emissions rate for a C&G Facility must be determined by a comprehensive lifecycle analysis (LCA) that adheres to the specific rules outlined in the Final Regulations. The emissions rate equals the net rate of GHG emitted into the atmosphere by such facility in the production of electricity (or for CHP property, both production of electricity and thermal energy), expressed as grams of CO₂e per kWh.

Starting and ending boundary of LCA: The starting boundary of the LCA is feedstock generation or feedstock extraction and includes processes and inputs necessary to produce and collect or extract the raw materials used to produce electricity, including those used as energy inputs to electricity production. LCA must take into account direct emissions (such as those associated with fuel and feedstock production, distribution, and use by a C&G Facility) and significant indirect emissions. The Final Regulations clarify that sources of significant indirect emissions include emissions in the United States

and other countries associated with market-mediated changes in related commodity markets, such as emission from indirect land use change and emissions consequences of commodity production.

The ending boundary of the LCA for electricity that is transmitted to the grid or used on-site is the meter at the point of production of the C&G Facility. Emissions associated with use of such electricity, including emissions from transmission and distribution are not within the LCA boundary.

LCA baseline: Consistent with the Proposed Regulations, the Final Regulations provide that the LCA must be based on a future anticipated baseline, which projects future status quo in the absence of the Tech-Neutral Credits, taking into account anticipated changes in technology, policies, practices, and environmental and other socioeconomic conditions. The Final Regulations clarify that the future anticipated baseline must be updated as necessary to capture material regulatory, economic, supply chain, or environmental changes. The update must occur at least every ten years, but not more often than every five years.

Principles and consideration for included emission within LCA boundary

Market-mediated effects: The Final Regulations provide a new principle, “market-mediated effects,” which means effects resulting from policy interventions and other factors (for example, technological advances) that alter the availability of and demand for marketed goods and activities and their related GHG emissions profiles. These effects are driven by and result in changes in absolute and relative prices which can occur at local, national, and global boundaries. Examples of market-mediated effects include direct and significant indirect emissions, such as land use changes or land use management changes that result from the production of fuels derived from biomass and shifts in total market demand and supply for input fuels, feedstocks and related commodities, and other materials, as a result of changes associated with the policy intervention.

Alternative fates and avoided emissions: The Final Regulations further clarify that the LCA may consider alternative fates and account for avoided emissions, including for the fuels and feedstocks consumed in the fuel and feedstock supply chain and at the electricity generating facility. The term alternative fate means a set of informed assumptions (for example, production processes, material outcomes, and market-mediated effects) used to estimate the emissions from the use or disposal of each feedstock were it not for the feedstock's new use due to the implementation of policy (that is, to produce electricity). The term avoided emissions means the estimated emissions associated with the feedstock, including the feedstock's production and use or disposal, that would have occurred in the alternative fate (if such feedstock had not been diverted for electricity production) but are instead avoided with the feedstock's use for electricity production.

Temporal scales: The Proposed Regulations requested comments regarding what factors should be considered in establishing the timeframe for the LCA analysis. The comments submitted requested various time horizons, ranging from 10 years to 100 years or more. Upon consideration of all comments, including of the EPA's renewable fuel standard program, the Final Regulations provide that the LCA should evaluate the emissions over a time horizon of 30 years from the year in which a qualified facility first qualifies for the credit (or, for purposes of the section 48E Credit, the year in which a qualified facility was placed in service).

Spatial scales: The Proposed Regulations requested comments regarding setting spatial scale, that is, defining the area over which emissions outcomes will be evaluated. Commenters submitted a wide range of recommendations. Upon consideration of all comments and the LCA modeling practices under the

EPA rules, the Final Regulations provide that spatial scales analysis should analyze whether the feedstock will be:

- Used or sold on the market in the absence of the Tech-Neutral Credits;
- Used directly in or as an input to an activity or good in local markets;
- Transported for use in domestic markets elsewhere;
- Traded for use in international markets; and
- Used in a manner that has significant ramifications on other markets.

If the feedstock does not meet any of the above criteria, then the market-mediated effects analysis would not be necessary beyond the relevant spatial scale(s). Based on the results of the assessment, the LCA should evaluate the emissions on a sub-regional, regional, national, or international scale as appropriate. The evaluation of emissions should include the market and emissions implications of sourcing new or additional material for electricity generation across the applicable market and spatial scales.

Categorization of products: The preamble to the Proposed Regulations stated an intent to clarify the principles for categorizing products and assessing the emissions outcomes for such products and requested comments. Upon consideration of all comments, the Final Regulations provide that the LCA should distinguish between primary products, co-products, byproducts, and waste products, and adopt the below principles for categorizing and assessing the emissions outcomes for different types of products, where applicable.

- The LCA should take into account relevant geospatial variations in supply and demand (that is, differences across local, sub-regional, and larger regions), as well as variations across specific product types and characteristics, and producer types as relevant.
- The LCA should assess whether there are market-mediated effects and, if so, take these into account as part of the GHG analysis.
- The LCA should consider whether the availability of the Tech-Neutral Credits is expected to result in additional production of that material or in material changes in the supply chain, and, if so, take into account the direct and indirect emissions impact of the additional production or changes in the supply chain.
- Policy and other interventions (for example, technological advances) can alter the availability and demand for marketed goods and services, which can alter the treatment of materials once disposed of. Therefore, reevaluation of material categorization should occur at least every ten years, but not more often than every five years.
- All determinations of marketability, market-mediated effects, and behavioral changes must be supported by an analytical assessment performed by one or more National Laboratories, in consultation with other Federal agency experts as appropriate.
- A material should be considered to have a market recognized economic value and an established market if one existed within the last five years as of the date of the analysis.

Observation: Although the Final Regulations provide detailed discussion of the principles and concepts of included and excluded emissions within LCA boundary, Treasury and the IRS have not provided an LCA model that taxpayers can use to determine emissions rates for the Tech-Neutral Credits. In the preamble to the Proposed Regulations, Treasury and the IRS requested comments on any existing models and data sources that could be used for modeling. In response, many comments were received addressing various existing models such as GREET model, EPA modeling, and numerous feedstock-specific models (for example, MSW-DST, WARM models, C-BREC model, C-ROADS, and En-ROADs models). The preamble to the Final Regulations provides that after consideration of the comments, Treasury and the IRS determined that there is not a clear or obvious single model that would be appropriate for all situations. Therefore, Treasury and the IRS

will coordinate with Federal agency scientific technical experts on the selection and development of a model or models.

Biogas, renewable natural gas (RNG), and fugitive sources of methane used by C&G Facilities as fuel or feedstock: The Final Regulations provide guidance specific to C&G Facilities that produce electricity through combustion or gasification using methane derived from biogas, RNG, or fugitive sources of methane (or any hydrogen derived from methane from these sources) (collectively, “methane”) as a fuel or feedstock.

First productive use not adopted: The preamble to the Proposed Regulations stated that Treasury and the IRS intended to require that for RNG to receive an emissions value consistent with that gas (and not fossil natural gas), the RNG must originate from the first productive use of the relevant methane. This means that the RNG produced from any source of methane, where the methane had been productively used in a taxable year prior to the taxable year in which the C&G Facility was placed in service, would not receive an emission value consistent with biogas-based RNG. Upon consideration of all comments, the Final Regulations do not adopt the first productive use requirement and instead adopt an alternate approach to address the concerns related to diversion of natural gas alternatives from other productive uses and the risk of emissions associated with the creation of new or expansion of existing sources of natural gas alternatives.

Alternative fate and avoided emissions: While not imposing a first productive use requirement, the Final Regulations adopt an alternate approach and require taxpayers to consider the alternative fates and avoided emissions of that methane for purposes of determining GHG emissions rates associated with the use of natural gas alternatives. These include:

- Avoided emissions and alternative productive uses of that methane;
- The risk that the availability of tax credits creates incentives resulting in the production of additional methane or otherwise induces additional emissions; and
- Observable trends and anticipated changes in waste management and disposal practices over time as they are applicable to methane generation and uses.

Alternative fate: The alternative fate is flaring for methane from landfill sources, from wastewater sources and coal mine methane. However, the alternative fate for methane from animal waste must be derived from the national average of all animal waste management practices, which results in a carbon intensity (CI) score of -51 gCO₂e/megajoule (MJ). MJ basis refers to the lower heating value of the methane contained in the biogas prior to upgrading.

Observation: With regard to the CI score of -51 gCO₂e/MJ, the preamble to the Final Regulations cites the DOE’s publication³ relating to the clean hydrogen production credit under section 45V. In addition to these Final Regulations, Treasury and the IRS finalized rules under section 45V on January 10, 2025, providing similar rules, although with some differences, on how to determine GHG emissions rates related to the production of clean hydrogen. As the industry looks to understand Treasury and IRS rules relating to the LCA boundary for purposes of the Tech-Neutral Credits, guidance provided under section 45V provides additional context to the direction and approach considered by Treasury and the IRS.

Additionally, by using an average of all animal waste management practices, some types of animal waste (dairy waste) end up being treated less favorably than they would if they had animal-specific waste CI scores, and some types of animal waste (chicken waste) end up benefiting because the waste portion (hay, debris, etc.) far outweighs the actual animal manure.

No book-and-claim accounting: The Final Regulations prohibit C&G Facilities from using book-and-claim accounting to determine or claim the energy attributes of any input or feedstock. A determination of whether a facility is eligible for the Tech-Neutral Credits must be based on its actual operational processes to produce electricity.

Observation: Citing to an article by DOE's National Renewable Energy Laboratory (NREL), the preamble to the Final Regulations discusses that C&G Facilities that combust natural gas—such as natural gas-fired boilers and combustion turbines—are expected to have GHG emissions rates greater than zero, even with the use of carbon capture and sequestration (CCS) technology. The preamble to the Final Regulations states that the LCA must consider emissions in the fuel lifecycle prior to CCS through the point of electricity production and the rate of CCS when combusting the gas is not technically capable of reaching 100 percent. However, subject to further analysis and dependent on specific facts and circumstances, there may be cases in which a C&G Facility that uses a blend of natural gas and other feedstocks that have negative lifecycle emissions and use CCS could potentially achieve lifecycle GHG emissions not greater than zero.

See <https://www.nrel.gov/docs/fy21osti/80580.pdf>.

Provisional emissions rates: Designated LCA model or the DOE: The Final Regulations adopt the provisional emissions rate (PER) process provided in the Proposed Regulations. For any facility not included in the Annual Table, a taxpayer must obtain the emissions rate with respect to such facility by obtaining an emissions value by using a most recent version of an LCA model designated by Treasury and filing a petition with Treasury. If an emissions value of the taxpayer's facility cannot be determined by using the most recent version of an LCA model, the taxpayer may request an emissions value from the DOE.

A taxpayer must file a PER petition by attaching it to the taxpayer's Federal tax return for the first taxable year in which the taxpayer claims the 45Y Credit or the taxable year the 48E Credit is claimed with respect to the qualified facility. The PER petition must contain an emissions value, and if applicable, the associated letter from the DOE, and the emissions value of the facility specified on such petition will be deemed accepted.

Observation: In the preamble to the Final Regulations, Treasury and the IRS indicated that the emissions value request process will open after the publication of these Final Regulations. Similarly, the preamble also provides that the DOE will publish more information about the process to receive an emissions value in forthcoming guidance. At this time, neither Treasury nor the DOE has published additional information regarding the PER process. Additionally, Treasury has not designated any LCA models. Therefore, at this time, facilities that are not listed in the Annual Table do not have a process to submit a PER petition and thereby determine eligibility for net-zero requirement for the Tech-Neutral Credits.

Substantiation

The Final Regulations largely adopt the substantiation requirement proposed in the Proposed Regulations, requiring that in general, taxpayer must maintain in its books and records documentation regarding the design, operation, and if applicable, feedstock or fuel source used by the facility that establishes that such facility has a GHG emissions rate of not greater than zero for the taxable year. Sufficient documentation includes a third-party report that verifies the facility's emissions rate.

Carbon capture and sequestration (CCS): The Final Regulations provide that in order to exclude any qualified CO₂ produced by the facility, that is captured

and disposed of, or utilized by the taxpayer in a manner described under section 45Q, the taxpayer must satisfy the requirements for substantiation and verification of carbon capture and sequestrations provided under section 45Q and the underlying regulations and guidance. In addition, the taxpayer must comply with applicable requirements of the EPA's Greenhouse Gas Reporting Program (GHGRP) and include its GHGRP ID on the IRS Form, where applicable.

Biomass: The Final Regulations clarify that for facilities that use biomass feedstocks, the taxpayer must substantiate that the source of such fuels or feedstocks used are consistent with the taxpayer's claims.

Unmarketable feedstock: Where facilities use unmarketable feedstocks that are indistinguishable from marketable feedstocks (for instance, after processing), the taxpayer must maintain documentation substantiating the origin and original form of the feedstock.

Section 48E: Determining anticipated GHG emissions rate

The Final Regulations generally adopt the Proposed Regulations relating to the determination of anticipated GHG emissions rate. A facility's anticipated GHG emissions rate must be objectively determined based on the facts and circumstances. The Final Regulations clarify that for facilities that require the use of certain fuel sources or CCS to achieve net-zero emissions rate, objective indicia that such facilities will use such fuel sources or operate such carbon capture equipment in a manner that results in a net-zero emissions rate for at least 10 years beginning from the facility's placed in service date are required to establish reasonable expectation that such facility will result in a net-zero emissions rate.

The Final Regulations provide examples of such objective indicia, which include the following:

- Co-location of the facility with a fuel source which is reasonably expected to result in net-zero emissions rate;
- 10-year binding written contract to purchase fuels that is reasonably expected to result in a net-zero emissions rate;
- A facility type that only accommodates one type of fuel or small range of fuels which is reasonably expected to result in net-zero emissions rate;
- 10-year binding written contract for permanent geological storage or utilization of qualified CO₂ and capture and practice
- A legally binding Federal or State air permit which requires the facility operates in a manner that is reasonably expected to result in a net-zero emissions rate and that any CO₂ is permanently geologically stored and subjects the holder to civil or criminal penalties in the event the relevant permit requirements are breached.

The Final Regulations require taxpayers claiming the 48E Credit to attest under penalty of perjury in a manner prescribed by the IRS in forms or instructions that the anticipated GHG emissions rate as determined under the statute and the final regulations is not greater than zero.

Expansion of facility: Incremental production

The Final Regulations provide updated rules for incorporating new units or additions of capacity ("Incremental Production Rule") for the Tech-Neutral Credits. Under the Incremental Production Rule, a new unit or an addition to capacity is treated as a separate qualified facility but only to the extent of the increased amount of electricity produced at the facility by reason of such new unit or addition of capacity.

Measurement standard: The Final Regulations provide the following measurement standards that taxpayers must apply to measure the capacity and change in capacity of a facility:

1. Modified or amended facility operating licenses from the Federal Energy Regulatory Commission (FERC) or the Nuclear Regulatory Commission (NRC), or related reports prepared by FERC or NRC as part of the licensing process;
2. Only if (1) is not available, the International Standard Organization (ISO) conditions to measure the nameplate capacity of the facility consistent with the definition of nameplate capacity provided in 40 CFR 96.202; or
3. A measurement standard prescribed by the Secretary in guidance published in the Internal Revenue Bulletin.

Special rule for restarted facilities: In response to comments to the Proposed Regulations, the Final Regulations provide several clarifications to the special rule that allows a restarted facilities that were decommissioned to be considered to have increased capacity from a base of zero if certain conditions are met. The conditions are as follows:

1. The existing facility must have ceased operations;
2. The existing facility must have a minimum shut-down period of one year, in which the facilities were “not authorized to operate” by the FERC or the NRC;
3. The restarted facility must be eligible to restart pursuant to operating licenses issued by either the FERC or the NRC; and
4. The facility must not have ceased operations for the purpose of qualifying as a restarted facility.

Computation: The Proposed Regulations provided that with respect to section 48E, the qualified investment with respect to an addition of capacity is a proportionate share of such costs reflecting the extent to which the electricity produced attributable to a new unit or addition of capacity increased the existing facility’s production. The Final Regulations did not adopt the proportionate computation rule and revised the rule to provide that the qualified investment with respect to a new unit or addition of capacity includes the total cost of qualified property that is part of the new unit or addition of capacity.

Retrofit of an existing facility: 80/20 rule

With respect to both sections 45Y and 48E, the Proposed Regulations provided that a retrofitted qualified facility (and an EST for section 48E) can qualify as originally placed in service even if it contains some used components of property within the unit of qualified facility or unit of EST, if it is retrofitted in a manner that satisfies the 80/20 rule (that is, the fair market value of the new components of the unit of qualified facility or unit of EST is at least 80% of the total fair market value of both new and used components combined) as well as meets other requirements of sections 45Y and 48E. The Final Regulations retain this rule but clarify that a qualified facility or EST that meets the 80/20 rule may claim the 45Y or 48E Credit without satisfying the Incremental Production rule.

Observation: The Final Regulations provide a helpful example illustrating the application of the 80/20 rule to upgrades to a hydropower qualified facility. In Treas. Reg. § 1.48E-4(c)(6)(v), the example provides that a unit of hydropower facility includes water intake, water isolation mechanisms, turbine, pump, motor, and generator. The dam and power conditioning equipment are integral parts of the unit of qualified facility.

No single project concept for energy communities or domestic content

The preamble to the Final Regulations clarifies that, unlike section 48, there is no basis for providing an “energy project” or aggregation rule to sections 45Y and 48E for purposes of the domestic content or energy communities bonus credit. Therefore, each qualified facility or EST must separately satisfy the energy communities or domestic content requirements.

Observation: Section 48 requires taxpayers to apply the PWA, domestic content, and energy communities requirements at an “energy project” level, which is defined as a project consisting of one or more energy properties that are part of a single project. For a qualified facility and EST claiming the credit under section 48E, the bonus credit requirements are applied at each unit of qualified facility and unit of EST. This will likely cause difficulties for many technologies, as the first question is determining what constitutes a unit of qualified facility and a unit of EST, and second, how to document the eligibility for each unit. While certain technologies may be easier to determine, for example, a wind facility, it may be difficult for other technologies such as EST to determine an appropriate level of unit.

PWA requirements, integrated operations, and the one-megawatt exception

Under sections 45Y and 48E, facilities that have a maximum net output (or capacity in the case of EST) of less than one megawatt as measured in alternating current (AC) (“the One-Megawatt Exception”) are exempt from meeting PWA requirements, while still benefiting from the increased credit amount.

The Final Regulations provide that the determination of whether a facility meets this threshold is based on calculating the qualified facility’s nameplate capacity. For facilities that generate in direct current (DC), the maximum net output in AC is determined by using the lesser of: (1) the sum of the nameplate capacities within the unit of qualified facility in DC (which is deemed the nameplate capacity in AC); or (2) the nameplate capacity of the first component of property that inverts the DC into AC.

Integrated operations: The Final Regulations provide that if a qualified facility has “integrated operations” with one or more qualified facilities of the same technology type, then the nameplate capacities of the qualified facilities are aggregated for purposes of determining the application of the One-Megawatt Exception. One or more facilities are in integrated operations if the facilities:

1. Are owned by the same or related taxpayers;
2. Are placed in service in the same taxable year; and
3. Transmit electricity generated by the facilities through the same point of interconnection or, if the facilities are not grid-connected or are delivering electricity directly to an end user behind a utility meter, are able to support the same end user.

The Final Regulations provide a similar integrated operations rule for EST for purposes of section 48E.

Transition rule: To allow additional time to comply with the amendments made relating to the One-Megawatt Exception, the Final Regulations provide a delayed applicability date that is 60 days after publication of the Final Regulations, that is, March 17, 2025. Therefore, Treas. Reg. §§ 1.45Y-3(b)(1) and 1.48E-3 apply to qualified facilities and qualified ESTs placed in service in taxable years ending after January 15, 2025, and the construction of which begins after March 17, 2025.

Observation: As stated in the preamble to the Final Regulations, a plain reading of the statute regarding the One-Megawatt Exception indicates Congress’ intent to have only lower output, small facilities excepted from the PWA requirements and still be eligible for the increased credit amount. This exception simplifies credit access for small projects, encouraging widespread adoption of clean energy technologies.

Furthermore, the Final Regulations clarify that the aggregation of nameplate capacities for qualified facilities is only applicable to the One-Megawatt Exception and not applicable to other rules like the five-

megawatt limitation for interconnection property or the evaluation of eligibility for the domestic content or energy communities bonus credit amounts.

Rules specific to section 45Y

Metering device

The Final Regulations generally adopt the Proposed Regulations regarding definition of “metering device” and the standards for maintaining and operating such a device but slightly expand the performance standards requirement. Under the Final Regulations, a metering device must be certified as meeting “generally accepted industry performance standards, such as the American National Standards Institute (ANSI) C12.1-2022 standard, or subsequent revisions.” The Proposed Regulations required that a metering device meets the ANSI standards and did not provide room for any other standards to be used.

Related and unrelated persons

Under the Proposed Regulations, the term “related person” meant a person that is related to another person under section 52(b) and provided a special rule for sale between members of a consolidated group. The special rule provided that a member of a consolidated group is treated as selling electricity to an unrelated person if such electricity is sold to an unrelated person by another member of such group.

The Final Regulations adopt the “related person” rule and decline to adopt commenters’ suggestions that the related party sale rule under Notice 2008-60, which applies to section 45, should apply to section 45Y. The rule applicable to section 45 treats electricity as sold to an unrelated person if the ultimate purchaser of the electricity is not related to the person that produced the electricity even if the initial purchaser purchasing the electricity for resale is related to the producer. As explained in the preamble to the Final Regulations, Treasury and the IRS reasoned that Congress’ intent in allowing electricity production to qualify under section 45Y if the taxpayer’s qualified facility “is equipped with a metering device, which is owned and operated by an unrelated person” was to allow the section 45Y Credit for related sales only if the qualified facility has such a metering device. To allow taxpayers to apply the concept provided in Notice 2008-60 to section 45Y would undermine the metering obligation in section 45Y, the preamble further stated.

CHP

To be eligible for the 45Y Credit, a CHP property must have, among others, an energy efficiency percentage exceeding 60%, and such percentage is calculated using the lower heating value of the fuel sources. The Final Regulations provide additional guidance regarding how to calculate the energy efficiency percentage and heat rate for fuels without lower heating values. For a CHP property using nuclear energy, which does not involve combustion, the facility’s reactor’s total annual thermal output (in Btus, using a conversion rate of 3,412,140 Btus per megawatt hour thermal) serves as the functional equivalent of the lower heating value of fuel sources. For other facilities not using combustion, additional methodologies may be prescribed in guidance published in the Internal Revenue Bulletin.

Observation: Sections 45Y and 48E are intended to provide an incentive to any qualified net-zero electricity production from all sources, rather than specifying types of technologies or sources that qualify. Nevertheless, section 45Y provides a special rule for CHP property to include both electricity production and useful thermal energy production for purposes claiming the credit, whereas section 48E does not provide similar rule for

CHP. The Final regulations do not address or provide any rules specific to CHP property for purposes of qualifying for the 48E Credit. Therefore, it is unclear if CHP is eligible for the 48E Credit.

GHG emissions rate standard during 10-year credit period

The preamble to the Final Regulations clarifies that a facility that initially operates with greater than zero GHG emissions may later be treated as a qualified facility if in subsequent years, the facility operates with not greater than zero emissions, *but* only during the 10-year period beginning on the date the facility was originally placed in service. The preamble provides an example where a taxpayer places in service a facility in year 1 that has GHG emissions of greater than zero, and in year 6, such facility achieves zero GHG emissions, such facility is a qualified facility under section 45Y and taxpayer may claim the credit for year 6 and any subsequent years in which zero GHG emissions is achieved.

Furthermore, the preamble to the Final Regulations confirms, in accordance with the statute, that there is no de minimis exception GHG emissions standard, stating that a facility cannot qualify for the section 45Y Credit during a taxable year if it has GHG emissions greater than zero, even for a limited time or limited amount.

Rules specific to section 48E

Hybrid systems (qualified facility and EST)

The Final Regulations confirm that the section 48E Credit is determined separately with respect to qualified facilities and ESTs. Further, the guidance provides that although integral part property may be shared by a co-located qualified facility and EST, units of qualified facilities and ESTs may not share components for section 48E. Thus, an EST that meets the requirements of section 48E is eligible for the credit, even if it is co-located with a qualified facility that has claimed section 45 or 45Y Credits.

Tangible personal property and other tangible property

Consistent with the Proposed Regulations, the Final Regulations provide that the term “tangible personal property” means any tangible property except land or improvements thereto, such as buildings or other inherently permanent structures. The Final Regulations clarify that machinery located outside of a building is qualified property if it is used for the generation of electricity and the components of machinery are functionally interdependent. Local law does not control whether property is tangible property or is tangible personal property for purposes of section 48E.

Nuclear containment structures: The preamble to the Final Regulations discusses that while buildings and their structural components are not qualified property, not all structures are considered “buildings.” If a structure is essentially an item of machinery or equipment, or if it houses components of property that are integral to the intended function of the qualified facility and if the use of the structure is so closely related to the use of the housed components of property therein that the structure clearly can be expected to be replaced if the components of property it initially houses are replaced, the structure will not be regarded as a building. In response to comments, Treasury and the IRS confirm that nuclear containment structures fall within the exception since they are essentially pieces of specialized equipment.

Energy storage technology (EST)

Electrical energy storage property: Consistent with the Proposed Regulations, the Final Regulations provide that property primarily used in the transportation of goods or individuals should be excluded as electrical energy storage

property. Further, the preamble explains that a bright-line rule regarding the meaning of “primarily used” is not feasible as varying scenarios would be fact dependent.

Thermal energy storage property. The Final Regulations clarify that thermal energy storage property includes equipment involved in “adding, or transferring, already-existing heat from one medium to the storage medium” (for example, heat pumps), but does not include “equipment that transforms other forms of energy into heat in the first instance” (for example, gas boilers). The Final Regulations also provide that property that “removes heat from, or adds heat to, a storage medium for subsequent use” is property that is designed with the particular purpose of substantially altering the time profile of when heat added to or removed from the thermal storage medium can be used to heat or cool the interior of a residential or commercial building (“time altering purpose”).

The Final Regulations provides a safe harbor, which provides that a thermal energy storage property is deemed to have the time altering purpose if the thermal energy storage property is capable of storing energy that is sufficient to provide heating or cooling of the interior of a building for a minimum of one hour.

The Final Regulations provide following examples of property that is thermal energy storage property:

- A system that adds heat to bricks heated to high temperatures that later use the stored energy to heat a building through the HVAC system;
- Thermal ice storage systems that use electricity to run a refrigeration cycle to produce ice that is later connected to the HVAC system as an exchange medium for air conditioning a building, heat pump systems that store thermal energy in an underground tank, an artificial pit, an aqueous solution, a borehole field, or a solid-liquid phase change material to be extracted for later use for heating and/or cooling; and
- Air-to-water heat pump systems with a water storage tank.

The preamble further notes that a conventional gas boiler with an integrated storage tank would not generally be thermal energy storage property, as it would generate new heat in the first instance through combustion and subsequently add that heat to the storage medium. However, the integrated storage tank (without the conventional gas boiler) may be thermal energy storage property if it otherwise meets the thermal energy storage property definition.

Hydrogen energy storage property. The Proposed Regulations provided that hydrogen energy storage property must store hydrogen that is solely used as energy and not for the production of end products such as fertilizer (“end-use requirement”). The Final Regulations do not adopt the end-use requirement, stating that Treasury and the IRS agreed with commenters that the requirements would present administrative challenges. Furthermore, the Final Regulations clarify that hydrogen energy property includes, but is not limited to, above ground storage tanks, underground storage facilities, and associated compressors. In addition, a list of integral parts of a hydrogen energy storage property include, but not limited to, hydrogen liquefaction equipment and gathering, and distribution lines within a hydrogen energy storage property.

Modification of EST: Consistent with the statute, the Final Regulations provide that an electrical or hydrogen energy storage property that is modified such that the property has an increase in nameplate capacity of not less than 5 kWh (or such modification results in the property placed in service before August 16, 2022, achieving not less than 5 kWh), such property is treated as qualified EST, except that the basis of the existing property prior to such modification is not taken into account. Treasury and the IRS explain in the preamble that the rules for modification of EST does not take into account potential degradation

of the EST prior to its modification. Therefore, the increase in nameplate capacity is equal to the difference between nameplate capacity immediately after the modification and nameplate capacity immediately prior to the modification.

Qualified interconnection property

Consistent with the statute, the Final Regulations provide that the qualified investment with respect to a qualified facility includes amounts paid or incurred by the taxpayer for qualified interconnection property (“interconnection cost”), in connection with a qualified facility that has a maximum net output of not greater than 5 MW (as measured in AC) (“5 MW threshold”).

Interconnection cost reimbursed: The Final Regulations provide that if the costs borne by the taxpayer are reduced by utility or non-utility payments, Federal income tax principles may require taxpayers to reduce the interconnection cost. The Final Regulations provide examples illustrating circumstances in which the taxpayer does not reduce the interconnection cost because in the year the qualified facility is placed in service, the taxpayer had no reasonable expectation of any payment from the utility or other parties, although such payments were actually received by the taxpayer in a later year.

Interconnection cost paid over time: Furthermore, the preamble to the Final Regulations clarifies that it is not determinative whether such amounts are paid by the taxpayer to the utility upfront or over a period of time; however, payments that are made over a period of time may include a number of markups for a rate of return, tax gross-up, or other costs. Whether specific costs are allowable would be a fact-specific inquiry related to whether such costs are incurred with respect to the eligible tangible property.

EST not qualified: The preamble to the Final Regulations clarifies that amounts paid or incurred by a taxpayer for qualified interconnection property are not includible in the section 48E Credit for stand-alone EST.

Nameplate capacity: With regard to the 5 MW threshold, the Final Regulations generally retain the rule that the determination is made based on the nameplate capacity of the unit of qualified facility. However, for qualified facilities such as solar facilities, which generate electricity in DC, the Final Regulations provide that a taxpayer may determine the maximum net output (in AC) for each qualified facility by using the lesser of the following:

1. The sum of the nameplate generating capacities *within the unit of qualified facility* in DC (deemed the nameplate generating capacity of the unit of qualified facility in AC); or
2. The nameplate capacity of the first component of property that *inverts* the DC electricity into AC.

Observation: As terms of interconnection agreements with transmission owners are not all uniform, a close review of the agreements is necessary to determine whether there’s a reasonable expectation of future reimbursement of the interconnection cost where the interconnection cost is paid by the taxpayer over a period of time, how such installment payments are computed, and for any hybrid systems (such as solar and EST), what portion of the interconnection cost may be allocated to the qualified facility.

Note that for section 48, the interconnection cost related to a stand-alone EST is eligible because the qualified interconnection cost related to an “energy property”, which includes EST. For projects (either stand-alone EST or hybrid system with EST) that began construction prior to 2025 and were placed in service after 2024, this difference in the interconnection cost eligibility is one of the factors, (in addition to the application of bonus

credits) that will need to be examined to model the potential benefits under sections 48 and 48E.

Recapture

Section 48E(g) provides that for purposes of the recapture rules under section 50(a), if the qualified facility has a GHG emissions rate of greater than 10 grams of CO₂ e per kWh during the five-year period beginning on the date such qualified facility is originally placed in service, such facility ceases to be investment credit property, and the credit amount is recaptured. The Final Regulations provide that a change to the GHG emissions rate for a type or category of facility that is published in the Annual Table after a facility is placed in service does not result in a recapture event.

A determination of whether a recapture event occurred must be made for each taxable year occurring within the five-year recapture period. A taxpayer that has claimed the 48E Credit, including a taxpayer that has transferred a specified credit portion under section 6418, is required to provide to the IRS information on GHG emissions rate of the qualified facility during the recapture period at the time and in the form and manner prescribed in IRS forms or instructions or in publications or guidance published in the Internal Revenue Bulletin.

Incremental cost

Under the Final Regulations, if a component of qualified property of a qualified facility or component of property of an EST is also used for a purpose other than the intended function of the qualified facility or EST, only the incremental cost of such component is included in the basis of the qualified facility or EST. The term “incremental cost” means the excess of the total cost of a component over the amount that would have been expended for the component if that component were used for a non-qualifying purpose.



Footnotes

¹ This appears to be drafting error; we believe the reliance date should be March 17, 2025.

² See Footnote 1

³ US Department of Energy, “A Generic Counterfactual Greenhouse Gas Emission Factor for Life-Cycle Assessment of Manure-Derived Biogas and Renewable Natural Gas” (2025), available at www.energy.gov/45vresources

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