

DEPARTMENT OF THE TREASURY**Internal Revenue Service****26 CFR Part 1**

[TD 10010]

RIN 1545-BQ85

Advanced Manufacturing Production Credit**AGENCY:** Internal Revenue Service (IRS), Treasury.**ACTION:** Final rule.

SUMMARY: This document sets forth final regulations regarding the advanced manufacturing production credit established by the Inflation Reduction Act of 2022 to incentivize the production of eligible components within the United States. Eligible components include certain solar energy components, wind energy components, inverters, qualifying battery components, and applicable critical minerals. These final regulations also address specific recordkeeping and reporting requirements. These final regulations affect eligible taxpayers who produce and sell eligible components and intend to claim the benefit of an advanced manufacturing production credit, including by making elective payment or credit transfer elections.

DATES:

Effective date: These regulations are effective December 27, 2024.

Applicability date: For date of applicability, see §§ 1.45X-1(j), 1.45X-2(f), 1.45X-3(g), and 1.45X-4(d).

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SUPPLEMENTARY INFORMATION:**Authority**

This document contains final regulations (final regulations) that amend the Income Tax Regulations (26 CFR part 1) to implement the statutory provisions of section 45X of the Internal Revenue Code (Code). The final regulations are issued by the Secretary of the Treasury or her delegate (Secretary) under the authority granted under sections 45X(a)(3)(B)(i) and (ii), 1502, 6001, 6417(h), 6418(h), and 7805(a) of the Code.

Section 45X(a)(3)(B)(i) of the Code provides a specific delegation of authority to the Secretary to prescribe the form and manner for a taxpayer to make an election such that “a sale of components by such taxpayer to a related person shall be deemed to have been made to an unrelated person.”

Section 45X(a)(3)(B)(ii) provides a specific delegation of authority to the Secretary, “[a]s a condition of, and prior to, any election described in [section 45X(a)(3)(B)(i)],” to “require such information or registration as the Secretary deems necessary for purposes of preventing duplication, fraud, or any improper or excessive amount determined under [section 45X(a)(1)].”

Section 1502 of the Code requires the Secretary to “prescribe such regulations as he may deem necessary in order that the tax liability of any affiliated group of corporations making a consolidated return and of each corporation in the group, both during and after the period of affiliation, may be returned, determined, computed, assessed, collected, and adjusted, in such manner as clearly to reflect the income-tax liability and the various factors necessary for the determination of such liability, and in order to prevent avoidance of such tax liability.” Section 1502 of the Code also provides that the Secretary “may prescribe rules that are different from the provisions of chapter 1 that would apply if such corporations filed separate returns.”

Section 6001 of the Code provides an express delegation of authority to the Secretary, stating that, “[e]very person liable for any tax imposed by this title, or for the collection thereof, shall keep such records, render such statements, make such returns, and comply with such rules and regulations as the Secretary may from time to time prescribe. Whenever in the judgment of the Secretary it is necessary, [s]he may require any person, by notice served upon such person or by regulations, to make such returns, render such statements, or keep such records, as the Secretary deems sufficient to show whether or not such person is liable for tax under this title.”

Sections 6417(h) and 6418(h) of the Code direct the Secretary to issue such regulations or other guidance as may be necessary to carry out the purposes of each section, respectively.

Finally, section 7805(a) of the Code authorizes the Secretary “to prescribe all needful rules and regulations for the enforcement of [the Code], including all rules and regulations as may be necessary by reason of any alteration of law in relation to internal revenue.”

Background*I. Overview of Section 45X*

Section 45X was added to the Code by section 13502(a) of Public Law 117-169, 136 Stat. 1818 (August 16, 2022), commonly known as the Inflation Reduction Act of 2022 (IRA). In general,

for purposes of the general business credit under section 38 of the Code, section 45X provides for the advanced manufacturing production credit (section 45X credit) with respect to eligible components produced by the taxpayer and sold during the taxable year to an unrelated person. Section 45X applies to eligible components produced and sold after December 31, 2022.

Under section 45X(a)(1), the total section 45X credit amount for the taxable year equals the sum of the credit amounts determined under section 45X(b) with respect to each eligible component (as defined in section 45X(c)(1)). Under section 45X(a)(2), any eligible component produced and sold by the taxpayer is taken into account only if the production and sale is in a trade or business of the taxpayer.

Section 45X(a)(3) generally provides rules regarding the sale of eligible components to an unrelated person. However, section 45X(a)(3)(B) provides a special rule whereby if a taxpayer makes an election in the form and manner prescribed by the Secretary, a sale of eligible components by the taxpayer to a related person will be treated as if made to an unrelated person, referred to in these final regulations as the related person election (Related Person Election). As a condition of, and prior to, a taxpayer making the Related Person Election, the Secretary may require such information or registration as the Secretary deems necessary for purposes of preventing duplication, fraud, or any improper or excessive credit amount.

II. Credit Amounts for Eligible Components

Section 45X(b)(1) generally provides the credit amount determined with respect to any eligible component, including any other eligible component it incorporates, subject to the credit phase out rules provided at section 45X(b)(3). Section 45X(b)(1)(A) through (M) and section 45X(b)(2) set forth the credit amounts for each type of eligible component. The credit amounts are generally subject to phase out rules under section 45X(b)(3), but the phase out rules do not apply to any applicable critical mineral. For any eligible component (except applicable critical minerals) sold after December 31, 2029, the credit amount for such component equals the product of the amount determined under section 45X(b)(1) for such component multiplied by the applicable phase out percentage under section 45X(b)(3)(B)(i) through (iv). In the case of an eligible component sold during calendar year 2030, 2031, and

2032, the phase out percentages are 75 percent, 50 percent, and 25 percent, respectively. For any eligible component sold after December 31, 2032, the phase out percentage is zero percent, and no section 45X credit is allowed other than for applicable critical minerals.

Section 45X(b)(4) provides capacity limitations used to compute the credit amount for battery cells under section 45X(b)(1)(K)(ii) and battery modules under section 45(b)(1)(L)(ii). Section 45X(b)(4)(A) provides that the capacity determined with respect to a battery cell or battery module must not exceed a capacity-to-power-ratio of 100:1. Section 45X(b)(4)(B) defines “capacity-to-power-ratio” as the ratio of the capacity of a battery cell or battery module to the maximum discharge amount of such cell or module.

III. Eligible Components

Section 45X(c)(1)(A) defines an eligible component to mean any solar energy component, any wind energy component, any inverter described in section 45X(c)(2)(B) through (G), any qualifying battery component, and any applicable critical mineral. Section 45X(c)(1)(B) clarifies that eligible components do not include any property that is produced at a facility if the basis of any property that is part of such facility is taken into account for purposes of the qualifying advanced energy project credit allowed under section 48C after August 16, 2022 (the date of enactment of the IRA).

Section 45X(c)(2)(A) generally defines an inverter as an end product that is suitable to convert direct current (DC) electricity from one or more solar modules or certified distributed wind energy systems into alternating current (AC) electricity. Section 45X(c)(2)(B) through (G) defines the following different types of eligible inverters: central inverter, commercial inverter, distributed wind inverter, microinverter, residential inverter, and utility inverter.

Section 45X(c)(3)(A) defines a solar energy component as a solar module, photovoltaic cell, photovoltaic wafer, solar grade polysilicon, torque tube, structural fastener, or polymeric backsheet. Section 45X(c)(3)(B) defines these different types of eligible solar energy components as well as a solar tracker.

Section 45X(c)(4)(A) defines a wind energy component as blades, nacelles, towers, offshore wind foundations, and related offshore wind vessels. Section 45X(c)(4)(B) defines these different types of eligible wind energy components.

Section 45X(c)(5)(A) defines a qualifying battery component as electrode active materials, battery cells, and battery modules. Section 45X(c)(5)(B) defines these different types of qualifying battery components.

Section 45X(c)(6) defines applicable critical minerals. The following minerals are eligible for the section 45X credit if converted or purified to specified purities or forms: aluminum, antimony, arsenic, barite, beryllium, bismuth, cerium, cesium, chromium, cobalt, dysprosium, erbium, europium, fluorspar, gadolinium, gallium, germanium, graphite, hafnium, holmium, indium, iridium, lanthanum, lithium, lutetium, magnesium, manganese, neodymium, nickel, niobium, palladium, platinum, praseodymium, rhodium, rubidium, ruthenium, samarium, scandium, tantalum, tellurium, terbium, thulium, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium.

IV. Special Rules

Section 45X(d)(1) provides that persons are related to each other for purposes of the section 45X credit if they would be treated as a single employer under section 52(b) of the Code and § 1.52–1(b). Section 52(b) and § 1.52–1(b) generally provide that trades or businesses that are partnerships, trusts, estates, corporations, or sole proprietorships under common control are members of a controlled group and are treated as a single employer. Section 52(b) requires the regulations under section 52(b) to be based on principles similar to the principles that apply under section 52(a), which generally provide that corporations that are members of a controlled group of corporations are treated as a single employer. Section 52(a) provides that a controlled group of corporations is defined with reference to section 1563(a) of the Code. Section 52(b) and § 1.52–1 provide rules based on principles similar to those under section 52(a), but with certain modifications to account for different types of ownership interests.

Section 45X(d)(2) provides that sales of eligible components are taken into account under section 45X only for eligible components that are produced within the United States (including continental shelf areas described in section 638(1) of the Code), or a U.S. territory (including continental shelf areas described in section 638(2)).¹

¹ The preamble to these section 45X final regulations refers to U.S. territory to mean a possession as defined in section 638(2).

Section 45X(d)(3) directs the Secretary to promulgate regulations adopting rules similar to the rules of section 52(d) to apportion credit amounts between estates or trusts and their beneficiaries on the basis of the income of the estates or trusts allocable to each, and to pass-thru any apportioned credit amounts to the beneficiaries.

Section 45X(d)(4) provides that a person is treated as having sold an eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component that is sold to an unrelated person.

V. Prior Guidance

On October 24, 2022, the Department of the Treasury (Treasury Department) and the IRS published Notice 2022–47, 2022–43 IRB 312, requesting comments on issues arising under section 45X that may require guidance. On December 15, 2023, after full consideration of all the stakeholder input received in response to Notice 2022–47, the Treasury Department and the IRS published a notice of proposed rulemaking and a notice of public hearing (REG–107423–23) in the **Federal Register** (88 FR 86844) to provide guidance on the advanced manufacturing production credit under section 45X (Proposed Regulations). While the Proposed Regulations are summarized in the Summary of Contents and Explanation of Revisions portion of this preamble, the provisions of the Proposed Regulations are explained in greater detail in the preamble to the Proposed Regulations.

On March 6, 2023, the Treasury Department and the IRS published Notice 2023–18, 2023–10 IRB 508, establishing the qualifying advanced energy project allocation program (section 48C(e) program). On June 20, 2023, the Treasury Department and the IRS published Notice 2023–44, 2023–25 IRB 924, providing additional guidance on the section 48C(e) program, including rules for the interaction between sections 45X and 48C. The rules regarding the interaction between sections 45X and 48C provided in Notices 2023–18 and 2023–44 were addressed in the Proposed Regulations and have been incorporated into these final regulations. Section 5.05(2) of Notice 2023–18 and section 3 of Notice 2023–44 are superseded by these final regulations.

Summary of Comments and Explanation of Revisions

I. Overview

This Summary of Comments and Explanation of Revisions summarizes the Proposed Regulations, all substantive comments submitted in response to the Proposed Regulations, and revisions adopted by these final regulations. The Treasury Department and the IRS received 193 written comments in response to the Proposed Regulations. The comments are available for public inspection at <https://www.regulations.gov> or upon request. A public hearing was held in person and telephonically on February 22, 2024. After full consideration of the comments and testimony, these final regulations adopt the Proposed Regulations with modifications in response to the comments and testimony as described in this Summary of Comments and Explanation of Revisions.

Comments merely summarizing the statute or the Proposed Regulations, recommending statutory revisions to section 45X or other statutes, and addressing issues that are outside the scope of this rulemaking (such as revising other Federal regulations and recommending changes to IRS forms) are generally not addressed in this Summary of Comments and Explanation of Revisions or adopted in these final regulations. Some commenters requested additional time to submit comments. The Proposed Regulations required all comments to be received by February 13, 2024; however, comments received later but before these final regulations were substantially developed were carefully considered in drafting these final regulations. The final regulations retain the same basic structure as the Proposed Regulations with certain revisions.

II. General Rules Applicable to the Advanced Manufacturing Production Credit

A. In general

Proposed § 1.45X-1 would have provided general rules regarding the section 45X credit including generally applicable definitions, rules regarding the computation of the credit amount, the definition of “produced by the taxpayer,” the requirement to produce eligible components in the United States, the production and sale in a trade or business requirement, the sale of integrated components, the interaction between sections 45X and 48C, and an anti-abuse rule. Commenters addressed certain aspects

of these proposed rules, as described in Part II. of this Summary of Comments and Explanation of Revisions. These final regulations generally adopt proposed § 1.45X-1, with the modifications described in this Part II. of the Summary of Comments and Explanations of Revisions.

B. Definition of Produced by the Taxpayer

1. In General

Section 45X(a)(1) allows a section 45X credit with respect to each eligible component which is produced by the taxpayer and sold to an unrelated person during the taxable year. Proposed § 1.45X-1(c)(1) would have defined “produced by the taxpayer” to mean a process conducted by the taxpayer that substantially transforms constituent elements, materials, or subcomponents into a complete and distinct eligible component that is functionally different from that which would result from mere assembly or superficial modification of the elements, materials, or subcomponents. Proposed § 1.45X-1(c)(1)(i) would have provided that “produced by the taxpayer” does not include partial transformation that does not result in substantial transformation of constituent elements, materials, and subcomponents into a complete and distinct eligible component as described in proposed § 1.45X-1(c)(1). Proposed § 1.45X-1(c)(1)(ii) would have provided that “produced by the taxpayer” does not include minor assembly of two or more constituent elements, materials, or subcomponents, or superficial modification of the final eligible component, if the taxpayer does not also engage in the process resulting in a substantial transformation described in proposed § 1.45X-1(c)(1). Proposed § 1.45X-1(c)(1)(iii) would have provided examples illustrating the definition of “produced by the taxpayer.”

Several commenters requested that the final regulations specifically state that taxpayers may produce eligible components using recycled materials. While the preamble to the Proposed Regulations stated that primary and secondary production are included in the definition of “produced by the taxpayer,” that issue was not addressed in the text of the Proposed Regulations. The preamble to the Proposed Regulations further stated that primary production involves producing an eligible component using non-recycled materials while secondary production involves producing an eligible component using recycled materials.

The Treasury Department and the IRS agree with the request to clarify the general rule that production includes primary and secondary production, and these final regulations revise proposed § 1.45X-1(c)(1) and (2) to add secondary production to the definition of produced by the taxpayer.

A few commenters stated the definition of “produced by the taxpayer” should be defined consistently with section 263A of the Code to the extent possible and expressed concern that using different definitions will cause “increased technical uncertainty, additional compliance burden, especially for small business taxpayers, and unnecessary litigation and controversy.” Another commenter stated that the Proposed Regulations introduced new definitions, such as “substantial transformation” as production qualifiers, “raising concerns about its apparent conflict with the enacted statutes.”

The term “produced by the taxpayer” is not defined in section 45X, nor is there any indication in section 45X suggesting that Congress intended the use of any existing statutory definition, such as the standard in section 263A. Section 45X provides a credit based on the production of numerous eligible components and a variety of production processes are utilized by manufacturers in the production of these eligible components.

Given the variety of production processes and the highly technical nature of production, the Treasury Department and the IRS, in close coordination with the Department of Energy, proposed a definition that would apply broadly to eligible components. In addition, the proposed definition of “produced by the taxpayer” focused on requiring production of a complete and distinct eligible component and, accordingly, introduces a substantial transformation requirement to distinguish production from partial transformation, mere assembly, and superficial modification. The proposed definition of “produced by the taxpayer” along with the amendment clarifying that production includes secondary production is the appropriate standard to implement the section 45X credit. The definition provides the necessary flexibility to account for the highly technical nature of the production processes associated with eligible components. This standard also ensures that the section 45X credit is claimed by the taxpayer responsible for the key production activity and that such activity occurs in the United States or a United States territory. In contrast to section 45X, section 263A is designed

to ensure that taxpayers capture the direct and indirect costs associated with producing inventoriable goods for capitalization purposes. Moreover, in section 263A, the definition of production applies to a broad range of produced items, whereas the definition in section 45X applies to a limited number of statutorily enumerated eligible components. For these reasons, the Treasury Department and the IRS have concluded that the definition of “produced by the taxpayer” in the Proposed Regulations with the clarifying amendment addressing secondary production appropriately implements section 45X(a)(1)(A), and thus decline to accept the commenter’s recommendation to define “produced by the taxpayer” for purposes of section 45X consistent with the similar term under section 263A.

Several commenters requested that the final regulations provide more specific guidance for certain eligible components to illustrate whether certain activities or processes result in substantial transformation versus partial transformation, mere assembly, or superficial modification. One commenter, for example, requested that the final rules confirm that the term “produced” in the phrase “produced by the taxpayer” is applied within the context of the standard production process of each eligible component, such that the standard production process for each eligible component is deemed to be “substantial transformation” that meets the requirements of proposed § 1.45X–1(c)(1). The commenter provided an example of the production of a solar module, which “involves the final assembly of the other solar components, many of which separately qualify for their own section 45X credit, into the overall module.” The Treasury Department and the IRS recognize that certain eligible components, such as solar modules and battery modules using battery cells, are produced primarily by assembling other components. In these limited cases, the substantial transformation requirement is met by the taxpayer that assembles the constituent components to produce the solar module or battery module using battery cells. Because assembly is the activity that primarily produces these eligible components, the assembly necessary to achieve production of a solar module or battery module using battery cells should not generally be viewed as disqualifying “minor assembly.” The Treasury Department and the IRS also recognize that certain eligible components, such as nacelles,

that have undergone substantial transformation to be considered “produced by the taxpayer” may be produced and sold to a third party in a manner in which only minor assembly remains left to complete. In these cases, provided all other requirements of section 45X are met, the party that produces and sells the eligible components in such manner is not precluded from claiming the section 45X credit. The third party that completes the eligible component by performing minor assembly is not entitled to the section 45X credit because that third party is not considered to produce the eligible component. For these reasons, and for clarity and consistency, the final regulations replace each instance of “mere assembly” in the Proposed Regulations, with “minor assembly.”

A commenter suggested adding an additional example to proposed § 1.45X–1(c)(1)(iii) to clarify whether the integration of electrical subcomponents and software necessary to enable the functionality of an inverter is disqualifying minor assembly, and another commenter requested clarification on whether the coating of a battery separator is “superficial modification” or “substantial transformation.” A few commenters also requested that the final rules further clarify “substantial transformation” to ensure manufacturers claiming section 45X credits are actually producing an eligible component in the United States and suggested using examples to differentiate between substantial and partial transformation for specific components, such as inverters for solar energy.

As previously discussed, section 45X provides a credit based on the production of numerous eligible components and a variety of production processes are utilized by manufacturers in the production of these eligible components. Thus, listing specific production processes for each eligible component is not practicable and could also imply that other variations of production processes do not qualify as production. The Treasury Department and the IRS have determined that the inquiry into whether production activities or processes result in substantial transformation for a specific eligible component is highly fact dependent and conclude that the examples in proposed § 1.45X–1(c)(1)(iii), which are included in the final regulations, provide sufficient guidance to determine what types of activities or production steps do not qualify as substantial transformation.

2. Special Rule for Production of Certain Eligible Components

Proposed § 1.45X–1(c)(2) would have provided that for solar grade polysilicon, electrode active materials, and applicable critical minerals, produced by the taxpayer means processing, conversion, refinement, or purification of source materials, such as brines, ores, or waste streams, to derive a distinct eligible component. Several commenters requested that in addition to processing, conversion, refinement, and purification, the final regulations clarify that the production process includes extraction, while others requested maintaining the position in the Proposed Regulations to exclude costs of extraction. The Treasury Department and the IRS decline to amend the final regulations to expressly include the term “extraction,” as the action of extraction alone does not produce an eligible component. For the discussion and analysis of whether extraction costs are includible as production costs in the production of electrode active materials or applicable critical minerals, see Part IV.E.1.e. of this Summary of Comments and Explanation of Revisions.

Another commenter asked whether recycling aluminum transformer wire (cleaning, melting, and bailing it) to send to an aluminum smelter constitutes “secondary aluminum production.” The Treasury Department and the IRS note that under both proposed § 1.45X–1(c)(2) and § 1.45X–1(c)(2) of these final regulations, substantial transformation for an applicable critical mineral requires that the applicable critical mineral be “processed, converted, refined, or purified to derive a distinct eligible component.” Because a taxpayer in these circumstances would not derive a distinct eligible component, this would not be an eligible component produced by the taxpayer within the meaning of section 45X(a)(1)(A).

These final regulations make a clarifying revision to the definition of produced by the taxpayer under proposed § 1.45X–1(c)(2) so that it references substantial transformation. While no comments were received on this issue, this revision is needed to appropriately align the definition of “produced by the taxpayer” in § 1.45X–1(c)(2) with the requirements to qualify as an eligible taxpayer in § 1.45X–1(c)(3).

3. Eligible Taxpayer

a. In General

Proposed § 1.45X–1(c)(3)(i) would have provided that the taxpayer

claiming a section 45X credit with respect to an eligible component must be the person that performs the actual production activities that bring about a substantial transformation resulting in the eligible component and that sells such eligible component to an unrelated person.

b. Contract Manufacturing Arrangement

Proposed § 1.45X–1(c)(3)(ii)(A) would have provided that, if the production of an eligible component is performed in whole or in part subject to a contract that is a contract manufacturing arrangement, then the party to such contract that may claim the section 45X credit with respect to such eligible component, provided all other requirements in section 45X are met, is the taxpayer that performs the actual production activities that bring about a substantial transformation resulting in the eligible component. The preamble to the Proposed Regulations stated that this proposed rule was intended to provide an administrable rule that provides clarity and certainty in determining which taxpayer may claim the section 45X credit in a contract manufacturing arrangement.

c. Contract Manufacturing Defined

Proposed § 1.45X–1(c)(3)(ii)(B) would have defined the term “contract manufacturing arrangement” to mean any agreement providing for the production of an eligible component if the agreement is entered into before the production of the eligible component to be delivered under the contract is completed. Proposed § 1.45X–1(c)(3)(ii)(B) would have further provided that a routine purchase order for off-the-shelf property is not treated as a contract manufacturing arrangement. Proposed § 1.45X–1(c)(3)(ii)(B) also would have provided that an agreement will be treated as a routine purchase order for off-the-shelf property if the contractor is required to make no more than *de minimis* modifications to the property to tailor it to the customer’s specific needs, or if at the time the agreement is entered into, the contractor knows or has reason to know that the contractor can satisfy the agreement out of existing stocks or normal production of finished goods. This definition of the term “routine purchase order” is based on the definition found in § 1.263A–2(a)(1)(ii)(B)(2)(ii). The Treasury Department and the IRS requested comments in the preamble to the Proposed Regulations on whether this definition should be further clarified or modified. Comments on the definition of manufacturing arrangements are

discussed in Part II.B.3.d. of this Summary of Comments and Explanation of Revisions.

d. Special Rule for Contract Manufacturing Arrangements

Proposed § 1.45X–1(c)(3)(iii) would have explained the special rule allowing parties to a contract manufacturing arrangement to agree on which party to the contract will claim the section 45X credit for eligible components produced subject to such contract. Proposed § 1.45X–1(c)(3)(iv) would have explained the certification requirements for the special rule. Several commenters expressed support for the contract manufacturing rules, but one commenter expressed concern about the treatment of contract manufacturing arrangements in effect prior to the applicability date of the Proposed Regulations. This commenter recommended that the final regulations adopt a safe harbor rule that would function as an exception to the general rule and provide that when one party is contractually entitled to purchase all or substantially all (for example, at least 90 percent) of the output of the fabricator’s production of a given component for the taxable year, the purchaser would be treated as the producer for purposes of section 45X. The Treasury Department and the IRS decline to adopt the commenter’s request to add a safe harbor for contract manufacturing arrangements in place before the applicability date of the Proposed Regulations, but note that a taxpayer may still have the option of applying the special rule in § 1.45X–1(c)(3)(iii) of these final regulations for contract manufacturing arrangements entered into before the applicability date, provided all requirements of the special rule are met.

The preamble to the Proposed Regulations stated that the Treasury Department and the IRS intend for the production cost incurred rules in proposed § 1.45X–3(e)(2) to apply to a credit claimant in a contract manufacturing arrangement. The Treasury Department and the IRS requested comments on whether the proposed rules need further clarification or modification as applied to contract manufacturing arrangements. One commenter requested allowing taxpayers that extract and recycle raw materials and taxpayers that process such materials and incorporate them into applicable critical minerals to apply the contract manufacturing arrangement provisions, in the event that costs of extraction and direct and indirect material costs are not includible in the eligible production costs of

producing an applicable critical mineral. The Treasury Department and the IRS think that the clarification requested by this commenter is no longer necessary because these final regulations permit the inclusion of extraction and certain material costs in the cost of producing an applicable critical mineral if certain requirements are met. See Parts IV.E.1.e. and V.C. of this Summary of Comments and Explanation of Revisions for further discussion.

Proposed § 1.45X–1(c)(3)(v) would have provided examples illustrating the application of the special rule. One commenter requested that proposed § 1.45X–1(c)(3)(v)(C) (*Example 3*) specifically state that the domestic production requirement requires that each wind tower section must be produced in the United States. Proposed § 1.45X–1(c)(3)(v)(C) (*Example 3*) states that a taxpayer could claim a credit for a tower for which it had three different producers each produce one section, provided that the parties all agree that the taxpayer is the sole party that can claim the credit and “all other requirements of section 45X are met.” The Treasury Department and the IRS have determined that the domestic production requirement is already included by this language and thus, additional clarification is not necessary.

Another commenter questioned whether, in proposed § 1.45X–1(c)(3)(v)(C) (*Example 3*), V must sell the completed wind tower to Z for the special rule in proposed § 1.45X–1(c)(3)(iii) to apply. In the example, V enters into a contract manufacturing arrangement with W, X, and Y to make the wind tower, which V sells to Z. All parties to the contract manufacturing arrangement and Z are unrelated. The commenter stated that if V, W, X, and Y sign a certification statement and Y claims the section 45X credit, Y could claim the section 45X credit in 2025 because that is when it sold the eligible component to V. Contrary to the commenter’s conclusion with respect to Y’s ability to claim a section 45X credit in 2025, Y is not eligible for the section 45X credit until the eligible component, which is the wind tower comprised of all three wind tower sections, is produced and then sold to an unrelated person (in this case Z). Under the contract manufacturing arrangement, W, X, and Y are collectively viewed as producing the entire eligible component (wind tower) because all three sections together result in a single eligible component. Along with the production of the entire wind tower, V has to sell the completed wind tower to an

unrelated person before the designated party is eligible for a section 45X credit.

A commenter suggested revisions to the proposed rules to allow an allocation of any portion of the credit to parties who extract the mineral and perform initial refining processes, rather than allowing a credit to the taxpayer that purifies the critical mineral to the statutory minimum. Section 45X(c)(6) defines a list of applicable critical minerals with specific minimum purity levels which must be met for the taxpayer to have produced an eligible component. The Treasury Department and the IRS do not have the authority to modify these statutory requirements. However, the Treasury Department and the IRS seek to clarify that a taxpayer who performs extracting and refining activities may benefit from the contract manufacturing provisions described in this section. The final regulations accordingly add § 1.45X-1(c)(3)(v)(D) (*Example 4*) to demonstrate how the contract manufacturing provisions may apply in the situation described by the commenter.

4. Timing of Production and Sale

Proposed § 1.45X-1(c)(4)(i) would have provided that production of eligible components for which a taxpayer is claiming a section 45X credit may begin before December 31, 2022, but production of eligible components must be completed, and the eligible components must be sold, after December 31, 2022. Proposed § 1.45X-1(c)(4)(ii) would have provided an example illustrating the timing of the production and sale rule in proposed § 1.45X-1(c)(4)(i).

Some commenters requested further clarity on when production and sale of an eligible component may take place. One commenter requested that the final rules provide that a specific minimum percentage of production of an eligible component must occur after 2022 and that no sale of the eligible component be reported by the taxpayer before 2023. The Treasury Department and the IRS decline to adopt these percentage test suggestions because Congress clearly recognized that some production could occur prior to 2023 but did not specify an exact amount of production that must occur in taxable years either before or after 2023. Moreover, if a sale occurred before 2023, which requires a facts and circumstances analysis based in part on contractual terms, the component sold is not eligible for the section 45X credit. Accordingly, the final regulations adopt proposed § 1.45X-1(c)(4)(i) and the example in proposed § 1.45X-1(c)(4)(ii) without modification.

Another commenter stated that the Proposed Regulations do not specify whether production activities that qualify for the section 45X credit have to occur after the effective date of the rule or whether the activities can be retroactive. The commenter suggests the final rule specify the applicable period for the production activities and provide a reasonable transition rule for taxpayers who produce eligible components before the effective date of the final regulations. The Treasury Department and the IRS have determined that the Proposed Regulations and these final regulations are clear as to the timing of production and sale requirements under section 45X. For clarification, and as described earlier, section 13502(c) of the IRA provides that section 45X applies to components produced and sold after December 31, 2022. The preamble to the Proposed Regulations clarified application of the section 45X effective date, stating that each of proposed §§ 1.45X-1 through 1.45X-4 would have applied to eligible components for which production is “completed” and sales occur after December 31, 2022, and during taxable years ending on or after the date of publication of these final regulations. Proposed § 1.45X-1(c)(4)(i) would have provided that production of eligible components may begin before December 31, 2022, and only required production of eligible components be completed, and sales must occur, after December 31, 2022. Proposed § 1.45X-1(c)(4)(ii) would have provided an example illustrating proposed § 1.45X-1(c)(4)(i). These final regulations adopt these proposed rules. The Treasury Department and the IRS do not have statutory authority to provide for a section 45X credit in a situation in which production was completed on or before December 31, 2022.

C. Produced in the United States

Consistent with section 45X(d)(2), proposed § 1.45X-1(d)(1) would have provided that sales are taken into account for purposes of the section 45X credit only for eligible components that are produced within the United States, as defined in section 638(1) of the Code, or a United States territory. Proposed § 1.45X-1(d)(2) would have clarified that constituent elements, materials, and subcomponents used in the production of eligible components are not subject to the domestic production requirement provided in proposed § 1.45X-1(d)(1). Thus, while the eligible component must be produced domestically, its

constituent elements, materials, and subcomponents need not be.²

Some commenters agreed with this approach in the Proposed Regulations. According to these commenters, the Proposed Regulations appropriately allowed the credit for eligible components produced in the United States provided that the activities necessary to transform them into eligible components are conducted in the United States. Furthermore, these commenters expressed concern that a contrary rule ignores the reality that some constituent elements, materials, and subcomponents cannot be sourced in the United States and would discourage investment in production activities that rely on foreign-sourced constituent elements, materials, and subcomponents. However, other commenters disagreed with the proposed approach, suggesting that allowing eligible components to be produced using foreign subcomponents is inconsistent with the section 45X credit’s objective of incentivizing domestic production of eligible components.

The Treasury Department and the IRS note that, while section 45X specifically requires domestic production of an eligible component for credit eligibility, it is silent regarding the location of production or sourcing of constituent elements, materials, and subcomponents. Accordingly, imposing a domestic production requirement for constituent elements, materials, and subcomponents is not supported by the statutory language of section 45X. For these reasons, the Treasury Department and the IRS decline to adopt these suggestions and adopt the proposed rule without change.

Beyond agreement or disagreement with this proposed rule, some commenters inquired about its scope. One commenter asked whether the domestic production rule applicable to eligible components also applies to eligible components that are both an eligible component and a “constituent element, material or subcomponent” of another eligible component. Another commenter asked whether raw materials and intermediate products used to produce eligible components are included in the definition of “constituent elements, materials or subcomponents.”

² See Joint Committee on Taxation, *General Explanation of Tax Legislation Enacted in the 117th Congress*, JCS-1-23 (December 21, 2023) at 267 (“The credit only applies to sales where the eligible components are produced within the United States or U.S. territories. This requirement is not intended to apply to subcomponents or materials used to produce eligible components.”).

The Treasury Department and the IRS confirm that all three of these categories of items are included in the definition of “constituent elements, materials, and subcomponents.” An eligible component that is a “constituent element, material or subcomponent” of another eligible component is not subject to the domestic production rule, and thus, an eligible component may incorporate another eligible component that is also a foreign-sourced “constituent element, material or subcomponent” and still be eligible for a section 45X credit. In addition, raw materials and intermediate products generally qualify as constituent elements, materials, or subcomponents.

A commenter also requested confirmation in the final regulations that there is no requirement that eligible components be *used* in the United States for section 45X credit eligibility. Consistent with section 45X(d)(2), proposed § 1.45X–1(d)(1) would have provided that sales are taken into account for purposes of the section 45X credit only for eligible components that are produced within the United States (or a United States territory). Thus, the Proposed Regulations specify only the location of production of the eligible component, and not the location of the sale or the use of such eligible component. Accordingly, the Treasury Department and the IRS conclude that the additional confirmation requested by the commenter is unnecessary, as there would be no statutory basis for requiring domestic sale or use.

D. Production and Sale in a Trade or Business

Proposed § 1.45X–1(e) would have stated that an eligible component must be produced and sold in a trade or business of the taxpayer, with the term “trade or business” defined as a trade or business within the meaning of section 162 of the Code.

A commenter requested that proposed § 1.45X–1(e) expressly include eligible components that are produced and then used to replace defective units pursuant to a contractual obligation entered into at the time of the original sale. The commenter stated that these warranty transactions do not appear to violate any of the anti-abuse provisions at proposed § 1.45X–1(i). If an eligible component is produced and sold to an unrelated person in the normal course of a trade or business, and the eligible component is then replaced with a new eligible component produced by the same taxpayer, there is no new sale to an unrelated person for the replacement eligible component, but the replacement eligible component relates back to the

original sales transaction. The precise issue is whether section 45X should be read to effectively incentivize the production of two eligible components where each is related to a single sales transaction. The Treasury Department and the IRS decline to adopt this suggestion because only one credit may be claimed with respect to the sale of an eligible component.

E. Sale of Integrated Components

1. In General

Section 45X(d)(4) provides that, for purposes of section 45X, a person is treated as having sold an eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component which is sold to an unrelated person. Proposed § 1.45X–1(f)(1) was intended to be consistent with section 45X(d)(4), and thus would have provided that a taxpayer is treated as having produced and sold an eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component that is then sold to an unrelated person.

Although no comments were received regarding this general rule in the Proposed Regulations, the Treasury Department and the IRS want to clarify that section 45X(d)(4) provides only for deemed sale treatment and not deemed production. A taxpayer must produce (rather than merely purchase or acquire) an eligible component that is integrated, incorporated, or assembled into another eligible component that is then sold to an unrelated person in order for the deemed sale rule to apply. Thus, these final regulations clarify that a taxpayer is “treated as having sold” an eligible component to an unrelated person if the taxpayer produced such component and the component is integrated, incorporated, or assembled into another eligible component that is then sold to an unrelated person, rather than “treated as having produced and sold” an eligible component that the taxpayer did not itself produce that is then integrated, incorporated, or assembled into another eligible component and then sold to an unrelated person. Proposed § 1.45X–1(f)(1) is clarified accordingly in these final regulations.

2. Application of Section 45X(d)(4) to Produced Products

Proposed § 1.45X–1(f)(2)(i) would have clarified that a taxpayer may claim a section 45X credit for each eligible component that the taxpayer produces and sells to an unrelated person, including any eligible component the

taxpayer produces that was used as an element, material, or subcomponent and integrated, incorporated, or assembled into another complete and distinct eligible component or another complete and distinct product (that is not itself an eligible component) that the taxpayer also produces and sells to an unrelated person. Proposed § 1.45X–1(f)(2)(ii) would have provided an example of the credit eligibility of a sale of a product with incorporated eligible components to a related person.

Commenters expressed agreement with proposed § 1.45X–1(f)(2)(i). One commenter stated that the clarification in § 1.45X–1(f)(2)(i) avoids the need for some vertically integrated producers of eligible components that incorporate the eligible components into another product that is not an eligible component to artificially restructure in order to create an intercompany sale. Another commenter requested a flexible interpretation of section 45X(d)(4) that would apply the section 45X credit as an additive credit across the supply chain to the final assembler. The commenter stated such an interpretation is consistent with the language in section 45X(b)(1), which provides that the section 45X credit amount is determined with respect to any eligible component, including any eligible component it incorporates. For example, in the commenter’s view, a taxpayer that produces a structural fastener would be eligible to receive a credit for its production of an eligible component as would the integrator, incorporator, assembler of the structural fastener into another eligible component. Although the Treasury Department and the IRS agree that section 45X(b)(1) provides that the credit amount is determined with respect to any eligible component produced by the taxpayer, including any eligible component the taxpayer incorporates that was also produced by the taxpayer, the Treasury Department and the IRS disagree with the implication that the calculation of the section 45X credit should be additive based on the number of eligible components used to produce an item in a case in which each eligible component is not produced by the taxpayer. Only the producer of an eligible component would be eligible for a section 45X credit. Proposed § 1.45X–1(f)(1) and (2) are finalized with no modifications because the Treasury Department and the IRS conclude the rules provide clarity as currently written.

F. Interaction Between Sections 45X and 48C

1. In General

Consistent with section 45X(c)(1)(B), proposed § 1.45X-1(g)(1) would have provided that, for purposes of section 45X, an eligible component must be produced at a section 45X facility and does not include any property (produced property) that is produced at a facility if the basis of any property that is part of the production unit that produces the produced property is eligible property that is included in a section 48C facility and is taken into account for purposes of a credit allowed under section 48C (section 48C credit) after August 16, 2022.

Proposed § 1.45X-1(g)(2)(i) would have provided that a section 45X facility includes all tangible property that comprises an independently functioning production unit that produces one or more eligible components. Proposed § 1.45X-1(g)(2)(ii) would have provided that a production unit is comprised of the tangible property that substantially transforms material inputs to complete the production process of an eligible component.

Proposed § 1.45X-1(g)(3)(i) would have provided that a section 48C facility includes all eligible property included in a qualifying advanced energy project for which a taxpayer receives an allocation of section 48C credits and claims such credits after August 16, 2022. Proposed § 1.45X-1(g)(3)(ii) would have defined eligible property that is included in a section 48C facility.

With respect to the proposed rules on the interaction between sections 45X and 48C various comments were received. A commenter requested that the final rules not apply section 45X(c)(1)(B) to disallow the section 45X credit in the event that the taxpayer claiming the section 45X credit incorporates into its eligible component a subcomponent that was produced by a section 48C facility, as long as that same taxpayer was not eligible for the section 48C credit with respect to the section 48C facility that produced the subcomponent. Revisions were made to these final regulations to clarify that the only equipment, or other tangible property, that must be included in the section 45X facility is the equipment used by the taxpayer that is necessary to be considered the producer of the potential eligible component. As further explained later, if production of a subcomponent (or like property) is not a requirement to be considered the producer under section 45X, then the equipment that is part of that section 48C facility used to produce the

subcomponent is not part of the section 45X facility. As a result, it is possible that the same taxpayer could receive a section 48C credit on equipment used to produce a subcomponent (or like property), and a section 45X credit on the production of an eligible component.

One commenter requested an example to help determine whether an eligible component produced at a facility located “adjacent” to a section 48C facility that received a section 48C credit impacts eligibility for the section 45X credit. The physical proximity of a section 45X facility to a section 48C facility does not determine whether a product may be an eligible component and revisions to these final regulations were made to clarify that point.

Another commenter requested more clarity to determine whether a facility that shares upstream raw materials and processes as a section 48C facility is still eligible for a section 45X credit and requested examples of upstream supply chains and processes that are eligible and ineligible for both sections 48C and 45X. Several commenters requested additional clarity regarding the meaning and extent of the term “production unit.”

Based on the comments and further consideration of the Proposed Regulations, revisions were made in these final regulations to simplify the rules and examples in proposed § 1.45X-1(g)(1) through (4). Specifically, these final regulations make clear that the general rule is that property that would otherwise qualify as an eligible component (otherwise qualified property) is only an eligible component if the property is produced at a section 45X facility and no part of that section 45X facility is also a section 48C facility. These final regulations also revise the definition of section 45X facility, clarifying that a section 45X facility is the independently functioning tangible property used by the taxpayer that is necessary to be considered the producer of the otherwise qualified property within the meaning of § 1.45X-1(c)(1) or (2), as applicable. The Proposed Regulations would have relied on the concept of a “production unit” to define the scope of a section 45X facility, but there was overlap between the term production unit as proposed and the definition of a section 45X facility. After careful consideration, the Treasury Department and the IRS determined that the proposed term “production unit” introduced unnecessary complexity, particularly in light of the revisions to the definition of section 45X facility in these final regulations. Accordingly,

these final regulations do not use the term production unit.

The definition of section 45X facility in these final regulations includes independently functioning tangible property that is used and that is necessary for the otherwise qualified property to be considered produced by the taxpayer within the meaning of § 1.45X-1(c)(1) or (2), as applicable. Accordingly, tangible property used to produce a subcomponent or other property which is later integrated, incorporated, or assembled into a distinct and final eligible component is not part of the section 45X facility. This rule, however, does not apply if the other property is of a type that the taxpayer must produce for the resulting eligible component to be considered produced by the taxpayer. This analysis can depend on the definition of the eligible component being ultimately produced. For example, section 45X(c)(3)(B)(ii)(I)(bb) requires a single manufacturer to produce a photovoltaic wafer through formation of an ingot from polysilicon and subsequent slicing. Thus, the section 45X facility with respect to the photovoltaic wafers would include any equipment that is tangible property that is used to produce the ingot and any equipment that is tangible property that is used to perform the subsequent slicing. In contrast, equipment used to produce front glass of a solar module under section 45X(c)(3)(B)(v) could be excluded from a section 45X facility because it is not necessary to use the front glass equipment to be considered the producer of the solar module for section 45X. This rule may benefit a taxpayer that produces a subcomponent or other property of an eligible component using equipment that is also eligible property for purposes of the section 48C credit, but uses other equipment not related to the section 48C credit to produce the eligible component.

Lastly, these final regulations add a specific rule for contract manufacturing arrangements in § 1.45X-1(g)(2)(ii) to address any uncertainty with respect to how to determine a section 45X facility in that situation. This rule clarifies that the tangible property used to produce the otherwise qualified property (regardless of who claims the credit) must be considered.

4. Examples of Sections 45X and 48C Interaction

Proposed § 1.45X-1(g)(4)(i) through (v) would have provided examples to illustrate the application of these rules. A few commenters requested that, contrary to proposed § 1.45X-1(g)(4)(ii) (*Example 2*), ingot and wafer production

should be treated as two separate manufacturing activities so that an ingot facility is eligible for the section 48C credit while a wafer facility is eligible for the section 45X credit. As required by section 45X(c)(3)(B)(ii)(I)(bb), however, a photovoltaic wafer must be produced by a single manufacturer either by forming an ingot from molten polysilicon (for example, Czochralski method) and then subsequently slicing it into wafers, or by forming molten or evaporated solar grade polysilicon or deposition into a sheet or layer (that is, thin-film deposition). As the statute requires production of a photovoltaic wafer by a single manufacturer that both forms an ingot and slices it into wafers, it is not appropriate to treat ingot and wafer production as two separate manufacturing activities. Rather, as both activities are necessary, it follows that the tangible property used to complete each activity must be within a single section 45X facility with respect to the eligible component produced. No comments were received on the other examples in proposed § 1.45X-1(g)(4)(i) through (v). However, all of the examples in proposed § 1.45X-1(g)(4)(i) through (v) were modified consistent with the revisions in § 1.45X-1(g)(1) through (3).

A few commenters suggested that parties in a contract manufacturing arrangement under proposed § 1.45X-1(c)(3)(iii) could circumvent the prohibition under section 45X(c)(1)(B) that disallows a section 45X credit for items produced at a section 48C facility. More specifically, commenters suggested that a taxpayer could enter into a contract manufacturing arrangement under proposed § 1.45X-1(c)(3)(iii) to produce photovoltaic wafers that are then used to manufacture photovoltaic cells. If the taxpayer itself integrated, incorporated, or assembled the photovoltaic cells into solar modules, the taxpayer might claim a section 45X credit for all three products upon their sale, even though the photovoltaic wafers were manufactured by the contract manufacturer at a section 48C facility while the photovoltaic cells were manufactured at a section 45X facility, if the taxpayer was unaware that the contract manufacturer manufactured the photovoltaic wafers at a section 48C facility. The Proposed Regulations did not allow this, and the final regulations would continue to disallow a section 45X credit for the photovoltaic wafers in this scenario. To the extent that the photovoltaic wafers were produced at a section 48C facility, the photovoltaic wafers would not qualify as an eligible

component to any party to the contract manufacturing arrangement. As described earlier, these final regulations add a rule in § 1.45X-1(g)(2)(ii) to clarify the rules in a contract manufacturing arrangement situation, and the examples in § 1.45X-1(g)(4) have also been modified.

G. Anti-Abuse Rule

As explained in the preamble to the Proposed Regulations, proposed § 1.45X-1(i)(1) would have provided a general anti-abuse rule that would make the section 45X credit unavailable in extraordinary circumstances in which, based on a consideration of all the facts and circumstances, the primary purpose of the production and sale of an eligible component is to obtain the benefit of the section 45X credit in a manner that is wasteful, such as discarding, disposing of, or destroying the eligible component without putting it to a productive use. Proposed § 1.45X-1(i)(1) would have provided that the rules of section 45X and the section 45X regulations must be applied in a manner consistent with the purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit). A purpose of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) is to provide taxpayers an incentive to produce eligible components in a manner that contributes to the development of secure and resilient supply chains. Accordingly, the section 45X credit is not allowable if the primary purpose of the production and sale of an eligible component is to obtain the benefit of the section 45X credit in a manner that is wasteful, such as discarding, disposing of, or destroying the eligible component without putting it to a productive use. A determination of whether the production and sale of an eligible component is inconsistent with the purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) is based on all facts and circumstances. Proposed § 1.45X-1(i)(2) would have provided an example illustrating this anti-abuse rule.

One commenter suggested that, in applying the anti-abuse rule, the taxpayer claiming a section 45X credit should not be held responsible for the activities of the customer after a sale has occurred (unless the customer is a related entity); the determination of whether a component is defective should be made at the factory gate; and

“productive use” should include the sale of an eligible component to an entity engaged in the business of directly (such as a utility) or indirectly (such as a project developer) deploying the batteries. Proposed § 1.45X-1(i)(1) provides that a determination of whether the production and sale of an eligible component is inconsistent with the purposes of section 45X and the section 45X regulations (and the regulations under sections 6417 and 6418 related to the section 45X credit) is based on all the facts and circumstances. Under a facts and circumstances analysis, no single factor is determinative, and the considerations listed by the commenter would have to be evaluated in the context of all other facts and circumstances. The Treasury Department and the IRS thus decline to list specific parameters that automatically result in a finding of a favorable or unfavorable primary purpose.

Another commenter suggested adding additional examples to proposed § 1.45X-1(i) to make clear that the section 45X credit is never allowable with respect to any cost the primary purpose of which is to increase the amount of the section 45X credit. While both examples offered by the commenter involve possible abuses, the anti-abuse rule is intended to cover a broad range of abuses. Proposed § 1.45X-1(i) would have provided that a determination of whether the production and sale of an eligible component is inconsistent with the purposes of section 45X and the section 45X regulations is based on all facts and circumstances, and no single factor is determinative. Accordingly, the Treasury Department and the IRS decline to adopt the commenter’s suggestion.

III. Sale to Unrelated Person

A. In General

Proposed § 1.45X-2(a) would have stated that the amount of the section 45X credit for any taxable year is equal to the sum of the credit amounts determined under section 45X(b) (and described in proposed §§ 1.45X-3 and 1.45X-4) with respect to each eligible component that is produced by the taxpayer and, during the taxable year, sold by the taxpayer to an unrelated person. Applicable Federal income tax principles apply to determine whether a transaction is in substance a sale (or the provision of a service, or some other disposition). Proposed § 1.45X-2(a) also would have cross-referenced proposed § 1.45X-1(d) and (e) for additional requirements relating to sales. Section

45X(d)(1) provides that persons are treated as related to each other if such persons would be treated as a single employer under the regulations prescribed under section 52(b). Proposed § 1.45X–2(b) would have provided definitions of the terms “person,” “related person,” and “unrelated person” for purposes of the section 45X credit.

A few commenters requested additional clarity in the final rules on how a sale is defined and when a sale is determined for the purpose of section 45X. One commenter recommended that a sale be defined for 45X as the point when a taxpayer signs a binding contractual agreement with a buyer in the taxpayer’s trade or business for the purchase of an eligible component. Section 45X provides special rules addressing sales of eligible components to related persons that may be treated as sales to unrelated persons, and a general rule that an eligible component produced and sold by the taxpayer is only taken into account if such production and sale is in a trade or business of the taxpayer, but otherwise does not provide any specific rules regarding whether and when a sale have occurred. Proposed § 1.45X–2(a) would have provided that applicable Federal income tax principles apply to determine whether a transaction is in substance a sale (or the provision of a service, or some other disposition), and those same principles apply in determining when a transaction is a sale. More specific rules on the determination of whether and when a sale occurs is beyond the scope of these final regulations. Accordingly, the Treasury Department and the IRS maintain the standard in proposed § 1.45X–2(a) and finalize the proposed rule without modification.

Another commenter requested further clarification on the sale of eligible components in two scenarios. In the first scenario, Company A is a U.S. based company producing eligible components that it sells to Company B, which is not directly using the eligible components but resells to Company C to use in a manufacturing process or otherwise in its trade or business. For this first scenario, the commenter requested clarification on whether Company A is eligible to claim the section 45X credit for the domestic production and sale of the eligible components. In the second scenario, the commenter assumed the same facts as in the first scenario, but Company B or Company C is using Company A’s eligible component outside the United States. In this second scenario, the commenter requested clarification on

whether Company A remains eligible to claim the section 45X credit for the domestic production and sale of the eligible components.

In both scenarios under the Proposed Regulations, Company A is eligible to claim the section 45X credit for the domestic production and sale of the eligible components if the production and sale is in a trade or business of Company A, regardless of whether the first purchaser is using the eligible component in its trade or business or sells to a subsequent purchaser for use in the subsequent purchaser’s trade or business, and regardless of whether the purchaser or subsequent purchaser uses the eligible component in the United States. Because the Proposed Regulations clearly provide this result, no further revision is necessary in these final regulations.

B. Special Rules for Sales to a Related Person

Consistent with section 45X(a)(3)(A), proposed § 1.45X–2(c)(1) would have provided a special rule that, for purposes of section 45X(a), a taxpayer is treated as selling an eligible component to an unrelated person if such component is sold to such person by a person who is related to the taxpayer. Proposed § 1.45X–2(c)(2) would have provided an example to illustrate this special rule.

Given the importance of whether parties are related persons or unrelated persons, a commenter proposed a particular fact pattern and requested clarification on who the purchaser is and whether they were related or unrelated to the producer and seller. In general, section 45X(d)(1) and proposed § 1.45X–2(b)(2) provides that persons are treated as related to each other if such persons would be treated as a single employer under the regulations prescribed under section 52(b). A request for application of the section 52(b) regulations by the Treasury Department and the IRS to a particular fact pattern requiring a facts and circumstances analysis is outside the scope of these final regulations.

Another commenter requested that the final rules clarify whether a Related Person Election is necessary when eligible components are sold by the producer to an unrelated person, who subsequently sells them to a person related to the producer of such eligible components. The commenter proposes amending proposed § 1.45X–2(c) to clarify that direct or indirect sales to a related person qualify if the producer knows or has reason to know the unrelated person is intending to sell the same eligible components to a person

related to the producer. To provide assurance to commenter, a Related Person Election is not necessary in this situation because the first sale was to an unrelated party, but the Treasury Department and the IRS have determined that the rules as set out by proposed § 1.45X–2(c) do not require further clarification on this point. In addition, if there are circumstances in which purported sales are made to unrelated persons to circumvent the requirements of section 45X, proposed § 1.45X–2(a) provides that applicable Federal income tax principles apply to determine whether a transaction will be respected as a sale.

C. Related Person Election

1. Availability of Election—In General

Proposed § 1.45X–2(d)(1)(i) would have provided that a taxpayer may make a Related Person Election under section 45X(a)(3)(B) to treat a sale of eligible components by such taxpayer to a related person as if made to an unrelated person. As a condition of, and prior to, a taxpayer making a Related Person Election, the Secretary may require such information or registration as the Secretary deems necessary for purposes of preventing duplication, fraud, or any improper or excessive credit amount determined under section 45X(a)(1). Proposed § 1.45X–2(d)(1)(ii) would have provided the rules regarding the Related Person Election for members of a consolidated group (as defined in § 1.1502–1(h)).

One commenter requested that taxpayers be allowed to exercise the Related Person Election in situations where it is difficult for the taxpayer to determine whether two entities are related under the section 52(b) regulations. Allowing the exercise of the Related Person Election as commenter requested would conflict with the language in section 45X(d)(1), which requires the parties be treated as a single employer under the section 52(b) regulations, not just that it be difficult to determine the status. Therefore, these final regulations do not adopt the commenter’s request.

2. Anti-Abuse Rule

Proposed § 1.45X–2(d)(4) would have provided an anti-abuse rule for the Related Person Election consistent with section 45X(a)(3)(B)(ii) for preventing duplication, fraud, or any improper or excessive amount of the section 45X credit. Proposed § 1.45X–2(d)(4)(i) would have provided that a Related Person Election may not be made if the taxpayer fails to provide the information required by proposed § 1.45X–2(d)(2)

with respect to the relevant eligible components, the taxpayer provides information that shows such components were put to an improper use as defined in proposed § 1.45X-2(d)(4)(ii) or were defective as defined in proposed § 1.45X-2(d)(4)(iii), or such components were actually put to an improper use or were defective.

Proposed § 1.45X-2(d)(4)(ii) would have provided that an eligible component is put to an improper use if it is so used by the related person to which the eligible component is sold. The term improper use would mean a use that is wasteful, such as discarding, disposing of, or destroying the eligible component without putting it to a productive use. The Treasury Department and the IRS requested comments in the preamble to the Proposed Regulations on the definition of the term improper use and whether any clarifications to its scope are necessary.

Proposed § 1.45X-2(d)(4)(iii) would have provided that a defective component means a component that does not meet the requirements of section 45X and the section 45X regulations. The Treasury Department and the IRS requested comments in the preamble to the Proposed Regulations on the definition of defective components and whether clarifications to its scope are necessary.

In response to the Treasury Department and the IRS's request for comments, one commenter requested additional guidance regarding when an eligible component can be deemed defective under section 45X. The commenter recommended clarification that an eligible component can be deemed defective and therefore ineligible for a tax credit under section 45X "up until the point of sale of the eligible component to an unrelated party." However, in circumstances where a taxpayer has made a valid Related Person Election, a sale of eligible components to a related person is treated as if made to an unrelated person, thus making a sale to an unrelated person not relevant for section 45X credit determination purposes. The preamble to the Proposed Regulations stated that the Treasury Department and the IRS are concerned that the Related Person Election may be used by taxpayers to claim a credit for eligible components that are defective, not capable of being used for its intended purpose, do not meet the requirements for the section 45X credit, and therefore are not eligible for the section 45X credit. The Treasury Department and the IRS agree that if an eligible component is not defective at the time

of sale, defects arising after the point of sale may occur in the ordinary course of a business and do not generally raise the improper claim concerns regarding defective components described in the Preamble to the Proposed Regulations. Accordingly, the final rules modify proposed § 1.45X-2(d)(4)(iii) to clarify that components with respect to which defects arise after the deemed sale are not considered defective components for purposes of the anti-abuse rule.

Another commenter suggested that the definitions of improper use and defective components should provide an exception for a defective component that can be sold or given to a related or unrelated person conducting legitimate recycling operations and allowing defective components to earn a section 45X credit provided they are properly recycled in the United States. The Treasury Department and the IRS decline to adopt this request because section 45X does not authorize allowing a section 45X credit for a defective component that does not meet the definition of an eligible component and is not capable of being used for its intended purpose without further substantial modification.

D. Sales of Integrated Components to a Related Person

1. In General

Section 45X(d)(4) provides that for purposes of section 45X, a person is treated as having sold an eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component that is sold to an unrelated person. See Part II.E. of this Summary of Comments and Explanation of Revisions for rules applicable to eligible components that are integrated, incorporated, or assembled into other eligible components and sold to an unrelated person.

Proposed § 1.45X-2(e)(1) would have provided that, for purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit), a taxpayer that produces and 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 may claim a section 45X credit in the taxable year of the sale to the unrelated person.

Proposed § 1.45X-2(e)(2) would have provided examples to illustrate the treatment of sales of multiple incorporated eligible components to

related and unrelated persons. One commenter questioned the practical application of the requirements in proposed § 1.45X-2(e)(2)(i) (*Example 1*) and expressed concern that although Company X and Y are related, the proposed rule would require a significant amount of coordination of information. This coordination would be necessary for the credit to be claimed in the proper tax year in which the ultimate product (photovoltaic cells produced by Y using photovoltaic wafers produced by X and purchased by Y) was sold to Company Z. Proposed § 1.45X-2(e)(2)(i) (*Example 1*) illustrates the rule in section 45X(d)(4) requiring an ultimate actual sale to an unrelated person of an eligible component. Because section 45X(d)(4) expressly conditions the deemed sale on an actual subsequent sale to an unrelated person by the related person, the Treasury Department and the IRS do not have the authority to change this statutorily imposed conditional timing requirement despite any practical difficulties taxpayers may experience in obtaining such information. Taxpayers may, however, make a Related Person Election as illustrated in the example in § 1.45X-2(e)(3)(ii) and claim the section 45X credit upon the sale to the related person. This would obviate the need for such taxpayer to know when the related person actually makes the subsequent sale to an unrelated person. For these reasons, the final regulations adopt proposed § 1.45X-2(e)(2)(i) (*Example 1*) without modification.

2. Special Rules Applicable to Related Person Election

Proposed § 1.45X-2(e)(3) would have provided that if a taxpayer makes a valid Related Person Election under section 45X(a)(3)(B)(i) and proposed § 1.45X-2(d)(1), and 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, the taxpayer's sale of the eligible component to the related person is treated (solely for purposes of the section 45X credit and the section 45X regulations, and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) as if made to an unrelated person in the taxable year in which the sale to the related person occurs. One commenter expressed support for this proposed rule, as it applies thoughtfully to vertically integrated electric vehicle manufacturers engaging in sales of

multiple integrated eligible components to related and unrelated persons (with a Related Person Election). No other comments were received on this special rule, so it is adopted in these final regulations without revision.

IV. Eligible Components

A. In General

Proposed § 1.45X–3(a) would have defined the term “eligible component” as any solar energy component, any wind energy component, any inverter, any qualifying battery component, and any applicable critical mineral, as each is respectively defined in the Proposed Regulations. For solar energy components, wind energy components, inverters, and qualifying battery components, proposed § 1.45X–3(b) through (e) would have provided definitions, rules for determining the credit amount, and documentation requirements. Proposed § 1.45X–3(f) would also have provided rules for applying the phase out of the section 45X credit. Proposed § 1.45X–4 would have provided such information for applicable critical minerals (other than rules for applying the phase out, which does not apply to applicable critical minerals).

Commenters addressed certain aspects of these proposed rules, as described in this Part IV. of the Summary of Comments and Explanation of Revisions. These final regulations generally adopt the rules as proposed in § 1.45X–3, with the modifications described in this Part IV. of the Summary of Comments and Explanation of Revisions.

B. Solar Energy Components—in General

Consistent with section 45X(c)(3), proposed § 1.45X–3(b) would have provided that solar energy component means a solar module, photovoltaic cell, photovoltaic wafer, solar grade polysilicon, torque tube, structural fastener, or polymeric backsheet. Several commenters requested that the final regulations add other non-listed solar energy components (or alternatively, to provide a safe harbor) to allow for section 45X credit eligibility. Examples of other non-listed solar energy components commenters raised include the encapsulant used to protect the photovoltaic cells and hold the entire system together; charge transport materials used in photovoltaic cells; photovoltaic wire; solar mirror facets; and solar thermal receivers. A commenter also suggested adopting a functionally interdependent and integral part test analogous to section 48

of the Code to include additional solar energy components.

Section 45X(c)(3) expressly identifies the qualifying solar energy components that are eligible for the section 45X credit. The Treasury Department and the IRS do not have the authority to add to the set of solar energy components that are identified by statute, for example, by applying a functional interdependence or integral part test. For this reason, the Treasury Department and the IRS decline to adopt the commenters’ requests in these final regulations.

1. Photovoltaic Cell

Proposed § 1.45X–3(b)(1)(ii) would have provided that the credit amount for a photovoltaic cell is equal to the product of 4 cents multiplied by the capacity of such photovoltaic cell. The proposed rule provided that the capacity of each photovoltaic cell is expressed on a direct current watt basis and capacity is the nameplate capacity in direct current watts using Standard Test Conditions (STC), as defined by the International Electrotechnical Commission (IEC). The proposed rule further provided that in the case of a tandem technology produced in serial fashion, such as a monolithic multijunction cell composed of two or more sub-cells, capacity must be measured at the point of sale at the end of the single cell production unit; and, in the case of a four-terminal tandem technology produced by mechanically stacking two distinct cells or interconnected layers, capacity must be measured for each cell at each point of sale.

A few commenters expressed concern that the proposed rule treats two-terminal and four-terminal tandem technologies differently, and that by labeling a monolithic two-terminal configuration as composed of sub-cells, the proposed rule would require this technology to be measured as a single cell rather than two distinct tandem cells. In contrast, proposed § 1.45X–3(b)(1)(ii) provides that mechanically stacked four-terminal tandem technology consists of “two distinct cells.” In the commenters’ view, the proposed rule would allow four-terminal cells to be measured before they are combined, while two-terminal cells would be measured after they are combined, resulting in higher capacity for four-terminal cells and increased credit amounts for four-terminal cells. A commenter also suggested that proposed § 1.45X–3(b)(1)(ii) is currently problematic for future tandem technology cell production and, perhaps unintentionally, directs the

development of certain tandem technologies.

The Treasury Department and the IRS agree with the commenters’ concerns regarding disparate treatment between four-terminal and two-terminal cells and capacity and credit amounts. Accordingly, these final regulations revise proposed § 1.45X–3(b)(1)(ii) to add additional text at the end as follows: “Where that cell is sold to a customer who will use it as the bottom cell in a tandem module, its capacity should be measured with the customer’s intended top cell placed between the bottom cell and the one-sun light source.”

2. Photovoltaic Wafer

Consistent with section 45X(c)(3)(B)(ii), proposed § 1.45X–3(b)(2)(i) would have defined a photovoltaic wafer to mean a thin slice, sheet, or layer of semiconductor material of at least 240 square centimeters that comprises the substrate or absorber layer of one or more photovoltaic cells. A photovoltaic wafer must be produced by a single manufacturer by forming an ingot from molten polysilicon (for example, Czochralski method) and then subsequently slicing it into wafers, forming molten or evaporated polysilicon into a sheet or layer, or depositing a thin-film semiconductor photon absorber into a sheet or layer (that is, thin-film deposition).

Some commenters suggested revisions to the definition of a photovoltaic wafer to include non-traditional methods of producing wafers. For example, a commenter requested expanding the definition to include wafers produced by any of the emerging ‘kerfless’ or ‘direct’ wafer technologies, as well as the polysilicon used by these technologies. The Treasury Department and the IRS have determined that direct wafer technologies fall within the statutory definition of photovoltaic wafers, if they are produced directly from evaporated solar grade polysilicon but disagree that any further clarification is needed in these final regulations.

A commenter requested that the final regulations clarify that ingots must be produced within the United States for solar wafers to be eligible for the section 45X credit. As required by section 45X(c)(3)(B)(ii)(I)(bb), to qualify for a section 45X credit, a photovoltaic wafer must be produced by a single manufacturer either by forming an ingot and then subsequently slicing it into wafers, or by forming molten or evaporated solar grade polysilicon or deposition into a sheet or layer. Thus,

to qualify for a section 45X credit, both the ingot and the wafer must be produced domestically in accordance with section 45X(d)(2). Proposed § 1.45X-1(d)(2) would have clarified that constituent elements, materials, and subcomponents used in the production of eligible components are not subject to the domestic production requirement provided in proposed § 1.45X-1(d)(1). Because the ingot production is part of the wafer production, ingots are not constituent elements, materials, or subcomponents. The Treasury Department and the IRS have determined it is unnecessary to specify that the ingot must be domestically produced as section 45X and proposed § 1.45X-3(b)(2)(i) require the wafer to be domestically produced, which includes production of the ingot. See also Part II.F.2. of this Summary of Comments and Explanation of Revisions for a discussion of proposed § 1.45X-1(g)(4)(ii) (*Example 2*) concerning the production of ingots and wafers.

3. Polymeric Backsheet

Consistent with section 45X(c)(3)(B)(iii), proposed § 1.45X-3(b)(3) would have defined polymeric backsheet to mean a sheet on the back of a solar module that acts as an electric insulator and protects the inner components of such module from the surrounding environment.

Certain commenters recommended that the term be considered to include a product that qualifies solely based on the property's functionality and not the property's composition, in order for backsheets made of glass to be eligible components. One commenter stated that its product is used in solar panels and therefore its request is consistent with Congressional intent of expediting the transition to clean energy, the underlying intent of section 45X to create parity among technologies, and incentivizing the creation of a U.S.-based supply chain for current and future solar technologies. The commenter thought that other energy components were defined based on their function, not their "composition" (for example, inverter, photovoltaic cell, and solar module) and believes that glass performs the same function as a backsheet made of plastic. The commenter suggested that clarity on whether a backsheet made of glass is part of the definition of "polymeric backsheet" is important because it will help with decisions on pursuing a section 48C credit and for avoiding penalties under section 6694 of the Code (preparer penalty) or section 6662 of the Code (substantial understatement). Another commenter

recommended adding back glass as a solar energy component because it is better for the environment in that a domestic facility that uses recycled glass from retired solar modules is "cleaner" than an overseas facility.

In considering these comments, the Treasury Department and the IRS determined that the best reading of the statute is that the term "polymeric backsheet" is limited to backsheets made of polymeric materials that also meet the functional definition provided in section 45X(c)(3)(B)(iii). This excludes most glass backsheets because they are typically not composed of a polymer, but of soda-lime glass. The final regulations add the word "polymeric" into the definition as a clarification. In reaching this determination, the Treasury Department and the IRS considered that when drafting the statute, Congress affirmatively included "polymeric" in the term and this inclusion should be given effect. Thus, the final regulations clarify that the definition is limited to a sheet on the back of solar modules composed, at least in part, of a polymer, that acts as an electric insulator and protects the inner components of such module from the surrounding environment.

4. Solar Grade Polysilicon

Consistent with section 45X(c)(3)(B)(iv), proposed § 1.45X-3(b)(4) would have defined solar grade polysilicon to mean silicon that is suitable for use in photovoltaic manufacturing and purified to a minimum purity of 99.999999 percent silicon by mass. A commenter requested that the final rules state that the production of the silicon gas that is used for direct wafer production may receive the section 45X credit for polysilicon for the mass of silicon in the gas. The Treasury Department and the IRS have determined, in close consultation with the Department of Energy, that gas used for direct wafer production includes molecules of silicon contained within another substance. Accordingly, such gas is not a complete and distinct eligible component within the meaning of proposed § 1.45X-1(c)(1)(i). For this reason, the Treasury Department and the IRS decline to adopt this request in these final regulations.

A few commenters requested guidance on how the purity level for solar grade polysilicon should be determined. One commenter requested that the final rules clarify that only impurities that are "material to the industry" should be counted in determining whether the minimum purity level is met. Because these final

regulations add the purity standard in SEMI Specification PV17-1012 Category 1 to proposed § 1.45X-3(b)(4), which distinguishes between material and immaterial impurities, the Treasury Department and the IRS decline to adopt the commenter's suggestion of clarifying that the statutory purity level refers only to impurity levels that are "material to the industry."

A commenter recommended adopting the standards for polysilicon feedstock in SEMI Specification PV17-1012. The Treasury Department and the IRS, in close consultation with the Department of Energy, have determined that SEMI Specification PV17-1012 Category 1 meets the purity standard of 99.999999 percent, while Categories 2 through 5 do not. The Treasury Department and the IRS thus agree with this request but only for Category 1, and these final regulations accordingly revise proposed § 1.45X-3(b)(4) to add the purity standard in SEMI Specification PV17-1012 Category 1.

5. Solar Module

Proposed § 1.45X-3(b)(5)(ii) would have stated that the credit amount for a solar module is equal to the product of 7 cents multiplied by the capacity of such module. The proposed rule also provided that the capacity of each solar module is expressed on a direct current watt basis, and that capacity is the nameplate capacity in direct current watts using STC, as defined by the IEC. A commenter requested producers be required to use "flash" values to determine the value of the tax credit for modules. The preamble to the Proposed Regulations explained that nameplate capacity is an appropriate, accurate, and consistent standard for the measurement of solar module capacity that can be used to measure the capacity of other eligible components. Using an industry standard such as nameplate capacity that is widely applicable to various eligible components provides greater taxpayer certainty, reduces taxpayer compliance burdens, and aids IRS administration. For these reasons, the Treasury Department and the IRS have determined that the best application of the statute is to require the use of nameplate capacity to measure the capacity of a solar module. The Treasury Department and the IRS therefore decline to adopt this suggestion to permit the use of "flash" value capacity measurements in these final regulations.

6. Solar Tracker

Consistent with section 45X(c)(3)(B)(vi), proposed § 1.45X-3(b)(6) would have provided that a solar

tracker means a mechanical system that moves solar modules according to the position of the sun and to increase energy output. Section 45X(c)(3)(B)(vii) provides that torque tubes (as defined in proposed § 1.45X-3(b)(7)) or structural fasteners (as defined in proposed § 1.45X-3(b)(8)) are solar tracker components that are eligible components for purposes of the section 45X credit.

Commenters requested that the definition of a solar tracker (not an eligible component) in section 45X(c)(3)(B)(vi) be modified to allow solar thermal collectors, heliostats, and fixed tilt systems (additional items) to be solar tracker components as defined in section 45X(c)(3)(B)(vii). A solar tracker is defined in 45X(c)(3)(B)(vi) as a “mechanical system that moves solar modules according to the position of the sun to increase energy output.” To be a solar tracker, a device must be a mechanical system that *moves* a solar module. The Treasury Department and the IRS do not have authority to expand the definition of solar tracker to include additional items such as the ones suggested that increase energy output without moving solar modules. Moreover, modification of the definition of a solar tracker in the manner the commenter requested would not result in such additional items qualifying as eligible components because a solar tracker is not a solar energy component that is an eligible component under section 45X(c)(1)(A)(i). Section 45X(c)(3)(B)(vii) provides that torque tubes and structural fasteners are the only two solar tracker components that may qualify as eligible components. The Treasury Department and the IRS do not have authority to expand the categories of eligible solar tracker components. For these reasons, the Treasury Department and the IRS decline to adopt this request in the final regulations.

7. Torque Tube

Consistent with section 45X(c)(3)(B)(vii)(I), proposed § 1.45X-3(b)(7)(i) would have provided that torque tube means a structural steel support element (including longitudinal purlins) that: (i) is part of a solar tracker; (ii) is of any cross-sectional shape; (iii) may be assembled from individually manufactured segments; (iv) spans longitudinally between foundation posts; (v) supports solar panels and is connected to a mounting attachment for solar panels (with or without separate module interface rails); and (vi) is rotated by means of a drive system.

Commenters suggested various statutory revisions to the definition of torque tube in section

45X(c)(3)(B)(vii)(I). A commenter recommended replacing the definition with a more generalized term such as “Tracker Structural Frame” to allow for other common solar collector morphologies. Another commenter requested removing or revising section 45X(c)(3)(B)(vii)(I)(dd) to include single foundation mounted structures or ground-mounted carousel structures. One commenter proposed clarifying that aluminum bearings, steel damper arms, steel saddle brackets, and steel bottom brackets are included in the definition of torque tubes or structural fasteners. Alternatively, the commenter suggested providing either: (i) a non-exclusive list of items that are included in the definition of torque tube or structural fasteners, or (ii) a test similar to the functionally interdependent or integral part tests under proposed § 1.48-9(f)(2)(ii) and (f)(3) to determine when a component is included in the definition of a torque tube or structural fastener.

Because section 45X(c)(3)(B)(vii)(I) specifically defines torque tube for purposes of section 45X, the Treasury Department and the IRS do not have the authority to expand the definition of torque tubes and solar tracker components in the final regulations to include additional solar energy components. As previously discussed, the Treasury Department and the IRS also lack authority to incorporate a functional interdependence or integral part tests that would allow other components not specified in the statute to qualify for the section 45X credit. For these reasons, the Treasury Department and the IRS decline to adopt these comments in the final regulations.

8. Structural Fastener

Consistent with section 45X(c)(3)(B)(vii)(II), proposed § 1.45X-3(b)(8)(i) would have defined a structural fastener to mean a component that is used: (i) to connect the mechanical and drive system components of a solar tracker to the foundation of such solar tracker; (ii) to connect torque tubes to drive assemblies; or (iii) to connect segments of torque tubes to one another.

Several commenters requested revisions to the definition of structural fastener in proposed § 1.45X-3(b)(8)(i). For example, commenters requested that the definition of structural fastener be extended “beyond steel and iron torque tubes to specifically allow for innovations made from other materials,” such as durable plastic; that solar frames made from greenhouse gas reducing steel and roll-form fabricated frames (as opposed to the current industry standard, imported extruded aluminum

frames) qualify as structural fasteners, solar modules, or torque tubes; and that the definition of structural fasteners be expanded to include those that secure the photovoltaic module to the torque tube or module interface rails. The Treasury Department and the IRS do not have the authority to expand the definition of structural fasteners and solar tracker components in the final regulations to include additional solar energy components. However, the Treasury Department and the IRS note that a component that is used for any of the functions described in section 45X(c)(3)(B)(vii)(II) would be considered a structural fastener for purposes of section 45X. The Treasury Department and the IRS think that proposed § 1.45X-3(b)(8)(i) and the statutory definition of a structural fastener is sufficiently clear to address the requested clarifications. Proposed § 1.45X-3(b)(8)(i) is therefore adopted in these final regulations without revision.

Proposed § 1.45X-3(b)(8)(iii) would have required that, for substantiation purposes, a taxpayer must document that a structural fastener is used in a manner described in proposed § 1.45X-3(b)(8)(i)(A), (B), or (C), with a bill of sale or other similar documentation that explicitly describes such use. One commenter specifically supported the substantiation requirement for structural fasteners in proposed § 1.45X-3(b)(8)(iii). Another commenter requested the final rules require taxpayers to substantiate that the structural fasteners for which they are claiming the section 45X credit include only the manufactured component (bolt or rivet) itself. The Treasury Department and the IRS have determined there is no need for further clarification of the substantiation requirement for structural fasteners in addition to the specific requirements relating to use in proposed § 1.45X-3(b)(8)(iii) and the general substantiation requirements in section 6001 of the Code. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

C. Wind Energy Components

1. In General

Consistent with section 45X(c)(4), proposed § 1.45X-3(c) would have provided that a wind energy component means a blade, nacelle, tower, offshore wind foundation, or related offshore wind vessel. Commenters generally requested expanding proposed § 1.45X-3(c) to include other non-listed wind energy components such as structural fasteners. Section 45X(c)(4) specifically provides a list of qualifying wind energy

eligible components. The Treasury Department and the IRS do not have the authority to expand the statutorily enumerated list of wind energy components eligible for a section 45X credit. For this reason, the Treasury Department and the IRS decline to adopt the commenters request in these final regulations.

2. Nacelle

Consistent with section 45X(c)(4)(B)(iii), proposed § 1.45-3(c)(3)(i) would have defined a nacelle to mean the assembly of the drivetrain and other tower-top components of a wind turbine (with the exception of the blades and the hub) within their cover housing.

A commenter stated that guidance should distinguish between manufacturing of eligible wind energy components (for example, in a manufacturing facility) from the installation of wind energy components at the relevant project site, as the latter does not constitute manufacturing or production of eligible components. The Treasury Department and the IRS have determined that the definition of “produced by the taxpayer” provided in proposed § 1.45X-1(c)(1) is sufficient to clarify that production of an eligible component requires substantially transforming constituent elements, materials, or subcomponents into a complete and distinct eligible component that is functionally different from that which would result from disqualifying minor assembly or superficial modification of the elements, materials or subcomponents.

Another commenter requested that the final regulations recognize that, where a new drivetrain and associated equipment (the pitch bearing, pitch system, main shaft, main bearing, gearbox, flex coupling, and slip ring) are produced for use in repowering of existing wind turbines and installed into an existing nacelle cover housing with certain other used equipment (including yaw bearing and baseplate), the nacelle is eligible for the section 45X credit. Under this commenter’s approach, the drivetrain of the nacelle must be new to be eligible for the section 45X credit. Another commenter also suggests inclusion of a “reasonable computation” of the section 45X credit for repowered eligible components.

The Treasury Department and the IRS note that repowering is a form of onsite re-manufacturing that is typically accomplished through a hybrid of primary and secondary production that utilizes a mix of existing and new components. To produce a nacelle within the definition of proposed

§ 1.45X-3(c)(3)(i), the taxpayer would need to meet the requirements of the definition of “produced by the taxpayer” provided in proposed § 1.45X-1(c)(1), including by substantially transforming the combination of existing and new subcomponents into a new nacelle that is distinct from the original nacelle. In some circumstances, nacelle repowering may constitute production of an eligible component. For example, a taxpayer that manufactures and installs a new drivetrain and associated subcomponents within housing atop a wind tower will be considered to have substantially transformed the combination of new and existing subcomponents, so that taxpayer will have produced an eligible nacelle. In contrast, a taxpayer that merely replaces the controller in a nacelle with a new one will not have substantially transformed the combination of new and existing subcomponents, so that taxpayer will not have produced an eligible nacelle. Routine maintenance or part replacement would fall under the definition of disqualifying minor assembly or “superficial modification.”

3. Related Offshore Wind Vessel

Consistent with section 45X(c)(4)(B)(iv), proposed § 1.45X-3(c)(4)(i) would have defined related offshore wind vessel to mean any vessel that is purpose-built or retrofitted for purposes of the development, transport, installation, operation, or maintenance of offshore wind energy components. Proposed § 1.45X-3(c)(4)(i) would have clarified that a vessel is purpose-built for development, transport, installation, operation, or maintenance of offshore wind energy components if it is built to be capable of performing such functions and it is of a type that is commonly used in the offshore wind industry. Proposed § 1.45X-3(c)(4)(i) would have further clarified that a vessel is retrofitted for development, transport, installation, operation, or maintenance of offshore wind energy components if such vessel was incapable of performing such functions prior to being retrofitted, the retrofit causes the vessel to be capable of performing such functions, and the retrofitted vessel is of a type that is commonly used in the offshore wind industry.

Under proposed § 1.45X-3(c)(4)(ii), consistent with section 45X(b)(1)(F)(i), the credit amount for a related offshore wind vessel would have been equal to 10 percent of the sales price of the vessel. Under the Proposed Regulations the sales price of the vessel does not include the price of maintenance,

services, or other similar items that may be sold with the vessel. For a related offshore wind vessel with respect to which a Related Person Election under section 45X(a)(3)(B)(i) has been made, the election would not cause the sale price of such vessel to be treated as having been determined with respect to a transaction between uncontrolled taxpayers for purposes of section 482 of the Code and the regulations thereunder.

One commenter requested clarification on the valuation of retrofitted offshore wind vessels and requested guidance on whether the section 45X credit applies to the cost of the retrofit itself, the value-add of the retrofit, the cost of the final sale of a retrofitted vessel, or some other amount. The Treasury Department and the IRS confirm that the credit amount specified in section 45X(b)(1)(F)(i)—ten percent of the sales price of such vessel—specifically applies to any related offshore wind vessel which is purpose-built or retrofitted as provided in section 45X(c)(4)(B)(iv).

A commenter stated that the definition of an offshore wind vessel is too narrow and that more standard vessel types (for example, tugboats and barges) that are capable of doing offshore wind work should also be eligible for the section 45X credit if they are being constructed or retrofitted for the purpose of offshore wind work. The Treasury Department and the IRS note that section 45X(c)(4)(B)(iv) and proposed § 1.45X-3(c)(4)(i) would have defined a related offshore wind vessel to mean “any vessel” that is purpose-built or retrofitted for purposes of the development, transport, installation, operation, or maintenance of offshore wind energy components. Proposed § 1.45X-3(c)(4)(i) would have clarified that a vessel is purpose-built for development, transport, installation, operation, or maintenance of offshore wind energy components if it is built to be capable of performing such functions and it is of a type that is commonly used in the offshore wind industry. Proposed § 1.45X-3(c)(4)(i) would have further clarified that a vessel is retrofitted for development, transport, installation, operation, or maintenance of offshore wind energy components if such vessel was incapable of performing such functions prior to being retrofitted, the retrofit causes the vessel to be capable of performing such functions, and the retrofitted vessel is of a type that is commonly used in the offshore wind industry. Thus, if a vessel meets the definition of a related offshore wind vessel in proposed § 1.45X-3(c)(4)(i), there are no limitations as to the type of

vessel that may be an eligible component.

The commenter's requested clarification would require an application of the standard in proposed § 1.45X-3(c)(4)(i) to specific cases for which a categorical determination of eligibility for additional vessel types would not be appropriate in these final regulations because such a determination would depend on the specific facts of each case.

Although no comments were received on proposed § 1.45X-3(c)(4)(i), the Treasury Department and the IRS revise proposed § 1.45X-3(c)(4)(i) in these final regulations to clarify that Federal income tax principles apply in determining the accuracy of the sales price used to calculate the section 45X credit. This revision provides greater certainty as to what principles apply for purposes of the section 45X credit and is in addition to the specific exclusions from a vessel's sales price in proposed § 1.45X-3(c)(4)(i), which included maintenance, services, or other similar items that may be sold with the vessel.

4. Total Rated Capacity of the Completed Wind Turbine

Proposed § 1.45X-3(c)(6) would have provided that, for purposes of proposed § 1.45X-3(c), the total rated capacity of the completed wind turbine means, for the completed wind turbine for which a blade, nacelle, offshore wind foundation, or tower was manufactured and sold, the nameplate capacity at the time of sale as certified to the relevant national or international standards, such as IEC 61400, or American National Standards Institute (ANSI)/American Clean Power Association (ACP) 101-1-2021, the Small Wind Turbine Standard (Standard). Under proposed § 1.45X-3(c)(6), certification of the turbine to such Standards must be documented by a certificate issued by an accredited certification body and the total rated capacity of a wind turbine must be expressed in watts.

One commenter expressed support for the proposal requiring that qualifying wind turbine components must be made and sold for use on certified wind turbines. Another commenter recommended including both American Wind Energy Association (AWEA) 9.1-2009 and ANSI/ACP 101-1-2021 as acceptable wind turbine certification standards. The commenter explained that ANSI/ACP 101-1-2021 is a revision of the AWEA standard (the original small wind certification standard, and all currently certified small wind systems are certified to this standard) that streamlines the certification process, but there is no requirement that

turbines with the original certification must recertify to the new ANSI/ACP standard. Thus, the commenter states that including both standards in the final rules will allow currently certified turbines made in the United States to earn section 45X credits as well as new turbines currently in the certification process following the newer standard. The Treasury Department and the IRS agree with this request and these final regulations revise proposed § 1.45X-3(c)(6) to add both AWEA 9.1-2009 and ANSI/ACP 101-1-2021 as acceptable wind turbine certification standards.

A commenter sought clarification as to whether a wind tower producer may rely on a certification of the total rated capacity of the turbine obtained from the original equipment manufacturer (OEM) that produces the completed wind turbine in which the wind tower is incorporated, provided the certificate was issued by an accredited certification body. The commenter noted that requiring wind tower producers to independently verify the capacity of the completed turbine would cause "undue expense and delay." To provide assurance to the commenter, a wind tower producer may rely on an OEM's certification of the total rated capacity of the completed wind turbine in which the tower was incorporated, but the Treasury Department and the IRS have determined that the rules as set out by proposed § 1.45X-3(c)(6) and (7) do not require further clarification on this point.

D. Inverters

1. In General

Consistent with section 45X(c)(2), proposed § 1.45X-3(d) would define an inverter as an end product that is suitable to convert direct current (DC) electricity from one or more solar modules or certified distributed wind energy systems into alternating current (AC) electricity. Proposed § 1.45X-3(d) would have further provided that an end product is suitable to convert DC electricity from one or more solar modules or certified distributed wind energy systems into AC electricity if, in the form sold by the manufacturer, it is able to connect with such modules or systems and convert DC electricity to AC electricity from such connected source. For purposes of section 45X, the term inverter includes a central inverter, commercial inverter, distributed wind inverter, microinverter, or residential inverter. Proposed § 1.45X-3(d) would have clarified the definition of each of these types of inverters, including the required rated outputs.

The preamble to the Proposed Regulations stated that section 45X(c)(2) requires certain types of inverters be "suitable to" or "suitable for" a statutorily required use or application to be considered an eligible component. Proposed § 1.45X-3(d) would also have provided the calculation of the credit amount for each type of inverter. In general, the credit amount for each type of inverter would be equal to the product of the inverter's total rated capacity and the amount prescribed in section 45X(b)(2)(B) for such inverter.

One commenter requested the final rules provide a credit for utility-scale power converters and that a "utility-scale power converter" be defined in a manner consistent with section 2.1.9 of Underwriters Laboratories Standard 1741 (2002). Specifically, the commenter requested modifying the final rules to provide a credit for products that only convert direct current to direct current or alternating current to direct current. Because section 45X(c)(2)(A) specifically defines the term inverter to mean "an end product which is suitable to convert direct current electricity . . . into alternating current electricity," the Treasury Department and the IRS do not have the authority to expand the definition of inverter in the final regulations to include these additional products. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

Another commenter requested that, for each type of inverter provided for under section 45X(c)(2), the rated output of alternating current power be defined as "the maximum continuous grid-tied power rating the inverter is capable of handling." The commenter asserts that the suggested change will "ensure consistent interpretation across technologies despite consumer-driven decisions impacting output." Section 45X(c)(2) uses the term "rated output" to define, in part, a commercial inverter, distributed wind inverter, microinverter, residential inverter, or utility inverter. The Treasury Department and the IRS decline to adopt this comment in the final regulations because the term rated output is in the statutory definition for these inverters.

Several commenters requested that the final rules provide a section 45X credit for inverters that convert direct current from sources other than solar modules or certified distributed wind energy systems as long as these inverters meet the technical requirements of an inverter defined under section 45X(c)(2). Section 45X(c)(2)(A)

specifically defines the term inverter to mean “an end product which is suitable to convert direct current electricity from one or more solar modules or certified distributed wind energy systems into alternating current electricity.” Other types of inverters such as bidirectional electric vehicle inverters or utility and commercial inverters that are in practice used with battery modules can meet the existing suitability standard within the definition without additional clarification required. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

2. Central Inverter

Consistent with section 45X(c)(2)(B), proposed § 1.45X–3(d)(2)(i) would have defined a central inverter as an inverter that is suitable for large utility-scale systems and has a capacity that is greater than 1,000 kilowatts, expressed on an alternating current watt basis. Proposed § 1.45X–3(d)(2)(i) would have further clarified that an inverter is suitable for large utility-scale systems if, in the form sold by the manufacturer, it is capable of serving as a component in a large utility-scale system and meets the core engineering specifications for such application. Proposed § 1.45X–3(d)(2)(ii) would have provided a credit equal to the product of 0.25 cents multiplied by the total rated capacity of the central inverter where the total rated capacity is expressed on an alternating current watt basis.

One commenter requested the credit amount available for a central inverter be changed to match the credit available for utility inverters because utility inverters are eligible for a credit that is six times higher than central inverters. Because section 45X(b)(2)(B) provides the credit amounts available for central inverters and utility inverters, the Treasury Department and the IRS do not have the authority to make the requested change. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

3. Commercial Inverter

a. Definition

Consistent with section 45X(c)(2)(C), proposed § 1.45X–3(d)(3)(i) would have provided that a commercial inverter means an inverter that is suitable for commercial or utility-scale applications, has a rated output of 208, 480, 600 or 800 volt three-phase power, and has a capacity expressed on an alternating current watt basis that is not less than 20 kilowatts and not greater than 125 kilowatts.

One commenter requested the definition of a commercial inverter be changed to provide a credit for inverters with a rated output greater than 800 volt three-phase power. Section 45X(c)(2)(C)(ii) defines a commercial inverter, in part, as having “a rated output of 208, 480, 600, or 800 volt three-phase power.” The Treasury Department and the IRS do not have the authority to expand the definition of a commercial inverter in the final regulations to those with a rated output greater than 800 volt three-phase power. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

A few commenters requested that the final rules modify the definition of a commercial inverter to include a DC optimized commercial inverter system, and that, when DC optimizers are paired with a commercial inverter, the credit amount available for commercial inverters should be determined in a manner similar to the credit computation for direct current optimized inverter systems (DC optimized inverter systems, as the term would have been defined in Proposed § 1.45X–3(d)(5)(iii)(B) and discussed in Part IV.D.3.a. of this Summary of Comments and Explanation of Revisions). Generally, these commenters requested that, with the modified definition of commercial inverter, the available credit be computed as a product of \$0.02 multiplied by the lesser of the sum of the alternating current capacity of each DC optimizer when paired with the inverter in the DC optimized inverter system or the alternating current capacity of the inverter in the DC optimized inverter system. No language in the statutory text or proposed rules prohibits the use of direct current optimizers with commercial inverters. Thus, it is unnecessary to modify the final rules to state that DC optimizers may be used with a commercial inverter.

Section 45X(b)(1)(I) provides that the amount of the section 45X credit for an inverter is equal to the applicable amount with respect to each type of inverter multiplied by the capacity of such inverter (expressed on a per alternating current watt basis). The Treasury Department and the IRS do not have the authority to change the method for computing the credit for commercial inverters. In contrast, language that appears only in the definition of “microinverter” in section 45X(c)(2)(E) (‘suitable to connect to one solar module’) does require clarification about how to apply the definition to DC optimized systems and multi-module

microinverters. Because this language does not appear in the definition of “commercial inverter” in section 45X(c)(2)(C), there is no analogous need to clarify the application of the definition or credit calculation. For this reason, the Treasury Department and the IRS decline to adopt these requests pertaining to commercial inverters in the final regulations.

b. Credit Amount

Proposed § 1.45X–3(d)(3)(iii) would have provided a credit equal to the product of 2 cents multiplied by the total rated capacity of the commercial inverter where the total rated capacity is expressed on an alternating current watt basis.

Commenters requested that DC optimizers be allowed to be paired with commercial or utility scale system configurations, like microinverters. This comment is not adopted for the reasons provided in Part IV.D.3.a. of this Summary of Comments and Explanation of Revisions.

4. Microinverters

a. Definition

Consistent with section 45X(c)(2)(E), proposed § 1.45X–3(d)(5)(i) would have defined a microinverter as an inverter that is suitable to connect with one solar module; has a rated output of 120 or 240 volt single-phase power, or 208 or 480 volt three-phase power; and has a capacity, expressed on an AC watt basis, that is not greater than 650 watts. One commenter requested the final rules change the maximum capacity limit for the microinverter from 650 watts to 700 watts to accommodate future technological advancements. Because section 45X(c)(2)(E)(iii) provides the maximum capacity of a microinverter, the Treasury Department and the IRS do not have the authority to make the requested change. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

b. Suitable To Connect to One Solar Module—in General

Proposed § 1.45X–3(d)(5)(iii)(A) would have clarified that an inverter is suitable to connect to one solar module if, in the form sold by the manufacturer, it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity.

Proposed § 1.45X–3(d)(5)(iii)(B) would have clarified that a DC optimized inverter system may qualify as a microinverter. Proposed § 1.45X–

3(d)(5)(iii)(B) would have defined a DC optimized inverter system to mean an inverter that is comprised of an inverter connected to multiple DC optimizers that are each designed to connect to one solar module. Proposed § 1.45X–3(d)(5)(iii)(B) would have provided that a DC optimized inverter system is suitable to connect with one solar module if, in the form sold by the manufacturer, it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity. Proposed § 1.45X–3(d)(5)(iv)(B) would have provided that a DC optimized inverter system qualifies as a microinverter if each DC optimizer paired with the inverter in a DC optimized inverter system meets the requirements of section 45X(c)(2)(E) and a taxpayer must produce and sell the inverter and the DC optimizers in the DC optimized inverter system together as a combined end product.

Several commenters agreed with the proposed rule permitting DC optimizers paired with an inverter to qualify as microinverters and receive the corresponding credit amount. One commenter suggested revising the definition of a DC optimized inverter systems to more clearly define the qualifying system components of a DC optimized inverter system. This commenter proposed that qualifying system components include items that control the DC output of one or more solar modules and are integral to the function of the inverter and modules. The Treasury Department and the IRS, in consultation with the Department of Energy, conclude that the additional confirmation the commenter is requesting is not necessary as it would not provide additional clarity. For this reason, the Treasury Department and the IRS decline to adopt this suggestion in the final regulations.

Several commenters requested that the final rules remove the requirement that a taxpayer produce and sell both the inverter and the DC optimizers in the DC optimized inverter system as a combined end product. One commenter expressed the view that the requirement distorts the market, provides an unfair advantage to companies that already manufacture both items, and requires companies to seek out partnerships solely for the purpose of obtaining the section 45X credit. Other commenters that manufacture both products state that the proposed requirement is inconsistent with standard industry practices where a manufacturer sells the items separately. In contrast, one

commenter supported the “combined end product” requirement and suggested it also be applied to multi-module inverters to prevent multiple entities from claiming section 45X credits for the same system. Section 45X(c)(2)(A) defines an inverter as an end product that is suitable to convert DC electricity from one or more solar modules or certified distributed wind energy systems into AC electricity. For each type of inverter listed under section 45X(c)(2), section 45X(b)(1)(I) provides the applicable credit is determined as an amount equal to the product of each inverter’s applicable amount multiplied by the capacity of such inverter. The section 45X credit is separately computed for each inverter. The Treasury Department and the IRS do not have the authority to allow a credit solely for a DC optimizer, because it does not convert DC electricity into AC electricity as the definition of inverter in section 45X(c)(2) requires. The Treasury Department and the IRS also do not have the authority to change the number of inverter units used to compute the available credit amount. For these reasons, the Treasury Department and the IRS decline to adopt these comments in these final regulations. However, while proposed § 1.45X–3(d)(5)(iv)(B) requires that the inverter and DC optimizer in the DC optimized inverter system must be produced and sold as a combined end product, the Treasury Department and the IRS clarify that the inverter and the DC optimizer do not need to be physically packaged together at sale, and the inverter and DC optimizer do not need to be fully interconnected and assembled at the time of sale.

Proposed § 1.45X–3(d)(5) would have clarified that a multi-module inverter may also qualify as a microinverter. Proposed § 1.45X–3(d)(5)(iii)(C) would have defined a multi-module inverter to mean an inverter that is comprised of an inverter with independent connections and DC optimizing components for two or more modules. Proposed § 1.45X–3(d)(5)(iii)(C) would have further provided that a multi-module microinverter is suitable to connect with one solar module if it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity. Proposed § 1.45X–3(d)(5)(iv)(C) would have provided that multimodule inverter qualifies as a microinverter if it meets the requirements of section 45X(c)(2)(E).

One commenter suggested revising the definition of a multi-module

inverter to more clearly define the qualifying system components of a multi-module inverter. The commenter suggested that qualifying system components should be those items that control the DC output of one or more solar modules and are integral to the function of the inverter and modules. The same commenter also suggested revising the definition of a multi-module inverter to clarify that for a multi-module inverter to qualify as a microinverter, a taxpayer must produce and sell the inverter and the DC optimizers together as a combined end product. A different commenter agreed with this suggestion.

A few commenters suggested revising the definition of a multi-module inverter to provide that a multi-module inverter includes a DC optimized inverter system such that each DC optimizer may connect with more than one solar module and the credit amount in such a system is computed similarly to a DC optimized inverter system, except that the DC optimizers are not required to be sold with the inverter as a “combined end product.” Other commenters disagreed with this suggestion and support the proposed rule that would not have allowed solar modules to share a connection to a multi-module inverter.

The reasons provided for retaining the rule for DC optimized inverter systems also apply to adopting the requirement for multi-module inverters. The Treasury Department and the IRS think that requiring taxpayers to produce and sell the inverter and the DC optimizers together as a combined end product will create parity with DC optimized inverter systems and avoid potential abuse. For these reasons, the Treasury Department and the IRS adopt these comments in the final regulations.

c. Credit Amount

Proposed § 1.45X–3(d)(5)(iv)(A) would have provided that generally, the credit amount for a microinverter is equal to the product of 11 cents multiplied by the total rated capacity of the microinverter where the total rated capacity is expressed on an alternating current watt basis.

Proposed § 1.45X–3(d)(5)(iv)(B) would have clarified how to determine the credit amount for a DC optimized inverter system that qualifies as a microinverter. Proposed § 1.45X–3(d)(5)(iv)(B) would have provided that the credit amount for a DC optimized inverter system that qualifies as a microinverter is equal to the product of 11 cents multiplied by the lesser of the sum of the alternating current capacity of each DC optimizer when paired with

the inverter in the DC optimized inverter system or the alternating current capacity of the inverter in the DC optimized inverter system where capacity is measured in watts of alternating current converted from DC electricity by the inverter in a DC optimized inverter system.

One commenter requested that the alternating current capacity of each DC optimizer when paired with the inverter in the DC optimized inverter system be calculated as the product of the optimizer's rated input power capacity, the optimizer's DC-to-DC conversion efficiency percentage, and the inverter's DC-to-AC conversion efficiency percentage. Section 45X(b)(1)(I) provides the applicable credit is determined as an amount equal to the product of each inverter's applicable amount multiplied by the capacity of such inverter (expressed on a per alternating current watt basis). The requirement that capacity is "expressed on an alternating current watt basis" already factors in any DC-to-DC conversion efficiency upstream of the DC-to-AC conversion, and the inverter's DC-to-AC conversion efficiency percentage is accounted for by the use of "capacity of such inverter" (expressed on a per alternating current watt basis). Therefore, these requirements are duplicative of rules contained in the statutory text. For this reason, the Treasury Department and the IRS decline to adopt this suggestion in the final regulations.

5. Utility Inverter

Consistent with section 45X(c)(2)(G), proposed § 1.45X-3(d)(7)(i) would have defined a utility inverter as an inverter that is suitable for commercial or utility-scale systems, has a rated output of not less than 600 volt three-phase power, and has a capacity expressed on an alternating current watt basis that is greater than 125 kilowatts and not greater than 1000 kilowatts.

One commenter requested reducing the required rated output from "not less than 600 volt three-phase power" to "not less than 480 volt three-phase power." Section 45X(c)(2)(G)(ii) defines a utility inverter, in part, as having "a rated output of not less than 600 volt three-phase power." The Treasury Department and the IRS decline to adopt the commenter's request because defining a utility inverter to include those with a rated output of not less than 480 volt three-phase power would be inconsistent with the statute.

E. Qualifying Battery Components

Proposed § 1.45X-3(e)(1) would define a qualifying battery component

as electrode active materials, battery cells, or battery modules.

1. Electrode Active Materials

a. In General

Proposed § 1.45X-3(e)(2)(i)(A) would have defined electrode active materials to include cathode electrode materials, anode electrode materials, and electrochemically active materials that contribute to the electrochemical processes necessary for energy storage. In general, electrode active materials are materials that are capable of being used within a battery for energy storage. Proposed § 1.45X-3(e)(2)(i)(A) would also have provided that the following materials in a battery or vehicle would not qualify for the section 45X credit as an electrode active material: battery management systems, terminal assemblies, cell containments, gas release valves, module containments, module connectors, compression plates, straps, pack terminals, bus bars, thermal management systems, and pack jackets. Proposed § 1.45X-3(e)(2)(v) would have clarified that a taxpayer may claim only one section 45X credit with respect to a material that qualifies as both an electrode active material and an applicable critical mineral.

Some commenters recommended altering the definition of electrode active materials as defined in section 45X(c)(5)(B)(i) and in proposed § 1.45X-3(e)(2)(i)(A). The Treasury Department and the IRS do not have the authority to alter the definition of electrode active materials as provided by the statute. For this reason, the Treasury Department and the IRS decline to adopt these recommendations in the final regulations.

One commenter raised a concern that certain definitions in the Proposed Regulations applicable to electrode active materials would inadvertently exclude separators from being treated as an eligible component because those definitions do not include language specific to the separator production process. As proposed § 1.45X-3(e)(2)(i)(D) specifically included separators in the definition of electrochemically active materials, such changes to definitions are unnecessary, and the Treasury Department and the IRS decline to adopt the commenter's recommendation.

b. Cathode Electrode Materials and Anode Electrode Materials

Proposed § 1.45X-3(e)(2)(i)(B) would have defined "cathode electrode materials" to mean the materials that comprise the cathode of a commercial battery technology, such as binders, and

current collectors (that is, cathode foils). Proposed § 1.45X-3(e)(2)(i)(C) would have defined "anode electrode materials" to mean the materials that comprise the anode of a commercial battery technology, including anode foils.

A commenter recommended that the definition of cathode electrode materials in proposed § 1.45-3(e)(2)(i)(B) and of anode electrode materials in proposed § 1.45-3(e)(2)(i)(C) be clarified to specify that the materials be "battery-grade" so the precursor materials are eligible for the section 45X credit. Because these proposed definitions would require that the materials comprise the cathode or anode of a commercial battery technology, the Treasury Department and the IRS conclude that specifying that such materials be "battery-grade" would be redundant. For this reason, the Treasury Department and the IRS decline to adopt these recommendations in the final regulations.

Another commenter recommended that the definition of cathode electrode materials be clarified to address its concern that the qualifier "commercial battery technology" excludes hydrogen fuel cells contrary to the definition of the term in the statute, which contains no such qualifier. The Treasury Department and the IRS do not have the authority to alter the definition of electrode active materials as battery components as provided by the statute. For this reason, the Treasury Department and the IRS decline to adopt this recommendation in the final regulations. The Treasury Department and the IRS note, however, that although electrode active materials in general must be capable of being used within a battery for energy storage, such materials would still be eligible for the section 45X credit if they are also capable of being used in other applications, such as hydrogen fuel cells.

c. Electrochemically Active Materials

Proposed § 1.45X-3(e)(2)(i)(D) would define "electrochemically active materials that contribute to the electrochemical processes necessary for energy storage" to mean the battery-grade materials that enable the electrochemical storage within a commercial battery technology. In addition to the list of electrochemically active materials provided in section 45X(c)(5)(B)(i) (that is, solvents, additives, and electrolytic salts), these may include electrolytes, catholytes, anolytes, separators, and metal salts and oxides.

One commenter requested the definition of electrochemically active

materials explicitly include solid-state electrolytes. Solid-state electrolytes are included in the definition of electrochemically active materials because Proposed § 1.45X-3(e)(2)(i)(D) includes “electrolytes,” with no particular form required. The Treasury Department and the IRS conclude that specifying that such materials are included in this definition would be redundant. For this reason, the Treasury Department and the IRS decline to adopt these recommendations in the final regulations.

d. Battery Grade Materials

Proposed § 1.45X-3(e)(2)(i)(F) would have defined “battery-grade materials” to mean the processed materials found in a final battery cell or an analogous unit, or the direct battery-grade precursors to those processed materials. A few commenters requested the final rules clarify the meaning of direct battery-grade precursors. Commenters also requested the final rules provide that silane gas, ultra-high molecular weight polyethylene, and needle coke meet the definition of electrochemically active materials as direct battery-grade precursors. While the Treasury Department and the IRS understand the desire for assurance, listing specific precursors that qualify as electrochemically active materials would not be possible or advisable because it could imply that unlisted materials do not qualify as electrochemically active materials, particularly as battery technologies may evolve over time. For this reason, the Treasury Department and the IRS decline to adopt these recommendations in these final regulations.

e. Production Costs Incurred

Proposed § 1.45X-3(e)(2)(iv) would have provided that costs incurred for purposes of determining the credit amount includes costs as defined in § 1.263A-1(e) that are paid or incurred within the meaning of section 461 of the Code by the taxpayer for the production of an electrode active material only. Thus, under the Proposed Regulations, production costs with respect to an electrode active material would not include any costs incurred after the production of the electrode active material.

The Proposed Regulations would not have allowed direct material costs as defined in § 1.263A-1(e)(2)(i)(A), indirect material costs as defined in § 1.263A-1(e)(3)(ii)(E), or any costs related to the extraction or acquisition of raw materials to be taken into account as production costs. This limitation disallowed, for purposes of calculating

the credit: the inclusion of the cost of acquiring the raw material used to produce the electrode active materials; the cost of materials used for conversion, purification, or recycling of the raw material; and other material costs related to the production of electrode active materials. The Proposed Regulations applied section 263A and the regulations under section 263A (section 263A regulations) solely to identify the types of costs that are includible in production costs incurred for the purpose of computing the amount of the section 45X credit. The Proposed Regulations did not apply section 263A or the section 263A regulations for any other purposes, such as to determine whether a taxpayer is engaged in production activities.

The preamble to the Proposed Regulations explained that the rationale for the proposed rule was that the credit for the production of electrode active materials provides incentives for taxpayers to conduct activities that add value to the production of electrode active materials. Merely purchasing raw materials may enable a taxpayer to produce an electrode active material but it is not by itself an activity that adds value. In addition, excluding the costs of acquiring electrode active materials mitigates the risk of crediting the production costs for the same underlying material more than once as that material is used in various stages of the production process. For these reasons, material costs were not creditable costs under the Proposed Regulations.

The Treasury Department and the IRS requested comments on the proposed rule for determining the costs incurred with respect to the production of electrode active materials. Specifically, comments were sought as to whether and how extraction and other similar value-added activities in the production of raw materials used in electrode active materials should be taken into account and how extraction should be defined, including whether the term should be defined consistent with proposed § 1.30D-3(c)(8). Comments were also requested with respect to applicable critical minerals, which are summarized in Part V.C. of this Summary of Comments and Explanation of Revisions. Many of these comments had similarities, and the reasoning and revisions in these final regulations are described in this Part IV.E.1.e. of this Summary of Comments and Explanation of Revisions and are adopted for both electrode active materials and applicable critical minerals.

Approximately 72 of the comments received addressed the definition and

scope of production costs generally. Many commenters recommended that, contrary to the Proposed Regulations, all costs with respect to the production of electrode active materials be included in production costs for purpose of determining the credit, including direct material costs as defined in § 1.263A-1(e)(2)(i)(A), indirect material costs as defined in § 1.263A-1(e)(3)(ii)(E), and costs related to the extraction of raw materials.

A significant number of commenters focused their recommendations on material costs or the costs of extraction, but there was agreement among many of them that “costs of production” should be interpreted broadly to include all costs. In support of this position, commenters asserted that section 45X(b)(1)(J) and (M) do not place limits or otherwise qualify production costs eligible for the credit and that the regulations should not impose limitations not explicitly present in the Code itself. Some of these commenters also argued that, because the costs excluded from production costs in the Proposed Regulations are often a substantial or predominant portion of the total costs of producing some electrode active materials, substantial limitations on the inclusion of these costs would contradict Congress’s goal of incentivizing the production of electrode active materials. Commenters also disputed that direct and indirect costs are not incurred in value-adding activities.

Some commenters also disagreed that the potential for over crediting (that is, crediting the same production costs multiple times) justifies denying a credit for these costs. A subset of these commenters disagreed that over crediting was a legitimate concern, arguing instead that section 45X provides a credit for costs incurred at different stages of production attributable to the same underlying material. Others agreed that over crediting might not be permissible but that the concern was insufficient to deny entirely credits for all costs that might be impermissibly claimed more than once for the same underlying material. In the view of these commenters, prohibiting crediting these same production costs multiple times would be the proper approach rather than entirely denying all credits for these costs. Some commenters noted that, in the case of certain specifically identified electrode active materials, there was no risk of crediting the same production costs multiple times and thus direct and indirect costs should be included in the costs of production for these electrode active materials. A third

set of commenters argued that credits should be permissible once under section 45X(b)(1)(M) for applicable critical minerals and again under section 45X(b)(1)(J) for electrode active materials.

In the case of electrode active materials that are precursors for the production of other electrode active materials, one commenter recommended that the cost of the precursor electrode active materials only be included in the cost of production for which a credit may be claimed if the precursor electrode active materials are completely consumed in the production process and are not used for any other commercial purpose.

A number of commenters proposed solutions to the problem of potentially crediting the same production costs multiple times. One solution commenters proposed was to reduce the basis of property for which a credit has been claimed by an upstream producer. Commenters also proposed a system under which a taxpayer would only be eligible for a credit on costs of material for which no other taxpayer had previously claimed a credit. This arrangement could be administered through a system of certifications in which taxpayers would be required to verify that its suppliers had not previously claimed credits for costs associated with the same materials for which the taxpayer is claiming credits. A commenter also urged that producers of electrode active materials be able to claim a credit if they can establish that the acquired electrode active materials and applicable critical minerals used in the production of electrode active materials were acquired from extraction or production outside the United States and thus were previously ineligible for a section 45X credit.

In addition to general comments regarding the inclusion of direct, indirect, and extraction costs, commenters recommended clarification about more specific costs, including costs associated with transportation. Another commenter requested the final rules be modified to include costs of the production of anodes used in the aluminum production to convert alumina into aluminum. Other commenters asserted that the costs of processing and purification of materials in the production of electrode active materials add value and should, on that basis, be included in the scope of the credit.

Several commenters recommended that the direct and indirect costs of the production of electrode active materials from recycled feedstock should be classified as production costs for

purposes of the credit. According to one commenter, recycling processes begin with waste products at what is essentially a new supply chain.

A commenter supported the Proposed Regulations' exclusion of direct material, indirect material, and extraction costs from production costs eligible for the credit. This commenter was concerned that a contrary rule would invite fraud, waste, and abuse and that, in the case of extraction costs, would be difficult to administer without the creation of a tracing system.

With respect to costs related to extraction, the Proposed Regulations would have excluded extraction costs because extraction could be far removed, particularly in the case of electrode active materials, in the supply chain from the ultimate production of the eligible component. However, commenters highlighted the critical importance of extraction to the production of both applicable critical minerals and electrode active materials as well as the close connection these costs often have to the final production of these materials.

The Treasury Department and the IRS have reconsidered the treatment of extraction costs in these final regulations for taxpayers that extract raw materials domestically and for taxpayers that acquire either domestically or foreign-sourced extracted raw materials. For both electrode active materials and applicable critical minerals, the final regulations in §§ 1.45X-3(e)(2)(iv) and 1.45X-4(c)(3), respectively, allow taxpayers to include extraction costs related to the extraction of raw materials in the United States or a United States territory, but only if those costs are paid or incurred by the taxpayer that claims the section 45X credit with respect to the relevant electrode active material or applicable critical mineral. The Treasury Department and the IRS note that the section 45X credit is available only to taxpayers that produce and sell an eligible component. Thus, the final regulations provide that extraction costs may be included in production costs consistent with the rules provided under section 263A only if such costs are incurred by the taxpayer that claims the section 45X credit with respect to the relevant applicable critical mineral or electrode active material. The Treasury Department and the IRS have determined that this inclusion of extraction costs incurred by the taxpayer most accurately captures the meaning "the costs incurred by the taxpayer with respect to the production of" applicable critical minerals and electrode active materials under section

45X(b)(1)(J) and (M). If, however, a taxpayer acquires extracted raw material as a direct (or indirect) material cost, the material costs may be included as production costs consistent with the rules provided under section 263A regardless of whether the extracted material is domestically- or foreign-sourced.

With respect to direct and indirect material costs, the Proposed Regulations would have excluded direct and indirect material costs from production costs for both applicable critical minerals and electrode active materials. The Proposed Regulations excluded material costs from production costs based on an interpretation of the term "costs incurred by the taxpayer with respect to production" in section 45X(b)(1)(J) and (M) as being limited to value-added activities in the production process. Electrode active materials and applicable critical minerals differ from all other eligible components described in section 45X because their credit amounts are calculated as a percentage of production costs rather than specifying a fixed dollar amount or rate. The preamble to the Proposed Regulations stated that the mere purchase of materials does not itself add value in a production process despite being a necessary part of such process. Furthermore, it is unlikely that Congress intended to allow production costs associated with applicable critical minerals or electrode active materials to be credited multiple times, due to the high risk of fraud, waste, and abuse; the administrative burden of preventing these outcomes; and the limited effectiveness in supporting domestic production of new eligible components. The exclusion of direct and indirect material costs addressed these concerns.

Numerous commenters highlighted the importance and appropriateness of including material costs in production costs. There was, however, disagreement as to whether and to what extent the costs of non-U.S. produced constituent elements, materials, and subcomponents used in the production of electrode active materials should be included in production costs. Some commenters recommended that the costs of all materials be included while others urged limitations to only credit materials produced domestically. One commenter proposed that the final regulations modify the proposed rule regarding constituent elements, materials, and subcomponents used in the production of applicable critical minerals to distinguish between imports of materials otherwise available from domestic sources and imported

materials that are not available from domestic sources.

The Treasury Department and the IRS, after consultation with the Department of Energy, have reconsidered the proposed exclusion of all material costs based on these comments. The final regulations adopt a rule allowing taxpayers that produce applicable critical minerals and electrode active materials as specified in the statute to include direct and indirect materials costs (as described in the referenced section 263A regulations) in production costs if certain conditions are met, but only if those direct or indirect material costs do not relate to the purchase of materials that are an eligible component at the time of acquisition (such as an electrode active material or applicable critical mineral). In addition, two examples illustrating the revised production costs rule are included in § 1.45X-3(e)(2)(iv)(A)(2).

In finalizing this rule, the Treasury Department and the IRS considered the provisions of section 45X and determined this final rule appropriately implements the statute as a whole. Section 45X(a)(1) and (2) limit the section 45X credit to the sum of the credit amounts determined under section 45X(b) with respect to each eligible component that is produced by the taxpayer and, during such taxable year, sold to an unrelated person in the taxpayer's trade or business. The statute allows a section 45X credit for the sale of an applicable critical mineral or electrode active material produced and sold by the taxpayer in its business. The section 45X credit for an applicable critical mineral or electrode active material is equal to 10 percent of the costs incurred by the taxpayer with respect to production, under section 45X(b)(1)(M) and (J), respectively.

In calculating a taxpayer's costs incurred in the production of applicable critical minerals and electrode active materials, it is necessary to consider situations involving the integration of eligible components (whether directly made by the taxpayer or purchased from another taxpayer) in the course of producing an applicable critical mineral or electrode active material. Generally, integrating one eligible component into another produced eligible component results in two credits pursuant to section 45X(d)(4) if the taxpayer produced both, while integrating a purchased eligible component into another produced eligible component will only result in a credit for the eligible component produced by the taxpayer. In the case of an applicable critical mineral or electrode active material, however, the section 45X

credit calculation differs from the other eligible components. Thus, further examination was needed to determine how a credit should be calculated in such a case.

The Treasury Department and the IRS considered the treatment of a vertically integrated taxpayer. For example, assume a taxpayer produced an applicable critical mineral or electrode active material and incurred \$50X of costs with respect thereto (EC 1) and integrated EC 1 into a separate applicable critical mineral or electrode active material (EC 2), incurring an additional \$100X of costs with respect to the production of EC 2 (total production costs of \$150X), with EC 2 ultimately being sold by the taxpayer to an unrelated person. In calculating the section 45X credit, pursuant to section 45X(d)(4), taxpayer is treated as having sold an eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component which is sold to an unrelated person. It is important to note that section 45X makes no distinction between integrated eligible components that were purchased or produced by the taxpayer. As section 45X(d)(4) directs the taxpayer to treat itself as selling both EC 1 and EC 2 to the unrelated person, it is necessary to determine a credit for each EC 1 and EC 2 when both were produced by the taxpayer.

In this example, the \$50X of production costs attributable to EC 1 were not incurred with respect to the production of EC 2, since the production of EC 2—in other words, the substantial transformation of EC 1 into EC 2—does not include the production of EC 1. Thus, the taxpayer would be eligible for a total section 45X credit of \$15X: \$5X (10% of \$50X) for EC 1 and \$10X (10% of \$100X) for EC 2. If the \$50X of production costs attributable to EC 1 were included for both EC 1 and EC 2, then the same costs would be double credited. Double crediting would result in the taxpayer generating a \$20X credit from the sale of EC 1 and EC2, which would provide an increased credit amount as compared to the credit amount that should result from the \$150X of actual production costs incurred (or, stated differently, a section 45X credit that was 13.33 percent of the taxpayer's actual \$150X of production costs in the example). The correct result is taxpayer should be viewed as having incurred \$50X of production costs for EC 1 and \$100X of production costs for EC 2, resulting in a \$15X credit, which also matches 10 percent of the taxpayer's actual production costs

(\$150X) and does not create a double crediting of costs.

Alternatively, consider a taxpayer that, instead of producing EC 1, purchases EC 1 for \$60X. The taxpayer then spends another \$100X producing EC 2, using EC 1. Similar to the vertically integrated taxpayer, when the taxpayer sells EC 2, pursuant to section 45X(d)(4), the taxpayer is treated as having sold EC 1 and EC 2 to an unrelated person. The difference is that in this case the taxpayer did not produce EC 1, and therefore the taxpayer does not satisfy section 45X(a)(1)(A) for a section 45X credit for the sale of EC 1. If the taxpayer were permitted to include the costs for EC 1 (\$60X) in calculating the credit for EC 2, then the taxpayer would receive a larger credit for producing EC 2 than if the taxpayer had produced both EC 1 and EC 2. Without a clearer indication in the statute that Congress intended to treat these two fact patterns differently, in a way that disadvantages vertically integrated production, the statute as a whole is appropriately implemented when the result is the same credit amount for EC 2 (\$10X in these examples) whether the taxpayer purchases or produces EC 1.

In comparing the two results of these examples under the final rule, the vertically integrated taxpayer gets a larger total section 45X credit by directly engaging in more credit generating activities, while the non-vertically integrated taxpayer receives a section 45X credit commensurate with its activities of producing EC 2, but no credit for integrated eligible components that it did not produce. These results are consistent with the general rule of section 45X(a)(1) and (2) and avoid allowing taxpayers to use the same cost in multiple credit calculations.

Section 45X(d)(2) provides that only sales of eligible components produced within the United States, or a United States territory, are taken into account for purposes of section 45X and is additional support for the rule that does not include foreign applicable critical minerals or electrode active materials in production costs, regardless of whether purchased or produced by the taxpayer. Allowing a foreign produced applicable critical mineral or electrode active material to increase the section 45X credit conflicts with section 45X(d)(2), particularly when considered with the rule under section 45X(d)(4). The Treasury Department and the IRS also note that section 45X(d)(2) confirms that treatment as an "eligible component" is not dependent on where production occurred, and so a foreign applicable critical mineral or electrode active

material is an eligible component subject to the rule in section 45X(d)(4).

The final rule is also consistent with the overall purpose of section 45X and addresses the concerns described in the preamble of the Proposed Regulations. While the final rule adopts certain commenters' position that incurring material costs is necessary and may add value to a production process, the Treasury Department and IRS maintain that the inclusion of material costs must be balanced against the risk of multiple crediting of the same costs and the creation of incentives that are contrary to the purpose of section 45X. The final rule accomplishes this balance. Further, although applicable critical minerals and electrode active materials, or any other eligible component, produced outside the United States do not pose a risk of multiple crediting, permitting the production costs of a non-U.S. produced applicable critical mineral or electrode active material to be included in production costs would provide an incentive for the purchase of electrode active materials or applicable critical minerals produced abroad, which is inconsistent with the overall statutory scheme and purpose of section 45X (that is, to encourage domestic production of eligible components). Thus, excluding all costs of acquiring materials that are eligible components (for example, an applicable critical mineral or electrode active material at the time of acquisition) as a direct or indirect material cost with respect to the production of another applicable critical mineral or electrode active material appropriately implements the statute. It is also appropriate to have the same rules for applicable critical minerals and electrode active materials with respect to production costs, as the statutory language regarding calculation of the credit for applicable critical minerals and electrode active materials is the same.

These final regulations also include certain substantiation requirements for a taxpayer that is claiming a section 45X credit with respect to an applicable critical mineral or electrode active material. The preamble to the Proposed Regulations supported not including all direct and indirect material costs by referencing the possibility that the same production costs may be credited multiple times and the potential for increased fraud and abuse related to claiming the section 45X credit. Proposed § 1.45X-4(c)(4) would have required the taxpayer to document that their product meets the criteria for an applicable critical mineral as described in section 45X(c)(6) with a certificate of analysis (COA) provided by the taxpayer

to the person to which the taxpayer sold the applicable critical mineral. The Treasury Department and the IRS requested comments on this substantiation requirement, including whether a similar requirement should be applied to electrode active materials.

Based on a review of the comments, including comments specifically suggesting certification statements, and the need to balance the expansion of costs included as production costs with respect to the Proposed Regulations while mitigating the risk of fraud, waste and abuse, these final regulations revise the substantiation rules in proposed § 1.45X-4(c)(4) for applicable critical minerals and added substantiation rules for electrode active materials in § 1.45X-3(e)(2)(iv)(C). In order to include direct or indirect materials costs as defined in § 1.263A-1(e)(2)(i)(A) and (e)(3)(ii)(E) as production costs when calculating a section 45X credit for the production and sale of an applicable critical mineral or electrode active material, a taxpayer must include, as at attachment to the return on which the section 45X credit is claimed, certifications from any supplier, including the supplier's employer identification number and that is signed under penalties of perjury, from which the taxpayer purchased any constituent elements, materials, or subcomponents of the taxpayer's eligible component, stating that the supplier is not claiming the section 45X credit with respect to any of the material acquired by the taxpayer, nor is the supplier aware that any prior supplier in the chain of production of that material claimed a section 45X credit for the material. A taxpayer must also prepare the following information, and maintain that information in the taxpayer's books and records: (1) a document that provides an analysis of any constituent elements, materials, or subcomponents that concludes the material did not meet the definition of an eligible component (for example, did not meet the definition of applicable critical mineral or electrode active material) at the time of acquisition by the taxpayer (the document may be prepared by the taxpayer or ideally by an independent third-party); (2) a list of all direct and indirect material costs and the amount of such costs that were included within the taxpayer's total production cost for each electrode active material or applicable critical mineral, as applicable; and (3) a document related to the taxpayer's production activities with respect to the direct and indirect material costs that establishes the materials were used in the production of

the electrode active material or applicable critical mineral, as applicable (the document may be prepared by the taxpayer or ideally by an independent third-party). Finally, the taxpayer must provide any other information related to the direct or indirect materials specified in guidance and comply with the directions for providing such information as specified in guidance. Failure to provide this documentation with the return filing, or providing a "available upon request" statement, will constitute a failure to substantiate the claim. The Treasury Department and the IRS have determined, in consultation with the Department of Energy, that these revisions to the Proposed Regulations are necessary in order to properly substantiate credit amounts claimed under section 45X for applicable critical minerals and electrode active materials.

2. Battery Cells—Definition

a. In General

Consistent with section 45X(c)(5)(B)(ii), proposed § 1.45X-3(e)(3)(i) would have defined the term battery cell as an electrochemical cell comprised of one or more positive electrodes and one or more negative electrodes, with an energy density of not less than 100 watt-hours per liter, and capable of storing at least 12 watt-hours of energy.

Commenters asked for additional guidance clarifying the volumetric energy density calculation methodology given the variety of battery shapes, sizes, and construction methodologies that exist in the market. The Treasury Department and the IRS understand these comments to be made with respect to calculating energy density under proposed § 1.45X-3(e)(3)(i)(B) and agree that clarification would be helpful. Energy density can refer to volumetric energy density but is commonly used to refer to gravimetric (mass-based) energy density. These final regulations clarify that energy density is referring to volumetric energy density in § 1.45X-3(e)(3)(i)(B).

One commenter asked that the final rules provide that hydrogen fuel cells be included under the definition of battery cells by amending the definition of a battery cell to waive the requirement that a battery cell be capable of storing at least 12 watt-hours of energy and permitting this requirement to be met by "a large hydrogen storage tank." The Treasury Department and the IRS do not have the authority to amend the definition of a battery cell in the final regulations or to waive the requirement that it be capable of storing at least 12

watt-hours of energy. For this reason, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

At least one commenter raised a matter involving a vertically integrated manufacturer of electric vehicles that, together with a related person, operates a battery cell production facility. According to the commenter, the commenter purchases battery cells from this production facility and assembles, integrates, and incorporates them into battery modules at battery assembly facilities located in other States. Modules produced at these assembly facilities are then shipped to various electric vehicle production facilities. As described by the commenter, the process of taking completed battery cells and integrating, incorporating, and assembling them into completed battery packs happens across several different facilities, all of which are operated by the commenter and its affiliates that are separate legal entities. Each facility is neither solely a battery module facility nor solely a battery pack facility. The commenter requested that the final regulations allow a vertically integrated manufacturer and related parties to elect which facility will receive the credit in situations where the manufacturer and related parties complete all stages of the production process and can substantiate that the corresponding credit will not be duplicated. The Treasury Department and the IRS appreciate the complex operations that may be inherent in battery production. However, the statute requires a determination of the taxpayer that produces an eligible component and does not authorize the relief requested by the commenter.

b. Capacity Measurement

Proposed § 1.45X–3(e)(3)(ii) would have provided that taxpayers must measure the capacity of a battery cell in accordance with a national or international standard, such as IEC 60086–1 (Primary Batteries), or an equivalent standard. Taxpayers can reference the United States Advanced Battery Consortium (USABC) Battery Test Manual for additional guidance.

Several commenters agreed with the proposed definition because it provided taxpayers the ability and needed flexibility to determine the appropriate standard, but others recommended additional guidance or information be included in these final regulations. A commenter requested that the final regulations “retain the criteria that the standard used by the taxpayer must be one issued by a recognized standards setting body.” While not specifically using that language, these final

regulations do maintain that concept by continuing to require measurement in accordance with a national or international standard.

Another commenter requested that the final regulations eliminate the reference to “an equivalent standard” to IEC 60068–1 because “IEC 60086–1 is not applicable to rechargeable battery chemistries, and it is unknown therefore what an equivalent standard would be.” The Treasury Department and the IRS have determined that this clarification is unnecessary because the reference to IEC 60068–1 or “an equivalent standard” merely provides a non-exclusive example of an acceptable national or international standard for capacity measurement. These final regulations therefore do not adopt the commenter’s suggestion.

Other commenters suggested the addition of various specific national or international standards to the language provided in proposed § 1.45X–3(e)(3)(ii) regarding the standards to be used for battery cell capacity measurement. The Treasury Department and the IRS understand the desire for assurance but have determined that these proposed additions, if included as examples, will not add further clarity to the final regulations. The Treasury Department and the IRS further do not think that there is a basis to include any of these proposed additions as the exclusive standard or standards for capacity measurement. The final regulations therefore do not adopt these commenters’ suggestions regarding particular national or international standards to be used for capacity measurement in § 1.45X–3(e)(3)(ii).

Another commenter recommended that the final regulations require that battery cell “capacity” must be mathematically normalized to a 100-hour discharge time, regardless of the time otherwise dictated by the appropriate national or international standard. The Treasury Department and the IRS do not think there is a basis to adopt this requirement, as this would displace other national or international standards with a new requirement that is not in the statute. Therefore, the Treasury Department and the IRS decline to adopt additional specific standards in these final regulations beyond those provided in the Proposed Regulations.

Some commenters noted that the USABC Battery Test Manual, which proposed § 1.45X–3(e)(3)(ii) states may be used for additional guidance regarding measurement of the capacity of a battery cell, is not applicable to all battery cell applications and technologies that may be eligible for the

section 45X credit. One commenter suggested removing the reference to the USABC Battery Test Manual for this reason. Because the inclusion of this reference is intended to inform taxpayers of a resource that may be helpful in some cases, even if it may not be applicable in all cases, the Treasury Department and the IRS decline to adopt this suggestion.

Another commenter suggested an additional requirement to conduct a performance test in a certified laboratory once every three years to verify the capacity of the battery cell. It was unclear from the comment when this performance testing would be required. Section 45X requires the production and sale of eligible components. Because an eligible component must meet the requirements under section 45X at the time of sale, it would be inappropriate to verify capacity once every three years. Thus, the Treasury Department and the IRS decline to adopt this additional capacity measurement requirement in the final regulations.

3. Battery Modules—Definition

Under section 45X(c)(5)(B)(iii), the term battery module, in the case of a module using battery cells, is a module with two or more battery cells which are configured electrically, in series or parallel, to create voltage or current, as appropriate, to a specified end use, with an aggregate capacity of not less than 7 kilowatt-hours (or, in the case of a module for a hydrogen fuel cell vehicle, not less than 1 kilowatt-hour). Similarly, under section 45X(c)(5)(B)(iii), a battery module with no cells means a module with an aggregate capacity of not less than 7 kilowatt-hours (or, in the case of a module for a hydrogen fuel cell vehicle, not less than 1 kilowatt-hour). Consistent with section 45X(c)(5)(B)(iii), proposed § 1.45X–3(e)(4)(i) would have defined battery module to mean a module described in proposed § 1.45X–3(e)(4)(i)(A) (with cells) or (B) (without cells) with an aggregate capacity of not less than 7 kilowatt-hours (or, in the case of a module for a hydrogen fuel cell vehicle, not less than 1 kilowatt-hour).

Some commenters suggested lowering the aggregate capacity limitation to incentivize domestic production of all battery types used in various industrial applications. One commenter recommended eliminating the capacity thresholds entirely for battery modules when used in medical or military applications. While the Treasury Department and the IRS appreciate commenters’ desire to incentivize domestic battery manufacturing, section 45X(c)(5)(B)(iii)(II) provides the

aggregate capacity thresholds that battery modules must meet in order to be eligible components. The Treasury Department and the IRS decline to adopt the commenters' request to alter or eliminate the aggregate capacity requirements for battery modules as such revisions would be inconsistent with the statute. Thus, these final regulations adopt proposed § 1.45X-3(e)(4)(i) without change.

a. Modules Using Battery Cells

Proposed § 1.45X-3(e)(4)(i)(A) would have defined a module using battery cells as a module with two or more battery cells that are configured electrically, in series or parallel, to create voltage or current (as appropriate), to a specified end use, meaning an end-use configuration of battery technologies. Under the proposed rule, an end-use configuration is the product that ultimately serves a specified end use. It is the collection of interconnected cells, configured to that specific end-use and interconnected with the necessary hardware and software required to deliver the required energy and power (voltage and current) for that use. The preamble to the Proposed Regulations explained that, as applied to batteries commonly used in electric vehicles, proposed § 1.45X-3(e)(4)(i)(A) would have permitted a credit for the production and sale of the battery pack in an electric vehicle, but it would not have permitted a credit for the production of a module that is not the end-use configuration. The Treasury Department and the IRS requested comments on this proposed interpretation of the phrase "to a specified end use" in section 45X(c)(5)(B)(iii)(I)(aa).

Many commenters raised concerns with the interpretation of the phrase "to a specified end use" in proposed § 1.45X-3(e)(4)(i)(A). Some commenters asserted that requiring that modules be in an end-use configuration would be overly restrictive for certain product categories. For example, certain types of modules may be transported to the end-use site only partially assembled due to safety considerations, with final assembly performed by the battery manufacturer, the customer, or a third-party contractor.

Similarly, a few commenters expressed concern that no taxpayer may be eligible for the battery module credit in certain cases. One commenter suggested that this result might occur if module manufacturers do not manufacture a pack in its end-use configuration. Further, those who purchase such items and convert them to their end-use configuration may

struggle to demonstrate their activities amount to substantial transformation. One commenter suggested changing proposed § 1.45X-3(e)(4)(i)(A) to provide that "an end-use configuration is the product that ultimately serves a specified end use—whether delivered pre-assembled or assembled on-site." Further, the commenter recommended an additional sentence at the end of proposed § 1.45X-3(e)(4)(i)(A) to identify the section 45X claimant in cases where assembly occurs by someone other than the taxpayer.

Several commenters stated that proposed § 1.45X-3(e)(4)(i)(A) created confusion because the definition of battery module could, in some circumstances, include the items that are referred to in industry as "battery packs." One commenter noted that while battery cells and modules predominantly originate from battery manufacturers, battery packs are assembled by electric vehicle manufacturers before being installed in electric vehicles.

Some commenters requested that, if the definition of battery modules includes battery packs in the case of electric vehicle battery modules, the process to transform what is colloquially referred to in industry as a battery module into what is known as a "battery pack" be clarified in the final regulations to constitute disqualifying minor assembly or "partial transformation." Another commenter requested that the final regulations state that the rules are agnostic as to the form or manner in which a battery module with cells is incorporated into the electric vehicle.

Other commenters supported the proposed definition of battery module with cells, stating that this definition appropriately captures the intention of the section 45X credit. One commenter asserted that the battery pack production covered by the proposed definition is a more valuable activity than the production of a single battery module and is the activity closer to the downstream consumer.

The Treasury Department and the IRS appreciate the comments received regarding battery modules and have determined, in close consultation with the Department of Energy, that additional clarification is needed. Section 45X(c)(5)(B)(iii)(I)(aa) defines battery module using battery cells as "a module using battery cells, with two or more battery cells which are configured electrically, in series or parallel, to create voltage or current, as appropriate, to a specified end use[. . .]." Section 45X(c)(5)(B)(iii)(II) provides a capacity threshold limitation of "[an] aggregate

capacity of not less than 7 kilowatt-hours (or, in the case of a module for a hydrogen fuel cell vehicle, not less than 1 kilowatt-hour)" that such battery module using battery cells (as defined in section 45X(c)(5)(B)(iii)(I)(aa)) must meet.

In reviewing comments, the Treasury Department and the IRS understand that the explanation in the preamble of the Proposed Regulations regarding application to electric vehicles may not have aligned with industry understanding and the statutory text. Upon review of the comments received, the Treasury Department and the IRS wish to restate that the requirement found in section 45X(c)(5)(B)(iii)(I)(aa), that battery modules using battery cells that contain battery cells configured to a specified end use, applies regardless whether the items are typically called "battery modules" or "battery packs" in industry practice. These final regulations are therefore clarified to provide that a battery module using battery cells becomes an eligible component upon first meeting the requirements of section 45X(c)(5)(B)(iii)(I)(aa) and (c)(5)(B)(iii)(II), notwithstanding when this transformation may occur in a manufacturing production chain.

At least one commenter requested a rule allowing the entity that assembles the pack to assign tax credits to the joint venture that manufactured the module. Alternatively, if the definition of specified end use is not adopted with respect to joint ventures, the regulations should instead allow for joint venture partners to assign battery-related section 45X credits to the joint venture as the parties see fit, or in cases where the parties do not choose to assign the credits to one of the parents, the joint venture itself. This comment is not adopted as issues specific to joint ventures are outside the scope of these final regulations. For discussion of "produced by the taxpayer" and the associated rules for who may claim the section 45X credit, see Part II.B. of this Summary of Comments and Explanation of Revisions.

b. Modules With No Battery Cells

Proposed § 1.45X-3(e)(4)(i)(B) would have defined the term "module with no battery cells" as a product with a standardized manufacturing process and form that is capable of storing and dispatching useful energy; that contains an energy storage medium that remains in the module (for example, it is not consumed through combustion); and that is not a custom-built electricity generation or storage facility. This proposed definition would allow battery

technologies, such as flow batteries and thermal batteries, to be eligible for the section 45X credit, but would not permit technologies that do not meet this definition, such as standalone fuel storage tanks or fuel tanks connected to engines or generation systems, to qualify as a module with no battery cells.

Several commenters supported the proposed definition of a battery module, and specifically the inclusion of thermal batteries. Commenters also asked for clarification regarding a technology-neutral application of the proposed definition of a battery module. Other commenters suggested specific clarifications to the final regulations regarding certain types of thermal battery systems, such as thermal ice storage or thermal bricks. Some commenters requested that the final regulations incorporate similar language used in the section 48 proposed regulations to facilitate this technology-neutral treatment. For example, these commenters suggested that the final regulations should adopt the language in proposed § 1.48–9(e)(10)(ii) by specifically stating that “batteries of all types (such as lithium ion, vanadium flow, sodium sulfur, and lead-acid)” are eligible components. Commenters asserted that there is symmetry between the investment tax credits for energy storage property and advanced manufacturing credits for energy storage products. Additionally, commenters raised that technology-neutral treatment aligns with Congressional intent to establish eligibility criteria based on performance thresholds, not technology.

The Treasury Department and the IRS, in close consultation with the Department of Energy, agree with commenters that a battery module with no battery cells does not require a specific storage medium nor are there chemistry-based requirements for qualifying battery modules. However, the Treasury Department and the IRS decline to include specific language as a non-exhaustive list of possible storage mediums. Including a non-exhaustive list of current storage mediums on an industry-by-industry basis is not practical and may inadvertently create confusion for other emerging technologies on whether those mediums would qualify for the section 45X credit.

Some commenters disagreed with the requirement in proposed § 1.45X–3(e)(4)(i)(B) that the storage medium remain in the module, asserting that the requirement “may inadvertently exclude technologies” such as compressed air “that can deliver on the intent of the regulations.” The Treasury Department and the IRS decline to amend proposed § 1.45X–3(e)(4)(i)(B) in

response to this comment. The Treasury Department and the IRS, in consultation with the Department of Energy, have determined that the proposed rule appropriately implements the statute. The requirement that the storage medium remain in the module gives meaning to both “battery” and to “module.” For batteries, this requirement describes a feature common to electrochemical and more nascent types of batteries and distinguishes batteries from technologies that rely on fuel. For modules, this requirement helps segregate qualifying technologies from those that are self-contained and not merely one component of a larger system.

Manufacturing the constituent components of battery modules without manufacturing the entire energy storage system does not result in the production of a module with no battery cells under the final regulations. For example, in thermal energy storage applications, the taxpayer must produce and sell the entire system and not just the storage medium. A manufacturer that only produces a thermal storage medium (for example, molten salt) in a thermal energy storage system would not be eligible for the credit. Requiring the production of the entire energy storage system from “energy in” through “energy out” provides similar treatment for purposes of the section 45X credit to the production of a battery module using battery cells.

Numerous comments requested additional clarification of “custom-built electricity . . . storage facility.” Commenters noted that the definition in proposed § 1.45X–3(e)(4)(i)(B) creates ambiguity as to which modifications made in order to meet site or use specifications would trigger the “custom-built” disqualifier. Several commenters asserted that the Proposed Regulations create additional limitations on battery modules without cells that do not apply to the other eligible components. Commenters contended that the terms in the Proposed Regulations, such as “manufacturing,” “standardized,” and “not custom-built,” do not appear in the statutory text and diverge from the general approach taken by the Proposed Regulations with respect to other eligible components. Some commenters asserted that nearly all thermal battery implementations are associated with custom-built generation and storage facilities.

These commenters requested that the final regulations clarify that the eligible components may be assembled with other property to comprise a functioning energy generation or storage facility. Commenters also suggested additional

clarity regarding the physical boundaries of a battery module and thought that using the proposed definition of “produced by the taxpayer” would allow for an eligible component to be assembled on-site, such as battery modules with no battery cells that are too heavy and large to transport fully assembled. Commenters asserted that most or all batteries will require some amount of on-site installation. Commenters generally requested that the final regulations provide a clear and principled definition of “custom-built” that continues to support a technology-neutral and inclusive implementation of section 45X.

Commenters provided various alternatives to further clarify the definition of “custom-built” in the Proposed Regulations. One commenter recommended clarifying the definition of “a custom-built electricity storage facility” as “a facility (1) that contains an energy storage medium and (2) of which all, or substantially all, of the integral components are designed specifically for the facility and are not interchangeable with components of other facilities that utilize the same or similar electricity storage technology.” Another commenter asked that the final regulations clarify that a module with no battery cells is not treated as custom-built if modules are produced by the taxpayer using the same or similar components or property generally used by the taxpayer to produce such modules but in different configurations or amounts to accommodate the storage needs or the site layout applicable to the storage asset. A commenter recommended clarifying the definition that a module with modular components manufactured offsite may undergo final assembly at its installation site without being considered a custom-built facility and include an example regarding final assembly on site. Another suggestion included clarifying that modules with no cells are items of property that must be combined with other tangible personal property to store energy.

Separately, a commenter noted that for contract manufacturing arrangements, “a routine order for off-the-shelf-property” is not eligible for the section 45X credit. The commenter suggested the final regulations provide that an agreement will be treated as a routine purchase order for off-the-shelf property if the contractor is required to make no more than *de minimis* modifications to the property to tailor it to the customer’s specific needs. However, if the manufacturer does make more than *de minimis* modifications,

the module may be custom-built. The commenter asserted that the proposed rule sets up a complicated dichotomy under which manufacturers of modules with no battery cells who enter into contract manufacturing arrangements will have to establish an undefined standard that are neither off the shelf nor custom-built.

Commenters also provided specific examples regarding whether certain technologies or configurations would be considered custom-built. For example, physical site conditions at a customer's site may require that the same components used for one pumped heat energy storage (PHES) are differently arranged for another PHES. The use of the PHES by a customer may require modified storage durations (for example, 20 hours versus 10 hours), which would require additional storage media and vessels. The commenter asserted that this should not be considered custom-built. Commenters also noted that, for closed-loop pumped storage hydropower systems, pipes and other related components are otherwise produced in a standardized process, and neither resemble nor are functionally equivalent to standalone fuel storage tanks or fuel tanks connected to engines or generation systems custom-built electricity generation or storage facility. Commenters also raised that these differences are based on the topography of the site where the system is located and not on the intended function of these components or the system as a whole.

One commenter requested that the Treasury Department and the IRS include hydrogen fuel cell systems under the definition of a battery module using battery cells. Proposed § 1.45X-3(e)(4)(i)(B) would define the term "module with no battery cells" as a product with a standardized manufacturing process and form that is capable of storing and dispatching useful energy, that contains an energy storage medium that remains in the module (for example, it is not consumed through combustion), and that is not a custom-built electricity generation or storage facility.

In general, the Treasury Department and the IRS appreciate the complexity of the issues raised by commenters. Given the myriad of technologies, industry-specific applications, and customary business practices, the final regulations provide additional clarifications. The Treasury Department and the IRS understand the need for clear, administrable rules for both taxpayers and the IRS. The comments also illustrate the impracticality of providing rules to specifically address

all situations. The Treasury Department and the IRS, in close consultation with the Department of Energy, have determined that the definition provided in proposed § 1.45X-3(e)(4)(i)(B) strikes the appropriate balance between bright-line rules and the necessary flexibility for evolving industries. The Treasury Department and the IRS therefore decline to adopt suggested revisions to the definition of "module with no battery cells" in the final regulations.

The Treasury Department and the IRS, in close consultation with the Department of Energy, also have determined that requiring battery modules be modular in the sense that they are both self-contained and not highly customized appropriately implements the statutory definition provided in section 45X(c)(5)(B)(iii). Because of this, the preamble to the Proposed Regulations further clarified that this proposed definition would allow battery technologies such as flow batteries and thermal batteries to be eligible for the section 45X credit, but it would not permit technologies that do not meet this definition such as standalone fuel storage tanks or fuel tanks connected to engines or generation systems to qualify as a module with no battery cells. For these reasons, the Treasury Department and the IRS decline to adopt this comment in the final regulations.

One commenter recommended adopting the definition of modules using battery cells for the definition of modules with no battery cells, with the addition that the module should receive, store, and deliver energy for conversion to electricity. However, adopting the commenter's recommended definition would not be appropriate for modules with no battery cells because the definition of modules using battery cells requires the inclusion of battery cells in the module. Accordingly, The Treasury Department and the IRS decline to adopt the commenter's recommendation.

The Treasury Department and the IRS agree with commenters who suggest that the examples illustrating the contrast between "substantial transformation" and disqualifying minor assembly, explained in Part II.B. of this Summary of Comments and Explanation of Revisions provide useful guidelines for taxpayers and the IRS in determining what is a standardized manufacturing process and not a custom-built electricity generation or storage facility. Thus, incidental onsite assembly of prefabricated modular components for final assembly that are generally produced in the ordinary course of a taxpayer's trade or business would

constitute a standardized manufacturing process for purposes of § 1.45X-3(e)(4)(i)(B). Battery modules with no battery cells that undergo a substantial transformation onsite or are specially manufactured for a single customer would constitute a custom-built electricity generation or storage facility. The Treasury Department and the IRS decline to provide a *de minimis* threshold which would exclude certain manufacturing or configurations that would otherwise qualify for the section 45X credit using the principles described in Part II.B. of this Summary of Comments and Explanation of Revisions.

c. Capacity Measurement

Proposed § 1.45X-3(e)(4)(ii)(A) would have provided that, for modules using battery cells, taxpayers must measure the capacity of a module with a testing procedure that complies with a national or international standard published by a recognized standard setting organization. The capacity of a battery module using battery cells may not exceed the total capacity of the battery cells in the module. Proposed § 1.45X-3(e)(4)(ii)(B) would have provided that, for modules with no battery cells, taxpayers must measure the capacity using a testing procedure that complies with a national or international standard published by a recognized standard setting organization. If no such standard applies to a type of module with no battery cells, taxpayers must measure the capacity of such module as the Secretary may prescribe in regulations or other guidance. The Treasury Department and the IRS requested comments on what recognized national or international standards are currently available for measuring capacity of modules with no battery cells and whether further guidance may be required.

One commenter suggested that the aggregate capacity measurement outlined in section 45X and the Proposed Regulations for battery modules is challenging to apply in the context of thermal battery modules with no cells. Another commenter explained that battery capacity measurements are subject to variations contingent upon environmental conditions during measurement and that capacity assessment for both battery cells and battery modules must occur within a standard testing environment. Some commenters agreed with the approach in the Proposed Regulations of allowing taxpayers to determine the appropriate national or international standards because taxpayers are in a better position to determine the appropriate

standard. Moreover, this approach provides the flexibility necessary for emerging technologies to qualify for the credit. Such commenters requested that the final regulations retain the criteria that the taxpayer must use a testing procedure issued by a recognized standards setting body.

Other commenters explained that the Treasury Department and the IRS should prescribe a flexible approach to capacity measurement for battery modules with no battery cells such that different technologies are appropriately measured and provide alternative testing procedures that complies with a national or international standard published by a recognized standard setting organization that is relevant and applicable for the varying technologies. One commenter asserted that, in their view, such standards may include American Society of Mechanical Engineers (ASME) or International Standards Organization (ISO), but specifically recommended that capacity should be measured based on nameplate capacity as provided in 40 CFR 96.202 in the absence of a bright-line standard. Another commenter supported this approach because of alleged difficulties in determining the minimum capacity of battery modules with no cells before they are placed in service. Other commenters suggested various standards, including ASME PTC 53; ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 94.2–2010; and ASHRAE 94 testing methods (specifically, 94.1, 94.2, and 94.3). Another commenter recommended that the final regulations require use of a conversion factor of $1.16RT/kW = 14/12$ and recommended that the regulations provide a capacity measure if there is no national or international standard for a given technology.

A different commenter raised concerns regarding capacity measurement for battery modules with no battery cells and suggested adding to proposed § 1.45X–3(e)(4)(iii)(B), “. . . The capacity of each battery module is expressed on a kilowatt-hour basis in the actual useful energy unit that is specific to the battery module without cells. For example, both thermal and thermochemical battery modules have their capacity expressed on a kilowatt-hour-thermal basis.”

The Treasury Department and the IRS, after consultation with the Department of Energy, have determined that taxpayers producing thermal and thermochemical battery modules with no battery cells must convert the energy storage to a kilowatt-hour basis and provide both methodology and testing

regarding this conversion. Taxpayers must maintain this testing and methodology as part of books and records under section 6001. However, the kilowatt-hour conversion cannot exceed the direct conversion of the total nameplate capacity of the thermal battery module to kilowatt-hours (the capacity that is sold to the consumer). The taxpayer claiming the section 45X credit must use the same methodology consistently, subject to any updated standard of the same methodology and testing, for battery modules (with or without cells) sold in the taxpayer's trade or business. The final regulations incorporate these clarifications in § 1.45X–3(e)(4)(ii) regarding testing and methodology with respect to battery modules.

One commenter requested the final rules remove the requirement that the capacity of a battery module not exceed the total capacity of the battery cells in the module because the different structures of each eligible component may affect the capacity measurement of the module. The Treasury Department and the IRS, in consultation with the Department of Energy, have determined that this rule serves an important function in reducing the potential to manipulate testing conditions in the measurement of capacity and in encouraging the application of reliable measurement standards for battery cells. The Treasury Department and the IRS therefore decline to remove the requirement that the capacity of a battery module not exceed the total capacity of the battery cells in the module.

Another commenter requested that the final regulations provide that the entity that manufactures a battery module that exceeds the statutory 7 kilowatt-hours threshold limitation in section 45X(c)(5)(B)(iii)(II) receives the \$10/kWh module credit. As discussed in Part IV.E.3.a. of this Summary of Comments and Explanation of Revisions, the taxpayer that produces and sells the eligible component (when a battery module first becomes the eligible component) may claim the section 45X credit. Whether an eligible component is produced by the taxpayer is generally discussed in Part II.B. of this Summary of Comments and Explanation of Revisions.

A commenter noted that proposed § 1.45X–3(e)(4)(i), which provides the definition for battery modules “with an aggregate capacity of not less than 7 kilowatt-hours,” aligns with section 30D. The language in section 30D is based on the capacity of the complete battery installed on the vehicle. The commenter asserted that the parallel

language describing the capacity threshold in section 45X and in section 30D indicates that the eligible component for the section 45X credit for battery modules are the items commonly referred to in industry as “battery packs.” This comment is not adopted. As explained in Part IV.E.3.a. of this Summary of Comments and Explanation of Revisions, a battery module (within the meaning of section 45X) is an eligible component, regardless of whether industry nomenclature would describe that module as a “battery pack.”

Proposed § 1.45X–3(e)(5)(i) would have provided a special rule where the capacity determined with respect to a battery cell or battery module must not exceed a capacity-to-power ratio of 100:1. At least one commenter requested clarification on the definition of “capacity to power ratio.” The commenter noted that term could mean either the maximum energy that the battery cell and module can hold or the maximum output that the battery cell and module can release instantaneously. The final regulations retain the proposed rule defining “capacity to power ratio” in § 1.45X–3(e)(5). The Treasury Department and the IRS confirm that the rule, with respect to a battery cell or battery module, the capacity-to-power ratio refers to both the power and the capacity as a cap on the section 45X credit amount, rather than an eligibility criterion. Power is the battery cell's maximum rate of discharge; capacity is the maximum amount of energy the component can store.

F. Phase-Out Rule

Consistent with section 45X(b)(3), proposed § 1.45X–3(f)(1) would have provided that, in the case of any eligible component sold after December 31, 2029, the amount of the section 45X credit determined with respect to such eligible component is equal to the product of the amount determined under proposed § 1.45X–3(b) through (e) with respect to such eligible component, multiplied by the phase out percentage under proposed § 1.45X–3(f)(2). Consistent with section 45X(b)(3)(C), proposed § 1.45X–3(f)(3) would have provided that the phase out rules described in proposed § 1.45X–3(f)(1) and (2) apply to all eligible components except applicable critical minerals. Proposed § 1.45X–3(f)(2) would have provided the phase out percentage is equal to 75 percent for eligible components sold during calendar year 2030; 50 percent for eligible components sold during calendar year 2031; 25 percent for eligible

components sold during calendar year 2032, and zero percent for eligible components sold after calendar year 2032.

A commenter expressed concern that the phase out rules create disparate treatment of an applicable critical mineral produced by a taxpayer that with further value-added processing would result in the production of an electrode active material and provided the example of the production of natural graphite active anode materials. The commenter stated that if the production of the applicable critical mineral and production of the electrode active material occurs in a vertically integrated company, the taxpayer may only claim a section 45X credit for one component. Thus, the commenter requests the phase out rule be modified to not apply to electrode active materials.

The Treasury Department and the IRS decline to adopt the commenter's request. The Treasury Department and the IRS do not have the authority to allow a section 45X credit for the production of an electrode active material in amounts in excess of what is permitted under section 45X(b)(3).

For these reasons, these final regulations adopt proposed § 1.45X-3(f) without modification.

V. Applicable Critical Minerals

Proposed § 1.45X-4 would have provided definitions for the listed applicable critical minerals (generally in accordance with section 45X(c)(6)), the credit amounts, and rules regarding production costs for purposes of determining credit amounts. Commenters addressed certain aspects of these proposed rules, as described in this Part V. of the Summary of Comments and Explanation of Revisions. These final regulations generally adopt the rules as proposed in § 1.45X-4, with the modifications described in this Part V. of the Summary of Comments and Explanation of Revisions.

A. In General

Section 45X(c)(6) defines applicable critical minerals that are eligible components for purposes of the section 45X credit. Consistent with section 45X(c)(6), proposed § 1.45X-4 provides that an applicable critical mineral means any of the minerals that are listed in section 45X(c)(6) and defined in proposed § 1.45X-4(b).

Several commenters requested that the final rules generally clarify and expand the eligibility of metals and metal alloys (including alloys made from primary and secondary metal production) under the purity

requirements. Section 45X generally provides specific minimum purity requirements or forms for applicable critical minerals. Metals or metal alloys under the specified purity requirements that do not meet specified forms do not qualify for the section 45X credit. Thus, the Treasury Department and the IRS do not have the statutory authority to add additional metals and alloys to the list of applicable critical minerals in these final regulations.

B. Definitions

1. Aluminum

Section 45X(c)(6)(A) provides that aluminum that is converted from bauxite to a minimum purity of 99 percent alumina by mass or purified to a minimum purity of 99.9 percent aluminum by mass qualifies as an applicable critical mineral. Proposed § 1.45X-4(b)(1) would have defined aluminum to mean aluminum that is converted from bauxite to a minimum purity of 99 percent alumina by mass or purified to a minimum purity of 99.9 percent aluminum by mass. The preamble to the Proposed Regulations stated that section 45X(c)(6)(A) should be interpreted in light of the dynamics of the aluminum industry and the role that critical materials like aluminum play in the renewable energy and energy storage industry. Proposed § 1.45X-4(b)(1) would have interpreted section 45X(c)(6)(A) to mean aluminum, including commodity-grade aluminum, described in section 45X(c)(6)(A)(i) and (ii). Proposed § 1.45X-4(b)(1) would have defined "commodity-grade aluminum" as aluminum that has been produced directly from aluminum that is described in proposed § 1.45X-4(b)(1)(i) or (ii), is limited to primary production of unwrought forms, and is in a form that is sold on international commodity exchanges, which would include commercial grade aluminum that is 99.7 percent aluminum by mass.

A commenter expressed support for the definition of aluminum in the proposed rule, and stated that the statutory definition could be read to apply only to the refining of alumina and, as a result, not benefit domestic primary aluminum producers, nor achieve the spirit of the legislation to increase domestic manufacturing. The commenter noted confusion with the statutory definition, which stated in part, that aluminum "which is converted from bauxite to a minimum purity of 99 percent alumina by mass" meets the definition of aluminum—however, alumina is converted from bauxite, not aluminum. Thus, the commenter noted that the proposed rule

correctly states the primary aluminum production process and will help United States primary aluminum producers bolster domestic operations and strengthen global competitiveness.

A commenter requested that the final regulations provide that aluminum oxide (alumina) is a form of aluminum for the purposes of section 45X(c)(6)(A)(i). The Treasury Department and the IRS note that section 45X(c)(6)(A)(i) provides eligibility for the credit for aluminum that is converted from bauxite to a minimum purity of 99 percent alumina by mass. One commenter requested that the definition of primary aluminum include molten metal. The Treasury Department and the IRS note that section 45X(c)(6)(A)(ii) does not restrict the form of aluminum purified to a minimum purity of 99.9 percent aluminum by mass. One commenter proposed lowering the eligible purity for aluminum to 96 percent. The Treasury Department and the IRS view this request as inconsistent with the statute.

A few commenters requested the definition of primary aluminum include all unwrought primary aluminum smelted from aluminum oxide (that is, alumina). One commenter requested that the final rules clarify that aluminum produced through secondary production is eligible for the section 45X credit. The preamble to the Proposed Regulations stated that proposed § 1.45X-4(b)(1) clarifies that the term "commodity-grade aluminum" is limited to primary production of unwrought forms by specifying that commodity-grade aluminum must be "produced directly" from certain forms of aluminum. The Treasury Department and the IRS understand that the ability to ascertain and substantiate the process or processes used at an earlier point in the lifecycle of feedstock aluminum for secondary production is limited. The Treasury Department and the IRS are concerned that such limitations would pose significant substantiation and administrability issues if secondary production were permitted for commodity-grade aluminum under proposed § 1.45X-4(b)(1).

A few commenters requested that the final rules replace the requirement that commodity-grade aluminum be "in a form sold on international commodity exchanges" with the requirement that such aluminum "has the ability to meet the chemical specifications of aluminum sold on international commodity exchanges," because not all aluminum sold to third-party customers is traded through the London Metal Exchange, which imposes the shape requirements. The commenters state

that commercial grade aluminum is made into products that are alloyed to different specifications and shapes that are not traded through commodity markets, and the final rules should not distinguish among the end markets. Although the Treasury Department and the IRS view the requirement that commodity-grade aluminum be “in a form sold on international commodity exchanges” as providing important clarity and certainty for taxpayers and the IRS, as well as an objective and observable standard to determine eligibility, the Treasury Department and the IRS will continue to consider these comments as they work to finalize proposed § 1.45X–4(b)(1).

One commenter requested the final regulations clarify “aluminum that is converted from alumina with a minimum purity of 99 percent on a fired basis should qualify as an applicable critical mineral.” The Treasury Department and the IRS think that the additional language specifying whether the purity is measured on a fired basis or dried basis is not necessary due to the specific purity standards already listed in section 45X and the proposed rules. In addition, although these terms are often included on a Certificate of Analysis (COA), the Treasury Department and IRS anticipate that using these terms may cause confusion in circumstances in which these terms are not included on a COA.

With respect to all of the comments related to the definition of aluminum, the Treasury Department and the IRS have determined that additional consideration is necessary prior to finalizing proposed § 1.45X–4(b)(1), which the Treasury Department and the IRS intend to do at a later date. For that reason, § 1.45X–4(b)(1) is reserved in these final regulations.

2. Neodymium

Consistent with section 45X(c)(6)(R), proposed § 1.45X–4(b)(18) would have provided that the term neodymium means neodymium that is converted to neodymium-praseodymium oxide that is purified to a minimum purity of 99.5 percent neodymium oxide by mass; or purified to a minimum purity of 99.9 percent neodymium by mass.

One commenter requested that the final rules provide that the following are eligible for the section 45X credit: (1) neodymium if purified to the industry standard minimum purity of 99.0 percent neodymium by mass; (2) neodymium converted to neodymium-

praseodymium and purified to a minimum purity of 99.0 percent neodymium-praseodymium by mass; (3) neodymium-praseodymium that is purified to a minimum purity of 99.0 percent neodymium-praseodymium by mass; and (4) neodymium-iron-boron alloy or neodymium-praseodymium-iron-boron alloy purified to 99.0 percent by mass. The Treasury Department and the IRS do not have the statutory authority to modify the definition of neodymium or to modify purity percentages in proposed § 1.45X–4(b)(18) and these final regulations adopt this proposed rule without change.

3. Vanadium

Consistent with section 45X(c)(6)(X), proposed § 1.45X–4(b)(24) would have provided that the term vanadium means vanadium that is converted to ferrovandium or vanadium pentoxide. One commenter requested that the definition of vanadium includes vanadium when it is purified to a minimum purity of 99 percent vanadium by mass. The Treasury Department and the IRS do not have the statutory authority to modify the definition of vanadium to include purity percentages, and these final regulations adopt this proposed rule without change.

4. Magnesium

Consistent with section 45X(c)(6)(Z)(x), proposed § 1.45X–4(b)(26)(x) would have provided that the term magnesium means magnesium purified to a minimum purity of 99 percent by mass. One commenter requested that the definition of magnesium be expanded to include magnesium oxide and magnesium hydroxide at purity levels that range from 90–98 percent. The Treasury Department and the IRS do not have the statutory authority to modify the definition of magnesium or to modify purity percentages in proposed § 1.45X–4(b)(26)(x), and these final regulations adopt this proposed rule without change.

C. Credit Amount—in General

Section 45X(b)(1) generally provides the credit amount determined with respect to any eligible component, including any eligible component it incorporates, subject to the credit phase out provided at section 45X(b)(3). Section 45X(b)(3)(C) provides that the credit phase out does not apply with respect to any applicable critical mineral.

Section 45X(b)(1)(M) provides that, in the case of any applicable critical

mineral, the credit amount is an amount equal to 10 percent of the costs incurred by the taxpayer with respect to production of such mineral. Proposed § 1.45X–4(c)(3) would have provided that the costs incurred for purposes of determining the credit amount includes costs as defined in § 1.263A–1(e) that are paid or incurred within the meaning of section 461 of the Code by the taxpayer for the production of an applicable critical mineral only. As explained in the preamble to the Proposed Regulations, this rule has the effect of excluding any costs incurred after the production of the applicable critical mineral. The Proposed Regulations applied section 263A and the section 263A regulations solely to identify the types of costs that are includible in production costs incurred for purposes of computing the credit amount. The Proposed Regulations did not apply section 263A or the section 263A regulations for any other purposes, such as to determine whether a taxpayer is engaged in production activities.

Under the Proposed Regulations, direct or indirect materials costs, as defined in § 1.263A–1(e)(2)(i)(A) and (e)(3)(ii)(E), respectively, and any costs related to the extraction or acquisition of raw materials would not be taken into account as production costs. The Proposed Regulations would have attributed a wide range of costs to the production of an applicable critical mineral as costs incurred in producing the applicable critical mineral, including, but not limited to, labor, electricity used in the production of the applicable critical mineral, storage costs, depreciation or amortization, recycling, and overhead. However, the cost of acquiring the raw material used to produce the applicable critical mineral; the cost of materials used for conversion, purification, or recycling of the raw material; and other material costs related to the production of the applicable critical mineral were not taken into account.

The Proposed Regulations provided a credit for the costs associated with production activities that add value to the applicable critical mineral and are conducted by the taxpayer that produces the applicable critical mineral. Because purchasing raw materials may enable a taxpayer to produce an applicable critical mineral but it is not by itself an activity that adds value, the Proposed Regulations excluded material costs from creditable costs. This exclusion of material costs mitigates the risk of crediting the same costs multiple times.

Many commenters made similar arguments with respect applicable critical minerals and the inclusion of direct material costs as defined in § 1.263A-1(e)(2)(i)(A), indirect material costs as defined in § 1.263A-1(e)(3)(ii)(E), and costs related to the extraction of raw materials in their production costs for purposes of determining the credit. Commenters argued that there was insufficient textual support for a limitation, and any such limitation would work against the purposes of the credit. As with electrode active materials, commenters asserted that direct costs were often a substantial or predominant cost of producing applicable critical minerals. Denying credits for these costs would, in the opinion of commenters, be contrary to the goal of incentivizing extraction and production of applicable critical minerals. Commenters also disputed that direct and indirect costs are not incurred in value-adding activities.

A number of commenters also disputed that a credit should only be available once for the same material. Several commenters argued that the statutory language and structure did, at a minimum, give taxpayers credits for production of applicable critical minerals and, when those applicable critical minerals were used to produce electrode active materials, additional credits for the production of the electrode active materials. According to these commenters, the dual credits reflect the fact that these are separate productive activities for which section 45X provides separate credits. A commenter also urged that producers of applicable critical minerals be able to claim a credit if they can establish that the applicable critical minerals used in the production were acquired from production or extraction outside the United States and thus were previously ineligible for a section 45X credit. For applicable critical minerals that are produced using other precursor applicable critical minerals, a commenter recommended that the cost of the precursor applicable critical minerals be excluded from the cost of producing the applicable critical minerals.

A number of commenters proposed solutions to the problem of crediting the same production costs multiple times. One solution commenters proposed was to reduce the basis of property for which a credit has been claimed by an upstream producer. Commenters also proposed a system under which a taxpayer would only be eligible for a credit on costs of material for which no other taxpayer had previously claimed a credit. This arrangement could be

administered through a system of certification or tracing in which taxpayers would be required to verify that its suppliers had not claimed previously claimed credits for costs associated with the same materials for which the taxpayer is claiming credits. Commenters generally agreed that producers should not need to be vertically integrated to claim credits. Instead, these commenters argued that each producer in the supply chain should be eligible to claim credits for, at a minimum, their addition to the value of the applicable critical minerals produced.

Some commenters addressed the requirement in section 45X(d)(2) that extraction or production of applicable critical minerals occur within the United States or a possession of the United States. A commenter urged that only the cost of extraction of applicable critical minerals occurring in the geology of the United States or its possessions should qualify for the section 45X credit in calculating the cost of production of such mineral. Other commenters urged that credits be permitted to taxpayers that process applicable critical minerals extracted outside the United States provided that the processing occurs within the United States or its possessions. One commenter proposed that the final regulations modify the proposed rule regarding constituent elements, materials, and subcomponents used in the production of applicable critical minerals to distinguish between imports of materials otherwise available from domestic sources and imported materials that are not available from domestic sources. Although this suggested proposal deviates from the Proposed Regulations, it would still allow for credits associated with costs of foreign-sourced constituent elements, materials, and subcomponents but only where domestic alternatives are not available.

Three commenters supported the Proposed Regulations' exclusion of direct, indirect, and extraction costs from production costs eligible for the credit. One commenter was concerned that a contrary rule would invite fraud, waste, and abuse and that, in the case of extraction costs, would be difficult to administer without the creation of a tracing system. Two commenters specifically identified extraction costs as something that should be excluded from the costs of production for the credit. One recommended more explicit clarification that the cost of the extraction of raw materials is excluded from creditable production costs.

With respect to these comments, refer to Part IV.E.1.e. of this Summary of Comments and Explanation of Revisions, which describes the revisions to the proposed rules for production costs of both electrode active materials and applicable critical minerals that are in these final regulations.

Proposed § 1.45X-4(c)(4) would have required the taxpayer to document that their product meets the criteria for an applicable critical mineral as described in section 45X(c)(6) with a certificate of analysis provided by the taxpayer to the person to which the taxpayer sold the applicable critical mineral. The Treasury Department and the IRS requested comments on this substantiation requirement, including whether a similar requirement should be applied to electrode active materials. With respect to this proposed rule, refer to Part IV.E.1.e. of this Summary of Comments and Explanation of Revisions, which describes the revisions to the proposed rules for substantiation of both electrode active materials and applicable critical minerals that are in these final regulations.

VI. Other Comments Received Regarding Ancillary Issues

In response to the Proposed Regulations, certain commenters responded concerning the application of sections 6417 and 6418. A commenter noted that the Proposed Regulations do not explain the process for making a section 6417 elective pay election for a section 45X credit and recommends the final regulations provide more details and guidance on the payment amount and potential considerations. Another commenter requested additional clarification on application procedures, methods, reporting items, refund/transfer periods, and other supplementary procedures relevant to the provisions of section 6417. Similar comments were received with respect to the transferability provisions of section 6418 that may apply to the section 45X credit. A separate commenter requested clarification regarding a transfer of tax credits from vessel manufacturer (shipyard) to vessel owner, and the possible effects of different ownership arrangements of related offshore wind vessels.

The comments related to sections 6417 and 6418 are outside the scope of these final regulations under section 45X, as the comments relate to rules under sections 6417 and 6418. Final regulations under sections 6417, 89 FR 17546 (March 11, 2024), corrected in 89 FR 26786 (April 16, 2024), and corrected in 89 FR 66562 (August 16, 2024) and 6418, 89 FR 34770 (April 30,

2024), corrected in 89 FR 67859 (August 22, 2024), are available and provide relevant information on the elective payment election under section 6417, making a transfer election under section 6418, and the impacts of various ownership structures on the ability and requirements when making an election under either section 6417 or section 6418.

A commenter suggested that the Proposed Regulations should have addressed whether the section 45X credit can be carried back to offset prior year tax liabilities or whether it can be transferred to other taxpayers. The commenter suggested that the final regulations allow the credit to be carried back for a reasonable period of time or to be transferred to other eligible taxpayers under certain conditions and limitations. This request is outside the scope of these final regulations, but as a clarification, section 39 of the Code describes rules related to the carryback and carryforward of unused credits, including section 39(a)(4) which provides a 3-year carryback period for any applicable credit (as defined in section 6417(b)). Section 1.6418-5(h) also provides a rule clarifying that a transferee of a specified credit portion under section 6418 can apply section 39(a)(4) to the extent the specified credit portion is described in section 6417(b) (list of applicable credits, taking into account any placed in service requirements in section 6417(b)(2), (3), and (5)).

A commenter requested that the final regulations define what constitutes a disposition or a cessation of eligibility for the purpose of recapturing the credit within five years of being placed in service. According to the commenter, the final rules should define the terms “disposition” and “cessation of eligibility” and provide examples and exceptions. As a clarification, the section 45X credit is not subject to the recapture provisions of section 50 of the Code because it is not an investment credit under section 46 of the Code. Further, there is no statutory authority under the provisions of section 45X to require recapture of the credit. Thus, these final regulations do not include any rules related to recapture.

A commenter noted that the Proposed Regulations do not address whether the section 45X credit can be specially allocated to certain partners or whether the credit can be modified by a partnership agreement for partnerships that produce and sell eligible components, possibly “creating inconsistencies or unfairness for some partners who may have different interests or expectations.” The

commenter requested that the final regulations include a rule allowing the section 45X credit to be specially allocated or modified by a partnership agreement. Because the commenter’s request is addressed under section 704 and § 1.704-1(b)(4)(ii) and does not relate to credit eligibility under section 45X, the Treasury Department and IRS decline to adopt a rule addressing partnership allocations in these final regulations.

VII. Severability

If any provision in this rulemaking is held to be invalid or unenforceable facially, or as applied to any person or circumstance, it shall be severable from the remainder of this rulemaking, and shall not affect the remainder thereof, and the application of the provision to other persons not similarly situated or to other dissimilar circumstances.

Applicability Dates

These regulations apply to eligible components for which production is completed and sales occur after December 31, 2022, and during taxable years ending on or after October 28, 2024. Taxpayers may choose to apply these regulations to eligible components for which production is completed and sales occur after December 31, 2022, and during taxable years ending before October 28, 2024, provided that taxpayers follow these regulations in their entirety and in a consistent manner.

Effect on Other Documents

Section 5.05(2) of Notice 2023-18 and section 3 of Notice 2023-44, which relate to the interaction between sections 45X and 48C, are superseded for eligible components for which production is completed and sales occur after October 28, 2024.

Special Analyses

I. Regulatory Planning and Review

Pursuant to the Memorandum of Agreement, Review of Treasury Regulations under Executive Order 12866 (June 9, 2023), tax regulatory actions issued by the IRS are not subject to the requirements of section 6(b) of Executive Order 12866, as amended. Therefore, a regulatory impact assessment is not required.

II. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3520) (PRA) generally requires that a Federal agency obtain the approval of the Office of Management and Budget (OMB) before collecting information from the public, whether such collection of information is

mandatory, voluntary, or required to obtain or retain a benefit.

The collections of information in these final regulations contain reporting and recordkeeping requirements that are required to validate eligibility to claim a section 45X credit. These collections of information would generally be used by the IRS for tax compliance purposes and by taxpayers to facilitate proper reporting and compliance. The general recordkeeping requirements mentioned within these final regulations are considered general tax records under § 1.6001-1(e). Specific certification statements under § 1.45X-1(c)(3) and statements required in §§ 1.45X-3(e)(2)(iv)(C) and 1.45X-4(c)(4) are considered general tax records and are required for the IRS to validate the taxpayer that may claim a section 45X credit. For PRA purposes, general tax records are already approved by OMB under 1545-0074 for individuals, 1545-0123 for business entities, and under 1545-0092 for trust and estate filers.

These final regulations also provide reporting requirements related to making the Related Person Election as described in § 1.45X-2(d) and calculating the section 45X credit amount as described in § 1.45X-1. The Related Person Election will be made by taxpayers with Forms 1040, 1041, 1120-S, 1065, and 1120, on Form 7207, *Advanced Manufacturing Production Credit* (or any successor forms); and credit calculations will be made on Form 3800 and supporting forms including Form 7207 (and any successor forms). These forms are approved under 1545-0074 for individuals, 1545-0123 for business entities, 1545-2306 for trust and estate filers of Form 7207, and 1545-0895 for trust and estate filers of Form 3800. These final regulations are not changing or creating new collection requirements not already approved by OMB or will be approved under 5 CFR 1320.10 by OMB.

No public comments were received by the IRS directed specifically at the PRA or on the collection requirements, but commenters generally articulated the burdens associated with the documentation requirements contained in the Proposed Regulations. As described in the relevant portions of this preamble, the Treasury Department and the IRS have determined that the documentation requirements are necessary to administer the provisions of section 45X.

III. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) (RFA) imposes certain requirements with respect to Federal rules that are subject to the

notice and comment requirements of section 553(b) of the Administrative Procedure Act (5 U.S.C. 551 *et seq.*) and that are likely to have a significant economic impact on a substantial number of small entities. Unless an agency determines that a proposal is not likely to have a significant economic impact on a substantial number of small entities, section 603 of the RFA requires the agency to present a final regulatory flexibility analysis (FRFA) of the final regulations. The Treasury Department and the IRS have not determined whether the final regulations will likely have a significant economic impact on a substantial number of small entities. This determination requires further study. Because there is a possibility of significant economic impact on a substantial number of small entities, a FRFA is provided in these final regulations.

Pursuant to section 7805(f) of the Code, the Proposed Regulations were submitted to the Chief Counsel of the Office of Advocacy of the Small Business Administration for comment on its impact on small business, and no comments were received.

A. Need for and Objectives of the Rule

The final regulations provide greater clarity to taxpayers that intend to claim a section 45X credit. The final regulations provide necessary definitions, the time and manner to make the Related Person Election and rules regarding the determination of credit amounts. The Treasury Department and the IRS intend and expect that giving taxpayers guidance that allows them to claim the section 45X credit will beneficially impact various industries. In particular, the section 45X credit encourages the domestic production of eligible components and incentivizes taxpayers to invest in clean energy projects that generate eligible credits.

B. Affected Small Entities

The RFA directs agencies to provide a description of, and if feasible, an estimate of, the number of small entities that may be affected by the proposed rules, if adopted. The Small Business Administration Office of Advocacy (SBA) estimates in its 2023 Frequently Asked Questions that 99.9 percent of American businesses meet its definition of a small business. The applicability of these final regulations does not depend on the size of the business, as defined by the SBA.

As described more fully in the preamble to this final regulation and in this initial regulatory flexibility analysis (IRFA), section 45X and these final

regulations may affect a variety of different entities across several different clean energy industries as multiple types of eligible components are provided for under the statute and manufacturers may produce more than one type. Although there is uncertainty as to the exact number of small businesses within this group, the current estimated number of respondents to these final rules is 13,450 taxpayers. The estimated total annual reporting burden and estimated average annual burden per respondent will be computed when Form 7207 and the instructions to Form 7207 are updated to reflect these final regulations.

The Treasury Department and the IRS utilize tax data as the basis for its RFA analysis. Tax entities supply information on tax forms, which information is processed and recorded by the IRS. This data is then available to the IRS office of Research, Applied Analytics and Statistics and to the Treasury Department's Office of Tax Policy for use in estimating the impact of tax regulation on businesses. Tax data is the more appropriate data as it provides nearly universal coverage of the entities that are affected by these tax regulations. All taxpayers and many potential taxpayers are represented in the universe of tax data. Second, the tax data more accurately reflect the level of organization to which tax regulations are applicable because tax data is collected on the entity rather than the enterprise level. Overwhelmingly, business tax regulations apply to the entity level making tax data a natural fit for the analysis of regulatory impact. Further, with limited exceptions, tax regulations apply to all entities organized in a particular manner regardless of industry or size. Finally, analysis of the implications of tax regulations for the purposes of the PRA and any Special Analyses, including the Regulatory Impact Analysis, are carried out using tax data. Generally, restricting analysis for the RFA to tax data prevents difficulties in reconciling the different analyses within a given regulation.

Reliance on tax data has some drawbacks. In general, tax forms do not collect information unless it is directly relevant to the calculation of tax liability. The Northern American Industry Classification System (NAICS) codes referenced by the Office of Advocacy of the Small Business Administration are included on tax forms for informational purposes and may not be reliable. For example, past the first two-digits of the NAICS code, economic sector level, entries may be left blank in the raw data. In addition,

for a tax entity that is comprised of multiple different enterprises that each operate in a different industry, the NAICS code reported on a tax form may not reflect the appropriate industry for the regulation under analysis. Furthermore, most tax returns have no independent verification of the accuracy of NAICS codes. Notwithstanding this concern, tax data remains the most appropriate data for analysis of the implications of tax regulations.

The Treasury Department and the IRS have considered other data alternatives including Census data sources, such as the Statistics of U.S. Businesses (SUSB) suggested by SBA's Office of Advocacy. The 2020 SUSB includes only six million firms and eight million establishments while the proposed tax data includes approximately 18 million business entities. Unlike the SUSB data, the tax data includes more small businesses, not only ones with at least one employee. Tax data provides a more inclusive estimate of businesses affected by tax regulations. In conclusion, while tax data is an appropriate resource for evaluating the impact of tax regulations, this data does not permit some of the usual analysis presented to the SBA. Furthermore, since the NAICS codes reported on the tax return may not accurately reflect the industry of the entity, applying separate standards by industry is inadvisable.

Thus, the Treasury Department and the IRS have determined that reliance on NAICS codes would not accurately reflect the entities affected by these regulations. Further, the Treasury Department and the IRS currently do not have useable tax data that reflects the entities that will be affected by these regulations. While there is uncertainty as to the exact number of small businesses within this group, the Treasury Department and the IRS continue to estimate that approximately 13,450 taxpayers will be impacted.

The Treasury Department and the IRS expect to receive more information on the impact on small businesses after taxpayers start to claim the section 45X credit using the guidance and procedures provided in these final regulations.

C. Impact of the Rules

The final regulations provide rules for how taxpayers can claim the section 45X credit. Taxpayers that claim the section 45X credit will have administrative costs related to reading and understanding the rules as well as recordkeeping and reporting requirements because of the Related Person Election, computation of the section 45X credit and tax return

requirements. The costs will vary across different-sized entities and across the type of production activities in which such entities are engaged.

The Related Person Election allows a taxpayer to make an irrevocable election annually with their Federal income tax return by providing the information required on Form 7207 (or any successor form), including, for example, the name, EIN of the taxpayer; a description of the taxpayer's trade or business; the name, address and EINs of all related persons; a list of the eligible components that are sold, and the intended purpose of the eligible components sold by the related person. To make the Related Person Election and claim the section 45X credit, the taxpayer must file an annual Federal income tax return. The reporting and recordkeeping requirements for that Federal income tax return would be required for any taxpayer that is claiming a general business credit, regardless of whether the taxpayer was making a Related Person Election under section 45X.

D. Alternatives Considered

The Treasury Department and the IRS considered alternatives to these final regulations. For example, the Treasury Department and the IRS considered whether to impose certain pre-return filing requirements as a condition of making the Related Person Election as authorized in section 45X(a)(3)(B)(ii) to prevent duplication, fraud, or improper or excessive credits. These final regulations were designed to minimize burdens for taxpayers while ensuring that the IRS has sufficient information to determine eligibility for the section 45X credit. The Treasury Department and the IRS determined that requiring registration before a taxpayer makes the Related Person Election is unnecessary at this time. These final regulations would allow taxpayers to make an irrevocable Related Person Election annually with their Federal income tax return by providing the information required on Form 7207 (or any successor form), which would provide the IRS with sufficient information to assist in preventing duplication, fraud, or the claiming of improper or excessive credits if eligible components are produced and then sold to related persons.

E. Duplicative, Overlapping, or Conflicting Federal Rules

The final rule would not duplicate, overlap, or conflict with any relevant Federal rules. As discussed previously, the final rule would merely provide procedures and definitions to allow

taxpayers to claim the section 45X credit. The Treasury Department and the IRS invite input from interested members of the public about identifying and avoiding overlapping, duplicative, or conflicting requirements.

IV. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 requires that agencies assess anticipated costs and benefits and take certain other actions before issuing a final rule that includes any Federal mandate that may result in expenditures in any one year by a State, local, or Tribal government, in the aggregate, or by the private sector, of \$100 million (updated annually for inflation). These final regulations do not include any Federal mandate that may result in expenditures by State, local, or Tribal governments, or by the private sector in excess of that threshold.

V. Executive Order 13132: Federalism

Executive Order 13132 (Federalism) prohibits an agency from publishing any rule that has federalism implications if the rule either imposes substantial, direct compliance costs on State and local governments, and is not required by statute, or preempts State law, unless the agency meets the consultation and funding requirements of section 6 of the Executive order. These final regulations do not have federalism implications and do not impose substantial direct compliance costs on State and local governments or preempt State law within the meaning of the Executive order.

VI. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175 (Consultation and Coordination with Indian Tribal governments) prohibits an agency from publishing any rule that has Tribal implications if the rule either imposes substantial, direct compliance costs on Indian Tribal governments, and is not required by statute, or preempts Tribal law, unless the agency meets the consultation and funding requirements of section 5 of the Executive order. This final rule does not have substantial direct effects on one or more federally recognized Indian tribes and does not impose substantial direct compliance costs on Indian Tribal governments within the meaning of the Executive order.

VII. Congressional Review Act

Pursuant to the Congressional Review Act (5 U.S.C. 801 *et seq.*), the Office of Information and Regulatory Affairs

designated this rule as a major rule as defined by 5 U.S.C. 804(2).

Statement of Availability of IRS Documents

IRS notices and other guidance cited in this preamble are published in the Internal Revenue Bulletin (or Cumulative Bulletin) and are available from the Superintendent of Documents, U.S. Government Publishing Office, Washington, DC 20402, or by visiting the IRS website at <https://www.irs.gov>.

Drafting Information

The principal authors of these final regulations are Mindy Chou, John Deininger, Derek Gimbel, John Lovelace, and Alexander Scott. However, other personnel from the Office of Chief Counsel, the Treasury Department, and the IRS participated in the development of these regulations.

List of Subjects in 26 CFR Part 1

Income taxes, Reporting and recordkeeping requirements.

Adoption of Amendments to the Regulations

Accordingly, the Treasury Department and the IRS amend 26 CFR part 1 as follows:

PART 1—INCOME TAXES

■ **Paragraph 1.** The authority citation for part 1 is amended by adding entries in numerical order for §§ 1.45X–1 through 1.45X–4 to read in part as follows:

Authority: 26 U.S.C. 7805 * * *

Section 1.45X–1 also issued under 26 U.S.C. 45X, 6001, 6417(h) and 6418(h).

Section 1.45X–2 also issued under 26 U.S.C. 45X and 1502.

Section 1.45X–3 also issued under 26 U.S.C. 6001.

Section 1.45X–4 also issued under 26 U.S.C. 6001.

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■ **Par. 2.** Sections 1.45X–0 through 1.45X–4 are added to read as follows:

Sec.

* * * * *

1.45X–0 Table of contents.

1.45X–1 General rules applicable to the advanced manufacturing production credit.

1.45X–2 Sale to unrelated person.

1.45X–3 Eligible components.

1.45X–4 Applicable critical minerals.

* * * * *

§ 1.45X–0 Table of contents.

This section lists the major captions contained in §§ 1.45X–1 through 1.45X–4.
§ 1.45X–1 General rules applicable to the advanced manufacturing production credit.

- (a) Overview.
- (b) Credit amount.
- (c) Definition of produced by the taxpayer.
- (d) Produced in the United States.
- (e) Production and sale in a trade or business.

(f) Sale of integrated components.
 (g) Interaction between sections 45X and 48C.

- (h) [Reserved]
- (i) Anti-abuse rule.
- (j) Applicability date.

§ 1.45X–2 Sale to unrelated person.

- (a) In general.
- (b) Definitions.
- (c) Special rule for sale to related person.
- (d) Related person election.
- (e) Sales of integrated components to related person.

(f) Applicability date.

§ 1.45X–3 Eligible components.

- (a) In general.
- (b) Solar energy components.
- (c) Wind energy components.
- (d) Inverters.
- (e) Qualifying battery component.
- (f) Phase out rule.
- (g) Applicability date.

§ 1.45X–4 Applicable critical minerals.

- (a) In general.
- (b) Definitions.
- (c) Credit amount.
- (d) Applicability date.

§ 1.45X–1 General rules applicable to the advanced manufacturing production credit.

(a) *Overview*—(1) *In general*. This section provides general rules regarding the advanced manufacturing production credit determined under section 45X of the Code (section 45X credit). Paragraph (a)(2) of this section provides definitions of certain terms that apply for purposes of section 45X and the section 45X regulations (as defined in paragraph (a)(2)(xv) of this section). Paragraphs (b) through (j) of this section provide the basic rules regarding the section 45X credit, including the definition of the term *produced by the taxpayer*, and rules to determine the taxpayer that produces an eligible component and whether such taxpayer is entitled to claim a section 45X credit in contract manufacturing arrangements; where the production of eligible components must occur; the treatment of integrated, incorporated or assembled eligible components; and the interaction between sections 45X and 48C of the Code. See § 1.45X–2 for rules regarding sales to unrelated persons, sales to related persons, and the related person election (Related Person Election), including rules regarding the time, place, and manner of making the Related Person Election. See § 1.45X–3 for the definitions of all eligible components (except applicable critical minerals) and the credit amounts available for each of these eligible components, including certain phase-

out percentages. See § 1.45X–4 for the definitions of applicable critical minerals and the rules regarding the determination of the credit amount for applicable critical minerals.

(2) *Generally applicable definitions*. This paragraph (a)(2) provides definitions of terms that apply for purposes of section 45X and the section 45X regulations.

(i) *Applicable critical mineral*. The term *applicable critical mineral* means any of the minerals that are listed in section 45X(c)(6) and defined in § 1.45X–4(b).

(ii) *Code*. The term *Code* means the Internal Revenue Code.

(iii) *Contract manufacturing arrangement*. The term *contract manufacturing arrangement* is defined in paragraph (c)(3)(ii)(B) of this section.

(iv) *Electrode active materials*. The term *electrode active materials* is defined in section 45X(c)(5)(B)(i) and described in § 1.45X–3(e)(2).

(v) *Eligible component*. The term *eligible component* is defined in section 45X(c)(1)(A) and described in §§ 1.45X–3 and 1.45X–4.

(vi) *Eligible taxpayer*. The term *eligible taxpayer* is defined in paragraph (c)(3) of this section.

(vii) *Extraction*. The term *extraction* is defined in § 1.45X–3(e)(2)(iv)(B).

(viii) *Guidance*. The term *guidance* means guidance published in the **Federal Register** or Internal Revenue Bulletin, as well as administrative guidance such as forms, instructions, publications, or other guidance on the IRS.gov website. See §§ 601.601 and 601.602 of this chapter.

(ix) *IRA*. The term *IRA* means Public Law 117–169, commonly known as the Inflation Reduction Act of 2022.

(x) *IRS*. The term *IRS* means the Internal Revenue Service.

(xi) *Produced by the taxpayer*. The term *produced by the taxpayer* is defined in paragraph (c) of this section, and the related terms *production activities* and *production process* have the meaning given those terms in paragraph (c) of this section.

(xii) *Related person*. The term *related person* is defined in § 1.45X–2(b)(2).

(xiii) *Related Person Election*. The term *Related Person Election* is defined in § 1.45X–2(d)(1).

(xiv) *Secretary*. The term *Secretary* means the Secretary of the Treasury or her delegate.

(xv) *Section 45X regulations*. The term *section 45X regulations* means the provisions of this section, §§ 1.45X–2 through 1.45X–4, and the regulations in this chapter under sections 6417 and 6418 of the Code that relate to the section 45X credit.

(xvi) *Unrelated person*. The term *unrelated person* is defined in section 45X(a)(3) and described in § 1.45X–2(b)(3).

(b) *Credit amount*. Except as otherwise provided in section 45X(b)(3) and § 1.45X–3(f), for purposes of section 38 of the Code, the amount of the section 45X credit for any taxable year is equal to the sum of the credit amounts provided under section 45X(b) and described in §§ 1.45X–3 and 1.45X–4 with respect to each eligible component that is produced by the taxpayer and, within the taxable year, sold by the taxpayer to an unrelated person. See § 1.45X–2 for rules regarding sales of eligible components to related persons that may be treated as if sold to unrelated persons for purposes of section 45X(a).

(c) *Definition of produced by the taxpayer*—(1) *In general*. The term *produced by the taxpayer* means a process conducted by the taxpayer that substantially transforms constituent elements, materials, or subcomponents into a complete and distinct eligible component that is functionally different from that which would result from minor assembly or superficial modification of the elements, materials, or subcomponents, and includes both primary and secondary production. Primary production involves producing an eligible component using non-recycled materials while secondary production involves producing an eligible component using recycled materials.

(i) *Partial transformation*. The term *produced by the taxpayer* does not include partial transformation that does not result in substantial transformation of constituent elements, materials, or subcomponents into a complete and distinct eligible component as described in this paragraph (c)(1).

(ii) *Minor assembly or superficial modification*. The term *produced by the taxpayer* does not include minor assembly of two or more constituent elements, materials, or subcomponents, or superficial modification of the final eligible component, if the taxpayer does not also engage in the process resulting in a substantial transformation described in paragraph (c)(1) or (2) of this section.

(iii) *Examples*. The following examples illustrate the application of this paragraph (c)(1).

(A) *Example 1*. Taxpayers X, Y, and Z each produce one of three sections of a wind tower that together make up the wind tower. No taxpayer has produced an eligible component within the meaning of section 45X(a)(1)(A) because

no taxpayer has produced all sections of the wind tower.

(B) *Example 2.* Same facts as paragraph (c)(1)(iii)(A) of this section (*Example 1*), but taxpayers X, Y, and Z instead form Partnership XYZ. Partnership XYZ produces all three sections of the wind tower. Partnership XYZ has produced an eligible component within the meaning of section 45X(a)(1)(A).

(C) *Example 3.* Taxpayer V puts the external casing on a battery module (within the meaning of § 1.45X-3(e)(4)(i)(A)) that already had cells, battery management systems, and other components integrated into it. Taxpayer V has engaged in minor assembly and has not produced an eligible component within the meaning of section 45X(a)(1)(A).

(D) *Example 4.* Taxpayer U purchases two finished halves of a wind turbine nacelle and combines them into a single nacelle. Taxpayer U has engaged in minor assembly and has not produced an eligible component within the meaning of section 45X(a)(1)(A).

(E) *Example 5.* Taxpayer T purchases a dry cell battery and fills the electrolyte of the battery. Taxpayer T has engaged in minor assembly and has not produced an eligible component within the meaning of section 45X(a)(1)(A).

(F) *Example 6.* Taxpayer W purchases a prefabricated wind turbine blade and applies paint and finishes. Taxpayer W has engaged in superficial modification of the blade and has not produced an eligible component within the meaning of section 45X(a)(1)(A).

(2) *Special rule for certain eligible components—(i) In general.* For solar grade polysilicon, electrode active materials, and applicable critical minerals, the term *produced by the taxpayer* means processing, converting, refining, or purifying source materials, such as brines, ores, or waste streams, to substantially transform the source materials to derive a distinct eligible component, and includes both primary and secondary production. For the production process for electrode active materials and applicable critical minerals, the term *conversion* is defined in § 1.45X-3(e)(2)(ii)(A) or § 1.45X-4(c)(2)(i), respectively, and the term *purification* is defined in § 1.45X-3(e)(2)(ii)(B) or § 1.45X-4(c)(2)(ii), respectively.

(ii) *Example.* Taxpayers X, Y and Z are unrelated C corporations that have calendar year taxable years. In 2024, X extracts raw lithium from natural mineral deposits and purifies the extracted material to 90% lithium by mass. X subsequently hires Y to further purify the lithium material furnished by

X to a purity of no less than 99.9% lithium by mass as required by section 45X(c)(6)(P) and § 1.45X-4(b)(16)(ii). In 2025, Y purifies the material to 99.9% lithium by mass (qualifying lithium). X subsequently sells the qualifying lithium to Z in 2026. X may not claim a section 45X credit for the qualifying lithium sold to Z because the qualifying lithium was not produced by X within the meaning of this paragraph (c)(2) of this section, given that X did not transform the lithium material to derive a distinct eligible component (*i.e.*, lithium which satisfies the minimum purity of 99.9% lithium by mass prescribed by section 45X(c)(6)(P)).

(3) *Eligible taxpayer—(i) In general.* Except as otherwise provided in paragraph (c)(3)(iii) of this section, a taxpayer claiming a section 45X credit with respect to an eligible component must be the taxpayer that directly performs the production activities that bring about a substantial transformation resulting in the eligible component and must sell such eligible component to an unrelated person.

(ii) *Contract manufacturing arrangement—(A) In general.* If the production of an eligible component is performed in whole or in part pursuant to a contract that is a contract manufacturing arrangement, then, provided the other requirements of section 45X are met, the party to such contract that may claim the section 45X credit with respect to such eligible component is the party that performs the actual production activities that bring about a substantial transformation resulting in the eligible component.

(B) *Contract manufacturing arrangement defined.* The term *contract manufacturing arrangement* means any agreement (or agreements) providing for the production of an eligible component if the agreement is entered into before the production of the eligible component to be delivered under the contract is completed. A routine purchase order for off-the-shelf property is not treated as a contract manufacturing arrangement for purposes of this paragraph (c)(3). An agreement will be treated as a routine purchase order for off-the-shelf property if the contractor is required to make no more than de minimis modifications to the property to tailor it to the customer's specific needs, or if at the time the agreement is entered into, the contractor knows or has reason to know that the contractor can satisfy the agreement out of existing stocks or normal production of finished goods.

(iii) *Special rule for contract manufacturing arrangements.* If an eligible component is produced by a

taxpayer pursuant to a contract manufacturing arrangement, the parties to such agreement may determine by agreement the party that may claim the section 45X credit. If a taxpayer enters into contract manufacturing arrangements with multiple fabricators to produce an eligible component, the parties to such agreements may determine by agreement the party that may claim the section 45X credit. The IRS will not challenge the agreement of the parties provided all the parties submit signed certification statements in the manner required in Form 7207, *Advanced Manufacturing Production Credit*, or its instructions (as described in paragraph (c)(3)(iv) of this section) indicating that all parties agree as to the party that may claim the section 45X credit.

(iv) *Certification statement requirements.* A certification statement indicating that all parties to a contract manufacturing arrangement agree as to the party that will claim the section 45X credit must include—

(A) All required information set forth in guidance; and

(B) A properly signed penalty of perjury statement that includes the following: under penalties of perjury, I declare that I have examined this statement, including accompanying documents, and to the best of my knowledge and belief, the facts presented in support of this statement are true, correct, and complete.

(v) *Examples.* The following examples illustrate the application of this paragraph (c)(3).

(A) *Example 1: Contract manufacturing with sale.* Taxpayers X, Y and Z are unrelated C corporations that have calendar year taxable years. In 2024, pursuant to a contract manufacturing arrangement as described in paragraph (c)(3)(ii)(B) of this section, X hires Y to produce a solar module. The contract is a tolling arrangement and provides that Y will produce the solar module according to X's designs and specifications and using the materials and subcomponents that X provides. X and Y enter an agreement providing that X is the sole party that may claim a section 45X credit for the production and sale of the solar module, and X and Y each sign a certification statement as described in paragraph (c)(3)(iv) of this section reflecting this agreement. In 2025, Y produces and delivers the solar module to X, and in 2026, X sells the solar module to Z. X may claim a section 45X credit in taxable year 2026 for the solar module it sold to Z provided all other requirements of section 45X are met and the certification statements signed by X

and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by X. Y could claim a section 45X credit if the agreement between X and Y had designated Y as the sole party that could claim a section 45X credit for the production and sale of the solar module provided all other requirements of section 45X are met and the certification statements signed by X and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by Y.

(B) *Example 2: Contract manufacturing with no sale.* Assume the facts are the same as in paragraph (c)(3)(v)(A) of this section (*Example 1*), except that X does not sell the solar module and instead X uses it to generate electricity for use in X's trade or business. Because there has been no sale, neither X nor Y may claim a section 45X credit for the solar module regardless of whether X and Y submit signed certification statements described in paragraph (c)(3)(iv) of this section.

(C) *Example 3: Multiple contract manufacturing arrangements.* Taxpayers V, W, X, Y, and Z are unrelated C corporations that have calendar year taxable years. In 2024, pursuant to three separate contract manufacturing arrangements as described in paragraph (c)(3)(ii)(B) of this section, V hires W, X, and Y to produce the bottom, middle and top segments, respectively, of a single wind tower that V designed. W, X, Y, and V enter into an agreement providing that V is the sole party that may claim a section 45X credit for the production and sale of the wind tower, and W, X, Y, and V each sign a certification statement as described in paragraph (c)(3)(iv) of this section reflecting this agreement. In 2024, W and X both produce and deliver their respective wind tower segments to the installation site, and in 2025, Y produces and delivers its wind tower segment to the installation site. In 2026, V sells the completed wind tower to Z. V may claim a section 45X credit in taxable year 2026 for the wind tower it sold to Z provided all other requirements of section 45X are met and the certification statements signed by V, W, X, and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by V. W or X or Y could be the party that could claim a section 45X credit if the agreement between V, W, X and Y had designated W or X or Y as the sole party that could claim a section 45X credit for the production and sale of the wind tower provided all other requirements of section 45X are met and the certification

statements signed by V, W, X, and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by the party designated as the sole party that could claim a section 45X credit.

(D) *Example 4: Applicable Critical Mineral Processing with Certification.* Taxpayers X, Y, and Z are unrelated C corporations that have calendar year taxable years. In 2024, X extracts raw lithium from natural mineral deposits and purifies the extracted material to 90% lithium by mass. X subsequently hires Y to further process the lithium material pursuant to a contract manufacturing arrangement as described in paragraph (c)(3)(ii)(B) of this section. Specifically, the contract is a tolling arrangement and provides that X remains the owner for Federal income tax purposes throughout the purification process and that Y will further purify the lithium material furnished by X to a purity of no less than 99.9% lithium by mass as required by section 45X(c)(6)(P) and § 1.45X-4(b)(16)(ii). X and Y enter an agreement providing that X is the sole party that may claim a section 45X credit for the production and sale of the applicable critical mineral, and X and Y each sign a certification statement as described in paragraph (c)(3)(iv) of this section reflecting this agreement. In 2025, Y purifies the material to 99.9% lithium by mass (qualifying lithium) and delivers it to X. X subsequently sells the qualifying lithium to Z in 2026. X may claim a section 45X credit in taxable year 2026 for the qualifying lithium sold to Z, provided that all other requirements of section 45X are met, and the certification statements signed by X and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by X. Y could claim a section 45X credit if the agreement between X and Y had designated Y as the sole party that could claim a section 45X credit for the qualifying lithium, provided that all other requirements of section 45X are met, and the certification statements signed by X and Y meet the requirements described in paragraph (c)(3)(iv) of this section and are properly submitted by Y. Neither X nor Y could claim a section 45X credit in the absence of a designating agreement and certification statement (described in paragraphs (c)(3)(iii) and (iv) of this section, respectively) for the reasons stated in paragraph (c)(2)(i) of this section.

(4) *Timing of production and sale—(i) In general.* Production of eligible components for which a taxpayer is claiming a section 45X credit may begin

before December 31, 2022. Production of eligible components must be completed, and sales of eligible components must occur, after December 31, 2022.

(ii) *Example.* Taxpayer X has a calendar year taxable year. Taxpayer X begins production of a related offshore wind vessel (as defined in section 45X(4)(B)(iv) and described in § 1.45X-3(c)(4)) in January 2022. Production is completed in December 2024 and the sale to an unrelated person occurs in 2025. Taxpayer X is eligible to claim the section 45X credit in 2025, assuming that all other requirements of section 45X are met.

(d) *Produced in the United States—(1) In general.* Sales are taken into account for purposes of the section 45X credit only for eligible components that are produced within the United States, as defined in section 638(1) of the Code, or a United States territory, which for purposes of section 45X and the section 45X regulations has the meaning of the term *possession* provided in section 638(2).

(2) *Subcomponents.* Constituent elements, materials, and subcomponents used in the production of eligible components are not subject to the domestic production requirement provided in paragraph (d)(1) of this section.

(e) *Production and sale in a trade or business.* An eligible component produced and sold by the taxpayer is taken into account for purposes of the section 45X credit only if the production and sale are in a trade or business (within the meaning of section 162 of the Code) of the taxpayer.

(f) *Sale of integrated components—(1) In general.* For purposes of the section 45X credit, section 45X(d)(4) provides that a taxpayer that produces an eligible component is treated as having sold such eligible component to an unrelated person if such component is integrated, incorporated, or assembled into another eligible component that is then sold to an unrelated person.

(i) *Integrated, incorporated, or assembled.* The term *integrated*, *incorporated*, or *assembled* means the production activities by which an eligible component that is a constituent element, material, or subcomponent is substantially transformed into another complete and distinct eligible component that is not solar grade polysilicon, an electrode active material, or an applicable critical mineral. The term *integrated*, *incorporated*, or *assembled* does not mean the minor assembly or superficial modification of an eligible component used as an element, material, or subcomponent and other elements, materials, or

subcomponents that results in a distinct product.

(ii) *Special rule for eligible components resulting in solar grade polysilicon, electrode active materials, or applicable critical minerals.* For solar grade polysilicon, electrode active materials, and applicable critical minerals, the term *integrated, incorporated, or assembled* means the production activities in which an eligible component is processed, converted, refined, or purified to derive a distinct eligible component that is solar grade polysilicon, an electrode active material, or an applicable critical mineral. The term *integrated, incorporated, or assembled* does not mean minor assembly or superficial modification of an eligible component used as an element, material, or subcomponent and other elements, materials, or subcomponents that results in a distinct product.

(2) *Application—(i) In general.* A taxpayer may claim a section 45X credit for each eligible component the taxpayer produces and sells to an unrelated person, including any eligible component the taxpayer produces that was used as a constituent element, material, or subcomponent and integrated, incorporated, or assembled into another complete and distinct eligible component or another complete and distinct product (that is not itself an eligible component) that the taxpayer also produces and sells to an unrelated person.

(ii) *Example: Sale of product with incorporated eligible components to unrelated person.* In 2022, X, a domestic corporation that has a calendar year taxable year, begins production of electrode active materials (EAMs) that are completed in 2023 and incorporated into battery cells that X also produces. In 2024, X incorporates those battery cells into battery modules (within the meaning of § 1.45X-3(e)(4)(i)(A)) and integrates the battery modules into electric vehicles. X sells the electric vehicles to Z, an unrelated person, in 2024. X may claim a section 45X credit for the EAMs, the battery cells, and the battery modules in 2024.

(g) *Interaction between sections 45X and 48C—(1) In general.* For purposes of the section 45X credit, consistent with section 45X(c)(1)(B), property that would otherwise qualify as an eligible component (otherwise qualified property) is only an eligible component if the property is produced at a section 45X facility (as defined in paragraph (g)(2) of this section) and no part of that section 45X facility is also a section 48C facility (as defined in paragraph (g)(3) of this section).

(2) *Section 45X facility—(i) In general.* A section 45X facility comprises the independently functioning tangible property used by the taxpayer that is necessary to be considered the producer of the otherwise qualified property within the meaning of paragraph (c)(1) or (2) of this section, as applicable. The tangible property that comprises a section 45X facility may be in more than one location.

(ii) *Special rule for contract manufacturing arrangement.* In the case of a contract manufacturing arrangement where the parties have agreed to who can claim a section 45X credit under paragraph (c)(3)(iii) of this section, the section 45X facility under paragraph (g)(2)(i) of this section is determined by taking into account the tangible property used to produce the otherwise qualified property, regardless of which party to the arrangement claims the credit.

(3) *Section 48C facility—(i) In general.* A section 48C facility includes all eligible property included in a qualifying advanced energy project for which a taxpayer receives an allocation of section 48C credits under the allocation program established under section 48C(e) and claims such credits after August 16, 2022.

(ii) *Eligible property.* Eligible property is property that—

(A) Is necessary for the production or recycling of property described in section 48C(c)(1)(A)(i), re-equipping an industrial or manufacturing facility described in section 48C(c)(1)(A)(ii), or re-equipping, expanding, or establishing an industrial facility described in section 48C(c)(1)(A)(iii);

(B) Is tangible personal property, or other tangible property (not including a building or its structural components), but only if such property is used as an integral part of the qualified investment credit facility; and

(C) With respect to which depreciation (or amortization in lieu of depreciation) is allowable.

(4) *Examples.* The following examples illustrate the application of this paragraph (g), and assume any other requirements of section 45X that are not described have been met:

(i) *Example 1: Two independent section 45X facilities—(A) Facts.* Taxpayer owns and operates a manufacturing site that contains tangible property made up of Equipment A and Equipment B, each set of which functions independently and which is arranged in serial fashion. Equipment A is used by the taxpayer to produce otherwise qualified property 1. Equipment B is used to produce otherwise qualified property 2, a

different type of product than otherwise qualified property 1. Taxpayer was allocated a section 48C credit under the section 48C(e) program for a section 48C facility that includes Equipment A and subsequently placed the section 48C facility and Equipment A in service in taxable year 2026. Taxpayer claimed a section 48C credit related to Equipment A for taxable year 2026.

(B) *Analysis.* The section 45X facility with respect to otherwise qualified property 1 is the tangible property made up of Equipment A, which is the independently functioning tangible property used by the taxpayer that is necessary to be considered the producer of the otherwise qualified property within the meaning of paragraph (c)(1) or (2) of this section. However, Equipment A is also eligible property that is considered part of a section 48C facility as defined in paragraph (g)(3) of this section. Therefore, otherwise qualified property 1 is not an eligible component under paragraph (g)(1) of this section because part (all in this case) of the section 45X facility where otherwise qualified property 1 was produced is also considered a section 48C facility. There is a separate section 45X facility with respect to otherwise qualified property 2. That section 45X facility is the tangible property made up of Equipment B. Equipment A is not included in the section 45X facility as it is not used to produce otherwise qualified property 2. None of the tangible property comprising the section 45X facility with respect to otherwise qualified property 2 is considered part of a section 48C facility. Thus, otherwise qualified property 2 is an eligible component under paragraph (g)(1) of this section.

(ii) *Example 2: Single section 45X facility at different locations—(A) Facts.* Taxpayer owns and operates two manufacturing sites at different locations. The tangible property at manufacturing site 1 is Equipment A, which is used to continue and finish the first part of the production process for otherwise qualified property. The tangible property at manufacturing site 2 is Equipment B, which is used to complete the production process of the same otherwise qualified property. Taxpayer was allocated a section 48C credit under the section 48C(e) program for Equipment A.

(B) *Analysis.* Equipment A and B comprise a single section 45X facility regardless of location under paragraph (g)(2)(i) of this section because both Equipment A and B were used to produce the otherwise qualified property and the use of Equipment A and B are necessary to consider the

taxpayer the producer, consistent with the meaning of produced by the taxpayer in paragraph (c)(1) or (2) of this section. However, part of the property comprising the section 45X facility is also a section 48C facility under paragraph (g)(3) of this section because Equipment A is eligible property that is part of a section 48C facility. As a result, the otherwise qualified property is not considered an eligible component, and the sale of the otherwise qualified property will not generate a section 45X credit.

(iii) *Example 3: Independent tangible property and production of component*—(A) *Facts.* Taxpayer owns and operates two manufacturing sites. Manufacturing Site 1 contains tangible property that is Equipment A, which is used to produce photovoltaic cells. Manufacturing Site 2 contains tangible property that is Equipment B and tangible property that is Equipment C, which are arranged in serial fashion. Equipment B is used to produce photovoltaic cells. Equipment C is used to produce solar modules, in part, by combining the photovoltaic cells produced by Equipment A and Equipment B. Taxpayer was allocated a section 48C credit under the section 48C(e) program for a section 48C facility that includes Equipment B. Subsequently, Taxpayer places the section 48C facility and Equipment B in service in taxable year 2026. Taxpayer claimed a section 48C credit for Equipment B in taxable year 2026.

(B) *Analysis.* Equipment A and Equipment B each comprise a section 45X facility since each independently functions to produce otherwise qualified property, photovoltaic cells. No part of the section 45X facility comprised of Equipment A is eligible property that is included in a section 48C facility. Thus, the photovoltaic cells produced in the section 45X facility comprised of Equipment A are eligible components. The photovoltaic cells that are produced in the section 45X facility comprised of Equipment B are otherwise qualified property that cannot qualify as eligible components because part (all in this case) of the section 45X facility comprised of Equipment B where the photovoltaic cells are produced is also considered a section 48C facility. Solar modules, a different otherwise qualified property, are produced in using Equipment C, which is itself a separate section 45X facility. Equipment C does not have to include any of the tangible property included in Production Unit A or B under paragraph (g)(2)(i) of this section because it is not necessary for the Taxpayer to use that equipment to be considered the

producer of the solar modules for purposes of section 45X. As a result, no part of section 45X facility comprised of Equipment C where the solar modules are produced is considered a section 48C facility, and the solar modules are considered an eligible component for purposes of section 45X.

(iv) *Example 4: Manufacturing under a contract manufacturing arrangement*—(A) *Facts.* X is hired by Y to manufacture photovoltaic cells, but X and Y agree under paragraph (c)(3)(iii) of this section that Y will be the party to claim any section 45X credit resulting from the sale of the photovoltaic cells. X owns and operates a manufacturing site that contains equipment that is tangible property used to produce the photovoltaic cells. X was allocated a section 48C credit under the section 48C(e) program for a section 48C facility that includes the equipment used to produce the photovoltaic cells. The equipment is eligible property that is part of the section 48C facility that was placed in service in taxable year 2026. X claimed a section 48C credit for the equipment in taxable year 2026.

(B) *Analysis.* Under paragraph (g)(2)(ii) of this section, in determining the section 45X facility related to the photovoltaic cells (the otherwise qualified property), Y must consider the equipment that X used in producing the photovoltaic cells. In this case, that means that part of the section 45X facility is also considered a section 48C facility, as the equipment used to produce the photovoltaic cells is also eligible property that is part of a section 48C facility. Therefore, the photovoltaic cells are not eligible components for purposes of section 45X to X or Y, and there is no section 45X credit generated if the photovoltaic cells are sold.

(v) *Example 5: Two independent production units manufacturing under a contract manufacturing arrangement*—(A) *Facts.* Assume the facts are the same as in paragraph (g)(4)(iv) of this section (*Example 4*), except that Y and X also agreed for X to produce photovoltaic wafers using other equipment that is tangible property that is different than the equipment X uses to produce the photovoltaic cells.

(B) *Analysis.* While Y must consider the equipment that X uses to produce the photovoltaic wafers (the otherwise qualified property) under paragraph (g)(2)(ii) of this section to determine the section 45X facility associated with the photovoltaic wafer production, Y is not required to include any of the equipment used by X to produce the photovoltaic cells because it was not necessary to use that equipment to be considered the producer of the

photovoltaic wafers. As a result, no part of the section 45X facility related to photovoltaic wafers is part of a section 48C facility. Therefore, the photovoltaic wafers are eligible components for purposes of section 45X and Y will be entitled to claim a section 45X credit upon the sale.

(h) [Reserved]

(i) *Anti-abuse rule*—(1) *In general.* The rules of section 45X and the section 45X regulations must be applied in a manner consistent with the purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit). A purpose of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) is to provide taxpayers an incentive to produce eligible components in a manner that contributes to the development of secure and resilient supply chains. Accordingly, the section 45X credit is not allowable if the primary purpose of the production and sale of an eligible component is to obtain the benefit of the section 45X credit in a manner that is wasteful, such as discarding, disposing of, or destroying the eligible component without putting it to a productive use. A determination of whether the production and sale of an eligible component is inconsistent with the purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) is based on all facts and circumstances.

(2) *Example*—(i) *Facts.* Taxpayer is engaged in the activity of producing and selling multiple units of Eligible Component 1 (EC1). Taxpayer engages in no other activities. The cost of producing each unit of EC1 is less than the amount of the section 45X credit that would be available if each EC1 qualified for the section 45X credit. Taxpayer sells some of its units of EC1 to related persons and makes a Related Person Election pursuant to section 45X(a)(3)(B)(i). Taxpayer also sells some of its units of EC1 to unrelated persons. Taxpayer sells all units of EC1 at an amount equal to cost plus a markup to reflect an anticipated accommodation fee and establishes corresponding accounts receivable at the time of the respective sales. In addition, Taxpayer knows or reasonably expects that after acquiring the units of EC1, the related and unrelated transferees will not resell the units of EC1 or use them in their trades or businesses. Taxpayer intends to obtain the benefit from the section 45X credit by claiming such credits

itself or monetizing such credits through an election under section 6417 or section 6418. Taxpayer eliminates the aforementioned accounts receivable at the time it claims the section 45X credit or receives related payments attributable to the section 45X credit, and further makes payments to the related and unrelated transferees as accommodation fees computed as a percentage of such benefits.

(ii) *Analysis.* Based on all of the facts and circumstances in paragraph (i)(2)(i) of this section, the primary purpose of Taxpayer's production and sale of EC1 is to obtain the benefit of the section 45X credit in a manner that is wasteful and will not be treated as the production and sale of eligible components in a trade or business of Taxpayer for purposes of section 45X(a)(1) and (2). Taxpayer is not eligible for the section 45X credit with respect to units of EC1 that it produced and sold. See sections 6417(d)(6) (excessive payments) and 6418(g)(2) (excessive credit transfer).

(j) *Applicability date.* This section applies to eligible components for which production is completed and sales occur after December 31, 2022, and during a taxable year ending on or after October 28, 2024.

§ 1.45X-2 Sale to unrelated person.

(a) *In general.* The amount of the section 45X credit for any taxable year is equal to the sum of the credit amounts determined under section 45X(b) (and described in §§ 1.45X-3 and 1.45X-4) with respect to each eligible component that is produced by the taxpayer and, during the taxable year, sold by the taxpayer to an unrelated person. Applicable Federal income tax principles apply to determine whether a transaction is in substance a sale (or the provision of a service, or some other disposition). See § 1.45X-1(d) and (e) for additional requirements relating to sales.

(b) *Definitions.* This paragraph (b) provides definitions of terms that apply for purposes of this section.

(1) *Person.* The term *person* means an individual, a trust, estate, partnership, association, company, or corporation, as provided in section 7701(a)(1) of the Code. For purposes of this section, an entity disregarded as separate from a person (for example, under § 301.7701-3 of this chapter) is not a person.

(2) *Related person.* The term *related person* means a person who is related to another person if such persons would be treated as a single employer under the regulations in this chapter under section 52(b) of the Code.

(3) *Unrelated person.* The term *unrelated person* means a person who is not a related person as defined in paragraph (b)(2) of this section.

(c) *Special rule for sale to related person—(1) In general.* For purposes of section 45X(a), a taxpayer is treated as selling an eligible component to an unrelated person if such component is sold to such person by a person who is a related person with respect to the taxpayer.

(2) *Example.* X and Y are members of a group of trades or businesses under common control under section 52(b), and thus are related persons under section 45X(d)(1). Each of X and Y has a calendar year taxable year. Z is an unrelated person. X is in the trade or business of producing and selling solar modules. X produces and sells solar modules to Y in 2023. Y sells the solar modules to Z in 2024. X may claim a section 45X credit for the sale of the solar modules in 2024, the taxable year of X in which Y sells the solar modules to Z.

(d) *Related person election—(1) Availability of election—(i) In general.* In such form and manner as the Secretary may prescribe, a taxpayer may make an election under section 45X(a)(3)(B) (Related Person Election), to treat a sale of eligible components by such taxpayer to a related person as if made to an unrelated person. As a condition of, and prior to, a taxpayer making a Related Person Election (as described in paragraph (d)(2) of this section), the Secretary may require such information or registration as the Secretary deems necessary for purposes of preventing duplication, fraud, or any improper or excessive credit amount determined under section 45X(a)(1).

(ii) *Members of a consolidated group.* A Related Person Election is made by a member of a consolidated group (as defined in § 1.1502-1(h)) in the manner described in paragraph (d)(3)(ii) of this section. A member of a consolidated group that sells eligible components in an intercompany transaction (as defined in § 1.1502-13(b)(1)) may make the Related Person Election to claim the section 45X credit in the year of the intercompany sale. For the treatment of the selling member's gain or loss from that sale, see § 1.1502-13.

(2) *Time and manner of making election—(i) In general.* A taxpayer must make an affirmative Related Person Election annually on the taxpayer's timely filed original Federal income tax return, including extensions in such form and in such manner as may be prescribed in guidance. The Related Person Election will be applicable to all sales of eligible components to related

persons by the taxpayer for each trade or business that the taxpayer engages in during the taxable year that resulted in a credit claim and for which the taxpayer has made the Related Person Election.

(ii) *Required information.* For all sales of eligible components to related persons, the taxpayer must provide all required information set forth in guidance. Such information may include, for example, the taxpayer's name, employer identification number (EIN), a description of the taxpayer's trade or business (including principal business activity code); the name(s) and EINs of all related persons; a listing of the eligible components that are sold; and the intended purpose of any sales of eligible components to or from related persons.

(3) *Scope and effect of election—(i) In general.* A separate Related Person Election must be made with respect to related person sales made by a taxpayer for each eligible trade or business of the taxpayer. The election applies only to such trade or business for which the Related Person Election is made. An election under this section applies to all sales to related persons (including between members of the same consolidated group) of eligible components produced by the taxpayer during the taxable year with respect to each trade or business for which the Related Person Election is made and is irrevocable for the taxable year for which the election is made. An election under paragraph (d)(2)(i) of this section applies solely for purposes of the section 45X credit and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit).

(ii) *Application to consolidated groups.* For a trade or business of a consolidated group, a Related Person Election must be made by the agent for the group on behalf of the members claiming the section 45X credit and filed with the group's timely filed original Federal income tax return, including extensions, with respect to each trade or business that the consolidated group conducts. See § 1.1502-77 (providing rules regarding the status of the common parent as agent for its members). A separate election must be filed on behalf of each member claiming the section 45X credit, and each election must include the name and EIN of the agent for the group and the member on whose behalf the election is being made.

(iii) *Application to partnerships.* The Related Person Election for a partnership must be made on the partnership's timely filed original

Federal income tax return, including extensions, with respect to each trade or business that the partnership conducts. The election applies only to such trade or business for which the Related Person Election is made. An election by a partnership does not apply to any trade or business conducted by a partner outside the partnership.

(4) *Anti-abuse rule*—(i) *In general.* A Related Person Election may not be made if, with respect to the eligible components relevant to such election, the taxpayer fails to provide the information described in paragraph (d)(2) of this section, provides information described in paragraph (d)(2) of this section that shows that such components are described in paragraph (d)(4)(ii) or (iii) of this section, or such components are described in paragraph (d)(4)(ii) or (iii) of this section.

(ii) *Improper use.* For purposes of this paragraph (d)(4) the term *improper use* means a use that is wasteful, such as discarding, disposing of, or destroying the eligible component without putting it to a productive use by the related person to which the eligible component is sold.

(iii) *Defective components.* The term *defective component* means a component that does not meet the requirements of section 45X and the section 45X regulations.

(e) *Sales of integrated components to related person*—(1) *In general.* For purposes of section 45X and the section 45X regulations (and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit), a taxpayer that 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, may claim a section 45X credit (or make an election under section 6417 or section 6418) with respect to the taxable year in which the related person's sale to the unrelated person occurs.

(2) *Examples.* The following examples illustrate the rules provided in paragraph (e)(1) of this section.

(i) *Example 1: Sales of multiple incorporated eligible components to related persons.* X and Y are C corporations that are members of a group of trades or businesses under common control under section 52(b), and thus are related persons under section 45X(d)(1) and paragraph (b)(2) of this section. Each of X and Y has a calendar year taxable year. Z is an unrelated person. X and Y are in the

trade or business of producing and selling photovoltaic wafers and cells. X produces and sells photovoltaic wafers to Y in 2023. Y incorporates the photovoltaic wafers into photovoltaic cells and sells the photovoltaic cells to Z in 2024. X may claim a section 45X credit for the sale of the photovoltaic wafers in 2024, the taxable year of X in which Y sells the photovoltaic cells to Z.

(ii) *Example 2: Sales of multiple incorporated eligible components to related and unrelated persons.* W, X, and Y are domestic C corporations that are members of a group of trades or businesses under common control under section 52(b), and thus are related persons under section 45X(d)(1) and paragraph (b)(2) of this section. Each of W, X, and Y has a calendar year taxable year. W produces electrode active materials (EAMs) and sells the EAMs to X in 2023. In 2024, X incorporates the EAMs into battery cells that it produces and sells the battery cells to Y. In 2025, Y incorporates the battery cells into battery modules (within the meaning of § 1.45X-3(e)(4)(i)(A)) that it produces and sells the battery modules to Z, an unrelated person. W may claim a section 45X credit for EAMs sold to X, X may claim a section 45X credit for the battery cells sold to Y, and Y may claim a section 45X credit for the battery modules sold to Z in 2025, the taxable year of each of W, X, and Y in which the battery modules are sold to Z.

(3) *Special rules applicable to related person election*—(i) *In general.* If a taxpayer makes a valid Related Person Election under section 45X(a)(3)(B)(i) and paragraph (d)(1) of this section, and 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, the taxpayer's sale of the eligible component to the related person is treated (solely for purposes of the section 45X credit and the section 45X regulations, and the regulations in this chapter under sections 6417 and 6418 related to the section 45X credit) as if made to an unrelated person in the taxable year in which the sale to the related person occurs.

(ii) *Example: Sales of multiple integrated eligible components to related and unrelated persons with a related person election.* W, X, and Y are domestic C corporations that are members of a group of trades or businesses under common control and thus are related persons under section 45X(d)(1) and paragraph (b)(2) of this

section. Each of W, X, and Y has a calendar year taxable year. W produces electrode active materials (EAMs) and sells the EAMs to X in 2023. W makes a valid Related Person Election under paragraph (d)(1) of this section in 2023 with regard to the sale. In 2024, X incorporates the EAMs into battery cells that it produces and sells the battery cells to Y. X makes a valid Related Person Election under paragraph (d)(1) of this section in 2024 with regard to the sale. In 2025, Y incorporates the battery cells into battery modules that it produces and sells the battery modules to Z, an unrelated person. W may claim a section 45X credit for the sale of the EAMs in 2023 because the sale to X is treated as if made to an unrelated person solely for purposes of section 45X(a). X may claim a section 45X credit for the sale of the battery cells in 2024 because the sale to Y is treated as if made to an unrelated person solely for purposes of section 45X(a). Y may claim a section 45X credit for the sale of battery modules in 2025 because Z is an unrelated person.

(f) *Applicability date.* This section applies to eligible components for which production is completed and sales occur after December 31, 2022, and during a taxable year ending on or after October 28, 2024.

§ 1.45X-3 Eligible components.

(a) *In general.* For purposes of the section 45X credit, *eligible component* means any solar energy component (as defined in paragraph (b) of this section), any wind energy component (as defined in paragraph (c) of this section), any inverter (as defined in paragraph (d) of this section), any qualifying battery component (as defined in paragraph (e) of this section), and any applicable critical mineral (as defined in § 1.45X-4(b)). See paragraph (f) of this section for certain phase-out rules applicable to eligible components other than applicable critical minerals.

(b) *Solar energy components.* *Solar energy component* means a solar module, photovoltaic cell, photovoltaic wafer, solar grade polysilicon, torque tube, structural fastener, or polymeric backsheet, each as defined in this paragraph (b).

(1) *Photovoltaic cell*—(i) *Definition.* *Photovoltaic cell* means the smallest semiconductor element of a solar module that performs the immediate conversion of light into electricity that is either a thin film photovoltaic cell or a crystalline photovoltaic cell.

(ii) *Credit amount.* For a photovoltaic cell, the credit amount is equal to the product of 4 cents multiplied by the capacity of such photovoltaic cell. The

capacity of each photovoltaic cell is expressed on a direct current watt basis. Capacity is the nameplate capacity in direct current watts using Standard Test Conditions (STC), as defined by the International Electrotechnical Commission (IEC). In the case of a tandem technology produced in serial fashion, such as a monolithic multijunction cell composed of two or more sub-cells, capacity must be measured at the point of sale at the end of the single cell production unit. In the case of a four-terminal tandem technology produced by mechanically stacking two distinct cells or interconnected layers, capacity must be measured for each cell at each point of sale. If a cell is sold to a customer who will use it as the bottom cell in a tandem module, its capacity should be measured with the customer's intended top cell placed between the bottom cell and the one-sun light source.

(iii) *Substantiation*. The taxpayer must document the capacity of a photovoltaic cell in a bill of sale or design documentation, such as an IEC certification (for example, IEC 61215 or IEC 60904).

(2) *Photovoltaic wafer*—(i) *Definition*. *Photovoltaic wafer* means a thin slice, sheet, or layer of semiconductor material of at least 240 square centimeters that comprises the substrate or absorber layer of one or more photovoltaic cells. A photovoltaic wafer must be produced by a single manufacturer by forming an ingot from molten polysilicon (for example, Czochralski method) and then subsequently slicing it into wafers, forming molten or evaporated polysilicon into a sheet or layer, or depositing a thin-film semiconductor photon absorber into a sheet or layer (that is, thin-film deposition).

(ii) *Credit amount*. For a photovoltaic wafer, the credit amount is \$12 per square meter.

(3) *Polymeric backsheet*—(i) *Definition*. *Polymeric backsheet* means a sheet on the back of a solar module, composed, at least in part, of a polymer, that acts as an electric insulator and protects the inner components of such module from the surrounding environment.

(ii) *Credit amount*. For a polymeric backsheet, the credit amount is 40 cents per square meter.

(4) *Solar grade polysilicon*—(i) *Definition*. *Solar grade polysilicon* means silicon that is suitable for use in photovoltaic manufacturing and purified to a minimum purity of 99.999999 percent silicon by mass. Satisfaction of the minimum purity requirement will be determined in

accordance with the standards provided in SEMI Specification PV17–1012, Category 1.

(ii) *Credit amount*. For solar grade polysilicon, the credit amount is \$3 per kilogram.

(5) *Solar module*—(i) *Definition*. *Solar module* means the connection and lamination of photovoltaic cells into an environmentally protected final assembly that is—

(A) Suitable to generate electricity when exposed to sunlight; and

(B) Ready for installation without an additional manufacturing process.

(ii) *Credit amount*. For a solar module, the credit amount is equal to the product of 7 cents multiplied by the capacity of such module. The capacity of each solar module is expressed on a direct current watt basis. Capacity is the nameplate capacity in direct current watts using STC, as defined by the IEC.

(iii) *Substantiation*. The taxpayer must document the capacity of a solar module in a bill of sale or design documentation, such as an IEC certification (for example, IEC 61215 or IEC 61646).

(6) *Solar tracker*. *Solar tracker* means a mechanical system that moves solar modules according to the position of the sun and to increase energy output. A torque tube (as defined in paragraph (b)(7) of this section) or structural fastener (as defined in paragraph (b)(8) of this section) are solar tracker components that are eligible components for purposes of the section 45X credit.

(7) *Torque tube*—(i) *Definition*. *Torque tube* means a structural steel support element (including longitudinal purlins) that—

(A) Is part of a solar tracker;

(B) Is of any cross-sectional shape;

(C) May be assembled from individually manufactured segments;

(D) Spans longitudinally between foundation posts;

(E) Supports solar panels and is connected to a mounting attachment for solar panels (with or without separate module interface rails); and

(F) Is rotated by means of a drive system.

(ii) *Credit amount*. For a torque tube, the credit amount is 87 cents per kilogram.

(iii) *Substantiation*. The taxpayer must document that a torque tube is part of a solar tracker with a specification sheet, bill of sale, or other similar documentation that explicitly describes its application as part of a solar tracker.

(8) *Structural fastener*—(i) *Definition*. *Structural fastener* means a component that is used—

(A) To connect the mechanical and drive system components of a solar

tracker to the foundation of such solar tracker;

(B) To connect torque tubes to drive assemblies; or

(C) To connect segments of torque tubes to one another.

(ii) *Credit amount*. For a structural fastener, the credit amount is \$2.28 per kilogram.

(iii) *Substantiation*. The taxpayer must document that a structural fastener is used in a manner described in paragraph (b)(8)(i)(A), (B), or (C) of this section with a bill of sale or other similar documentation that explicitly describes such use.

(c) *Wind energy components*. *Wind energy component* means a blade, nacelle, tower, offshore wind foundation, or related offshore wind vessel, each as defined in this paragraph (c).

(1) *Blade*—(i) *Definition*. *Blade* means an airfoil-shaped blade that is responsible for converting wind energy to low-speed rotational energy.

(ii) *Credit amount*. For a blade, the credit amount is equal to the product of 2 cents multiplied by the total rated capacity of the completed wind turbine for which the blade is designed.

(2) *Offshore wind foundation*—(i) *Definition*. *Offshore wind foundation* means the component (including transition piece) that secures an offshore wind tower and any above-water turbine components to the seafloor using—

(A) Fixed platforms, such as offshore wind monopiles, jackets, or gravity-based foundations; or

(B) Floating platforms and associated mooring systems.

(ii) *Credit amount*. For a fixed offshore wind foundation platform, the credit amount is equal to the product of 2 cents multiplied by the total rated capacity of the completed wind turbine for which the fixed offshore wind foundation platform is designed. For a floating offshore wind foundation platform, the credit amount is equal to the product of 4 cents multiplied by the total rated capacity of the completed wind turbine for which the floating offshore wind foundation platform is designed.

(3) *Nacelle*—(i) *Definition*. *Nacelle* means the assembly of the drivetrain and other tower-top components of a wind turbine (with the exception of the blades and the hub) within their cover housing.

(ii) *Credit amount*. For a nacelle, the credit amount is equal to the product of 5 cents multiplied by the total rated capacity of the completed wind turbine for which the nacelle is designed.

(4) *Related offshore wind vessel*—(i) *Definition*. *Related offshore wind vessel*

means any vessel that is purpose-built or retrofitted for purposes of the development, transport, installation, operation, or maintenance of offshore wind energy components. A vessel is purpose-built for development, transport, installation, operation, or maintenance of offshore wind energy components if it is built to be capable of performing such functions and it is of a type that is commonly used in the offshore wind industry. A vessel is retrofitted for development, transport, installation, operation, or maintenance of offshore wind energy components if such vessel was incapable of performing such functions prior to being retrofitted, the retrofit causes the vessel to be capable of performing such functions, and the retrofitted vessel is of a type that is commonly used in the offshore wind industry.

(ii) *Credit amount.* For a related offshore wind vessel, the credit amount is equal to 10 percent of the sales price of the vessel. The sales price of the vessel, determined under Federal income tax principles, does not include the price of maintenance, services, or other similar items that may be sold with the vessel. For a related offshore wind vessel with respect to which an election under section 45X(a)(3)(B)(i) has been made, such election will not cause the sale price of such vessel to be treated as having been determined with respect to a transaction between uncontrolled taxpayers for purposes of section 482 of the Code and the regulations in this chapter.

(5) *Tower*—(i) *Definition.* *Tower* means a tubular or lattice structure that supports the nacelle and rotor of a wind turbine.

(ii) *Credit amount.* For a tower, the credit amount is equal to the product of 3 cents multiplied by the total rated capacity of the completed wind turbine for which the tower is designed.

(6) *Total rated capacity of the completed wind turbine.* For purposes of this section, *total rated capacity of the completed wind turbine* means, for the completed wind turbine for which a blade, nacelle, offshore wind foundation, or tower was manufactured and sold, the nameplate capacity at the time of sale as certified to the relevant national or international standards, such as IEC 61400, or ANSI/ACP 101-1-2021, the Small Wind Turbine Standard (Standard). Certification of the turbine to such Standards must be documented by a certificate issued by an accredited certification body. The total rated capacity of a wind turbine must be expressed in watts.

(7) *Substantiation.* Taxpayers must maintain specific documentation

regarding wind energy components for which a section 45X credit is claimed. For blades, nacelles, offshore wind foundations, or towers, a taxpayer must document the turbine model for which such component is designed and the total rated capacity of the completed wind turbine in technical documentation associated with the sale of such component. For related offshore wind vessel, such documentation could include the contract to construct or retrofit (along with retrofit plans), sales contract, U.S. Coast Guard bill of sale, U.S. Coast Guard Certificate of Documentation (COD), and U.S. Coast Guard Certificate of Inspection (COI).

(d) *Inverters*—(1) *In general.* *Inverter* means an end product that is suitable to convert direct current (DC) electricity from one or more solar modules or certified distributed wind energy systems into alternating current electricity. An end product is suitable to convert DC electricity from one or more solar modules or certified distributed wind energy systems into alternating current electricity if, in the form sold by the manufacturer, it is able to connect with such modules or systems and convert DC electricity to alternating current electricity from such connected source. The term inverter includes a central inverter, commercial inverter, distributed wind inverter, microinverter, or residential inverter. Only an inverter that meets at least one of the requirements in paragraphs (d)(2) through (7) of this section is an eligible component for purposes of the section 45X credit.

(2) *Central inverter*—(i) *Definition.* *Central inverter* means an inverter that is suitable for large utility-scale systems and has a capacity that is greater than 1,000 kilowatts. The capacity of a central inverter is expressed on an alternating current watt basis. An inverter is suitable for large utility-scale systems if, in the form sold by the manufacturer, it is capable of serving as a component in a large utility-scale system and meets the core engineering specifications for such application.

(ii) *Credit amount.* For a central inverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 0.25 cents multiplied by the total rated capacity of the central inverter.

(iii) *Substantiation.* The taxpayer must document that a central inverter meets the core engineering specifications for use in a large utility-scale system and has a capacity that is greater than 1,000 kilowatts with a specification sheet, bill of sale, or other similar documentation that explicitly

describes such specifications and capacity.

(3) *Commercial inverter*—(i) *Definition.* *Commercial inverter* means an inverter that—

(A) Is suitable for commercial or utility-scale applications;

(B) Has a rated output of 208, 480, 600, or 800 volt three-phase power; and

(C) Has a capacity expressed on an alternating current watt basis that is not less than 20 kilowatts and not greater than 125 kilowatts.

(ii) *Suitable for commercial or utility-scale applications.* An inverter is suitable for commercial or utility-scale applications if, in the form sold by the manufacturer, it is capable of serving as a component in commercial or utility-scale systems and meets the core engineering specifications for such application.

(iii) *Credit amount.* For a commercial inverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 2 cents multiplied by the total rated capacity of the commercial inverter.

(iv) *Substantiation.* The taxpayer must document that a commercial inverter meets the core engineering specifications for use in commercial or utility-scale applications, the inverter's rated output, and the inverter's capacity in a specification sheet, bill of sale, or other similar documentation.

(4) *Distributed wind inverter*—(i) *In general.* *Distributed wind inverter* means an inverter that is used in a residential or non-residential system that utilizes one or more certified distributed wind energy systems and has a total rated output, expressed on an alternating current watt basis, of not greater than 150 kilowatts.

(ii) *Certified distributed wind energy system.* *Certified distributed wind energy system* means a wind energy system that is certified by an accredited certification agency to meet Standard 9.1-2009 of the American Wind Energy Association; IEC 61400-1, 61400-2, 61400-11, 61400-12; or ANSI/ACP 101-1-2021, the Standard, including any subsequent revisions to or modifications of such Standard that have been approved by ANSI.

(iii) *Credit amount.* For a distributed wind inverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 11 cents multiplied by the total rated capacity of the distributed wind inverter.

(iv) *Substantiation.* The taxpayer must document that a distributed wind inverter is used in a residential or non-residential system that utilizes one or

more certified distributed wind energy systems with a specification sheet, bill of sale, or other similar documentation that explicitly describes such use and the total rated output of the inverter on an alternating current watt basis.

(5) *Microinverter*—(i) *Definition*. *Microinverter* means an inverter that—

(A) Is suitable to connect with one solar module;

(B) Has a rated output described in paragraph (d)(5)(ii) of this section; and

(C) Has a capacity, expressed on an alternating current watt basis, that is not greater than 650 watts.

(ii) *Rated output*. For purposes of paragraph (d)(5)(i)(B) of this section, for an inverter to be a microinverter, the inverter must have a rated output of—

(A) 120 or 240 volt single-phase power; or

(B) 208 or 480 volt three-phase power.

(iii) *Suitable to connect to one solar module*—(A) *In general*. An inverter is suitable to connect to one solar module if, in the form sold by the manufacturer, it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity.

(B) *Application to direct current (DC) optimized inverter systems*. A *DC optimized inverter system* means an inverter that is comprised of an inverter connected to multiple DC optimizers that are each designed to connect to one solar module. A DC optimized inverter system is suitable to connect with one solar module if, in the form sold by the manufacturer, it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity.

(C) *Application to multi-module inverters*. A *multi-module inverter* means an inverter that is comprised of an inverter with independent connections and DC optimizing components for two or more modules. A multi-module microinverter is suitable to connect with one solar module if it is capable of connecting to one or more solar modules and regulating the DC electricity from each module independently before that electricity is converted into alternating current electricity.

(iv) *Credit amount*—(A) *In general*. For a microinverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 11 cents multiplied by the total rated capacity of the microinverter.

(B) *DC optimized inverter systems*. A DC optimized inverter system qualifies as a microinverter if it meets the requirements of paragraph (d)(5)(i) of this section. For purposes of paragraph (d)(5)(i)(C) of this section, a DC optimized inverter system's capacity is determined separately for each DC optimizer paired with the inverter in a DC optimized inverter system. If each DC optimizer paired with the inverter in a DC optimized inverter system meets the requirements of paragraph (d)(5)(i) of this section, then the DC optimized inverter system qualifies as a microinverter. The credit amount for a DC optimized inverter system that qualifies as a microinverter is equal to the product of 11 cents multiplied by the lesser of the sum of the alternating current capacity of each DC optimizer when paired with the inverter in the DC optimized inverter system or the alternating current capacity of the inverter in the DC optimized inverter system. For purposes of this paragraph (d)(5)(iv)(B), capacity must be measured in watts of alternating current converted from DC electricity by the inverter in a DC optimized inverter system. For a DC optimized inverter system to qualify as a microinverter, a taxpayer must produce and sell the inverter and the DC optimizers in the DC optimized inverter system together as a combined end product.

(C) *Multi-module inverters*. A multi-module inverter qualifies as a microinverter if it meets the requirements of paragraph (d)(5)(i) of this section. For purposes of paragraph (d)(5)(i)(C) of this section, a multi-module inverter's capacity is determined separately for each internal DC optimizer paired with the inverter. The credit amount for a multi-module inverter is equal to the product of 11 cents multiplied by the total alternating current capacity of the DC optimizers in the multi-module inverter when paired with the inverter in the system. For purposes of this paragraph (d)(5)(iv)(C), capacity must be measured in watts of alternating current converted from DC electricity by the inverter in a multi-module microinverter.

(v) *Substantiation*. The taxpayer must document that a microinverter meets the core engineering specifications to be suitable to connect with one solar module, the inverter's rated output, and the inverter's capacity in a specification sheet, bill of sale, or other similar documentation. In the case of a DC optimized inverter system, the taxpayer must also document that the DC optimizers and the inverter in such system were sold as a combined end product.

(6) *Residential inverter*—(i) *Definition*. *Residential inverter* means an inverter that—

(A) Is suitable for a residence;

(B) Has a rated output of 120 or 240 volt single-phase power; and

(C) Has a capacity expressed on an alternating current watt basis that is not greater than 20 kilowatts.

(ii) *Suitable for a residence*. An inverter is suitable for a residence if, in the form sold by the manufacturer, it is capable of serving as a component in a residential system and meets the core engineering specifications for such application.

(iii) *Credit amount*. For a residential inverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 6.5 cents multiplied by the total rated capacity of the residential inverter.

(iv) *Substantiation*. The taxpayer must document that a residential inverter meets the core engineering specifications for use in a residence, the inverter's rated output, and the inverter's capacity in a specification sheet, bill of sale, or other similar documentation.

(7) *Utility inverter*—(i) *Definition*. *Utility inverter* means an inverter that—

(A) Is suitable for commercial or utility-scale systems;

(B) Has a rated output of not less than 600 volt three-phase power; and

(C) Has a capacity expressed on an alternating current watt basis that is greater than 125 kilowatts and not greater than 1000 kilowatts.

(ii) *Suitable for commercial or utility-scale systems*. An inverter is suitable for commercial or utility-scale systems if, in the form sold by the manufacturer, it is capable of serving as a component in such systems and meets the core engineering specifications for such application.

(iii) *Credit amount*. For a utility inverter the total rated capacity of which is expressed on an alternating current watt basis, the credit amount is equal to the product of 1.5 cents multiplied by the total rated capacity of the utility inverter.

(iv) *Substantiation*. The taxpayer must document that a utility inverter meets the core engineering specifications for use in commercial or utility-scale systems, the inverter's rated output, and the inverter's capacity in a specification sheet, bill of sale, or other similar documentation.

(e) *Qualifying battery component*—(1) *In general*. *Qualifying battery component* means electrode active materials, battery cells, or battery

modules, each as defined in this paragraph (e).

(2) *Electrode active materials*—(i) *Definitions*—(A) *Electrode active materials*. *Electrode active materials* means cathode electrode materials, anode electrode materials, and electrochemically active materials that contribute to the electrochemical processes necessary for energy storage. Electrode active materials do not include battery management systems, terminal assemblies, cell containments, gas release valves, module containments, module connectors, compression plates, straps, pack terminals, bus bars, thermal management systems, and pack jackets.

(B) *Cathode electrode materials*. *Cathode electrode materials* means the materials that comprise the cathode of a commercial battery technology, such as binders, and current collectors (for example, cathode foils).

(C) *Anode electrode materials*. *Anode electrode materials* means the materials that comprise the anode of a commercial battery technology, including anode foils.

(D) *Electrochemically active materials*. *Electrochemically active materials* that contribute to the electrochemical processes necessary for energy storage means battery-grade materials that enable the electrochemical storage within a commercial battery technology. In addition to solvents, additives, and electrolyte salts, electrochemically active materials that contribute to the electrochemical processes necessary for energy storage may include electrolytes, catholytes, anolytes, separators, and metal salts and oxides.

(E) *Example*. A commercial battery technology contains Cathode Active Material (CAM), which is a powder used in the battery that is made by processing and combining Battery-Grade Materials A and B. Battery-Grade Material A is a derivative of Material C, which has been refined to the necessary level to enable electrochemical storage. The production costs for CAM and its direct inputs (Battery-Grade Material A and Battery-Grade Material B) are eligible for the section 45X credit for electrode active materials, but the unrefined Material C is not.

(F) *Battery-grade materials*. *Battery-grade materials* means the processed materials found in a final battery cell or an analogous unit, or the direct battery-grade precursors to those processed materials.

(ii) *Credit amount*. For an electrode active material, the credit amount is equal to 10 percent of the costs incurred

by the taxpayer with respect to production of such materials.

(iii) *Production processes for electrode active materials*—(A) *Conversion*. For purposes of section 45X, the term *conversion* means a chemical transformation from one species to another.

(B) *Purification*. For purposes of section 45X, the term *purification* means increasing the mass fraction of a certain element.

(iv) *Production costs incurred*—(A) *In general*—(1) *Definition of production costs incurred*. Costs incurred by the taxpayer with respect to production of an electrode active material includes all costs as defined in § 1.263A-1(e) that are paid or incurred within the meaning of section 461 of the Code by the taxpayer for the production of such electrode active material including direct materials costs as defined in § 1.263A-1(e)(2)(i)(A), or indirect materials costs as defined in § 1.263A-1(e)(3)(ii)(E), but does not include direct or indirect materials costs that relate to the purchase of materials that are an eligible component at the time of acquisition (for example, an electrode active material as defined in paragraph (e)(2)(i) of this section or applicable critical mineral as defined in § 1.45X-4(b)). This definition of production costs incurred also includes any costs incurred by the taxpayer related to the extraction, as defined in paragraph (e)(2)(iv)(B) of this section, of raw materials in the United States or a United States territory, but only if those costs are paid or incurred by the taxpayer that claims the section 45X credit with respect to the relevant electrode active material. Section 263A of the Code and the regulations in this chapter under section 263A apply solely to identify the types of costs that are includible in production costs incurred for purposes of computing the amount of the section 45X credit, but do not apply for any other purpose, such as to determine whether a taxpayer is engaged in production activities.

(2) *Production costs for production of incorporated eligible components*. The production costs that a taxpayer pays or incurs in the production of an eligible component (whether produced domestically or not) that the taxpayer then incorporates into a further distinct electrode active material within the meaning of § 1.45X-1(f)(1) are not included in the costs incurred by the taxpayer in producing the further distinct electrode active material. A taxpayer may not include the same production costs in the calculation of the credit amount for more than one eligible component. For example, if the

taxpayer pays or incurs production costs of \$50X for eligible component 1 and an additional \$100X of production costs for eligible component 2 that included integrating eligible component 1 within the meaning of § 1.45X-1(f)(1), then the production costs for eligible component 1 equal \$50X and the production costs for eligible component 2 equal \$100X.

(3) *Examples*. The following examples illustrate the rules of this section:

(i) *Example 1*. Taxpayers X, Y and Z are unrelated C corporations that have calendar year taxable years. In 2024, X extracts raw nickel from natural mineral deposits located in the United States and purifies the extracted material to 99% nickel by mass (qualifying nickel) as required by section 45X(c)(6)(S) and § 1.45X-4(b)(19)(ii). Y subsequently purchases the qualifying nickel and uses the material to produce battery-grade nickel salts which qualify as electrode active materials within the meaning of paragraph (e)(2) of this section. Y sells the battery-grade nickel salts to Z in tax year 2026. Y may claim a section 45X credit for the battery-grade nickel salts in tax year 2026 because Y produced, within the meaning of § 1.45X-1(c)(2), an eligible component. In calculating its production costs with respect to such credit, Y may not include the purchase price it paid to X for the qualifying nickel because the qualifying nickel met the minimum purity requirement prescribed by section 45X(c)(6)(S) such that the material constituted an applicable critical mineral (and, accordingly, an eligible component) at the time at which Y acquired the qualifying nickel.

(ii) *Example 2*. Assume the facts are the same as in paragraph (e)(2)(iv)(A)(2)(i) of this section (*Example 1*), except that X purifies the extracted raw nickel material to a purity of 90% nickel by mass, rather than 99% nickel by mass as required by section 45X(c)(6)(S) and § 1.45X-4(b)(19)(ii). Y may claim a section 45X credit for the battery-grade nickel salts in tax year 2026 because Y produced, within the meaning of § 1.45X-1(c)(2), an eligible component. In calculating its production costs with respect to such credit, Y may include the purchase price of the 90% nickel material among its production costs, provided that Y satisfies the substantiation requirements described in paragraph (e)(2)(iv)(C) of this section, because, at the time at which Y acquired such material, the material did not meet the minimum purity as required by section 45X(c)(6)(S) to constitute an applicable critical mineral.

(B) *Definition of extraction*. The term *extraction* means the activities

performed to harvest minerals or natural resources from the ground or from a body of water. Extraction includes, but is not limited to, operating equipment to harvest minerals or natural resources from mines and wells and the physical processes involved in refining.

Extraction also includes operating equipment to extract minerals or natural resources from the waste or residue of prior extraction, including crude oil extraction to the extent that processes applied to that crude oil yield an applicable critical mineral or an electrode active material as a byproduct. Extraction concludes when activities are performed to convert raw mined or harvested products or raw well effluent to substances that can be readily transported or stored for direct use in critical mineral or electrode active material processing. Extraction does not include activities that begin with a recyclable commodity (as such activities are recycling). Extraction does not include the chemical and thermal processes involved in refining.

(C) *Substantiation.* In order to include direct or indirect materials costs as defined in § 1.263A-1(e)(2)(i)(A) and (e)(3)(ii)(E) as production costs when calculating a section 45X credit for the production and sale of an electrode active material, a taxpayer, as part of filing an annual tax return (or a return for a short year within the meaning of section 443 of the Code), must include the information in paragraph (e)(2)(iv)(C)(1) of this section as an attachment to that return, prepare the information required in paragraphs (e)(2)(iv)(C)(2) through (4) of this section and maintain that information in the taxpayer's books and records under section 6001, and comply with directions for the information required in paragraph (e)(2)(iv)(C)(5) of this section as specified in guidance:

(1) Certifications from any supplier, including the supplier's employer identification number and that is signed under penalties of perjury, from which the taxpayer purchased any constituent elements, materials, or subcomponents of the taxpayer's electrode active material, stating that the supplier is not claiming the section 45X credit with respect to any of the material acquired by the taxpayer, nor is the supplier aware that any prior supplier in the chain of production of that material claimed a section 45X credit for the material.

(2) A document that provides an analysis of any constituent elements, materials, or subcomponents that concludes the material did not meet the definition of an eligible component (for example, did not meet the definition of

applicable critical mineral or electrode active material) at the time of acquisition by the taxpayer. The document may be prepared by the taxpayer or ideally by an independent third-party.

(3) A list of all direct and indirect material costs and the amount of such costs that were included within the taxpayer's total production cost for each electrode active material.

(4) A document related to the taxpayer's production activities with respect to the direct and indirect material costs that establishes the materials were used in the production of the electrode active material. The document may be prepared by the taxpayer or ideally by an independent third-party.

(5) Any other information related to the direct or indirect materials specified in guidance.

(D) Failure to provide the documentation described in paragraph (e)(2)(iv)(C) of this section with the return filing, or providing an available upon request statement, will constitute a failure to substantiate the claim.

(v) *Materials that are both electrode active materials and applicable critical minerals—(A) In general.* A material that qualifies as an electrode active material and an applicable critical material is eligible for the section 45X credit. A taxpayer may claim the section 45X credit with respect to such material either as an electrode active material or an applicable critical material, but not both.

(B) *Example.* Lithium carbonate is an electrode active material because it is a direct battery-grade precursor to electrolyte salts, which are processed materials found in a final battery cell. Lithium carbonate is also eligible for the 45X critical minerals credit. A taxpayer who produces and sells lithium carbonate may claim either the electrode active material credit or the critical mineral credit for its production and sale of lithium carbonate but may not take both credits.

(3) *Battery cells—(i) Definition.* *Battery cell* means an electrochemical cell—

(A) Comprised of one or more positive electrodes and one or more negative electrodes;

(B) With a volumetric energy density of not less than 100 watt-hours per liter; and

(C) Capable of storing at least 12 watt-hours of energy.

(ii) *Capacity measurement.* Taxpayers must measure the capacity of a battery cell in accordance with a national or international standard, such as IEC 60086-1 (Primary Batteries), or an

equivalent standard. Taxpayers can reference the United States Advanced Battery Consortium (USABC) Battery Test Manual for additional guidance.

(iii) *Credit amount.* For a battery cell, the credit amount is equal to the product of \$35 multiplied by the capacity of such battery cell, subject to the limitation provided in paragraph (e)(5) of this section. The capacity of a battery cell is expressed on a kilowatt-hour basis.

(4) *Battery module definitions and applicable rules—(i) Battery module defined.* The term *battery module* means a module described in paragraph (e)(4)(i)(A) or (B) of this section with an aggregate capacity of not less than 7 kilowatt-hours (or, in the case of a module for a hydrogen fuel cell vehicle, not less than 1 kilowatt-hour).

(A) *Modules using battery cells.* A module using battery cells, is a module with two or more battery cells that are configured electrically, in series or parallel, to create voltage or current, as appropriate, to a specified end use, meaning an end-use configuration of battery technologies. An end-use configuration is the product that combines cells into a module such that any subsequent manufacturing is done to the module rather than to the cells individually. Where multiple points in a supply chain may be eligible under this section, the first module produced and sold that meets the requirements of this section and the kilowatt-hour requirement in paragraph (e)(4)(i) of this section will be the only module eligible.

(B) *Modules with no battery cells.* A *module with no battery cells* means a product with a standardized manufacturing process and form that is capable of storing and dispatching useful energy, that contains an energy storage medium that remains in the module (for example, it is not consumed through combustion), and that is not a custom-built electricity generation or storage facility. For example, neither standalone fuel storage tanks nor fuel tanks connected to engines or generation systems qualify as modules with no battery cells.

(ii) *Capacity measurement—(A) Modules using battery cells.* Taxpayers must measure the capacity of a module using battery cells with a testing procedure that complies with a national or international standard published by a recognized standard setting organization. The capacity of a battery module may not exceed the total nameplate capacity of the battery cells in the module. Taxpayers must measure the capacity of a battery cell in accordance with a national or international standard, such as IEC

60086–1 (Primary Batteries), or an equivalent standard. Taxpayers can reference the USABC Battery Test Manual for additional guidance.

(B) *Modules with no battery cells.* Taxpayers must measure the capacity of a module with no battery cells with a testing procedure that complies with a national or international standard published by a recognized standard setting organization. Taxpayers producing thermal and thermochemical battery modules described in paragraph (e)(4)(i)(B) of this section must convert the energy storage to a kilowatt-hour basis and provide both methodology and testing regarding this conversion. Such conversion of the kilowatt-hour basis cannot exceed the total direct conversion of the total nameplate capacity of the thermal battery module to kilowatt-hours.

(C) *Substantiation of capacity measurement.* Taxpayers must maintain the testing standard and methodology with respect to the capacity measurement described in paragraphs (e)(4)(ii)(A) and (B) of this section as part of books and records under section 6001 and § 1.6001–1. The testing procedure and methodology must consistently be used, subject to any updated standard of the same methodology and testing, for battery modules (with or without cells) sold in the taxpayer's trade or business.

(iii) *Credit amount—(A) Modules using battery cells.* For a battery module with cells, the credit amount is equal to the product of \$10 multiplied by the capacity of such battery module, subject to the limitation provided in paragraph (e)(5) of this section. The capacity of each battery module is expressed on a kilowatt-hour basis.

(B) *Modules with no battery cells.* For a battery module without cells, the credit amount is equal to the product of \$45 multiplied by the capacity of such battery module, subject to the limitation provided in paragraph (e)(5) of this section. The capacity of each battery module is expressed on a kilowatt-hour basis.

(5) *Limitation on capacity of battery cells and battery modules—(i) In general.* For purposes of paragraphs (e)(3)(iii) and (e)(4)(iii) of this section, the capacity determined with respect to a battery cell or battery module must not exceed a capacity-to-power ratio of 100:1.

(ii) *Capacity to power ratio.* For purposes of paragraph (e)(5)(i) of this section, *capacity-to-power ratio* means, with respect to a battery cell or battery module, the ratio of the capacity of such cell or module to the maximum

discharge amount of such cell or module.

(f) *Phase out rule—(1) In general.* Except as provided in paragraph (f)(3) of this section, in the case of any eligible component sold after December 31, 2029, the amount of the section 45X credit determined with respect to such eligible component must be equal to the product of—

(i) The amount determined under this section with respect to such eligible component, multiplied by

(ii) The phase out percentage under paragraph (f)(2) of this section.

(2) *Phase out percentages.* The phase out percentage is equal to—

(i) 75 percent for eligible components sold during calendar year 2030;

(ii) 50 percent for eligible components sold during calendar year 2031;

(iii) 25 percent for eligible components sold during calendar year 2032, and

(iv) Zero percent for eligible components sold after calendar year 2032.

(3) *Exception for applicable critical minerals.* The phase out rules described in paragraphs (f)(1) and (2) of this section apply to all eligible components except applicable critical minerals.

(g) *Applicability date.* This section applies to eligible components for which production is completed and sales occur after December 31, 2022, and during a taxable year ending on or after October 28, 2024.

§ 1.45X–4 Applicable critical minerals.

(a) *In general.* The term *applicable critical mineral* means any of the minerals that are listed in section 45X(c)(6) and defined in paragraph (b) of this section.

(b) *Definitions.* The following definitions apply for the purpose of this section—

(1) [Reserved]

(2) *Antimony.* The term *antimony* means antimony that is—

(i) Converted to antimony trisulfide concentrate with a minimum purity of 90 percent antimony trisulfide by mass; or

(ii) Purified to a minimum purity of 99.65 percent antimony by mass.

(3) *Barite.* The term *barite* means barite that is barium sulfate purified to a minimum purity of 80 percent barite by mass.

(4) *Beryllium.* The term *beryllium* means beryllium that is—

(i) Converted to copper-beryllium master alloy; or

(ii) Purified to a minimum purity of 99 percent beryllium by mass.

(5) *Cerium.* The term *cerium* means cerium that is—

(i) Converted to cerium oxide that is purified to a minimum purity of 99.9 percent cerium oxide by mass; or

(ii) Purified to a minimum purity of 99 percent cerium by mass.

(6) *Cesium.* The term *cesium* means cesium that is—

(i) Converted to cesium formate or cesium carbonate; or

(ii) Purified to a minimum purity of 99 percent cesium by mass.

(7) *Chromium.* The term *chromium* means chromium that is—

(i) Converted to ferrocromium consisting of not less than 60 percent chromium by mass; or

(ii) Purified to a minimum purity of 99 percent chromium by mass.

(8) *Cobalt.* The term *cobalt* means cobalt that is—

(i) Converted to cobalt sulfate; or

(ii) Purified to a minimum purity of 99.6 percent cobalt by mass.

(9) *Dysprosium.* The term *dysprosium* means dysprosium that is—

(i) Converted to not less than 99 percent pure dysprosium iron alloy by mass; or

(ii) Purified to a minimum purity of 99 percent dysprosium by mass.

(10) *Europium.* The term *europium* means europium that is—

(i) Converted to europium oxide that is purified to a minimum purity of 99.9 percent europium oxide by mass; or

(ii) Purified to a minimum purity of 99 percent of europium by mass.

(11) *Fluorspar.* The term *fluorspar* means fluorspar that is—

(i) Converted to fluorspar that is purified to a minimum purity of 97 percent calcium fluoride by mass; or

(ii) Purified to a minimum purity of 99 percent fluorspar by mass.

(12) *Gadolinium.* The term *gadolinium* means gadolinium that is—

(i) Converted to gadolinium oxide that is purified to a minimum purity of 99.9 percent gadolinium oxide by mass; or

(ii) Purified to a minimum purity of 99 percent gadolinium by mass.

(13) *Germanium.* The term *germanium* means germanium that is—

(i) Converted to germanium tetrachloride; or

(ii) Purified to a minimum purity of 99.99 percent germanium by mass.

(14) *Graphite.* The term *graphite* means natural or synthetic graphite that is purified to a minimum purity of 99.9 percent graphitic carbon by mass. The term *99.9 percent graphitic carbon by mass* means graphite that is 99.9 percent carbon by mass.

(15) *Indium.* The term *indium* means indium that is—

(i) Converted to—

(A) Indium tin oxide; or

(B) Indium oxide that is purified to a minimum purity of 99.9 percent indium oxide by mass; or

(ii) Purified to a minimum purity of 99 percent indium by mass.

(16) *Lithium*. The term *lithium* means lithium that is—

(i) Converted to lithium carbonate or lithium hydroxide; or

(ii) Purified to a minimum purity of 99.9 percent lithium by mass.

(17) *Manganese*. The term *manganese* means manganese that is—

(i) Converted to manganese sulphate; or

(ii) Purified to a minimum purity of 99.7 percent manganese by mass.

(18) *Neodymium*. The term *neodymium* means neodymium that is—

(i) Converted to neodymium-praseodymium oxide that is purified to a minimum purity of 99 percent neodymium-praseodymium oxide by mass;

(ii) Converted to neodymium oxide that is purified to a minimum purity of 99.5 percent neodymium oxide by mass; or

(iii) Purified to a minimum purity of 99.9 percent neodymium by mass.

(19) *Nickel*. The term *nickel* means nickel that is—

(i) Converted to nickel sulphate; or
(ii) Purified to a minimum purity of 99 percent nickel by mass.

(20) *Niobium*. The term *niobium* means niobium that is—

(i) Converted to ferroniobium; or
(ii) Purified to a minimum purity of 99 percent niobium by mass.

(21) *Tellurium*. The term *tellurium* means tellurium that is—

(i) Converted to cadmium telluride; or
(ii) Purified to a minimum purity of 99 percent tellurium by mass.

(22) *Tin*. The term *tin* means tin that purified to low alpha emitting tin that—

(i) Has a purity of greater than 99.99 percent by mass; and

(ii) Possesses an alpha emission rate of not greater than 0.01 counts per hour per centimeter square.

(23) *Tungsten*. The term *tungsten* means tungsten that is converted to ammonium paratungstate or ferrotungsten.

(24) *Vanadium*. The term *vanadium* means vanadium that is converted to ferrovanadium or vanadium pentoxide.

(25) *Yttrium*. The term *yttrium* means yttrium that is—

(i) Converted to yttrium oxide that is purified to a minimum purity of 99.999 percent yttrium oxide by mass; or

(ii) Purified to a minimum purity of 99.9 percent yttrium by mass.

(26) *Other minerals*. The following minerals are also applicable critical minerals provided that such mineral is purified to a minimum purity of 99 percent by mass:

(i) Arsenic.

(ii) Bismuth.

(iii) Erbium.

(iv) Gallium.

(v) Hafnium.

(vi) Holmium.

(vii) Iridium.

(viii) Lanthanum.

(ix) Lutetium.

(x) Magnesium.

(xi) Palladium.

(xii) Platinum.

(xiii) Praseodymium.

(xiv) Rhodium.

(xv) Rubidium.

(xvi) Ruthenium.

(xvii) Samarium.

(xviii) Scandium.

(xix) Tantalum.

(xx) Terbium.

(xxi) Thulium.

(xxii) Titanium.

(xxiii) Ytterbium.

(xxiv) Zinc.

(xxv) Zirconium.

(c) *Credit amount*—(1) *In general*. For any applicable critical mineral, the credit amount is equal to 10 percent of the costs incurred by the taxpayer with respect to production of such mineral.

(2) *Production processes for applicable critical minerals*—(i) *Conversion*. For purposes of section 45X, the term *conversion* means a chemical transformation from one species to another.

(ii) *Purification*. For purposes of section 45X, the term *purification* means increasing the mass fraction of a certain element.

(3) *Production costs incurred*—(i) *In general*. Costs incurred by the taxpayer with respect to the production of applicable critical minerals includes all costs as defined in § 1.263A-1(e) that are paid or incurred within the meaning of section 461 of the Code by the taxpayer for the production of an applicable critical mineral, including direct or indirect materials costs as defined in § 1.263A-1(e)(2)(i)(A) and (e)(3)(ii)(E), respectively, but only if those direct or indirect material costs do not relate to the purchase of materials that are an eligible component at the time of acquisition (for example, an electrode active material as defined in § 1.45X-3(e)(2)(i) or applicable critical mineral as defined in paragraph (b) of this section). This definition of production costs incurred would include any costs incurred by the taxpayer related to the extraction of raw materials in the United States or a United States territory, but only if those costs are paid or incurred by the taxpayer that claims the section 45X credit with respect to the relevant applicable critical mineral. Section 263A of the Code and the regulations in

this chapter under section 263A apply solely to identify the types of costs that are includible in production costs incurred for purposes of computing the amount of the section 45X credit, but do not apply for any other purpose, such as to determine whether a taxpayer is engaged in production activities.

(ii) *Production costs for production of incorporated eligible components*. The production costs that a taxpayer pays or incurs in the production of an eligible component (whether produced domestically or not) that the taxpayer then incorporates into a further distinct applicable critical mineral within the meaning of § 1.45X-1(f)(1) are not included in the costs incurred by the taxpayer in producing the further distinct applicable critical mineral. A taxpayer may not include the same production costs in the calculation of the credit amount for more than one eligible component. For example, if the taxpayer pays or incurs production costs of \$50X for eligible component 1 and an additional \$100X of production costs for eligible component 2 that included integrating eligible component 1 within the meaning of § 1.45X-1(f)(1), then the production costs for eligible component 1 equal \$50X and the production costs for eligible component 2 equal \$100X.

(4) *Substantiation*. In order to include direct or indirect materials costs as defined in § 1.263A-1(e)(2)(i)(A) and (e)(3)(ii)(E) as production costs when calculating a section 45X credit for the production and sale of an applicable critical mineral, a taxpayer, as part of filing an annual tax return (or a return for a short year within the meaning of section 443 of the Code), must include the information in paragraph (c)(4)(i) of this section as an attachment to that return, prepare the information required in paragraph (c)(4)(ii) through (iv) of this section and maintain that information in the taxpayer's books and records under section 6001, and comply with directions for the information required in paragraph (c)(4)(v) of this section as specified in guidance:

(i) Certification from any supplier, including the supplier's employer identification number and that is signed under penalties of perjury, from which the taxpayer purchased any constituent elements, materials, or subcomponents of the taxpayer's applicable critical mineral, stating that the supplier is not claiming the section 45X credit with respect to any of the material acquired by the taxpayer, nor is the supplier aware that any prior supplier in the chain of production of that material claimed a section 45X credit for the material.

(ii) A document that provides an analysis of any constituent elements, materials, or subcomponents that concludes the material did not meet the definition of an eligible component (for example, an applicable critical mineral or electrode active material) at the time of acquisition by the taxpayer. The document may be prepared by the taxpayer or ideally by an independent third-party.

(iii) A list of all direct and indirect material costs and the amount of such costs that were included within the taxpayer's total production cost for each applicable critical mineral.

(iv) A document related to the taxpayer's production activities with respect to the direct and indirect material costs that establishes the materials were used in the production of the applicable critical mineral. The document may be prepared by the taxpayer or ideally by an independent third-party.

(v) Any other information related to the direct or indirect materials specified in guidance.

(5) Failure to provide the documentation described in paragraph (c)(4) of this section with the return filing, or providing an available upon

request statement, will constitute a failure to substantiate the claim.

(d) *Applicability date.* This section applies to eligible components for which production is completed and sales occur after December 31, 2022, and during a taxable year ending on or after October 28, 2024.

Douglas W. O'Donnell,

Deputy Commissioner.

Approved: October 17, 2024.

Aviva R. Aron-Dine,

Deputy Assistant Secretary of the Treasury (Tax Policy).

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