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Section 45X

ADVANCED MANUFACTURING PRODUCTION CREDIT
ELIGIBLE COMPONENTS
DEFINITIONS & CREDIT AMOUNTS

Section 45X: Qualifying energy components

Detailed definitions of qualifying energy components under Section 45X are included below.
If you're interested in a specific section, use the links below to navigate directly to that section.

Solar energy components

POLYMERIC BACKSHEET	
A sheet on the back of a solar module that acts as an electric insulator and protects the inner components of the module from the surrounding environment.	**40 cents per square meter**
PHOTOVOLTAIC CELL	
The smallest semiconductor element of a solar module that performs the immediate conversion of light into electricity.	**4 cents per watt of cell capacity (direct current basis)**
PHOTOVOLTAIC WAFER	
A thin slice, sheet, or layer of semiconductor material of at least 240 square centimeters — (1) produced by a single manufacturer either directly from molten or evaporated solar grade polysilicon or deposition of solar grade thin film semiconductor photon absorber layer, or through formation of an ingot from molten polysilicon and subsequent slicing, and (2) that comprises the substrate or absorber layer of one or more photovoltaic cells.	**$12 per square meter**
SOLAR GRADE POLYSILICON	
Silicon that's — (1) suitable for use in photovoltaic manufacturing, and (2) purified to a minimum purity of 99.999999% silicon by mass.	**$3 per kilogram**
TORQUE TUBE	
A structural steel support element (including longitudinal purlins) that — (1) is part of a solar tracker; (2) is of any cross-sectional shape; (3) may be assembled from individually manufactured segments; (4) spans longitudinally between foundation posts; (5) supports solar panels and is connected to a mounting attachment for solar panels (with or without separate module interface rails); and (6) is rotated by means of a drive system.*	**87 cents per kilogram**
STRUCTURAL FASTENER	
A component that's used to connect — (1) the mechanical and drive system components of a solar tracker to the foundation of such solar tracker, (2) torque tubes to drive assemblies, or (3) segments of torque tubes to one another.*	**$2.28 per kilogram**
SOLAR MODULE	
The connection and lamination of photovoltaic cells into an environmentally protected final assembly that's — (1) suitable to generate electricity when exposed to sunlight, and (2) ready for installation without an additional manufacturing process.	**7 cents per watt of module capacity (direct current basis)**
***SOLAR TRACKER**	
A mechanical system that moves solar modules according to the position of the sun and used to increase energy output.	**N/A — integrated into torque tube and structural fastener definitions above**

Wind energy components

BLADE	
An airfoil-shaped blade that's responsible for converting wind energy to low-speed rotational energy.	**2 cents per watt of the total rated capacity of the completed wind turbine for which such component is designed**
NACELLE	
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.	**5 cents per watt of the total rated capacity of the completed wind turbine for which such component is designed**
TOWER	
A tubular or lattice structure that supports the nacelle and rotor of a wind turbine.	**3 cents per watt of the total rated capacity of the completed wind turbine for which such component is designed**
OFFSHORE WIND FOUNDATION	
The component, including transition piece, that secures an offshore wind tower and any above-water turbine components to the seafloor using — (1) fixed platforms, such as offshore wind monopiles, jackets, or gravity-based foundations, or (2) floating platforms and associated mooring systems.	**Fixed platform:** **2 cents per watt of the total rated capacity of the completed wind turbine for which such component is designed** **Floating platform:** **4 cents per watt of the total rated capacity of the completed wind turbine for which such component is designed**
RELATED OFFSHORE VESSEL	
Any vessel that's purpose-built or retrofitted for purposes of the development, transport, installation, operation, or maintenance of offshore wind energy components.	**10% of the sales price of such vessel**

Inverters

CENTRAL INVERTER	
An inverter that's suitable for large utility-scale systems and has a capacity that's greater than 1,000 kilowatts (expressed on a per alternating current watt basis).	**0.25 cents per watt (alternating current basis) of the capacity of such inverter**
COMMERCIAL INVERTER	
An inverter that — (1) is suitable for commercial or utility-scale applications; (2) has a rated output of 208, 480, 600, or 800 volt three-phase power; and (3) has a capacity that isn't less than 20 kilowatts and not greater than 125 kilowatts (expressed on a per alternating current watt basis).	**2 cents per watt (alternating current basis) of the capacity of such inverter**
DISTRIBUTED WIND INVERTER	
An inverter that — (1) is used in a residential or nonresidential system that utilizes 1 or more certified distributed wind energy systems; and (2) has a rated output of not greater than 150 kilowatts. *Certified distributed wind energy system: The term means a wind energy system that's certified by an accredited certification agency to meet Standard 9.1-2009 of the American Wind Energy Association, including any subsequent revisions to or modifications of such Standard which have been approved by the American National Standards Institute.*	**11 cents per watt (alternating current basis) of the capacity of such inverter**
MICROINVERTER	
An inverter that — (1) is suitable to connect with one solar module; (2) has a rated output of 120 or 240 volt single-phase power or 208 or 480 volt three-phase power; and (3) has a capacity that isn't greater than 650 watts (expressed on a per alternating current watt basis).	**11 cents per watt (alternating current basis) of the capacity of such inverter**
RESIDENTIAL INVERTER	
An inverter that — (1) is suitable for a residence, (2) has a rated output of 120 or 240 volt single-phase power, and (3) has a capacity that isn't greater than 20 kilowatts (expressed on a per alternating current watt basis).	**6.5 cents per watt (alternating current basis) of the capacity of such inverter**
UTILITY INVERTER	
An inverter that — (1) is suitable for commercial or utility-scale systems; (2) has a rated output of not less than 600 volt three-phase power; and (3) has a capacity that's greater than 125 kilowatts and not greater than 1000 kilowatts (expressed on a per alternating current watt basis).	**1.5 cents per watt (alternating current basis) of the capacity of such inverter**

Qualifying battery components

ELECTRODE ACTIVE MATERIALS	
Cathode materials, anode materials, anode foils, and electrochemically active materials, including solvents, additives, and electrolyte salts that contribute to the electrochemical processes necessary for energy storage.	**10% of the costs incurred by the taxpayer with respect to production of such materials**
BATTERY CELLS	
An electrochemical cell — (1) comprising 1 or more positive electrodes and 1 or more negative electrodes, (2) with an energy density of not less than 100 watt-hours per liter, and (3) capable of storing at least 12 watt-hours of energy.	**$35 per kW of battery cell capacity**
BATTERY MODULES	
A module — (1) in the case of a module using battery cells, with 2 or more battery cells that are configured electrically, in series or parallel, to create voltage or current, as appropriate, to a specified end use, or with no battery cells; and (2) 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).	**Modules using battery cells: $10 per kW of battery module capacity** **Modules that don't use battery cells: $45 per kW of battery module capacity**

Applicable critical minerals

ALUMINUM	
That is: • *Converted from bauxite to a minimum purity of 99% alumina by mass.* • *Purified to a minimum purity of 99.9% aluminum by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
ANTIMONY	
That is: • *Converted to antimony trisulfide concentrate with a minimum purity of 90% antimony trisulfide by mass.* • *Purified to a minimum purity of 99.65% antimony by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
BARITE	
That is: • *Barium sulfate purified to a minimum purity of 80% barite by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**

BERYLLIUM	
That is: • *Converted to copper-beryllium master alloy.* • *Purified to a minimum purity of 99% beryllium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
CERIUM	
That is: • *Converted to cerium oxide, which is purified to a minimum purity of 99.9% cerium oxide by mass.* • *Purified to a minimum purity of 99% cerium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
CESIUM	
That is: • *Converted to cesium formate or cesium carbonate.* • *Purified to a minimum purity of 99% cesium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
CHROMIUM	
That is: • *Converted to ferrochromium consisting of not less than 60% chromium by mass.* • *Purified to a minimum purity of 99% chromium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
COBALT	
That is: • *Converted to cobalt sulfate.* • *Purified to a minimum purity of 99.6% cobalt by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
DYSPOSIUM	
That is: • *Converted to not less than 99% pure dysprosium iron alloy by mass.* • *Purified to a minimum purity of 99% dysprosium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
EUROPIUM	
That is: • *Converted to europium oxide, which is purified to a minimum purity of 99.9% europium oxide by mass.* • *Purified to a minimum purity of 99% by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
FLUORSPAR	
That is: • *Converted to fluorspar, which is purified to a minimum purity of 97% calcium fluoride by mass.* • *Purified to a minimum purity of 99% fluorspar by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**

GADOLINIUM	
That is: • *Converted to gadolinium oxide, which is purified to a minimum purity of 99.9% gadolinium oxide by mass.* • *Purified to a minimum purity of 99% gadolinium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
GERMANIUM	
That is: • *Converted to germanium tetrachloride.* • *Purified to a minimum purity of 99.99% germanium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
GRAPHITE	
That is: • *Purified to a minimum purity of 99.9% graphitic carbon by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
INDIUM	
That is: • *Converted to — (a) indium tin oxide or (b) indium oxide that's purified to a minimum purity of 99.9% indium oxide by mass.* • *Purified to a minimum purity of 99% indium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
LITHIUM	
That is: • *Converted to lithium carbonate or lithium hydroxide.* • *Purified to a minimum purity of 99.9% lithium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
MANGANESE	
That is: • *Converted to manganese sulphate.* • *Purified to a minimum purity of 99.7% manganese by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
NEODYMIUM	
That is: • *Converted to neodymium-praseodymium oxide that's purified to a minimum purity of 99% neodymium-praseodymium oxide by mass.* • *Converted to neodymium oxide that's purified to a minimum purity of 99.5% neodymium oxide by mass.* • *Purified to a minimum purity of 99.9% neodymium by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**
NICKEL	
That is: • *Converted to nickel sulphate.* • *Purified to a minimum purity of 99% nickel by mass.*	**An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral**

NIOBIUM

That is:
- *Converted to ferronibium.*
- *Purified to a minimum purity of 99% niobium by mass.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

TELLURIUM

That is:
- *Converted to cadmium telluride.*
- *Purified to a minimum purity of 99% tellurium by mass.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

TIN

That is purified to low alpha emitting tin, which:
- *Has a purity of greater than 99.99% by mass.*
- *Possesses an alpha emission rate of not greater than 0.01 counts per hour per centimeter square.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

TUNGSTEN

That is:
- *Converted to ammonium paratungstate or ferrotungsten.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

VANADIUM

That is:
- *Converted to ferrovanadium or vanadium pentoxide.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

YTTRIUM

That is:
- *Converted to yttrium oxide, which is purified to a minimum purity of 99.999% yttrium oxide by mass.*
- *Purified to a minimum purity of 99.9% yttrium by mass.*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

OTHER MINERALS

Any of the following minerals, provided that such mineral is purified to a minimum purity of 99% by mass:

- *Arsenic*
- *Bismuth*
- *Erbium*
- *Gallium*
- *Hafnium*
- *Holmium*
- *Iridium*
- *Lanthanum*
- *Lutetium*
- *Magnesium*
- *Palladium*
- *Platinum*
- *Praseodymium*
- *Rhodium*
- *Rubidium*
- *Ruthenium*
- *Samarium*
- *Scandium*
- *Tantalum*
- *Terbium*
- *Thulium*
- *Titanium*
- *Ytterbium*
- *Zinc*
- *Zirconium*

An amount equal to 10% of the costs incurred by the taxpayer with respect to production of such mineral

IF YOU HAVE ANY QUESTIONS, PLEASE REACH OUT TO:

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