

# Guidelines for Determining Tax Credit for Investing in Renewable Energy Property

## INTRODUCTION

This document describes the North Carolina state tax credit for investing in renewable energy property (G.S. 105-129.16A) and explains tax credit provisions for taxpayers who donate to nonprofits and units of state and local government to enable the tax exempt- entity to acquire renewable energy property (G.S. 105-129.16H). It gives background, explains the various provisions of the credit, provides definitions for key terms, includes a chart of the ceiling limits for the different kinds of renewable energy technologies, and identifies the expenditures that are eligible for the credit for each kind of technology. If you have questions about this document, you may call the Personal Taxes Division at (919) 733-3565 or the Corporate, Excise, & Insurance Tax Division at (919) 733-8510. You may also write to either of the Divisions at P.O. Box 871, Raleigh, N.C. 27602-0871.

Note: This document does not address the tax credit for biodiesel producers in G.S. 105-129.16F or the credit for constructing renewable fuel facilities in G.S. 105-129.16D.

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## **BACKGROUND**

Renewable energy is energy derived from solar radiation, vegetation, organic wastes, moving water, or wind. Renewable energy does not include energy from nuclear reactions or fossil fuels. Renewable energy property is equipment that uses the renewable energy sources listed above to heat or cool buildings; to produce hot water, thermal, or process heat; to produce biofuels; or to generate electricity.

To promote and encourage the conservation of non-renewable energy through the increased use of renewable energy, the 1977 session of the North Carolina General Assembly enacted legislation that provided tax incentives in the form of a tax credit for the construction or installation of a solar energy system to heat, cool, or provide hot water to a building in North Carolina. Throughout the years, other tax credits encouraging investment in renewable energy sources were enacted. These included installation of a hydroelectric generator, installation of solar energy equipment for the production of heat or electricity in manufacturing or service processes of a person's business, installation of a wind energy device, and construction of a methanol gas facility. These credits were statutorily provided in both the corporation and individual income tax laws and had different calculation methods and maximum credit amounts.

The 1999 session of the General Assembly repealed the various tax credits in the corporation and individual income tax laws and recodified those provisions into one credit for investing in renewable energy property. The credit is codified in G. S. 105-129.16A, which is part of Article 3B of Chapter 105 of the North Carolina General Statutes. The different kinds of technologies that qualify for the renewable energy credit are subject to the same calculation percentage but the ceilings that apply to renewable energy property serving nonresidential property are different than those that apply to renewable energy property serving residential property. Also, because the credit is included in Article 3B, the allowable credit may not exceed fifty percent (50%) of the taxpayer's tax liability for the year reduced by the sum of all other credits.

In 2005 the General Assembly extended the renewable energy property tax credit, which was scheduled to expire January 1, 2006, for an additional five years and amended several provisions of the tax credit statute. These changes included increasing the maximum credit for nonresidential property; expanding the definition of eligible renewable biomass resources; and clarifying that residential solar pool heating equipment is eligible for the credit. The 2007 session of the General Assembly further expanded the tax credit to allow a taxpayer who donates money to a tax-exempt nonprofit to help fund a renewable energy project to claim the renewable energy property tax credit in proportion to the project costs donated. The 2008 session of the General Assembly applied this same mechanism to donations made to units of state and local government. The 2009 session of the General Assembly extended the tax credit through December 31, 2015, added geothermal heat pumps as eligible technologies, and allowed the credit to offset the gross premiums tax.

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## **PROVISIONS OF THE TAX CREDIT FOR INVESTING IN RENEWABLE ENERGY PROPERTY ([G. S. 105-129.16A](#))**

**Tax Credit Amount.** The tax credit for investing in renewable energy property is equal to thirty-five percent of the cost of renewable energy property constructed, purchased, or leased by a taxpayer and placed into service in North Carolina during the taxable year. The credit can be taken against franchise tax, income tax, or gross premiums tax. If the property serves a single-family dwelling, the credit is taken for the taxable year in which the property is placed in service. If the property is a multi-family dwelling or if the property is non-residential, the credit is taken in five equal installments beginning with the year the property is placed in service.

**Maximum Credit and Other Limitations.** The credit is subject to various ceilings depending on whether the renewable energy equipment serves nonresidential property or residential property and, for residential property, the kind of renewable energy technology being used. The chart on page 8 provides an overview of the different kinds of renewable energy technologies and the ceilings that apply to each.

The allowable credit cannot exceed 50% of the taxpayer's tax liability for the year reduced by the sum of all other credits. The unused portion of the credit may be carried over for the next five succeeding years. The credit expires and any remaining installments of the credit cannot be claimed if the property is disposed of, taken out of service, or moved out of the State during the five-year installment period. Corporations may elect to apply the credit against the income tax, the franchise tax, or the gross premiums tax. The election must be made in the first year in which an installment of the credit is claimed and is binding for all future installments or carryforwards of that credit.

**Eligibility to Claim a Credit.** The tax credit is allowable only to a person that owns the system or to a person that first leases a building constructed or modified for sale in which a renewable energy system is constructed or installed. A taxpayer may not take a credit for property the taxpayer leases from another unless the taxpayer obtains the lessor's written certification that the lessor will not claim a credit with respect to the property.

A taxpayer may claim a tax credit for investing in more than one type of renewable energy property. For example, a taxpayer who purchases and installs both a photovoltaic system and a solar water heating system for residential use may claim a credit for both the photovoltaic system (up to \$10,500) and a credit for the solar water heating system (up to \$1,400) in the same year.

**Filing Tax Credit Forms.** The allowable credit is calculated on Form NC-478G and the amount eligible to be claimed as a credit for the current year is carried to Form NC-478. Form NC-478 is used to determine if the credit is reduced because it exceeds the 50% of tax less other credits limitation and for corporations to elect whether the credit is to be claimed against franchise tax, income tax, or gross premiums tax. These forms are available on the NC Department of Revenue website at:

<http://www.dor.state.nc.us/downloads/corporate.html>.

A taxpayer claiming a tax credit for investing in renewable energy equipment must designate the type of renewable energy system installed on Form NC-478G. Only one credit is allowed per system, regardless of the number of subsequent owners or persons leasing the building.

**Eligible Costs.** Renewable energy equipment costs eligible for the tax credit include the cost of the equipment and associated design, construction costs, and installation costs less any discounts, rebates, advertising, installation assistance credits, name referral allowances, costs provided by public funds, or other similar reductions paid to the owner of the system as an inducement to purchase the renewable energy system. Public funds include federal, state, and local government funds. Senate Bill 388 of 2010 clarified that federal grants made under section 1603 of the American Recovery and Reinvestment Act of 2009 do not constitute public funds, and therefore, will not reduce the basis for determining the NC tax credit.

The cost of repairs to an existing system will not qualify for any additional credit; however, increases in capacity to an existing system may qualify for a new credit. All of the cost of new equipment added to an existing system to increase capacity is eligible for the credit.

When replacing equipment in a system increases the capacity of that system, and a credit has previously been claimed for the system, a percentage of the cost of the replacement equipment is eligible for the tax credit. The allowable percentage is calculated by dividing the increase in project capacity by the project capacity after the replacement. If a credit has not previously been claimed for the system and the replacement of equipment results in an increased project capacity, 100% of the cost of the replacement equipment qualifies for the credit.

**Equipment and Installation Requirements.** To qualify for the tax credit, a renewable energy system must conform to all applicable state and local codes and the requirements of all inspecting jurisdictions. The intent of the credit is to encourage the installation and use of equipment that takes advantage of a renewable energy resource such as solar energy. Systems that only incidentally incorporate renewable energy to sell other products do not qualify for the credit.

A system is not a renewable energy system for purposes of the tax credit until it is installed and fully functional. If an individual has paid for the system, but it is not yet installed and available for use during the year, no credit is allowed until the year in which the system is placed in service.

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**PROVISIONS OF THE CREDIT FOR DONATING FUNDS TO A NONPROFIT ORGANIZATION OR UNIT OF STATE OR LOCAL GOVERNMENT TO ENABLE THE TAX-EXEMPT ENTITY TO ACQUIRE RENEWABLE ENERGY PROPERTY ([G. S. 105-129.16H](#))**

Effective for taxable years beginning on or after January 1, 2008, NC General Statutes §105-129.16H allows a credit to a taxpayer who donates money to a tax-exempt nonprofit organization (as defined under section 501(c)(3) of the federal tax code) or unit of state or local government to construct, purchase, or lease renewable energy property in North Carolina. This credit is available to any individual or business that is a North Carolina taxpayer.

The amount of the credit is the taxpayer's proportionate share of the credit the tax-exempt entity could have taken under the renewable energy tax credit in G.S. 105-129.16A if the tax-exempt entity were subject to tax. A single donor may qualify for the entire tax credit if the taxpayer donates 100% of the cost of the renewable energy property. The calculation of the tax credit is as follows:

$$\text{Tax Credit} = \frac{\text{Taxpayer Donation}}{\text{Cost of Renewable Energy Property}} \times 35\%$$

The maximum tax credit limit outlined on page 8 still applies. In addition, if the donations made for the renewable energy property exceed the cost of the property, the tax-exempt entity must prorate each taxpayer's share of the credit. The sum of the credits allowed under this provision to taxpayers who make donations to a tax-exempt entity may not exceed the amount of the credit the tax-exempt entity could claim the renewable energy tax credit under G.S. 105-129.16A if it were subject to tax.

The credit must be taken in the year in which the property is placed in service even if the property serves a nonresidential facility. Any unused portion of the credit may be carried forward for the succeeding five years.

Note that a taxpayer claiming a credit under this section may not also deduct this donation as a charitable contribution for state tax purposes. However, this provision does not restrict a taxpayer from claiming a deduction for the donation for federal tax purposes.

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For information about eligible renewable energy property, contact:

The North Carolina Solar Center, North Carolina State University, Raleigh NC 27695, <http://www.ncsc.ncsu.edu>, or contact Brian Lips ([brian\\_lips@ncsu.edu](mailto:brian_lips@ncsu.edu), 919-515-3954).

The North Carolina Solar Center offers free fact sheets on various solar and renewable energy topics on their website at [http://www.ncsc.ncsu.edu/information\\_resources/fact\\_sheets.cfm](http://www.ncsc.ncsu.edu/information_resources/fact_sheets.cfm), as well a directory of professionals who provide products and services at <http://www.greenprofessionals.org/site/profd/index.cfm>.

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## DEFINITIONS

<b>Baffles</b>	Louvers positioned in a light well to evenly distribute natural light and to prevent direct sunrays from reaching the floor or other surfaces in the space.
<b>Collector</b>	A device that collects solar radiation and converts it to heat.
<b>Conditioned area</b>	Any space within the shell of a building that is mechanically heated or cooled.
<b>Double-glazing</b>	Two pieces of glazing that are separated by at least 1/4 inch and enclose a sealed air space to create an insulating barrier.
<b>Glazing</b>	A transparent or translucent material used for separating space and admitting light.
<b>Heat gain</b>	An increase in the amount of heat contained in a space, resulting from direct solar radiation and heat given off by people, lights, equipment, machinery, and other sources.
<b>Heat loss</b>	A decrease in the amount of heat contained in a space, resulting from heat flow through walls, windows, the roof, and other building envelope components.
<b>Heating season</b>	The period during which additional heat is needed to keep a building warm in North Carolina, typically from October to April.
<b>Hydroelectric generator</b>	A machine that produces electricity by water power or by the friction of water or steam.
<b>Light pipes</b>	A device consisting of reflective pipes with a solar collection and distribution terminus at the ends.
<b>Light well</b>	A shaft or opening from the ceiling to windows or skylights at the roof, designed for the distribution of light.
<b>Renewable biomass resources</b>	Organic matter produced by terrestrial and aquatic plants and animals, such as standing vegetation, aquatic crops, forestry and agricultural residues, landfill wastes, and animal wastes.
<b>Retrofit</b>	The addition of a solar energy system or another device to an existing home.

<b>R-value</b>	A unit of thermal resistance used for comparing insulation values for different materials; the reciprocal of conductivity. The higher the R-value of a material, the greater its insulating properties.
<b>Roof monitor</b>	A weather-tight roof structure that includes a vertical glazed area and a roof surface.
<b>Skylight</b>	A clear or translucent glazing panel set into a roof to admit sunlight into a building.
<b>Thermal storage</b>	A device or medium specifically designed and constructed to absorb collected solar radiation, convert the energy to heat, and store the heat for later use.
<b>Thermosiphoning</b>	The convective circulation of fluid or air that occurs when warm fluid or air rises and is displaced by cooler fluid or air in the same system.
<b>Trombe wall</b>	A passive heating system consisting of a vertical masonry wall with glazing in front. Solar radiation is absorbed by the wall, converted to heat, and transferred to the building interior by convection, radiation, or a combination of these. Vents may be used to circulate warm air from the space between the glass and wall to the building interior. Pronounced "trome."

## North Carolina Tax Credit Limits for Renewable Energy Technologies

Renewable Energy Technology	Credit Limit	
	Residential Property	Non-residential Property
<b>Solar Energy Equipment for Domestic Water Heating or Solar Pool Heating</b>	\$1,400 Per Dwelling Unit	\$2,500,000 Per Installation
<b>Solar Energy Equipment for Active Space Heating</b>	\$3,500 Per Dwelling Unit	\$2,500,000 Per Installation
<b>Solar Energy Equipment for Combined Active Space and Domestic Hot Water Systems</b>	\$3,500 Per Dwelling Unit	\$2,500,000 Per Installation
<b>Solar Energy Equipment for Passive Solar Energy</b>	\$3,500 Per Dwelling Unit	\$2,500,000 Per Installation
<b>Solar Energy Equipment for Solar Electric or Other Solar Thermal Applications</b>	\$10,500 Per Installation	\$2,500,000 Per Installation
<b>Solar Energy Equipment for Daylighting</b>	N/A	\$2,500,000 Per Installation
<b>Wind</b>	\$10,500 Per Installation	\$2,500,000 Per Installation
<b>Hydroelectric</b>	\$10,500 Per Installation	\$2,500,000 Per Installation
<b>Biomass</b>	\$10,500 Per Installation	\$2,500,000 Per Installation
<b>Geothermal Heat Pumps and Geothermal Equipment</b>	\$8,400 Per Installation	\$2,500,000 Per Installation

For the purpose of determining the maximum allowable credit, an “installation” is considered to be each identifiable system of renewable energy property that converts renewable energy into a useful energy product identified in G.S. 105-129.15.

## **HOT WATER AND ACTIVE SPACE HEATING**

### **Eligible Expenditures**

A solar hot water or heating system is a system that is capable of collecting solar radiation, converting it into heat, and transferring the collected heat to storage or to the point of use. Any solar system that has a fan, pump, or another mechanical means of moving the heat collection medium is an active system. Solar systems without mechanical components are passive systems. While components, design, operation, and performance of systems will vary, to qualify for the tax credit the system must meet this description.

One hundred percent of the cost of the solar energy system design, installation, and equipment for water heating, including solar pool heating, and active space heating is eligible for the tax credit. Components of the system that serve an additional purpose to what is necessary for the solar heating system, such as domestic hot water heaters, air conditioning systems, and conventional heating systems, are ineligible for the credit.

### **Ineligible Expenditures**

All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

### **System Requirements for Water and Active Space Heating**

- The system must be installed by a contractor appropriately licensed in North Carolina or, in the case of a residential installation by the homeowner, in accordance with the North Carolina State building code and be inspected by a local code official.
- The system must provide adequate freeze protection that does not rely on electrical power.
- Space heating systems must provide adequate overheating protection during the non-heating season.
- The system must remain fully operational for the period during which installments of the tax credit are claimed.
- The system must include an easy to understand way for the owner to determine if the system is operating properly. This may include thermometers and flow indicators.
- It is highly recommended that installed solar collectors be OG-100 certified by the Solar Rating and Certification Corporation (SRCC). It is also highly recommended that all stand-alone residential solar hot water systems installed be OG-300 certified by SRCC.

## **PASSIVE SOLAR ENERGY SYSTEMS**

### **Eligible Expenditures**

A passive solar energy system is a carefully designed assembly of non-mechanical building components that capture, store, and use solar energy to light building interiors (see Daylighting section) or to heat building interiors in the heating season without causing overheating in the non-heating season, thus providing a significant net energy savings. Great care must be taken when using passive solar energy systems in non-residential buildings because these buildings are often cooling-dominated and do not require significant heating.

To qualify for a passive solar energy tax credit, a building must include all of the following:

- A solar collection surface with required shading.
- Thermal storage elements.
- Control and distribution elements.
- A ratio of south facing glass area to room floor area (where glass is located) of at least 7% and a maximum of 12%, or
- If the building is sun-tempered, a ratio of south facing glass area to room floor area of at least 6% and a maximum of 7%.
- Meet the performance requirements of the NC State Building Code: Energy Conservation Code enforced at the time of the installation.

There are 2 exceptions to the requirement for thermal storage:

- A sun-tempered building of limited solar collection area may qualify without thermal storage by using the contents of the house instead of building integrated thermal mass as the thermal storage element.
- A thermosiphoning collector can qualify without thermal storage.

Eligibility requirements and credit amounts are explained below according to element and component type. Items that only incidentally provide passive solar energy benefits are not eligible. For example, south-facing windows are only eligible when part of a complete system with thermal storage and control and distribution elements.

### **Solar Collection Surfaces**

All solar collection surfaces must be oriented to within 15 degrees of true south for new construction and within 20 degrees of true south for retrofits. Solar collection surfaces must not be shaded at noon on December 21 and must be fully shaded at noon on June 21 (the dates of the lowest and highest sun angle each year). Solar collection surfaces include:

a. South-facing windows with glazing installed that is, at a minimum, double pane insulated and has frames that are thermally broken or made of material with a low conductivity.. It is recommended that coated glazings not be used on the south side of a passively solar heated building unless specifically formulated for solar heat gain. If coated glazings are used, the center of glass solar heat gain coefficient (SHGC) must be greater than or equal to .70 or the whole window SHGC must be greater than or equal to .57. The percentage of window cost eligible for the credit must be calculated using the worksheet at the end of this section. The calculation determines the percentage of a building's windows located on a building's south side to improve passive solar heating performance and only gives credit to buildings that have more windows on the south side than other sides.

b. Trombe walls with double-glazing mounted no more than two feet in front of a thermal storage wall if that wall's sole function is for the collection of solar energy. The installation and equipment costs of the wall are eligible.

c. Skylights with double-glazing located on a south-facing roof having a pitch of 8-12 (34° angle from horizontal) or greater, an area of less than 8%, and an area that, when combined with the area of south-facing windows, does not exceed 12% of the floor area of the room where they are located. The skylight must have integrated insulation having an insulating value of at least R-5 to provide winter nighttime insulation and summer shading. The installation and equipment costs of these skylights are eligible.

d. Thermosiphoning collectors that operate on thermosiphoning principles and whose sole purpose is solar energy collection. These include solar window box heaters, thermosiphoning water and air panels, and "integral solar collectors" for passive solar water heaters. The installation and equipment costs of these collectors are eligible for the credit.

### **Thermal Storage Elements**

Building components or materials specifically designed for the storage of solar energy are eligible for the tax credit. These materials must be located in the same building spaces with the south-facing solar collectors and ideally have a maximum ratio of sq.ft. of mass to sq.ft. of glass of 6:1. Masonry products used as thermal storage in walls or floors must be a minimum of 2 inches thick and must not be more than 25% covered by carpet, linoleum, or other insulating materials. Materials that are not specifically designed for thermal storage, such as hot tubs or swimming pools, or do not have sufficient mass, such as single-layer gypsum board, wood paneling, and flooring, are not eligible. The percentage of thermal storage element costs eligible for the tax credit must be calculated using the worksheet at the end of this section. The calculation determines the percentage

of the building's thermal mass that is necessary to store the collected solar energy and control temperature swings.

### **Control and Distribution Elements**

Devices that are specifically designed to control heat loss or heat gain or to distribute heat energy from a passive solar energy system are eligible for the passive solar energy tax credit. These include:

- a. Movable insulation if the insulation is for solar collection surfaces, has an R-value of at least 3, and seals tightly against the window frame. Standard draperies and curtains do not qualify.
- b. Shading devices for south-facing collection surfaces. These devices are required and must shade the collection surface at noon on June 21 and must not shade the collection surface at noon on December 21. Fixed, adjustable, or removable awnings, solar screens, and latticework used to support vines are examples of shading devices. Fixed roof overhangs, gutters, and trees, shrubbery, and other vegetation are not eligible, nor are interior shading devices such as shades or blinds.
- c. Ducts, fans, vents, back-flow preventers, and other similar devices and their controls, if designed exclusively as part of the solar energy distribution (not collection) system. Although fans are not technically passive elements, some passive systems may use fans to assist the natural convective flows to improve system performance. Ceiling fans, attic fans, and freestanding fans are not eligible for the credit.

### **Ineligible Expenditures**

Equipment, components, and other items that do not qualify for the passive solar energy tax credit include:

- Insulation, except as otherwise noted above
- Storm windows and storm doors
- Wood burning stoves and furnaces
- Oil and gas furnaces, including replacement burners and ignition systems
- Automatic set back thermostats
- Heat pumps, including air, ground, and water-source units
- Evaporative cooling systems

## Worksheet for Calculating the Tax Credit for Investing in a Passive Solar Energy System

**IMPORTANT:** This worksheet must be retained with your tax records for examination by the North Carolina Department of Revenue. It will be a necessary supporting document, together with other supporting information, for the tax credit for renewable energy systems claimed on your tax return.

### Solar Collection Surfaces

#### 1. South-facing Windows

- a. Calculate the area of glass of the windows on the non-south walls \_\_\_\_\_ sq.ft.
  - b. Calculate the interior area of the non-south walls \_\_\_\_\_ sq.ft.
  - c. Divide line 1a by line 1b to get % of non-south walls in glass \_\_\_\_\_ %
  - d. Calculate the area of glass of the windows on the south wall \_\_\_\_\_ sq.ft.
  - e. Calculate the interior area of the south-facing wall \_\_\_\_\_ sq.ft.
  - f. Divide line 1d by line 1e to get % of south wall in glass \_\_\_\_\_ %
  - g. Subtract line 1c from line 1f \_\_\_\_\_ %
  - h. Divide line 1g by line 1f to determine the percentage of extra glass on south wall as compared to the other walls. If line 1c % exceeds line 1f, enter zero here and on line 1i \_\_\_\_\_ %
  - i. Multiply line 1h by the cost of south windows \$ \_\_\_\_\_
2. Trombe Wall - cost of glazing and mass wall \$ \_\_\_\_\_
  3. Skylights - cost of qualifying south-facing skylights \$ \_\_\_\_\_
  4. Thermosiphoning and Batch Water Heaters - cost of thermosiphoning collectors and batch water heaters \$ \_\_\_\_\_

### Thermal Storage Elements

#### 5. Storage

- a. Calculate the floor area square footage of the building spaces where the solar collection windows are located \_\_\_\_\_ sq.ft.
- b. Multiply line 5a times 6% (the minimum % of solar collection area to floor area for a passive solar building) \_\_\_\_\_ sq.ft.
- c. Calculate the square footage of south facing \_\_\_\_\_ sq.ft.

windows

- d. Subtract line 5b from line 5c to determine the passive solar collecting area \_\_\_\_\_ sq.ft.
- e. Multiply line 5d by 6 (the maximum ratio of sq. ft. mass to sq. ft. of south-facing glass allowable for the tax credit) \_\_\_\_\_ sq.ft.
- f. Multiply line 5e by the cost per sq. ft. of thermal mass \$ \_\_\_\_\_

**Control and Distribution Elements**

- 6. Movable Insulation – the cost of movable insulation devices \$ \_\_\_\_\_
- 7. Shading Devices – cost of qualifying devices used to shade solar collection surfaces \$ \_\_\_\_\_
- 8. Distribution and Controls – cost of ducts, fans, vents and back-flow preventers designed exclusively as part of the solar system \$ \_\_\_\_\_
- 9. Total costs eligible for the tax credit – add lines 1i, 2, 3, 4, 5f, 6, 7 and 8 \$ \_\_\_\_\_

The amount on line 9 is the total amount eligible for the passive solar energy systems tax credit. Add this amount to the total costs eligible for other renewable energy systems and enter the sum on Part 1, Line 1 of Form NC-478G.

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## **SOLAR THERMAL AND SOLAR THERMAL ELECTRIC APPLICATIONS**

### **Eligible Expenditures**

- 100% of the cost of equipment to generate electricity from solar energy and of the cost of related devices for collecting, storing, exchanging, or converting solar energy, including design, construction, and installation costs.
- 100% of the cost of equipment for distillation, detoxification, industrial or commercial process heat, or absorption cooling from solar energy including related devices to convert, condition or store thermal energy, including design, construction, and installation costs.
- A reduced amount of the cost of the above solar energy equipment when it serves two or more functions such as a roof or siding in addition to solar energy equipment. The expenditures eligible for the tax credit must be reduced by the cost of a comparable product for the non-solar energy equipment functions

### **Ineligible Expenditures**

All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

### **System Requirements for Solar Thermal and Solar Thermal Electric Installations**

- The electrical system must be installed by a licensed electrical contractor or, in the case of a residential installation by the homeowner, with the permission of the electrical inspector in accordance with the National Electrical Code and local building codes.<sup>1</sup>
- The system must be inspected and approved by the local building inspections department as required. The tax credit can only be taken for the tax year in which the Certificate of Compliance, or similar inspector-issued documentation, is issued.
- The system must remain fully operational for the period during which installments of the tax credit are claimed. If the system is utility interactive<sup>2</sup> it must, at a minimum, meet the requirements of the Institute of Electrical and Electronics Engineers (IEEE). System owners must contact their utility to inform the utility that the system is being installed.
- The system must have a permanent label adhered at an easily readable location that identifies the name, address, and phone number of the contractor for future service.
- A maximum of 35 kWh (35,000 Watt hours) of battery storage capacity per kiloWatt of solar thermal electric capacity is eligible for the tax credit. Battery storage capacity is calculated at the c/20 discharge rate.
- The system must provide adequate freeze protection that does not rely on electrical power. Space heating systems must provide adequate overheating protection during the non-heating season.

- The system must include an easy to understand way for the owner to determine if the system is operating properly. This may include thermometers and flow indicators.

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<sup>1</sup> The North Carolina Solar Center maintains a directory of renewable energy professionals at <http://www.greenprofessionals.org/site/profd//index.cfm>. In addition, a list of solar thermal system installers in North Carolina certified by the North American Board of Certified Energy Practitioners may be accessed at <http://www.nabcep.org/map.cfm?state=nc>.

<sup>2</sup> "Utility interactive system" refers to an energy system that operates in parallel with and may deliver power to an electrical production and distribution network. For the purpose of this definition, an energy storage subsystem of an energy system, such as a battery, is not another electrical production source. National Fire Protection Association, 2008 National Electrical Code, Article 705-2.

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## **SOLAR ELECTRIC APPLICATIONS**

### **Eligible Expenditures**

- 100% of the cost of equipment to generate electricity from solar energy, including related devices for collecting, storing, exchanging, or converting solar energy, including design, construction, and installation costs.
- A reduced amount of the cost is allowed when the solar energy equipment serves two or more functions such as a solar attic fan.. The eligible expenditure for the tax credit is reduced by the cost of a comparable product for the non-solar functions.

### **Ineligible Expenditures**

All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

### **System Requirements for Photovoltaic Installations**

- The electrical system must be installed by a licensed electrical contractor or, in the case of a residential installation by the homeowner, with the permission of the electrical inspector in accordance with the National Electrical Code and local building codes.<sup>3</sup>
- The system must be inspected and approved by the local building inspections department. The tax credit can only be taken for the tax year in which the Certificate of Compliance, or similar inspector-issued documentation, is issued.
- The system must remain fully operational for the period during which installments of the tax credit are claimed.
- It is highly recommended that installed photovoltaic power systems equipment, such as modules, inverters, charge controllers, and power centers, be listed and

- used in accordance with that listing. However, the local building inspections department has final authority over acceptable equipment. <sup>4</sup>
- If the system is utility interactive it must, at a minimum, meet the requirements of the Institute of Electrical and Electronics Engineers (IEEE) Std. 929-2000 "Recommended Practice for Utility Interface of Photovoltaic (PV) Systems." The system must comply with the utility technical and procedural guidelines <sup>5</sup>
  - The system must have a permanent label adhered at an easily readable location that identifies the name, address, and phone number of the contractor for future service.
  - A maximum of 35 kWh (35,000 Watt hours) of battery storage capacity per kiloWatt of photovoltaic capacity (standard test conditions DC rated) is eligible for the tax credit. Battery storage capacity is calculated at the c/20 discharge rate.

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<sup>3</sup> *The North Carolina Solar Center at N.C. State University maintains a directory of renewable energy professionals at <http://www.greenprofessionals.org/site/profd//index.cfm>. In addition, a list of photovoltaic system installers in North Carolina certified by the North American Board of Certified Energy Practitioners may be accessed at <http://www.nabcep.org/map.cfm?state=nc>.*

<sup>4</sup> *"Listed" refers to equipment, materials, and services included in a list published by an organization that is acceptable to the local authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspections of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, materials or services meet identified standards or have been tested and found suitable for a specified purpose. National Fire Protection Association, 2008 National Electrical Code, Article 100.*

<sup>5</sup> *"Utility interactive system" refers to a solar photovoltaic system that operates in parallel with and may deliver power to an electrical production and distribution network. For the purpose of this definition, an energy storage subsystem of a solar photovoltaic system, such as a battery, is not another electrical production source. National Fire Protection Association, 2008 National Electrical Code, Article 690-2.*

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## **DAYLIGHTING SOLAR ENERGY SYSTEMS**

### **Eligible Expenditures**

Daylighting systems are carefully designed solar applications that use sunlight to meet a building's illumination needs. A system is only eligible if it accomplishes ALL of the following:

- Saves energy by reducing electrical lighting and, if mechanically cooled, by reducing mechanical operating costs.
- Brings sunlight into the interior spaces of buildings with no glare at workspace and less overheating than energy gain by reduced electric lighting.

- Integrates automatic lighting controls that reduce electrical lighting when solar daylighting satisfies the lighting requirements of the building.

The following daylighting systems and their system components are eligible for the tax credit:

1. Vertically glazed roof monitor daylight systems. These systems consist of roof-mounted or light well structures designed to allow solar radiation to enter a building while carefully minimizing and controlling glare and overheating. The system must include baffles or other measures designed to eliminate glare and diffuse solar radiation, a minimum double-glazing or equivalent R-2/U-0.5 glazing, and automatic lighting controls that measure the daylighting levels within the space and proportionally reduce electrical lighting.
2. Sloped or horizontal glazing daylight systems (skylights). These systems consist of roof-mounted structures that have a glazed area to floor area (of the room where they are located) ratio of less than 15% and are designed to allow solar radiation to enter a building while carefully minimizing and controlling glare and overheating during the non-heating season. The system must include baffles or other methods designed to eliminate glare and diffuse solar radiation, a minimum double glazing or equivalent R-2/U-0.5 glazing, and automatic lighting controls that measure the daylighting levels within the space and proportionally reduce electrical lighting.
3. Light shelf daylight systems. These systems consist of highly reflective horizontal surfaces (over 75% reflectance) placed at least seven feet above the finished floor of a building and directly next to vertical glazing for the purpose of reflecting sunlight deep into interior building spaces. The light shelf must have a total horizontal dimension of at least one foot (inside, outside, or combined). The light shelf glazing must have a height of no more than two times the width of the light shelf and be a minimum double-glazing or equivalent R-2/U-0.5 glazing.
4. Advanced daylighting glazing that allows visible spectrum solar radiation to enter interior building spaces with minimal glare and heat gain. The glazing's thermal conductivity must not be greater than conventional double glazing R-2/U-0.5.
5. Daylight transport systems. These systems consist of highly reflective light wells, light pipes, shafts, fiber optic cables, or similar structures designed to transport visible solar radiation from its collection point to the interior of a building while excluding interior heat gain in the non-heating season. Included are tracking or fixed collectors that are designed to collect or concentrate the sunlight.

### **Ineligible Expenditures**

- Skylights and all other roof-mounted structures that do not meet all the requirements of (2) above.
- Windows, glass or other glazing and window tinting films, and low E and other glass coatings that are not integrally part of daylighting systems listed above.
- Greenhouse structures, Florida rooms, atriums, and other structures that do not meet all the requirements of (2) above.

## **WIND RESOURCES**

### **Eligible Expenditures**

One hundred percent of the cost of equipment required to capture and convert wind energy into electricity or mechanical power and of related devices for converting, conditioning, and storing electricity, including design, construction, and installation costs, is eligible for the credit. Towers are considered eligible equipment.

### **Ineligible Expenditures**

All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

### **System Requirements for Wind Energy Installations**

- The electrical system must be installed by a licensed electrical contractor or, in the case of a residential installation by the homeowner, with the permission of the electrical inspector in accordance with the National Electrical Code and local building codes.<sup>6</sup>
- The system must be inspected and approved by the local building inspections department as required. The tax credit can only be taken for the tax year in which the Certificate of Compliance, or similar inspector-issued documentation, is issued.
- The system must remain fully operational for the period during which installments of the tax credit are claimed.
- It is highly recommended that installed wind energy systems equipment, such as wind turbines, inverters, charge controllers, and power centers be listed and used in accordance with that listing. However, the local building inspections department has final authority over acceptable equipment.<sup>7</sup>
- If the system is utility interactive it must, at a minimum, meet the requirements of the Institute of Electrical and Electronics Engineers (IEEE). System owners must contact their utility to inform the utility that the system is being installed.<sup>8</sup>
- The system must have a permanent label adhered at an easily readable location that identifies the name, address, and phone number of the contractor for future service.
- A maximum of 35 kWh (35,000 Watt hours) of battery storage capacity per kiloWatt of wind turbine capacity is eligible for the tax credit. Battery storage capacity is calculated at the c/20 discharge rate.

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<sup>6</sup> *The North Carolina Solar Center at N.C. State University maintains a directory of renewable energy professionals at <http://www.greenprofessionals.org/site/profd/index.cfm>.*

<sup>7</sup> "Listed" refers to equipment, materials, and services included in a list published by an organization that is acceptable to the local authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspections of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, materials, or services meet identified standards or have been tested and found suitable for a specified purpose. National Fire Protection Association, 2008 National Electrical Code, Article 100.

<sup>8</sup> "Utility interactive system" refers to a wind energy system that operates in parallel with and may deliver power to an electrical production and distribution network. For the purpose of this definition, an energy storage subsystem of a wind energy system, such as a battery, is not another electrical production source. National Fire Protection Association, 2008 National Electrical Code, Article 705-2.

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## **HYDROELECTRIC RESOURCES**

### **Eligible Expenditures**

One hundred percent of the cost of equipment to generate electricity at existing dams or in free-flowing waterways and of related devices for water supply and control, and for converting, conditioning, and storing electricity, including design, construction and installation costs, is eligible for the credit.

### **Ineligible Expenditures**

Expenditures for any of the following do not qualify for the credit:

- Construction of new dams, repairs or additions to existing dams, or dredging to increase original impoundment capacity.
- All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

### **System Requirements for Hydro Installations**

- The electrical system must be installed by a licensed electrical contractor or, in the case of a residential installation by the homeowner, with the permission of the electrical inspector in accordance with the National Electrical Code and local building codes.<sup>9</sup>
- The system must be inspected and approved by the local building inspections department as required. The tax credit can only be taken for the tax year in which the Certificate of Compliance, or similar inspector-issued documentation, is issued.
- The system must remain fully operational for the period during which installments of the tax credit are claimed.
- It is highly recommended that installed hydro systems equipment, such as generators, inverters, change controllers, and power centers, be listed by a recognized agency and used in accordance with that listing.<sup>10</sup>

- If the system is utility interactive it must, at a minimum, meet the requirements of the Institute of Electrical and Electronics Engineers (IEEE). System owners must contact their utility to inform the utility that the system is being installed.<sup>11</sup>
- The system must have a permanent label adhered at an easily readable location that identifies the name, address, and phone number of the contractor for future service.
- A maximum of 50 kWh (50,000 Watt hours) of battery storage capacity per kiloWatt of hydro generator capacity (standard test conditions DC rated) is eligible for the tax credit. Battery storage capacity is calculated at the c/20 discharge rate.

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<sup>9</sup> The North Carolina Solar Center at N.C. State University maintains a directory of renewable energy professionals at <http://www.greenprofessionals.org/site/profd//index.cfm>

<sup>10</sup> "Listed" refers to equipment, materials, and services included in a list published by an organization that is acceptable to the local authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspections of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, materials or services meet identified standards or have been tested and found suitable for a specified purpose. National Fire Protection Association, 2008 National Electrical Code, Article 100.

<sup>11</sup> "Utility interactive system" refers to a hydro energy system that operates in parallel with and may deliver power to an electrical production and distribution network. For the purpose of this definition, an energy storage subsystem of a hydro energy system, such as a battery, is not another electrical production source. National Fire Protection Association, 2008 National Electrical Code, Article 705-2.

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## **BIOMASS RESOURCES**

### **Eligible Expenditures**

New Facilities — 100% of the cost of any of the following is eligible for the credit:

- Biomass processing plant equipment and structures that use renewable biomass resources for producing alcohol, ethanol, methanol, bio-oils, biodiesel, or other biofuels;
- Anaerobic biogas production of methane utilizing agricultural and animal waste or garbage; and
- Commercial thermal or electrical generation from renewable energy crops, wood waste materials or other biomass resources, defined as organic matter produced by terrestrial and aquatic plants and animals, such as standing vegetation, aquatic crops, forestry and agricultural residues, spent pulping liquor, landfill wastes, and animal wastes.

Eligible equipment and structures include devices at the processing plant site to receive, handle, collect, condition, store, process, or convert biomass materials into solid, liquid, or gaseous fuels, secondary co-products, process heat, or electrical generation and their associated design, construction, and installation costs. Biomass materials are non-fossil fuels and include landfill gas, vegetation such as forestry and agricultural crops and their harvesting residues, animal manure, and organic wastes such as sludges, waste waters, municipal solid wastes, textile wastes, spent pulping liquor, and yard and urban wood wastes.

Co-energy Applications — When renewable biomass resources are combined with fossil or other nonrenewable fuels (e.g. co-firing), project expenditures eligible for the credit are the same percentage as the percentage of contribution to the project’s output of the renewable, biomass resources based on the BTU inputs of the various fuels in the year the biomass resources are placed into service.

### **Ineligible Expenditures**

Expenditures for any of the following do not qualify for the credit:

- Wood burning stoves and furnaces used for space heating or water heating.
- All equipment and other costs for growing, collecting, handling, storing, and transporting biomass materials prior to their receipt at the processing plant gate or, in the case of on-site biomass resources such as those on a farm, prior to their placement in the on-site biomass processing equipment.
- Transportation and secondary storage of products and coproducts beyond their initial storage at the processing plant. All maintenance expenditures at existing or previously credited projects including replacement of eligible equipment unless capacity is increased.

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## **Geothermal Heat Pumps and Geothermal Equipment**

### **Eligible Expenditures**

One hundred percent of the cost of geothermal heat pump systems, also known as ground source heat pumps, that use the ground or groundwater as a thermal energy source to heat a structure or as a thermal energy sink to cool a structure, or other geothermal equipment that uses the low seasonal variation in temperature of the earth as a mechanism to greatly reduce traditional energy use for water heating or active space heating and cooling.

### **Ineligible Expenditures**

All maintenance expenditures at existing or previously credited projects, including replacement of eligible equipment.

## **System Requirements for Geothermal Heat Pumps and Geothermal Equipment**

- The system must be installed by a contractor appropriately licensed in North Carolina.
- The system must be inspected and approved by the local building inspections department as required.
- The tax credit can only be taken for the tax year in which the Certificate of Compliance (existing buildings)/Occupancy(new buildings), or similar inspector-issued documentation, is issued.
- The system must remain fully operational for the period during which installments of the tax credit are claimed.
- Systems serving single-family homes must be sized to meet or not exceed by one half ton (6,000 btu/hr) either the cooling OR heating requirements of the Air Conditioning Contractors of America (ACCA) Manual J; sizing for cooling requirements is required in zones 3 & 4 as delineated in the NC State Building Code: Energy Conservation Code, Chapter 3. Non-residential systems must be designed to meet the requirements of the appropriate section(s) of the version of ASHRAE 90.1 enforced by the NC State Building Code: Energy Conservation Code at the time of installation.