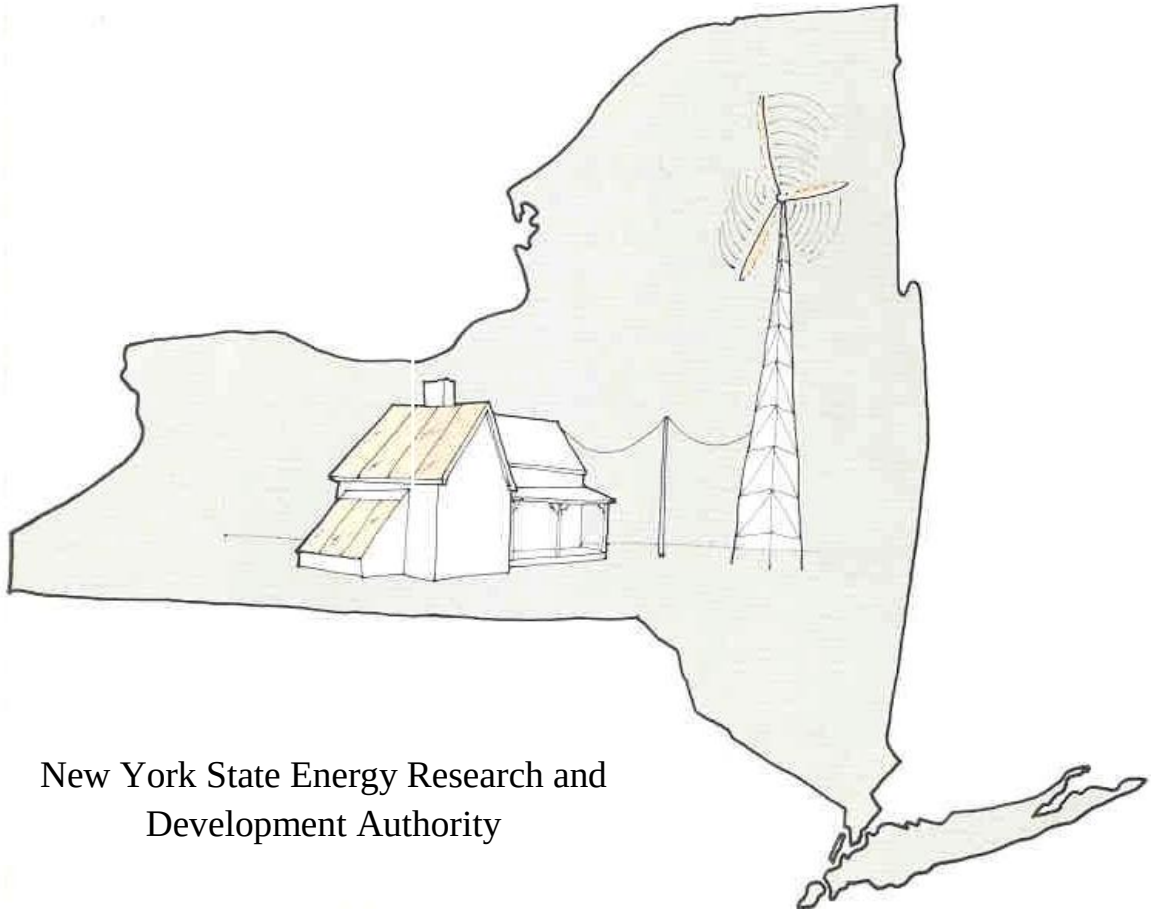
SOLAR , FARM WASTE AND WIND ENERGY SYSTEMS:

Definitions and Guidelines for Property Tax Exemptions



New York State Energy Research and Development Authority

Dear New Yorker,

Thank you for your interest in renewable energy resources.

A goal of New York's energy policy is to assure that renewable resources, such as wind and solar energy, play a larger role in meeting our future energy needs. Wind and solar energy have multiple benefits -- they reduce air pollution, decrease our need to import oil and help reduce energy bills.

To encourage New Yorkers to install renewable energy systems, the State provides property tax exemptions for certain wind and solar energy systems. Our goal is to make these systems more affordable.

This booklet describes the exemptions and which systems are eligible. I hope you find it helpful.

INTRODUCTION

Section 487 of the New York State Real Property Tax Law, enacted in 1977 and amended in 1979, 2002 and 2006, provides a 15-year real property tax exemption for certain solar, wind energy, and farm waste energy systems constructed in the State. Systems constructed prior to July 1, 1988 may be eligible for the exemption throughout the State. Systems constructed between January 1, 1991 and January 1, 2011 may be eligible except where a local municipality or a school district has provided by local law or resolution that no solar, farm waste or wind exemption shall apply within its jurisdiction for systems constructed after January 1, 1991 or the date of such local law or resolution, whichever is later.

Check with your local property assessor, the State Division of Equalization and Assessment or the State Energy Office to determine whether the exemption is available in your locality for systems constructed after January 1, 1991.

The intent of the law is to encourage installation of solar, wind energy, and farm waste energy systems in residential, commercial, institutional, agricultural and industrial applications. The exemption for solar, farm waste and wind energy systems, where available, assures property owners that their real property taxes will not increase as a result of the installation of such a system.*

The statute provides for an exemption to be granted for any increase in assessed value of real property which is attributable to the solar, farm waste or wind energy system. Some building's components serve as part of the system as well as the building structure. It should be noted, however, that where components serve dual functions, i.e., part of a building structure as well as part of a solar, farm waste or wind energy system, only the increased assessed value which is attributable to the portion of the components that allows them to serve as part of the solar, farm waste or wind energy system is eligible for the tax exemption. The law specifies the manner in which this is to be determined, as set forth in this publication.

Section 487 of the Real Property Tax Law contains broad definitions of solar, farm waste and wind energy systems and solar, farm waste and wind equipment, which are also restated below. More detailed system descriptions and criteria for eligibility for an exemption are found in the main sections of this publication. These sections can also assist assessors and property owners in determining the amount of an exemption appropriate for each type of solar and wind energy system.

The system descriptions identify how specific types of solar, farm waste and wind energy systems function, their typical components and examples of their applications

To qualify for the exemption provided by Section 487 of the Real Property Tax Law, a solar, farm waste or wind energy system must meet the system definitions and eligibility criteria set forth in this publication. These criteria are based on specific designs, which have been shown to be effective in New York State.

*The exemption provided in Section 487 is not applicable, however, to special ad valorem levies or special assessments.

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SUBSTANCE OF PERTINENT STATUTORY PROVISIONS

Section 487(2) of the Real Property Tax Law

Real property which includes an eligible solar, farm waste or wind energy system shall be exempt from taxation to the extent of any increase in the value thereof by reason of the inclusion of such solar or wind energy system for a period of 15 years. When a solar or wind energy system or components thereof also serve as part of the building structure, the increase in value which shall be exempt from taxation shall be equal to the assessed value attributable to such system or components multiplied by the ratio of the incremental cost so such system or components to the total cost of such system or components.

Section 487(5) of the Real Property Tax Law

The exemption granted shall only be applicable to solar or wind energy systems which are (a) existing or constructed prior to July 1, 1988 or (b) constructed subsequent to January 1, 1991 and prior to January 1, 2011.

Section 487(8) of the Real Property Tax Law

Notwithstanding the above, a county, city, town or village may by local law, and a school district may by resolution, provide that no exemption shall be applicable within its jurisdiction with respect to any solar, farm waste or wind energy system constructed subsequent to January 1, 1991 or the effective date of such local law or resolution, whichever is later. A copy of any such local law or resolution shall be filed with the State Board of Equalization and Assessment and with the president of [NYSERDA].

Section 487(1) of the Real Property Tax Law - Statutory Definitions

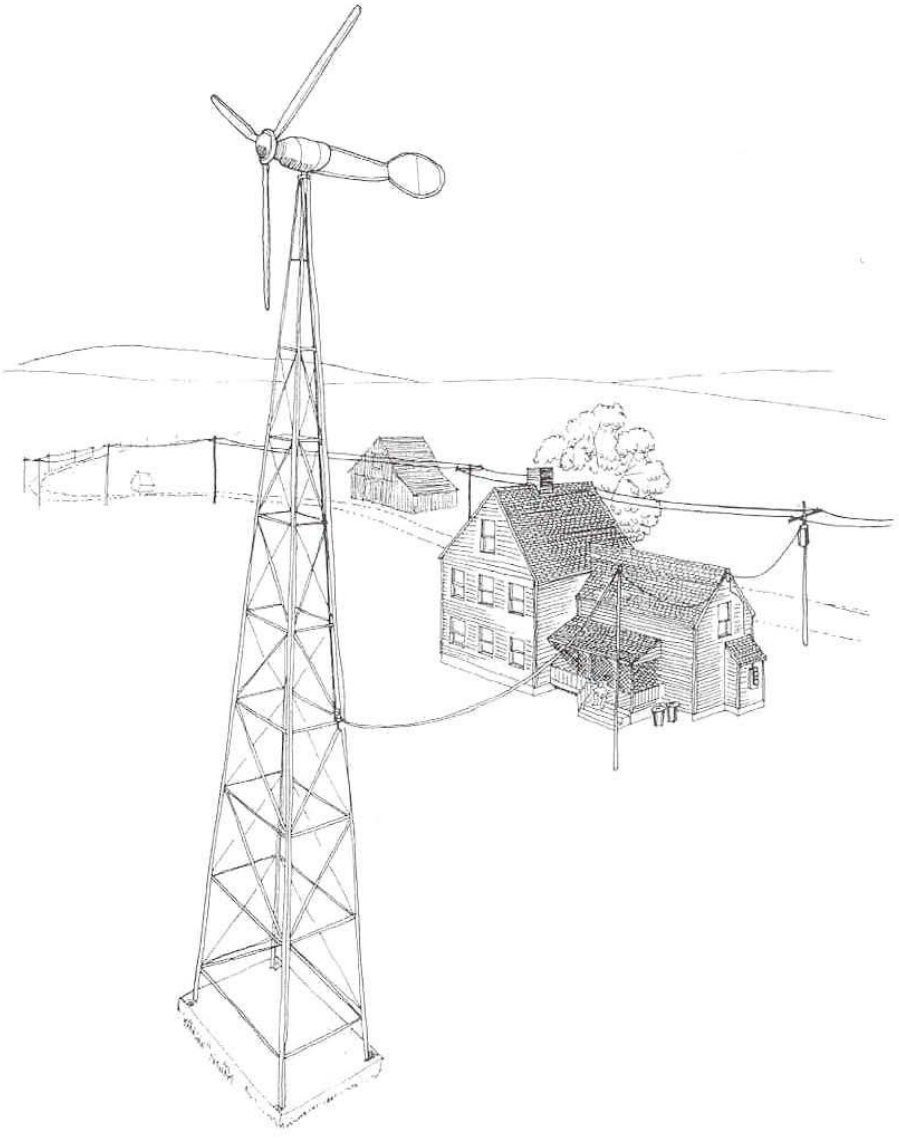
"Solar or wind energy system" means an arrangement or combination of solar or wind energy equipment designed to provide heating, cooling, hot water, or mechanical, chemical, or electrical energy by the collection of solar or wind energy and its conversion, storage, protection and distribution.

"Incremental cost" means the increased cost of a solar or wind energy system or component thereof which also serves as part of the building structure, above that for similar conventional construction, which enables its use as a solar and wind energy system or component.

"Solar or wind energy equipment" means collectors, controls, energy storage devices, heat pumps and pumps, heat exchangers, windmills, and other materials, hardware or equipment necessary to the process by which solar radiation or wind is (i) collected, (ii) converted into another form of energy such as thermal, electrical, mechanical or chemical, (iii) stored, (iv) protected from unnecessary dissipation and (v) distributed. It does not include pipes, controls, insulation or other equipment, which are part of the normal heating, cooling, or insulation system of a building. It does include insulated glazing or insulation to the extent that such materials exceed the energy efficiency standards required by law.

"Farm waste electric generating equipment" means equipment that generates electric energy from biogas produced by the anaerobic digestion of agricultural waste, such as livestock manure, farming waste and food processing wastes with a rated capacity of not more than four hundred kilowatts that is (i) manufactured, installed and operated in accordance with applicable government and industry standards, (ii) connected to the electric system and operated in conjunction with an electric corporation's transmission and distribution facilities, (iii) operated in compliance with the provisions of section sixty-six-j of the public service law, (iv) fueled at a minimum of ninety percent on an annual basis by biogas produced from the anaerobic digestion of agricultural waste such as livestock manure materials, crop residues and food processing wastes, and (v) fueled by biogas generated by anaerobic digestion with at least seventy-five percent by weight of its feedstock being livestock manure materials on an annual basis.

"Farm waste energy system" means an arrangement or combination of farm waste electric generating equipment or other materials, hardware or equipment necessary to the process by which agricultural waste biogas is produced, collected, stored, cleaned, and converted into forms of energy such as thermal, electrical, mechanical or chemical and by which the biogas and converted energy are distributed on-site. It does not include pipes, controls, insulation or other equipment which are part of the normal heating, cooling or insulation system of a building.



Wind Energy System

SYSTEM DESCRIPTIONS, ELIGIBILITY CRITERIA AND GUIDELINES FOR CALCULATING EXEMPTIONS

WIND ENERGY SYSTEMS

System Description

Wind energy systems collect wind energy through a propeller or blade configuration, known as a rotor, and use that energy to drive a generator to produce electric power, to power a drive shaft for mechanical applications or to provide heat.

Electric generating wind energy systems may appear in varying use patterns. A wind energy system may be a property owner's sole, principal or supplementary source of electricity. Such a system may be isolated from the electric grid and connected to on-site storage or to another property owner's facilities for the sale of excess power, or it may be connected to a utility distribution line, enabling excess electricity to be sold to the utility or others and enabling supplemental or back-up power to be purchased from the utility. Further, a wind energy system may produce electricity solely or principally for sale to a utility or others (e.g., as in the case of a wind farm arrangement where multiple wind generators produce power for input to the utility grid), or be used as part of an electric utility generating system.

Typical components of an electric generating wind energy system include a rotor assembly which captures the wind energy; a generator and accessories which convert the mechanical energy of the spinning rotor into electrical energy; a tower and base which support the rotor and generator; control and regulation systems; power conditioning and transmission equipment; and, in some instances, storage batteries.

Mechanical wind energy systems are typically used in rural settings for pumping water for immediate use or for storage in a tank or pond. They may also be used in industrial process applications to provide direct mechanical drive. The major components of a mechanical wind energy system include a tower, pump, pump rod, rotor assembly and coupler.

Wind energy systems can also be used to produce thermal energy, either by direct mechanical heating of water in a water twister, or by generating electricity to operate resistance heaters which heat a thermal storage medium. The stored heat may be extracted and used for space heating, hot water or operation of an absorption chiller for cooling.

Eligibility Criteria

To be eligible for the property tax exemption, a wind energy system must be equipped with overspeed controls. In addition, an electric generating wind energy system must be designed to produce not less than 250 watts of power in 25 mile per hour winds.

Guidelines for Calculating the Amount of the Exemption

Eligible wind energy systems should qualify for an exemption an amount equal to the assessed value of the entire system, including the following components:

a) Wind turbines (including rotors, generators, pumps, power transmissions and controls) which collect the wind energy and convert it into electrical, mechanical or thermal energy;

b) Supporting towers, foundations, frames and bracing;

c) Electric wiring, switchgears and pipes to the point of storage or connection with a conventional system;

d) Power conditioning equipment;

e) Associated safety equipment and metering devices;

f) Storage devices used solely for the wind generated energy; and

g) Other connecting parts and components necessary for the operation of the system.

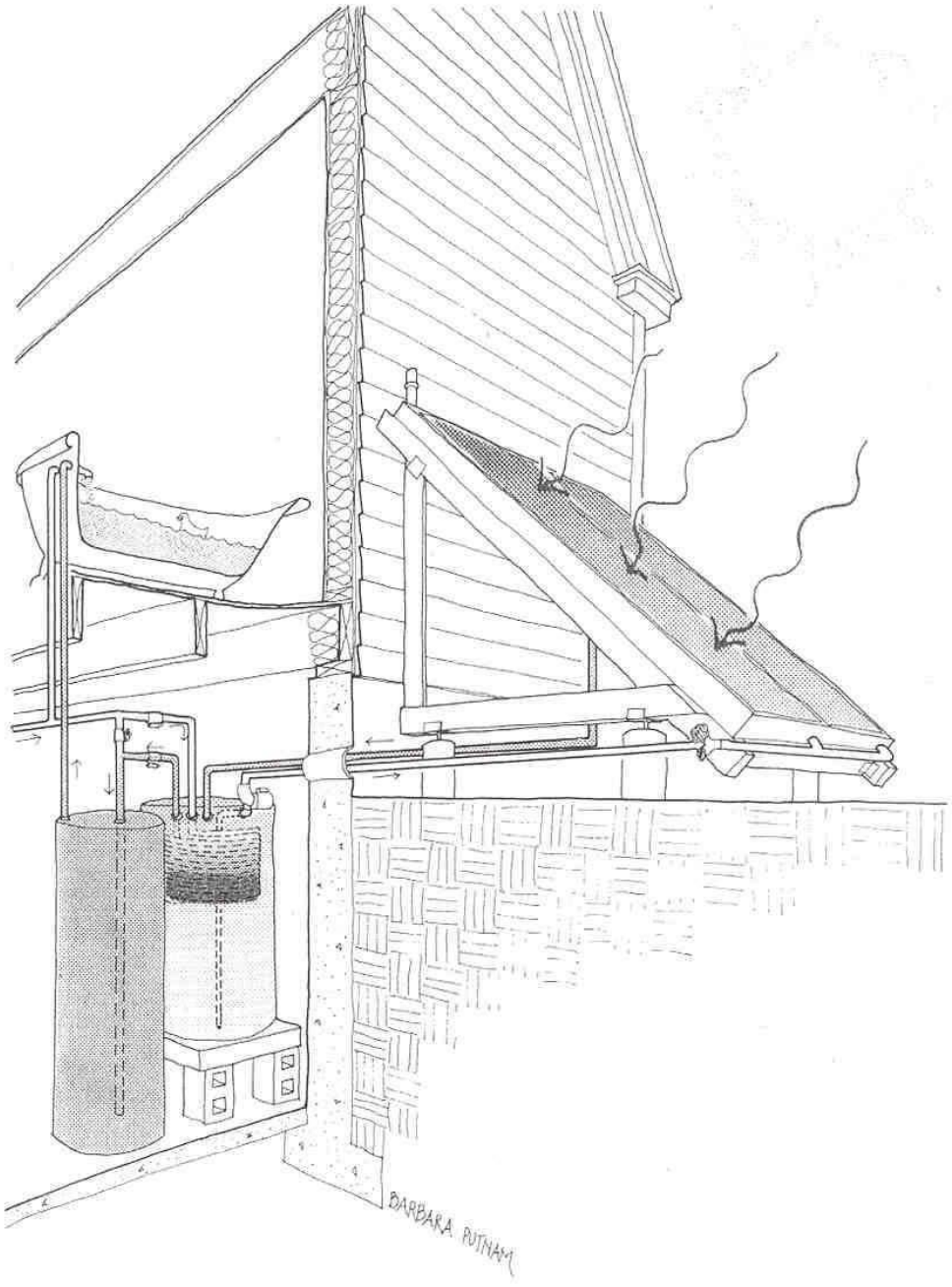
ACTIVE SOLAR ENERGY SYSTEMS

Active Solar Heating, Cooling and Hot Water Systems

System Description

These active solar energy systems use specialized hardware to provide space heating, cooling or hot water, for residential, commercial or industrial purposes. The hardware is used to collect solar radiation, to convert it into another form of energy and to transfer and store the converted energy. These systems rely on pumps and/or fans to distribute the collected heat. An active solar heating/cooling system typically consists of the following components: solar collectors, a heat transfer medium, a heat storage unit, a heat distribution system and control devices.

Most active solar heating, cooling or hot water systems use a rooftop, wall-mounted or ground-mounted flat-plate collector. This is a shallow glass- covered box, inside of which is an absorber surface which collects solar energy and transfers it to a heat transfer medium. Other types of collectors include concentrating collectors which use reflectors or lenses to focus the solar radiation entering the collector onto the absorber, and tracking collectors which move to follow the sun’s east to west path to capture a maximum amount of solar radiation.



Solar Hot Water System

Radiant energy from the sun enters the collector through the glazing and heats the absorber. A heat transfer medium, which can be air, water or a special heat transfer fluid, is circulated by pumps or fans through or past the absorber where it is heated, and the heat is then transferred to a storage unit or medium. To regulate the flow of heat or hot water, automatic controls are provided to direct the position of valves or dampers at the command of temperature sensors in the system. If heat is transferred from the collector by air, it is generally stored in rocks, bricks or other high-density materials. Heat may also be delivered directly to the conditioned space. If the heat is transferred by liquid, it is generally stored as hot water in an insulated tank. From storage, heat will be moved through conventional systems - such as hot water pipes or forced air ducts - to various points in the building.

Solar cooling systems use collected solar heat to drive a cooling process, which may include absorption refrigeration, evaporative coolers or other devices.

Eligibility Criteria

To be eligible for the property tax exemption, an active solar heating, cooling or hot water system must satisfy the following criteria:

1) The collector glazing must face within 30° of true south when installed in a newly constructed building within 45° of true south when installed in an existing building or an addition thereto;

2) The collector must lie at a tilt angle of not less than 25° from the horizontal; and

3) The system must incorporate insulation which has:

- an R value of not less than 4 on all piping and ductwork located outside the building;
- an R value of not less than 3 on all piping and ductwork located inside the building;
- an R value of not less than 11 on all storage devices.

Guidelines for Calculating the Amount of the Exemption

Eligible active solar heating, cooling and hot water systems should qualify for an exemption in an amount equal to the assessed value of the sys-

tem from exterior collector to the interior point of connection with the conventional heating, cooling or hot water system*.

In the case of solar heaters for swimming pools, the collector, mounting brackets, controls and pipes to the pool are eligible for an exemption. The swimming pool does not qualify for an exemption as a storage medium or otherwise.

Solar Electric Systems

System Description

Solar electric systems use specialized hardware to collect solar radiation and convert this energy into electricity. Two major technologies are currently available, solar thermal power systems and photovoltaic systems.

In a solar thermal power system, solar energy is collected and focused onto a small area to heat a fluid to a high temperature. The solar energy is collected either by a series of concentrating collectors or by a number of heliostats (Mirrors) which focus the solar energy at a single point containing the fluid to be heated. The heated fluid drives a turbine or a heat engine which, in turn, drives an electric generator. Solar thermal power systems are sued primarily in industrial settings, with only limited application in the residential, commercial or institutional settings.

Photovoltaic systems produce electricity from sunlight by a physical process which does not require the use of a turbine or heat engine. Semiconductor devices, called photovoltaic cells, generate electricity whenever light strikes them. These cells are connected and enclosed in a sealed glass or plastic module which can resemble a flat-plate solar collector. In general, a photovoltaic system must be connected to a power conditioner before the electricity which it generates can be sued. Photovoltaic systems may or may not include batteries to store excess electricity. Such systems may also be connected to a utility's distribution lines or to another property owner's facilities to enable excess electricity to be sold. Further, photovoltaic systems may produce electricity solely or principally for sale to a utility or others, or be used as part of an electric utility system.

*When solar assisted heat pumps are used in conjunction with solar systems, any increase in value directly resulting from the heat pump, excluding its cooling and resistance heating components, should qualify for exemption. The cooling and resistance heating components, as well as heat pumps which stand alone or which serve as a backup to a solar system, may qualify for an exemption under section 487-a of the Real Property Tax Law.

Eligibility Criteria

To be eligible for the property tax exemption, a solar electric system must satisfy the following criteria:

- The installation must comply with the requirements of the National Electrical Code (NEC) and all local and state jurisdictions having authority.

- The electrical equipment and electrical components must be compliant with all applicable Institute of Electrical and Electronics Engineers (IEEE) standards. The electrical equipment and electrical components must be certified to meet those standards by a nationally recognized testing laboratory (e.g., Underwriters Laboratory).

Guidelines for Calculating the Amount of the Exemption

Eligible solar electric systems should qualify for an exemption in an amount equal to the assessed value of the entire system. This includes collectors; heat engines; photovoltaic cells; supporting towers, foundations, frames and bracing; electric wiring up to the point of storage or connection with the conventional electric system; power conditioning equipment; associated safety equipment and metering devices; electric storage devices; and other connecting parts and components necessary for operation of the system.

PASSIVE SOLAR ENERGY SYSTEMS

General Description

Passive solar energy systems rely upon the original or retrofitted design features and budding materials of a structure to enhance the use of natural forces including solar radiation, winds and nighttime coolness to provide heating or cooling within a residential, commercial, institutional or industrial building. Such systems are not primarily dependent upon mechanical power for operation, although they may make use of fans to enhance thermal distribution. Passive solar energy systems may also provide hot water, most commonly for residential purposes.

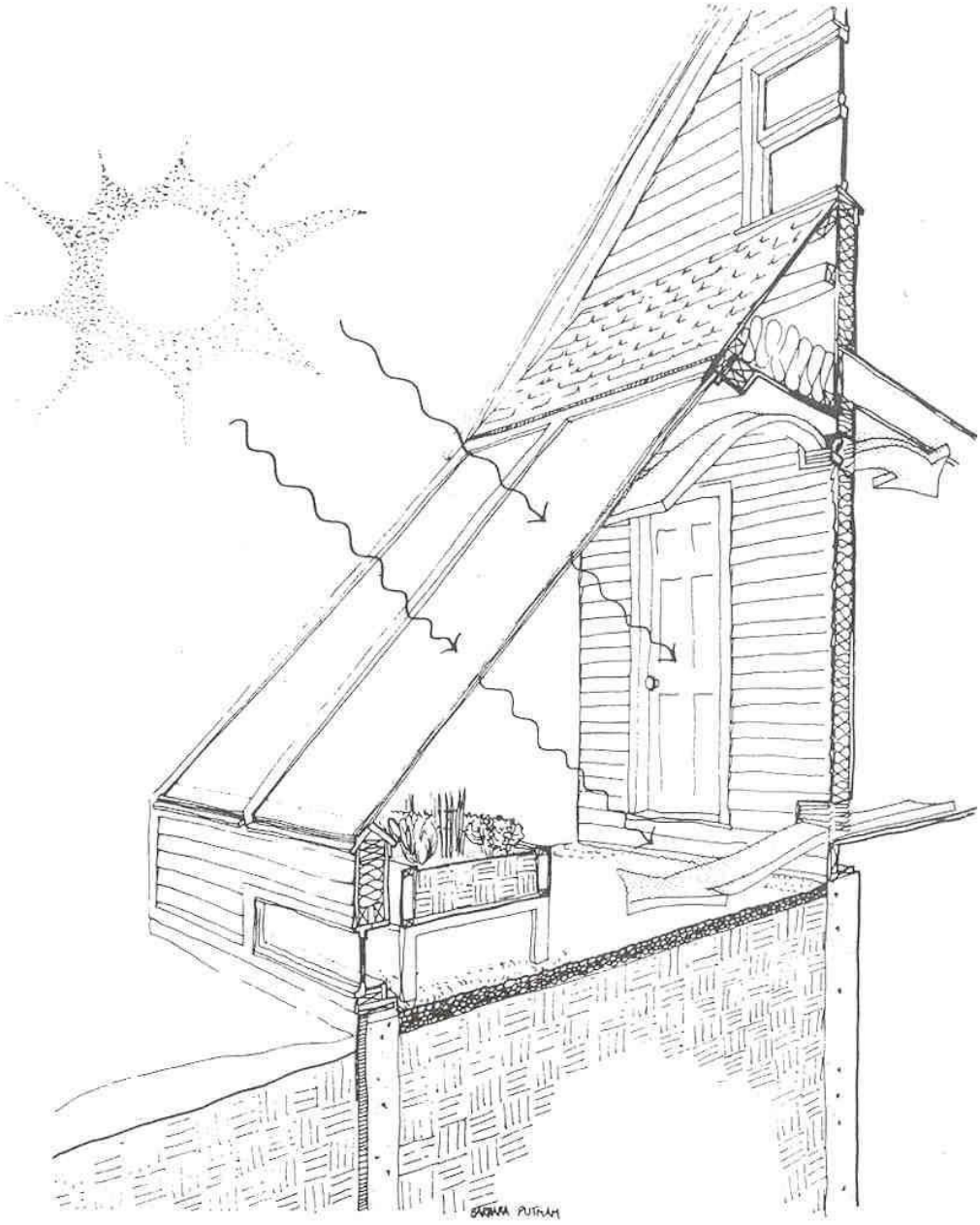
All passive solar energy systems incorporate:

- a solar collection area - a large south-facing area of transparent or translucent material, such as glass, positioned so that the solar radiation directly strikes an absorber. Glazing systems may consist of commercially available thermal window units and/or site-constructed window units.

- an absorber - a surface, such as a floor, that is exposed to the rays of the sun. The absorber converts solar radiation into heat, and then transfers the heat to the conditioned space or to a thermal storage mass. In many cases, a floor or wall which serves as an absorber may also serve as a storage mass.
- thermal storage mass - structural and nonstructural elements of a building including material such as masonry, concrete, brick, adobe, We, rocks, slate, sand, water, sheetrock, wood, plaster and phase change materials which receive and store the converted thermal energy from the absorber. At night or on cloudy days when indoor temperatures become cooler, the stored heat is reradiated into the conditioned space. The storage mass must be located so that it is capable of distributing the stored heat directly to the conditioned space through a heat distribution method; where a mass floor is used, it must be thermally protected from the ground and along the perimeter.
- a heat distribution method - heat distribution takes place in areas adjacent to storage materials by direct radiation and convection, and in remote areas of the building by the use of ducts, electrical fans, vents and doors.
- a heat control device - a shading device, such as a roof overhang or awning, to control the amount of solar heat admitted through the solar collection area, and/or a venting mechanism to remove excess heat. In some systems temperature is controlled through additional storage mass used to absorb excess beat. Movable insulation or its equivalent is also necessary to control the amount of heat permitted to escape from the conditioned space.

The components of a passive solar system that perform the basic functions of collection, conversion, storage, distribution and control of solar energy qualify for an exemption from property tax. However, since in many cases these components also serve functions other than as part of the passive solar system, it is necessary to determine the increased assessed value which results from the use of these components as part of the solar system. In these cases, the value of the dual function system or components which is exempt is the product of (1) the total assessed value of the system or components, and

(2) the ratio of the increased cost of the system or components over similar conventional construction to the total cost of the system or components. Examples of the application of this general statement are given below, along with descriptions of four of the most common types of passive solar energy systems and specific eligibility criteria. It should be noted that the process of determining the exemption appropriate for a passive solar energy system in some cases will be made easier by the provision of available cost date by the applicant.



Greenhouse

Greenhouse and Sunspace Systems

System Description

Both greenhouses and sunspaces are permanent structures which are attached to, but physically separated from, the conditioned space, and which contain no conventional heating source. Solar radiation passes through south-facing glazing, is converted to heat as it strikes the interior surfaces and objects, and is delivered to the conditioned space by controlled natural and/or forced convection. A greenhouse generally contains a large quantity of thermal storage mass to maintain stable temperatures at night. To reduce nighttime heat loss in such systems, movable insulation or high thermal performance glazing is used. In contrast, a sunspace is thermally isolated from the conditioned space and is allowed to cool down during periods of low solar radiation.

A permanently attached space which meets the above description, but which also contains a conventional heating source, should be considered a direct gain system, described on page 18.

Eligibility Criteria

To be eligible for the property tax exemption, a greenhouse or sunspace must satisfy the following criteria:

1) Glazing must face within 30° of true south when installed in a newly constructed building and within 45° of true south when installed in an existing building or an addition thereto;

2) The greenhouse or sunspace must either:

   (i) Contain or be connected to thermal mass to store the converted thermal energy, and contain movable insulation for the south-facing glazing which together with the glazing provides an R value of not less than 4. Movable insulation is not required if the glazing incorporates a high transmissivity film or a heat mirror coating and has an R value of not less than 3; or

   (ii) Be thermally isolated from the conditioned living space or remote thermal storage during periods of low solar radiation;

3) The collector area must be at least double-glazed;

4) The area of south-facing glazing within the greenhouse or sunspace must be not less than 50% of the area of its floor space;

5) The area of nonsouth-facing glazing within the greenhouse or sunspace must be less than 50% of the area of its nonsouthfacing exterior walls;

6) Non-glazed portions of exterior walls must be insulated to an R value of not less than 11 and all roof surfaces which lie at a tilt angle of less than 35° from horizontal must be insulated to an average R value of not less than 20; and

7) A permanently installed means of transferring collected thermal energy into the conditioned living space and a means of venting or shading the greenhouse or sunspace to prevent overheating of the conditioned living space must be included.

Guidelines for Calculating the Amount of the Exemption

Generally, eligible greenhouses and sunspaces qualify for an exemption in an amount equal to the difference in assessed value between the solar system and similar conventional construction. This can be calculated by multiplying the total assessed value of the system by the fraction in which the numerator is the increased cost of the greenhouse or sunspace above that for similar conventional construction, which enables its use as a solar system, and the denominator is the total cost of such greenhouse or sunspace. Depending upon the particular characteristics of the solar system installed, the conventional construction most comparable to the solar greenhouse or sunspace may be a conventional greenhouse, an enclosed porch, or an enclosed porch with finished room modifications.

This calculation recognizes that greenhouses and sunspaces often expand a building's usable space. To the extent that the assessed value of the property increases due to this non-solar function, no exemption applies. However, where a solar sunspace is constructed so as not to provide any usable space (e.g. a depth of four feet or less) and a load bearing wall exists behind the sunspace, it should not be considered to function also as a structural component of the building. In such cases, the total assessed value of such system should be exempt.

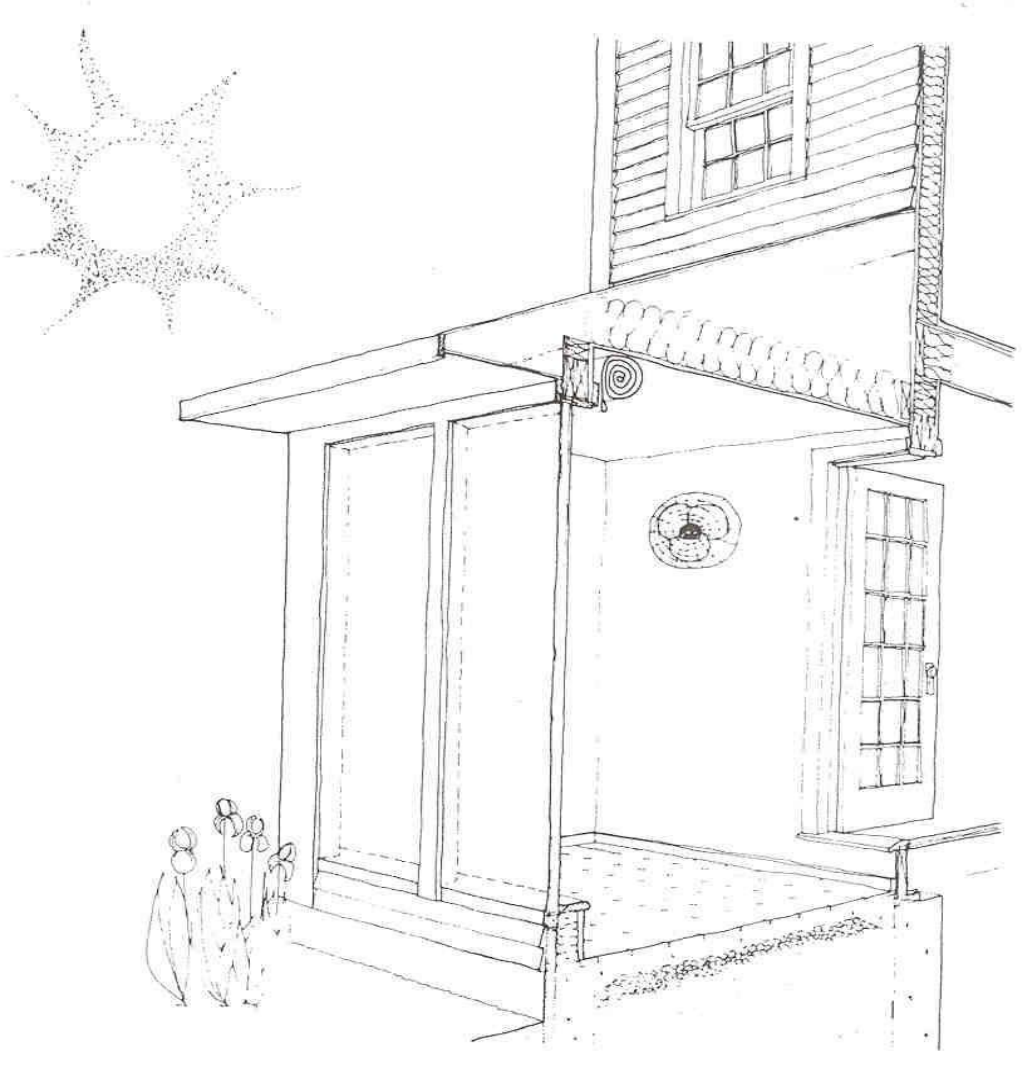
It is useful to note that, in general, the incremental cost of a sunspace or greenhouse over the cost of similar conventional construction is approximately 60% of the cost of the passive system. Thus, as a convenient rule of thumb, the property tax exemption for solar greenhouses and sunspaces which serve dual functions should be equal to 60% of the assessed property value of the passive solar system.

Examples:

l. Homeowner A adds a solar greenhouse to his home. The cost of the system is $7,500; the cost of a similar, conventional greenhouse would have been $3,250 (i.e., $4,250 is attributable to the construction of the greenhouse in order for it to meet the criteria for solar greenhouses.

listed above). The assessed property value for the solar greenhouse is $500. The exemption which Homeowner A is entitled to is equal to $500 x 4250/7500, or $283.

2. Homeowner B modifies his south-facing porch so that it satisfies the eligibility criteria for a sunspace, but does not otherwise alter the structure. Any increase in the value of his home should be exempt since the expenditures entirely reflect the increased cost of the sunspace system over the cost of the conventional porch.



Sunspace

Mass Wall Systems

System Description

In a mass wall system, which may also be known as a Trombe wall, water wall or drum wall, solar radiation passes through south-facing glazing and is absorbed and stored by a mass wall which is positioned between the glazing and the conditioned space. The mass wall can be either masonry (e.g., Trombe wall), water (e.g., drum wall) or phase change materials, and is usually dark colored. Stored heat is delivered into the conditioned space through conduction and convection. In some Trombe wall systems, vents are added to the top and bottom of the system, thus creating a thermo-siphoning loop to deliver heated air to the conditioned space. Movable insulation, high thermal performance glazing or special coatings on the exterior side of the mass wall reduce heat loss to the outside during periods of low solar radiation.

Eligibility Criteria

To be eligible for the property tax exemption, a mass wall system must satisfy the following criteria:

1) Glazing must face within 30° of true south when installed in a newly constructed building and within 45° of true south when installed in an existing building or an addition thereto;

2) The south-facing glazing should be positioned in close proximity to a mass wall which is located within the insulated shell of the residence;

3) The collector area in the system must be at least double-glazed;

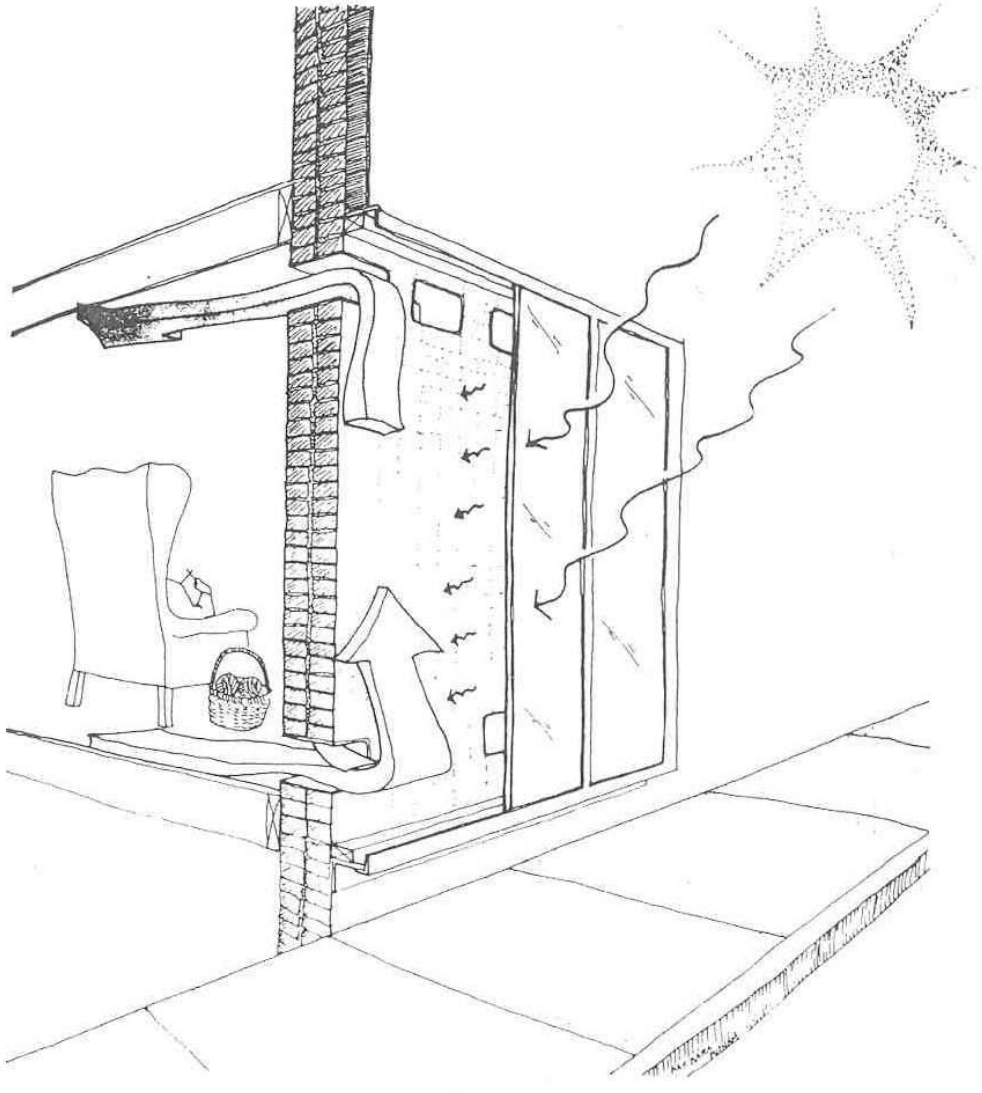
4) A means of venting or shading the system must be provided to prevent overheating of the conditioned living space; and

5) Movable insulation must be provided for the south-facing glazing which together with the glazing provides an R value of not less than

4. Movable insulation is not required if the glazing incorporates a high transmissivity film or a heat mirror coating and has an R value of not less than 3, or the exterior mass wall has a selective surface coating which together with the glazing has an R value of not less than 3.

Guidelines for Calculating the Amount of the Exemption

An eligible mass wall system which incorporates a nonload bearing mass wall should qualify for an exemption in an amount equal to the assessed value of such system, including the mass wall, south-facing glazing and supporting frames, movable insulation, shading and ventilation devices, controls and fans. None of these components should be considered to serve also as structural components of the building.



Vented Mass Wall System

An eligible mass wall system which incorporates a load bearing mass wall qualifies for an exemption in an amount equal to the difference in the assessed value of the mass wall including the glazing, and a conventional exterior wall, plus the assessed value of movable insulation, shading and ventilation devices, controls and fans.

Since the latter systems are generally constructed only as part of new construction, the difference in assessed value between the mass wall and a conventional wall can be calculated by multiplying the assessed value of the structure or addition with the mass wall by the fraction in which the numerator is the increased cost of the structure or addition above that for similar conventional construction, which enables its use as part of the solar system, and the denominator is the total cost of such mass wall.

It is useful to note that, in general, the cost of a load bearing exterior mass wall (Trombe wall) exceeds the cost of a conventional exterior wall by approximately 70% of the cost of such mass wall.

Examples:

1 Homeowner C constructs an eligible mass wall system on the exterior of an existing south-facing wall of his home. Since the mass wall is a nonloading bearing wall, none of the system components also serve as structural components of the building. Homeowner C is entitled to an exemption for the full property value of the system.

2 Homeowner D adds a 10' x 24' room to his home and constructs the south facing wall as an eligible Trombe wall system. The cost of the addition is $13,000; the cost of a similar, conventionally constructed room would have been $10,025 (i.e., $2,975 is attributable to the additional cost of constructing a load bearing mass wall and the full costs of the movable insulation vents, dampers and controls). The assessed property value of the room is $6,000. The exemption which Homeowner D is entitled to is $6,000 x $2,975/13,000, or $1,373.

Direct Gain Systems

System Descriptions

In a direct gain system, solar radiation enters the conditioned space directly through south-facing glazing, strikes thermal mass and is converted into heat. This heat energy is stored in mass walls, mass floors or other thermal storage mass which is located within the insulated building shell. As the room temperature drops, the stored heat is released into the conditioned space by radiation and convection. Movable insulation or high thermal performance glazing reduces heat losses to the outside during periods of low solar radiation.

Eligibility Criteria

To be eligible for the property tax exemption, a direct gain system must satisfy the following criteria:

1) The system must be incorporated into a newly constructed budding, an existing building in which major structural components (e.g., floors, wars, ceilings) have been buttressed, replaced or substantially modified, or a newly constructed space added to an existing building.

2) Glazing must face within 30° of true south when installed in a newly constructed building and within 45° of true south when installed in an existing building or an addition thereto;

3) The collector area must be at least double-glazed;

4) The tilt angle of the south-facing glazing must be equal to or greater than 35° from the horizontal; and

5) Movable insulation must be provided for all south-facing glazing which together with the glazing provides an R value of not less than 4, or the glazing must incorporate a high transmissivity film or a heat mirror coating and have an R value of not less than 3.

Guidelines for Calculating the Amount of the Exemption

Several of the components of a direct gain system will also serve as structural components of the building. As such, eligible direct gain systems qualify for an exemption in an amount equal to the difference in assessed value between the solar system and similar conventional construction.

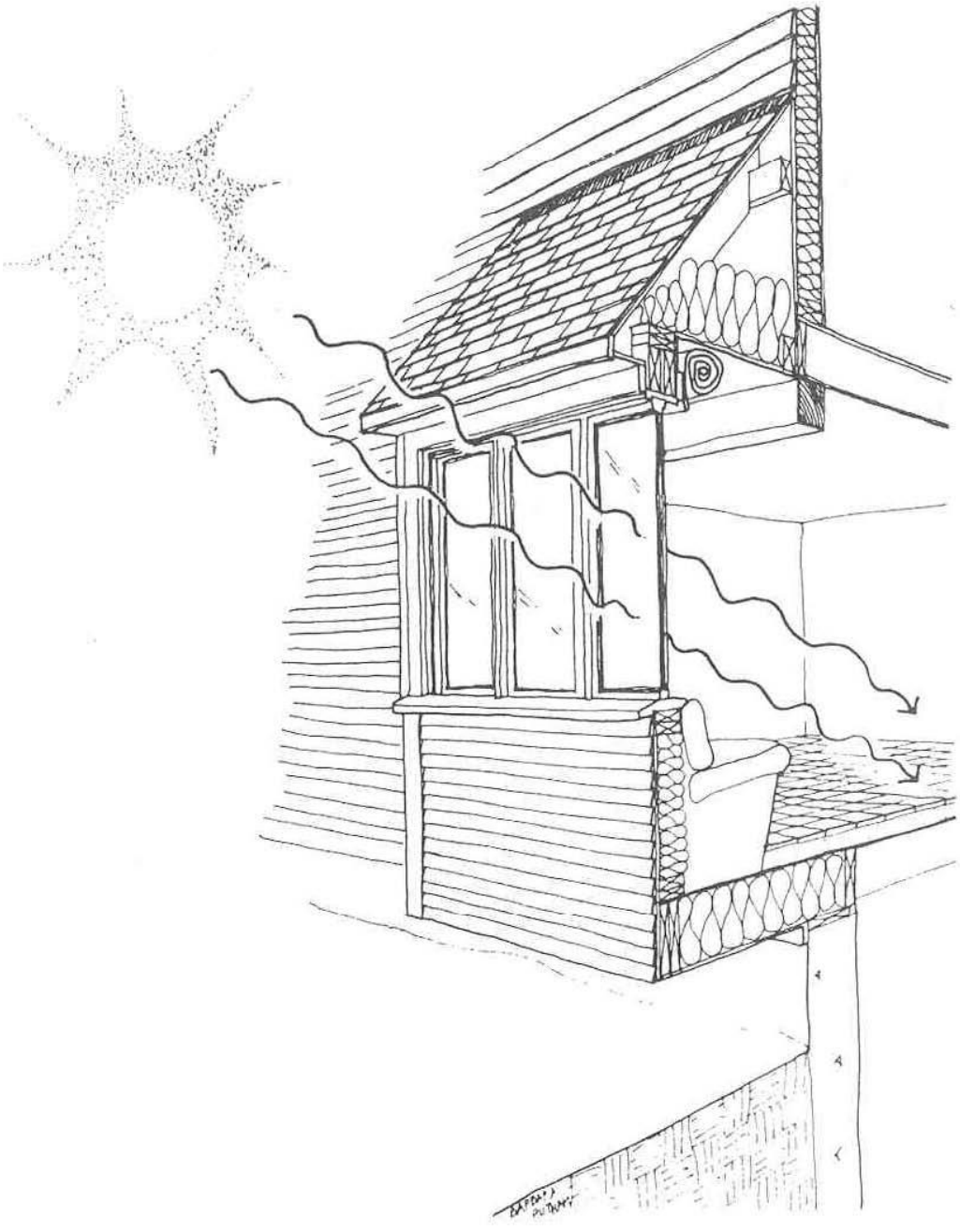
This is calculated by multiplying the assessed property value of the direct gain system by the traction in which the numerator is the increased cost of the system or components above that for similar conventional construction, which enables their use as a solar system, and the denominator is the total cost of the direct gain system or components.

Such increased costs include:

1) the full costs of movable insulation, shading and ventilation devices, controls and fans;

2) the difference in cost between a mass wall which serves as thermal storage and a conventional wall;

3) the difference in cost between a mass floor which serves as thermal storage and a conventional floor; and



Direct Gain System

4) the cost of the south-facing glazing and supporting frames which is in excess of one-third of the total glazing area on the other three nonsouth walls of a newly constructed building or room**,** or the total cost of south-facing glazing area added to an existing building or room.

It is useful to note that, in general the cost of an interior mass wall exceeds the cost of a conventional interior wall by approximately 80% of the cost of the interior mass wall; and the cost of a load bearing exterior mass wall exceeds the cost of a conventional exterior wall by approximately 70% of the cost of the exterior mass wall. Similarly, the cost of a mass floor exceeds the cost of a conventional floor by approximately 60% of the cost of the mass floor.

Example:

Homeowner E adds a south-facing 16’ x 24' room to his home which meets the criteria for a direct gain system listed above. The cost of the room is $20,000; the cost of a similar, conventionally constructed room would have been $13,400 (i.e., $6,600 is attributable to the additional costs of constructing the mass walls and mass floors rather than conventional walls and flooring, the qualifying south-facing glazing and the movable insulation, vents, dampers, fans and control devices which enable the room to function as a direct gain system). The assessed property value of the room is $3,000. The exemption which Homeowner E is entitled to is equal to $3,000 x 6,600/20,000, or $990.

Thermosiphon Air Panel Systems

System Description

A thermosiphon air panel system is an exterior wall-mounted collector that delivers solar heated air into a building through natural convection. Typically, the collector is a well-insulated box, with a dark colored absorber, which is covered with glazing. Vents directly behind the absorber allow air from within the building to flow upward while being heated and to re-enter the building. Collected thermal energy is vented either directly to the living space or to remote thermal storage by controlled natural and/or forced convection.

Eligibility Criteria

To be eligible for the property tax exemption, a thermosiphon air panel system must satisfy the following criteria:

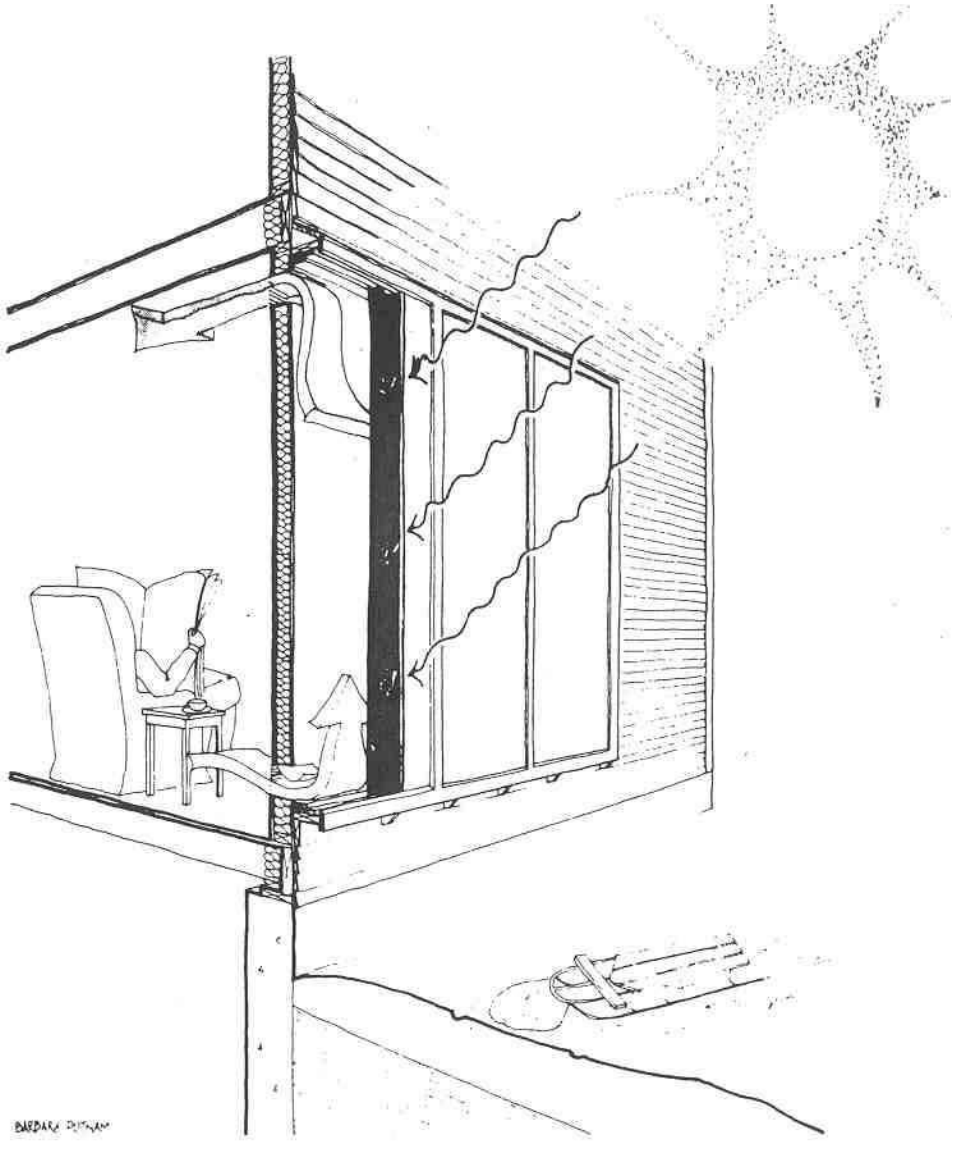
1) The collector must face within 30° of true south when installed in a newly constructed building and within 45° of true south when installed in an existing building or an addition thereto;

2) A means of preventing reverse thermal circulation during periods of low solar radiation must be provided; and

3) A means of thermally isolating the thermosiphon air panel to prevent overheating of the conditioned living space must be provided.

Guidelines for Calculating the Amount of the Exemption

Eligible thermosiphon air panel systems should qualify for an exemption in an amount equal to the assessed value of the thermosiphon air panel and remote thermal storage mass, if any. None of the system components should be considered to serve also as structural components of the building.



Thermosiphon Air Panel System