



Solar Water Heating and Photovoltaic Electric Generators Installed on Commercial Buildings

Category: Commercial Construction

Revised: April 24, 2009 [Paul L. Scarlett], Director

Responsible Bureau Section: Development Services Center
1900 SW Fourth Avenue
Portland, OR 97201
503-823-7310

I. BACKGROUND

Incorporating solar energy into commercial buildings is an increasingly common way for businesses to display environmental stewardship. With large financial incentives available at the local, state and federal level, it can be a sound business investment.

This program guide outlines the application and review procedures for obtaining the necessary permits to install a solar energy system on a new or existing commercial building.

II. SOLAR ENERGY SYSTEM DESCRIPTION

For the purpose of this program guide a solar energy system is defined as a solar water heating or solar electric (also known as a photovoltaic or PV) system.

A. Solar Water Heating

A solar water heating system reduces a business' energy consumption by preheating water so that the water heater or boiler does less work. The system consists of two primary components:

1. Solar collectors, which are commonly installed on the roof; and
2. A storage tank, which is typically co-located with the water heater and in which potable water is preheated by the solar collectors via a heat exchanger.

B. Solar Electric

A solar electric system produces electricity that is distributed to the building via an electrical panel, offsetting electric energy that would otherwise be purchased from the utility. It consists of two primary components:

1. Photovoltaic panels, which are commonly installed on the roof; and
2. One or more inverters, which convert the direct current electricity produced by the panels into alternating current electricity that can be used by the building.

C. Commercial Solar Pool Heating

A commercial solar pool heating system consists of light-weight unglazed polymer (plastic) solar collectors, typically mounted on a roof, through which swimming pool water is circulated during the summer months to capture the sun's heat. This type of system is not subject to the requirements of this Program Guide, and may be installed by obtaining a mechanical permit. In some cases an electrical permit may also be necessary to install the control system for the solar collectors.

III. SCOPE

This program guide is designed to provide guidelines and permitting requirements to those interested in solar hot water heaters or photovoltaic solar electric panels on commercial construction. This may include adding a solar system on to an existing structure by addition or alteration, or incorporating a solar system into new building construction. The intent of these guidelines is to streamline the permitting process for solar energy systems. The Bureau of Development Services (BDS) may require additional information be submitted to ensure proper compliance with code requirements.

IV. INSTALLATION REQUIREMENTS

A. Land Use

Solar installations must comply with the Zoning Code. Specific zoning information regarding a site can be obtained from the BDS Planning and Zoning Section by calling 503-823-7526.

1. Height

In all instances, installations of solar equipment, including the rails and panels, are subject to the height limitations of the specific zone where they are being installed.

For installations mounted flush with a pitched roof, the height of the panels will not be calculated, unless the panels will extend above the highest ridge of the roof.

2. Setbacks

Installations that are 6 feet or less in height are allowed to be placed in the setbacks of the individual lot. Installations taller than 6 feet are not allowed in this area unless they are placed on the roof of a building or approved through a land use review adjustment process.

3. Design and Historic Review

Projects in design overlay zones, historic districts, conservation districts, or individual historic or conservation landmarks may require Design Review. Design Review analyzes the aesthetics of a project, in order to conserve or enhance special scenic, architectural or cultural areas of the City. It is a discretionary review that requires a public notice and generally takes about 8 weeks to complete. The design review fee for a solar installation will be based on the current Land Use Services Fee Schedule for a 'Minor C' review. In some design overlay zones or historic districts, design review may not be required if the project is eligible to use the Community Design Standards. Please contact BDS Planning and Zoning Section at 503-823-7526, if you are unsure if the project is located in a design or historic zone or is eligible to use the Community Design Standards.

4. Upgrades to Non-conforming Development

Upgrades to non-conforming development will only be required as part of the solar installation when other modifications to the building are made (such as increasing the structural capacity of the roof system), and the valuation of the building permit for those modifications excluding the valuation of the solar system exceeds the dollar threshold of Section 33.258.070.D.2.a of the Zoning Code.

B. Structural

The solar collectors and underlying substructure (mounts, rails, etc.) must be designed to meet the loading requirements of the Oregon Structural Specialty Code. In general, the design and details may be required to be completed by an engineer registered in Oregon. For additional information please contact BDS Structural Engineering Section at 503-823-1302.

C. Plumbing and Electrical

1. General

All portions of the installation of solar systems governed by the plumbing or electrical code shall comply with the respective requirements of each code at the time of completion of the project.

2. Plan review

In general, plumbing or electrical plan review is not required for the installation of solar systems in commercial buildings. Plumbing and electrical plan review is only required for those solar systems that are being added to complex systems as defined by the State of Oregon in Administrative Rules OAR 918-780-0040 and OAR 918-311-0040 (1), cert ef. 10-01-06. In all instances, field inspection is required to verify code compliance.

V. PERMITS

A. General.

When a solar system is added to an existing building, the installation is considered an “alteration”. Solar panels that are part of new construction will be processed in conjunction with the new commercial construction permit. Under the provisions of the Oregon Structural Specialty Code, all alterations must meet the requirements for new construction. All necessary permits shall be obtained prior to installation of the system. Where plumbing and electrical permits are required as noted below, they must be obtained as separate permits.

B. Specific Permits required.

- 1. Building Permits.** A building permit is required for all solar systems including support structures and collector panels.
- 2. Electric Permits.** A separate electrical permit is required for the connection of a photovoltaic system to the building’s electrical system.
- 3. Plumbing Permits.** A separate plumbing permit is required for all systems that exchange energy with and are attached to the building’s potable water system.

C. Application Process

All permit applications for solar installations shall be submitted for review at the BDS Development Services Center (DSC) located at 1900 SW 4th Avenue, Portland Oregon on the first floor. At that time, DSC staff will determine if the project needs to be taken in for review or if the solar system can be reviewed over the counter.

Where a solar system is installed under another program such as the Facility Permit Program (FPP), the application process for that program shall be followed.

D. Permit Submittal Requirements

1. General.

In all cases, solar systems being installed in commercial buildings need the following reviews:

- a.** Planning and Zoning; and
- b.** Structural.

In addition, all permit applications shall clearly indicate the type of solar system to be installed. The information noted in items 2 through 4 shall be submitted for each permit.

2. Construction Drawings.

Construction drawings are required as indicated below. Structural drawings and calculations may be required to bear the stamp and signature of an Oregon registered engineer.

a. Structural drawings

- 1) Building structure** - Drawings shall clearly show the building structure that supports the system, any additional roof framing required to support the panel array, and all connections. Roof loads such as snowdrift, HVAC units and other items shall be addressed. Calculations shall justify adequacy of items.
- 2) System Details** - Drawings shall include:
 - a)** Plans and sections indicating solar collector layout, substructure layout, mounting points, and rails.
 - b)** Details for all connections.

3. Other Drawings

- a. Site plan.** A site plan is required showing building footprints, property lines, location and dimensions of solar collectors, ridgeline of roof, and a description of the solar system.
- b. Elevation.** An elevation drawing must show the height of the building and the height of the solar installation above the roof, but does not need to show other building details, unless Design Review is required.

- c. **Details.** Roof penetration detail including water proofing, curbs, flashing, etc.

4. Electrical and Plumbing Plans.

Plumbing or electrical plans are only required for those installations that fall under the definition of complex structure as defined by the State of Oregon in OAR 918-780-0040 and OAR 918-311-0040 respectively. Plumbing or electrical plans are not required for other solar system installations.

After all plans and necessary information has been approved by all reviewers, and applicable permit fees have been paid, the permits shall be issued.

VI. INSPECTIONS

Inspections are required for all permits issued for solar systems as indicated below:

A. Building.

Building inspections will be determined based upon the scope of the entire project on a project by project basis.

B. Plumbing.

Plumbing inspections are required where the solar apparatus attaches to the potable water system, usually a water heater. The inspections will verify that the collection system is properly attached, so that no contamination of the potable system can occur. Two plumbing inspections, listed in order, are required to verify that the system has been installed properly:

1. IVR Code 340: Water Heater
2. IVR Code 399: Final Plumbing.

C. Electrical.

Electrical inspections are required to verify the circuits and feeders have been installed properly and the system has been connected properly. Three electrical inspections, listed in order, are required to verify that the system has been installed properly:

1. IVR Code 145: Circuits/Feeders
2. IVR Code 120: Permanent Electrical Service/ Reconnect
3. IVR Code 199: Final Electrical.

VII. FEES

Fees for all required building, plumbing or electrical permits will be calculated using the current and applicable BDS fee schedules available online at

**Bureau of Development Services
Program Guide – Solar Water Heating and Photovoltaic Electric Generators
Installed on Commercial Buildings
Page 7 of 7
April 24, 2009**

<http://www.portlandonline.com/bds> or in the BDS Development Services Center at 1900 SW 4th Avenue, Portland, Oregon.

A. General

In general, building permit fees will be based on the valuation of the structural elements for the solar panels, including the mounting brackets and rails and the cost of labor to install them. Excluded from the permit valuation is the cost of the solar equipment, including the solar collector panels, inverters and preheat tanks.

Valuation of Project = Total Project Price – Solar Equipment Value

B. Design Review

Where Design Review is required, the fee will be for a 'Minor C' Design Review, based on the current Land Use Services Fee Schedule.

VIII. ENFORCEMENT

All code requirements shall be in accordance with applicable permitting and inspection procedures established by BDS.

New May 1, 2008