

## **5.12 Technical Specification: Solar Water Heating**

### **Small Premium Project Type:**

Solar water heating system use radiant energy collected from the sun to heat. This method of heating offsets electric or gas energy use that is used in a conventional water heating system thus reducing purchased energy consumption.

### **Description:**

Solar water heating systems include collectors, storage tanks and associated piping, pumps and controls. Solar water heating systems gather solar radiation to heat water for pools and domestic hot water.

The energy performance of all eligible solar water heaters must be demonstrated with annual energy performance calculations obtained from the Solar Rating and Certification Corporation. The calculations must be included with the application documentation. In projects that have greater than 5% shading of the collector arrays, a site specific sun chart is also required with the application documentation.

### **Minimum Operation:**

The facility must have an annual average hot water load of more than 250 gallons per day and remain in operation a minimum of 2,000 hours per year (for commercial buildings).

### **Equipment Type, Capacity and Performance:**

The following performance requirements must be met:

1. The collectors must be oriented to face a direction within 45 degrees of true south.
2. The collectors must be tilted to an angle between 15 and 40 degrees of horizontal.
3. The collectors must be OG-100 certified by the Solar Rating and Certification Corporation.
4. The system must be OG-300 certified by the Solar Rating and Certification Corporation.
5. The project must be designed to last a minimum of 20 years (with reasonable maintenance) and deliver or exceed performance expectations of a well-designed project that meets industry standards.
6. Project must be permitted and in compliance with all applicable building and electrical and plumbing codes. [Oregon Mechanical Specialty Code (Chapter 14 OSMC), the Oregon Residential Specialty Code (Chapter 23), the Oregon Plumbing Specialty Code and all other local regulations with jurisdiction.]
7. All equipment must be rated for a 20 year lifespan at the temperature and exposure conditions ambient environment in which it is installed.
8. All primary system components must be new (collectors, tanks, controls, pumps).
9. Array mounting must not reduce the expected life or durability of the structure on which it is located.
10. The project must include a customer manual. The manual must contain: Operational procedures, as-built drawings, project site plan, sun chart, operation and maintenance requirements and procedures, warranty information, permit documentation, bill of

materials and manuals and data sheets for major components, including but not limited to collectors, controllers, pumps, etc.

11. Project is sized appropriate for load. The solar savings fraction not to exceed 0.70, without a means of rejecting heat once load is met. Pressurized storage tanks must not be allowed to heat above 180°F.
12. Thermal storage is adequate to accommodate daily use pattern. For typical load profiles this is defined as a minimum of 1.25 gallons per square foot of collector area. For projects with loads that are coincident with solar generation, this storage amount may be reduced if documentation is provided.
13. Tank Insulation: All solar storage tanks must be insulated with not less than R15 insulation.
14. Pipe Insulation:
  - a. Collector loop insulation must be rated for conditions in which it operates. Pipe insulation must have a minimum R-value of 3. Closed loop facilities must be able to handle stagnation temperatures of the collector (300+°F).
  - b. Potable water pipe insulation must have a minimum R-value of 12. Pipe insulation must be protected if located in exposed conditions. U-V rate tape or pipe jacket is required. U-V paint is not sufficiently durable.
15. Anti-convective pipe loop or trap is required on the inlet and outlet of the storage tank. These loops or traps must have a minimum 8-inch vertical drop to constitute an effective convective heat barrier. Heat trap nipples alone are not reliable in stopping heat migration and will not meet this requirement.
16. Install thermometers on collector supply and return pipes. One movable thermometer for two wells is sufficient.
17. Projects must be designed and installed for complete automatic operation including protection from freeze damage and overheating of collectors.

**Incentive Estimate Worksheet:**

The incentive worksheets shown in the following schedules are the prescribed tax credit amounts that small premium projects can receive for solar thermal water heating. The total area of the collector array refers to the sum square footage of the installed solar collectors.

*Domestic Hot Water Tax Credit Schedule*

Total Area of Collector Array (SqFt)	A Number of Arrays	B Tax Credit	C Incentive Amount A x B
30 - 50		\$2,422	
50 - 70		\$3,276	
70 - 90		\$4,045	
90 - 110		\$4,730	
110 - 130		\$5,331	
130 - 150		\$5,848	
150 - 170		\$6,280	
170 - 190		\$6,629	
190 - 210		\$6,893	
Total from Column C			

*Pools Water Heating Tax Credit Schedule*

Total Area of Collector Array (SqFt)	A Number of Arrays	B Tax Credit	C Incentive Amount A x B
275 - 325		\$1,505	
325 - 375		\$1,684	
375 - 425		\$1,863	
425 - 475		\$2,042	
475 - 525		\$2,221	
525 - 575		\$2,400	
575 - 625		\$2,580	
625 - 675		\$2,759	
675 - 725		\$2,938	
Total from Column C			