



**Manufacturer of the Exciting
"SolarRoofs"
Solar Water Heaters**

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SolarRoofs.com is a wholly owned subsidiary of ACR Solar International Corp.
**A Socially Responsible, Innovative Technology Company Manufacturing Attractive,
Light Weight, Low Cost, and Easy To Install Solar Water Heating Systems.**

Advantages of "Skyline" Systems over Conventional Solar Water Heaters

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Background:

It is important to understand the many differences between conventional solar water heating systems and SolarRoofs "Skyline" solar water heating systems to determine the true value of SolarRoofs.com over other competitive options.

Conventional collector's original designs, dating back to the 1970s, were intended to be heavy-duty commercial collectors and were never truly appropriate as residential collectors. Due to the need for expensive mounting structures, roof reinforcement and inherent high wind loads caused by their large size, conventional collectors often aren't as good as SolarRoofs "Skyline" collector even for many commercial applications.

The 19 and 38 pound Skyline collectors are far easier and safer to install. Imagine the impediment to installing Photovoltaic systems if the standard panel weighed over 150 pounds? How happy and safe would installers be having to deal with these weights on a roof day in and day out? How much higher would labor costs be and what would safety and workers compensation risks and costs be?

1. One person can easily carry and safely install a SolarRoofs collector on an average one-story roof, a conventional glass covered collector requires several helpers or a boom lift to safely install. Once an installer has installed a SolarRoofs, they may never want to install anything else, and the labor savings are significant.
2. SolarRoofs "rail and C clip" mounting system make installation on the roof easy and secure. In fact, the mounting system and collector easily passed the tough Florida Solar Energy Center 150 mph wind test.
3. SolarRoofs collectors use simple union connections for up to 4 in a row. No soldering is required for the solar loop so PV installers can install the solar loop without learning to solder. Another very nice feature is that during shipping, the feed and return connections are protected from damage by sliding into the collector.

Opening the Mass Market For Solar Water Heating:

1. What SolarRoofs product can do for solar water heating has been compared to what the "SOLARTUBE" product has done for skylights. Integral to the SOLARTUBE's success is that it is dramatically easier to install than conventional skylights -- that one feature made all the difference in opening a mass market for the SOLARTUBE product.
2. Similarly, the SolarRoofs collector is smaller than conventional collectors, which allows for its easier installation, greater design flexibility and attractive appearance. These distinctions make for a more efficient and economical solution to consumers' solar needs.

Improved Design reduces Overheating:

1. The design of conventional flat plate collector systems is optimized to trap as much heat as possible. The result is a solar collector that is optimized for a design temperature capable of being too high to be safe for DHW applications. Conventional collectors can develop temperatures high enough to melt 95/5 solder, a situation that will never happen with a SolarRoofs collector. SolarRoofs collectors are safety engineered for optimum performance at the Domestic Hot Water (DHW) design temperature. The long narrow design allows for heat dissipation above the design temperature.

The SolarRoofs collector is superior by design:

2. From an aesthetic perspective, SolarRoofs outperforms the competition. Available in 26 Designer colors, SolarRoofs water heater adds to the architecture and Real Estate of a house.
3. SolarRoofs collectors and systems come out ahead when measured by the installed cost per delivered BTU. The residential installed cost of a SolarRoofs system can be reduced by over \$400.00 over conventional systems due to reduced installation costs. There is no chance of expensive and dangerous glass breakage do to vandalism, bad weather, thermal shock or accident.

When all things are considered, the SolarRoofs system has significant and compelling advantages. On the factory floor, on the roof, at your customers faucet, and when paying their utility bills, the SolarRoofs DHW system is the best choice for dealers, builders, wholesalers, installers and homeowners.

Quantitative Analysis of Installation and Safety Advantages of SolarRoofs over Conventional Water Heaters

Statement:

The following will address installation safety issues and installation costs that affect system installation cost for conventional solar water heaters compared to SolarRoofs solar water heater. Difficulty to ship, move, and install have slowed the solar water heating market. Typical conventional collectors weigh over 150 lb. compared to SolarRoofs much safer weight of 38 pounds. We will quantify the time and safety issue savings for an installation following proper safety guidelines.

A Note on NIOSH, Workers Compensation and Safe Lifting

1. Back Injury is the most prevalent and costly source of injury to American workers. A reported 372,683 back injuries occurred in 2001 (most recent data available), accounting for 27% of all lost time cases. (US Bureau of Labor Statistics).
2. Twenty-two percent of these back injuries are involved more than 31 days lost from work. Using the figure of just 31 days per case, that accounts for 6,964 years of lost time! (since BLS only reports 31 days or more lost, it can be safely assumed that this figure is even higher !)
3. Back injury costs are staggering; The US Army Center for Health Promotion and Preventative Medicine reports that the average cost of a lost-time back injury is over \$24,000, and cases involving surgery average \$180,000. Once a back injury occurs, the patient is 90% more likely to suffer recurrence of a back injury than the general population.
4. From an individual standpoint, few injuries are as debilitating, or painful as a serious back injury. Affecting not only work, but sleep, eating, playing, and every other facet of an individual's life are all negatively impacted by a back injury.

Using the following guideline from The National Institute of Occupational Safety and Health (NIOSH), the maximum weight a person should lift is 51 pounds as follows:

Load Constant-the maximum weight any person should lift, under optimum conditions. (Optimum conditions are described in the italics above. The NIOSH formula prescribes a Load Constant of 51 pounds (23 kilograms). Completely optimum conditions rarely exist. **This means that under no circumstances, should a person lift more than 51 pounds.**)

Here are the weight/resistance limits of the common materials handling tasks:

Push-100 pounds*

Lift-51 pounds

Pull-35 pounds.*

Following are estimates for delivery and installation of one system for a typical dealer. Costs for conventional could be more if 3 strong people or a lift are not readily available for delivery.

Fully burdened labor costs are estimated at \$24.00 hour.

	Conventional:	Hrs.	Cost	SolarRoofs:	Hrs.	Cost	Savings
Shipping costs (freight):			\$196			\$110	\$86
Delivery (unload and store system):		1/2	12	1/4	6		6
Delivery to Site (load and unload for installation):		1	24	1/2	12		12
Delivery time to Roof (inc. lift rental time):		3	72	¼	6		66
Lift Rental:			150			0	150
Installation on Rack:		2	48	1	24		24
Connecting lines:		2	36	1	24		12
Balance of system 2 people 2 hour Vs 2 people 3 hr (components of SolarRoofs do not require soldering)		5	120	3	72		48
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Totals:		13 1/2	\$658	7	\$254		\$404

Notes:

The less experienced the crew, the greater the savings will be for SolarRoofs as far less soldering and heavy lifting is required. Technically, SolarRoofs can be installed by one person in most situations. SolarRoofs system will not get to as dangerously high temperatures as a conventional system. SolarRoofs system peaks out at about 300 F where conventional systems can get over 400 F and can burn glycol and pop off pressure valves much more easily.

In all cases, the risk of injury is significantly higher for the conventional system even with 3 people. In all cases, the conventional system will require a lift with an estimated daily rental of \$150 plus the time to get and return it. Three people could be used to get the collector on a roof but would not meet NIOSH guidelines for lifting. The 38-pound SolarRoofs is within safe NIOSH limits in all situations for one person. Batch or thermosyphon systems may require expensive engineering and truss reinforcement adding greatly to the costs.

Bottom Line is:

1. SolarRoofs is designed for safety and ease of installation. The degree of difficulty for installing a SolarRoofs system is far less than a conventional system and the degree of safety is much greater.
2. To a customer, needing to replace SolarRoofs' glazing in 15 to 20 years is a small price to pay for a lower initial cost (estimated to be 2 times the savings to the average dealer or roughly \$808, or the amount the price could be reduced to the customer). SRCC OG300 performance ratings are comparable to similar systems and energy savings for the customer will be similar.
3. SolarRoofs has important features not offered by conventional systems: Conventional systems unfortunately are widely regarded as ugly and undesirable. With SolarRoofs, the customer has a much more architecturally attractive system. It can be custom designed to match the roof color and or have a 24' long "Skyline" design that is a beautiful architectural feature. It leaves more room for a PV or pool system and can have an optional roof-venting feature. SolarRoofs is the only mass-produced system that can add architectural value to a home.
4. For the Dealer, SolarRoofs is much easier to sell and much safer to install. This reduces the dealers marketing costs, risk of expensive injury, downtime and Workman's Compensation rates. Many solar PV and Pool dealers just won't sell water heaters if they have to deal with ugly, heavy and dangerous to install collectors.
5. **SolarRoofs systems have the vital installation, safety, and appearance advantages needed to open the true mass market for solar water heating systems.**