

# What is PV?

As the world seeks to reduce its dependence on fossil fuels, companies are increasingly turning to PV panels. Photovoltaic (PV) cells are semiconductor devices, usually made of silicon, that enable sunlight to be converted directly into electricity – every moment that the sun shines on them. Practically for free.

As a result, these powerful cells are now included more routinely in the construction of homes, offices, government buildings, industrial complexes and large commercial spaces. The decision to include photovoltaics in a new building design or retrofit plan is usually simple because PV cells have no liquids, corrosive chemicals or moving parts to worry about. As a result, PV requires little maintenance, does not pollute and operates silently.

With all their benefits, it's not surprising PV solar panels have been hailed as the cleanest and safest method of power generation around. But do they truly measure up to the fanfare?

## PV only 10% efficient!

To date there have been two drawbacks to PV solar panels. First, the initial cost is high and the payback slow, often taking decades for the costs to be recouped. This is because of reason #2: The cells are typically 10% - 15% efficient and the panels produce far more heat than electricity.

In fact, for every 1°C rise in PV panel temperature, there is a 0.4% - 0.5% drop in PV efficiency. When you consider that many PV solar panels are placed on roofs in temperate climates, this can represent a significant loss of effectiveness.



Of greater concern is that the heat build-up can damage PV cells, shortening their useful life. In some cases, roof temperatures get so hot that the underlying roofing materials get damaged, too. How hot? Temperatures of over 85°C have been recorded on bright summer days – not exactly great news for shingles or building managers.

Simply by keeping air circulating evenly around the PV modules, a lot of the heat can be dispersed, bringing the combined PV/T system efficiency to 50% or more. By increasing the electricity production, while reducing the heating energy requirements, tremendous cost savings can be achieved – and in the process, payback time can be cut by as much as two-thirds.

## SolarWall® PV/T – a total energy system.

A photovoltaic thermal system is often referred to as a “total energy system”, because in addition to converting sunlight into electricity, it collects the residual heat energy and delivers both heat and

electricity in usable form.

John Hollick, inventor of the transpired solar collector (the SolarWall heater) and Conservall Engineering president, originated the concept of marrying PV cells with a SolarWall heating system to create a PV/T system that can boost the overall efficiency of the combined system by three-fold or more.

## How it works.

The SolarWall PV panels get placed over regular SolarWall transpired collector panels and placed on the roof, just like any other PV installation (walls work, too, if preferred). This helps in a few ways. For starters, each square meter of SolarWall paneling has about 2,500 perforations which allows a lot of fresh air to pass through, balancing the air flow behind each PV module, and cooling them in the process.

In the winter months, the excess heat from the PV modules is drawn through the transpired collector into a space between the building and

the SolarWall heater. This excess solar PV heat, which would normally be wasted, is instead used to warm the ventilation air before it enters the building's heating and ventilation system, providing a reliable source of fresh, but pre-heated make-up air.



In warmer weather, although fresh air continues to cool the PV modules, special dampers ensure that only fresh ambient (not pre-heated) air gets into the HVAC system.

Strategic placement of PV cells is also key. Traditionally, PV modules get placed in an unbroken line up the slope of a roof. With this method there's no way to dissipate the heat between the panels and the top part of an array can overheat. With a SolarWall system, small gaps are left between each

PV module, further helping to prevent excessive heat build-up. This is especially important in the summer months when even air flow is essential to cool hot PV modules.

## SolarWall makes PV look good.

Any time a building is erected or renovated, appearance is a key concern. The senior partner at IMIU Architects says, *"The 21<sup>st</sup> century marked a turning point because clients now worry as much about the way buildings look and how 'green' they are as the amount they cost."*

According to George Beeler, principal architect at AIM Associates in the San Francisco Bay area and renewable energy advocate, *"People are concerned about the appearance of things that get put on a roof. Chimneys and skylights (which is what PV looks like) are normal. It's human nature. If you aren't used to seeing something, it feels uncomfortable. With my place [2005 winner of the Sonoma-Marín Best Large Home Remodel Award] I took special precautions to make sure that it looked good. I designed it [the SolarWall PV] to work with the architecture and I get nothing but compliments."*

Peter Arnold, Director of Pathways to a Sustainable Future, from The Chewonki Foundation in Maine, installed PV over SolarWall heating panels and says, *"We were interested in maximum efficiency as well as aesthetics. The SolarWall/PV*

*installation accomplished both goals at the same time. We're very pleased with the final product."*

## No Room at the Inn.

Early on, a lot of rooftops got covered in PV panels because grants were plentiful and PV seemed like an energy crisis panacea. But what if you were an early adopter and now want to add the solar thermal component... only to find there's no room on your roof?

SolarWall offers the ideal solution because the PV modules get mounted right over rooftop SolarWall panels, so no extra space is required. If, however, you already have a SolarWall system, it's easy to add PV – by means of simple clips. Installation can be completed in a day or less, with energy savings showing up immediately.

## Why wouldn't you?!

In short, installing SolarWall PV/T lets you generate more electricity from your PV array, lower your heating costs, improve your indoor air quality and makes your PV installation look better – all without contributing greenhouse gases to the environment. Given that installing a SolarWall system makes sense on so many fronts, one advocate asked, *"Why wouldn't you do it?!"*

To learn how you can easily include SolarWall PV/T in your plans and gain LEED points in the process, please call us and talk to one of our engineers.



**U.S.A.**  
**Conserval Systems Inc.**  
4242 Ridge Lea Rd., Suite 28, Buffalo, New York 14226  
**T:** 716.835.4903 **F:** 716.835.4904  
**E:** solarwallUSA@solarwall.com  
**W:** www.solarwall.com

**Canada**  
**Conserval Engineering Inc.**  
200 Wildcat Road, Toronto, ON M3J 2N5  
**T:** 416.661.7057 **F:** 416.661.7146  
**E:** info@solarwall.com  
**W:** www.solarwall.com