

# HYBRID SYSTEM DELIVERS ENERGY EFFICIENCY THROUGH SOLAR THERMAL & ELECTRICITY PRODUCTION



*A fully integrated roof using Atlantis collaborative partners is saving a homeowner in Virginia nearly 2,000Kwh per month.*

**"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait 'til oil and coal run out before we tackle that."**

*Thomas Edison*

#### **Advisory Partners:**

**Dawn Solar Systems  
Rappahannock Electric Coop  
Enviromation Inc.**



***By combining solar thermal hot water and Atlantis Energy Systems, Sunslates, the homeowner doubled the efficiency of solar energy production used in the home.***

Known in the industry for pushing the envelop of fully integrated solar energy, Atlantis Energy Systems teamed with Dawn Solar to collaborate on a solar thermal and photovoltaic system on an existing home in Virginia.

By placing solar thermal tubing underneath the photovoltaic (PV) tile system two solar objectives are achieved. First, the solar thermal system absorbs heat created from the electric production process of the PV panels resulting in both systems operating more efficiently. Secondly, the PV tiles with the roofing shingles and the solar thermal tubing are hidden underneath. The renovation also included PV integrated glass for

skylights, all of which blend nicely into the neighborhood.

The hybrid system located above the pool house generates over 3 kilowatts (kW) of electricity and saves another .79kW per hour do to the 2700 Btus of heat recovered from the heat generated below the PV tiles. In addition, 4' x 6' Atlantis energy architectural glass totaling 1.2kW was used as skylights and another Sunslate PV system over the south sloped roof generates 1kW of electricity. The hybrid system is able to increase its solar efficiency by 5% when outside temperatures are above 85°F making the system a perfect design solution in hot climates.



Installing the solar thermal tubing below the Atlantis Energy Sunslates



4'x6' integrated photovoltaic glass is used as a skylight over the Pool House, 14W Atlantis Sunslates as roofing.

**FOR MORE INFORMATION**

about energy efficient, sustainable design & photovoltaics, call or e-mail Atlantis Energy Systems.



### Temperature Readings

Figure 1  
(Tufts University Test Bed Study)

The sun gives us energy in two forms: light and heat. Technologies, such as photovoltaics (PV) and solar thermal systems, harness energy from the sun providing power in two forms: light and heat. Solar energy is a plentiful and renewable resource that releases no greenhouse gas emissions. In fact, enough sunlight reaches the earth's surface each year to produce approximately 1,000 times the amount of energy produced by burning all fossil fuels mined and extracted during the same time period. With solar energy we can both heat our water and homes and provide electricity to power our lights, stoves, refrigerators and other appliances.

A recent Tufts University study illustrates clearly the benefits of the Dawn Solar/Atlantis Energy Systems Hybrid PV Integrated solar thermal system (Fig 1). Without a means to illuminate naturally occurring waste heat generated from the production of electric energy below the PV tile, temperatures exceed 110°F at High Noon and at peak solar production. Using solar thermal to extract some of this excess heat, the temperatures below the tiles are significantly reduced on the average of 37°F and is expected to save over 221,000 Btus monthly. When considered over a 50 year lifespan, will reduce the owner's energy costs at 20-30percent (%).

The following applications can be used with the heat collected in the system.

Domestic hot water heaters	Radiant floor heating systems
Institutional, commercial and industrial process water systems	Swimming pool heater
Remote site or isolated cabin applications	Warm air heating systems
De-icing	Attic space cooling

**Installation**

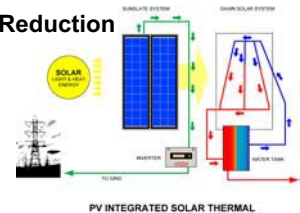
Ideal for both new construction and re-roofing, the hybrid SUNSLATES™ system is delivered to the job site. It is advisable to contact your local "Green" architect and/or mechanical engineer. Once trained, the mechanical contractor and electrician can handle the installation themselves:

- SUNSLATES™ are secured with stainless steel storm anchor hooks and anchored to 1x4 nailers resting on 2x2 sleepers.
- Each SUNSLATES™ tile comes with a proprietary gas-tight connector that wires each tile to the adjacent tile.
- At the end of each course a "homerun" cable is run to a splice box on the underside of the roof deck.
- Depending upon location and application design, an open or closed loop system can be created as fluids are pumped through the system and cycled through conventional heat transfer and distribution systems.

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**Source Emission Reduction**

SO<sub>2</sub> – 291.05 lbs  
 NO<sub>x</sub> – 128.18 lbs  
 CO<sub>2</sub> – 29.03 Tons



*Emissions reduction potential of a grid-connected PV system depends more on the characteristics of the regional electricity system than on the available solar resource. A detailed analysis of historical PV generation, fossil generation, and fossil emissions data for your region will have specific characteristics such as fuel portfolio and demand patterns that determine the magnitude of emission reductions. For this study extensive literature searches provided the basis of our emission reduction calculations.*

**Greenhouse Gas Avoided**

CO<sub>2</sub> – 16.8 Tons  
 According to the USEPA estimate (2003, 1.4lbs of CO<sub>2</sub> is released in the production of 1 kWh of electricity

*This fact sheet was provided by A Design Consulting for Atlantis Energy Systems, Inc. and with the consultation of Enviromation Inc. Photos/Graphics by A Design Consulting and Joe Morrissey.*