

Solar Roofing and Re-Roofing for Schools

The American Solar Roof

American Solar's approach to renewable energy is to utilize the existing roofs and walls of the building to deliver solar energy, in all its varied forms. In addition to this basic approach, our team has experience with the full range of conventional solar technologies. The full Team, American Solar and its teaming partners, can deliver conventional solar technologies from an individual solar roof to a campus wide project. While our team can do it all, customers achieve the greatest savings, with our new approach, using the large roof surfaces as the solar collector.

With our roofing approach, the building's ordinary roof and walls become weather tight solar collection surfaces, indistinguishable from conventional roofing and siding.



**Image: Berkeley Middle School
Metal Re-roof
Over Flat Roof**

These wall and roof surfaces can provide heat, light, and electric power for a fraction of the cost of a separate solar collector system. In the case where a building needs a new roof, the American Solar approach will deliver a lower cost, longer life, weather tight roof that is a powerful solar collector.

In most cases, the American Solar roof will cost no more to install than conventional re-roofing, and over its life, it will save more in energy expenses than the roof itself costs. The metal solar roof provides a better roof, with positive water drainage, longer life, lower maintenance, and better appearance. In fact, installing a conventional roof is a waste of money compared to installing a better, solar roof.

We provide a brief description of the American Solar roof because many people are unaware of the many installations we have completed. The description shows how a solar metal roof can provide heat and electricity in significant amounts to reduce energy use in a school building.

Our solar metal roof installations and designs use conventional metal roofing systems to harvest hot air from below the metal roof panels. The heating systems within the building use the solar heated air for a variety of purposes. American Solar has used the solar heated air for: space heating, water heating,

ventilation air preheating, boiler air preheating, heat pump preheating, equipment heating, loading dock heating, radiant floor heating, paint booth heating, and more, -- even air conditioning.

The beauty of this approach is that the solar collector cost is greatly reduced compared to conventional solar collectors mounted over a non-solar roof, because our systems do not use a separate new collector. The roof itself is the collector, so the only added costs are for the ducts, fans and controls. This provides high energy delivery at low cost, leading to a short payback period. In comparison, a conventional non-solar roof will never repay its installation cost.

American Solar and its teaming partners, which include some of the largest roofing companies, have also applied flexible photovoltaic (PV) panels to metal roof surfaces, enabling the roof system to generate electricity and solar heated air from the same surface. Although the PV panels are not as cost effective, the solar heating savings can provide enough savings to support a limited amount of PV and still have an economically viable project.

Since this solar re-roof system has not received the publicity of the very expensive PV roofing systems, we provide an example of the economics of a school that could save more than \$1,000,000 by re-roofing with a 35,000 square foot solar metal roof, instead of a conventional re-roof.

Example: Conventional Re-roof versus Solar Re-roof

The Conventional, Non-solar Re-roof: Consider a school, in a northern climate zone, that has a 35,000 square foot flat roof that is reaching the end of its service life. Re-roofing that roof with a typical membrane system will cost about \$10 per square foot and 20 years later the building will need another re-roofing. With each re-roofing, the roofer needs to remove the worn out membrane, send it to a landfill and install a new 20-year membrane at \$10 per square foot. The membrane roof delivers no renewable energy. Each re-roof will just be a \$350,000 expense to the school system, \$700,000 over 40 years. If the membrane re-roofs are financed via a mortgage or bond issue, the total cost over the 40 years would be \$863,037 including interest charges

A School-Financed Solar Metal Re-roof: However, if the school system installs a solar metal re-roof, the solar metal roof will deliver 40 years of weather tight protection and 40 years of warm air to reduce the conventional heating bills. Over time, the solar heat alone will more than pay for the cost of the solar re-roof. The total energy and roofing savings from a financed solar metal re-roof versus a conventional re-roof is \$1,026,000 over the 40 year life of the roof. The solar metal roof costs \$20 per square foot, or \$700,000. The net savings for a 35,000 square foot roof over 40 years would be \$163,630, for the same overall re-roofing cost.



PV Laminate on Standing Seam Metal Roof

Adding Solar Electric Capacity to the Solar Metal Re-roof:

If desired, we can laminate solar electric panels onto the solar metal roof, to provide electric power to the facility. While the solar electric panels are expensive, the solar heat savings can provide enough additional savings to cover the higher cost of any solar electric panels, and still provide a cost effective bundled solar package. For example, if we add 5 kilowatts of electric panels, the cost would increase by \$75,000. The building saves \$80,000 in electric energy over the 20 year life of the PV system and saves \$1,013,000 in reduced heating costs over 40 years.

Third Party Financed Solar Metal Re-roof: Finally, the school building owner can finance the solar re-roof through a third party. Current US tax regulations offer several financial incentives to the 3rd party, a commercial entity, which are not directly available to a non-profit or government owner of the school solar roof. With these incentives, the third party owner can reduce the system's costs and can pass along those cost savings to the school owner.

There are a variety of repayment approaches for a third party financed system, including:

- Energy Purchase Agreements
- Energy Savings Performance Contracts and
- Utility Energy Service Agreements



PV Laminate on Standing Seam Metal Roof

We can work with the third party in structuring financing, which provides an immediate payback to the school owner. The quick payback comes from the energy and roofing savings our systems deliver. These contracts are usually the lowest cost solution to re-roofing. In many cases, these financing approaches give the school positive cash flow for the entire length of the project, compared to the conventional re-roofing and energy purchase approach.

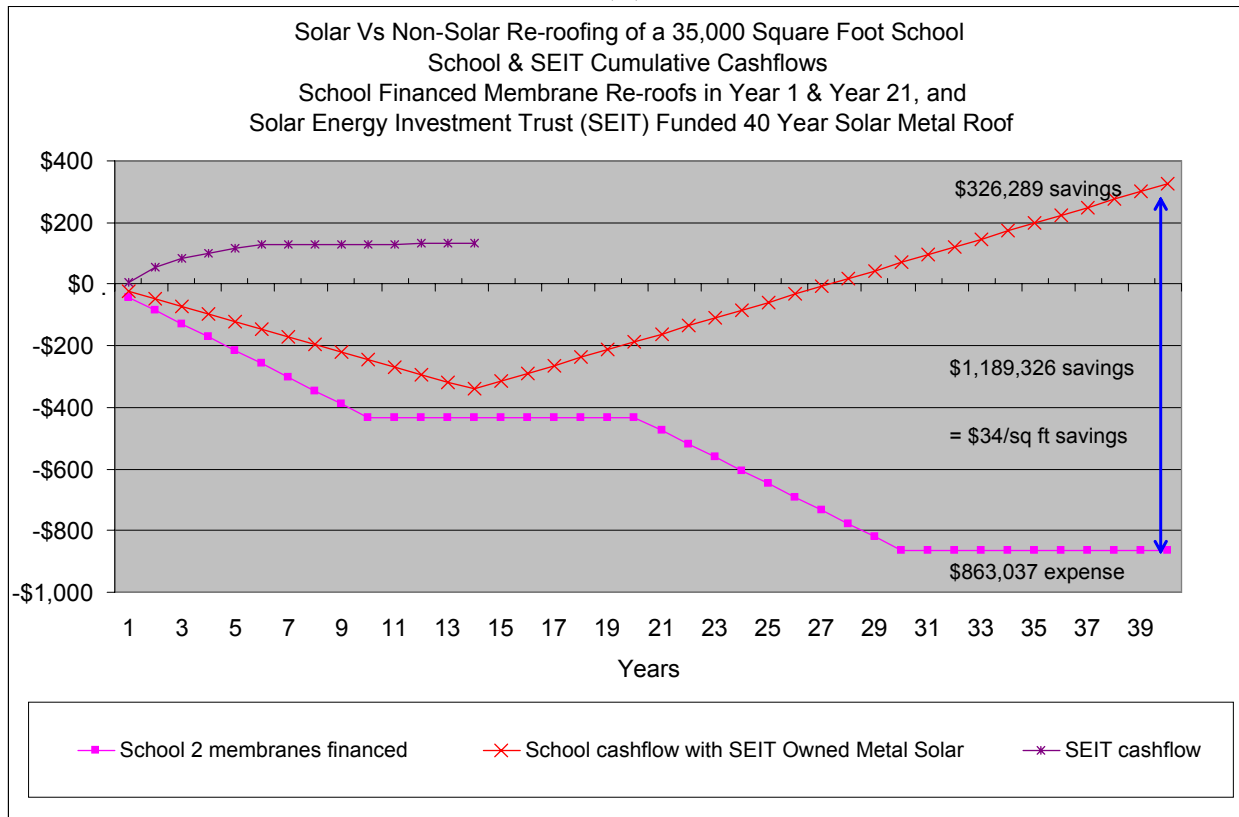
Example:

A 35,000 square-foot school building, with a worn-out, flat roof needs to be re-roofed:

School Re-roof Example	Conventional re-roof	American Solar re-roof
Cost to School Building Owner	\$700,000	\$700,378
Energy (savings)	-	(\$25,667/yr , \$1,026,680/40 yr)
Tax credit (savings)	-	(\$210,000)
Depreciation (savings)	-	(\$148,750) over 6 years
Interest Expense	\$163,037	\$253,378
40 yr School payments	\$863,037cost	\$700,378 cost
40 yr cost / (savings)	\$863,037cost	(\$326,289) saved

Typically, the school system owner would re-roof a worn-out flat roof using a plastic membrane. The membrane re-roof would cost about \$10 per installed square foot for a total of \$350,000. Financing the roof with a mortgage or a bond issue would add about \$81,500 over 10 years.

The membrane would last about 20 years (at best). There would be no energy savings, no tax credits, and no tax savings for depreciation for the school system. The roof is just an expense that the school owner incurs again at the end of the 20-year life of the new roof. At the end of 40 years, the school owner would have paid \$863,037 for the two (2) roofs.



In contrast to a membrane roof, one solar metal re-roof lasts 40 years and delivers heating energy savings to the building. The chart above depicts a scenario in which a third party, a Solar Energy Investment Trust (SEIT), owns the roof on a school building. The SEIT would be eligible for a tax credits (\$210,000), and depreciation allowances against taxes (\$148,750) that would lower the after tax cost of the system by about 50% of the installed cost. The SEIT would borrow \$465,000 for 14 years at 6% interest to fund the remainder of the after tax, project costs. Annual payments on the loan would be \$50,027. The school would see a reduction in its energy costs by \$25,667 per year and reduce its roofing cost by \$25,000 per year (compared to one membrane amortized at \$350,000/14 years). In this scenario, the school saves a total of \$50,667 per year. The school owner can use those savings to pay the SEIT \$50,027 per year to cover the SEIT's loan payments. At the end of 14 years, the school owner will no longer pay the SEIT, but will continue to receive energy savings of \$25,667 per year. Over 40 years, the school saves \$326,289.

The total savings between conventional re-roofing and 3rd party financed solar re-roofing is \$1,189,326, over the 40-year life of the solar roof. This is \$34 per square-foot of roof over 40-years.

No other roof or solar roof can provide the same cost savings to school building owners.

No other solar energy system can provide the same cost or energy savings to the school building owners.

Find out why any other roof, but an American Solar Roof, is a waste of money!

**John Archibald, President
American Solar, Inc.
Annandale, VA
www.americansolar.com
(703) 425-0923
info@americansolar.com**

