

# LANDMARKS' FIELD SERVICES

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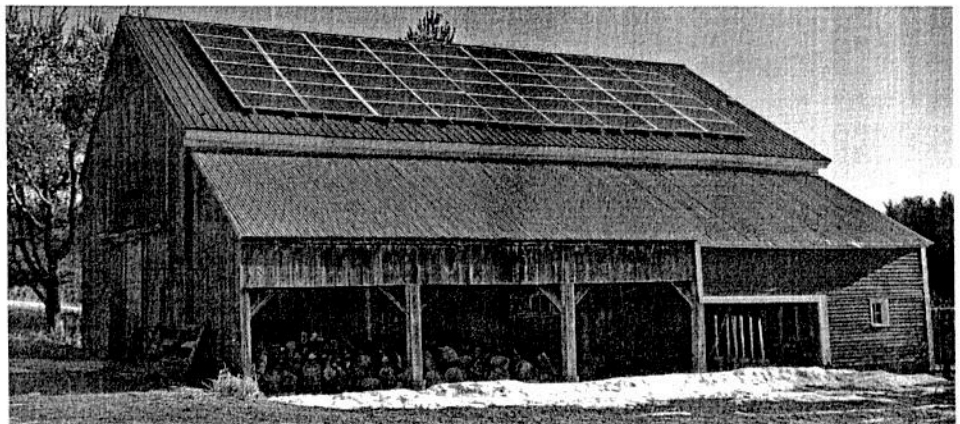
## Solar Photo-Voltaic Installations on Historic Buildings

**T**HROUGH RECENT ADVANCES in manufacturing technology, solar photo-voltaic (PV) systems can now generate electrical power reliably for 25-30 years. Equipment costs have fallen 70 percent since 2009 and are expected to fall further, and installation costs have remained flat or have declined slightly. The payback period on initial investment has shortened considerably from over 30 years to well under 15. Solar PV applications not only offer a supplemental energy source, but can lower building operating costs. Under certain conditions, solar PV can also generate additional operating income. Greater Portland Landmarks can provide guidance to building owners and developers of historic properties in determining if solar installations are feasible under historic preservation standards or for projects involving historic preservation tax credits.

### INITIAL CONSIDERATIONS

Before undertaking any major energy-efficiency project, it is important to determine overall building performance. To optimize your future investment, you will need to calculate your average monthly energy usage in order to help properly size the capacity of a solar PV system. First, focus on your current energy expenditures and explore whether you can reduce energy use.

Identifying and prioritizing energy projects is best accomplished through an energy audit, which costs about \$450 - \$650 for the average home. When selecting an energy auditor, be certain that the individual is certified to practice in Maine and is qualified to work with historic buildings. Before considering solar applications,



This solar installation on a barn in Gorham generates power for the owner's early 19th century farm. Landmarks can provide advice for homeowners considering solar photo-voltaic power in historic contexts.

you should consider thorough air-sealing, adding storm windows, and upgrading heating, ventilation and cooling equipment and controls. *The Energy Efficient Old House: A Workbook for Homeowners* (2011) published by Greater Portland Landmarks, is a useful resource. [www.portlandlandmarks.org](http://www.portlandlandmarks.org), as is the US Department of Energy's Energy Efficiency and Renewable Energy available at <http://www.energysavers.gov/>.

### SITE EVALUATION

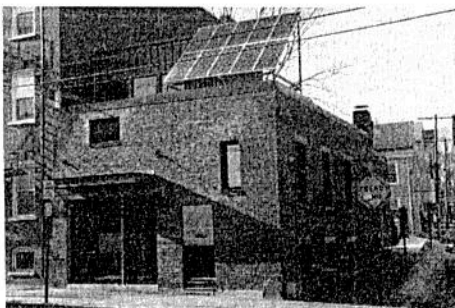
The next consideration is whether the site is suitable for a solar installation. For existing buildings you must evaluate where a solar array can be mounted, how the building is oriented to the sun, service access, and permitting. Typically, to produce one kilowatt-hour of electrical energy with current technology, between 64 and 88 square feet of collector space will be required, depending upon the panels. Site analysis should consider:

- Site latitude (43°40' for Portland, ME) and slope
- Elevation (relative to surrounding area, buildings and vegetation) and terrain characteristics
- Solar orientation (south is optimal)
- Shadows
- Tilt angle required (approximately 36° at Portland's latitude)
- "Full Sun Hours" available. For Portland, the average is 4.51 hours

Assuming favorable conditions, you can calculate the size and cost of the solar PV system based on roof surface area or site space available. As solar PV technology continues to improve, solar panel collection areas are likely to decrease.

In urban locations, because of the limitations of placement options on buildings, taller, flat-roofed buildings probably hold a competitive advantage for volume solar PV power production. If you own a flat-roofed historic commercial, industrial, or institutional building, there may be future income potential from solar installations. At least one commercial real estate company in the Portland area has already recognized the future of this market by optioning the purchase and/or lease of rooftops as sites for solar installations.

Ultimately, a study of the suitability of your site may show that solar is not the best alternative, and that another approach such as natural gas, geothermal or a high-efficiency heating system is better-suited, more cost-efficient, or has a shorter cost recovery period. ■



This contemporary design by architect Richard Renner integrates solar panels into the rehabilitation of a former commercial building in Portland.



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Providing historic preservation technical assistance, planning advice, guidance for community advocacy, field visits, and pre-assessment services

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