

**Solar Hot Water –  
How Hot Is It?**

Aesthetic appearance has been a persistent roadblock for residential solar energy systems. To address this concern, manufacturers of both solar thermal and electric systems have developed various building integration strategies to incorporate (or at least hide) solar systems within the structure of the building.

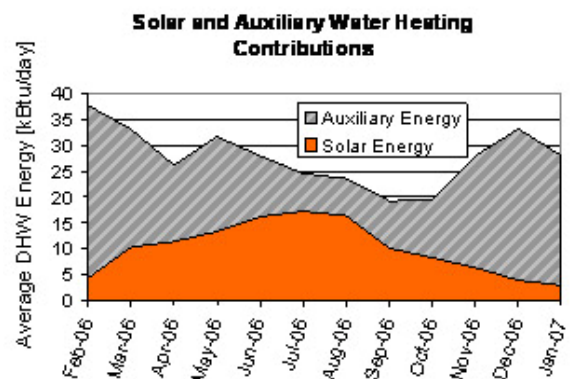
In late 2005, construction was completed on a home in Litchfield, Connecticut that incorporates roof-integrated, unglazed, solar thermal systems manufactured and installed by **Dawn Solar Systems**. Steven Winter Associates, Inc. (SWA) conducted the evaluation with funding provided by the **U.S. Department of Energy's Building America Program**.



The south-facing roof of the home actually consists of three active solar systems. The main southern roof of the home (750 square feet) incorporates a solar thermal system for space heating. The southern shed dormer (250 square feet) supports both a thermal system (for DHW) as well as a roof-integrated photovoltaic system using amorphous silicon laminates. Beneath the standing-seam metal roofs, the unglazed thermal collectors consist of cross-linked polyethylene (PEX) piping run in metal heat transfer plates.

Instrumentation was installed to monitor the performance of the solar systems and SWA now has 15 months of data documenting the performance. During the first 12 months monitored (February 2006-January 2007) occupants of the home used an average of 47.2 gallons of hot water each day. This resulted in a thermal load of 10.6 MMBtu; the small solar thermal system (on the shed dormer only) provided 3.68 MMBtu or 35% of the energy needed to heat this water.

As expected with an unglazed thermal system, performance varied greatly with outdoor temperatures. In January, for example, the system provided only 10% of the water heating load. In July, by contrast, the solar fraction was 60%. The monthly contributions of solar (along with auxiliary energy required) are shown in the chart above.



*Average daily energy required to heat hot water during each month monitored. Shaded areas show portions provided by solar and auxiliary propane water heater.*

SWA's Robb Aldrich will present the results of this project in a paper at the American Solar Energy Society Conference in Cleveland in July. For more information on this project, contact Aldrich at [raldrich@swinter.com](mailto:raldrich@swinter.com), or Doug Owens at [dowens@swinter.com](mailto:dowens@swinter.com).

## Near Zero Energy Home Draws Rave Reviews



Paul Dickerson, Chief Operating Officer, DOE's Office of Energy Efficiency and Renewable Energy, (left), and Congressman John Olver (right), D-Amherst, presented the "Energy Innovator" Award to Paul Douglas (center), Executive Director of RDI.

**Home builder Rural Development, Inc. (RDI)** held an open house for its first zero energy home with accolades and interest from local politicians, press, and a huge public turnout in rural Colrain, Massachusetts.

The prototype 1,350-square-foot home is the result of support from the U.S. Department of Energy's Building America program. SWA incorporated efficient and renewable energy systems into the project, local architects **Austin Design, Inc.** donated its services, and **Western Massachusetts Electric Co.** provided funding for the solar thermal system. The project has drawn huge public interest with an estimated 200 people visiting the home on a warm Saturday afternoon in May. (See April 2007 CARBNews at [www.swinter.com](http://www.swinter.com) for technical details).

SWA's Robb Aldrich noted a particularly strong interest among "solar geeks" at the open house who were especially interested in the photovoltaic system which is expected to provide at least 74% of the home's electricity needs, and the solar thermal system which will provide 44% of the space and water heating loads. Some of the efficiency features of this unique home include a 12" double wall system, a tankless water heater, ENERGY STAR appliances, fluorescent lighting, blown-in, recycled cellulose wall and ceiling insulation, low-e windows, and durable fiber-cement siding. Many people were also impressed by the fact that this is the first in the development of affordable housing with a price tag just under \$200,000.

SWA installed instrumentation to monitor and evaluate performance over the next two years while a family of three occupies the house. For more information, contact Robb Aldrich at [raldrich@swinter.com](mailto:raldrich@swinter.com).

## Building America Experts Meet on Foundations

**ConSol**, in coordination with **Oak Ridge National Laboratory**, recently hosted a Building America Experts meeting to discuss best practices, problems and opportunities with foundation systems. A wide range of industry researchers presented on projects dealing with basement and slab-on-grade foundation issues throughout the country. SWA's Marc Zuluaga presented on the evolution of CARB's work with high performance, builder friendly basement insulating systems. Most recently, CARB has worked with

**Oldcastle Precast Group** in their development of the OASIS Wall, a novel pre-cast foundation system that is installed pre-insulated and pre-finished. From the beginning, this system was designed with energy and moisture performance in mind. It features a continuous layer of EPS insulation that results in a R-10 whole wall performance, and eliminates thermal bridging through concrete studs. In addition, the OASIS Wall incorporates **Georgia Pacific's** Dens Armor Plus paperless gypsum board to enhance durability by eliminating a food source for mold. To date, approximately 50 OASIS installations have been completed in New England. More information on the OASIS Wall is available at [www.oasiswall.com](http://www.oasiswall.com), or contact Marc Zuluaga at [mzuluaga@swinter.com](mailto:mzuluaga@swinter.com).

