DOW CORNING

Solar
Solutions

Standing the test of time – silicone adhesive displays outstanding longevity on solar array

Case Study: Solar Living Center, California

City / Country
Hopland, CA, USA

Application
Silicone rail bonding on glass – back sheet (crystalline) solar module

Product
Dow Corning® brand silicone adhesive

Building Owner
Solar Living Institute

Solar Installer
PowerLight (later acquired by Sunpower)

THE PROJECT

- The Solar Living Center, established in 1998 as a non-profit solar training organization, promotes sustainable living through inspirational environmental education
- Visited by 200,000 people annually, the Center comprises a 12-acre site and runs a multitude of workshops and courses providing lectures and training. These include critical knowledge and hands-on practice in the essentials of photovoltaic technology and solar panel installation
- Site tours are available to assist learning on a range of topics from solar and wind power to eco-friendly building materials, to solar design in architecture, and organic gardening and permaculture
- *Dow Corning*® brand silicone adhesive, applied in 1998 for fixation of the solar modules, is performing as well today as on the day of installation

THE CHALLENGE

The Solar Living Center is widely recognized as being a standard for excellence in training for the construction of buildings and organic farming. Materials and methods to enhance sustainability and offer the potential to reduce living costs are an integral part of this learning. As a focal point of the Center, the choice and installation of a durable system for the 136 KW solar array to provide clean electricity for the facility was critical.

THE SOLUTION

The chosen system consists of four tables of frameless solar panels with 300 modules on each table, making a total of 1200 modules. Manufactured by AstroPower Inc., the panels are 1.48 m x 0.6 m in size and approximately 12 kg in weight. The four tables were pre-panelized onto two galvanized unistrut rails, using a *Dow Corning* silicone adhesive in place of mechanical fastenings. These panels and rail assemblies were then shipped to site and structurally secured onto the racking system. Pre-mounting solar panels using *Dow Corning* silicone adhesive allows a cost effective module design as well as rapid installation, with a capability to reduce a solar system's total installed cost per watt.

This early example of a larger scale photovoltaic project provides an excellent point of reference for the study of longevity and performance under the Californian environmental climate. After 14 years of exposure to the elements, each of the four tables is still securely bonded and no signs of the *Dow Corning* silicone adhesive cracking, degrading or being compromised in any way can be observed throughout the array.

HISTORICAL DATA RELATED TO HOPLAND ARRAY

FIGURE 1

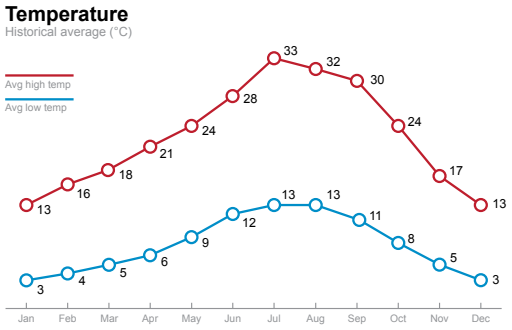

Figure 1 shows the historical temperature at the site, where the record high was +46°C and the record low was -11°C.

FIGURE 2

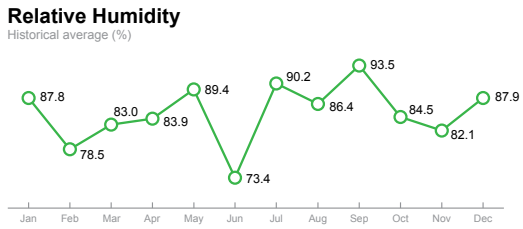

Figure 2 illustrates the annual humidity.

FIGURE 3

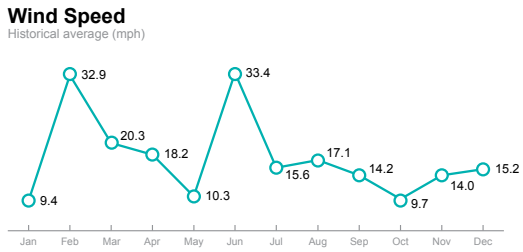

Figure 3 reveals the annual wind speed and direction in which the modules have been exposed.

At the Solar Living Center array, the wind has been primarily from the north which means that the wind load has been largely on the under side of the modules (Figure 3). Thanks to their proven capability and resistance under extreme weather conditions, silicone adhesives are ideally suited for structural bonding within solar panel systems. This array serves as an impressive platform from which solar energy components and systems can be promoted to visitors and future industry professionals for their longevity and outstanding performance.

FIGURE 4

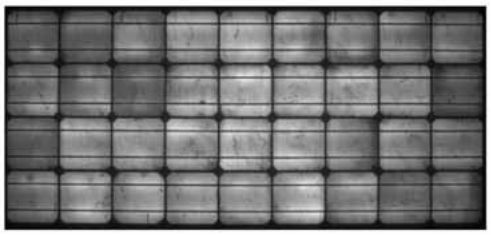

Figure 4 displays the condition of the module after 14 years of exposure to environmental conditions. The brighter areas indicate strong cell activity. There was no cracking observed and the power output is only 6% lower than the name plate power.

DOW CORNING® BRAND SILICONE ADHESIVES

Dow Corning silicone structural adhesives eliminate the need for mounting hardware and enhance performance by providing protection from moisture, environmental attack, thermal and mechanical shock, breakage and vibration. Fast curing, these adhesives minimize module stress and have the potential to speed up installation on site. They also enable frameless module design, effectively reducing installation costs.

LEARN MORE

Dow Corning has sales offices and manufacturing sites, as well as science and technology laboratories, around the globe. For more information, please visit ***dowcorning.com/solar*** or e-mail ***solar.solutions@dowcorning.com***.

Images: AV20044, AV20047, AV20048, AV20049

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