

# Solar Fueled Combined Heat & Power (CHP) System

## PRODUCT DESCRIPTION

### Basic Uses

The Dawn Solar CHP System is an architecturally integrated system used to collect and distribute solar-heated water and solar electricity (photovoltaic) from a shared and common roof or wall area. The electricity from the integrated photovoltaic panels can be used in all conventional grid tied and off grid applications. The solar thermal energy collected can be used to heat or pre-heat domestic and process water requirements for domestic use or space heating or process heating while simultaneously cooling the building envelope.

The integrated PV-Thermal systems uses Patent Pending Dawn Solar thermal technology closely coupled with photovoltaic (PV) panels available from many manufacturers. The PV panel is cooled by the thermal system, synergistically improving the PV panel's performance. The exposed surface of the solar thermal collector incorporates a PV panel from one of several established manufacturers.

The Dawn Solar CHP System should be considered whenever performance requirements demand solar electricity and solar water heating, and architectural design criteria dictate building integrated systems. Energy savings depend on several project specific factors and can be predicted by computer modeling. Factors that influence system effectiveness are: the energy distribution systems in the building, length of heating season, utility for heating, system slopes and orientation.

In all instances the system is assembled on site and installed on existing or new structures in conformance with local requirements. The system is supplied with a minimum 300 square foot area that is configurable in a variety of shapes. Depending upon weather and site variables, a 300 square foot system will preheat hot water for domestic or process heating applications and have a combined (PV-Thermal) rating of 12-22 watts (kW-T) per square foot. Electrical ratings of each PV system will vary as a function of each system's configuration.

The CHP System is supplied complete with all materials necessary to achieve a waterproof installation that will serve as a hardened component of a building's envelope. The solar thermal system is terminated at a multipoint manifold, ready for connection to circulating and storage systems custom designed for each project. The PV system is supplied with connections ready for connection to main electrical systems typically provided by others.

Applications are limited only by the designer's creativity.

### Ideal applications include:

- \* Roofing
- \* Curtain wall
- \* Shade structures
- \* Patio awnings
- \* Retail awnings
- \* Residential
- \* Schools and gymnasiums
- \* Arenas
- \* Laboratories
- \* Maintenance facilities
- \* Government and military buildings
- \* Warehouses

- \* Industrial
- \* Hospitals
- \* Theaters and conference centers
- \* Restaurants

### Major system components may include:

- \* Roof panels, wall panels
- \* PV panels, PV laminates, PV tiles
- \* Flashings, purlins, misc. hardware
- \* Temperature sensors, controls, manifolds
- \* Trim and closures

### Envelope Composition and Materials

The CHP System incorporates 24 gauge Galvalume<sup>®</sup> coated steel as the roofing/siding material, fiber cement PV panels or "PV tiles" such as those manufactured by Uni-Solar, GE, Sharp, Kyocera, Elk and others.

### Sizes and Profiles

The overall thickness of the CHP System is 1" plus the thickness of the roofing system or PV panel specified. Large scale implementations are easily achieved by installing systems in parallel or series. Architectural details can easily be accommodated.

### Color and Finish

With a metal envelope, a choice of 23 colors is available in Kynar 500<sup>®</sup> or Hylar 5000<sup>®</sup> based finishes for collector panels and accent components. (Request color chart or chips.) PV tiles and fiber cement PV panels come in a variety of colors.

### Limitations

The performance of a solar energy system is heavily dependant upon site specific construction, weather conditions and latitude and they are not designed to entirely replace conventional water heating, space heating or electrical supplies. Consult local codes for applicable standards in all applications.

## TECHNICAL DATA

### Applicable Standards

**Solar Thermal Collector System:** The underlying technology for building integrated solar thermal collector applications has been the subject of extensive testing by the Building America Program of the U.S. Department of Energy and the Florida Solar Energy Center (FSEC), a research institute of the University of Central Florida. Certified product performance data that can be used for applications modeling is on file at FSEC and the Solar Rating and Certification Corporation (SRCC).

### Exterior Finish Materials

DS-CHP systems can be installed with the following exterior finishes:

- \* Standing seam roofing
- \* Metal siding
- \* Fiber cement PV panels
- \* PV roofing shingles
- \* Tile PV panels

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### **Metal Roofing and Siding Materials**

Metal envelopes typically incorporate Kynar 500<sup>®</sup> or Hylar 5000<sup>®</sup> based finishes tested by paint supplier for:

- \* Description: Method: Durability: Substrates.
- \* Gloss ASTM-D-523-85 20-30 @ 60° steel and aluminum.
- \* Pencil Hardness ASTM-D-3363-74 HB-H steel and aluminum.
- \* Flexibility T-Bend ASTM-D-4145-83 1-T steel and aluminum.
- \* Flexibility T-Bend ASTM-D-4145-83 2-T steel.
- \* Mandrel ASTM-D-1737-85 no cracking steel and aluminum.
- \* Adhesion ASTM-D-3359-87 no adhesion loss steel and aluminum.
- \* Reverse Impact ASTM-D-2794-84 no adhesion loss, steel and aluminum.
- \* No cracking.
- \* Falling Sand ASTM-D-968-84 100 liters per mil. DFT steel and aluminum.
- \* Mortar Resistance ASTM-C-267 no effect steel and aluminum.
- \* Acid Pollutants AAMA-605.2-91 <5 units color change steel and aluminum.
- \* Acid Rain Kesternich 10 cycles min. steel and aluminum.
- \* Alkali Resistance ASTM-D-1308-87 no effect steel and aluminum.
- \* Salt Fog ASTM-B-117-85 passes 3000 hours aluminum.
- \* Salt Fog ASTM-B-117-85 passes 1000 hours steel.
- \* Humidity ASTM-D-2247-87 passes 3000 hours aluminum.
- \* Humidity ASTM-D-2247-87 passes 1000 hours steel.
- \* Color Retention ASTM-D-822-86 passes 3000 hours steel and aluminum.
- \* S. Florida Exposure ASTM-D-2244-85 max. 5 units change steel and aluminum.
- \* Chalk Resistance ASTM-D-659-86 min. rating of 8 steel and aluminum.

### **Environmental Considerations**

The Dawn Solar CHP System is a renewable energy collection system that benefits the environment by:

- \* Harvesting solar energy as heat and electricity, producing from 12-22kWH-T (Thermal), depending upon load and configuration.
- \* Collecting solar thermal energy that is suitable for water, space and process heating.
- \* Offsetting fossil fuel use, reducing a building's carbon footprint.
- \* Utilizing components that contain recycled material and are recyclable.
- \* Projects with this technology may qualify for LEED credits in renewable energy, optimizing energy performance, recycled content, recyclability and other areas.

## AVAILABILITY & COST

### **Availability**

The Dawn Solar CHP system is available through dealers and distributors.

### **Cost**

Systems costs are highly competitive with single mode solar thermal and PV systems. Significant economies are achieved due to integrations into building structures. Maintenance costs are lower than single mode products due to system simplicity. Contact product distributors for current pricing on systems. **Many state and federal incentives are available.**

### **Warranty**

The solar thermal system carries the Dawn Solar System 25-year warranty. The standing seam roof material carries the manufacturer's warranty. The Photovoltaic component of the system carries the manufacturer's warranty.

### **Maintenance**

Dawn Solar CHP Systems are virtually maintenance free, requiring annual services similar to conventional HVAC Systems. Periodic testing of the glycol fluids in the closed loop solar thermal collector is required.

### **Technical Services**

Complete technical information and literature and design services are available from Dawn Solar Systems, Inc.



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