



## Corporate Overview

### Who we are

United Solar Ovonics, a subsidiary of Energy Conversion Devices, Inc. (ECD), is a world leader in the technology and manufacturing of thin film solar panels under the name brand *UNI-SOLAR*<sup>®</sup>. We have a manufacturing plant of 25MW annual capacity that offers solar panels and systems to the market for a wide range of applications. Our lightweight, flexible, and rugged products are receiving worldwide recognition, and during the last year, we have witnessed 100% sales growth. We are now building a new plant to double our manufacturing capacity.

### Market Segments

#### Commercial/Industrial Systems

Lightweight, easily installed, solar electric solutions that can be integrated with a variety of roofing materials.

#### Residential Systems

Complete residential solar electric integrated systems and solutions.

#### Off-Grid and Remote Applications

Electricity for remote areas of developing countries.

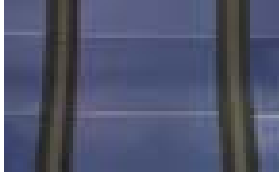


### Commercial Product Line

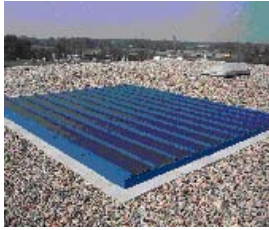
United Solar Ovonics offers a complete line of solar products that are lightweight, glass-free, flexible, durable, shadow tolerant, have excellent high temperature performance and are easily installed. Our products offer the following solutions:



- **Standing Seam Metal Roof Solution** – designed for customers with traditional metal roofs, *UNI-SOLAR*<sup>®</sup>'s SSMR solutions leverage the ease of installing our popular photovoltaic laminates (PVL)



- **UNI-SOLAR® Membrane Roof Solution** – designed for applying the UNI-SOLAR®'s photovoltaic laminates onto styrene-butadiene-styrene (SBS) modified bitumen and other low-slope membrane roofs, this solution is flexible and durable, capable of withstanding all environmental stresses

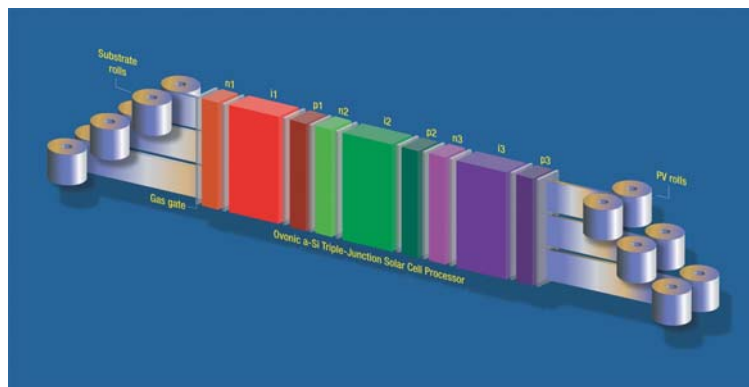


- **Premier Solar Flat Solution** - a self-ballasted collection of framed modules that can be easily removed for roof replacement or repair and is appropriate for any type of existing low-slope roofing material

UNI-SOLAR® PV products provide 20% more real energy\* than crystalline panels of the same power (\*Source: Solfest '98, Module Shoot Out, June 20-21, 1998) and our modules come with up to a 20-year warranty on power output. With power ratings of 3 watts to 136 watts, our solar modules can be customized to fit virtually any need.

### Our Innovative Technology

Each UNI-SOLAR® PV-module utilizes the unique Triple-Junction thin-film silicon solar cells from United Solar Ovonicon, LLC. UNI-SOLAR® modules yield unprecedented performance. Each solar cell is composed of three semiconductor junctions stacked on top of each other, forming three different sub-cells. The bottom sub-cell absorbs the red light; the middle cell the yellow/green light and the top cell absorbs the blue light. This light spectrum splitting capability is the key to higher efficiency, especially at lower insolation levels and under diffuse light.



UNI-SOLAR® solar cells are made in a roll-to-roll vacuum deposition process on a continuous roll of stainless steel sheet. The result is a unique, flexible and lightweight cell. The solar cells are arranged in a series string and encapsulated in UV stabilized and weather-resistant polymers to form PV Laminates. The polymer encapsulation includes at the front side EVA and the fluoro-polymer ETFE (e.g. TEFZEL® from DuPont).

Flexible *UNI-SOLAR*<sup>®</sup> PV-modules can be bonded to conventional metal roofing panels, single-ply membranes, and modified bitumen roofing materials or they can be fabricated into flexible roofing shingles (*UNI-SOLAR*<sup>®</sup> SHR-17). The resulting modules are exceptionally durable. By-pass diodes are connected across each cell, allowing the modules to produce power even when partially shaded or soiled. Each power module has a means of easily making the required electrical connections to create compatible system voltages. These interfaces include weather-tight, Quick Connect plugs, pre-connected to UV protected wires appropriate for all applications from simple single module requirements to high voltage grid-connected applications.

### **Higher Outdoor Performance**

*UNI-SOLAR*<sup>®</sup> products perform better than all their crystalline-silicon and other thin film counterparts under non-ideal orientations and under real outdoors conditions (higher kWh energy output per Wp installed). This enhanced performance, up to 20 % higher, can be attributed to the higher sensitivity for low light conditions and for diffuse light, better performance at high temperatures and improved shadow tolerance of *UNI-SOLAR*<sup>®</sup> products.

All solar modules are sold with their peak power performance (Wp) tested under laboratory conditions (STC conditions), i.e. under a very high and direct irradiation (1000 W/m<sup>2</sup>) of only one type of solar spectrum (AM 1.5) and under a module temperature of 25°C. In real outdoor conditions this peak power is seldom achieved, since module temperature usually is more in the range of 40-60°C when in the sun (this is especially true for modules that are building-integrated), since the occurrence of 1000 W/m<sup>2</sup> irradiation is only about 1% of total sun-hours and since the spectral content of the solar spectrum changes continuously with varying climatic conditions. Diffuse light is dominating when the sky is clouded or during mornings and evenings. In most areas of North America as well as Northern and Central Europe, the majority of solar irradiation comes from diffuse light (more than 50% of all solar irradiation) and even in the sunnier sections, the diffuse part is, on average, still 33%. Outdoor testing has shown that *UNI-SOLAR*<sup>®</sup> PV products perform 40% better at low light conditions (40-100 W/m<sup>2</sup>) than all present crystalline technologies. In North American climates, where low light conditions and diffuse light prevail, this results in 8-20 % higher yearly energy output per Wp of purchased power for *UNI-SOLAR*<sup>®</sup> products compared to all crystalline (and other thin film) technologies. In warm climates, e.g. southern US, performance and yearly energy harvest is also up to 20 % higher, in this case due to the better temperature behavior of *UNI-SOLAR*<sup>®</sup> products.

### **Quality Warranty – Proven Reliability**

*UNI-SOLAR*<sup>®</sup> modules comply with following qualification tests (CEI/IEC61646-CEC701 Certificate):

- Thermal Cycling
- Humidity-Freeze Test
- Damp Heat Test
- UV-Test
- Wet Insulation Test
- Mechanical Load Test
- Hail Impact Test
- Robustness of Terminations Test

# Large Scale *UNI-SOLAR*<sup>®</sup> PV-Installations

## POWER PLANTS:



### **500 kWp SolarMine-project**

Location: Fellows, California USA  
Owner: Texaco Exploration and Production Inc.  
Type of installation: Power Plant  
Type of modules: *UNI-SOLAR*<sup>®</sup> SSR-128  
Type of inverters: Xantrex 300 kW and Xantrex 225 kW  
Type of sub-construction: Steel Support Frames  
Year of installation: 2002  
Estimated energy yield: 2000 kWh/kWp  
Measured power: 510 kWac (one year after installation)



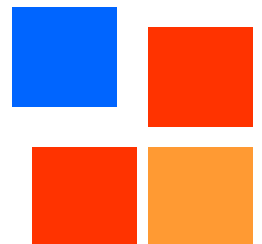
### **300 KWp Copal-Project**

Location: Grevenmacher, Luxemburg  
Owner: Copal-belle-boutique  
Type of installation: Power Plant  
Type of modules: *UNI-SOLAR*<sup>®</sup> US-116  
Type of inverters: Fronius IG-30  
Type of sub-construction: Steel/Wood Support Structure  
Year of installation: 2003-12-18  
Estimated energy yield: 900 kWh/kWp



### **199 kWp Singleton Solar Farm- stage 2**

Location: Singleton Shire, NSW, Australia  
Owner: EnergyAustralia  
Type of installation: Power Plant  
Type of modules: *UNI-SOLAR*<sup>®</sup>/Canon US-60  
Type of inverters: 4 Power Solutions Australia Inverters 50 kW  
Type of sub-construction: Steel Support Structure  
Year of installation: 1998  
Estimated yield: 1478 kWh/kWp



# Large Scale *UNI-SOLAR*<sup>®</sup> PV-Installations

## POWER PLANTS:



### 34.8 kWp Sporthalle Looren

Location: Maur, Switzerland

Owner: City Council Maur

Type of installation: Power Plant On Flat Roof

Type of modules: *UNI-SOLAR*<sup>®</sup> US-116

Type of sub-construction: Metal Profiles

Year of installation: 2002



### 20 kWp Energiparken

Location: Dommismoen, Grimstad, Norway

Owner: Agder Energi and Agder University College

Type of installation: Power Plant

Type of modules: *UNI-SOLAR*<sup>®</sup> US-64

Type of sub-construction: Steel Support Structure

Year of installation: 2000

Measured yield: *UNI-SOLAR*<sup>®</sup> panels deliver 8.7% more energy during winter days than a similar sized c-Si system (Fortum modules) in the same location

## BUILDING INTEGRATED PV-PLANTS



### 148 kWp Kogarah Town PV-roof

Location: Kogarah, NSW, Australia

Owner: EnergyAustralia

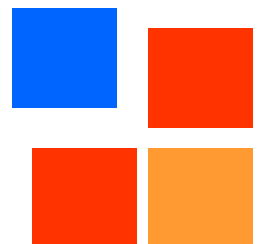
Type of installation: PV-metal roof (BIPV)

Type of modules: *UNI-SOLAR*<sup>®</sup> PVL-64/PVL-128 integrated in BHP steel panels

Type of inverters: Sun Power 2500 and 1800

Type of sub-construction: Normal sub-roof crossbeams

Year of installation: 2002





# Large Scale *UNI-SOLAR*<sup>®</sup> PV-Installations

## BUILDING INTEGRATED PV-PLANTS



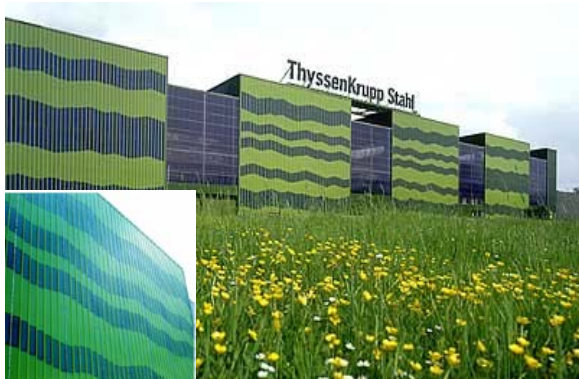
### 90 kWp VAG-Nürnberg PV-roof

Location: Nürnberg, Bavaria, Germany  
Owner: VAG Verkehr-Aktiengesellschaft Nürnberg  
Type of installation: PV-polymer roof (BIPV)  
Type of modules: Evalon<sup>®</sup> polymer roofing with integrated *UNI-SOLAR*<sup>®</sup> 22-L-B PV-laminates  
Type of inverters: Fronius Sunrise Mini  
Type of sub-construction: Profiled metal sheets with insulation board  
Year of installation: 2002  
Estimated energy yield: 830 kWh/kWp



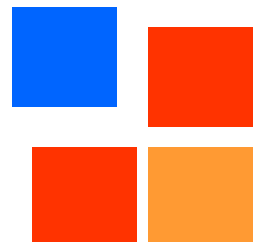
### 76 kWp UBISA PV-roof

Location: Burgos, Castilla y Leon, Spain  
Owner: Industria del Ubierna SA  
Type of installation: PV-metal roof (BIPV)  
Type of modules: *UNI-SOLAR*<sup>®</sup> PVL-64/PVL-128 on Aluzinc<sup>®</sup> coated steel panels  
Type of inverters: Fronius Sunrise Maxi  
Type of sub-construction: Normal sub-roof crossbeams  
Year of installation: 2001  
Measured energy yield: 1150 kWh/kWp



### 51 kWp ThyssenKrupp PV-façade

Location: Duisburg, NRW, Germany  
Owner: ThyssenKrupp Stahl AG  
Type of installation: PV-metal façade (BIPV)  
Type of modules: Thyssen-Solartec<sup>®</sup> metal elements with integrated *UNI-SOLAR*<sup>®</sup> 11-L and 11-S PV-laminates  
Type of inverters: SMA Sunny Boy 2500  
Type of sub-construction: Façade frame  
Year of installation: 2002  
Estimated energy yield: 642 kWh/kWp



## **UNI-SOLAR® PV-Installations**

### **BUILDING INTEGRATED PV-PLANTS**



#### **30 kW Michigan Alternative and Renewable Energy Center**

Location: Muskegon, Michigan  
Owner: Grand Valley State University  
Type of installation: PV on Membrane  
Type of modules: *UNI-SOLAR®* PVL -128  
Type of inverters: Xantrex  
Type of sub-construction: Single-ply Membrane  
Year of installation: 2003-4  
Estimated energy yield: 1025 kWh/kWp



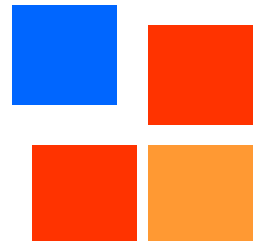
#### **30 kW Santa Monica Civic Auditorium Carport**

Location: Santa Monica, California  
Owner: Civic Auditorium  
Type of installation: PVL on Metal  
Type of modules: *UNI-SOLAR®* PVL -128  
Type of inverters: 3 Xantrex 10 kW  
Type of sub-construction: Metal Purlin  
Year of installation: 1997  
Estimated energy yield: 1244 kWh/kWp



#### **20kW Flat Roof Mount San Francisco Airport – (An RER project)**

Contact: Joseph Birrer, PE Electrical Engineer, City & County Airport Commission, SFO Int'l Airport  
Phone: 650-821-7751  
Greg McCarthy  
Phone: 650-821-5304



# Domestic *UNI-SOLAR*<sup>®</sup> PV-Installations PVL ON STEEL



## **11kW Glenmead School Building**

Location: Chino Hills, California  
Operator: Gleanmead Elementary School  
Type of installation: PV Metal Shade Structure  
Type of modules: *UNI-SOLAR*<sup>®</sup> PVL -128  
Type of sub-construction: Metal Purlin  
Year of installation: 1998  
Estimated energy yield: 1422 kWh/kWp



## **12 kW Aquinas College, Jerecki Center**

Location: Grand Rapids, Michigan  
Operator: Aquinas College Jerecki Center  
Type of installation: PV on Metal  
Type of modules: *UNI-SOLAR*<sup>®</sup> PVL-64  
Type of inverters: 3 Omnion 4 kW  
Type of sub-construction: Standard Roof Deck  
Year of installation: 1999  
Estimated energy yield: 134 kWh/kWp



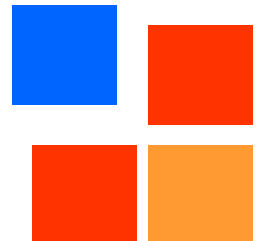
## **10 kW Building Integrated Electric Solar Shingles Oakland University, Community Center**

Oakland County, Michigan  
Contact: Jim Leidel - Energy Manager, Oakland University  
Phone: 248-370-4990  
Email: leidel@oakland.edu



## **10kW Mendoza School Building**

Imperial Beach, California  
Contact: Frank Villagrana  
Phone: 619-628-3590





# Domestic *UNI-SOLAR*<sup>®</sup> PV-Installations PVL ON STEEL



## **5.3kW University of California and Southern California Edison Standing Seam Metal Roof**

Irvine, California

Contact: Richard Hack, Facilities Manager

Advanced Power and Energy Program

Phone: 949-824-5950 x122



## **5kW Employee Lunch Shelter**

Valencia, California



## **5.5kW The Nature Conservancy Disney Wilderness Preserve**

Location: Kissimmee, Florida

Operator: The Nature Conservancy, Disney Wilderness Preserve

Type of installation: PV on Metal Roof

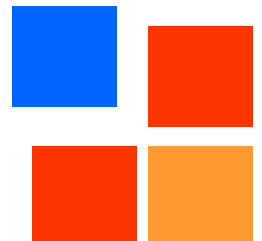
Type of modules: *UNI-SOLAR*<sup>®</sup> PVL-128/PVL-64

Type of inverters: Xantrex/ Trace SW4048

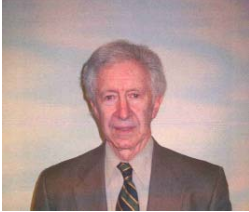
Type of sub-construction: Standard Roof Deck

Year of installation: 2001

Estimated energy yield: 1347 kWh/kWp



- **Dr. Richard Blieden**



Dr. Blieden is Director of Government and International Sales at United Solar Ovonics, LLC, a wholly owned subsidiary of Energy Conversion Devices, Inc (ECD). He has been working in the field of alternative energy technology development and commercialization for thirty years.

At United Solar and at ECD, he has been responsible for establishing sales of Uni-Solar Photovoltaic (PV) products and systems worldwide.

He has promoted and managed innovative applications of PV, such as the world's first 500 kW triple junction solar system for pumping petroleum in Kern County, California.

Dr. Blieden was Vice President of ARCO Solar, Inc. and was responsible for strategic planning for solar electric technologies at the Atlantic Richfield Company where he identified Energy Conversion Device's amorphous silicon technology as the most promising direction for commercial success. He organized and directed the first USA National Program for Terrestrial Applications of Photovoltaic Technology at the National Science Foundation, and directed the Office of Solar Electric Applications at the U.S. Energy Research and Development Administration. Dr. Blieden is a leading authority on solar electric applications worldwide and has been recognized for his pioneering work in the field. He has served on the Board of Directors for the Solar Energy Industries Association (USA) as Vice Chairman of the Photovoltaic Division.



United Solar Ovonics, LLC  
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Website: [www.uni-solar.com](http://www.uni-solar.com)

April 12, 2006

Mr. Bryan Zaplitny  
MTI Energy Management/Lighting Specialists  
7627 Park Place  
Brighton, MI 48116

Dear Bryan,

About United Solar Ovonics...

*Throughout the world, the combination of the price of electricity, available free sunshine and incentives offered by governments now position photovoltaic (PV) systems as attractive investments. Once considered to be too expensive an option, today's PV systems produce electricity that has a quantifiable cash value.*

*United Solar Ovonics is the world leader in thin-film amorphous photovoltaics (PV). Our high volume production equipment is the world's largest and most advanced for the manufacture of thin-film amorphous-silicon alloy solar cells. Because of characteristics unique to the United Solar Ovonics solar cell technology, such as lightweight, ruggedness and flexibility, it is ideal as building-integrated photovoltaic (BIPV) roofing systems for residential and commercial customers.*

*United Solar Ovonics has two 25 MW annual capacity manufacturing plants in Auburn Hills, Michigan that offer solar panels to the market for a wide range of applications. In order to strengthen our position in the rapidly growing market for solar power systems, our goal is to expand our manufacturing capacity to 300 Megawatts by 2010. The first phase of this expansion plan will include construction of a third manufacturing facility with an annual capacity of 50 Megawatts, located in Greenville, Michigan.*

Additional information is available at <http://www.uni-solar.com>.

Please contact me if you have any questions.

Best regards,

Richard Blieden  
Director Government & International Sales  
United Solar Ovonics, LLC

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