

# **SOLAR RESOURCE GUIDE**

**Wisconsin Center for Demand Side Research**

**January 23, 1994**

**Prepared by:**

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The Solar Resource Guide was prepared for the Wisconsin Public Utilities AP7 Solar Task Force by a graduate student under the direction of Professor John Mitchell, Solar Energy Laboratory, University of Wisconsin-Madison. The information contained in this report is to be freely distributed among all contributing parties.

In addition to this document, business, product, and solar organization information are available in a computerized database. This information was collected and compiled between July 1993 and January 1994. All prices contained within the database are subject to change without notice. Some supplemental business and product information is available from the author.

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## Executive Summary

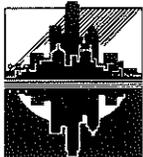
The Solar Resource Guide was developed to provide a common data base to aid Wisconsin Utilities in planning. This document contains information on manufacturers and distributors of solar products, specific product data, and contact information for organizations involved with solar energy. The database is divided into three main categories: Businesses, Products, and Organizations. To aid the reader in quickly obtaining specific business and product data, two reference charts are provided at the beginning of the appendices. Detailed explanations of how to locate entries are given in the **Businesses**, **Products**, and **Solar Organizations** sections of the report.



The report itself contains two other sections. The first of these, titled **System Prices for Solar Domestic Hot Water** provides a price list and graphical price comparison of some residential water heating systems. These retail prices range from \$1600 to \$4599. This section also gives a brief description of the four main types of solar water heating systems that are available on the market: Forced Circulation, Integral Collector Storage (ICS), Thermosyphon, and Self-Pumping. Detailed product entries for systems used in the price comparison can be found in Appendix D: Products.

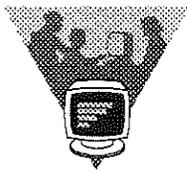


The second section, titled **Strategies for Solar Commercialization and Investment** highlights three proposals submitted by solar manufacturers. The first selection is **Commercialization of Large Scale Industrial Solar Thermal** and was submitted by Rick Fossum, president of Sun Trapper Solar Systems, Inc.. The second selection, from Les Hamisaki, president of Sun Utility Network, Inc., is titled **Solar Investment Strategy**. The final selection, **Specific Points of Interest with Respect to Solar Water Heating**, was received from Christel D. Bieri, Vice President of Marketing at Heliodyne, Inc. . These articles provide a representation of the ideas and concerns of today's solar manufacturers.



The appendices of this document contain specific information about manufacturers, distributors, organizations, and products. Business data is provided in multiple formats to allow the reader easy access to desired information. The **Businesses** section features a summary of the formats, as well as an example of a typical business entry. The first business references are found in Appendix A. This appendix contains alphabetized listings of companies have products certified by the Solar Rating and Certification Corporation. Appendix B is a quick reference chart. This chart furnishes a complete inventory of all businesses in the database. The final section devoted primarily to business information is Appendix C: This appendix contains addresses, phone and fax numbers, contact persons, and a variety of other data.

## Introduction



The Solar Resource Guide was developed to provide a common data base to aid Wisconsin Utilities in planning. It is also intended to demonstrate that solar technology is available for implementation in Wisconsin. A common misconception is that, because of our harsh winters and overcast periods, solar energy is not a viable alternative. Many systems have been installed - cost effectively - in conditions much worse than those typically found in Wisconsin.

One of the most cost effective areas for solar implementation is new construction. If a family is planning to build in a remote location, solar energy should definitely be considered as an option. With a combination of energy efficient appliances, photovoltaics, and solar domestic hot water, a household can be virtually energy independent. Even in non-remote locations, solar systems can provide clean, reliable energy year round.

Consider a single family home with four occupants. The family would like to build in a location that is not yet serviced by the local utility. They are also weighing the possibility of installing a pool in the back yard. After some deliberation, they decide to live "off the grid", i.e., without paying for the utility to extend transmission lines to their home. They contact their local distributor to obtain information on how to design and size their system.

The first of their energy needs is electricity. They decide on a combination of DC (direct current) and AC (alternating current) appliances. The basic units of their photovoltaic system include: 12 Solarex MSX-60 solar panels; a 24 volt, 2500 watt Trace inverter; panel mounts; backup batteries, and other electrical equipment. Because they have decided on a combination system, they also select a Sunfrost DC refrigerator. To provide hot water for their home they purchase a Copper Cricket solar hot water system with natural gas backup. After looking at available pool heating options, they choose Heliocol HC-50 solar pool panels. They complete their energy package with compact fluorescent lighting and other energy efficient appliances. These systems represent a considerable investment, but they had already accepted the responsibility of building a home. Solar energy provides them with a clean, relatively low maintenance energy source.

Although this scenario may seem unrealistic to some people, more and more households are choosing solar energy. Many distributors have cited an increase in demand during recent years, even without tax credits. As we advance into the next century, demand side measures will play an increasingly important role in energy availability. It is hoped that this reference will be a useful tool for those interested in developing our solar resource.



## System Prices for Solar Domestic Hot Water



Many different types of solar water heating systems are available on the market today. In general, all solar heating systems fall into one of these four categories.

1. **Forced Circulation** or “active systems” are those that use a pump to circulate the water or other fluid from the collector where it is heated by the sun to the storage area where it is kept until you need it.
2. **Integral Collector Storage (ICS)** systems, or “batch” water heaters, combine the collector and the storage tank into one. That is, the sun shines into the collector and strikes the storage tank directly, heating the water.
3. **Thermosyphon** systems have a separate storage tank located above the collector. Liquid (which could be water or an antifreeze solution) warmed in the collector rises naturally to the storage tank where it is kept until needed.
4. **Self-Pumping** systems are those which use a phase change (liquid-vapor) or other passive means to cause the fluid in the collector to circulate and transport heat from the collector to the storage.

The ICS, thermosyphon and self-pumping systems are often called “passive” solar system because they do not use mechanical energy to move the heated water [SRCC Handbook 1993]. Given on the following page are price comparisons for some typical systems. Detailed information on these systems can be found in Appendix D: Products.

## Strategies for Solar Commercialization and Investment



Many misconceptions about the reliability and cost of solar energy exist in the marketplace today. Even where there is an interest in developing solar resources, high initial costs often make this development difficult. In response to these concerns, the solar industry has gone through many changes. In the last twenty years they have made their products more cost effective, reliable, and efficient. Along with improved product quality, many companies have refined marketing techniques for large scale implementation in both the residential and industrial sectors. This section of the report highlights some suggestions and comments from companies represented in the database.

The first selection is from Rick Fossum, President of Sun Trapper Solar. Sun Trapper Solar Systems, Inc. has been manufacturing, designing and installing their own patented products since 1978. In the early 80's they had a small manufacturing facility in Minnesota, but when the tax credits were eliminated the solar industry declined rapidly, and the facility was sold. This facility did, however, allow them to gain valuable experience operating and installing systems in harsh northern climates.

### Commercialization of Large Scale Industrial Solar Thermal

It has been our experience that tremendous energy savings with maximum environmental benefit can be obtained through the implementation of solar thermal industrial process heat. We at Sun Trapper have designed and built prototype systems of this magnitude that have operated flawlessly for up to ten years. Our first commercial system was installed on an apartment complex eleven years ago and is still operating perfectly with the original collectors, tank, heat exchanger, pump and control. Since that date we have installed over a dozen similar systems and continue to maintain a flawless track record with our large scale solar designs.

Our original design concept using gravity drain-back for freeze protection, elimination of time build-up, and non-pressurized collector loop has proved to be the most successful and fail safe system design ever achieved in the solar industry. Our largest solar thermal system to date using this design installed at the Santa Rosa Hospital located in San Antonio, Texas. This system has never had a service call or any maintenance done since it was installed in 1990, over three years ago, and has continued to generate over 12,000 gallons of hot water per day, a track record that the best boiler system could not achieve.

The energy impact of this large industrial system equates to at least the energy used by 120 residential homes using approximately 100 gallons of hot water per day. If serious energy reductions are our goal these large industrial applications of solar thermal are the most practical target area to achieve maximum energy savings. It has been our experience that in designing systems for schools, hospitals, hotels, prisons, apartment complexes and swimming pools we find that they all have a common pay-back of three to five years. This would

C. Pre-engineered shelf stock commercial systems that engineers, architects, designers, can use and incorporate into new and existing buildings that are proven can cost effective.

D. Long term low interest financing for renewable that would make them attractive to everyone. Not a give away program, but one that would help consumers defray the up-front costs. An example of this would be an average homeowner that had their water heater go out and needed a replacement. If this person bought a conventional replacement it would cost \$350 up front and they would pay (present day) \$35 - \$75 per month for the energy used by this appliance. If this same person had a choice and could purchase a solar water heater for the same up front cost and almost no monthly energy cost they would choose the solar every time. Unfortunately the solar system costs more because of the nature of the components needed to collect the free energy, but if an energy loan were available with a fixed monthly payment less than the expected energy costs and with a warranty good throughout this payment period would this not be the way to go? Yes, the homeowner would make money and so would the person/company who collected, labor revenues and tremendous income potential of exporting renewable energy products.

We at Sun Trapper Solar have been manufacturing in San Antonio, Texas since 1978 and have installed over 5,000 solar systems during that period. Our proudest contribution to the solar industry is when our satisfied customers claim that they have paid for their children's education with the savings from a Sun Trapper solar system. In the past 15 years we have installed over a dozen large commercial systems and in doing so have gained the experience necessary to patent the most state of the art system on Santa Rosa Hospital in San Antonio, Texas. This installation has received notoriety from many sources and has lead to inquiries from many foreign governments.

We are presently involved in three major commercial contracts outside the U.S. directly attributable to the Santa Rosa Hospital demonstration project of the Governors' Energy Office. These projects will bring in foreign revenue and stimulate the renewable energy awareness worked wide. These new revenue sources should be expanded and be a major income producer for the State of Wisconsin. We at Sun Trapper Solar are seriously committed to our motto "Shaping Our Solar Future".

#### WHAT IT WILL COST

A. Demonstrations can be done through existing building improvement funds, and will go a long way to improve solar energy's negative image. In studies of Schools, Prisons, and Hospitals it is obvious that the taxpayer burden is heavy and getting worse. In 1993 Sun Trapper Solar and Chet Buford the Energy Manager for the Texas Prison System completed a detailed energy study that included several operating prisons. The results of this study indicated that with the unique design of a Sun Trapper solar system the average cost installed in a prison could be paid back within as little as three years. The money saved in these areas will get serious attention and prove to the public a new and positive direction that solar is cost-effective, durable and has a short term pay-back through energy savings.

## Solar Investment Strategy

SUN Utility Network, Inc. (SUN) is proposing an innovative, large scale, **Pilot Demonstration Solar Utility Domestic Hot Water (SUDHW) Lease Program** for seniors and low income rate payers. This program will lower the overall cost of your solar program and provide an economic stimulus to the local economy.

SUN believes that DSM solar rebate and state tax credit programs are mainly targeted to those who can take advantage of these incentives, most senior citizens on fixed incomes and low income households would not benefit from such programs. SUN's pilot program is a solar lease program with no up front cost to the households, but with a low ongoing service fee that will come a portion of the energy savings.

### **How will this Pilot Demonstration SUDHW Lease Program reduce cost?**

SUN has designed a cost effective private/public partnership financing strategy by optimizing the use of funds from both the investor owned utility and government. In addition, this program will drastically reduce marketing cost, provide economies of scale on hardware cost, and reduce installation time and cost.

- **Marketing cost**

Many utilities have special programs for senior citizens, therefore, are best qualified to market and qualify senior citizens for the lease program. The qualified low income customer would pay no up front cost for the installation. The only cost would be a monthly service fee.

Currently, the marketing cost through a solar dealer network is equivalent to the cost of the solar collector. Since the utility has the confidence and list of electric water heater rate payers, and since it is a voluntary program, the utility would be the logical entity to provide the marketing service at minimal cost to them.

- **Hardware cost**

The utility has the financial resources to enter into a multi-year commitment for a bulk hardware purchase program. In contrast, most local solar contractors do not have the resources to make a large volume commitment. Furthermore, with the backing of the State or local government for a low interest Industrial Development Bond (IDB) to further reduce the interest cost of the purchase, the utility would be a better risk. The rationale for using the IDB for financing the SUDHW is that this project will become the economic stimulus by creating jobs from savings generated by the reduced utility bills.

- **Installation cost**

Federal entitlement programs such as DOE's Solar Weatherization Assistance Program and HUD's Community Development Block Grant have funds which are targeted to seniors and low income households. These funds should be used for manpower training and installation portion of the project. To further reduce installation cost, these solar

cooperation would be essential in packaging the installation portion of the SUDHW program for Wisconsin.

### **What are the benefits of a SUDHW program?**

The Pilot Demonstration SUDHW Program will:

- strongly enhance WPSC's DSM program by managing and reducing peak load demand;
- help senior citizens and low income rate payers reduce their electric bills;
- provide an economic stimulus, created by the multiplier effect of these utility savings being spent within the local community; and
- empower the local community through job training and creation of local jobs;

In addition, the implementation of this proposal could provide an investment catalyst to establish a strategic, diversified solar products industry for the State of Wisconsin.



The final selection is from Christel D. Bieri, Vice President of Marketing at Heliodyne, Inc. . Heliodyne was founded in 1976 and became a California Corporation on December 3, 1976. Heliodyne's early use of closed loop system design led to the first mechanical and control modules on the market (1977). Other innovations include the development of special collector unions (1980); Flo-Thru support fixture, which was patented (1982); integral collector mounting; and the first UL listed plug-in solar energy appliances.

Heliodyne has also been a pioneer in systems approach, with a particular focus on closed loop systems. Helio-Pak heat transfer appliances cover a wide range of applications, from residential hot water to industrial applications. Special appliances are designed for radiant floor heating and indirect pool heating.

### **Specific Points of Interest with Respect to Solar Water Heating**

Addressing the subject of solar water heating, please note the following important points:

1. Production Capabilities are not a Limiting Factor.

All public agencies consistently underestimate the capabilities of production of the current solar energy industry. There are few of us manufacturers left, but we have produced on a much larger scale in the past and can readily gear up again and go far beyond previous levels. Others are waiting on the side-lines to reenter the market

2. Maturity of the Products. Another area of underestimation.

## Businesses



The appendices of this document contain specific information about manufacturers, distributors, organizations, and products. Business data is provided in multiple formats to allow the reader easy access to desired information. This section features a summary of the formats, as well as an example of a typical business entry.

The first business references are found in Appendix A. This appendix contains alphabetized listings of companies have products certified by the Solar Rating and Certification Corporation. The SRCC provides testing for both collectors and water heating systems. (For more details about SRCC certification, please see their entry in Appendix E: Solar Organizations.) These listings contain company names only, complete references are found later in the document.

Appendix B is a quick reference chart. This chart furnishes a complete inventory of all businesses in the database. Each business name appears alphabetically on the left hand side of the diagram. Along the top of the diagram is a catalogue of specific areas within the solar industry. To determine what area a company specializes in, one simply locates their name on the chart and cross references the areas marked in that line with descriptions at the top of the page. The majority of the companies featured are manufacturers, but several distributors are also included. They can be recognized by checking the second column from the right, marked "Distributor". The last column indicates Solar Energy Industry Association status.

Within the matrix itself there are two types of entries. The solid circle, "●", indicates that the business manufactures the product or provides the service. The open circle, "○", indicates that some specific product and/or business information is available in the database.

The final section devoted primarily to business information is Appendix C: This appendix contains addresses, phone and fax numbers, contact persons, and a variety of other data. A sample business entry is provided below, along with short explanations of each field.

*{Each entry begins with a summary of contact information}*

**Business Name:** American Solar Network, LTD  
**Address:** 5840 Gibbons Drive, Suite H  
Carmichael, CA 95608  
**Phone:** (916)481-7200  
**Toll Free:** (none available)  
**Fax:** (916)481-7203  
**Contact Person:** Al Rich, President

**Manufacturer:** Yes    **SEIA Member:** Yes

*{This field lists Wisconsin distributors named by the manufacturer, if any. If none are available then information is given about the company's views on establishing Wisconsin sales.}*

**Dealers & Distributors:** If a good market starts up in Wisconsin, ASN would probably start up a division here. In general, ASN sells factory direct primarily to the residential retrofit and new construction market.

*{Any information not covered in the other fields is shown here. This section often contains general product information, company projects, or marketing techniques.}*

**Other Information:** ASN's primary market is the SMUD program and much has been learned from this experience. Their primary focus is to serve the needs of the utilities and ASN is sensitive to their needs. In general, when it comes to a successful solar program, good financing is everything. ASN's greatest challenge with the SMUD solar program has been a very inconsistent program with slow approvals and slow payment. Many errors were made on both sides in getting the program going but this hard earned seasoning has resulted in much greater understanding and a better program. A major focus is the quality of the installation and the SRCC OG300 program, which ASN was the Beta case for, has been very important in this process.

In addition to the national DOE Award for Energy Innovation, ASN received a \$100,000 DOE Energy Related Inventions Program (ERIP) Grant. ASN is using the money to refine the solar storage system with the goal of reducing the cost per gallon of storage in half while more than doubling the life expectancy. (Source: personal correspondence with Al Rich)



*{The price listed in the unit price field is normally accompanied by a brief explanation in the Other Information field. This explanation often includes wholesale pricing and source of pricing data. If no source is listed, the pricing shown is factory direct from the manufacturer. Also provided in the Other Information field are product details that were not included in the Product Description. These include: typical applications, warranties, listing of system components, maintenance schedules, and other topics of interest.}*

**Unit Price:** \$930.00

**Other Information:** Price shown is list price. Bulk prices are as follows:  
1-5 collectors--\$433.00, 6-19 collectors--\$412.00, 20+ collectors--\$391.00.  
10 year limited warranty

*{The final field lists the sources of the product information. Although the majority of product literature was obtained directly from the manufacturers, some was provided by distributors and the SRCC Handbook.}*

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog 1993



## References

Bieri, C. , V.P. Marketing, Heliodyne, Inc. Letter to the author, 13 August 1993

Directory of Solar Manufacturers and Services. 1993. *Solar Industry Journal*.  
First Quarter 1993, v4, issue 1.

Fossum, R. , President, Sun Trapper Solar. Letter to the author, 18 January 1994

Hamasaki, L. , President and CEO, Sun Utility Network, Inc. Letter to the author,  
11 January 1994

Solar Energy Industry Association. 1993. Directory of the U.S. Solar Thermal Industry.

Solar Energy Industry Association. 1993. Directory of the U.S. Photovoltaic Industry

Solar Rating and Certification Corporation. 1993. Directory of SRCC Certified Solar  
Collector and Water Heating System Ratings. Washington, D.C.

The PV Network News. 1993. Solar Electricity Today.

**APPENDIX A: LISTINGS OF SRCC RATED COMPANIES**

**Alphabetical List of Companies**  
(Taken from SRCC Catalog 1993)

**CERTIFIED SOLAR COLLECTORS**

American Energy Technologies	Radco Products, Inc.
American Solar Network, Ltd.	SOLMAX
Heliocol USA, Inc.	SunEarth, Inc.
Heliodyne, Inc.	Sunsiaray Solar Mfg., Inc.
Kimex International Technologies	SunTrapper Solar
Nippon Electric Glass America, Inc.	Thermo Dynamics, Ltd.

**OG 300 CERTIFIED SOLAR SYSTEMS**

FAFCO, Inc.	Sage Advance Corporation
Kimex International Technologies	Solarhart, USA
Nippon Electric Glass America, Inc.	Thermo Dynamics, Ltd.

**OG 300 CERTIFIED SOLAR SYSTEMS**

American Solar Network, Ltd.	Sage Advance Corporation
FAFCO, Inc.	Solarhart, USA
Heliodyne, Inc.	SOLMAX
Nippon Electric Glass America, Inc.	SunEarth, Inc.









**APPENDIX C: BUSINESSES**

**Business Name:** 3M Company  
**Address:** 3M Center, 260-5S-15  
St. Paul, MN 55144  
**Phone:** (612)733-2649  
**Toll Free:** (none available)  
**Fax:** (612)736-3893  
**Contact Person:** Roger Appeldorn

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Advanced Photovoltaic Systems Inc.  
**Address:** 195 Clarksville Road  
Lawrenceville, NJ 08648  
**Phone:** (609)275-5000  
**Toll Free:** (none available)  
**Fax:** (609)275-0599  
**Contact Person:** Omi Walden

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** AHS Energy Supply, Inc.  
**Address:** 1630 North 63rd Street  
Boulder, CO 80301  
**Phone:** (303)447-9193  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Greg Jankowski

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Alternative Power & Light Co.

**Address:** 701 S Main  
Westby, WI 54667

**Phone:** (608)634-2984

**Toll Free:** (none available)

**Fax:** (none available)

**Contact Person:** Gunars Petersons

**Manufacturer:** No **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** Copper Cricket  
Exeltech Inverters  
Heart Inverters  
Heliotrope CC20 Charge Control  
K51 PV Module  
LA551J63 PV Module  
MSX High-Power Modules  
MSX Low-Power Modules  
MSX Mid-Range Modules  
MSX-Lite Modules  
Powerstar Inverters  
Siemens M55 / M45 PV module  
Siemens M65 / M35 PV module  
Siemens M75 / M40 PV module  
Trace Controllers  
Trace Inverters w/ Charging Option  
Trace Inverters w/o charging Option  
Uni-Solar MBC-525,-262,&-131  
Wattsun Solar Trackers  
Zomeworks Track Rack

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:** Mostly retrofit units. Mostly residential customers.

**Residential Information:**

**Public & Private Projects:**

**Business Name:** American Energy Technologies, Inc.  
**Address:** POB 1865  
Green Cove Springs, FL 32043  
**Phone:** (904)284-0552  
**Toll Free:** (none available)  
**Fax:** (904)284-0006  
**Contact Person:** William T. Guiney

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** AE-32 Black Chrome Collector,  
AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector  
MSC-40 Black Chrome Collector  
MSC-MH Standard Mount

**Products Distributed:** AE-32 Black Chrome Collector,  
AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector  
MSC-40 Black Chrome Collector  
MSC-MH Standard Mount

**Company Formation:** Since 1977 American Energy Technologies, Inc. (AET) and its subsidiaries have been pioneers in the solar industry in the U.S. A. AET has installed over 500,000 collectors worldwide through its international network of dealers, distributors, and agents.

3. Eagle Sun Systems are available for residential, commercial, and industrial applications. The staff of AET includes engineers, accountants and managers thoroughly familiar with all facets of design and economic analysis assuring the most appropriate system for the application yielding long term performance and maximizing the return on investment of the solar system. Eagle Sun Systems meet or exceed all applicable national, state and local solar water heating codes. Eagle Sun systems exceed HUD February 1991 solar standards and have been the choice of major home builders such as Centex Homes Inc. and U.S. Homes.

In addition to engineering and design services for the commercial sector, AET offers on site project management. AET will guarantee the thermal performance of Eagle Sun systems, when designed and installed under supervision by AET personnel.

In 1991, AET introduced its Micro-Utility Program (MUP). The MUP is a sale-of-energy program targeting large commercial and industrial applications. When a site is deemed appropriate for a solar thermal system, AET will install the optimal system of the facility at no cost to the business owner. Energy produced by the solar system is sold to the business owner at a rate (10%-20%) less than that of the present conventional fuel cost. The business owner has no risk while lowering his operating cost. AET owns, operates and maintains the solar system during the period of the sale-of-energy agreement, generally 7-10 years. Contact AET for additional information.

The MUP has at its heart a proprietary software system, AMUMS, developed by AET. AMUMS is utilized to analyze the existing load and load profile in an existing business as well as acting as the brain of the installed system controlling the systems operation and measuring with a high degree of accuracy and reliability the BTU output of the solar system. The MUP incorporates F-Chart simulation software and Transis software developed by the University of Wisconsin and SAS-Y-B, a solar sizing program licensed from Siemens Solar of the U.S.A. and Germany.

MUP is expected to become a valuable tool for AET's distributors in the U.S.A. to enter into the commercial and industrial market segments.

4. Manufacturing Technology by AET yields high output, low labor input and maximum utilization of raw materials and low energy consumption within its process. AET's state-of-the-art manufacturing process has undergone 17 years of continual engineering resulting proprietary manufacturing technologies and equipment unique to AET.

5. Ground Water Remediation: Under exclusive license from the University of Florida, AET entered the waste water clean-up industry early in 1993. The process called SOLTOX is the first commercially available solar technology for ground water and industrial effluent waste decontamination. The first SOLTOX demonstration collector reactors were shipped to Tyndall AFB, Pensacola, Florida in May 1992. AET is presently ramping up its manufacturing tooling and process to meet the full marketing/sales potential of SOLTOX early in 1994.

6. Research and Development: The R&D department consists of professional engineers, researchers and managers exploring new product development in the solar thermal field.

**Other Information:** ASN's primary market is the SMUD program and much has been learned from this experience. Their primary focus is to serve the needs of the utilities and ASN is sensitive to their needs. In general, when it comes to a successful solar program, good financing is everything. ASN's greatest challenge with the SMUD solar program has been a very inconsistent program with slow approvals and slow payment. Many errors were made on both sides in getting the program going but this hard earned seasoning has resulted in much greater understanding and a better program. A major focus is the quality of the installation and the SRCC OG300 program, which ASN was the Beta case for, has been very important in this process.

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**Business Name:** Ananda Power Technologies, Inc.  
**Address:** 14618 Tyler Foote Road  
Nevada City, CA 95959  
**Phone:** (916)292-3834  
**Toll Free:** (none available)  
**Fax:** (916)292-3330  
**Contact Person:** Jeff Rice

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Apro Tech Energy Management

**Address:** RT Box 77A  
Chaseburg, WI 54621

**Phone:** (608) 483-2064

**Toll Free:** (none available)

**Fax:** (none available)

**Contact Person:** Spark Burmaster

**Manufacturer:** No    **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** Distributor -- Featured in Solar Electricity Today Catalog.

**Business Name:** Array Technologies, Inc.  
**Address:** POB 751, 614 2nd Street, SW  
Albuquerque, NM 87103  
**Phone:** (505)242-8024  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Ron Corto

**Manufacturer:** No **SEIA Member:** Yes

**Products Manufactured:** (none)

**Products Distributed:** Wattsun Solar Trackers

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** AstroPower, Inc.  
**Address:** Solar Park  
Newark, DE 19716-2000  
**Phone:** (302)366-0400  
**Toll Free:** (none available)  
**Fax:** (302)368-6474  
**Contact Person:** Allen Barnett/Bill Bottenberg

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none)

**Products Distributed:** Wattsun Solar Trackers

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Bandow's Wood, Wind & Water  
**Address:** RT 3 Box 3329  
Hayward, WI 54843  
**Phone:** (715) 634-8515  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Mike Bandow

**Manufacturer:** No **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** Distributor -- Featured in Solar Electricity Today Catalog.

**Business Name:** Best Energy Systems

**Address:** POB 280  
Necedah, WI 54646

**Phone:** (608)565-7200

**Toll Free:** (none available)

**Fax:** (none available)

**Contact Person:** (none available)

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** Have been making inverters and UPS systems for years. Featured in Solar Electricity Today catalog.

**Business Name:** Blue Ridge Ind. Develop. Group  
**Address:** Blue Ridge Industrial Development Group  
POB 10864, Pittsburgh,PA 15326  
**Phone:** (813)371-0139  
**Toll Free:** (none available)  
**Fax:** (813)922-7919  
**Contact Person:** Thomas McCoy

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Burns-Milwaukee, Inc.  
**Address:** 4010 West Douglas Avenue  
Milwaukee, WI 53209  
**Phone:** (414)438-1234  
**Toll Free:** (none available)  
**Fax:** (414)438-1604  
**Contact Person:** Thomas J. Burns

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Cell Energy  
**Address:** 3190 B Orange Grove Avenue  
North Highlands, CA 95660  
**Phone:** (916)484-4974  
**Toll Free:** (none available)  
**Fax:** (916)484-1415  
**Contact Person:** Mac McClure

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Cummins Power Generation, Inc.  
**Address:** Box 3005-Mail Code 60125  
Columbus, IN 47022  
**Phone:** (812)377-3743  
**Toll Free:** (none available)  
**Fax:** (812)377-3334  
**Contact Person:** Jerome Davis

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Energy Concepts Company  
**Address:** 627 Ridgely Avenue  
Annapolis, MD 21401  
**Phone:** (410)266-6521  
**Toll Free:** (none available)  
**Fax:** (410)266-6539  
**Contact Person:** Donald C. Erickson

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** EPV - Energy Photovoltaic  
**Address:** POB 7456  
Princeton, NJ 08543  
**Phone:** (609)452-1155  
**Toll Free:** (none available)  
**Fax:** (609)452-1811  
**Contact Person:** Zoltan J. Kiss

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** FAFCO SOLAR  
**Address:** 901 SE 13th Place  
Cape Coral, FL 33904  
**Phone:** (813)574-1500  
**Toll Free:** (none available)  
**Fax:** (813)574-6198  
**Contact Person:** Daniel Morrissey

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** FAFCO Solar Water Heater 444 A

**Products Distributed:** FAFCO Solar Water Heater 444 A

**Company Formation:**

**Business Certifications:** SRCC OG 200, OG 300

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Heart Interface  
**Address:** 811 South First Ave.  
Kent, WA 98032  
**Phone:** (206)854-0640  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** (none available)

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** Heart Inverters

**Products Distributed:** Heart Inverters

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

manufacturer to offer a full 10 year, non-prorated warranty. Heliocol is still the only solar pool panel on the market that has a full ten year warranty that covers both panels and labor.

In 1992, Heliocol, through its worldwide network of distributors, sold more solar swimming pool panels than any other solar collector manufacturer. Well over 1,500,000 sq.ft. of product was sold in the United States alone. Presently, almost 5,000 sq.ft. of Heliocol panels are installed daily.

**Business Certifications:** SRCC Solar Collector Certification ASHRAE 3-77, Solar Collector Testing IAPMO listing, collector Certified by City of Los Angeles, collectors UL HELIOPAK DW CL  
Wind load certification, collectors, hardware

**Type of Construction/Installation:** New construction, retrofit, custom design

**Residential Information:** Thousands of water heating systems, numerous home heating projects, large number of pools.

Some examples of Heliodyne Gobi collector projects (parentheses indicate the number of collectors):

Public Housing Projects - Solar Hot Water:

Mayor Wright Housing, Honolulu (606)

Farm Labor Housing, Gilroy (3)

Farm Labor Housing, Salinas (10)

Apartments, Townhouses - Solar Water Heating:

Ellison Scott Apartments, Oakland (215)

Mission Creek, Fremont (16)

Fair Oaks Village, Sunnyvale (335)

Quiet Village, Fremont (82)

Corinthian Villas, Mill Valley (49)

**Public & Private Projects:** Many large projects with multiple collectors, space heating, hot water, and pool heating, located predominantly in California.

Some examples of Heliodyne Gobi collector projects (parentheses indicate the number of collectors):

Schools, Universities, Cities, Clubs - Solar Pool Heating:

California State University, Sacramento (40)

Medocino Coast Recreation Center, Fort Bragg (28)

City of El Cerrito Recreation Center (177)

Schools, Universities, Cities - Solar Hot Water, Space Heating: University of California, Davis (825)

University of California, Santa Barbara (723)

St. Mary's College, Moraga (63)

US - Government - Solar Pool Heating:

Marine Logistics Base, Barstow (67)

Mare Island Shipyards, Mare Island (80)

Heliodyne's machined brass Dyn-O-Seal unions with captive O-ring, specifically designed for the special demands of solar collectors and systems, have also found a wide range of applications outside the solar industry.

Design services: Heliodyne design services include typical design data and plumbing schematics made available to specifiers and installers. In addition, Heliodyne has developed a series of unique and valuable design tools, such as: GOBI SLIDE RULE, COMMERCIAL SIZING CHARTS, DESIGN MANUALS, CALIFORNIA TITLE 24.

**Business Name:** Independent Energy Inc.  
**Address:** POB 1305, 42 Ladd Street  
East Greenwich, RI 02818  
**Phone:** (401)884-6990  
**Toll Free:** (none available)  
**Fax:** (401)885-1500  
**Contact Person:** Fred Bootz/Gib Conover

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Int'l Prod. & Tech. Exchange, Inc.  
**Address:** International Product & Technology Exchange, Inc.  
1 Wood Lake Drive  
Piscataway, NJ 09954  
**Phone:** (908)463-1220  
**Toll Free:** (none available)  
**Fax:** (908)463-1221  
**Contact Person:** Kidamdi Raghunathan

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Johnson Controls, Inc.  
**Address:** Specialty Battery Division  
900 East Keefe Avenue  
Milwaukee, WI 53212  
**Phone:** (414)961-6502  
**Toll Free:** (none available)  
**Fax:** (414)961-6506  
**Contact Person:** Jim Winistorfer

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Kipp & Zonen  
**Address:** Division of Enraf-Nonius Co.  
390 Central Avenue  
Bohemia, NY 11716  
**Phone:** (516)589-2885  
**Toll Free:** (800)645-1025  
**Fax:** (516)589-2068  
**Contact Person:** Joseph Carlin

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Other Information:** They specialize in making very reliable solar power modules with very little output variation. The vendor states that modules can be installed on a rack straight from the box with no matching of similar output modules required.

Their most popular product is the LA51 (51 watts) which is used in most stand alone applications. For grid connected systems, the LA63 (63 watt) or the LA102 is preferred.

Kyocera's standard (10x10cm) polycrystalline cells are 14.2% efficient. Our laboratory is working toward 17% efficient cells during the next two years (presently at 16.4% on 15x15cm cells).

The Kyocera modules are cost competitive with the other major manufacturers. This has been demonstrated by the fact that of the 5+MW shipped last year, approximately one third was sold in the Americas, one third in Europe, and one third in Asia.

At present, they have capacity for 6MW per year and they have budgeted an increase to allow production up to 12MW as soon as business conditions warrant. Certain facilities such as casting and other manufacturing are capable of 12MW currently.

**Business Name:** Mobil Solar Energy Corporation  
**Address:** 4 Suburban Park Drive  
Billerica, MA 01821  
**Phone:** (508)667-5900  
**Toll Free:** (none available)  
**Fax:** (508)663-2868  
**Contact Person:** Mark A. Farber, ext. 388

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Nife Inc.  
**Address:** POB 1866  
Valdosta, GA 31603-1886  
**Phone:** (912)247-2331  
**Toll Free:** (none available)  
**Fax:** (912)247-8486  
**Contact Person:** Ole Vigerstol

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

Address listed under OG 200 Certified Solar Systems:  
Nippon Electric Glass America, Inc.  
3158 Des Plaines Ave., Suite 232  
Des Plaines, IL 60018  
(708) 285-8500  
(708) 285-8509

TYPICAL MICROGRID APPLICATIONS: Telecommunications, Portable Power Systems, Navigational Aids, Village Electrification, Aviation Obstruction Lighting, Utility Interactive Systems, Cathodic Protection MICROGRID TURNKEY POWER SYSTEMS INCLUDE: Shelters; Station Batteries; Power Regulation, Control, and Conditioning Equipment; Towers; Telemetry and System Monitoring Equipment POWER SYSTEMS ENGINEERING AND FIELD SERVICES :Power System Design, Engineering Feasibility Review, Product Development, Worldwide Installation Services, Operation and Maintenance Services

**Business Name:** OSRAM Corporation  
**Address:** 110 Bracken Road  
Montgomery, NY 12549  
**Phone:** (914)457-4040  
**Toll Free:** (none available)  
**Fax:** (914)457-4142  
**Contact Person:** Peter Bleasby

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Pawling Corporation  
**Address:** 157 Charles Coleman Boulevard  
Pawling, NY 12564  
**Phone:** (914)855-1000  
**Toll Free:** (none available)  
**Fax:** (914)855-1937  
**Contact Person:** Steven J. Smith

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Photocomm, Inc.  
**Address:** 7681 East Gray Road  
Scottsdale, AZ 85260  
**Phone:** (602)948-8003  
**Toll Free:** (none available)  
**Fax:** (602)483-6431  
**Contact Person:** Walter O'Neil

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Pistacchio Pump Co.  
**Address:** 88 Academy Avenue  
Sanger, CA 93657  
**Phone:** (209)875-4528  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Larry Pistacchio

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** PowerStar  
**Address:** 10011 N. Foothill Blvd.  
Cupertino, CA 95014  
**Phone:** (800)645-4004  
**Toll Free:** (800)645-4004  
**Fax:** (none available)  
**Contact Person:** (none available)

**Manufacturer:** Yes **SEIA Member:** No

**Products Manufactured:** Powerstar Inverters

**Products Distributed:** Powerstar Inverters

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Sage Advance Corporation  
**Address:** 1001 Bertelsen Road East  
Suite A  
Eugene, OR 97402  
**Phone:** (503)485-1947  
**Toll Free:** (none available)  
**Fax:** (503)485-5728  
**Contact Person:** Bill Kittredge, Manager Sales & Marketing

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** Copper Cricket

**Products Distributed:** Copper Cricket

**Company Formation:** Formed in 1987 in Oregon.

**Business Certifications:** SRCC Solar Collector Certification

**Type of Construction/Installation:** New construction, retrofit

**Residential Information:** Several systems installed in Wisconsin. Over 2000 Copper Cricket systems sold since 1987. Located throughout the continental United States and Canada. Majority located on the east or west coasts.

**Public & Private Projects:** Copper Dragon commercial systems introduced in 1991 and have been installed successfully in several applications from Arizona to Washington to Colorado.

**Dealers & Distributors:** None currently in Wisconsin. Sage Advance Corporation prefers to establish a wholly owned subsidiary within the territory to be serviced.

**Other Information:** All of their systems are based upon their patented geyser pumping technology. This technology incorporates the circulation of the active system with the simplicity of the passive system. Their systems contain absolutely no moving parts. They require no outside source of power. They require very little in the regular maintenance. They are immune to freeze damage. Their pricing structure is more complex than simply retail and wholesale. Sage Advance Corporation prefers to sell the units installed in cooperation with local utilities or other service organizations. The list price of their single panel system is \$2,120.00. Under utility programs on the West Coast, the installed system price varies between \$2,384.00 and \$2,560.00 depending upon the volume and the level of participation of the utility.

**Business Name:** Sealed Air Corporation  
**Address:** 3433 Arden Road  
Hayward, CA 94545  
**Phone:** (510)887-8090  
**Toll Free:** (800)451-6620  
**Fax:** (510)783-6817  
**Contact Person:** Gene Bradley/William Groechel

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Siemens Solar Industries  
**Address:** 4650 Adohr Lane, POB 6032  
Camarillo, CA 93010  
**Phone:** (805)482-6800  
**Toll Free:** (800)272-6765  
**Fax:** (805)388-6395  
**Contact Person:** Mark Stimson

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** Siemens M10 PV module  
Siemens M20 PV module  
Siemens M5 PV module  
Siemens M55 / M45 PV module  
Siemens M65 / M35 PV module  
Siemens M75 / M40 PV module

**Products Distributed:** Siemens M10 PV module  
Siemens M20 PV module  
Siemens M5 PV module  
Siemens M55 / M45 PV module  
Siemens M65 / M35 PV module  
Siemens M75 / M40 PV module

**Company Formation:** Siemens Solar Industries is one of the world's largest and most experienced producers of solar cells. They supply more than 20 percent of the total photovoltaic industry volume. As the only company with experience in design, construction and operation of multimegawatt utility-scale PV power plants, they offer utility customers extensive systems capabilities.

**Business Certifications:** All Siemens solar modules have the following characteristics:  
Pass requirements of JPL Specifications No. 5101-61 (Block V) to ensure environmental durability.

Passes Salt Fog Test per Military Standard 810.

Laboratory tested for a wide range of operating conditions (-40C to 90C, 0% to 80% humidity).

Nominal operating cell temperature (NOCT) as defined by ASTM E 1036 is 43 +/- 2C.

Ground continuity of less than 1 ohm for all metallic surfaces.

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:** Siemens Solar has extensive experience in the area of utility scale ( $\geq 100\text{kW}$ ) grid-connected projects. Over the last decade, Siemens Solar - and its precursor

**Business Name:** Snow Belt Solar Energy  
**Address:** 286 Wilson Street  
Amherst, WI 54406  
**Phone:** (715) 824-3982  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Bob Ramlow

**Manufacturer:** No **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** (none available)

**Company Formation:** Snow Belt Solar started manufacturing and installing solar heating systems in 1981. They manufactured a site-bult air heating system. They installed that system, and had a number of dealers throughout the state. They also solar and installed closed loop solar water heaters with flat plate collectors. They also sold photovoltaic modules. They have continuously operated the business since that time. They have also done repairs on all types of solar equipment around the state.

Snow Belt felt that to properly address the issue of using renewable energy, it was basic to include energy conservation as part of their overall approach. To this end they've included many products and services to offer their customers. These include home insulation services, solid fuel heating, energy saving lighting, and many other types of products.

**Business Certifications:**

**Type of Construction/Installation:** Over the years, most of their work has been in the residential market. They do only a few commercial jobs per year.

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** Snow Belt has installed over 200 solar systems. In the early years, most of their work was directed towards the air systems they manufactured. Solar water heaters were also popular. The number of PV installations was very small.

They discontinued manufacturing air collectors in the late 1980's, but continued to be involved in all technologies. Solar related activity was very low for several years. Since 1990, solar work has continued to increase. Today, Snow Belt has become very active in the

**Business Name:** Solahart USA  
**Address:** USA Corporate Office  
155 Mata Way, Suite #109  
San Marcos, CA 92069  
**Phone:** (619)736-7020  
**Toll Free:** (800)233-7652  
**Fax:** (619)736-7023  
**Contact Person:** Terry Eddy

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** Solahart Model 80GE  
Solahart Models 300JK and 300J  
**Products Distributed:** Solahart Model 80GE  
Solahart Models 300JK and 300J

**Company Formation:** Solahart is a division of Hardie Energy Products of Australia, established in 1888. The first Solahart Solar Hot Water System was installed in 1953 and through the years modifications were made until the best possible passive thermosyphon system was perfected.

Solahart is now installed in over 85 countries throughout the world. The U.S. office was opened in 1976 in San Diego, California, and services the U.S. dealer network across the country and in Hawaii.

The manufacturing plant is located in Perth, Western Australia. It occupies an area of some 3 acres under roof on a site location covering 10 acres. The most up-to-date modern machinery is used in manufacturing the Solahart products. Throughout the production of the units many quality control checks are carried out to ensure that only the highest quality equipment is produced and distributed to the worldwide network (source: Solarhart Architectural, Engineering, and Builder Manual).

**Business Certifications:** SRCC OG 200 Solar System Certification

**Type of Construction/Installation:** New construction, retrofit.

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Solar Development, Inc.  
**Address:** 3607 A Prospect Avenue  
Riviera Beach, FL 33404-1797  
**Phone:** (407)842-8935  
**Toll Free:** (none available)  
**Fax:** (407)842-8967  
**Contact Person:** Don Kazimir/David Burrows

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Solar Energy Corporation-SOLEC  
**Address:** 129 Walters Avenue  
Ewing Township, NJ 08638-1829  
**Phone:** (609)883-7700  
**Toll Free:** (none available)  
**Fax:** (609)497-0182  
**Contact Person:** Robert Aresty

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Solar Kinetics  
**Address:** 10635 King William Drive  
Dallas, TX 75220  
**Phone:** (214)556-2376  
**Toll Free:** (none available)  
**Fax:** (214)869-4158  
**Contact Person:** Gus Hutchison

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Solar Outdoor Lighting, Inc.  
**Address:** 3131 SE Waaler Street  
Stuart, FL 34997  
**Phone:** (407)386-9461  
**Toll Free:** (none available)  
**Fax:** (407)286-9616  
**Contact Person:** Alan Hurst

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Dealers & Distributors:**

**Other Information:** Everthing that Solar Spectrum sells comes with a manufacturer's warranty and Solar Spectrum guarantees their installation and workmanship for the duration of the warranties. We have numerous sized installations throughout northern Wisconsin with sales as far away as equatorial Africa. Most electrical installations to date are stand alone, off grid projects. They are currently working on a utility intertie system in Wisconsin Public Service territory.

Mickey Wurl-Koth is currently on the Board of Directors to the Midwest Renewable Energy Association. He is also a volunteer advisor to the Wisconsin Public Service Corporations Green Pricing Team.

**Business Name:** Solarex Corporation  
**Address:** 603 Solarex Court  
Frederick, MD 21701  
**Phone:** (301)698-4387  
**Toll Free:** (none available)  
**Fax:** (301)698-4201  
**Contact Person:** Roy D. Gibson, Technical Sales Programs

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** MSX High-Power Modules  
MSX Low-Power Modules  
MSX Mid-Range Modules  
MSX-Lite Modules  
Solarex Amorphous Silicon Modules  
**Products Distributed:** MSX High-Power Modules  
MSX Low-Power Modules  
MSX Mid-Range Modules  
MSX-Lite Modules  
Solarex Amorphous Silicon Modules

**Company Formation:** Solarex Corporation, an Amoco company, was founded in 1973 with the objective of developing commercial terrestrial application markets for its proprietary photovoltaic technology. Today, solarex is the principle U.S. owned manufacturer of semicrystalline and amorphous silicon photovoltaic products. From sales offices in the U.S., Europe, Australia, and Asia, Solarex distinguishes itself as a leading international marketer of quality photovoltaic power modules, systems and system components.

**Business Certifications:** NEMA 3R rated junction box, UL rated terminal block The Solarex Mega Series rigid glass front modules beginning with MSX-5 through MSX-64 are UL listed.

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:** Solarex has been involved in many Grid-Tie projects. The following is a list of the customers and KW Peak of the installation.

Representative Solarex Grid-Tie Projects: Wisconsin Electric Power Company -- 2 KW, Bechtel Corp. -- 14.2 KW, TNC -- 100 KW, ENEL -- 300 KW, Bechtel Corp. -- 21 KW, Dept. of Energy, Puerto Rico -- 50 KW, Philadelphia Electric Company -- 3.6 KW, U.S. Post Office -- 15 KW, EPA, Village of Waynesburg -- 25 KW, Jacksonville Electric Authority -- 5.6 KW, Hughes

Under nearly all climatic conditions, the solar cells in an operating module are hotter than the ambient temperature, a fact which must be considered when reading module data. NOCT (Nominal Operating Cell Temperature) is an indication of this temperature rise, and is the cell temperature under Standard Operating Conditions: Ambient temperature of 20C, solar irradiation of 0.8 KW/m sq, and average wind speed of 1 m/s.

Solarex modules now feature a module output rating under Standard Operating Conditions. This gives an estimate of the module performance which can be expected under field conditions in many locations.

**Business Name:** SOLMAX  
**Address:** 3654 Charlanne Dr.  
Redding, CA 96022  
**Phone:** (916)222-5995  
**Toll Free:** (none available)  
**Fax:** (916)221-2743  
**Contact Person:**

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** SOLMAX SX-1000 4X10  
SOLMAX SX-1000 4X8  
SOLMAX SX-600 4x10  
SOLMAX SX-600 4x8

**Products Distributed:** SOLMAX SX-1000 4X10  
SOLMAX SX-1000 4X8  
SOLMAX SX-600 4x10  
SOLMAX SX-600 4x8

**Company Formation:**

**Business Certifications:** SRCC Certified Collectors and Systems

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Specialized Env. Products, Inc.  
**Address:** Specialized Environmental Products, Inc.  
3325 Ali Baba, Suite 609  
Las Vegas, NV 89118  
**Phone:** (702)736-8382  
**Toll Free:** (none available)  
**Fax:** (702)736-3404  
**Contact Person:** Arthur Brooks

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Spire Corporation  
**Address:** Patriots Parks  
Bedford, MA 01730  
**Phone:** (617)275-6000  
**Toll Free:** (none available)  
**Fax:** (617)275-7470  
**Contact Person:** Roger Little

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Stirling Thermal Motors Inc.  
**Address:** 275 Metty Drive  
Ann Arbor, MI 48103  
**Phone:** (313)995-1755  
**Toll Free:** (none available)  
**Fax:** (313)995-0610  
**Contact Person:** Lennart Johansson

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

The company also sells photovoltaics for remote location, farm and ranch applications, i.e., water pumping. Design, manufacture, and install solar swimming pool/spa systems for commercial and residential.

Sun Trapper solar provided information on Commercialization of Large Scale Industrial Solar Thermal included in supplementary report.

**Business Name:** Sun Utility Network, Inc.  
**Address:** 626 Wilshire Blvd.  
Suite 711  
Los Angeles, CA 90017  
**Phone:** (800)822-7652  
**Toll Free:** (none available)  
**Fax:** (213)623-2041  
**Contact Person:** Les Hamasaki, President and CEO

**Manufacturer:** No **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** Nippon SUNTUBE DP6-2800 Collector  
Sunfamily PK 30  
Sunfamily PK 30P

**Company Formation:** SUN Utility Network, Inc. (SUN) is an international solar energy systems and environmental management company. SUN specializes in comprehensive solar utility hot water service applications for utilities' demand side management and integrated resource planning programs. In addition, SUN has capabilities to develop other solar energy systems in the areas of air conditioning, desalination, food processing and dehydration, home water distillation, and water purification.

SUN's management team has over 40 years of combined experience and expertise in the solar industry. Its international network has provided SUN with the latest technology available in the solar/alternative energy field.

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** SUN is the sole distributor of the SUN Family Command system comprised of a "smart" command/ controlled solar water system combined with a long life, highly energy efficient water heater. SUN is the exclusive distributor in the United States of the solar evacuated tube manufactured by Nippon Electric Glass, Co. Ltd., the largest television tube maker in the world.

**Business Name:** SunEarth Inc.  
**Address:** 4315 Santa Ana Street  
Ontario, CA 91761  
**Phone:** (909)984-8737  
**Toll Free:** (none available)  
**Fax:** (909)988-0477  
**Contact Person:** Al Abernathy

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** Copperheart CP-2000 P  
Empire EC-32 Collector  
Empire EC-40 Collector  
Imperial EC-32 Collector  
Imperial EC-40 Collector  
**Products Distributed:** Copperheart CP-2000 P  
Empire EC-32 Collector  
Empire EC-40 Collector  
Imperial EC-32 Collector  
Imperial EC-40 Collector

**Company Formation:**

**Business Certifications:** SRCC Certified Collectors

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

the photovoltaics application industry is their continuing commitment to providing the best service possible. They add value to their products by adding to the physical components the hard-won results of education and their experience. They strive for honest and open assessment of the technology that they use. They believe that these are the qualities valued more than any single product they provide.

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:** The 800 number is for orders only. For information call (406)363-6924.

**Other Information:** Sunnyside Solar, Inc. is a full service photovoltaic (solar electric) company located in Southern Vermont specializing in small, medium and large sized photovoltaic systems for both remote and non-remote locations. For many of the small, medium and large residential systems in New England, the use of solar electricity is for lighting, water pumping, refrigeration, entertainment and household appliances. Frequently these systems are paired with a generator or other back up system for extra power during the low sun winter season. Experience with small systems includes use of the electricity for lighting, traffic, counters and fence charging, medium sized systems use the electricity for office, educational and mobile electrical needs, and large systems integrate with the central power grid for meeting peak-power requirements. Where there is a need for reliable onsite electricity, there is a potential for photovoltaics.

The company's expertise is in the design, engineering, fabrication and installation of these systems. Much of the equipment is on hand and can be supplied either by sale from the shop or through mail order. Sunnyside has the ability to install complete turnkey installations, to prefabricate systems to be picked up at Sunnyside Solar or shipped to your site and to provide individual components to those doing their own installations. Available also are AC and DC water pumps, gas and electric refrigerators and energy efficient lighting, gas or propane generators.

**Business Name:** Sunquest, Inc.  
**Address:** 1555 Rankin Avenue  
Newton, NC 28658  
**Phone:** (704)465-6805  
**Toll Free:** (none available)  
**Fax:** (704)465-7370  
**Contact Person:** Greg Baer, P.E., President

**Manufacturer:** Yes **SEIA Member:** No

**Products Manufactured:** Sunquest FRESOURCE PSF-232  
Sunquest FRESOURCE PSF-240  
**Products Distributed:** Sunquest FRESOURCE PSF-232  
Sunquest FRESOURCE PSF-240

**Company Formation:** They have approximately 500 units in use today that have been in operation for a maximum of seven years. Their reliability is excellent and the only maintenance involved is for the fluid to be checked twice a year. Also offer a 1-year money back guarantee.

**Business Certifications:** Won the 1987 U.S. Department of Energy's Energy Innovation award as well as the Governor's Product Excellence award.

**Type of Construction/Installation:** New construction, retrofit; is utilized in both the residential and industrial areas.

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:** Currently have no dealers in Wisconsin. Willing to train potential personnel to service the equipment. They have produced and sold approximately 500 units which are nationally located through dealers and factory direct purchasing.

**Other Information:** The FRESOURCE has been expanded to heat a variety of items. Along with heating household water, it can also heat pools, spas, air, and floors. For those who would like to build or expand their own solar system, Sunquest also offers the following components. Absorber plates, any size, any style; Collectors: glass and spring-loaded Tedlar or Tefzel glazed. Heat exchangers and thermal storage modules; Pool and spa solar heat exchangers and controls. Radiant floor heating fin tubes, manifolds and controls; Ultrasonically welded fin tubes; Hamilton gas boilers; TACO pumps and controls; Sunquest also provides: skylights, greenhouses, sunrooms, saunas, custom designs, and free initial design / engineering consulting.

**Business Name:** Sunsearch, Inc.  
**Address:** P.O. Box 590  
Guilford, CT 06437  
**Phone:** (203)453-6591  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Everett M. Barber, Jr. , President

**Manufacturer:** No **SEIA Member:** No

**Products Manufactured:** (none)

**Products Distributed:** AE-32 Black Chrome Collector,  
AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
HC-50 Solar Pool Panel  
Siemens M10 PV module  
Siemens M20 PV module  
Siemens M5 PV module  
Siemens M55 / M45 PV module  
Siemens M65 / M35 PV module  
Siemens M75 / M40 PV module  
Solec S-53 PV Module  
Solec S-70 PV module

**Company Formation:** Sunsearch has been in business since 1975, designing, installing and/or servicing almost 7,000 systems throughout the Northeastern United States.

**Business Certifications:** Member of The International Solar Energy Association and The American Society of Heating, Refrigerating, and Air Conditioning Engineering.

**Type of Construction/Installation:** Sunsearch available services: new system quotations, feasibility studies, insurance claims estimates, annual inspection and preventative maintenance agreements, system inspections or assessments, repair to all existing solar energy systems, and solar system parts.

**Residential Information:** References provided on request.

**Business Name:** Sunsiaray Solar Mfg., Inc.

**Address:** 7095 Schoolcraft  
Davison, MI 48423

**Phone:** (313)653-3502

**Toll Free:** (none available)

**Fax:** (313)744-4322

**Contact Person:**

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** Northern Comfort NC-32

**Products Distributed:** Northern Comfort NC-32

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Texas Instruments Incorporated  
**Address:** POB 655012 - MS 35  
Dallas, TX 75265  
**Phone:** (214)995-0155  
**Toll Free:** (none available)  
**Fax:** (214)995-2337  
**Contact Person:** Eric Graf

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** (none available)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** The LT Corporation  
**Address:** 16860 Fairview Court  
Brookfield, WI 53005  
**Phone:** (414)781-1196  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** Mr. David Knaup

**Manufacturer:** Yes    **SEIA Member:** Yes

**Products Manufactured:** (none)

**Products Distributed:** (none available)

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

The SunPipe company is planning to introduce an optional artificial lighting package with control system. Using this feature, as natural light levels decrease, electric lighting surrounding the SunPipe dome will be activated to maintain interior light levels.

**Business Name:** Thermo Dynamics, Ltd.

**Address:** 81 Thornhill Dr.  
Dartmouth, Nova Scotia  
Canada B3B IR9

**Phone:** (902)468-1001

**Toll Free:** (none available)

**Fax:** (902)468-1002

**Contact Person:**

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** MICRO-FLO S32A Collector  
MICRO-FLO S32B Collector  
Solar Boiler SB 64 9A  
Solar Boiler SB 64 9P

**Products Distributed:** MICRO-FLO S32A Collector  
MICRO-FLO S32B Collector  
Solar Boiler SB 64 9A  
Solar Boiler SB 64 9P

**Company Formation:**

**Business Certifications:** SRCC Certified Collectors and Systems

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** United Solar Systems Corp.  
**Address:** 1100 West Maple Road  
Troy, MI 48084  
**Phone:** (313)362-4170  
**Toll Free:** (none available)  
**Fax:** (313)362-4442  
**Contact Person:** Larry Slominski

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** Uni-Solar MBC-525,-262,&-131  
Uni-Solar UPM-880  
**Products Distributed:** Uni-Solar MBC-525,-262,&-131  
Uni-Solar UPM-880

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Vanner Inc.  
**Address:** 4282 Reynold Drive  
Hillard, OH 43026  
**Phone:** (614)771-2718  
**Toll Free:** (none available)  
**Fax:** (none available)  
**Contact Person:** (none available)

**Manufacturer:** Yes **SEIA Member:** No

**Products Manufactured:** Vanner Inverters

**Products Distributed:** Vanner Inverters

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Wattsun Corporation

**Address:** PO Box 751  
614 2nd Street SW  
Albuquerque, NM 87103

**Phone:** (505)242-8024

**Toll Free:** (none available)

**Fax:** (none available)

**Contact Person:** (none available)

**Manufacturer:** Yes    **SEIA Member:** No

**Products Manufactured:** Wattsun Solar Trackers

**Products Distributed:** Wattsun Solar Trackers

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

**Dealers & Distributors:**

**Other Information:**

**Business Name:** Zomeworks Corporation  
**Address:** 1011 Sawmill Rd NW  
PO Box 25805  
Albuquerque, NM 87125  
**Phone:** (505)242-5354  
**Toll Free:** (none available)  
**Fax:** (505)243-5187  
**Contact Person:** Ross Edwards

**Manufacturer:** Yes **SEIA Member:** Yes

**Products Manufactured:** SKYLID Insulating Louvers  
Solar Ice Breaker  
Sunbender Reflector/Shade  
Zomeworks Active Water Heater,  
Zomeworks Active Water Heater,  
Zomeworks Cool Cell  
Zomeworks Passive Water Heater  
Zomeworks Passive Water Heater  
Zomeworks Track Rack

**Products Distributed:** Radco 408C-HP Collector  
Radco 408P-HP Collector  
Radco 410C-HP Collector  
Radco 410P-HP Collector  
SKYLID Insulating Louvers  
Solar Ice Breaker  
Sunbender Reflector/Shade  
Zomeworks Active Water Heater,  
Zomeworks Active Water Heater,  
Zomeworks Cool Cell  
Zomeworks Passive Water Heater  
Zomeworks Passive Water Heater  
Zomeworks Track Rack

**Company Formation:**

**Business Certifications:**

**Type of Construction/Installation:**

**Residential Information:**

**Public & Private Projects:**

## APPENDIX D: PRODUCTS

**Product Name:** AE-32 Black Chrome Collector, 4'x8'

**Product Category:** Liquid Flat-Plate Collector

**Product Type:** Component

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,  
Sunsearch, Inc.

**Related to:** AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector

**Description:** AE-SERIES

Glazing: 1 sheet of solite glass

Absorber Plate: Copper sheet with copper riser tubes

Absorber Coating: Black chrome with selective paint

**Unit Size:** Collector Area: 4'x8'

**Unit Price:** \$930.00

**Other Information:** Price shown is list price. Bulk prices are as follows:  
1-5 collectors--\$433.00, 6-19 collectors--\$412.00, 20+ collectors--\$391.00.  
10 year limited warranty

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog  
1993

**Product Name:** AE-FM Flush Mount  
**Product Category:** Installation Hardware  
**Product Type:** Component

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,  
Sunsearch, Inc.

**Related to:** AE-32 Black Chrome Collector,  
AE-40 Black Chrome Collector,4  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector  
MSC-40 Black Chrome Collector

**Description:** AE-FM Flush Mount Hardware is a time and cost saving technique that is used when mounting collectors in the same plane as the roof. Each of the four brackets is quickly locked on to the collector frame by a stainless steel lockbolt. The collector is held 3" above the roof surface to allow water and debris to flow down the roof freely. This flush mount hardware is truly an attractive and cost saving option for solar collector mounting.

**Unit Size:**

**Unit Price:** \$25.00

**Other Information:** Price shown is list price. Bulk prices are as follows:  
1-5 mounts--\$11.70, 6-19 mounts--\$11.10, 20+ mounts--\$10.60.

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog  
1993

**Product Name:** AE-RM Rack Mount  
**Product Category:** Installation Hardware  
**Product Type:** Component

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,  
Sunsearch, Inc.

**Related to:** AE-32 Black Chrome Collector,  
AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AET Direct PV System DPV-120-6  
AET Direct System D-120-64  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector  
MSC-40 Black Chrome Collector

**Description:** AE-RM Rack Mount Hardware is an excellent collector attachment device for use in commercial arrays. When a site constructed collector rack is used, these clips provide a very fast and inexpensive mount. As in all AET, Inc. hardware, a stainless steel lockbolt locks the clip to the collector frame. Each of the four brackets is color matched to the collector and provides a lightweight and attractive attachment.

**Unit Size:**

**Unit Price:** \$13.00

**Other Information:** Price shown is list price. Bulk prices are as follows:  
1-5 mounts--\$5.90, 6-19 mounts--\$5.60, 20+ mounts--\$5.30.

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog  
1993

**Product Name:** AET Direct System D-120-64

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,  
Sunsearch, Inc.

**Related to:** AE-32 Black Chrome Collector,  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Direct PV System DPV-120-6  
Eagle Sun Open Storage Tank  
MSC-32 Black Chrome Collector

**Description:** Direct (Open Loop) Systems

This type of system is most common in the Southern United States and Tropical climates. The system consists of solar collector(s) installed on the roof and a hot water storage tank usually located in the garage or utility room. An alternating current (A/C) pump circulates the water from the tank up to the collector and back. This system is referred to as direct because the sun's heat is transferred through the collector directly to the potable water. No antifreeze solution or heat exchanger is required.

The "D" System uses a differential control to sense the temperature differences between water leaving the collector and the coldest water in the bottom of the storage tank. The control turns the pump on when the water in the collector is about 20F warmer than the water in the tank. Similarly, the pump is turned off when the temperature variation is approximately 5F. This process ensures that the water is always being heated while the pump is operating.

A thermally operated valve is installed at the collector to provide freeze protection where required. This valve will open to let warm water flow through the collector whenever temperatures approach freezing. As an alternative the collector can be manually drained by closing the isolation valves and opening the drain valves (located above the storage tank).

**Unit Size:**

Collector: 64 sq ft

120 gallon tank

**Product Name:** AET Indirect PV System IPV-120-80

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Solar Network, LTD  
Sunsearch, Inc.

**Related to:** AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
MSC-40 Black Chrome Collector

**Description:** Indirect PV System

The "IPV" System is similar to the "I" System except that the energy needed to power the pump is provided by a photovoltaic panel. The photovoltaic panel converts sunlight into electricity which powers a DC pump. The transfer fluid circulates through the system only when the sun is shining. The DC pump and photovoltaic panel are suitably matched to ensure optimum performance. The pump starts when there is sufficient solar radiation available to heat the thermal collector. The pumping speed increases with the increase in the amount of sunlight. This produces a flow rate matched to the level of heat transfer required. The system then shuts off when the available solar energy diminishes.

**Unit Size:** Collector: 80 sq ft  
120 gallon tank

**Unit Price:** \$4,393.82

**Other Information:** Price shown is list price. Bulk prices are as follows:  
1-5 systems--\$2196.91, 6-19 systems--\$2069.52, 20+ systems--\$1961.35.

You will need one - two square feet of collector area for every 2 gallons of storage, i.e. 80 gallons of storage will require 60 square feet of collector area.

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog  
1993

**Product Name:** American SunCo SunTracker 8  
**Product Category:** PV One- or Two- Axis Tracking Mount  
**Product Type:** Component

**Manufactured by:** American SunCo

**Distributed by:** American SunCo

**Related to:** (none)

**Description:** SunTracker 8 one- and two- axis tracking systems include: Solid state tracking electronics; One or two linear actuating motors; Galvanized steel, pole-mounted tracker chassis; Pre-drilled, anodized aluminum mounting frame; Concentrating reflectors (optional); Limited 10-year warranty.

SunTracker 8 one- and two- axis trackers are designed to: Operate in ambient temperatures between -40F and 140F; Withstand winds in excess of 100 mph; Turn east at night in preparation for the next day's sunrise; Aim at the brightest area of the sky during overcast conditions; Allow quick and easy installation.

The SunTracker 8 is designed to accommodate the following PV panels:  
(listed by manufacturer and model)

Astropower -- AP 5104; DuraVolt -- DV 50; Siemens -- M55,M75;  
SunWatt -- SW60; Kyocera -- LA361K51, LA441K63;  
Solarex -- MSX-56, MSX-60; Solec -- S-50; Hoxan -- H-4810.

PV panels using Ethylene Vinyl Acetate (EVA) as a cell encapsulant should not be used in conjunction with optional concentrating reflectors. American SunCo recommends the SunWatt SW60 for use with their concentrators.

**Unit Size:**

**Unit Price:** \$650.00

**Other Information:** Price shown is for a four panel system with 1 axis tracking. Trackers are available for up to 20 panels systems. 2 axis tracking with reflectors is available for up to 12 panel systems.

Prices are as follows:

(#panels, 1 axis price, 2 axis price, 2 axis w/ reflectors price)

4 panels -- \$650, \$870, \$1170;

**Product Name:** ASN Solar "SKYLITE" Water Heater

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** American Solar Network, LTD

**Distributed by:** American Solar Network, LTD

**Related to:** ASN Solar Thermal Collector

**Description:** Freeze protected system with drainback tank. Includes a solar tank with an internal copper heat exchanger. Choice of flush, tilt or lift mount; differential controllers; photovoltaic power and digital temperature display.

**Unit Size:** Solar Tank with Internal Heat Exchanger: 50, 65, 80, 120 gallons

Drainback Tank: 4-6 gallons

**Unit Price:** \$2,295.00

**Other Information:** Price shown is for ASN 3 80EX with one 4'x16' collector and an 80 gallon storage tank.

System price includes: solar "SKYLITE" tm Collector(s), ASN Drainback Tank with Fill Valve and Fittings, Storage Tank, EX has Double Wall, External, Wrap Around Heat Exchanger, Standard Pump-Taco 008BC, 1/15hp ASN 1-31ft/ASN 2-30ft/ASN 3-29ft head, Differential Controller, Temperature Gauge (for solar/electric tank), Connecting Lines (2-40' "QEST" lines with sensor wire), Misc. Installation Components (everything except for insulation is supplied for solar loop).

Standard Color: dark bronze, custom available. Technical bulletin available for details on components.

**Information Source:** American Solar Network, Ltd. 1993

**Product Name:** Copper Cricket  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Sage Advance Corporation

**Distributed by:** Alternative Power & Light Co.  
Sage Advance Corporation  
Sunelco, Inc.

**Related to:** (none)

**Description:** Completely automatic, downward pumping, closed-loop, freeze damage immune passive solar domestic hot water heating system having no moving parts. The system is complete with Solar Pad heat exchanger for attachment to your pre-heat tank in the two-tank system. It is available in kit form for easy installation. A tempering valve is included in the system to prevent scalding. Collector: 4'x10 1/2', 008" copper with a black chrome selective coating, 1/8" low iron tempered glass, textured to reduce glare.

**Unit Size:** Collector: 4'x10-1/2'

**Unit Price:** \$2,180.00

**Other Information:** Price shown is list price for single panel system. Company prefers to sell the units installed in cooperation with local utilities or other energy service organizations. Under utility programs on the West Coast, the installed system price varies between \$2,384.00 and \$2,560.00 depending upon the volume and level of participation of the utility.

All systems installed since company's inception are still functioning. Only suggested regular maintenance is flushing of the heat exchanger. The heat exchanger is valved appropriately to permit this to be done in approximately five minutes. They also recommend that the collector be hosed off to clean the glass on an annual basis, or more frequently if conditions dictate. They send the owner of the Copper Cricket a Birthday Card every year to remind them to flush their heat exchanger. This also helps to remind them to flush their water tank, thereby maintaining the integrity of the entire water heating system.

**Information Source:** Sage Advance Corporation Product Literature 1993  
1993 SRCC Handbook

**Product Name:** Eagle Sun Closed Storage Tank

**Product Category:** Solar Mechanical Systems

**Product Type:** Component

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,

**Related to:** AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
MSC-40 Black Chrome Collector

**Description:** CST-80-E and CST-120-E

**Tank:** The tank surface is coated with an exclusive porcelain formula and fused to the solid steel shell at 1600F. The result is a smooth, tough, glass-like lining. Tank is designed and tested to withstand 300 PSI hydrostatic test pressure of 150 PSI U.L. Standard.

**Heat Exchanger:** Copper tubing wrapped around and secured to the tank. Double-wall, vented design for positive leak detection and foamed in place with R-Foam for high efficiency. Direct Immersion Heating Element is completely immersed- all the heat goes directly into the water. Nickel Chromium heating coil imbedded in magnesium oxide and sealed in a tinned-copper tube. Although in direct contact with water, the ends are sealed to prevent entrance of moisture. Elements are changed, should the need arise, by screwing into special tank flanges.

**Unit Size:** Models: 80 gallon and 120 gallon capacities

**Unit Price:** \$1,413.00

**Other Information:** Price shown is list price for 120 gallon tank with heat exchanger. Bulk prices are as follows: 1-5 tanks--\$659.00, 6-19 tanks--\$627.00, 20+ tanks--\$595.00.

List price for the 80 gallon tank with heat exchanger is \$1083.00.  
Bulk prices are as follows: 1-5 tanks--\$506.00, 6-19 tanks--\$480.00, 20+ tanks--\$456.00.

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog 1993.

**Product Name:** Empire EC-32 CollectorError! Bookmark not defined.

**Product Category:** Liquid Flat-Plate Collector

**Product Type:** Component

**Manufactured by:** SunEarth Inc.

**Distributed by:** SunEarth Inc.

**Related to:** (none)

**Description:** Working fluid: Water

Frame: Extruded Aluminum

Cover: Low Iron Tempered Glass

Absorber Material: Copper

Absorber Coating: Black Chrome

**Unit Size:** Collector Area: 32.8 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** Exeltech Inverters  
**Product Category:** Photovoltaic Inverters  
**Product Type:** Component

**Manufactured by:** Exeltech

**Distributed by:** Alternative Power & Light Co.  
Exeltech  
Solar Spectrum  
Sunnyside Solar, Inc.

**Related to:** (none)

**Description:** The complete line of SI Series power inverters features crest factors designed for today's electronics. The output current of the SI Series provides ample power for non-linear loads and protection from accidental overloads or highly reactive loads. In fact, the SI Series can instantaneously supply up to four times their rated power.

**Unit Size:**

SI250: 250 watts, 12/24 VDC  
SI500: 500 watts, 12/24 VDC  
SI1000: 1000 watts, 12/24 VDC  
SI1500: 1500 watts, 12/24 VDC  
SI2000: 2000 watts, 12/24 VDC  
Dimensions: SI250 and 500 -- 3.5"x4.5"x9"

**Unit Price:** \$395.00

**Other Information:** Price shown is for the SI250 and is taken from the Solar Spectrum company catalog 1993.

Prices for other units are as follows:

SI500 -- \$595.00, SI1000 -- \$1190.00, SI1500 -- \$1785.00, SI2000 -- \$2380.00.

Forced air cooling allows peak performance and an ambient temperature of 120F, with a guaranteed output of 250 watts. Higher temperatures will not prevent operation, but may result in reduced maximum continuous power.

The SI Series can handle almost any electrical load within its wattage rating, making it the perfect power source for computers, test equipment, stereos, most electric motors, small refrigerators and many power tools.

**Product Name:** FAFCO Solar Water Heater 444 AError! Bookmark not defined.

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** FAFCO SOLAR

**Distributed by:** FAFCO SOLAR

**Related to:** (none)

**Description:** Integral Collector Storage

Cover(outer): Teflon PVF Film

Cover(inner): FEP Film (Two Layers)

Transfer Fluid: Water

Copper Absorber with Black Paint Coating.

**Unit Size:** Collector Area: 37.2 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** Gobi, size 4'x8'  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** Gobi, size 4'x10'  
Helio-Clip  
Helio-Flo Systems AC  
Helio-Flo Systems PV  
Helio-Pak Systems AC  
Helio-Pak Systems PV  
Heliodyne Solar Pool Heating Systems

**Description:** Glazed all-purpose collector, single cover, black-chrome selective surface on all copper absorber. Permanent mechanical tube-to-fin bond. 1" headers. Factory fitted with positive seal no-solder DYN-O-SEAL half-unions.

**Unit Size:** Collector Area: 4'x8'

**Unit Price:** \$729.00

**Other Information:** Price shown is for 4'x8' collector w/ unions.

**Information Source:** Heliodyne, Inc. Product Literature 1993

**Product Name:** Heart Inverters  
**Product Category:** Photovoltaic Inverters  
**Product Type:** Component

**Manufactured by:** Heart Interface

**Distributed by:** Alternative Power & Light Co.  
Heart Interface  
Solar Spectrum

**Related to:** (none)

**Description:**

**Unit Size:**

EMS612: 600 watts, 12 V  
EMS1812: 1800 watts, 12 V, 65A charger  
EMS2812: 2800 watts, 12 V, 100A charger  
EMS1824: 1800 watts, 24 V, 32A charger  
EMS2824: 2800 watts, 24 V, 50A charger  
EMS1832: 1800 watts, 32 V, 24A charger  
EMS2832: 2800 watts, 32 V, 37A charger

**Unit Price:** \$650.00

**Other Information:** Price shown is for the EMS612 and is taken from the Alternative Power and Light Company catalog 1993.

Prices for other units are as follows:

EMS1812 -- \$1197.00, EMS2812 -- \$1689.00, EMS1824 -- \$1596.00,  
EMS2824 -- \$2161.00, EMS1832 -- \$1596.00, EMS2832 -- \$2161.00.

**Information Source:** Alternative Power and Light Company catalog 1993

**Product Name:** Helio-Flo Systems AC  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** Gobi, size 4'x10'  
Gobi, size 4'x8'  
Helio-Clip  
Helio-Flo Systems PV  
Helio-Pak Systems AC  
Heliodyne Solar Pool Heating Systems

**Description:** For mild areas. System includes Gobi collector(s), solar storage, Helio-pak heat transfer module, hardware.

**Unit Size:**

HF 2408 G 80 AC: 2 -- 4'X8' Gobi Collectors, 80 gallon tank  
HF 2408 G 120 AC: 2 -- 4'X8' Gobi Collectors, 120 gallon tank  
HF 2410 G 120 AC: 2 -- 4'X10' Gobi Collectors, 120 gallon tank  
HF 3408 G 120 AC: 3 -- 4'X8' Gobi Collectors, 120 gallon tank  
HF 3410 G 120 AC: 3 -- 4'X10' Gobi Collectors, 120 gallon tank

**Unit Price:** \$2,697.00

**Other Information:** Price shown is for the HF 2408 G 80 AC system with recirculating freeze protection and thermostatic valve backup.

Prices for other systems are as follows:

HF 2408 G 120 AC -- \$2973.00; HF 2410 G 120 AC -- \$3191.00  
HF 3408 G 120 AC -- \$3749.00; HF 3410 G 120 AC: -- \$4076.00.

Prices includes Gobi collector(s), flush mount hardware, blind unions, Helio-Flo pump/control module, sensors, solar storage, Dole freeze valve, air vent, tempering valve, thermometer. Systems with PV also available starting at \$1913 for non freeze climates only.

**Information Source:** Heliodyne, Inc. Product Literature 1993

**Product Name:** Helio-Pak DW CL Series  
**Product Category:** Solar Mechanical Systems  
**Product Type:** Component

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** (none)

**Description:** Efficient heat transfer modules with double wall heat exchangers for closed loop designs. Designed for propylene glycol. 150 psi rated for boilout protection. Helio-Paks keep collectors clean and freeze protected.

16 DW CL -- Standard size for solar hot water with up to 100 sq.ft. of Gobi collector area.

24,32, 48 DW CL -- Larger modules for up to 320 sq. ft. of Gobi collector area, for water or home heating.

16-16P DW CL -- Dual heat exchanger module for combined hot water and hot tub heating. Hot tub side features a cupronickel heat exchanger.

16-24H DW CL -- Designed for combined hydronic floor and hot water heating.

**Unit Size:**

**Unit Price:** \$1,012.00

**Other Information:** Price shown is for 16 DW CL dual pump heat exchange system.

16 PV DW CL w/12V DC pumps is \$1109.

24 DW CL is \$1204; 32 DW CL is \$1315; 48 DW CL is \$1610.

16-24H DW CL, system for home & DHW heat is \$1538.

16-16P DW CL CUPRO, system for spa & DHW is \$1584.

**Information Source:** Heliodyne, Inc. Product Literature 1993

**Product Name:** Helio-Pak Systems AC  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** Gobi, size 4'x10'  
Gobi, size 4'x8'  
Helio-Clip  
Helio-Flo Systems AC  
Helio-Flo Systems PV  
Heliodyne Solar Pool Heating Systems

**Description:** Can be installed anywhere, protected from freezing, boilout, or hard water deposits. Systems of different sizes include Gobi collector(s), solar storage, Helio-Pak heat transfer module, hardware.

**Unit Size:**

HP 2408 G 80 AC: 2 -- 4'X8' Gobi Collectors, 80 gallon tank  
HP 2408 G 120 AC: 2 -- 4'X8' Gobi Collectors, 120 gallon tank  
HP 2410 G 120 AC: 2 -- 4'X10' Gobi Collectors, 120 gallon tank  
HP 3408 G 120 AC: 3 -- 4'X8' Gobi Collectors, 120 gallon tank  
HP 3410 G 120 AC: 3 -- 4'X10' Gobi Collectors, 120 gallon tank

**Unit Price:** \$3,318.00

**Other Information:** Price shown is for the HP 2408 G 80 AC system.

Prices for other systems are as follows:

HP 2408 G 120 AC -- \$3594.00; HP 2410 G 120 AC -- \$3812.00;

HP 3408 G 120 AC -- \$4370.00; HP 3410 G 120 AC: -- \$4889.00.

Prices include Gobi collector(s), flush mount hardware, blind unions, Helio-Pak pump/control/heat exchanger module, solar storage, air vent, temperature valve, tank thermometer.

**Information Source:** Heliodyne, Inc. Product Literature 1993

**Product Name:** Heliodyne Racking, RACK-1

**Product Category:** Installation Hardware

**Product Type:** Component

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** (none)

**Description:** Aluminum channel legs and pin-joint shoes for any collector tilt. Certified to 60 lbs./sq.ft. wind load.

**Unit Size:**

**Unit Price:** \$123.65

**Other Information:** Price of racking varies with number of collectors, price shown is for a 1-collector bank.

**Information Source:** Heliodyne, Inc. Product Literature 1993

**Product Name:** Heliodyne Solar Home Heating

**Product Category:** Solar Home Heating

**Product Type:** System

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** (none)

**Description:** Packages for all climates for individual room or central heating, standard air or hydronic floor heat distribution.

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** Heliodyne, Inc. Company Information 1993

**Product Name:** Heliodyne Water Heating Packages  
**Product Category:** Commercial & Process Water Heating  
**Product Type:** System

**Manufactured by:** Heliodyne, Inc.

**Distributed by:** Heliodyne, Inc.

**Related to:** (none)

**Description:** Standard and custom packages for most commercial and industrial water uses.

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** Heliodyne, Inc.

**Product Name:** Imperial EC-32 CollectorError! Bookmark not defined.

**Product Category:** Liquid Flat-Plate Collector

**Product Type:** Component

**Manufactured by:** SunEarth Inc.

**Distributed by:** SunEarth Inc.

**Related to:** (none)

**Description:** Working fluid: Water

Frame: Extruded Aluminum

Cover: Low Iron Tempered Glass

Absorber Material: Copper

Absorber Coating: Black Paint

**Unit Size:** Collector Area: 32.8 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** K51 PV Module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Kyocera America, Inc.

**Distributed by:** Alternative Power & Light Co.  
Kyocera America, Inc.  
Solar Spectrum  
Sunnyside Solar, Inc.

**Related to:** Wattsun Solar Trackers  
Zomeworks Track Rack

**Description:** K51 High efficiency Multicrystal Photovoltaic Module.  
Maximum power 51 watts. Maximum power voltage 16.9 Volts. Maximum power current 3.02 Amps. Open circuit voltage 21.2 volts. Short-circuit current 3.25 Amps.

Kyocera's advanced cell processing technology and automated production facilities have produced a highly efficient multicrystal photovoltaic modules. The conversion efficiency of the Kyocera solar cell is over 14%. These cells are encapsulated between a tempered glass cover and an EVA pottant with PVF and aluminum foil back sheet to provide maximum protection from the severest environmental conditions. The entire laminate is installed in an anodized aluminum frame to provide structural strength and ease of installation. Product includes 12 year limited warranty.

**Unit Size:**  
51 watt PV module  
38.8"Lx17.5"Wx1.4"D  
Weight: 13 lbs

**Unit Price:** \$345.00

**Other Information:** Price shown is from the Alternative Power and Light Company catalog Fall 1993.

Applications: Grid-Integrated systems, microwave radio repeater stations, electrification of villages in remote area s, medical facilities in rural areas, power source for summer vacation homes, emergency communications systems, water quality and environmental data monitoring systems, Navigation lighthouses, and ocean buoys, pumping systems for irrigation, rural water supplies and livestock watering; Aviation obstruction lights, cathodic protection systems, desalination systems, recreational vehicles, railroad signals, sailboat charging systems.

**Information Source:** Company Product Literature from Kyocera International Fall 1993

**Product Name:** Kimex Solar Energizer II Collector  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** Kimex International Technologies

**Distributed by:** Kimex International Technologies

**Related to:** Kimex Solar DHW KS 1301

**Description:** Working fluid: Water  
Glazing: 1 sheet of low iron tempered glass  
Absorber Plate: Copper sheet with copper riser tubes  
Absorber Coating: Black chrome selective surface

**Unit Size:** Collector Area: 32.5 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** LA721G102S PV Module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Kyocera America, Inc.

**Distributed by:** Kyocera America, Inc.

**Related to:** (none)

**Description:** LA102 High efficiency Multicrystal Photovoltaic Module.  
Maximum power 102 watts. Maximum power voltage 33.8 Volts. Maximum Power current 3.02 Amps. Open circuit voltage 42.5 volts. Short-Circuit Current 3.25 Amps.

Kyocera's advanced cell processing technology and automated production facilities have produced a highly efficient multicrystal photovoltaic modules. The conversion efficiency of the Kyocera solar cell is over 14%. These cells are encapsulated between a tempered glass cover and an EVA pottant with PVF and aluminum foil back sheet to provide maximum protection from the severest environmental conditions. The entire laminate is installed in an anodized aluminum frame to provide structural strength and ease of installation.

Product includes 12 year limited warranty.

**Unit Size:**  
102 watt PV module  
38.9"Lx134.2"Wx2"D  
Weight: 24.7 Pounds

**Unit Price:** \$0.00

**Other Information:** Applications: Grid-Integrated systems, microwave radio repeater stations, electrification of villages in remote areas, medical facilities in rural areas, power source for summer vacation homes, emergency communications systems, water quality and environmental data monitoring systems, Navigation lighthouses, and ocean buoys, pumping systems for irrigation, rural water supplies and livestock watering; Aviation obstruction lights, cathodic protection systems, desalination systems, recreational vehicles, railroad signals, sailboat charging systems.

**Information Source:** Company Product Literature from Kyocera International Fall 1993

**Product Name:** MICRO-FLO S32B Collector

**Product Category:** Liquid Flat-Plate Collector

**Product Type:** Component

**Manufactured by:** Thermo Dynamics, Ltd.

**Distributed by:** Thermo Dynamics, Ltd.

**Related to:** Solar Boiler SB 64 9P

**Description:** Working fluid: Water/propylene glycol

Frame: Aluminum

Cover: Tempered Glass

Absorber Material: Copper Tube/Aluminum Fin

Absorber Coating: Black Paint

**Unit Size:** Collector Area: 31.9 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** MSC-40 Black Chrome Collector

**Product Category:** Liquid Flat-Plate Collector

**Product Type:** Component

**Manufactured by:** American Energy Technologies, Inc.

**Distributed by:** American Energy Technologies,

**Related to:** AE-40 Black Chrome Collector,4  
AE-FM Flush Mount  
AE-MH Standard Mount  
AE-RM Rack Mount  
AET Indirect PV System IPV-120  
AET Indirect System I-120-80  
Eagle Sun Closed Storage Tank  
MSC-MH Standard Mount

**Description:** Morning Star Collector Series

Glazing: 1 sheet of low iron tempered glass

Absorber Plate: Copper sheet with copper riser tubes

Absorber Coating: Black Chrome only

Design Life: 30 years

**Unit Size:** Collector Area: 4'x10'

**Unit Price:** \$1,178.00

**Other Information:** Price shown is list price.

Bulk prices are as follows:

1-5 collectors--\$580.00, 6-19 collectors--\$551.00, 20+ collectors--\$524.00.

10 year limited warranty

**Information Source:** American Energy Technologies, Inc., Solar Thermal Catalog  
1993

**Product Name:** MSX High-Power Modules  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Solarex Corporation

**Distributed by:** Alternative Power & Light Co.  
Solar Spectrum  
Solarex Corporation  
Sunelco, Inc.  
Sunwise Energy Systems

**Related to:** Wattsun Solar Trackers  
Zomeworks Track Rack

**Description:** Rugged, durable power modules-highest power in the industry. 2 inch extruded aluminum frame designed to withstand hurricane force loads. Improved, versatile NEMA-3R rated J-Box. Ready to accept standard Solarex mounting hardware.

Typical applications: Telecommunications, water pumping, residential, cathodic protection, utility, and navigation.

Options: Marine Environment J-Box. Protective aluminum backplate. Blocking or bypass diodes. Solarstate Voltage Regulator. Mounting hardware kits.

**Unit Size:**

MSX-120: 120w, 44.4"x39"x1.97", 30.8 lbs  
MSX-64: 64w, 43.8"x19.8"x1.97", 15.9 lbs  
MSX-60: 60w, 43.8"x19.8"x1.97", 15.9 lbs  
MSX-50cp: 50w, 43.8"x19.8"x1.97", 15.9 lbs

**Unit Price:** \$433.00

**Other Information:** Price shown is from the Sunelco product catalog, Fall 1993, for the MSX-64.

Prices for other modules are as follows: MSX-60 -- \$398.00, MSX-50 -- \$329.00.

Price of the MSX-120 and MSX-40, respectively, taken from the Sunnyside Solar catalog are \$840.00 and \$360.00.

**Information Source:** Solarex Photovoltaic Product Catalog 1993

**Product Name:** MSX Mid-Range Modules

**Product Category:** Photovoltaic Module

**Product Type:** Component

**Manufactured by:** Solarex Corporation

**Distributed by:** Alternative Power & Light Co.

Solarex Corporation

Sunelco, Inc.

Sunnyside Solar, Inc.

Sunwize Energy Systems

**Related to:** (none)

**Description:** Rugged, durable power modules-highest power in the industry. 2 inch extruded aluminum frame designed to withstand hurricane force loads. Improved, versatile NEMA-3R rated J-Box. Ready to accept standard Solarex mounting hardware.

Typical applications: Telecommunications, water pumping, residential, cathodic protection, utility, and navigation.

Options: Marine Environment J-Box. Protective aluminum backplate.

Blocking or bypass diodes. Solarstate Voltage Regulator. Mounting hardware kits 6 volt output. Low profile frame and JBox with 15 feet of AWG 18-2 polyethylene jacketed output cable (MSX18 and 30 only)

**Unit Size:**

MSX-50: 50w, 37.1"x19.76"x1.97", 13.9 lbs

MSX-40: 40w, 30.07"x19.76"x1.97", 11.8 lbs

MSX-30: 30w, 23.32"x19.76"x1.97", 8.5 lbs

MSX-18cp: 18.5w,16.57"x19.76"x 1.97", 6.5 lbs

**Unit Price:** \$329.00

**Other Information:** Price shown is from the Sunelco product catalog, Fall 1993, for the MSX-50. List price of the MSX-40 is \$289.00. Prices of the MSX-30 and MSX-18, respectively, taken from the Alternative Power and Light Catalog are \$245.00 and \$200.00.

**Information Source:** Solarex Photovoltaic Product Catalog 1993

**Product Name:** Nippon SUNTUBE DP6-2800 Collector  
**Product Category:** Liquid Collector with Absorber Tubes  
**Product Type:** Component

**Manufactured by:** Nippon Electric Glass Co., Ltd.

**Distributed by:** Nippon Electric Glass Co., Ltd  
Sun Utility Network, Inc.

**Related to:** Sunfamily PK 30

**Description:** Working fluid: Water  
Frame: Galvanized Steel  
Cover: Glass Vacuum Tube  
Absorber Material: Steel with Proprietary Selective Absorber  
Plating  
Absorber Coating: Metallic-Oxide

**Unit Size:** Collector Area: 29.7 sq ft, Number of Tubes: 6

**Unit Price:** \$0.00

**Other Information:** When compared with flat-plate collectors, SUNTUBE energy packages permit 30% reductions in required collector area. This reduction is possible for hot water supplies at 140F. Hot water temperatures of 200F may also be obtained. This is a level of performance not usually associated with most solar collectors. Accordingly, SUNTUBE is ideal for a wide range of heating as well as air conditioning applications.

Assembled in easy-to-install units, SUNTUBE provides highly efficient all-weather, year-round energy collection, assuring optimum performance in summer as well as in winter weather. Further, the durable construction of the individual collector tubes and their rugged units assures against long-term performance degradation even when installed with severe environmental conditions.

The Solar Tube Collectors can be installed horizontally - an installation method that is not possible with flat-plate collectors. This not only allows the utilization of virtually any level surface, but also ensures that the collectors can be integrated fully into their architectural surroundings.

**Information Source:** SRCC Catalog 1993, SUN Product Literature 1993

**Product Name:** Powerstar Inverters  
**Product Category:** Photovoltaic Inverters  
**Product Type:** Component

**Manufactured by:** PowerStar

**Distributed by:** Alternative Power & Light Co.  
PowerStar  
Solar Spectrum  
Sunelco, Inc.

**Related to:** (none)

**Description:** Input Voltage: 10.5 to 16.5 volts DC  
Output Voltage: 115 volts AC true RMS  $\pm 1\%$ , modified sine wave.  
Idle Current: 90 Milliamperes DC with the 115 volt output fully "ON".  
Appliances start instantly.

Low Battery Alarm: Audible alarm below 10.9 volts input. Shutdown below 10.5 volts.  
Reset manually by cycling the power switch, or automatically when the battery is recharged above 13 volts DC.

Over Voltage Shutdown: 16.8 volts  $\pm 2\%$ . Automatic reset.  
Over Temperature Protection: Proportional power reduction.

Overload protection: Dual mode limiter enables operation of appliance rated higher in power than inverter. A mode rate overload lowers the output voltage. A severe one causes shutdown. Reset by cycling the power switch.

Remote Control: A built-in connector socket has provisions for a remote switch as well as a hard-wired AC output.

Indicator: A green micropower lamp shows AC output present.  
Fusing: Replaceable fuses on both input and output.  
Efficiency: Over 90% at half rated power.

**Unit Size:**

P0120012: 200 watts, 12 VDC  
PO-UPG400: 400 watts, 12 VDC  
PO-UPG700: 700 watts, 12 VDC  
PO-UPG900: 900 watts, 24 VDC  
PO-UPG1300: 1300 watts, 12 VDC  
PO-UPG1500: 1500 watts, 24 VDC  
Size: 3.15"x3.3"x11" All Models.

**Product Name:** Prowatt Inverters  
**Product Category:** Photovoltaic Inverters  
**Product Type:** Component

**Manufactured by:** Statpower Technologies Corp.

**Distributed by:** Statpower Technologies Corp.  
Sunelco, Inc.

**Related to:** (none)

**Description:** Prowatt High Frequency Inverters

Features: 90% efficient over majority of power range, low idle currents, accepts 10-15 volt DC, low voltage audible alarm, and 18 month warranty.

These units are designed for years of totally silent, maintenance-free operation. Internal circuits protect your equipment from spikes and voltage fluctuations.

The Prowatt 125 and 250 models are excellent for electronic equipment such as TV's, VCR's and computers. Offering precisely regulated output voltage, they can be hardwired or plugged directly into a cigarette lighter plug. The low no-load current draw makes them ideal for small solar systems.

The Prowatt 800 and 1500 models offer more power for larger loads. They include an LED bar graph display of voltage and amperage draw which eliminates the guesswork for the owner. These units will shut themselves down if voltage is too low, if overheated or overloaded and restart themselves automatically once the problem is corrected.

**Unit Size:**

ST-PW125: 125 watts  
ST-PW250: 250 watts  
ST-PW800: 800 watts  
ST-PW1500: 1500 watts

**Dimensions:**

ST-PW125: 1.5"x4.5"x4.5"  
ST-PW250: 1.5"x4.5"x6"  
ST-PW800: 3"x9"x10"  
ST-PW1500: 3"x9"x15"

**Product Name:** Radco 408C-HP Collector  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** Radco Products, Inc.

**Distributed by:** Radco Products, Inc.  
Zomeworks Corporation

**Related to:** Zomeworks Active Water Heater,  
Zomeworks Passive Water Heater

**Description:** Working fluid: Water  
Frame: Aluminum  
Cover: Low Iron Tempered Glass  
Absorber Material: Copper  
Absorber Coating: Black Chrome

**Unit Size:** Collector Area: 4'x8', 32.3 sq ft

**Unit Price:** \$575.00

**Other Information:** Price obtained from Zomeworks Product Literature 1993.

**Information Source:** SRCC Catalog 1993

**Product Name:** Radco 410C-HP Collector  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** Radco Products, Inc.

**Distributed by:** Radco Products, Inc.  
Zomeworks Corporation

**Related to:** Zomeworks Active Water Heater,  
Zomeworks Passive Water Heater

**Description:** Working fluid: Water  
Frame: Aluminum  
Cover: Low Iron Tempered Glass  
Absorber Material: Copper  
Absorber Coating: Black Chrome

**Unit Size:** Collector Area: 4'x10', 39.9 sq ft

**Unit Price:** \$698.00

**Other Information:** Price obtained from Zomeworks Product Literature 1993.

**Information Source:** SRCC Catalog 1993

**Product Name:** Radco 412P-HP Collector  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** Radco Products, Inc.

**Distributed by:** Radco Products, Inc.

**Related to:** (none)

**Description:** Working fluid: Water  
Frame: Aluminum  
Cover: Low Iron Tempered Glass  
Absorber Material: Copper  
Absorber Coating: Flat Black Paint

**Unit Size:** Collector Area: 4'x12', 48.3 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** Siemens M20 PV module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Siemens Solar Industries

**Distributed by:** Siemens Solar Industries  
Sunnyside Solar, Inc.  
Sunsearch, Inc.

**Related to:** (none)

**Description:** Compact High Performance Solar Electric Modules

Designed to charge 12-volt batteries or directly power 12-volt DC motors, these rugged modules are a practical and versatile power source. Their compact size and durable solid-state construction make them a dependable power solution wherever reliability and performance are critical.

M-Series solar electric modules can withstand some of the harshest environmental conditions and continue to produce usable electricity in as little as 5% of full sunlight, resulting in more power everyday.

**Unit Size:** M20: 20 Watts  
22.4"Lx13.0"Wx1.4"D  
Weight: 5.6 lbs

**Unit Price:** \$195.00

**Other Information:** Price shown is for the M20 model quoted from Sunnyside Solar, Inc. Catalog. 1993. All solar cells within a module are electrically-matched and laminated between a multi-layered polymer backsheets and layers of ethylene vinyl acetate (EVA) for environmental protection, moisture resistance, UV stability and electrical isolation. Lightweight, yet rugged and corrosion resistant, an anodized aluminum frame is used for superior module strength. Terminal junctions are designed for easy field wiring, safety and environmental protection.

**STANDARD GROUND MOUNTS:** Rugged, lightweight and corrosion resistant, Siemens Ground Mounts are built to withstand wind speeds of up to 125 miles per hour. Support legs and channels, fabricated from anodized aluminum alloy, are adjustable from 15 to 65 degrees in nominal 5 degree increments. Model SGM-4 accommodates from 2 to 4 large modules and Model SGM-8 will support up to 8 large modules.

**Information Source:** Siemens Company Literature 1993

**Product Name:** Siemens M55 / M45 PV module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Siemens Solar Industries

**Distributed by:** Alternative Power & Light Co.  
Siemens Solar Industries  
Solar Spectrum  
Sunelco, Inc.  
Sunnyside Solar, Inc.  
Sunsearch, Inc.

**Related to:** Wattsun Solar Trackers  
Zomeworks Track Rack

**Description:** Large High Efficiency Power Modules  
M-Series solar electric modules can withstand some of the harshest environmental conditions and continue to produce usable electricity in as little as 5% of full sunlight, resulting in more power everyday.

**Unit Size:** M55: 53 Watts, M45: 48 Watts  
50.9"Lx13.0"Wx1.4"D  
Weight: 12.6 lbs

**Unit Price:** \$370.00

**Other Information:** Price shown is for the M55 model quoted from Alternative Power and Light Company Catalog 1993.

All solar cells within a module are electrically-matched and laminated between a multi-layered polymer backsheet and layers of ethylene vinyl acetate (EVA) for environmental protection, moisture resistance, UV stability and electrical isolation. Lightweight, yet rugged and corrosion resistant, an anodized aluminum frame is used for superior module strength. Terminal junctions are designed for easy field wiring, safety and environmental protection.

**STANDARD GROUND MOUNTS:** Rugged, lightweight and corrosion resistant, Siemens Ground Mounts are built to withstand wind speeds of up to 125 miles per hour. Support legs and channels, fabricated from anodized aluminum alloy, are adjustable from 15 to 65 degrees in nominal 5 degree increments. Model SGM-4 accommodates from 2 to 4 large modules and Model SGM-8 will support up to 8 large modules.

**Information Source:** Siemens Company Literature 1993

**Product Name:** Siemens M75 / M40 PV module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Siemens Solar Industries

**Distributed by:** Alternative Power & Light Co.  
Siemens Solar Industries  
Solar Spectrum  
Sunelco, Inc.  
Sunnyside Solar, Inc.  
Sunsearch, Inc.

**Related to:** Wattsun Solar Trackers  
Zomeworks Track Rack

**Description:** Large High Efficiency Power Modules  
M-Series solar electric modules can withstand some of the harshest environmental conditions and continue to produce usable electricity in as little as 5% of full sunlight, resulting in more power everyday.

**Unit Size:** M75: 48 Watts, M40: 40 Watts  
48.0"Lx13.0"Wx1.4"D  
Weight: 11.6 lbs

**Unit Price:** \$330.00

**Other Information:** Price shown is for the M75 model quoted from Alternative Power and Light Company Catalog, 1993. All solar cells within a module are electrically-matched and laminated between a multi-layered polymer backsheet and layers of ethylene vinyl acetate (EVA) for environmental protection, moisture resistance, UV stability and electrical isolation. Lightweight, yet rugged and corrosion resistant, an anodized aluminum frame is used for superior module strength. Terminal junctions are designed for easy field wiring, safety and environmental protection.

**STANDARD GROUND MOUNTS:** Rugged, lightweight and corrosion resistant, Siemens Ground Mounts are built to withstand wind speeds of up to 125 miles per hour. Support legs and channels, fabricated from anodized aluminum alloy, are adjustable from 15 to 65 degrees in nominal 5 degree increments. Model SGM-4 accommodates from 2 to 4 large modules and Model SGM-8 will support up to 8 large modules.

**Information Source:** Siemens Company Literature 1993

**Product Name:** Solahart Model 80GE  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Solahart USA

**Distributed by:** Solahart USA

**Related to:** (none)

**Description:** In the open loop system cold water is introduced into the solar collector panels. Radiation from the sun is absorbed by the collectors and, in turn, by the water. As the water heats, the principle of thermosyphon causes it to rise up the solar collectors and feed into the fully insulated storage cylinder. Water from the storage cylinder is naturally recirculated through the solar collectors.

The storage cylinder is completely insulated with high pressure injected polyurethane foam, which has excellent insulating properties. Overnight heat loss is minimized. The cylinder is protected against corrosion by a double lining of "primaglaze" vitreous enamel. Primaglaze has been developed, tested and proven to resist corrosion, even by the mineral salts present in well or bore water, and it effectively withstands the high temperatures associated with solar heating.

A back-up system is built into the unit for those days when there is insufficient solar radiation. The back-up is usually only required during prolonged periods of rain, heavy clouds or persistent low atmospheric temperatures.

Note: This system is not freeze-protected.

**Unit Size:** 2 Collectors, 43 sq ft (optional third collector available)  
Storage Cylinder , 80 U.S. gallons

**Unit Price:** \$1,600.00

**Other Information:** Price shown is list price for 2 panel system.  
Includes packaging and freighting. Does not include installation.

**Information Source:** Solarhart Architectural, Engineering, and Builder Manual 1993  
SRCC Handbook 1993

**Product Name:** Solar Boiler SB 64 9A  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Thermo Dynamics, Ltd.

**Distributed by:** Thermo Dynamics, Ltd.

**Related to:** (none)

**Description:** System Type: Forced Circulation  
Working fluid: Water/propylene glycol  
2 S32A Collector panels.  
Tank Material: Glass Lined Steel with Fiberglass Batt  
Heat Exchanger: Shell-and-Coil

**Unit Size:** Collector Area: 31.9 sq ft  
Solar Storage Tank: 80 gallons  
Supplemental Tank: 50 gallons

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** Solar Ice Breaker  
**Product Category:** Solar Stock Tank De-Icer  
**Product Type:** System

**Manufactured by:** Zomeworks Corporation

**Distributed by:** Zomeworks Corporation

**Related to:** (none)

**Description:** The SOLAR ICE BREAKER stock tank de-icer uses solar electricity (photovoltaics) to power a specially made air-lift pump. Air is pumped down a weather resistant hose to the bottom of the tank, through a submerged fluidic check valve and into an educator nozzle. The rising air bubbles bring 40F water from the bottom of the tank to the surface. This flow melts a hole through 2" of ice in less than an hour of early morning sun. The system is designed to operate in low light levels so water is assured even on cloudy days.

**SYSTEM COMPONENTS:**

1 ARCO LAMINATE Solar Electric Panel  
1 Solar Air-Lift Pump mounted in a Nema #R weather proof enclosure  
(includes panel-to-pump wire)  
1 Panel Mount (fits on 2" Sch 40 Pipe)  
12' Weather Resistant Air Hose  
1 Fluidic Check Valve

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:**

**OPTIONS:**

5' Mounting Pole w/ Base  
Base only (to accept 2" sch 40 pipe)  
10.5' Mounting Pole

**WARRANTY:** The photovoltaic module has a 5 year warranty based on power output and the rest of the Ice Breaker components have a 1 year warranty.

**Information Source:** Zomeworks Product Literature 1993

**Product Name:** Solec S-53 PV Module  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** Solec International Inc.

**Distributed by:** Solar Spectrum  
Solec International Inc.  
Sunnyside Solar, Inc.  
Sunsearch, Inc.

**Related to:** Zomeworks Track Rack

**Description:** Single crystal, glass covered, aluminum frame.

Peak power: 3.10A, 17.1V

Open circuit voltage: 20.3V

Short circuit Amps: 3.4A

The S-53 has 36 series connected 4 inch square cells. It is physically similar to the Siemens M55 module in power output and size.

**Unit Size:** S-53: 53 Watts

50.87"Lx12.87"Wx1.5"D

Weight: 12 lbs

**Unit Price:** \$350.00

**Other Information:** Price shown is quoted from the Solar Spectrum Catalog 1993.  
10 year warranty

**Information Source:** Solar Spectrum Catalog 1993

**Product Name:** SOLMAX SX-1000 4X10

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** SOLMAX

**Distributed by:** SOLMAX

**Related to:** SOLMAX SX-600 4x10

**Description:** Forced Circulation System

Indirect 80 gallon single tank with electric auxiliary, double wall heat exchanger, two SX-600 4'x10' collectors, differential controller.

**Unit Size:** Collector Area: 2 -- 4'x10'

Storage Tank: 80 gallons

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** SOLMAX SX-600 4x10  
**Product Category:** Liquid Flat-Plate Collector  
**Product Type:** Component

**Manufactured by:** SOLMAX

**Distributed by:** SOLMAX

**Related to:** SOLMAX SX-1000 4X10

**Description:** Working fluid: Water  
Frame: Aluminum  
Cover: Low Iron Tempered Glass  
Absorber Material: Copper Tube-Copper Sheet  
Absorber Coating: Black Paint

**Unit Size:** Collector Area: 4'x10', 40.4 sq ft

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** SRCC Catalog 1993

**Product Name:** Sun Trapper Solar Pool System

**Product Category:** Solar Pool Heater

**Product Type:** System

**Manufactured by:** Sun Trapper Solar Systems Inc.

**Distributed by:** Sun Trapper Solar Systems Inc.

**Related to:** (none)

**Description:** The SunTrapper pool system is designed to adapt easily to existing pool equipment and uses the existing pool pump to circulate the pool water through the solar collectors array. The pool time clock should be set to operate the pump during the hours of direct sunlight falling on the solar panels and turn the pump off at night. An optional solar pump control can be installed to maximize the solar gain, if desired. The warm water from the solar panels can be directed to either the pool, spa, or both as desired.

**Unit Size:** Panel: Length 10'2", Width 45.5", Thickness: 1.58",  
Dry weight: 48 lbs, Wet weight: 60 lbs

**Unit Price:** \$0.00

**Other Information:** 10 year limited warranty: Sun Trapper solar collectors have a 10 year limited warranty against defects in workmanship and materials. Copy of limited warranty is available by request.

Approximately 1 year pay-back based on the cost to buy a conventional gas or electric pool heater plus fuel for 1 year, equal the cost of a solar unit. Swimming season approximately doubled. No energy costs - uses existing pool pump in most cases. Pump directly into the spa and enjoy the warm spa daily with the heat ultimately flowing into the pool. 100% pool surface is recommended for an indoor pool installation.

**Information Source:** Sun Trapper Solar Systems Inc. 1993

**Product Name:** Sunbender Reflector/Shade  
**Product Category:** Daylighting Accessory  
**Product Type:** Component

**Manufactured by:** Zomeworks Corporation

**Distributed by:** Zomeworks Corporation

**Related to:** (none)

**Description:** The Sunbender Reflector/Shade is designed to fit any well built, sturdy curb mount skylight. During the heating season it reflects from 100,000 to 200,000 extra Btu's per square foot of skylight into the building below. In the lowered summer position, it shades the skylight and greatly reduces heat gain, while still allowing light to enter.

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:** WARRANTY: Zomeworks Corporation warrants the Sunbender Reflector/Shade for a period of five years against damage from winds up to 85 mph. Zomeworks is not liable for any damage due to improper installation.

**Information Source:** Zomeworks Product Literature 1993

**Product Name:** Sunfamily PK 30P  
**Product Category:** Solar Water Heater  
**Product Type:** System

**Manufactured by:** Nippon Electric Glass Co., Ltd.

**Distributed by:** Nippon Electric Glass Co., Ltd  
Sun Utility Network, Inc.

**Related to:** (none)

**Description:** Integral Collector Storage  
Evacuated tube 60 gallon integral collector storage, twelve tubes,  
pumped circulation with manual timer.  
Transfer Fluid: Water

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:** The Sunfamily's cylindrical heat collecting surface immediately absorbs the morning solar rays on a constant 90 degree angle and continues to collect throughout the day. The 360 surface even absorbs energy from roof reflections.

Glass tubes of Sunfamily transmit light at 91%. Light which passes through the glass tube, goes through the vacuum layer and reaches a special surface (selective absorption treatment) which absorbs the sun's light most efficiently. The surface is plated on a copper tube which collects heat and holds hot water. Thus, Sunfamily makes effective use of 76% of sunlight energy.

**Information Source:** SRCC Catalog 1993, SUN Product Literature 1993

**Product Name:** SunPipe-21 (Kit)  
**Product Category:** Daylighting Equipment  
**Product Type:** System

**Manufactured by:** The Sunpipe Company

**Distributed by:** Altech Energy  
The Sunpipe Company

**Related to:** (none)

**Description:** (Model #SPK-21-4) hollow super reflective aluminum pipe lined on its interior with 3M silverlux film. Pipes run from 1-foot above the roof down to the ceiling. The SunPipe is capped on the top with a clear dome to allow entry of daylight and the pipe terminates at the ceiling where a white translucent ceiling dome surrounds the pipe opening but is sealed to the ceiling. The white dome diffuses light throughout the area.

**Unit Size:** 21"Diameter x 4' Length SunPipe

**Unit Price:** \$688.00

**Other Information:**

Kit includes:

Clear acrylic top Dome,

Flashing/Collar assembly

21" Dia x 4' L Sun Pipe

Translucent White Ceiling Dome

Installation Hardware

Installation Guide & Freight

FLASHING NOT INCLUDED

Also Available is Model SPK-21-2 which is identical to SPK-21-4 except that it contains a 2' sunpipe instead of a 4' sunpipe at a cost of \$590.

**Information Source:** The Sunpipe Company Product Literature 1993

**Product Name:** Sunquest FRESOURCE PSF-240

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** Sunquest, Inc.

**Distributed by:** Sunquest, Inc.

**Related to:** (none)

**Description:** Patented 3-way, double wall copper heat exchanger. Isothermal paraffin thermal storage system. Connects to existing water heater. Heats the water heater day and night. Coated steel inner and outer protective shells. UL listed TACO circulating pumps. Pump controller with high temperature limit. Transparent fluid expansion tank.

Collector: Selectively coated copper absorber plate. Spring-loaded Tedlar glazing system. Ground or roof mounted. Polybutylene tubing connectors. Extruded aluminum frame, bronze color.

**Unit Size:** Collector(s): 4'x10'x5" thick, 85 lbs  
Heat Exchanger: 2' diameter x3.5' tall, 440 lbs

**Unit Price:** \$2,975.00

**Other Information:** Price shown is for a (2) 4'x10' Collector System & Paraffin-Based Thermal Storage.

Backed by a 5-year warranty.

U.S. Department of Energy's "Energy Innovation" Award

Governor's "Product Excellence" Award

Featured in NASA's annual "Spin-offs" Report.

**Information Source:** Sunquest, Inc. Product Literature 1993

**Product Name:** Trace Inverters w/ Charging Option

**Product Category:** Photovoltaic Inverters

**Product Type:** Component

**Manufactured by:** Trace Engineering

**Distributed by:** Alternative Power & Light Co.

Solar Spectrum

Sunelco, Inc.

Sunnyside Solar, Inc.

Trace Engineering

**Related to:** (none)

**Description:** Trace Engineering has designed a family of inverters that excel in delivering reliable and efficient AC power at an economical price. These inverters are highly recommended by several distributors.

Trace inverters use a "modified sinewave" or "quasi sinewave" which has both RMS voltage regulation and crystal controlled frequency. RMS voltage regulation means that resistive loads will receive a constant amount of power as load demand changes and battery voltage changes. Maintaining the correct waveform is more difficult when driving inductive loads. With the "Impulse Phase Correction" circuitry originated by Trace Engineering, inductive loads run smoothly and more efficiently.

Efficiency: Trace inverters are at least 90% efficient between 4% and 80% of their rated power. When no load is being run, the idle power is very low - 1/8 to 1/3 watt, depending on the model.

Power: Trace inverters use a larger compliment of power transistors than any similarly rated inverters on the market. This improves efficiency and increases surge power capacity.

Reliability: Protection circuitry is very extensive, featuring automatic reset from the following conditions: high battery, low battery, instantaneous overload, shorted output, and over-temperature. Transformer and transistor temperatures are monitored independently. If temperature parameters are exceeded, inverter operation is suspended. Unique to Trace inverters is a "Linear Temperature Compensation" circuit that dynamically optimizes the protection threshold for the power devices' current capacity versus temperature characteristics.

**Product Name:** Trace Inverters w/o charging option

**Product Category:** Photovoltaic Inverters

**Product Type:** Component

**Manufactured by:** Trace Engineering

**Distributed by:** Alternative Power & Light Co.

Solar Spectrum

Sunelco, Inc.

Sunnyside Solar, Inc.

Trace Engineering

**Related to:** (none)

**Description:** Trace Engineering has designed a family of inverters that excel in delivering reliable and efficient AC power at an economical price. These inverters are highly recommended by several distributors.

Trace inverters use a "modified sinewave" or "quasi sinewave" which has both RMS voltage regulation and crystal controlled frequency. RMS voltage regulation means that resistive loads will receive a constant amount of power as load demand changes and battery voltage changes. Maintaining the correct waveform is more difficult when driving inductive loads. With the "Impulse Phase Correction" circuitry originated by Trace Engineering, inductive loads run smoothly and more efficiently.

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Power: Trace inverters use a larger compliment of power transistors than any similarly rated inverters on the market. This improves efficiency and increases surge power capacity.

Reliability: Protection circuitry is very extensive, featuring automatic reset from the following conditions: high battery, low battery, instantaneous overload, shorted output, and over-temperature. Transformer and transistor temperatures are monitored independently. If temperature parameters are exceeded, inverter operation is suspended. Unique to Trace inverters is a "Linear Temperature Compensation" circuit that dynamically optimizes the protection threshold for the power devices' current capacity versus temperature characteristics.

**Product Name:** Uni-Solar MBC-525,-262,&-131

**Product Category:** Photovoltaic Module

**Product Type:** Component

**Manufactured by:** United Solar Systems Corp.

**Distributed by:** Alternative Power & Light Co.

Seelye Equipment Specialists

Solar Spectrum

United Solar Systems Corp.

**Related to:** (none)

**Description:** Uni-Solar Flexible Solar Chargers keep batteries charged on boats, recreational vehicles--ready to start up when you are. Uni-Solar Flexible chargers are powerful enough to maintain and fully recharge batteries. Battery life is extended (often more than doubled) saving you time and money. Uni-Solar Flexible Solar Chargers are your battery's friend--for life.

**Unit Size:** MBC-131:22 Watts, MBC-262: 11 Watts, MBC-525: 5.5 Watts

MBC-131:51"x16", MBC-262: 28"x16", MBC-525: 28"x8"

Weight: MBC-131: 4lbs, MBC-262: 2.5lbs, MBC-525: 1.5lbs

**Unit Price:** \$350.00

**Other Information:** Price shown is list price for MBC-525.

Bulk prices are as follows:

1-10 modules--\$192.00, 11-50 modules--\$180.00, 51-100 modules--\$173.00.

List price for MBC-262 is \$225.00.

Bulk prices are as follows:

1-10 modules--\$125.00, 11-50 modules--\$120.00, 51-100 modules--\$110.00.

List price for MBC-131 is \$136.00.

Bulk prices are as follows:

1-10 modules--\$76.00, 11-50 modules--\$73.00, 51-100 modules--\$66.00.

**FLEXIBILITY MEANS CONVENIENCE:** Park your RV in the shade and put your Uni-Solar charger in the sun. Tie it to the boom, dodger, or mount it on your flying bridge. MBC solar chargers are also easy to stow, when fighting a storm, or a fish. They fit easily under seat cushions or inside lockers. In the window or on an auto dash, Uni-Solar Flexible Solar Chargers will keep your batteries in top condition.

**Product Name:** Uni-Solar UPM-880  
**Product Category:** Photovoltaic Module  
**Product Type:** Component

**Manufactured by:** United Solar Systems Corp.

**Distributed by:** Seelye Equipment Specialists  
United Solar Systems Corp.

**Related to:** (none)

**Description:** Uni-Solar UPM-880 Utility Power Module

The UPM-880 is an electric-utility grade solar module ideally suited for remote telecommunications, outdoor lighting, transportation, water pumping, remote home and rural electrification applications. Connected in series and parallel, UPM-880's are the building blocks of solar power systems to meet any load-grid connected or stand-alone.

**Unit Size:** 22 Watts  
47.1"Lx13.5"Wx1.5"D  
Weight: 8 lbs

**Unit Price:** \$275.00

**Other Information:** Price shown is list price.

Bulk prices are as follows:

1-10 modules--\$153.00, 11-50 modules--\$145.00, 51-100 modules--\$140.00.

**DURABLE AND RELIABLE:** The UPM-880 is built tough. There is no glass to break or crystalline cells to fracture. The UPM-880 is so durable, it can take impacts from rocks or bullets and continue operating. The UPM-880 has bypass diodes between every cell to maintain reliable operation even in harsh shadows or partial covering.

**SUPERIOR PERFORMANCE & QUALITY:** The UPM-880 maintains performance at high operating temperatures with very little change in maximum power from rated conditions. UPM-880 Utility Power Modules exceed industry standards for mechanical and electrical integrity. Tefzel (by Dupont) serves as a durable long lasting front cover. A coated, galvanized steel plate provides a stiff protective backing. The UPM-880 has a black anodized aluminum frame and low profile, weather-resistant junction box for easy mounting and field wiring.

**10 YEAR WARRANTY:** The UPM-880 is covered by a 10 year Limited Warranty. Contact United Solar Systems Corp. for complete warranty information.

**Information Source:** Uni-Solar Company Literature 1993

**Product Name:** Wattsun Solar Trackers  
**Product Category:** PV One- or Two- Axis Tracking Mount  
**Product Type:** Component

**Manufactured by:** Wattsun Corporation

**Distributed by:** Alternative Power & Light Co.  
Array Technologies, Inc.  
Solar Spectrum  
Sunelco, Inc.  
Sunnyside Solar, Inc.  
Wattsun Corporation

**Related to:** K51 PV Module  
LA551J63 PV Module  
MSX High-Power Modules  
Siemens M55 / M45 PV module  
Siemens M75 / M40 PV module

**Description:** Specifications:

Pointing Accuracy: +/- 0.1 degrees in either axis

Azimuth range: 120 degrees

Elevation range: 65 degrees

Tracking mechanism: worm drive linear actuators

Frames: pre-drilled and adjustable to fit each major manufacturer's panels

Power supply: internal battery pack with 5-7 years life; easy snap-in replacement

Reset feature: fail-safe reset even if batteries have expired

Wind loading: approximately 120 mph

All module rack struts for trackers are fabricated in anodized aluminum. Gimbal and pivot brackets are treated, cadmium plated mild steel. Eight module and larger trackers include ball screw linear actuators.

Each tracker includes: FS-III controller, Heavy duty linear actuators, Module rack, Standard zinc plated hardware including module mounting bolts, 10 year limited warranty, optional 1 watt PV panel operation.

**Unit Size:**

**Unit Price:** \$695.00

**Product Name:** Zomeworks Active Water Heater, 120g

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** Zomeworks Corporation

**Distributed by:** Zomeworks Corporation

**Related to:** Radco 410C-HP Collector  
Radco 410P-HP Collector

**Description:** Active Solar Water Heater System includes: Water heater-120 gallons, ZW heat exchanger w/ stand, PV pump package with bracket, 2 - 4'x10' Radco collectors, set collector stands, ZW Tide Tank, regulator, 4 gallons Dow Frost., and 20' of cooling fin.

**Unit Size:** 2 Collector(s): 4'x10'  
Storage tank: 120 gallons

**Unit Price:** \$3,274.00

**Other Information:** Price of 120 gallon tank is subject to change at time of order as they are not inventoried.

Not included in price: 3 gate valves, 2 drain valves, pipe and connectors, pipe insulation, extra water heater insulation, wire for PV pump, and crating charges.

**Information Source:** Zomeworks Product Literature 1993

**Product Name:** Zomeworks Cool Cell  
**Product Category:** Battery Protection Device  
**Product Type:** Component

**Manufactured by:** Zomeworks Corporation

**Distributed by:** Zomeworks Corporation

**Related to:** (none)

**Description:** The Cool Cell protects batteries from destructive temperature extremes even in harshest climates, extending battery life in the heat and insuring capacity in the cold.

**Unit Size:**

**Unit Price:** \$0.00

**Other Information:**

**Information Source:** Zomeworks Product Literature 1993

**Product Name:** Zomeworks Passive Water Heater,120g

**Product Category:** Solar Water Heater

**Product Type:** System

**Manufactured by:** Zomeworks Corporation

**Distributed by:** Zomeworks Corporation

**Related to:** Radco 408C-HP Collector  
Radco 408P-HP Collector

**Description:** Passive Solar Water Heater System includes: Water heater-120 gallons, ZW heat exchanger w/ stand, ZW check valve, 2 - 4'x10' Radco collectors, set collector stands, ZW Expansion tank, 4 gallons Dow Frost.

**Unit Size:** 2 Collector(s): 4'x10'  
Storage tank: 120 gallons

**Unit Price:** \$2,814.00

**Other Information:** Price of 120 gallon tank is subject to change at time of order as they are not inventoried.

Not included in price: 3 gate valves, 2 drain valves, pipe and connectors, pipe insulation, extra water heater insulation, and crating charges.

**Information Source:** Zomeworks Product Literature 1993

Other prices are as follows:

(#panels, Siemens modules price, Solarex MSX53,56,60,64 price, Kyocera modules price, Solec S-53 and S-70 price)

2 panels -- \$360, \$385, \$385, \$360 and \$525;

4 panels -- \$590, \$735, \$600, \$590 and \$735;

6 panels -- \$705, \$850, \$715, \$---;

8 panels -- \$845, \$1040, \$870, \$845 and \$1075;

12 panels -- \$1040, \$1300, \$1085, \$1040 and \$---;

14 panels -- \$1235, \$---, \$---, \$---.

A sun tracker mount follows the path of the sun keeping the solar modules facing directly toward the sun from dawn to dusk. The Zomeworks tracker operates by liquid (R-22 freon) flowing between sealed frame members. There are no drive motors, gears or pistons to wear out, making this tracker almost as dependable as gravity and the heat of the sun.

These units are ideal for water pumping systems. Power comes in a smooth dawn to dusk flow rather than in a noon peak. The N-S tilt axis is seasonally adjustable for top performance throughout the year. The use of a tracker increases the amount of water pumped per day and makes the most of your solar modules and pump. A sometimes advantage of a tracker over a fixed mount is its ease of installation. The unit slips over a single pipe mast set in concrete and is locked into place by tightening one bolt.

**Information Source:** Sunelco catalog 1993

## APPENDIX E: ORGANIZATIONS

**Organization Name: American Wind Energy Association**

**Address:** 777 N. Capitol Street NE  
Suite 805  
Washington, DC 20002

**Phone:** (202)408-0660

**Fax:** (202)408-8536

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:**

**Organization Name: ASES**

**Address:** American Solar Energy Society

2400 Central Avenue

Suite B-1

Boulder, CO 80301

**Phone:** (303)443-3130

**Fax:** (303)443-3212

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:**

**Organization Name: Citizens Utility Board**

**Address:** 16 N. Carrol  
Madison, WI 53702

**Phone:**

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:** Public Interest Group

**Organization Name:** Dept. of Ind. Labor & Human Rel.

**Address:** Department of Industry Labor & Human Relations

Safety & Buildings Division

P.O. Box 7903

Madison, WI 53707

**Phone:** (608)266-1816

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:** Energy codes for residential, commercial, and rental property.

**Organization Name:** ECRE

**Address:** U.S. Export Council for Renewable Energy

777 N. Capitol Street NE

Suite 805

Washington, DC 20002

**Phone:** (202)408-0660

**Fax:** (202)408-8536

**Toll Free:**

**BBS Number:**

**Contact Person(s):** Scott Sklar

**Information:**

**Organization Name: Energy Analysis & Policy Program**

**Address:** Institute for Environmental Studies

University of Wisconsin - Madison

Madison, WI 53706

**Phone:** (608)263-3985

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

(Organization, Name, Phone #)

Social Costs of Energy, Mark Hanson, (608) 263-3985

Research Facility, Rodney Stevenson, (608) 263-4992

**Information:**

**Organization Name: NARUC**

**Address:** National Association of Regulatory Utility Commissioners

P.O. Box 684

Washington, DC 20044

**Phone:** (202)898-2200

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):** Mike Foley

**Information:**

**Organization Name: NASEO**

**Address:** National Association of State Energy Officials

613 G Street NW

5th Floor

Washington, DC 20001

**Phone:** (202)639-8749

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):** Frank Bishop

**Information:**

**Organization Name: National Hydropower Association**

**Address:** 1133 21st Street NW, #500  
Washington, DC 20036

**Phone:** (202)331-7551

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):** Elaine Evans

**Information:**

**Organization Name: National Wood Energy Association**

**Address:** 777 N. Capitol Street NE  
Suite 805  
Washington, DC 20002

**Phone:** (202)408-0660

**Fax:** (202)408-8536

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:**

**Organization Name: NCAT**

**Address:** National Center for Appropriate Technology  
P.O. Box 2525  
Butte, MT 59702-2525

**Phone:** (800)428-2525

**Fax:**

**Toll Free:** (800)428-2525

**BBS Number:**

**Contact Person(s):** Tom Wulf

**Information:**

**Organization Name: Public Service Commission of Wisconsin**

**Address:** P.O. Box 7854  
Madison, WI 53707

**Phone:** (608)266-3595

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

(Organization, Name, Phone #)

Solar, Terry Kosobucki, (608) 266-3595

Photovoltaic, Terry Kosobucki, (608) 266-3595

**Other related fields:**

Least Cost Utility, Anita Sprenger, (608) 267-3590

Social Cost of Energy, Dave Iliff, (608) 266-3905

Public Utility Commission, Cheryl Pofahl, (608) 267-7897

Energy Efficient Housing, Paul Neuman, (608) 267-5112

Wind, Terry Kosobucki, (608) 266-3595

Hydropower, Terry Kosobucki, (608) 266-3595

**Information:**

**Organization Name: SRCC**

**Address: Solar Rating & Certification Corporation**

777 North Capitol Street, N.E.

Suite 805

Washington, DC 20002-4226

**Phone:** (202)408-0306

**Fax:** (202)408-8536

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

**Information:** The Solar Rating & Certification Corporation is an independent, non-profit organization which certifies and rates the performance of solar energy equipment. The SRCC was formed in 1980 by the Solar Energy Industries Association (SEIA), the national solar trade association, and the Interstate Solar Coordination Council (ISCC), which represents state governments and publicly-owned utilities. Today, as an independent organization, SRCC works closely with these groups, while it is governed by its own board of directors.

The SRCC currently operates three major solar programs: collector certification (OG 100), water heating system certification (OG 200), and a preferred optional rating and certification for solar water heating systems (OG 300). The collector certification program (OG 100) applies to that part of a solar energy system which is exposed to the sun and collects the sun's heat. The collectors can be used to heat water, buildings, and for other purposes. The solar water heating system certification program (OG 200) deals with the entire solar system (collectors, controls, storage tanks, heat exchangers, pumps, etc.) used to heat domestic hot water using the sun. The OG 300 rating and certification program for solar hot water systems is a preferred option to the OG 200 system rating. It integrates results of collector tests and system tests and determines whether systems meet minimum standards for system durability, reliability, safety and operation; as well as factors affecting total system design, installation, maintenance and service.

A direct comparison of an SRCC rated collector to an SRCC rated solar water heating system is not possible. The reason for this is two-fold. First, the collector rating shows the performance of one component in the solar package while the system rating shows the performance of the entire package. Second, each rating, whether a collector rating or a system rating, is developed using a separate set of assumed conditions. Neither can direct comparisons be made between systems rated under OG 200 and OG 300 protocols because the OG 300 protocol includes evaluation of total system performance as well as factors affecting safety and long term performance. (Source: SRCC Catalog 1993)

**Organization Name: Wis. Housing & Economic Dev. Auth.**

**Address:** Wisconsin Housing & Economic Development Authority

31 W. Wilson

Madison, WI 53702

**Phone:** (608)266-5556

**Fax:**

**Toll Free:**

**BBS Number:**

**Contact Person(s):** Salli Martiniak

**Information:** Information available on loan programs for businesses and homeowners using oil overcharge funds.

**Organization Name: Wisconsin Energy Bureau**

**Address:** P.O. Box 7868

Madison, WI 53707-7868

**Phone:** (608)266-8234

**Fax:** (608)266-2164

**Toll Free:**

**BBS Number:**

**Contact Person(s):**

(Format: Organization, Name, Phone, FAX)

Solar, Dan Moran, (608) 266-1067, (608) 266-2164

Photovoltaic, Jim Mapp, (608) 266-8020, (608) 266-2164

**Related Offices:**

ISCC Delegate/Contact, Donald Wichert, (608) 266-7312, (608) 266-2164

Energy Office, Wisconsin Energy Bureau, (608) 266-8234, (608) 266-2164

Energy Information, Barbara Samuel, (608) 266-8871, (608) 266-2164

NASEO, John Marx, (608) 266-8870, (608) 266-2164

Wind, Dan Moran, (608) 266-1067, (608) 266-2164

Biomass, Dan Moran, (608) 266-1067, (608) 266-2164

Liquid Fuels Contact, Jim O'Neal, (608) 266-8921, (608) 266-2164

Waste-to-Energy, Don Wichert, (608) 266-7312, (608) 266-2164

Hydropower, Dan Moran, (608) 266-1067, (608) 266-2164

Energy Education, Barbara Samuel, (608) 266-8871, (608) 266-2164

Energy Efficient Housing, Gary Gorlen, (608) 266-8269, (608) 266-2164

**Information:**