



SOLARBEAM[™]

PARABOLIC SOLAR CONCENTRATOR





ABOUT SOLARTRON

Solartron Energy Systems Inc. (Solartron) is the designer and manufacturer behind the revolutionary SolarBeam™ parabolic dish. The designers and engineers behind the SolarBeam™ foresaw the need to engineer an affordable system capable of producing high thermal energy.

Solartron is not new to the energy sector. The executive team at Solartron has over 18 years' experience in manufacturing innovative energy conservation products for commercial and industrial applications. With their extensive experience in engineering state-of-the-art products, the SolarBeam™ is designed as an industrial yet elegant system.

The SolarBeam™ is manufactured in Michigan, USA for distribution in North America and Australia while Solartron Spain distributes throughout Europe and Middle East.

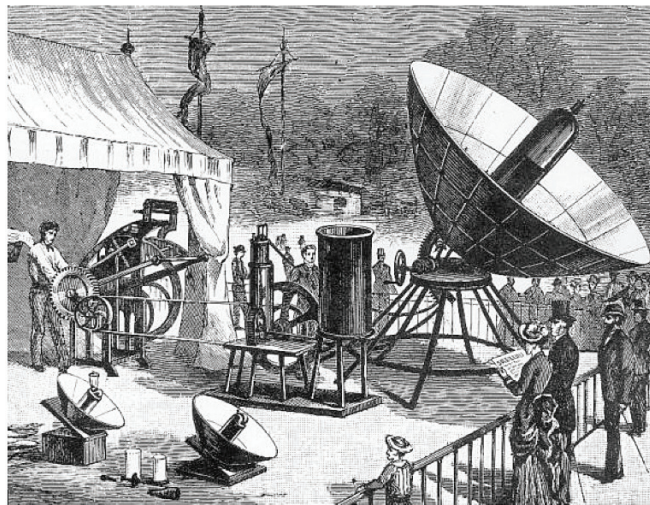


HISTORY OF CONCENTRATED SOLAR POWER (CSP)

The concept of harnessing the sun's energy dates back as far as 1774 when Antoine Lavoisier created a large device that had a glass lens that focused the sunlight into a focal point over material for combustion.

Later in 1878 a parabolic collector was showcased and reflected the sun's energy onto a steam boiler which operated a small engine that ran a printing press.

Recently, the development of sophisticated CSP increased but mainly for large scale utility production with the use of parabolic troughs and parabolic sterling engine systems. Solartron saw a need to target smaller scale applications that can benefit directly from free solar energy.



CERTIFICATIONS

SolarBeam™ is the first parabolic dish in the world to be tested to the following standards:

- USA: SRCC 600
- Europe: EN – 12975-2 Standard (KeyMark)
- Australia & New Zealand: AS NZS 2712
- Canada: CSA

TECHNOLOGY

The SolarBeam™ Concentrator achieves peak 11.5 kW (39,239 BTU/hour) of thermal heat per hour by tracking the sun with flawless precision and collecting the sun's radiation from a 15.8 m² (160 sq.ft) surface area and focusing the energy on a 25x25cm (10x10") absorber.

Instead of using traditional sun light sensors or inclinometers to determine the sun's position, the SolarBeam™ uses a sophisticated patent-pending celestial tracking system. The result: dish does not hunt for the sun, consistent sun-lock throughout the year, and seamless movement.

The SolarBeam™ Concentrator was designed as a low maintenance system capable of providing temperatures up to 93° Celsius (199.4° Fahrenheit) for the following applications:

- Process heating
- Space heating
- Cooling with adsorption / absorption chillers
- Future electricity production with CPV cell technology



DESIGN

The design of the SolarBeam™ blends art with form and functionality. With many engineers and architects designing buildings of the future, the SolarBeam™ seamlessly integrates with their vision. The SolarBeam™ makes more than a statement - it is a land mark.

Meticulous attention to detail starts from the mechanical design stage. Stress point simulation is performed to ensure maximum strength and durability in different weather conditions.



The reflective petal is made of a special “glass-infused” anodized aluminum specifically engineered for maximum solar reflectance and superior corrosion resistance. The material is extremely durable and unlike glass, it will not break. The reflective efficiency of the petal is 86% - harnessing every ray of the sun’s solar radiation.

Our engineers designed the powertrain with stainless steel bearings and shafts for long lasting performance. The frame is a heavy duty steel construction coupled with an industrial grade slew drive. The skirting and truss is made of high grade aluminum.

The Stone Grey semi-gloss paint used throughout the SolarBeam™ body conforms to CSL standard for industrial use within a high humidity and aggressive environment.

The petal’s patent-pending curvature makes the SolarBeam™ the only system in the world to maximize the solar potential for thermal and concentrated photo-voltaic power.

All electrical cable assemblies are IP66 rated for maximum protection from the elements. The polycarbonate control box is designed to meet IP 66 & NEMA 4, 4X, 12 & 13 ratings.



PERFORMANCE & RELIABILITY

SolarBeam™ maintains an average 10.5kW (35,827 BTU/hour) of thermal energy and a 64% efficiency at delta T of 50°C (122°F). This is all made possible thanks to the patent pending design of the dish petal and high efficiency absorber.

The results speak for themselves. The SolarBeam™ outperforms glazed flat plate, evacuated tube, and concentrated thermal systems for efficiency and kW output. In addition to the instantaneous energy output performance, the SolarBeam™ is 30% more efficient than systems that do not track the sun.

The SolarBeam™ has been tested in the harsh, cold Canadian winters to ensure high performance and durability. The SolarBeam™ was engineered to handle any weather condition including high and low ambient temperature, snow load and strong winds. The system is designed for 20 + years of low maintenance operation.

INSTALLATION

Complicated? No. When designing the system for field installations, our engineers were motivated to keep it simple. And simple - they did. The whole SolarBeam™ assembly is designed to be assembled in a fast and easy manner. One system can be assembled in one day.

The dish is pre-assembled on the ground and the 3 major components are put in place in 3 easy steps:

Step 1: Pole

Step 2: Powertrain

Step 3: Dish

An insulated dual PEX tubing, is used as the medium to transfer the fluid from the SolarBeam™ to the facility. In addition, 24VDC communication and power cables are fed from the building through the post to the SolarBeam™ control box.

Ground or roof mount – it’s your choice. For ground applications a pre-fabricated concrete pier, pre-fitted with all necessary conduits, is available for a faster installation.

Many urban areas may not have the ground real estate but have plenty of unused roof space. The SolarBeam™ is engineered to be roof mounted with our available roof mount kit.

SAFETY

To ensure a reliable system, the SolarBeam™ was engineered with various safety features. Below are a few of the many features provided in the system:

HEAT STAGNATION

Heat stagnation is one of the biggest concerns for all solar hot water installers. If the heat is not removed, critical temperature strain on components will occur along with damage to the collector. In addition, glycol and its additives become unstable at high temperatures making the system susceptible to freezing and corrosion of components.

SolarBeam™ has an Advanced Protection System (APS) which prevents heat stagnation from occurring. Multiple sensors monitor the fluid temperature and the SolarBeam™ will automatically move away from the sun if the temperature of the primary loop has been achieved. When additional heat is required, the SolarBeam™ automatically resumes tracking.

WIND CONDITIONS

The SolarBeam™ tracks the sun in winds up to 65 km/hour (40 mph). For winds that have a consistency above 65 km/hour (40 mph) the SolarBeam™ tilts to its “safety stow” position.

POWER OUTAGE

In an event of a power outage, a UPS (Uninterruptable Power Supply) moves the dish to the “safety stow” position. When the power resumes, a 1 hour lock-out ensures that the UPS is charged before it resumes auto tracking.

PRESSURE LOSS

If the pressure in the primary loop drops below 7 PSI, the SolarBeam™ automatically moves the dish to “safety stow” position.



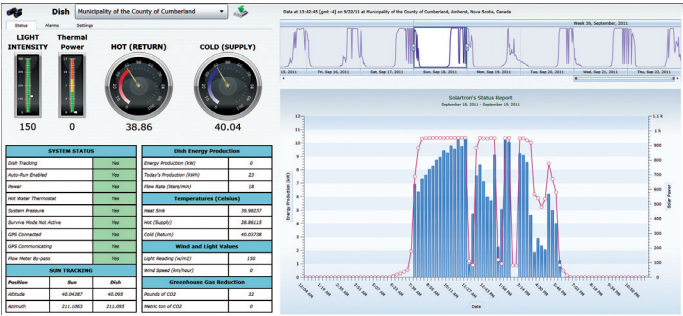
REMOTE MONITORING & SETUP

Though generating maximum solar power is thrilling in itself, the SolarBeam™ is packed with other features. The Solarbeam™ Dashboard is the world's first dashboard that not only provides energy production reporting but also system diagnostic, and setup via the website: www.solarbeamdashboard.com.

Each SolarBeam™ around the world is connected to an Ethernet or GSM/GPRS communication line. A central server communicates with the SolarBeam™ and logs the performance and status of the SolarBeam™. The SolarBeam™ can be remotely configured and allows for immediate set point changes.

In the event of an alarm or alert, the unit sends out an email to designated personnel. All alerts can be customized according to the notification the user wants to receive.

In order to provide periodic updates, the control units can receive automatic firmware updates to keep all systems up to date.



“EFFICIENCY”

Defined as the ratio of collected energy to the available energy falling on the entire collector area.

TABLE OF EFFICIENCY AND TEMPERATURE DIFFERENTIAL

Delta T	SolarBeam™	Glazed Flat Plate	Evacuated Tube
0°C / 32°F	0.73	0.72	0.50
10°C / 50°F	0.72	0.67	0.49
30°C / 86°F	0.69	0.56	0.47
50°C / 122°F	0.64	0.46	0.45
60°C / 140°F	0.61	0.41	0.44

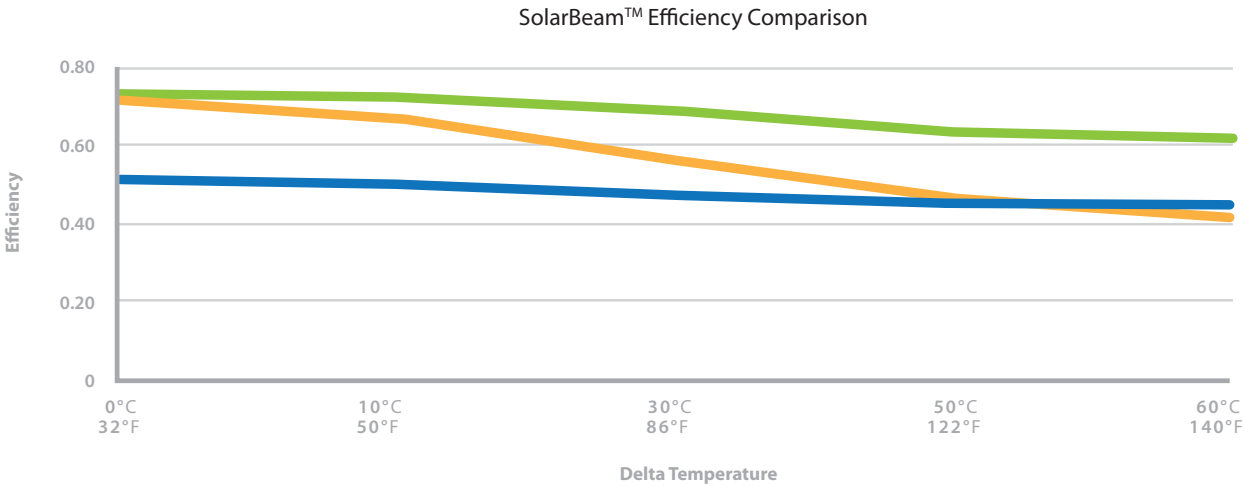
The comparison was based on data for the SolarBeam Concentrator and SRCC reports for manufacturers of glazed flat panel and evacuated tube systems.

The following equation was used for the thermal performance of the SolarBeam collector as per SRCC data:

$$Q / A = F'(\tau\alpha)_{en} K_{0b}(\theta) G_b + F'(\tau\alpha)_{en} K_{0d} G_d - c_6 u G^* - c_1 (t_m - t_a) - c_2 (t_m - t_a)^2 - c_5 dtm/dt$$

Efficiencies for non-concentrating collectors were calculated using the formula below:

$$\text{Efficiency} = F \text{ Collector Efficiency} - (\text{Slope} \times \text{Delta T}) / G \text{ Solar Radiation}$$

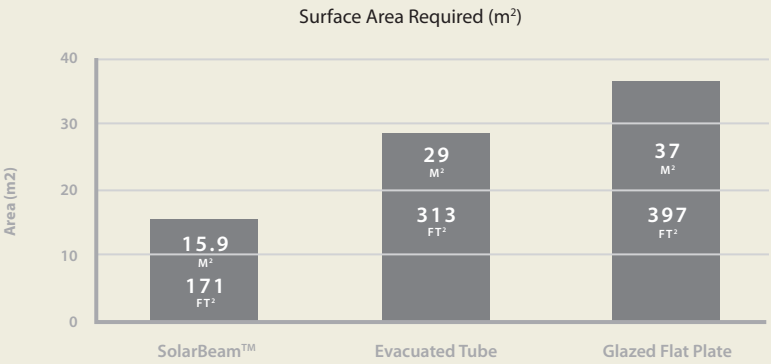


CPV

Generating high thermal efficiency is one thing. Generating electricity is another. Our engineers are working on merging the two to provide a hybrid system all packed into a small area.

The future CPV (Concentrated Photo-voltaic) add-on will provide peak 3.5 kW per hour of electricity. This breakthrough technology utilizes a triple junction CPV cell with an operating efficiency of 31%.

With a dish collector area of 15.8 m² focusing on a CPV panel area of 226 cm², the SolarBeam™ drastically reduces space requirements and maintenance as compared with conventional PV panels.



The information is based on 50° Celsius delta temperature and an average 6.8 kWh/m² direct beam radiation for Phoenix, Arizona, USA. The corresponding surface area of glazed flat panels and evacuated tubes were calculated to match the kWh thermal production of one SolarBeam.

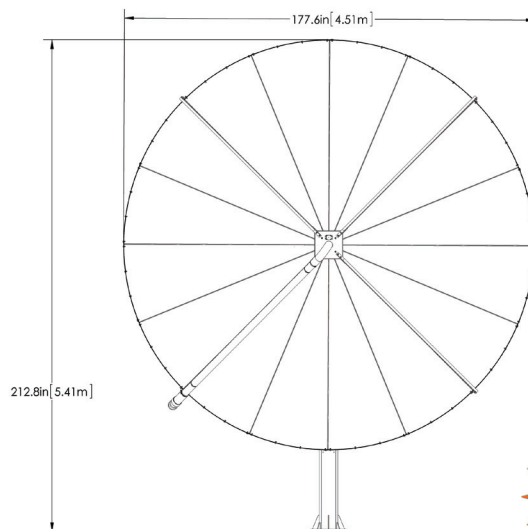
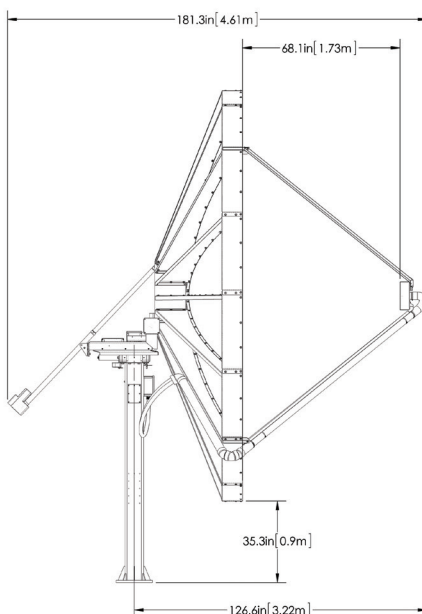
CONTACT US

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SOLARBEAM™ SPECIFICATIONS

Hot Water Production @ 1000 W/m ² Radiation	
Peak kW	11.5 kW
Peak BTUs	36,534 BTUs/hr
Average kW	10.5 kW
SRCC Efficiency	73%
Dimension and Area	
Reflector Diameter	4.5 m (14.7 ft)
Gross Area of Collector	15.9 m ² (171 ft ²)
Absorber Size	25.4cm X 25.4cm (10" X 10")
Gross Area of Absorber	0.0645 m ² (99.72 in ²)
Focal Point Distance	2.2 m (86.63")
Mounting Post	2.4 m (8 ft)
SolarBeam Parameters	
Optical Efficiency	86%
Tracking	Dual Axis
Volume of Fluid in Absorber	550 mL
Max Operating Pressure	25 PSI (1.72 Bar)
Stagnation Temp 1000W/m ² at 30° C	93° C (199° F)
Flow Rate	15 -18.9 (Liters/Min) / 4 -5 Gal/min
Collector Weight	240 kg (529 lbs)
Total Weight	463 kg (1,020 lbs)
Passed to Frost Level 2	- 25° C (- 13° F)
Maximum Absorber Temperature	145 C (293 F)
Maximum Fluid Temperature of Primary Loop	93° C (199° F)
Maximum Fluid Temperature of Secondary Loop	93° C (199° F)
AC Power Interruption Protection	Automatic Solar Concentrator Shut-down to Survival Position (90 Degree Vertical Axis)
Heat Transfer Fluid	Propylene Glycol/Water Solution (50%/50% to -30° C)

Power Consumption	
Input Voltage	24 VDC
Vertical Axis Motor	24W, 2A
Horizontal Axis Motor	12W, 0.5A
Power Back Up	UPS Battery
Enclosure Ratings	
Cable Assembly	IP66
Controller Interface	IP66 and NEMA 4
Paint	
Color	Stone Grey
Environment	ISO 12944-C5I
Protection Features	
Power Outage	Safety stow
Over Temperature Protection	Safety stow
Wind Speed Protection	Safety stow
Horizontal Monitor Axis	Home Position
Vertical Monitor Axis	Home Position
Pressure Loss	Safety stow
SolarBeam Controller	
Voltage	120 /220 V
Current	5A
Analog Inputs	4x / 0-10VDC
Pulse Inputs	6x
Output Voltage	24 VDC
Frequency	50/60 Hz
Communication	Ethernet
Dimension	51 cm x 40.64 cm x 17.78 cm (20"X16"X7")
Enclosure Rating	NEMA 1
Electrical Rating	QPS (UL/CSA Equivalent)
Tested to Certification Standards	
USA Standard	SRCC 600
Europe Standard	EN 12975-2 (KeyMark)
Australia/New Zealand Standard	AS/NZS 2712
Canada Standard	CSA



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