

Parabolic Trough Concentrator

# SkyTrough®

SkyFuel 

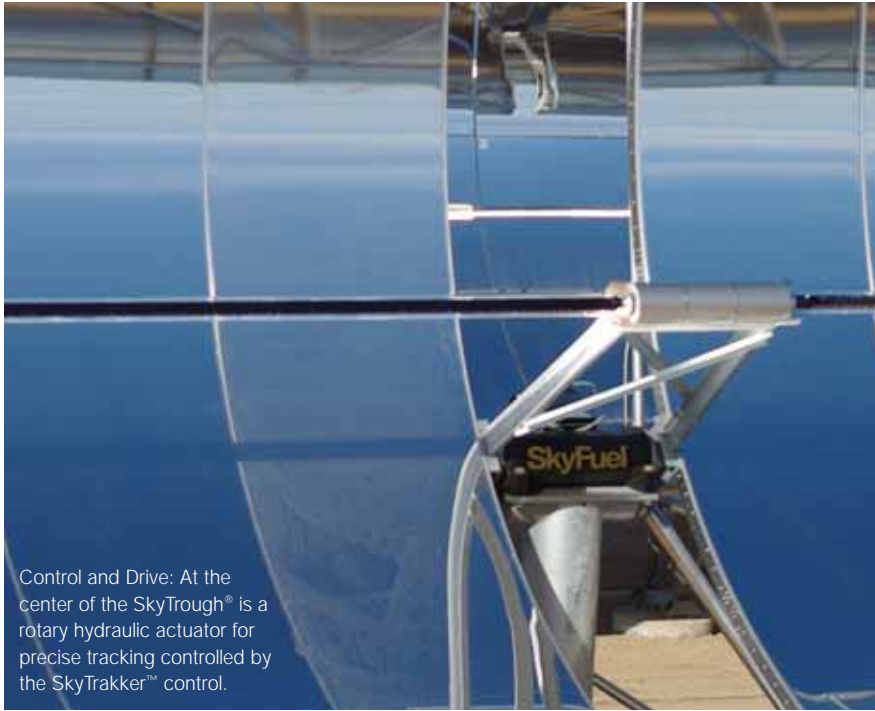


Product Information

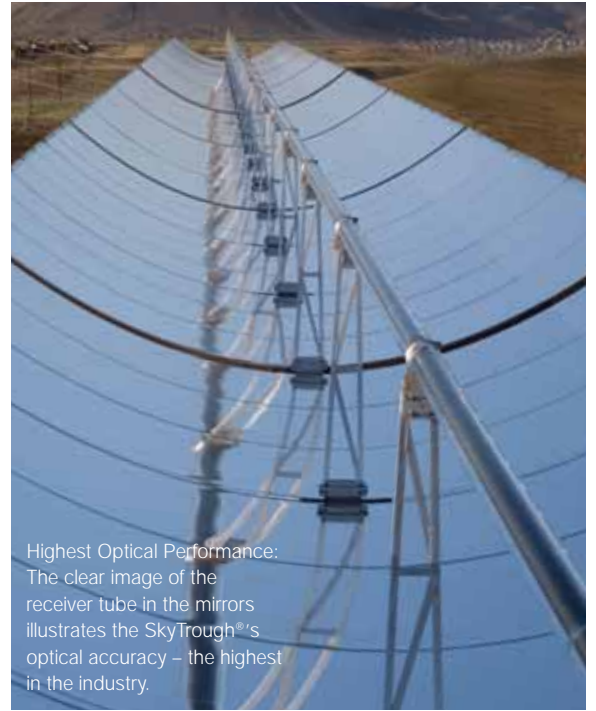
## Next-Generation Solar Parabolic Trough Technology

[www.SkyFuel.com](http://www.SkyFuel.com)





Control and Drive: At the center of the SkyTrough® is a rotary hydraulic actuator for precise tracking controlled by the SkyTrakker™ control.



Highest Optical Performance: The clear image of the receiver tube in the mirrors illustrates the SkyTrough®'s optical accuracy – the highest in the industry.

## Product Information

### Description

The SkyTrough® is a high-performance parabolic trough concentrating solar power collector for use in utility-scale solar thermal power plants or industrial process heat applications. Its breakthrough design is patterned after the best of the previous utility-scale parabolic trough designs with important innovations that improve performance and significantly reduce cost. SkyTrough® makes Concentrating Solar Power the affordable, dispatchable choice for today's clean power markets.

Each SkyTrough® solar collector assembly is 115 meters long with an aperture that is 6 meters in width. The collectors are modular and allow solar fields of different sizes to fit a wide variety of applications.

### Advantages

SkyTrough® collectors are designed to deliver the proven reliability of traditional glass-mirror parabolic trough systems, but with several performance and economic advantages that stem from significant design and material innovations, including the use of ReflecTech® Mirror Film in place of sagged glass mirrors, the OnSun™ rotary hydraulic drive system with advanced SkyTrakker™ Sun tracking controls, and the lightweight, fast-assembly space frame.

### SkyTrough® Advantages

- Significant Cost Reductions
- Unbreakable Mirrors
- Rapid Field Assembly
- Compact Transportation
- Low Maintenance

### Construction

The highly reflective surface of the SkyTrough® is a glass-free, silver-metalized polymer film called ReflecTech® Mirror Film. This proprietary mirror-film is weather resistant, easy to maintain, lightweight and commercially proven.

ReflecTech® Mirror Film is laminated to aluminum sheets to create a revolutionary rib-and-panel parabolic mirror which are integrated into an aluminum space frame to form the parabolic mirror surface of each module.

The space frame is made of extruded aluminum struts and other components that are precisely fabricated and it is self-aligning when joined together with fasteners, requiring no welding.

The entire assembly is mounted on pylons and attached to a self-locking rotary hydraulic drive enabling the SkyTrough® to pivot and track the Sun.



Novel Rib and Panel Structure:  
The SkyTrough® features an innovative space frame design and introduces a rib and panel mirror structure – a first for large-scale parabolic trough.

## Proven Performance of Parabolic Troughs

Parabolic trough concentrators have powered the Solar Energy Generating Systems (SEGS) in California’s Mojave Desert for over 20 years, producing over 350 megawatts of electricity, and serving as crucial proving grounds for new parabolic trough designs and components, including the SkyTrough®. The newest stand-alone parabolic trough concentrating solar plant in the United States, the Nevada Solar One 64-megawatt plant located near Las Vegas, Nevada, came online in the summer of 2007. Additional parabolic trough plants are now operating in Spain and more are planned and under construction in the region.

A SkyTrough® collector loop, with ReflecTech® Mirror Film and OnSun™ tracking system, has been operating at SEGS II in Daggett, California since February 2010. Performance data collected from the operating loop confirm the 73% thermal efficiency predicted by testing at the U.S. National Renewable Energy Lab (NREL). The ReflecTech film has demonstrated optical durability of over 20 years in NREL’s Ultra Accelerated Weathering System.

## Availability

The SkyTrough® is ready today, for global delivery. Please contact us to learn more about the SkyTrough® and how it can become a part of your solar-thermal project. The SkyTrough® is robust and versatile, capable of delivering thermal energy to new solar power plant projects, existing power plants, or industrial process heat applications.

## SkyTrough® Innovations

The weight savings of ReflecTech® Mirror Film over glass leads to easier and more rapid reflector installation. Each ReflecTech® mirror panel is one-third the weight of its sagged glass mirror equivalent. The lighter space frame uses less material, is easier to ship and requires less labor to assemble in the field.

The SkyTrough® uses a new version of the industry leading SCHOTT thermal receiver. The receiver is held along the full length of the collector’s focal line. An oil-based heat transfer fluid flows through the receiver to absorb the Sun’s energy and then delivers the thermal energy to a heat exchanger, where it generates steam for power generation or industrial processes.



SkyTrough® solar collectors in operation at SEGS II in Daggett, California.

## SkyTrough® Specifications

### Geometry

Total Solar Collector Assembly <sup>(1)</sup> Length	115 m	377 ft
Net Aperture Area <sup>(2)</sup>	656 m <sup>2</sup>	7,061 ft <sup>2</sup>
Number of Modules <sup>(3)</sup>	8 per Solar Collector Assembly <sup>(1)</sup>	
Module Aperture Length	13.9 m	45.6 ft
Module Aperture Width	6 m	19.7 ft
Receiver Type	SCHOTT PTR™80	
Absorber Tube Diameter	80 mm	3.15 in

(1) The Solar Collector Assembly ("SCA") length comprises the modules, pylons, control and drive, and ball joints (one at each end).

(2) Used for any metric expressed in [XYZ]/m<sup>2</sup>

(3) A module is the parabolic mirror and receiver unit supported by a pair of pylons.

### Performance

Thermal Efficiency <sup>(1)</sup>	73%
Design Point Thermal Output <sup>(1)</sup>	480 kW-th
Indicative Design Point Gross Electric Output <sup>(2)</sup>	180 kW-e
Optical Efficiency	> 77%
Typical Land Use	2 ha/MW-e      5 acre/MW-e
Maximum Wind Speed (Stow)	135 km/h      84 mile/h      3 second gust

(1) Defined as (Gross Thermal Power)/(Solar Power) at 1,000 W/m<sup>2</sup> of direct normal solar radiation and 350°C heat transfer fluid temperature.

(2) At 37.5 % net thermal-to-electric efficiency

### Mirrors

Structural Backing	Aluminum Sheet
Reflective Surface	ReflecTech® Mirror Film
Specular Reflectance <sup>(1)</sup>	94%

(1) At 1.4° acceptance angle measured with a Device & Services Specular Reflectometer

### SkyTrakker™ Controller

Controller Communications	Network	RS485 Wired or 2.4 GHz Wireless Radio Frequency
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### Heat Transfer Fluid System

Typical Heat Transfer Fluid <sup>(1)</sup>	Therminol® VP-1		
Typical System Operating Temperature Range	Inlet	290°C	554°F
	Outlet	391°C	735°F

(1) Or other diphenyl oxide/ biphenyl blend such as DOWTHERM

**For more information, please contact:**

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