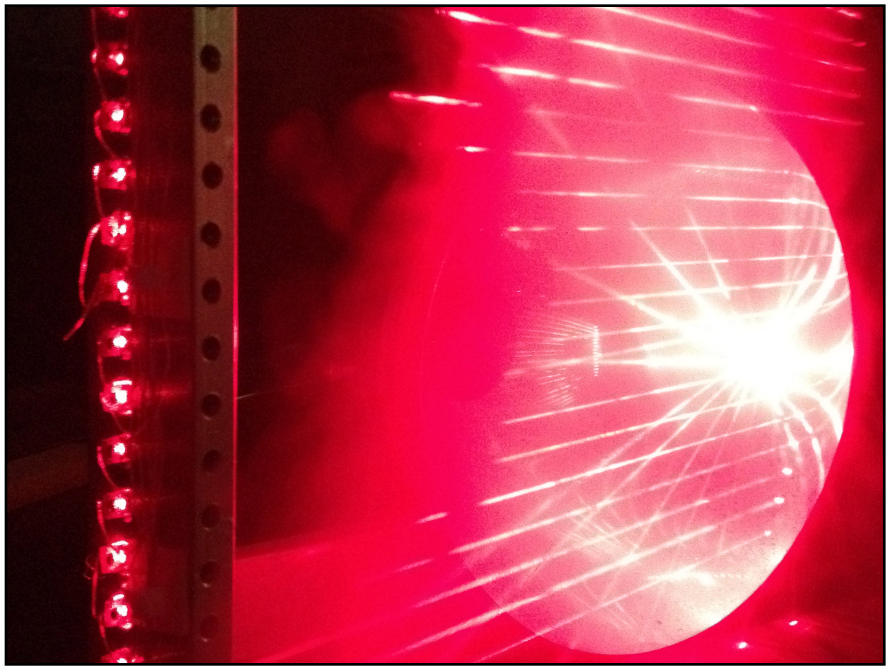
Low Cost Solar

New Ultra Lite™ Technology

Testing optics in SHEC Energy's LASER lab



Laser beams fire across the room in SHEC Energy's Q-Lab where testing of its latest technology has taken place. SHEC Energy's new proprietary solar concentrator is able to reduce solar collection costs by an estimated 73%.

The technology is applicable to:

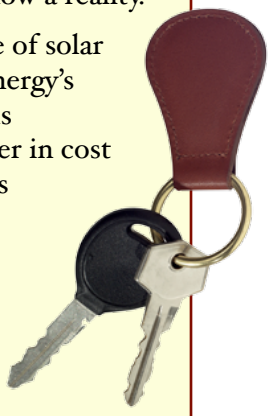
- trough concentrators
- point focus concentrators
- central tower designs

It can be used for power generation and heating.

Break Through Technology

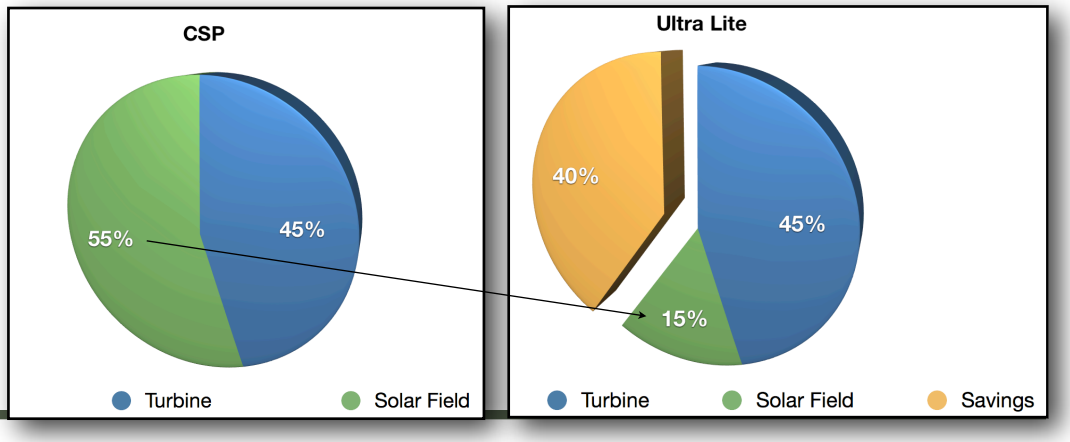
- Imagine producing solar power for similar or less cost than traditional polluting power generation.
- Imagine no more pollution or dependance on fossil fuels.
- Imagine no long-term radioactive waste from nuclear power.

You don't have to imagine any longer, it is now a reality.

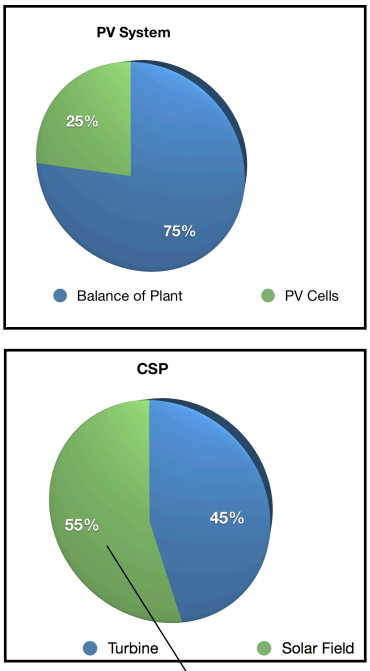


Key to the future of solar energy, SHEC Energy's new technology is substantially lower in cost than our previous generation technology. This could become a dominant technology for renewable solar power generation.

SHEC Energy's technology dramatically reduces what traditionally has been the highest cost component of Concentrating Solar Power (CSP), the solar collection field.



COMPARING PHOTO VOLTAIC (PV) TO CONCENTRATING SOLAR POWER (CSP)



Comparison of Plant costs makeup for PV and CSP. Similar total plant cost based on SHEC's original Technology.

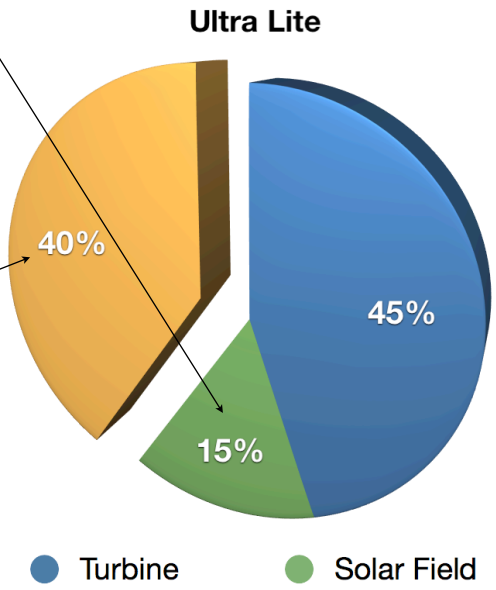
The cost of solar cells or Photo Voltaic (PV) as they are referred to in the industry, have dropped to as low as $0.70 per watt. This, however, is not the cost of a PV system. An entire system prices in between $3.00 and $3.50 per watt. Other system components include encapsulation of the PV cell, wiring interconnect, mounting frames, and a power inverter for grid connect. Any further cost reductions in PV cell costs will not appreciably decrease the cost of PV systems. The nice thing about PV systems is that they are scaleable from very small systems to large. Concentrating Solar Power (CSP) in comparison cannot scale to very small and are more expensive on a small scale. Solar thermal power systems become economical on a larger scale using steam turbines that are commonly used in power plants today. Using SHEC Energy's previous technology, it would price similarly to PV-based systems on a larger scale of about 100 megawatts. The big difference comes in when adding energy storage. Storing electrical energy from PV is generally much more expensive than storing thermal energy for CSP systems.

SHEC Energy has now made breakthroughs in its low cost Ultra Lite™ solar power generation technology and in its thermal energy storage technology that can lower prices even further.

SHEC Energy has the potential to reduce the solar field cost as depicted in the CSP pie chart by about 73% with it's Ultra Lite™ technology.

PROJECTED SAVING WITH ULTRA LITE™ TECHNOLOGY

Assume 73% cost reduction in the Solar Field. (55% reduces to 15%)



A 73% reduction in solar field costs would result in an overall savings of about 40% in total plant cost.

In a Base-Load solar power plant, cost saving could be as high as 50% for an Ultra Lite CSP plant with thermal storage compared to a PV plant with lead acid battery storage.

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SHEC Energy's Ultra Lite technology can be configured for a number of solar collection implementations as follows:

Point Focus

A typical solar collection and concentration system uses mirrors to reflect solar rays from a wide area onto a much smaller target such that the solar energy from the wide area is concentrated at the target. In concentrating point focus systems, a parabolic dish focuses sunlight onto a solar receiver. The parabolic shape is preferred as it focuses the solar rays on a small target, thereby increasing the temperature at the target. Dishes can typically vary in size and configuration from a small diameter of perhaps 1 meter to much larger structures of a dozen or more meters in diameter. Point focus dish concentrators are mounted on tracking systems that track the sun in two axes, directly pointing at the sun, and the receiver is attached to the dish at the focal point so that as the dish moves, the receiver moves with it. These point focus systems can generate high temperatures in excess of 1700ºC.

Trough

A trough concentrator is a long concave trough-shaped concentrator that forms a line focus instead of a point focus as is achieved in both the Point Focus Dish and Central tower designs. Again, a parabolic shape is preferred for the cross section of the trough to concentrate the rays on a narrow line. This has typically been the lowest cost solar collection technology due to its simplicity. The long trough concentrator focuses its light onto a solar receiver tube that runs the length of the solar trough concentrator. Depending on the latitude of the location, the troughs are oriented length wise in a North-South or East-West direction, and then pivot on their longitudinal axes such that the concave face of the trough follows the sun. These trough concentrators thus are only required to pivot on one axis, rather than on two axes as is required with point focus concentrators. Trough concentrators cannot produce as high a temperature as either the point focus dish or central tower designs since it cannot focus to a point and can only focus to a line. Temperatures of typically less than 600ºC can be achieved.

Tower

In central tower systems a solar receiver is mounted at the top of a tower. The tower is surrounded by heliostats, which are flat mirrors that redirect sunlight to the top of the tower and are controlled to track the sun so that sunlight is reflected in a constant direction at the receiver. Hundreds or thousands of heliostats may work in unison to direct sunlight to the top of the tower to generate high temperatures from 500ºC to 1,100ºC or more, typically used to operate a steam turbine.

Concentrating Photo Voltaic (CPV)

SHEC Energy's concentrator technology can be applied to CPV applications, reducing the cost of PV based systems.

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SHEC Energy's Ultra Lite technology configuration can be implemented for the following applications:

Utility Scale Power Generation

SHEC Energy is able to use its trough concentration technology for utility scale power generation. Traditionally solar troughs make up the large majority of CSP plants in operation today. The simplicity of this technology has traditionally made it the lowest cost CSP for utility scale power generation. CSP has the advantage of using thermal energy storage very cost effectively to store energy for continuous power production after the sun has set. Trough CSP plants typically operate at a lower efficiency when applying thermal storage due to the temperature drop that is required when storage is applied. Although trough systems may generate temperatures of up to 560ºC when using molten salt as the heat carrier, when going through storage, the typical delivered temperature to the turbine is about 280ºC. Turbines operating at these temperatures are not as efficient as their higher temperature cousins. Nonetheless, these are typically lower cost plants on a cost per unit of energy basis due to the simplicity of the design.

SHEC Energy is able to deploy hybrid CSP plants that implement a combination of trough concentrators and higher temperature point focus or solar towers to produce higher temperatures at the lowest cost possible. The higher temperatures significantly boost the operating efficiency of the turbine in a system employing thermal energy storage. The secondary point focus of tower component of the hybrid plant boosts the temperature for the trough solar field resulting in higher temperatures that can be stored using SHEC Energy's high temperature storage technology capable of storing close to 900ºC. Temperatures from storage in this instance could be on the order of 560ºC, the temperature of most modern turbines similarly used in coal fired power plants.

SHEC Energy's higher temperature hybrid plants could retrofit existing coal, oil, gas and even nuclear fueled steam turbine power plants since they are temperature compatible. This has several advantages. Existing infrastructure can be used. Deployment can be very rapid since the power plants are existing and only the solar field and solar boiler have to be deployed. Dramatic fossil fuel reductions and resulting pollution reductions can be realized. The fossil fuel capability of these plants can provide backup from fossil fuels for prolonged cloudy conditions.

Smaller Scale Power Generation

SHEC Energy's point focus concentrator technology and high efficiency solar receiver technology can be used for smaller scale power generation using Stirling engines or steam engines. Typical engines can range from 10 kilo watts to 250 kilo watts. Systems of this size use as little as one engine or hundreds can provide smaller scale power needs ranging from villages, neighborhoods, acreages, farms and industry.

For even smaller systems Concentrating PhotoVoltaic (CPV) can be implemented with SHEC Energy's concentrator technology. By concentrating sunlight on PV cells, more economical PV solutions can be deployed.

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SHEC Energy's Ultra Lite technology configuration can be implemented for the following applications:

Heating

CSP systems can co-generate heat and distilled water. It is possible to deploy heating systems only that can be used for applications such as:

- Building Heating
- Industrial Process Heating
- Thermo Chemical Processing
- Energy Carrier Reconstitution
- Distilled Water

Absorption Cooling

If it's hot, you don't need heat, but rather, air conditioning. Heat can be used to drive absorption cooling systems in a similar way that a propane refrigerator using heat to cool. In hot climates around the world where there is an abundance of sunlight, this sunlight can be put to work to cool buildings, homes and factories.

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