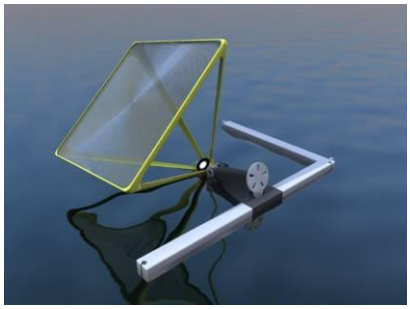
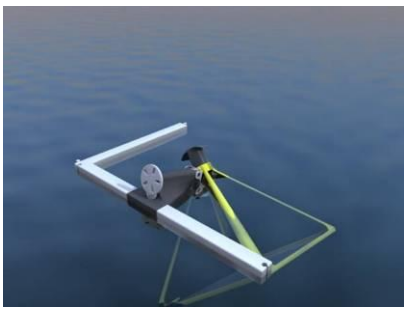
LSA TECHNOLOGY BRIEF

The LSA utilises well established solar and structural component technologies that have current and proven market reliability i.e. all technologies used are not revolutionary but evolutionary. It is LSA's application of these technologies in water that is unique and patented. LSA is a new PV concentrator using relatively lightweight plastic concentrators that float on water, mounted on anchored rafts. A thin plastic focusing concentrator lens rotates slowly to track the sun both daily and seasonally. A minimal amount of silicon (or other types of) photovoltaic cells are housed in a PV container that sits in the water where the cells are kept cool and efficient, through convective heat flow to the surrounding water. In bad weather the lens is protected by rotating it under the water to avoid damage in high winds, so the water becomes the vital structural component, cooler and protector. It is these applications of the water that are the basis for IP protection (patented so far in 10 countries including USA). The key feature of the LSA is its very low usage of materials and the simplicity of the materials used. Any further improvements in solar energy converter technology can be leveraged to reduce the LSA's cost per watt.
LSA is not bound by any particular solar technology and could potentially be applied not only to generating electricity, but other energy systems as well (such as the solar synthesis of fuels).

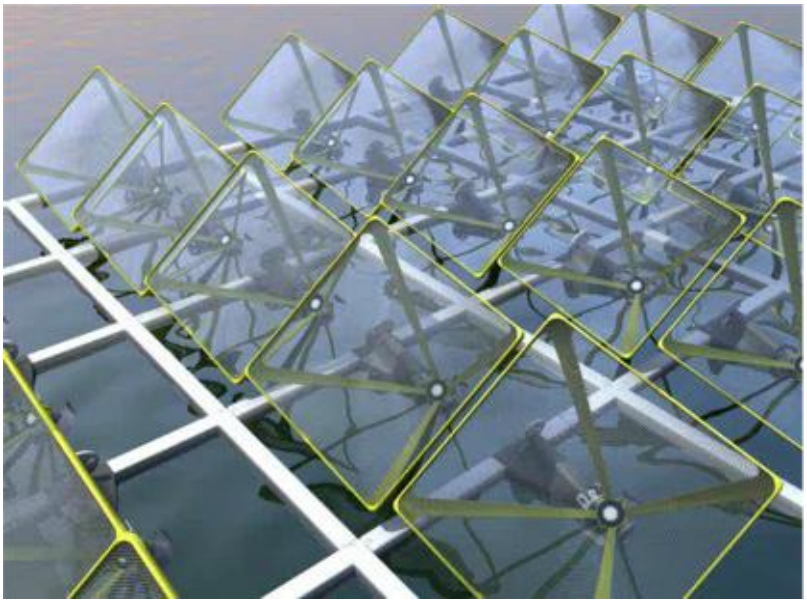
Core process The solar energy from direct sunlight is focused by a thin acrylic lens down through a glass lid, into a sealed, partially submerged metal well, containing photovoltaic cells. Collectors rotate tracking the movements of the sun by both a light sensor and dead reckoning software. A wind sensor is connected to the sun tracking software to submerge each unit into the water should winds rise above a predetermined force and return the lens to its tracking position once the winds have abated. The lens is water-sealed and is cleaned automatically. An inverter converts LSA power from direct current to alternating current, which is then connected to the power supply system (Grid).



Operating position

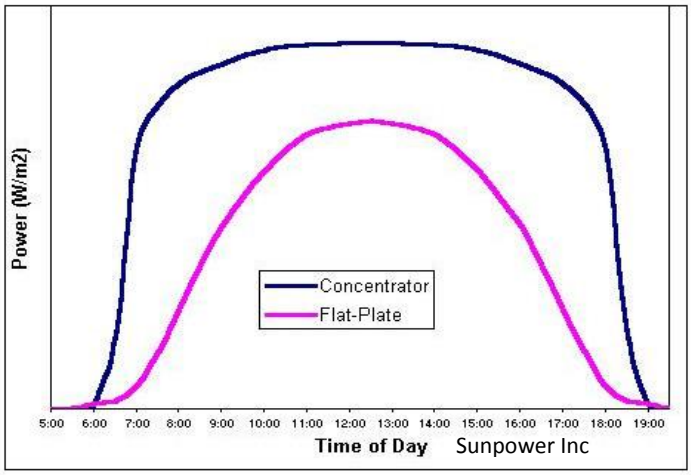


Protected position



As the name array implies, the LSA is designed to be modular and is rafted as the diagram (right) depicts. Each array is anchored to allow for changes in the water level and to keep them in position.

Limitations of conventional solar technology: High structural cost per watt of traditional solar power systems and available supply of silicon for the photovoltaic cells has limited its widespread acceptance.



Superiority over other solar technologies: LSA is a solar concentrator with medium to high efficiency; reduced structural cost through the use of water; lower silicon cost by using concentrators and eliminating overheating through the dual use of water. Experiment results (as reflected in the graph right) comparing flat plate photovoltaic system (pink line) and a LSA system that tracks the sun (blue line).There is significant difference in power produced and longer peak power output. Daily/seasonally tracking improves the efficiency and provides more peak hours of solar energy generation compared to flat plate PV cells

Structural advantage: The structure can be made from very light-weight, durable and inexpensive components that are widely available. One can expect lower maintenance as the unit is protected from extreme weather forces. Minimal land & setup cost and minimal mass, 12-14 kg per sq. M of collector. The process gives good efficiency and near constant output all day. Being modular, LSA is scalable from 1kW to Giga-watts. The use of small quantities of silicon implies rapid deployment of large capacity at lower cost.

Installation locations: LSA units can be commissioned on protected waterways from large-scale hydropower dams or mine pits to small-scale village dams or ponds (as illustrated below). The water can be fresh, salt or slightly caustic; LSA installations reduce evaporation and there is no toxicity in materials used.

Regions from light yellow (1,800hrs) through to dark red (3,500hrs) have good sunlight conditions for LSA