



Scalable Solar Solutions: **Power Generation** The Solution That Fits



THE SOPOGY VISION STATEMENT

Sopogy is dedicated to helping our customers achieve their renewable energy goals. Using our solar energy concentrator we help maximize energy production while minimizing costs.

Since 2002, SopoNova™ has undergone rigorous testing in the harsh Kona, Hawaii desert. There it was exposed to salt, humidity and storms.

ADVANTAGES

- Reduce Your Energy Cost
- Create Revenue Streams
- Lower Emissions
- Qualify for Renewable Energy Certificates
- Benefit from Tax Credits and Incentives



Environment



Economics



Engineering

MicroCSP Solutions By:



Figure 1: SopoNova 4.0

Overview

The benefits of solar power are compelling; the fuel is free, abundant and inexhaustible. In fact in just 1 year, six times as much useable solar energy hits the Earth as there is in total reserves from non-renewable sources. It is environmentally friendly, aids in the diversification of our fuel and energy supply, and is rapidly deployable.

Sopogy Technology for Generating Electricity

Thermal energy generated by using concentrated MicroCSP™ generate high temperature working fluid to drive either an organic rankine cycle power block that includes a turbine and generator or other thermally driven engines.

Competing Technologies for Generating Electricity

- 1) Conventional non-renewable fuel power plants using coal, natural gas, nuclear, etc.
- 2) Photovoltaic
- 3) Wind energy

Advantages of Concentrated Parabolic Trough Technology Over Non-Renewable Fuels

The primary advantage of the Concentrated Solar Power parabolic trough over non renewable technologies is that it is environmentally responsible using an emission free fuel source. Non-renewable technologies, require a refined fuel source, which is diminishing at an alarming rate, and are anything but environmentally benign.

Advantages of MicroCSP

In general, conventional fixed PV panels have an energy conversion efficiency of about 15 percent. In contrast, solar thermal plants convert the sun's energy to heat using parabolic solar concentrators that track the sun. The heat energy is used in a conventional steam-fired power plant or in an organic rankine cycle system to generate electricity. Efficiencies ranging from 20 percent to 40 percent are possible in these solar thermal power plants.

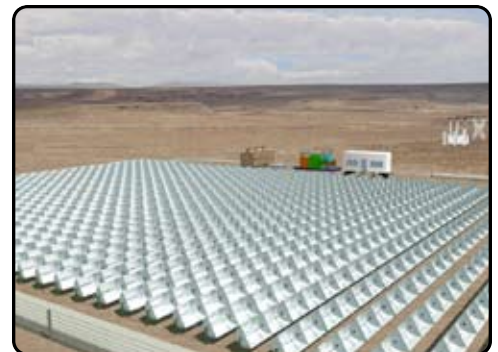


Figure 2: Solar Power Generation Deployment

Solar photovoltaic (PV) technology is well-suited to smaller, distributed installations in the kilowatt range, such as residential and commercial roof-tops. Solar thermal is more suited for large-scale, centralized energy generation in the megawatt and larger range.

Solar thermal has additional advantages over PV. Thermal energy storage can be used as a buffer against daily fluctuations due to intermittent cloud cover and can also shift or extend hours of power generation to match local utility peak pricing structures.

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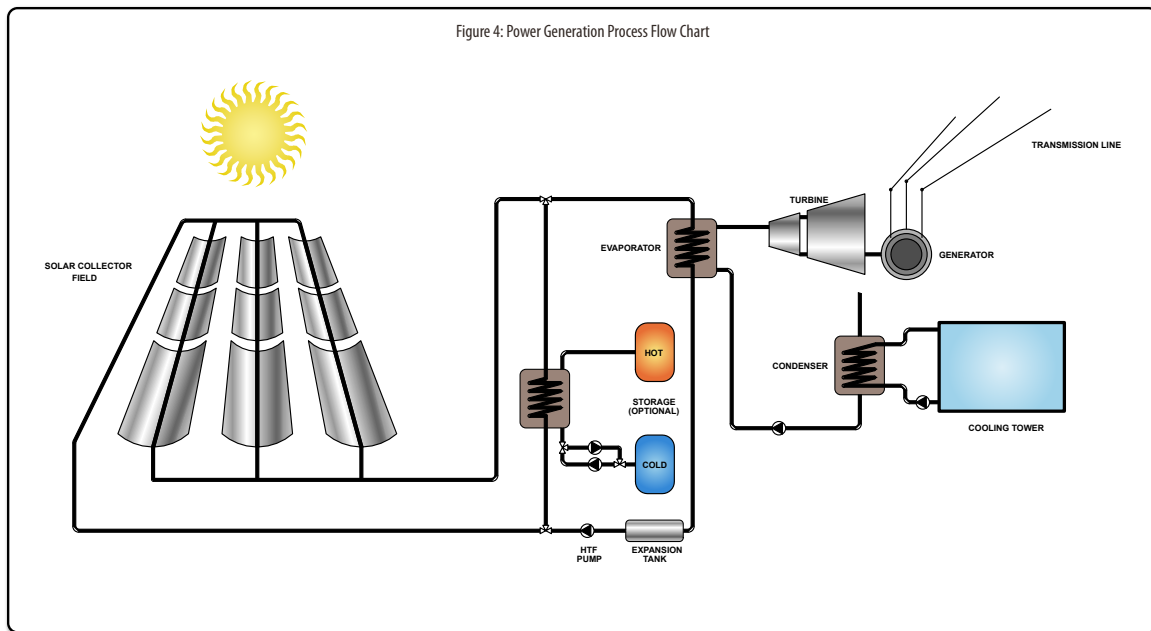


Data

| Sopogy Power Generation | | |
|---|----------------------|--------------------------|
| Direct Solar Radiation on a Clear Day | 850 W/m ² | 269 Btuh/ft ² |
| Solar to Thermal Efficiency | 60% | |
| Losses Through Piping, Pipe Fittings, Friction and Heat Exchanger Equipment | 10% | |
| Available Thermal Energy for Process after Losses | 459 W/m ² | |
| Thermal to Electric Efficiency | 20% | |
| Average Output per Panel | 0.512 kW | |
| Output Temperature Range | 200–400° F | 93-203° C |

| Dimensions/Panel Capacity | Soponova 4.0 | |
|---------------------------|---------------------|--------------------|
| Length | 3.66 m | 12 ft |
| Width | 1.52 m | 5 ft |
| Center to Center Spacing | 2.59 m | 8.5 ft |
| Area | 5.57 m ² | 60 ft ² |
| Daily Panel Output | 2.56 kWh/Panel/Day | |
| Annual Panel Output | 934 kWh/Panel/Year | |

| Application Data | Soponova 4.0 | | | | | |
|--|--------------|--------|---------|---------|---------|-----------|
| Power (kW) | 250 | 500 | 1,000 | 2,000 | 5,000 | |
| Number of Panels | 489 | 977 | 1,954 | 3,908 | 9,771 | |
| Space Requirements: Panel Area + Spacing | | | | | | |
| | square feet | 59,854 | 119,585 | 239,170 | 478,339 | 1,195,970 |
| | square meter | 5,561 | 11,110 | 22,220 | 44,439 | 111,109 |
| | acre | 1.37 | 2.75 | 5.49 | 10.98 | 27.46 |
| | hectare | 0.56 | 1.11 | 2.22 | 4.44 | 11.11 |



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