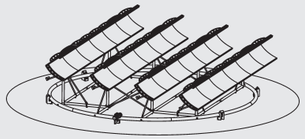
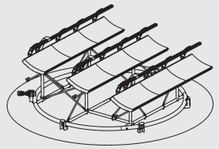
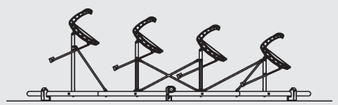
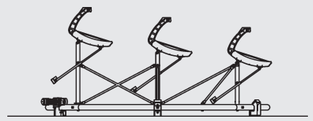
# Concentrated Solar Power

Power-Spar®

*Technical specifications*

| | **Configurations** | |
|---|---|---|
| | *Full Length* | *Half Length* |
| |  |  |
| | *PS2-4x40* | *PS2-3x20* |
| Length of Spar: | 39′ (12 m) | 19′6″ (6 m) |
| Approximate total weight of array: | 4600 lbs (2100 kg) | 2100 lbs (950 kg) |
| Maximum diameter swing for two-axis tracking array: | 50′ (15 m) | 30′ (9 m) |
| Maximum height of the array[1]: | 12′ (3.7 m) | 11′ (3.4 m) |
| ***Peak Outputs*** | | |
| Thermal-only configured array[2]: | 30 $kW_{th}$ (104,000 $BTU/h_{th}$) | 11 $kW_{th}$ (39,000 $BTU/h_{th}$) |
| Combined Thermal and PV configured array[2]: | 15 $kW_{th}$ (51,000 $BTU/h_{th}$)<br>9 $kW_e$ | 6 $kW_{th}$ (19,000 $BTU/h_{th}$)<br>3.5 $kW_e$ |
| Hybrid Solar Lighting array[3]: | 1,486,000 lumens | 557,000 lumens |
| |  |  |

*Power-Spar arrays can be mounted on the ground or on industrial roof tops*

***Environmental:*** 110 mph wind, 35 mm diameter hail @ terminal velocity, 1.5 inches of ice

***Warranty:*** 10 years

***Standards:*** CSA F379.1, F378 , F383, SRCC Standard 100, SRCC Document RM-1, SRCC Document OG-300, UL 1703

1 Final height will vary depending on mounting system chosen.
2 Peak watts based on 1000 watts/$m^2$ solar radiation on a clear day, measured at module output, your solar incidence will vary.
3 Light output measured at 30′.

***Contact a Menova Energy consultant to simulate the Power-Spar system performance for your site.***

***Call 1 888-Menova1*** *(1 888 636-6821)*

***Visit www.power-spar.com for links to government programs & incentives for renewable energy.***

Menova energy Inc.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# Concentrated Solar Power

## *Electricity, Heating, Cooling & Lighting*

*Industrial – Commercial – Institutional*

Power-Spar®

*Volatile energy prices…*
*Uncertain supply…*
*Environmental concerns…*
*Significant incentives…*

*Now… Industrial Solar co-generation makes sense*

Menova energy Inc.

## *Concentrated solar energy: cost-effective, reliable, modular & scalable*

The Power-Spar is a flexible cost-effective solar concentrating system that can be configured as an electrical, thermal and/or lighting solution.

The parabolic trough reflector concentrates the sun's energy onto a modular absorber. The absorber converts the sun's energy to electricity (via high efficiency multi-sun photovoltaic cells), or to heat (via a patented absorption surface) or transports the light to the buildings' interior (via optical cabling).

The system is designed for easy integration with heat recovery systems, turbines, thermal based chillers and geo-thermal solutions to maximize the thermal, electrical and lighting outputs. This efficient co-generation yields unprecedented dollar value.

Capable of capturing up to 80% of the sun's energy, Power-Spar systems can reduce typical building energy bills by as much as 70%/year!

## *Down to earth solar electricity, heat, hot water and lighting*

The solar energy striking an average building is sufficient to provide it with all of its heat, power and lighting. Using new patented technology, the Power-Spar concentrates this solar energy and then converts it to economical building electricity, heat, hot water or lighting.

The Power-Spar system also incorporates short-term thermal and electrical storage strategies to uniformly distribute this energy throughout the day, night and in cloudy conditions. Innovative long-term storage strategies can effectively store surplus thermal energy for use during low production periods (patent pending).

The Power-Spar system is self-monitoring. The sophisticated Spar-Net controller regulates and monitors all aspects of the performance of the Power-Spar modules; integrated sensors ensure that the spars make the best use of the available solar energy.

Up-to-the-minute performance data is stored on the Spar-Net controller and can be viewed through a web browser. Operational issues are automatically reported on a 24/7 basis. The system even sends monthly notices detailing the exact amount of free green energy delivered to your site.

## *Flexible purchase arrangements & generous incentives*

Power-Spar systems can be purchased outright, leased or financed through Power Purchase Agreements (PPA) or Energy Service Agreements (ESA). We offer very attractive financing rates with flexible structures through third party financial institutions.

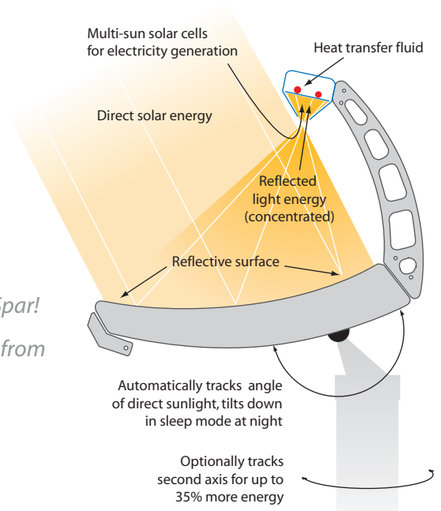
An ever-increasing number of jurisdictions offer rebates, grants, low-cost loans and/or tax incentives for renewable energy systems.

Visit www.power-spar.com – for a listing of, and links to, applicable incentive programs.

## *Low cost solar concentrator... Maximum efficiency minimum heat loss*

The Power-Spar concentrates the sun's rays onto a small absorbing area containing a heat transfer fluid and optional high-efficiency multi-sun solar cells. The concentrated light amplifies the electric current in the solar cells for greater power output while using a fraction of the number of solar cells required in conventional flat panel PV systems.

The fluid loop cools the PV cells resulting in higher operating efficiency. The small surface area of the absorber minimizes the heat loss of the entire system yielding extremely high year-round system efficiency




*Net Zero Energy buildings are now possible with Power-Spar!*

*Get 100% of your building heat, hot water and electricity from the Power-Spar!*

# *Concentrated Solar Power*

## *Electricity, Heating, Cooling & Lighting*

### *Industrial – Commercial – Institutional*

Power-Spar®

### 1 *Power-Spar Array*

*Solar energy is reflected and concentrated onto modular absorbers to produce*

- *Electricity*
- *Heat & Process Steam*
- *Lighting*

*Arrays can be roof or ground mounted.*

### A *Spar-Net Controller*

*The Spar-Net controller regulates and monitors all aspects of the Power-Spar installation.*

*Real time data from integrated sensors can be viewed through a Web browser.*

*Alerts are automatically sent to a 24/7 on-call technician if any performance issues are encountered.*

### B *Short Term Storage Tanks*

*Energy in solar heated glycol is transferred to water in short term storage tank via heat exchanger. This water is circulated to distribute energy to loads, day or night, as required.*

### C *Geo Thermal Heat Pump*

*Heat pump gets a 'solar boost' when scavenging heat stored in the ground.*

### D *Long Term Storage*

*Surplus thermal energy can be stored in the ground and reused later during low production periods.*

### E *Chiller Unit*

*Solar heat provides energy for thermally driven cooling process.*

### F *Solar Lighting Fixture*

*Bulbs automatically dim when the sun is shining extending bulb life, and reducing maintenance and electrical costs.*

### 2 *Electricity*

*Multi-sun solar cells in the Power-Spar absorber generate electricity at a fraction of the cost of non-concentrating solar cells. The electricity can be:*

- *directed back into the power grid (net metered/grid tied)*
- *used directly*
- *stored in batteries for emergency or off sun use*

### 3 *Heat & Process Steam*

*Fluid channels in the Power-Spar absorber generate large amounts of thermal energy. This energy can be:*

- *used directly for process heat (as steam or hot water)*
- *passed through heat exchangers for space heating or domestic hot water pre-heating*
- *transferred to an Organic Rankine Cycle Turbine for additional electrical output*
- *sent to thermal driven chillers*
- *stored in the ground for later use*

### 4 *Lighting*

*Fiber optic cables in the Power-Spar absorber collect the concentrated sunlight and transport it to solar lighting fixtures in the building.*