

## FREQUENTLY ASKED QUESTIONS

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### COMPANY AND SOLUTION

**1. What type of business is Cool Energy?**

Cool Energy is a privately held high tech energy conversion corporation based in Boulder, Colorado.

**2. What is the Cool Energy solution?**

Cool Energy has developed a thermal-to-electrical power generation system for converted wasted heat from engines and industrial processes into clean electricity. This system is built around an innovative advanced-materials Stirling engine called the **SolarHeart® Engine** which captures and converts low-temperature heat into electricity.



**3. How can I obtain a SolarHeart Engine ?**

Cool Energy is currently delivering 4<sup>th</sup> generation 3kW engines to qualified evaluation customers. Once the pilot testing phase is complete, Cool Energy will be selling the systems through certified dealers. These dealers will be trained in the operation, installation and maintenance of the system. Cool Energy will maintain a published list of the certified dealers on the website ([www.coolenergyinc.com](http://www.coolenergyinc.com)).

**4. When will the system be available?**

General availability to the public through a certified Cool Energy dealer is targeted for late 2012. Cool Energy will be placing a limited number of pilot systems for qualified field trials between now and mid 2012. These pilot systems will require financial commitment on the part of the partner to test the engines, and to share the test data with Cool Energy.

**5. What is the cost of the SolarHeart Engine?**

We estimate the market cost of the 3kW engine to be \$8,000 - \$12,000 USD in production quantities of 1,000 per year.

**6. What engine sizes will be available?**

The engine size currently being tested is a 3kWe engine. A 20kW engine is currently being designed, and even larger engines are planned for the future.

**7. Will this system qualify for credits or incentives?**

Depending on the source of thermal energy, the system will qualify for a United States federal tax credit as high as 30%. Many states, cities and municipalities have other incentives. For a detailed list of incentives in the U.S., please refer to <http://www.dsireusa.org>. Many provinces in Canada, and countries in Europe have electricity generation incentives or 'feed-in tariffs'.

### **8. How do I know if the SolarHeart Engine will work for my application?**

The SolarHeart Engine can be used with any heat source in the engine's optimal input temperature range of 100-300°C, and heat flow range of 40-150 liters/min.

### **9. How is Cool Energy funded?**

To date, Cool Energy has been backed primarily by angel and venture capital investment and has received several Small Business Innovation Research (SBIR) grants from the National Science Foundation, the Environmental Protection Agency, the U.S. Department of Energy and a Colorado Governor's Energy Office grant. Cool Energy is currently raising its Series B round of capital for the purposes of beginning volume manufacturing.

## **TECHNOLOGY**

### **1. What is the Cool Energy technology?**

The system is based on the SolarHeart Engine which is a Stirling Engine (Invented in the early 1800's by Robert Stirling). The Stirling engine is a heat engine that operates by expansion and compression of air or other gases (called the working fluid), at different temperature levels producing a net conversion of heat energy to mechanical work. The Cool Energy SolarHeart uses nitrogen as the working fluid, and is driven by relatively low temperatures (100°C-300°C). The mechanical work generated drives a generator (built inside the engine) that creates electrical power.

### **2. 300°C is too hot for water. What is the heat transfer fluid in the SolarFlow System?**

The SolarFlow System uses a mineral-oil based, food-safe and non-toxic heat transfer fluid which is rated to 340°C.

### **3. Does the SolarHeart Engine make noise?**

Because the SolarHeart operates at a low speed (600 rpm), has no internal explosions and is fully balanced, the engine is extremely quiet and low in vibration.

### **4. How reliable is the SolarHeart Engine?**

The SolarHeart Engine is designed for a 70,000 hour maintenance-free life. There is no lubrication required as all bearings are sealed.

### **5. How much heat and electricity can be generated?**

Cool Energy has sold three 4<sup>th</sup> generation SolarHeart Engines for 3kW power generation with >20% thermal to electric conversion efficiency at 300°C temperature differences. These systems are expected to increase fuel efficiencies by up to 20% with a ROI as low as one year. The company is currently designing a higher-power engine at 20kW<sub>e</sub> to capture the large untapped market for power conversion models at larger scales from 5kW<sub>e</sub> to 50kW<sub>e</sub>.