

Frequently Asked Questions (FAQs)



COMPANY AND SOLUTION

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

Cool Energy has developed a thermal-to-electrical power generation system for the conversion of wasted heat into clean electricity. The **ThermoHeart Engine** was built around an innovative advanced-materials Stirling engine which converts low-temperature (150-400C) heat to electricity.

2. **How can I obtain a ThermoHeart Engine ?**

Cool Energy is currently delivering pilot 25kW engines to qualified partners. Once the pilot 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.

3. **When will the ThermoHeart Engines be commercially available?**

With continued success and demand for our prototype engines, Cool Energy goal is to ramp production in mid 2018. Our go to market will be through licensing agreements. The 25kW ThermoHeart engine will be the first model commercially available.

The 25kW engine is in low volume production and has realized an almost 30% heat to power conversion efficiency. The 25KW engines will be a perfect fit in light or heavy industrial applications such as coffee roasting, cement plants, glass plants, metal manufacturers, kilns, and so on.

4. **What will be the cost of the ThermoHeart Engine?**

We estimate the market cost of the 25kW to be \$45,000 - \$50,000 USD

5. **How is Cool Energy funded?**

To date, Cool Energy has been backed primarily by angel and venture capital investment and has been awarded several SBIR grants from the National Science Foundation, the Environmental Protection Agency, the Department of Energy subcontract, and a Colorado Governor's Energy Office grant as well. Cool Energy is currently raising its Series B round of capital for the purposes of beginning volume manufacturing.

6. **How do I know if the ThermoHeart Engine will work for my application?**

The ThermoHeart Engine can be used with any heat source in the engine's optimal input temperature range of 150-400°C, and heat flow range of 40-150 liters/min. The following are examples of possible applications:

- Commercial and industrial processes
- Diesel Generators (remote and military uses)
- Biomass processing
- Geothermal
- Solar Thermal
- Ship engines

TECHNOLOGY

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

The system is based on the ThermoHeart 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 gas (called the working fluid), at different temperature levels such that there is a net conversion of heat energy to mechanical work. The Cool Energy ThermoHeart uses nitrogen as the working fluid, and is driven by relatively low temperatures (150°C-400°C). The mechanical work generated drives a generator (built inside the engine) that creates electrical power.

2. **What are the main elements of the ThermoHeart WHR system?**

ThermoHeart Engine, hot process heat exchanger, HTF pump, heat rejection radiator, water pump, engine controller/inverter and associated oil and water piping

3. **What are the operating costs?**

We have estimated operating costs at \$0.013/kWh based on the planned O&M schedule. This is similar to a diesel genset.

4. **What is your heat rejection method?**

It functions similar to a radiator on a car engine. A water/glycol mix is circulated by a pump between a heat-rejection radiator, which cools the water, and the internal cold heat exchangers of the ThermoHeart Engine, where the water is heated with thermal energy rejected from the Stirling cycle. This cooling water cools the nitrogen in the engine through high-surface-area heat exchangers, making the nitrogen easier to compress during the compression part of the cycle in the engine.

5. **400°C is too hot for water. What is the heat transfer fluid in the system?**

The ThermoHeart Engine uses an off the shelf mineral-oil based, food-safe and non-toxic heat transfer fluid which is rated for over 400°C.

6. **Does the ThermoHeart Engine make noise?**

The ThermoHeart Engine is extremely quiet and low in vibration because it operates at a low speed (approximately 600 rpm), has no internal combustion or explosions and is fully balanced. The metal housing adds acoustic and thermal insulation.

7. **Is the ThermoHeart reliable?**

The design lifetime is 180,000 operating hours, with service every 20,000 hours. There is no lubrication required as all bearings are sealed.

Media Contact: Ryan Ferrero ryan@ryanferrero.com or
Tracy Scholl tscholl@coolenergy.com