



Presentation

*“Free Piston Stirling-Solar System with Storage
A cost effective Solar Battery”.*

**A 24/7 grid quality 100% GREEN & STABLE
cost effective energy generation Solution**

What would be the solar technology that we would be willing to invest with minimum risk and without any hesitation?

The basic characteristics of such a technology should be able to provide:

- 1. LCOE well below \$0.07 / KWh.**
- 2. Minimum operating and maintenance cost.**
- 3. Mature and tested technology.**
- 4. No need of water.**
- 5. Suitable for slope terrains.**
- 6. Should be scalable.**
- 7. Should provide absolute dispatchability.**



SOLAR DISH 751S
Twin engine 7KW System



Unique Generator Platform Free Piston Stirling Engines

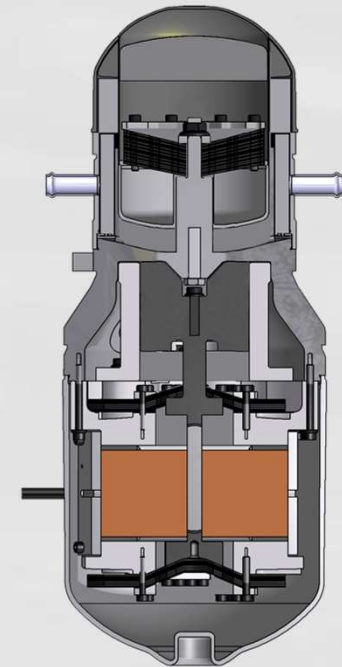


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- Free Piston Stirling Engines are a proven technology used successfully for many years in US space and defense industry.
- Free piston Stirling engines have been demonstrated in critical power applications that require quiet operation, high reliability, and very long, low-maintenance service lives.
- With a record of more than 120,000 hours (more than 13 years), of continuous, uninterrupted, maintenance free operation.
- Used in a number of Military and Space projects. e.g. Spaceship Curiosity



Free piston Stirling engines are distinct from more widely publicized kinematic Stirling engines that have inherent life and reliability limitations imposed by their lubricated mechanical system and sliding seals.



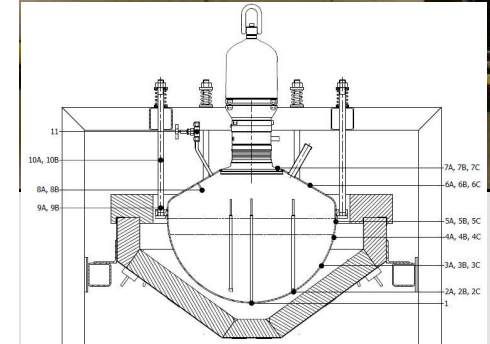
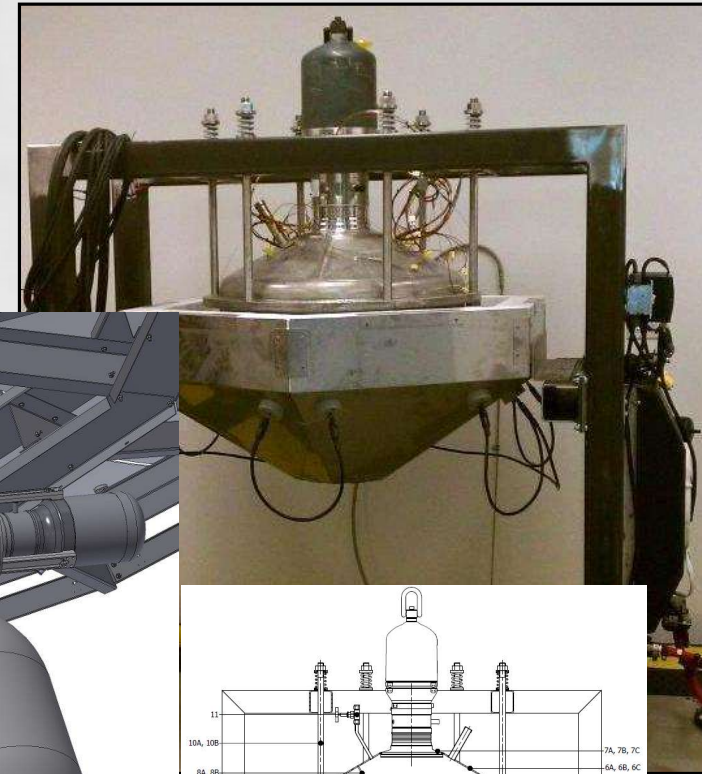
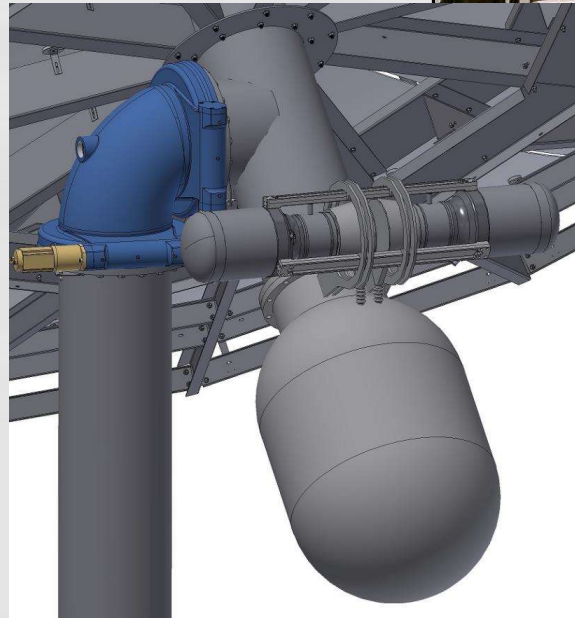
Thermal Energy Storage (TES)

Design Concept for 7-kW TES System

- Dual 3.5-kW A17 engines
- Cavity receiver
- Pumped loop heat pipe from receiver to TES
- 0.75-W electromagnetic pump returns liquid sodium
- Patented pool boiler transfers TES heat to engine
- 190 liter TES container gives solar multiple of 1.4
- 10 cm insulation loses 750 W
- Engine/TES module serves as counterweight



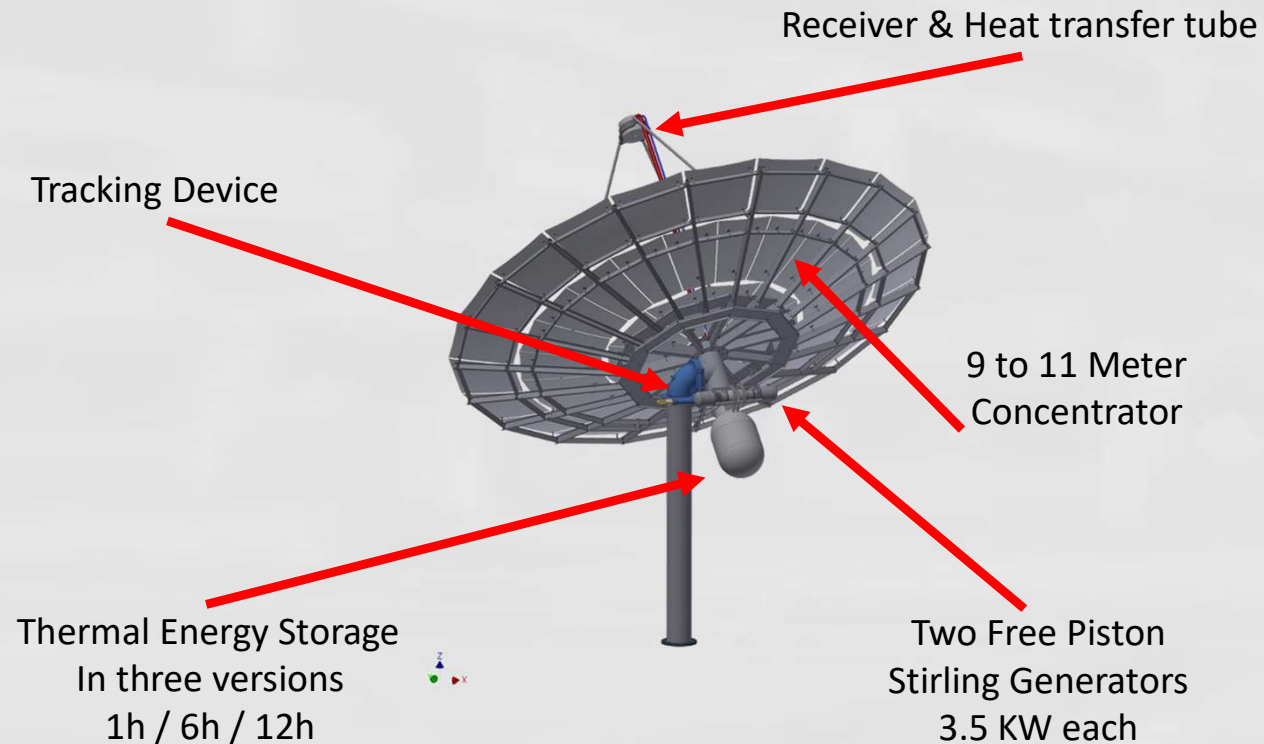
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The Thalis system will be a dish/ engine system which will be using a mirrored dish similar to a very large satellite dish. The dish-shaped surface will be directing and concentrating sunlight onto a thermal receiver, which will be absorbing and collecting the heat and transferring it to the engine generator. The most common type of heat engine used today in dish/ engine systems is the Stirling Engine. This system uses the fluid heated by the receiver to move pistons and create mechanical power. The mechanical power is then used to run a generator or alternator to produce electricity. The Thalis system is actually a technology integrator of the well-known and already tested Stirling Engine 3KW system, that is currently upgraded to 7 KW, and with an up to 12 hours Thermal Energy Storage System.





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Twin engine 7KW System

CAN BE USED FOR:

- Normal Generation of Electricity
- **To provide auxiliary services to the grid** (Phase and Voltage correction)
- **To provide reserves to the grid**
- To be used as a complimentary generation solution to other RES technologies e.g. PVs. Since it
Can generate electricity when other RES technologies need to shut down.



Thalis SolarDish 751S is today's missing link in providing a 24/7 grid quality 100% GREEN & STABLE energy at a cost effective manner.



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Thank you!

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