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Mechanical Power Generation Through Passive Radiative Cooling

Tech ID: 33726 / UC Case 2024-579-0

ABSTRACT

Researchers at the University of California, Davis have developed an approach to generating mechanical power from the earth's ambient thermal radiation using a Stirling engine.

FULL DESCRIPTION

This technology introduces a novel method for power generation by exploiting the temperature difference between the earth's surface and the cold night sky through radiative cooling. Utilizing a modified low-temperature differential (LTD) Stirling Engine, it converts thermal energy into mechanical work, offering a sustainable solution to augment renewable energy sources, especially during nighttime.

APPLICATIONS

- ▶ Renewable energy generation complementing solar power.
- ▶ Passive cooling and air circulation in agricultural greenhouses and residential buildings.
- ▶ Space exploration and terraforming missions.

FEATURES/BENEFITS

- ▶ Cost-effective and scalable design suitable for widespread deployment.
- ▶ Optimized radiative surface area through infrared emissive paint coating.
- ▶ Efficient thermal coupling with the ground enhances performance.
- ▶ Achieves sufficient temperature differentials for operation under various sky conditions.
- ▶ Versatile applications, including air circulation in greenhouses.
- ▶ Competitive power output at significantly lower manufacturing costs compared to solid-state devices.
- ▶ Potential for future performance enhancements and global impact. Allows energy generation during nighttime or in regions with limited sunlight.
- ▶ Decrease dependence on semiconductor devices or thermoelectric generators that are not easily scalable.
- ▶ Lowers high manufacturing costs and scarcity of materials required for existing power generation methods.

PATENT STATUS

Patent Pending

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OTHER INFORMATION

KEYWORDS

radiative cooling, low-temperature differential (LTD) Stirling Engine, renewable energy, energy generation

CATEGORIZED AS

- ▶ **Energy**
 - ▶ Other
 - ▶ Solar
- ▶ **Environment**
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