STEN: Solar-Routed Thermodynamic Energy Network

A revolutionary approach to powering humanity's multiplanetary future

By Mehmet Orkun Alabaz (Orqon)

The Problem with Space Power

Today's space missions rely on power systems that are fundamentally limited by physics and engineering constraints.

Bulky Solar Panels

Large, heavy, and vulnerable to damage. Ineffective in shadow or at distance from the Sun.

Radioactive RTGs

Limited fuel supply, safety concerns, and political complications for launch approval.

Chemical Fuel

Expensive to launch, non-renewable, and limits mission duration and capabilities.

Current solutions are heavy, complex, and not scalable for large-scale space operations on the Moon, Mars, and beyond.

The Fundamental Insight

"Space is cold. The Sun is hot. That's infinite usable energy."

2.7K

Deep Space

The temperature of the cosmic background radiation provides an ideal cold sink

2000K

Focused Sunlight

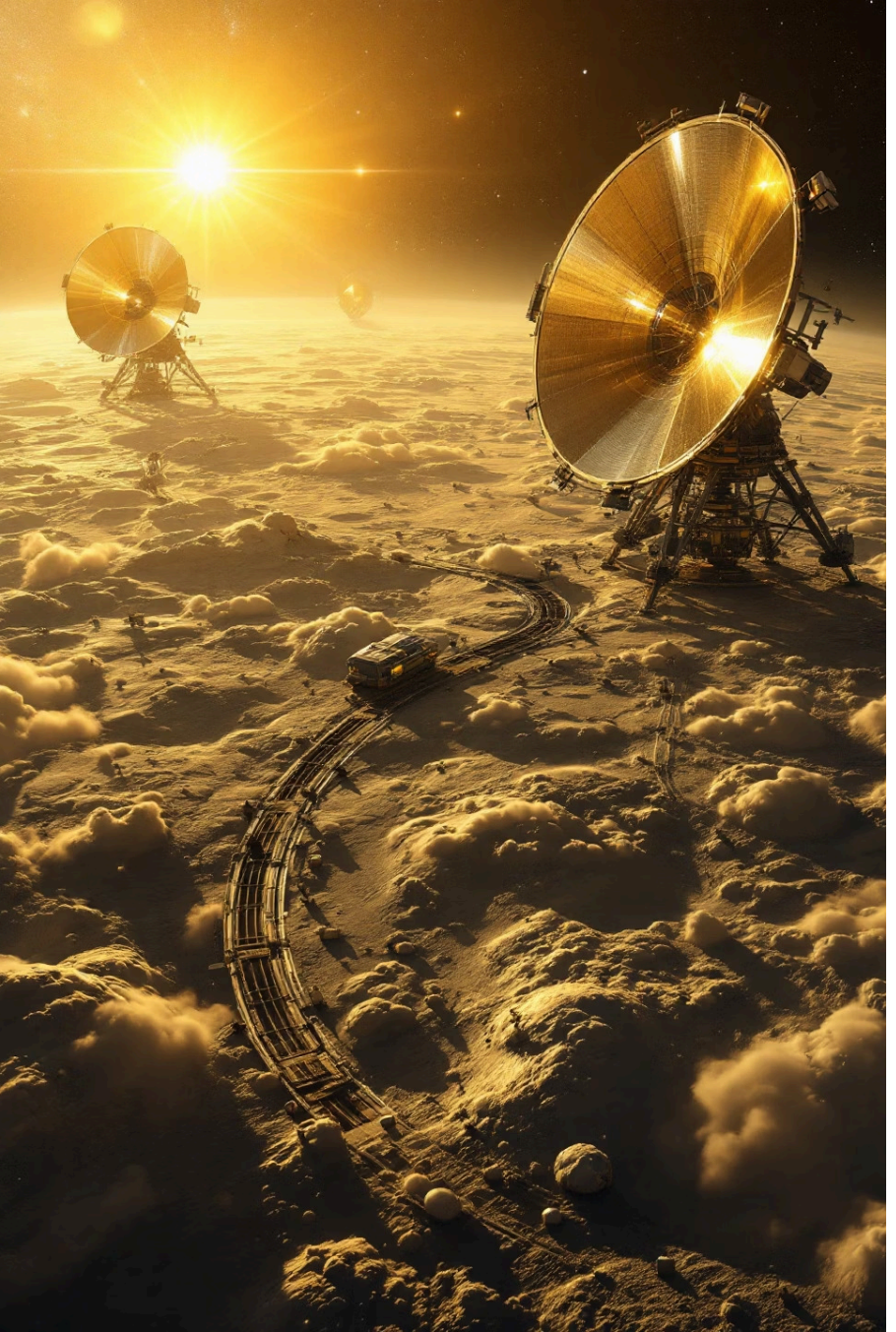
Achievable temperature with optical concentration systems

99%

Theoretical Efficiency

Maximum Carnot efficiency with this temperature gradient

This massive temperature differential creates an unprecedented opportunity for highly efficient energy conversion, using the fundamental laws of thermodynamics.



What is STEN?

A decentralized, space-based energy network that routes raw solar radiation to remote receivers

Solar Concentration

Arrays of mirrors or lenses capture and concentrate raw solar energy

Energy Routing

Directed beams of concentrated sunlight are routed to remote receivers

Thermodynamic Conversion

On-site conversion via thermoelectric generators or Stirling engines

Space Cold Sink

Deep space provides the ultimate heat sink for maximum efficiency

Technical Advantages

Passive, Scalable Infrastructure

Low-maintenance system with minimal moving parts and no consumables

Unprecedented Efficiency

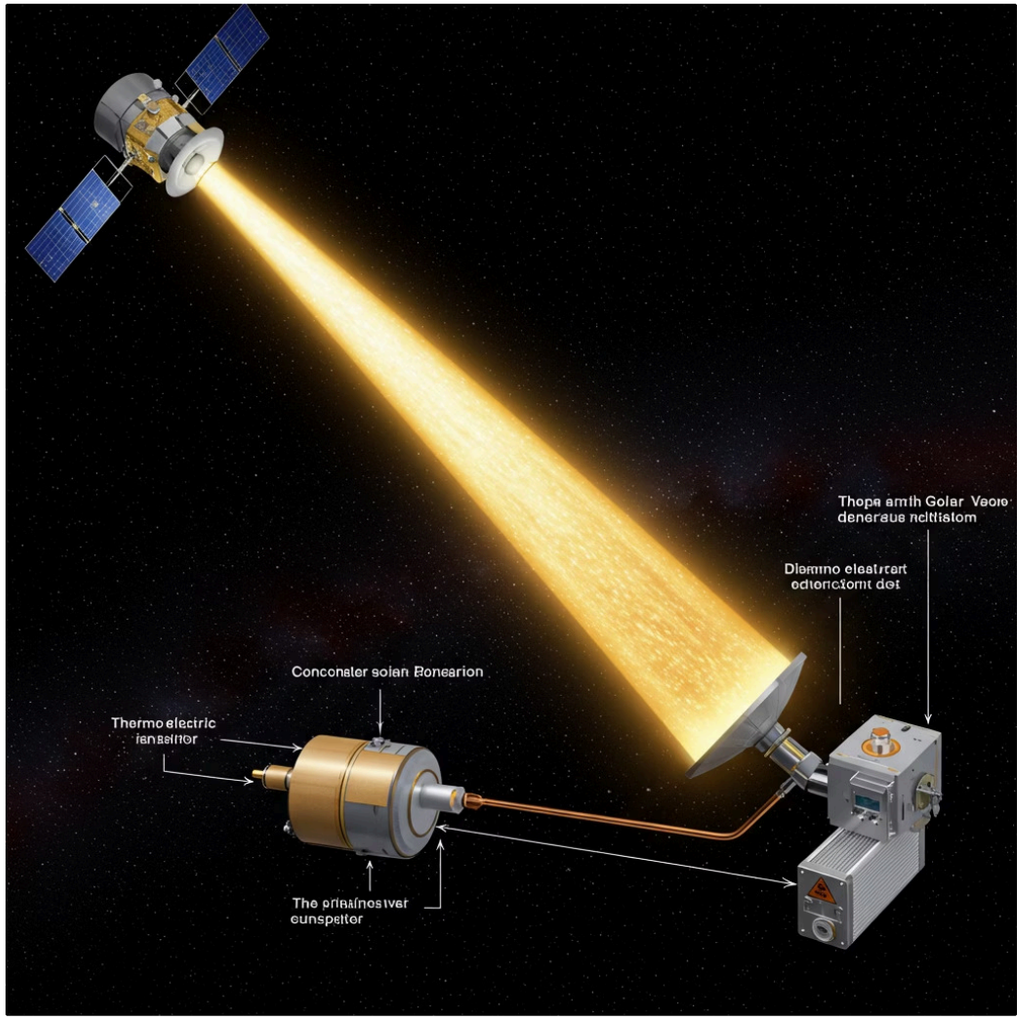
Theoretical Carnot efficiency of 99.7%, practical implementation at 30-60%

No Nuclear Risk

Eliminates radiation concerns of RTGs while maintaining high power output

Modular Deployment

Network can be expanded incrementally as mission needs grow



STEN creates a fundamental paradigm shift in space power generation by exploiting the extreme temperature differential between concentrated sunlight and deep space.

Use Cases

Lunar Bases

Power generation in permanently shadowed craters with valuable water ice, enabling continuous operations without nuclear power

Satellite Networks

Shared power infrastructure for Starlink-type constellations, reducing the need for individual power systems

Mars Colonies

Compensate for Mars' lower solar intensity and dust storms through orbital concentration and routing

Deep Space Missions

Enable long-duration missions beyond the effective range of solar panels without relying on limited nuclear fuel

Why Now?

1 Launch Economics

SpaceX's Starship enables affordable deployment of large-scale orbital infrastructure at unprecedented low cost

2 Manufacturing Capability

Lightweight solar concentrators can now be mass-produced with high optical precision

3 Network Infrastructure

STEN represents the natural next layer after communications networks like Starlink

> "We don't need more batteries. We need better physics."

Feasibility & Next Steps

Technical Challenges

- Beam divergence: manageable with 10-100m mirrors
- Pointing precision: achievable with existing tracking systems
- Thermal management: leveraging deep space as cold sink

Development Roadmap

- Phase 1: CubeSat prototype in LEO with miniature concentrator
- Phase 2: Larger demonstration between two satellites
- Phase 3: Starship-compatible full-scale implementation

Our Ask

- Support for detailed feasibility study and simulation
- Partnership for Starship-compatible test deployment
- Integration into future Mars mission architecture

The Vision

"STEN could become the power grid of a multiplanetary civilization."

Energy Independence

Eliminates need for fuel transport and resupply for remote bases

Lighter Missions

Reduces spacecraft mass by replacing onboard power systems

Scalable Infrastructure

Open architecture that grows with humanity's expansion into space

Thank You

STEN: Powering humanity's journey to the stars through revolutionary thermodynamic principles

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> ⓘ Interested in discussing potential partnerships, investment opportunities, or technical collaborations to bring STEN from concept to reality.