

# Solar Power Satellite with No Moving Parts



**IUPUI** SCHOOL OF ENGINEERING AND TECHNOLOGY  
A PURDUE UNIVERSITY SCHOOL  
Indianapolis

## Saving the Earth with Renewable Energy

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### What is Space Solar Power??

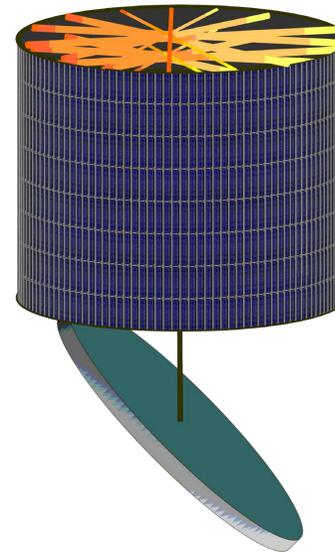
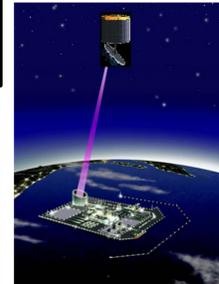
Solar power gathered in orbit has no night. Think on this! Power can be transmitted wirelessly to the Earth. Baseload!

### Key Challenges

Launching mass into orbit is expensive. VERY expensive! Use lunar or asteroidal materials, and process in situ. Extract silicon for solar cells, aluminum for wires, iron for structures.

### Top Benefits

Renewable, sustainable, perpetual power available to all! Clean, near-zero carbon, scalable, cheaper with more. Provides a stepping stone to the stars for all of humanity.



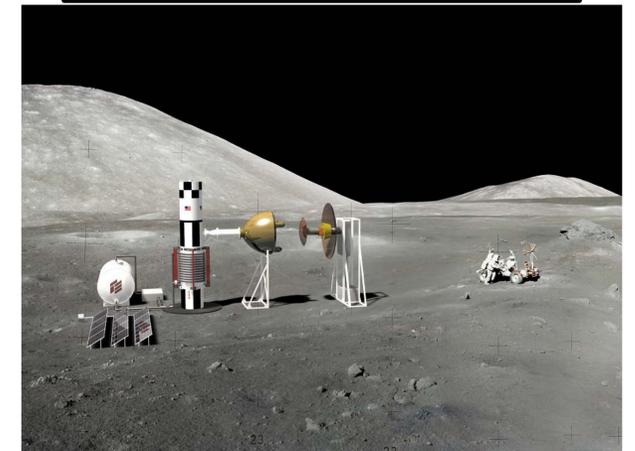
The "Tin Can" Solar Power Satellite

### Future

Space Solar Power calls for government collaboration to develop a Cislunar infrastructure, and sponsor research to demonstrate feasibility. India, China, Japan, and the EU have started. There is no funding for SSP in the United States.

With feasibility demonstrated, private investment can reap the huge economic rewards of renewable energy from space – the ultimate power source!

### Lunar Processing Facility



### Solar Power Satellite Constellation



### IUPUI Contributions to the field:

The Summer 2015 SSP Study Team performed a detailed design and economic study, published at the conference SPACE 2016 by the American Institute of Aeronautics and Astronautics in Pasadena, CA. By SPS no. 6 the cost is less than a similar-sized nuclear power plant, and the levelized cost of energy (LCOE) is cheaper than wind, solar, and coal.

Wireless Power Transfer using phased array antennas can produce sidelobes which interfere with terrestrial communication. The IUPUI team developed a novel configuration which eliminates all sidelobes (peer review pending.)

Power Management and Distribution (PMAD) for both the space transmit antenna and the earth receive antenna have been worked out in detail for the 1<sup>st</sup> time.

The "Tin Can" powersat is the only design with no moving parts.  
The Tin Can powersat has integral heat rejection and needs no radiator.  
The Tin Can powersat requires no station keeping, and needs no fuel  
The Tin Can powersat has a lifetime 3X that of other powersat designs.

### About the Lugar Center for Renewable Energy

The Richard G. Lugar Center for Renewable Energy (LCRE) was established in 2007 to address the societal needs for clean, affordable, renewable energy sources while improving the nation's energy security and helping to mitigate the negative impacts of climate change.

Our primary mission is to promote research excellence in renewable energy through collaborative efforts among faculty in the disciplines of engineering, chemistry, physics, biology, and environmental affairs and public policy.

These renewable energy applications are promoted through education, civic engagement, and synergistic partnerships with industry, government labs, and local communities.

Visit our website at [www.lugarenergycenter.org](http://www.lugarenergycenter.org)

### Summer 2015 Study Team



### Summer 2016 Study Team



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