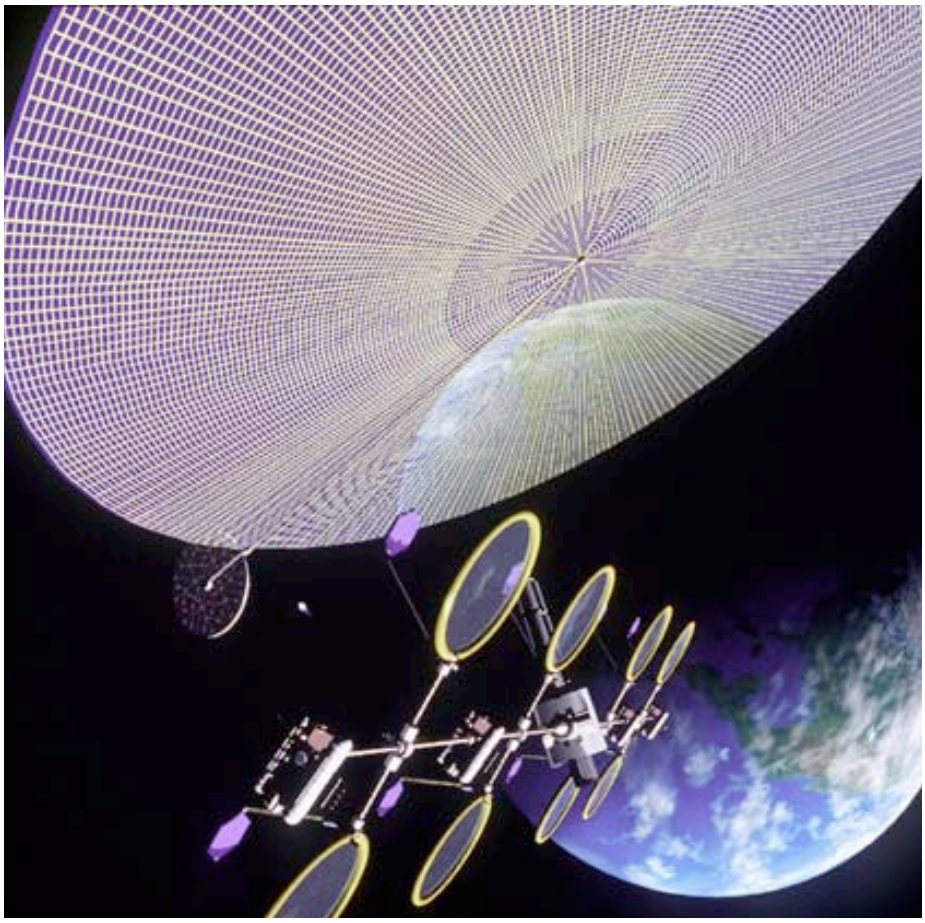
Solar Power From Space:



This giant disk floating in space isn't a UFO. It's a power generator, harvesting energy from the Sun. CREDIT: NASA/MSFC.

CONTEXT

Suppose I told you that we could build an energy source that:

- unlike oil, does not generate profits used to support Al Qaeda and dictatorial regimes.
- unlike nuclear, does not provide cover for rogue nations to hide development of nuclear weapons.
- unlike terrestrial solar and wind, is available 24/7 in huge quantities.
- unlike oil, gas, ethanol and coal, does not emit greenhouse gasses, warming our planet and causing severe problems.
- unlike nuclear, does not provide tremendous opportunities for terrorists.
- unlike coal and nuclear, does not require ripping up the Earth.
- unlike oil, does not lead us to send hundreds of thousands of our finest men and women to war and spend hundreds of billions of dollars a year on a military presence in the Persian Gulf.

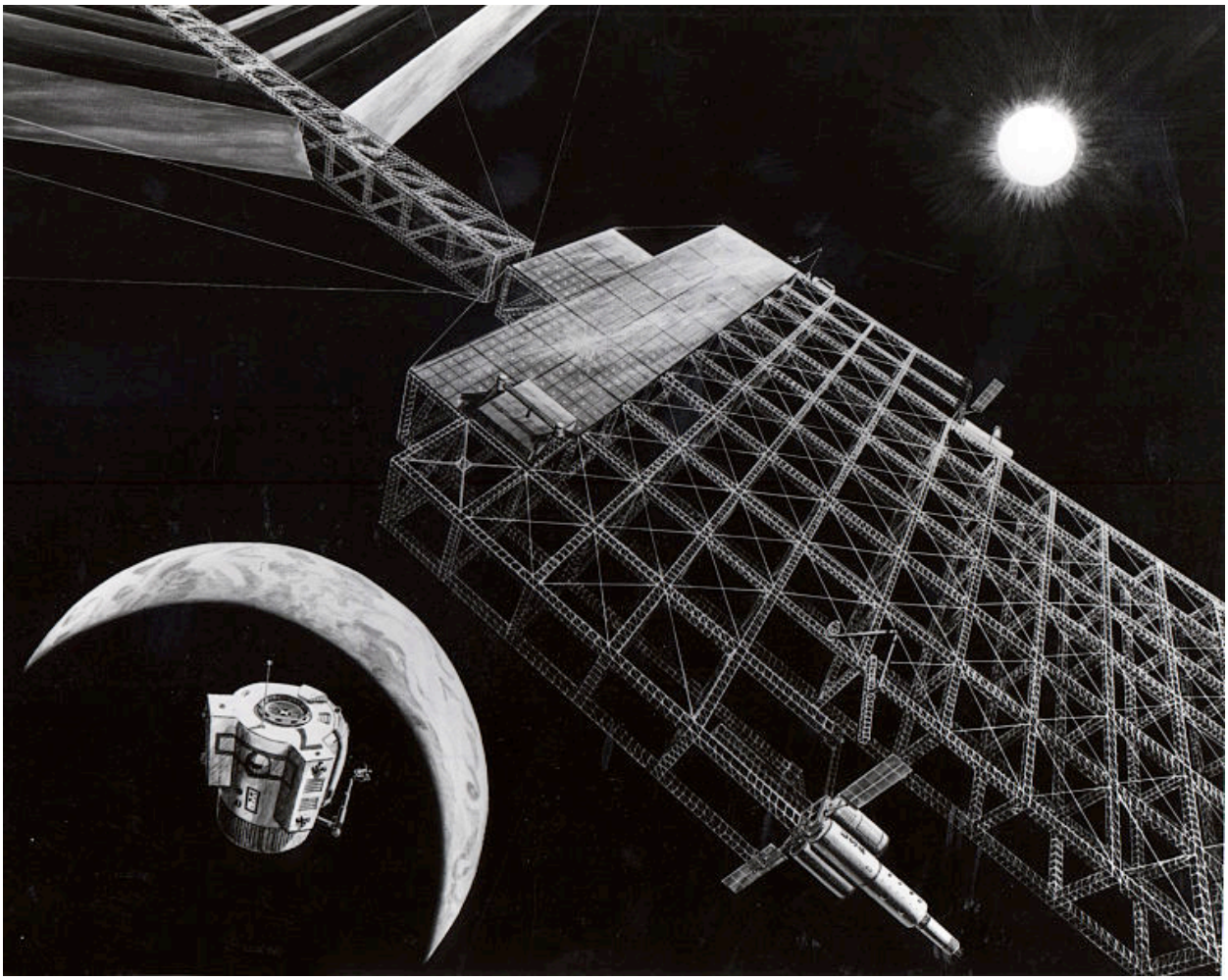
The basic idea:

build huge satellites in Earth orbit to gather sunlight, convert it to electricity, and beam the energy to earth using microwaves. We know we can do it, most satellites are powered by solar energy today and microwave beaming of energy has been demonstrated with very high efficiency. (We're talking about SSP - solar satellite power.)

SSP is environmentally friendly in the extreme. The microwave beams will heat the atmosphere slightly and the frequency must be chosen to avoid cooking birds, but SSP has no emissions of any kind, and that's not all. Even terrestrial solar and wind require mining all their materials on Earth, not so SSP. The satellites can be built from lunar materials so only the materials for the receiving antennas (rectennas) need be mined on Earth.

The catch is cost. Compared to ground based energy, SSP requires enormous up-front expense, although after development of a largely-automated system to build solar power satellites from lunar materials SSP should be quite inexpensive. To get there, however, will cost hundreds of billions of dollars in R&D and infrastructure development

http://www.space.com/3812-solar-power-space-strategy-america-world.html



The problem

A futuristic project plans to build a satellite 10 000 tons in geostationary orbit and solar panels of about 11.5 km and 4.5 km with a 18% efficency.
1°) What would be the power transmitted to Earth by microwave, so at this altitude, 1 m^2 panel receives radiant power of 1400W?
2°) What would be the power available if transmission by microwave with a efficency of 82%.
3°) This satellite is equivalent to how many nuclear power plant of 1100 MW