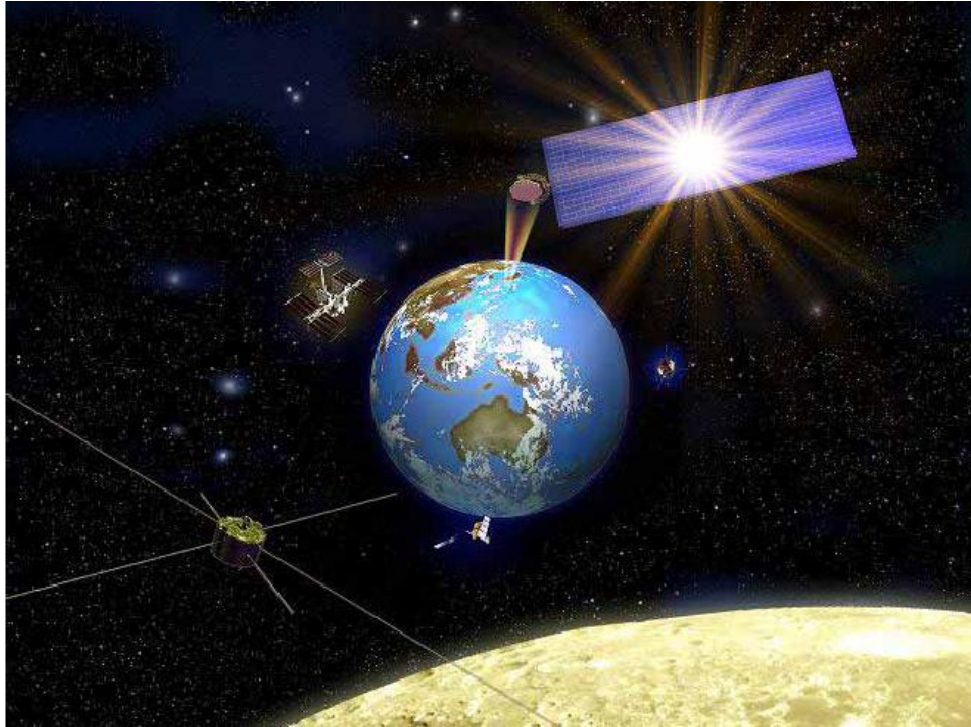


Revolutionary Energy sources



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Solar Based Solar Powered Satellite systems

- As a consequence of an ever-increasing world-wide energy demand and of a need for a “clean” energy source, the Solar Power Satellite (SPS) concept has been explored by scientists and engineers.
- Two critical aspects that have motivated research into SPS systems are the lack of attenuation of the solar flux by the Earth’s atmosphere and the twenty-four-hour availability of the energy,
- In a typical SPS system, solar energy is collected in space by a satellite in a geostationary orbit. The solar energy is converted to direct current by solar cells, and the direct current is in turn used to power microwave generators in the gigahertz frequency (microwave) range.

Solar Powered Satellite systems contd.

- The generators feed a highly directive satellite-borne antenna, which beams the energy to the Earth.
- On the ground, a rectifying antenna (rectenna) converts the microwave energy from the satellite to direct current, which, after suitable processing, is fed to the terrestrial power grid.
- A typical SPS unit - with a solar panel area of about 10 km², a transmitting antenna of about 2 km in diameter, and a rectenna about 4 km in diameter - may yield an electric power of about 1 GW.
- A huge clean power source is to be developed for sustainable economic activities with sufficient suppression of Co₂ Emission. Only Solar technologies can provide such a clean such a power source in the near future.
- The terrestrial photo-voltaics, wind, geo thermal and other natural resources depend on the environmental conditions and are neither stable nor sufficient

Energy from High Altitude Wind

- Wind is solar energy in motion. About 0.5 % of the sunlight is transmuted into the kinetic energy of air.
- Fortunately, that energy is not distributed evenly but concentrated into strong currents.
- Unfortunately, the largest , most powerful and most consistent currents are all at high altitude.
- Roughly two thirds of the total wind energy on the planet resides in the upper troposphere, beyond the reach of today's wind farms.
- The wind power variation with altitude, latitude and seasons has been estimated. The mother lode is the Jet stream, about 10000 meters(33000 feet) up between 20 and 40 deg latitude in the northern hemisphere.
- Wind power surges to 5000 to 10000 watts a square meter. The jet stream does wander but never stops.

High Altitude wind power generators

- If wind is ever to contribute terawatts to the global energy budget engineers will have to invent affordable ways to mine the mother lode
- Three high flying designs are in active development
- Magenn power from Canada plans to sell a rotating, Helium filled generator that exploits the Magnus effect (best known for giving loft to spinning golf balls) to float on a tether up to 122 meters above the ground. The bus sized device will produce 4 KW at its ground station and will cost about 5 lakhs.
- Higher size, 1.6 MW, about the size of a football field units will be in market by 2010

Magenn Air Rotor System (MARS)

- The Magenn system concept is deployment-flexible. Large MARS units may be deployed to supplement established grid systems supporting the electrical requirements of large urban areas.
- All competing wind generators use bladed two-dimensional disk-like structures and rigid towers. The Magenn Power Air Rotor system is a closed three-dimensional structure (cylinder).
- Electrical energy is transferred down the tether to a transformer at a ground station and then transferred to the electricity power grid. Helium (an inert non-reactive lighter than air gas) sustains the Air Rotor which ascends to an altitude for best winds and its rotation also causes the Magnus effect.



Nuclear Fusion

- Physicists are hopeful and promise of unlimited fuel and limited waste through fusion power but the cost of development is too high
- By harnessing the same thermonuclear force that fires the sun, a fusion plant could extract a Giga-watt of electricity from just a few kilograms of fuel a day
- Its hydrogen isotope fuel would come from seawater and lithium a common metal
- The reaction would produce no green house gases and relatively small amounts of low level radioactive waste, which would become harmless within a century
- The question is whether it is economically practical, even with a crash program it would take 30 years to develop a working design