International Journal of Modern Engineering Research (IJMER)
www.ijmer.com Vol.2, Issue.2, Mar-Apr 2012 pp-365-367 ISSN: 2249-6645

ENERGY FROM THE EXISTING RESOURCES

[*]J.BANUCHANDAR, [*]S.DEEPA, [*]N.TAMILARASI, [#]J.PARKAVI

[*]Electronics and Communication Engineering,
P.SR Engineering College, sivakasi
[#]Electrical and Electronics Engineering,
Mepco Schlenk Engineering college, sivakasi

ABSTRACT:

In the upcoming years the electrical energy will be the main source for world's growth. We all know that the consumption of electrical energy is increasing whereas the resources are depleting. Terrestrial renewable systems (hydroelectric, geothermal, ocean thermal, waves, and tides) cannot dependably provide adequate power. However expanding nuclear fission power would require breeder reactors, but there is intense political resistance to that idea because of concerns about proliferation, nuclear contamination of the environment, and cost So we have to switch over to renewable energy resources. Over the 21-st century, a global stand -alone system for renewable power would cost thousands of trillions of dollars to build and maintain. Energy costs could consume most of the world's wealth. We need a power system that is independent of earth's biosphere and provides an abundant energy at low cost. In this paper we are discussing how our natural satellite MOON can help us in such case. We have explored the space enough to build space laboratories. It is also possible to build a power station in moon as we have adequate knowledge on robotics. Moreover, we have construction materials in moon which reduces the erection cost as well as the transportation cost. Moon gets more sunlight than earth and it has abundant quantity of Helium-3 resources which is not present on earth. Here we are describing the power production methods from Solar and Helium-3 resources in moon. Also we are describing the power transmission from moon to earth via Microwaves.

INTRODUCTION:

Prosperity for everyone on Earth by 2050 will require a sustainable source of electricity equivalent to 3 to 5 times the commercial power currently produced. Because of the low average incomes in developing countries like India, however, this energy must be provided at one-tenth the present total cost per kilowatt-hour

Currently, commercial energy production on Earth raises concerns about pollution, safety, reliability of supply, and cost. These concerns grow as the world's nations begin to expand existing systems to power a more prosperous world. Such growth could exhaust coal, oil, and natural gas reserves in less than a century, while the production and burning of these fossil fuels pollute the biosphere. The new system we are going to adopt should be eco-friendly, economic and should satisfy the future energy requirements. . Lunar power stations constructed on the moon from common lunar materials could provide the clean, safe, low-cost commercial electric energy needed on Earth.

In this paper we are going to discuss two methods of getting energy from moon.

- Lunar Solar Power Station
- Lunar Helium-3 Power Station
- Micro wave Power Transmission

LUNAR SOLAR POWER GENERATION:

Although energy coming directly to Earth from the sun is renewable, weather makes the supply variable. Very advanced technologies, such as 30% efficient solar cells coupled with superconducting power transmission and storage, imply solar arrays that would occupy more space on earth rather than in moon. The 10 billion people living on Earth in 2050 will require 20 Terawatts (TW) of power. The Moon receives 13,000 TW of power from the sun. It is evident that harnessing just 1% of the solar power and directing it toward Earth could replace fossil fuel power plants on Earth.

LUNAR SOLAR COLLECTORS:

Figure 1. In this lunar power base, sunlight hits the solar converter, which transmits power via underground wires to a microwave generator, which in turn illuminates a microwave reflector. All such reflectors, when viewed from Earth, overlap to form a “lens” that can direct a narrow power beam toward Earth.

1).Solar converter.
2).Microwave generator.
3).Microwave reflector.
4).Mobile factory.
5).Assembly units.
6). Habitat / Manufacturing units

The LSP System uses 10 to 20 pairs of bases—one of each pair on the eastern edge and the other on the western edge of the moon, as seen from Earth—to collect on the order of 1% of the solar power reaching the lunar surface.

The moon receives sunlight continuously except during a full lunar eclipse, which occurs approximately once a year and lasts for less than three hours. Each lunar power base consists of tens of thousands of power plots distributed in an elliptical area to form fully segmented, phased-array radar that is solar-powered. Each demonstration power plot consists of four major subsystems. Solar cells collect sunlight and buried electrical wires (not shown) carry the solar energy as electric power to microwave generators. Basically Solar cells usually operate more efficiently under concentrated light. The manufactures are developing concentrators which further increase the cost to improve the solar cell efficiency. In our case there is no need of any concentrators as the moon can receive the sunlight without any obstacles and hence the cost gets reduced.

LUNAR HELIUM-3 POWER GENERATION:

HELIUM-3:

Helium-3 (He-3) is a light, non-radioactive isotope of helium with two protons and one neutron.Helium-3 is magnificent and an environmentally friendly fuel, an effective energy source. But unfortunately it is not found on Earth, while the Moon has vast resources of it The helium-3 will be extracted by the lunar bulldozers,. The amounts of helium-3 needed as a replacement for conventional fuels should not be underestimated. Scientists estimate there are about1 million tons of helium 3 on the moon, enough to power the world for thousands of years.

Helium-3 has the potential to be the fuel for a new generation of clean nuclear fusion power plants. Unfortunately, helium-3 is also exceptionally rare on the Earth. There is, however, thought to be an abundant supply of helium-3 on the surface of the Moon. NASA, some Russian corporations, China and India have therefore announced plans or intentions to establish bases on the Moon over the next couple of decades in order to mine helium-3.

Given that one Space Shuttle cargo bay of helium-3 could power the United States for a year, a new helium-3 Space Race and related infrastructure development may become one of the most significant aspirations and accomplishments in human history. Mining lunar helium-3 may also become a large part of our "solution" to the oil shortage, broader fossil fuel depletion, and climate change.

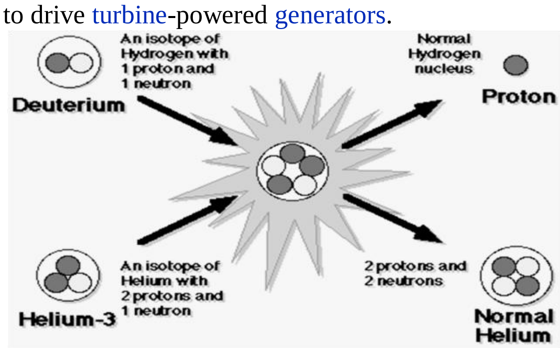
ENERGY PRODUCTION:

$$D + {}^{3}He \longrightarrow p(14.7\,MeV) + {}^{4}He\,(3.7\,MeV) + 18.4\,MeV$$

The total amount of energy produced in the ${}^{3}He$ + ${}^{2}_{1}H$+ reaction is 18.4 MeV, which corresponds to some 493 megawatt-hours (4.93e8 Wh) per three grams (one mole) of ${}^{3}He$. A second-generation approach to controlled fusion power involves combining helium-3 (**${}^{3}_{2}He$**) and deuterium (${}^{2}_{1}H$). This reaction produces a helium-4 ion (${}^{4}_{2}He$) and a high-energy proton positively charged hydrogen ion) (${}^{1}_{1}p$) and (alpha particle). There is no radiation threat of helium-3 fusion as the life time of radioactive proton is very less than that of fission.

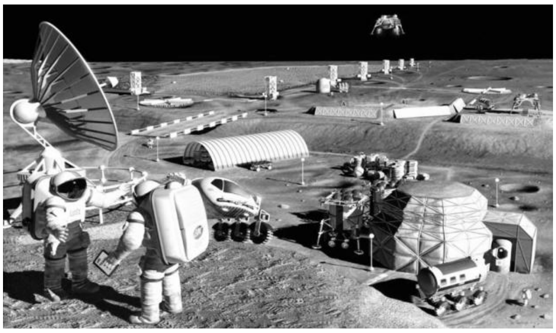
CONVERSION TO ELECTRICAL ENERGY:

The most important potential advantage of this fusion reaction for power production as well as other applications lies in its compatibility with the use of electrostatic fields to control fuel ions and the fusion protons. Protons, as positively charged particles, can be converted directly into electricity, through use of solid-state conversion materials as well as other techniques. Potential conversion efficiencies of 70 percent may be possible, as there is no need to convert proton energy to heat in order to drive turbine-powered generators.

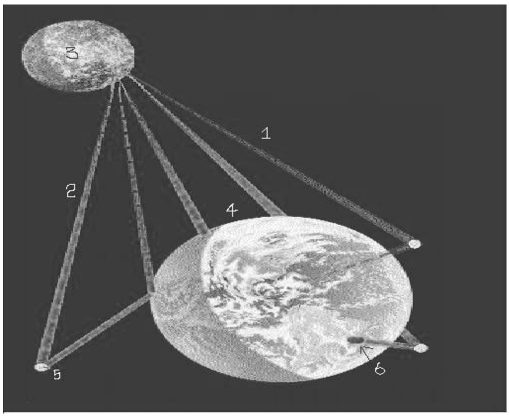


CONSTRUCTION:

One of the most significant steps towards self-sufficiency and independence from the Earth will be the use of lunar materials for construction. At least seven major potential lunar construction materials have been identified. These include concrete, sulfur concrete, cast basalt, sintered basalt, fiber glass, cast glass, metals. All of these materials may be used to construct a future lunar base. The basalt materials can be formed out of lunar regolith (soil) by a simple process of heating and cooling, and are the most likely to be used to build the first bases.



With the gravity level of the moon being 1/6th that of Earth, lunar structures can carries a load that is six times that of those on Earth. This allows for structures that are thicker and can provide better micrometeorite, radiation and thermal shielding for the crew. Researchers designed solar-powered robotic equipment that would scoop up the top layer of lunar soil and place it into a robotic unit. The soil would be heated, thus separating the helium-3 from other lunar material. The spent material then would be dropped off the back of the moving robotic miner. Because the Moon has one-sixth the Earth's gravity, relatively little energy would be required to lift the material.



ADVANTAGES:

There are so many advantages in installing power plants on moon. They are

Unlike Earth, the surface of the moon is compatible with the construction of extremely large areas of thin solar collectors and their dependable operation over many decades.

No oxygen, water, atmospheric chemicals, or life is present to attack and degrade thin solar collectors. No wind, rain, ice, fog, sleet, hail, driven dust, or volcanic ash will coat and mechanically degrade them.

Moonquakes and meteor impacts produce only tens of nanometers of ground motion. Micro meteors erode thin solar collectors less than 1 mm every 1 million years. Rectenna are projected to cost approximately $0.004/kWe•h, which is less than one-tenth of the current cost of most commercial electric energy

The production of lunar base requires the components which can be get from the moon itself. Bulk soil and separated soil fractions can be melted by concentrated sunlight and formed into thin glass sheets and fibers or sintered into rods, tubes, bricks, and more complex components. Silicon, aluminum, and iron can be chemically extracted from lunar soil for fabrication of solar cells. This reduces erection cost.

Helium-3 would offer lower capital and operating costs than their competitors due to less technical complexity, higher conversion efficiency, smaller size, the absence of radioactive fuel, no air or water pollution.

CONCLUSION:

The Lunar Power System is a reasonable alternative to supply earth's needs for commercial energy without the undesirable characteristics of current options. The system can be built on the moon from lunar materials and operated on the moon and on Earth using existing technologies. More-advanced production and operating technologies will significantly reduce up-front and production costs. The energy beamed to Earth is clean, safe, and reliable.

ACKNOWLEDGMENT

We would like to express our sincere thank to our beloved principal, staff members and special thanks to our friends Kaliraj and Balasubramanian.

The materials available with the listed reference books have a significant impact on this paper. We gratefully thank to the authors and publications of these reference books.

REFERENCE

1. Mark Z. Jacobson and Mark A. Delucchi (30 December 2010). "Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials". *Energy Policy*. Elsevier Ltd.
2. Renewable energy costs drop in '09 *Reuters*, November 23, 2009.
3. Solar Power 50% Cheaper By Year End - Analysis *Reuters*, November 24, 2009.
4. Henning Gloystein (Nov 23, 2011). "Renewable energy becoming cost competitive, IEA says". *Reuters*.
5. "GWEC, Global Wind Report Annual Market Update". Gwec.net. Retrieved 2011-11-21.
6. David Beattie (18 March 2011). "Wind Power: China Picks Up Pace". *Renewable Energy World*.