

Testimony of Dr. David R. Criswell at Senate Commerce, Science, and Transportation Subcommittee on Science, Technology, and Space Hearings: “Lunar Exploration”

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Dr. David R. Criswell, Director, Institute for Space Systems Operations, University of Houston and University of Houston-Clear Lake

Mr. Chairman and Members of the Subcommittee:

I am honored to have this opportunity to introduce a program for the economic and environmental security for Earth, and especially for the United States of America, by meeting Earth’s real electrical power needs.

By 2050, approximately 10 billion people will live on Earth demanding ~5 times the power now available. By then, solar power from the Moon could provide everyone clean, affordable, and sustainable electric power. No terrestrial options can provide the needed minimum of 2 kWe/person or at least 20 terawatts globally.

Solar power bases will be built on the Moon that collect a small fraction of the Moon’s dependable solar power and convert it into power beams that will dependably deliver lunar solar power to receivers on Earth. On Earth each power beam will be transformed into electricity and distributed, on-demand, through local electric power grids. Each terrestrial receiver can accept power directly from the Moon or indirectly, via relay satellites, when the receiver cannot view the Moon. The intensity of each power beam is restricted to 20%, or less, of the intensity of noontime sunlight. Each power beam can be safely received, for example, in an industrially zoned area.

The Lunar Solar Power (LSP) System does not require basic new technological developments. Adequate knowledge of the Moon and the essential technologies have been available since the late 1970s to design, build, and operate the LSP System. Automated machines and people would be sent to the Moon to build the lunar power bases. The machines would build the power components from the common lunar dust and rocks, thereby avoiding the high cost of transporting materials from the Earth to the Moon. The LSP System is distributed and open. Thus, it can readily accommodate new manufacturing and operating technologies as they become available.

Engineers, scientists, astronauts, and managers skilled in mining, manufacturing, electronics, aerospace, and industrial production of commodities will create new wealth on the Moon. Thousands of tele-robotic workers in American facilities, primarily on Earth, will oversee the lunar machinery and maintain the LSP System.

Our national space program, in cooperation with advanced U.S. industries, can produce the LSP System for a small fraction of the cost of building equivalent power generating capabilities on Earth. Shuttle- and Space Station-derived systems and LSP production

machinery can be in operation in space and on the Moon within a few years. A demonstration LSP System can grow quickly to 50% of averaged U.S. electric consumption, ~0.2 TWe, within 15 years and be profitable thereafter. When LSP provides 20 terawatts of electric power to Earth it can sell the electricity at one-fifth of today's cost or ~1 ¢/kWe-h. At current electric prices LSP would generate ~9 trillion dollars per year of net income.

Like hydroelectric dams, every power receiver on Earth can be an engine of clean economic growth. Gross World Product can increase a factor of 10. The average annual per capita income of Developing Nations can increase from today's \$2,500 to ~\$20,000. Economically driven emigrations, such as from Mexico and Central America to the United States, will gradually decrease.

Increasingly wealthy Developing Nations will generate new and rapidly growing markets for American goods and services. Lunar power can generate hydrogen to fuel cars at low cost and with no release of greenhouse gases. United States payments to other nations for oil, natural gas, petrochemicals, and commodities such as fertilizer will decrease. LSP industries will establish new, high-value American jobs. LSP will generate major investment opportunities for Americans. The average American income could increase from today's ~\$35,000/y-person to more than \$150,000/y-person.

By 2050, the LSP System would allow all human societies to prosper while nurturing rather than consuming the biosphere.

Respectfully submitted,

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The Lunar Solar Power System and its general benefits are described in the attached four-page document.

Additional papers are available on these websites and via search engines (search on "David R. Criswell" or "Lunar Solar Power"):

The Industrial Physicist

<http://www.tipmagazine.com>

The World Energy Congress (17th and 18th)

<http://www.worldenergy.org/wec-geis/>
