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Vison for the Future: The Age of Space-Solar Energy

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The industrial revolution has been driven for the past two centuries by the burning of hydrocarbons, first by coal in the Age of Steam, and then by oil and natural gas in the Age of Petroleum; however, as the flow of these fossil fuels slows down as demand goes up, ever-more-intrusive and massive extraction efforts increasingly threaten the progress of industrialization and the civilization it has produced.

The catastrophic Deepwater Horizon oil spill in the Gulf of Mexico is the latest and largest of hundreds of such ocean spills, and the recent methane gas explosion in Massey's Montcoal mine was just another of the many disasters, worldwide, which have snuffed out the lives of workers who labor in dangerous conditions to feed our fossil-fuel addiction.

All around the planet we live upon, the quest for hydrocarbons is threatening the ability of humans to survive in the degrading environmentand to govern their own corporate-dominated societies.

It is not just the environmental destruction caused by the extraction of coal-bed methane in Wyoming and Montana, the "fracking" of deep shale-gas formations and the consequential contamination of fresh water aquifers and rivers in the northeastern United States, or the blasting away of mountain tops in Appalachia; it is the fact that these extreme efforts are facilitated by a concert of corporate and governmental corruption that erodes freedom and democracy in the United States and threatens human civilization around the world.

There is no hope for the recovery of earth's environment and the survival of human

civilization as long as extraction decisions are governed by corporate greed. Public energy policy must be based on what is good for the people who vote for representatives, not on what produces profits for the corporations who buy the votes of the people's representatives.

It may already be too late. The environmental destruction caused by the production and burning of fossil fuels may have already set in motion irreversible events which will ultimately spell the extinction of humanity. But, not to worry.

Our loving and forgiving Mother Earth will survive. It may take eons for her oceans, winds, and rains to wipe clean the crap we have produced, but someday, never fear, another of Gaia's children will learn to fly and will study the artifacts of our existence and will wonder of we and why?

There may be, however, a more sensible and realistic alternative which will preserve the environment and human civilization, and which offers a more exciting and rewarding future for our children, as they learn to fly throughout the universe and to explore its adjacent dimensions.

So, let's expand our vision and imagine for a moment how life could be after just a decade or two of innovation in the public interest.

A Vision for the Future

Imagine that the Interstate Highway System and most major streets and freeways in America were improved to provide a constant source of electromagnetic energy sufficient to power a standard automobile, with comfortable seating for five adults, anywhere in the United States at no cost to the owner-operator.

Imagine the introduction of triple-hybrid cars designed to operate primarily on electromagnetic energy supplied by induction through the surface of most highways and freeways, and which are equipped with small fuel-efficient internal combustion engines to supplement rechargeable batteries for trips on local streets and byways.

Imagine people could travel for free throughout the United States as a matter of national privilege. Workers could get to their jobs without having to labor for the first hour each day just to pay for getting there. People would have more money to spend on vacations, and they would be able to tour the nation, see the grand sights, and visit with friends and relatives along the way.

Imagine the positive economic consequences that would flow from the reconstruction of America's transportation infrastructure and the creation of a domestic manufacturing capacity to build for the future.

Is this a realistic dream? If the United States decided to provide free power on its national highways as a matter of innovative public policy, where would it obtain the energy?

A Miraculous Source of Abundant Energy

First proposed by Dr. Peter Glaser in 1968, space-based solar technology can provide an inexhaustible, safe, pollution-free supply of energy and may offer a far more logical solution

to current energy problems than petroleum or ethanol-based or even nuclear-fueled hydrogen systems.

The technology currently exists to launch solar-collector satellites into geostationary orbits around the Earth to convert the Sun's radiant energy into electricity 24 hours a day and to safely transmit the electricity by microwave beams to rectifying antennas (rectennas) on Earth.

Space-solar energy is the greatest source of untapped energy which could, potentially, completely solve the world's energy and greenhouse gas emission problems.

Following its proposal, the concept of solar power satellites was extensively studied by both the Department of Energy and the National Aeronautics and Space Administration. By 1981, it was determined that the concept was a high-risk venture; however, further study was recommended.

With increases in electricity demand and costs, NASA took a "fresh look" at the concept between 1995 and 1997. The NASA study envisioned a trillion-dollar project to place several dozen solar-power satellites in geostationary orbits by 2050, sending between two gigawatts and five gigawatts of power to Earth. However, the study's leader, John Mankins,now says the program "has fallen through the cracks because no organization is responsible for both space programs and energy security."

The project may have remained shelved except for the military's need for sources of energy in its campaigns in Iraq and Afghanistan, where petroleum costs $400 a gallon. A report by the Department of Defense's National Security Space Office in 2007 recommended that the U.S. "begin a coordinated national program to develop [space-based solar power]."

There are three basic engineering problems presented in the deployment of a space-based solar power system: The size, weight and capacity of solar collectors to absorb energy; the ability of robots to assemble solar collectors in outer space; and the cost and reliability of lifting collectors and robots into space.

Two of these problems have been substantially solved since space-solar power was originally proposed. New thin-film advances in the design of solar collectors have steadily improved, allowing for increases in the efficiency of energy conversion and decreases in size and weight. At the same time, industrial robots have been greatly improved and are now used extensively in heavy manufacturing to perform complex tasks.

The remaining problem is the expense of lifting equipment and materials into space. At a cost of $20,000 per kilogram of payload, the U.S. is currently relying on the last few remaining flights of the space shuttle to move satellites into orbit and to resupply the space station. It has been estimated that economic viability of space solar energy would require a reduction in the payload cost to less than $200 per kilogram and the total expense, including delivery and assembly in orbit, to less than $3,500 per kilogram.

An American president once said, "We choose to go to the moon in this decade, not because it is easy, but because it is hard." The United States readily achieved that objective and, effectively, won the Cold War. A similar challenge is now presented in the "Energy War." What, if anything, will the current president say or do?

Although there are substantial costs associated with the development of space-solar power,

it makes far more sense to invest the precious space exploration budget in the development of an efficient and reliable power supply for the future, rather than to waste tax dollars on a stupid and ineffective missile defense system or on an ego trip to Mars.

With funding for the space shuttle ending in 2012 and for the space station in 2017, America must decide upon a realistic policy for space exploration, or else it will be left in the dust by other nations, which are rapidly developing futuristic space projects.

China has aggressively moved into space by orbiting astronauts and by demonstrating a capability to destroy satellites, and it is investing $35 billion of its hard-currency reserves in the development of energy-efficient green technology, and has become the world's leading producer of solar panels.

Over the past two years, Japan has committed $21 billion to secure space-solar energy. By 2030, the Japan Aerospace Exploration Agency plans to "put into geostationary orbit a solar-power generator that will transmit one gigawatt of energy to Earth, equivalent to the output of a large nuclear power plant." Japanese officials estimate that, ultimately, they will be able to deliver electricity at a cost of $0.09 per kilowatt-hour, which will be competitive with all other sources.

The first nation that captures and effectively makes use of space-solar energy will dominate the world energy market for generations to come and will provide its citizens with a much healthier and a far more secure society.

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The drawing of "Who Were They?" is by Helen Werner Cox, who was trained as a classical painter at Boston University. She is nearing retirement as a nationally-certified library media teacher, who has made extensive use of art in her literacy programs.
