EXCLUSIVE

The Solar Energy Fraud

by Eric Lerner

In their about-to-be-published environmental policy report, *The Unfinished Agenda,* the Rockefeller brothers propose the transition over the next 25 years to an economy completely based on solar energy. Jimmy Carter endorsed this general policy proposal both before and after his inauguration, and it is now being touted in the Congress as the main long-range energy policy alternative.

It is time to make the scientific facts on "clean, cheap, renewable" solar energy clear to the American public and their representatives in Congress. *Solar energy is a fraud.* There is no possible way that an economy based on solar energy in any form can supply the energy needed for a modern society. The implementation of a solar energy policy means reversion to a pre-industrial society, at best, or, far more likely, the total collapse of civilization and the destruction of the human race.

The Rockfellers advocate solar energy purely and simply as a cover for a policy of zero or negative energy growth rates, and as a justification for five- to ten-fold increases in the price of oil and gas, policies aimed at guaranteeing the Rockefeller's debt service at the expense of production.

Energy Density And Labor Power

The human race has managed to survive and increase its numbers to the present world population of four billion by a process of continual technological advance, in which the central necessary tendency has been the increase in *labor power.* Through innovations which improve the per capita productivity of labor, the per capita level of consumption has been increased, allowing further increases in the level of productivity and thus new innovations. Such increases in labor power have been necessarily linked to increases in overall per capita energy throughput. In order to increase the per capita flow of energy required by a higher standard of living, the concentration of energy, or energy flow density, must necessarily increase. This tendency is an extension in human social evolution of the same development of energy flow densities in the evolution of the biosphere as a whole from more primitive to more evolved species.

Until about 600 years ago, humanity relied exclusively on energy from the sun, as had pre-human species before us. Homes were heated by sunlight by day and firewood by night, and what minor manufacturing went on in feudal and pre-feudal society was powered by windmills and waterwheels, both indirect uses of solar energy. Of course, agriculture, then as now, relied on the sun as well. Such pre-industrial societies were severely limited by the extremely diffuse nature of sunlight — its very low energy density.

At the surface of the earth, the average power delivered by the sun is only about 200 watts per square meter, a level of power density that virtually precluded industrialization. The iron-making blast furnaces of 14th century England, for example, needed an acre of forest land a day to produce a tiny output of metal. The lack of energy density likewise limited the efficiency of agricultural production, restricting growth in food output to gains in land area through deforestation. By the early 14th century, feudal Europe, the last fully "solar-powered" society, reached its limits of expansion. Either new technologies had to be developed to increased energy flow density, or collapse was inevitable. The banking house of Bardi ensured that all available finance was channeled into the servicing of debt; the new technologies were not developed, agricultural resources were rapidly exhausted, and Europe's solar-powered feudalism collapsed in the catastrophe of the Black Death in which over one-third of Europe died.

In the Renaissance recovery from that collapse, nascent capitalism developed the use of fossil fuel — coal — as the necessary new energy source. Fossil fuels, the product of geological concentration of solar energy accumulated over millions of years, makes possible a tremendous jump in energy densities. Ultimately, in modern oil and gas burners, densities as high as 10 megawatts (i.e., 10 million watts) per square meter, or 50,000 times that of solar power, are possible. In the industrial society which slowly developed from the Renaissance on, the increasing and then dominant use of fossil fuels not only led to vastly increased production and population, but fed back into agriculture through fertilizers and mechanization, led to the far more efficient use of direct solar energy, now reduced to a small fraction of total energy use.

The present dilemma facing humanity as a result of the imminent exhaustion of fossil fuel supplies similarly demands a new jump upwards in energy densities and new increases in productivity. Fission provides a modest increase, in the area of 70 megawatts per square meter in a typical reactor. Initial economically feasible fusion designs (such as the Oak Ridge laser design) provide about the same power densities. Fusion alone, however, can provide theoretically unlimited power densities through the development of more and more advanced reaction designs — the theoretical limit of fusion power densities is *thousands of trillions of times higher* than present fission or fossil fuel generators.

The real cost of energy is in inverse proportion to energy density — the higher the energy density, the more energy produced for a similar capital and labor input. Thus fusion offers the prospect of virtually unlimited reduction of energy costs as designs advance.

From this standpoint of energy densities, it is clear exactly what the Rockefellers, our present-day Bardis, and Carter are proposing with their solar energy schemes. Enthusiasts can use whatever fancy names they like — "biomass conversion" instead of "firewood," and so on — but what is being proposed is a return to feudal energy supplies, a Great Leap Backwards to the 14th century. Since a return to feudal energy sources is

being proposed, to energy sources with 50,000 times less power density than fossil fuels, it should be no surprise that such a policy will lead to feudal standards of living, and in short order to a repetition of the catastrophe of the Black Death.

The Rockefellers are not at all unaware of what they are advocating. Laurance Rockefeller, the organizer of *The Unfinished Agenda,* has funded the establishment of a model feudal village on Long Island called Lindisfarne, named after a Dark Ages Irish monastery. It is explicitly designed to be an example of the *future* of the United States — "post-industrial society."

Solar Energy in Action

Solar energy in practice would bring to the United States all the manifold benefits of 14 century feudal society — including 30-year life expectancies, 50 per cent infant mortality rates, perpetual famine, and periodic bubonic plagues — if we are lucky. In reality, the transition might well be interrupted either by a general ecological collapse or thermonuclear war.

A little calculation is all that is necessary to demonstrate the devastating consequences of solar energy schemes.

The main proposals for solar energy use on earth are solar-generated electricity, solar house heating, and "biomass conversions" (firewood and fuels based on wood and other vegetation).

Solar electricity, long promoted by Barry Commoner, is now a bit in disrepute, and was not endorsed by *The Unfinished Agenda.* It should nevertheless be briefly examined as illustrative of the general problem. The main proposals for solar electricity are either solar collectors, in which huge arrays of mirrors focus sunlight on a boiler which drives a conventional generator, and solar cells, using direct photovoltaic generation. The former is about 30 per cent efficient, the latter 10 per cent at most. Taking the collector as the better example of the two, we can easily calculate the required size of any given solar generator. A generator big enough to power the electricity needs of New York City, for example, must produce 15,000 megawatts. At 60 watts per square meter effective generation, the total areas covered by the mirrors for an appropriate solar collector must be in excess of 240 square kilometers! Assuming a very conservative thickness of one centimeter as necessary for durability, the total mass of the generator mirrors would be in the area of five million tons — somewhat greater than the mass of the Great Pyramid! This is more than 20 times as bulky as a fission or fusion reactor of the same output, and the capital and labor costs involved are at least 10 times as great. Similarly, electricity costs with solar energy would be about ten times present rates.

To convert over fully to solar electric power in the next 25 years, involving building ten of these monstrosities a year, would require the diversion of about 50 per cent of U.S. steel and other heavy industrial production to building glass pyramids in the desert, with imaginable catastrophic effects on all other investment and consumption, effects similar to that which the original Great Pyramids had on the economy of ancient Egypt.

Yet this now-abandoned program is mild in its consequences compared with the current Rockefeller proposals, which do not even theoretically propose to maintain present energy consumption levels.

Energy Source	Power Density (kilowatts per square meter)
Solar, biomass	.0001
Solar, earth surface	.2
Solar, earth orbit	1.4
Fossil fuels	10,000
Solar at sun surface	20,000
Fission	70,000
Fusion (early commercial)	70,000
Fusion (theoretical limit)	above several millions of trillions of watts

The key measure of energy source is its power density — the higher the power density the lower the cost of energy. Note exceedingly low values of all forms of solar energy except near the sun's surface. (Fusion power densities will vary over an enormous range as technologies advance. Present "worst case" Tokamak designs, at 2,000 kilowatts per square meter, are probably too expensive for widespread use. Current laser fusion designs, among others, are around the cited 70,000 kilowatts per square meter figure which will be typical of early commercial fusion reactors. Ultimate power densities reflect actual rates of liberation of energy in inertial confinement systems.)

The proposal actually outlined in *The Unfinished Agenda* is a fully non-electric economy based on direct solar house heating with the rest of the economy fueled by methanol made from wood or directly by wood itself. An alternative version of this scheme already employed in Brazil involves using the food root, manioc, in place of wood. Such methods use an even lower energy density than solar generators, since they rely on photosynthetic capture of solar energy.

In either case of annual forest growth or that of manioc,(which is converted to alcohol for fuel use), yields average about half a ton of fuel per hectare, or the equivalent of .1 watts per square meter, a further thousand-fold drop in energy density.

To provide current annual U.S. energy consumption of roughly 3 trillion watts, we would have to burn down the entire forest land of the United States, some 200 million hectares, in a little over one year. If instead only the "renewable" annual growth is used, about one 20th of current U.S. energy consumption will be provided for — enough to support 10 million people at current standards of living. In fact the last time the U.S. was wholly wood-powered, in the 1850s, the population was only about 20 million. Conversely, if it is proposed to reduce per capita energy consumption roughly ten-fold, that is, to the per capita levels of the 14th century (or of the Third World), then the U.S. could support a maximum population of 75-80 million people. Small wonder that one of the chief organizers of *The Unfinished Agenda* estimated that "some of us just won't make it" into the 21st century.

The author of this part of the *Agenda*, Amory Lovins, has a simple way to justify his fantasies. He selects as his model nation for energy policy not the U.S. but — Canada, a nation blessed with a large number of trees and not very many people. Since Canada has one tenth of the United States' population and about twice the har-

vestable forest, it is the case that, as an autarchy, Canada could "theoretically" return to a wood-based economy. In fact, however, the Canadian economy is wholly linked into that of the U.S. Even if the problem is viewed only continentally, at best the U.S. and Canada could maintain their present populations at only feudal standards of living.

From a global standpoint, such "biomass" lunacies are even more dismal. Large-scale deforestation has already occurred in the Third World just to supply existing subsistence-level fuel needs — forest depletion with devastating consequences on world climate and agriculture would be inevitable within less than a decade. The deforestation of the Amazon has already led to widespread climate shifts, including the present North American drought and cold wave.

The other part of the plan, solar house heating, can be dismissed on the basis of simple economic calculations. First of all, since at least 40 square meters of solar heating area is required for each family unit, solar heating is necessarily limited to single-family dwellings. Even for a single-family dwelling, however optimistic cost estimates of $150 per sqare meter, or $6,000 per unit, are already indicative of the waste involved. Assuming a 20-year mortgage and 20-year lifetime on the house, the system will cost about $75 per month. This compares with gas heating costs at the interstate price of $57 a month. In terms of the economy as a whole, the primary waste would be the diversion of 1-2 million skilled construction workers into the entirely wasted effort of building solar heating units rather than new homes and factories.

(The inane but frequently proffered argument that solar energy is more appropriate for house heating because it is lower in temperature and therefore "closer in quality" to the heat required is sheer gobbledook. Any suggestion, such as that emanating from Barry Commoner, that some kind of energy efficiency is increased by decreasing the temperature of the energy source is a "Big Lie." The exact opposite is the case, as any competent thermodynamics textbook will state: The higher the temperature of the source, the more efficient the energy use, making fusion the potentially most efficient source by far. In any reader is confused on tis matter, he should ask himself — if energy efficiency really improved with reduced temperature, then why couldn't you use the heat of the ocean to drive a ship across it? Or, for that matter, the heat of the surrounding air to make a fire on a cold day?

The Cost of Energy

The question of relative pricing brings us to the motivation behind the solar energy push. While the actual implementation of a solar energy program would devastate the United States and the world, it is not that implementation which is primarily the goal of the Rockefeller brothers. What they intend is the diversion of all financial resources to debt payment and away from investment and consumption of *all types* — a position even more extreme than the previous "Project Independence" policy. In practice, it is the Chilean "shock treatment," carried out through tremendous one-shot or repeated increases in energy costs, curtailing both consumption and investment simultaneously, while creating a tax on the entire economy to be used for debt servicing.

The solar energy issue is thus simply a cover for high energy prices. The essential wedge for the transition to solar energy, according to *The Unfinished Agenda*, is to be a tax on energy supplies, especially oil and natural gas, to force their prices and the price of electricity up to that of solar-produced energy. As our calculations have shown, that price, conservatively estimated, would be around $5 per thousand cubic feet for natural gas, ten times current prices, and about $30 a barrel for oil, three times today's price. Further, this energy tax would suck something on the order of $200 billion a year out of the U.S. economy, enough to totally collapse investment, send consumption levels down by 30 to 40 per cent, and send unemployment up to "official" levels of 20 to 25 per cent. This is the Chilean policy applied at home. The first step in implementing such a tax, a $28 billion "BTU tax," has already been proposed to Carter by his cronies in the Georgia Conservancy. These forces consider the debate around gas deregulation as merely a foot in the door toward a much higher price for all energy, at least 50-100 per cent above that of deregulated gas.

The end result of this policy of unmitigated looting, under the cover of a "transition to solar power," can only be the rapid collapse of the U.S. economy and an even more rapid drive toward external looting and thermonuclear war.

Appendix: A Note On Solar Energy In Space

Although schemes for solar energy in outer space, involving sophisticated technologies, are not being proposed by the Rockefeller brothers or the main environmental groups, the question has been raised in a number of circles. The answer again relies on energy density arguments. Solar energy in near-earth space, such as in satellites, is only about eight to ten items more dense than on earth (because of the absence of clouds, night loss, obliquity, etc.). This still means a density of only a couple of kilowatts per square meter, compared with tens of megawatts in reactors, but a very significant energy and capital investment in getting the material into orbit. By moving closer to the sun, energy densities are of course increased reaching 20 megawatts per square meter in the immediate vicinity of the solar surface (close solar orbit). Yet this maximum possible solar energy density is still less than that of existing fission reactors, and far below that of easily foreseeable fusion plants, especially large-scale ones. With the development of direct conversion schemes, fusion reactor power densities will readily rise beyond several hundred megawatts per square meter. Nor is there any particular shortage of fusion fuel. The deuterium in the earth's oceans will provide a thousand years of energy at ten million times present consumption rates, and the outer planets contain hundreds of thousands of times more. If it becomes necessary to replace fusion with a successor energy from sometime in the next century, it will certainly be some still more energy-dense form, not solar power, even in space.