

GLOBALIZATION AND THE ENVIRONMENT: BUILDING A SUSTAINABLE SOCIETY*

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Many earlier civilizations at some point found themselves on an economic path that was environmentally unsustainable. Some understood what was happening and were able to make the needed adjustments and survive, even flourish. Others either did not understand the gravity of their situation or, if they did, could not adjust in time. They collapsed.

Our global civilization today is also on an economic path that is environmentally unsustainable, a path that is leading us toward economic decline and collapse. Environmental scientists have been saying for some time that the global economy is being slowly undermined by the trends of environmental destruction and disruption, including shrinking forests, expanding deserts, falling water tables, eroding soils, collapsing fisheries, rising temperatures, melting ice, rising seas and increasingly destructive storms.

Although it is obvious that no society can survive the decline of its environmental support systems, many people are not yet convinced of the need for economic restructuring. But this is now changing with important new evidence from China.

For some decades the United States, with 5 percent of the world's people, consumed a third of the world's resources. But now China has become the top consumer of most basic resources. Among the basic commodities — grain and meat in the food sector, oil and coal in the energy sector and steel in the industrial sector — China now consumes more than the United States does in every case except for oil. It consumes nearly twice as much meat (68 million tons compared with 39 million tons) and more than twice as much steel (250 million to 105 million tons).

China also now leads the United States in the number of mobile phones, television sets and refrigerators. The United States still has more personal computers, though not likely for much longer, and more automobiles.

These numbers are about total consumption. But what if China reaches the U.S. consumption level per person? If China's economy were to continue to expand at 8 percent a year, its income per person would reach the current U.S. level in 2031.

If at that point China's per capita resource consumption were the same as in the United States today, then its projected 1.45 billion people would consume the equivalent of two thirds of the current world grain harvest. China's paper consumption would be double today's world production. There go the world's forests.

If China one day has three cars for every four people, U.S. style, it will have 1.1 billion

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cars. The whole world today has 800 million cars. To provide the roads, highways and parking lots to accommodate such a vast fleet, China would have to pave an area equal to the land it now has in rice. It would need 99 million barrels of oil a day. Yet the world currently produces 84 million barrels per day and may never produce much more.

The western economic model — the fossil-fuel-based, auto-centered, throwaway economy — is not going to work for China. If it does not work for China, it will not work for India, which by 2031 is projected to have a population even larger than China's. Nor will it work for the 3 billion other people in developing countries who are also dreaming the "American dream."

And in an increasingly integrated world economy, where all countries are competing for the same oil, grain and steel, the existing economic model will not work for industrial countries either. China is helping us see that the days of the old economy are numbered.

Sustaining our early twenty-first century global civilization now depends on shifting to a renewable-energy-based, reuse/recycle economy with a diversified transport system. Business as usual — Plan A — cannot take us where we want to go. It is time for Plan B, time to build a new economy and a new world.

Plan B has three components — restructuring the global economy so that it can sustain civilization, an all-out effort to eradicate poverty and stabilize population in order to elicit participation of the developing countries and a systematic effort to reverse the trends of environmental destruction.

Glimpses of the new economy can be seen in the wind farms of Western Europe, the solar rooftops of Japan, the fast-growing hybrid car fleet of the United States, the reforested mountains of South Korea and the bicycle-friendly streets of Amsterdam. Virtually everything we need to do to build an economy that will sustain economic progress is already being done in one or more countries.

In this economic restructuring, the biggest changes will come in the energy economy as the world strives to stabilize atmospheric carbon dioxide levels and reduce dependence on oil. Over the last five years, oil and coal production have expanded by 2 percent annually while the use of wind and solar energy have grown by more than 30 percent per year. The energy transition is already under way. But it is not moving nearly fast enough.

Among the new sources of energy — wind, solar cells, solar thermal, geothermal, small-scale hydro, biomass — wind is breaking through into the big time. In Europe, which is leading the world into the wind era, some 40 million people now get their residential electricity from wind farms. The European Wind Energy Association projects that by 2020, half of the region's population — 195 million Europeans — will be getting their residential electricity from wind.

Wind energy is growing fast for six reasons: It is abundant, cheap, inexhaustible, widely distributed, clean and climate-benign. No other energy source has this combination of attributes.

The abundance of wind became evident in a national wind resource inventory undertaken by the U.S. Department of Energy in 1991. It reported that three states — North Dakota, Kansas and Texas — had enough harnessable wind energy to satisfy national electricity needs.

In retrospect, this was actually a gross underestimate because subsequent advances in design enabled wind turbines to operate at lower wind speeds, to convert wind into electricity more efficiently and, because turbines are 300 feet tall instead of 120 feet, they are harvesting

a far larger, more reliable wind regime. Some 22 states now have commercial-scale wind farms feeding electricity into their grids.

The world is rich in wind energy. In addition to North America and Western Europe, wind is especially abundant in Eastern Europe, the former Soviet republics, China, the Andean countries and Argentina. China could easily double its current electric generation from wind alone.

Although corn growers support the production of corn-based ethanol as an automotive fuel, this pales beside wind as an energy source. A large, advanced-design wind turbine sited on a quarter-acre of land in northern Iowa can easily produce \$100,000 worth of electricity per year. The same quarter-acre in corn would produce 40 bushels of corn, yielding 100 gallons of fuel ethanol worth perhaps \$200.

For the U.S. automotive fuel economy, the key to greatly reducing oil use and carbon emissions is gas-electric hybrid cars. The average new car sold in the United States last year got 22 miles to the gallon, compared with 55 miles per gallon for the Toyota Prius. If the United States decided for oil security and climate stabilization reasons to replace the entire fleet of passenger vehicles with super-efficient gas-electric hybrids over the next 10 years, gasoline use could easily be cut in half. This would involve no change in the number of cars or miles driven, only a shift to the most efficient automotive propulsion technology now available.

Beyond this, a gas-electric hybrid with an additional storage battery and a plug-in capacity would allow us to use electricity for short distance driving, such as the daily commute or grocery shopping. This could cut U.S. gasoline use by an additional 20 percent, for a total reduction of 70 percent. Then if we invest in thousands of wind farms across the country to feed cheap electricity into the grid, we could do most short-distance driving with wind energy, dramatically reducing both carbon emissions and the pressure on world oil supplies.

One advantage of this marriage of gas-electric hybrids with wind energy is that the batteries become a storage facility for wind energy. Beyond this there is the tank of gasoline as a backup. Using timers to recharge batteries during the low demand hours between 1 and 6 a.m. with electricity coming from wind farms costs the equivalent of 50¢-a-gallon gasoline. We have not only an inexhaustible alternative to oil, but an incredibly cheap one.

Building an economy that will sustain economic progress requires a cooperative world-wide effort. This means eradicating poverty and stabilizing population — in effect, restoring hope among the world's poor. As Jeffrey Sachs regularly reminds us, the world now has the resources to do this. Eradicating poverty accelerates the shift to smaller families. Smaller families in turn help to eradicate poverty.

The principal line items in the budget to eradicate poverty are investments in universal primary school education, in school lunch programs for the poorest of the poor, in basic village-level health care, including vaccinations for childhood diseases, and in reproductive health and family planning services for all the world's women. In total, reaching these goals will take \$68 billion of additional expenditures each year.

A strategy for eradicating poverty will not succeed if an economy's environmental support systems are collapsing. If croplands are eroding and harvests are shrinking, if water tables are falling and wells are going dry, if rangelands are turning to desert and livestock are dying, if fisheries are collapsing, if forests are shrinking and if rising temperatures are scorching crops, a poverty eradication program — no matter how carefully crafted and well implemented — will not succeed.

This means putting together an earth restoration budget, one to reforest the earth, restore fisheries, eliminate overgrazing, protect biological diversity and raise water productivity to the point where we can stabilize water tables and restore the flow of rivers. Adopted worldwide, these measures require additional expenditures of \$93 billion per year.

Restructuring the economy does not require its own budget primarily because it is mostly a matter of shifting existing subsidies from, for example, fossil fuels to renewable energy sources. As Amory Lovins points out in his landmark study for the U.S. Department of Defense, *The Oil Endgame*, the United States could cut energy use in half with currently available technologies and make a profit in doing so. In effect, restructuring the economy is self-financing.

Combining social goals and earth restoration components into a Plan B budget requires an additional annual expenditure of \$161 billion. Such an investment should not be seen as a charitable act but as an investment in the world in which our children will live.

If we fail to build a new economy before decline sets in, it will not be because of a lack of fiscal resources, but rather because of outdated priorities. The world is now spending \$975 billion annually for military purposes. The U.S. 2006 military budget of \$492 billion, accounting for half of the world total, goes largely to the development and production of new weapon systems. Unfortunately, these weapons are of little help in curbing terrorism or in reversing the destruction of the economy's environmental support systems.

The military threats to national security today pale beside those posed by the trends of environmental destruction and disruption, which threaten the sustainability of the existing economic system and thus of global civilization itself. New threats call for new strategies. The threats now are environmental degradation, climate change, the persistence of poverty and the loss of hope.

The U.S. military budget is totally out of sync with these threats to our early twenty-first century civilization. The United States could underwrite the entire \$161 billion Plan B budget by shifting resources from the \$492 billion spent on the military and it would still be spending more for military purposes than all other NATO members plus Russia and China combined.

Restructuring the global economy to avoid economic decline and collapse is challenging, but we know from history that rapid economic restructuring is possible.

Of all the resources needed to build an economy that will sustain economic progress, none is more scarce than time. With climate change and with Arctic ice melting fast, we may be approaching the point of no return. The temptation is to reset the clock. But we cannot. Nature is the timekeeper.

It is decision time. Like earlier civilizations that got into environmental trouble, we can decide to stay with business as usual and watch our global economy decline and eventually collapse. Or we can shift to Plan B, building an economy that will sustain economic progress. In this situation, inaction is actually a decision to stay on the decline-and-collapse path.

It is hard to find the words to convey the gravity of our situation and the momentous nature of the decision we are about to make. How can we convey the urgency of moving quickly? Will tomorrow be too late?

One way or another, the decision will be made by our generation. Of that there is little doubt. And it will affect life on earth for all generations to come.