

# The Surprises Are Coming! (And they're not all bad)

Amory and Hunter Lovins

*This is the edited text of a dialogue sermon by a husband-wife team early this year in the Cathedral of St John the Divine, New York City. Hunter and Amory Lovins are among the best-known researchers/writers on environmental concerns. Their "Energy by the People, Energy for the People," appeared in C&C for March 17, 1980.*

HUNTER LOVINS: Six years ago, Amory drew up a list of the 20 most likely surprises in energy policy over the following two decades. Near the top of the list were "a major reactor accident" and "a revolution in Iran." We have been looking for that list recently. But he remembers that the 20th item, of which no examples could be given, was "the surprises we haven't thought of yet."

It is remarkable how energy policy experts, who spend their professional lives coping with the effects of a single surprise in 1973, often go on to assume a surprise-free future. It isn't likely to be like that at all. The future is almost certain to be full of surprises, and we would be wise to start getting ready for it. This means making ourselves less vulnerable, more resilient, in the face of failures and side effects whose very nature we may not yet be able to understand.

The kind of brittleness we need to avoid is the kind, for example, that Con Edison has designed into the New York electrical system—a system no doubt reliable in the face of calculable kinds of breakdowns, but not at all resilient against the unforeseen and incalculable failures that are individually unlikely but collectively so numerous that they often catch up with us in the form of the supposedly "impossible" breakdown.

The surprises are coming!

Ten years ago, for example, nobody knew—as we now suspect—that it may be possible to change the global climate by just once spilling oil in the Beaufort Sea, where drilling is now proceeding regardless.

Nobody knew that artificial nitrogen fertilizers may damage the ozone layer, or that radioactive krypton gas released by

nuclear power plants may affect the electrical charges in the air on which the monsoon rain depends, or that the flows of electricity in the power lines of this region can alter the patterns of charged solar particles in the upper atmosphere over Antarctica.

Perhaps, as Rene Dubos suggests, the worst environmental problems may be the ones we haven't yet discovered. The

intricate connections in the world, which operate whether we understand them or not, often work in mysterious ways contrary to our everyday experience: Who would have guessed that a big molecule—a synthetic insect hormone used as a pesticide in California—happens to be the same shape as a substance released by the human pituitary gland, and so can cause irreversible hormonal imbalance in women in quantities of one or two molecules?

## Peculiar Side Effects

Some years ago the World Health Organization (WHO) attacked mosquitoes in Borneo with good intentions and plentiful DDT. Soon people's houses began to fall down. The DDT had killed a parasitic wasp that had controlled house-eating caterpillars. Then the cats started to die: They had accumulated lethal doses of DDT by eating geckos that had eaten poisoned caterpillars. Without the cats, the rats flourished. Faced with bubonic plague, the WHO had to parachute cats into Borneo.

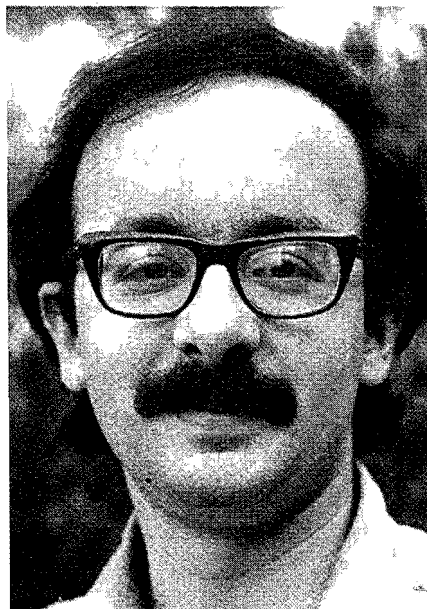
Many of the worst surprises of the 1980's may come from the combined efforts of government and industry to demonstrate yet again that often the cause of problems is solutions—that we can "solve" a problem by defining it so narrowly that we make it into someone else's problem, perhaps a problem of climate, equity, nuclear proliferation, war, soil fertility, food or water.

Consider, for example, that we are making all the same mistakes with water policy that we made with energy policy in the 1960's. We are seeking to bring in more water, rather than to use efficiently the water we already have. We are pretending that all uses of water uniformly require the highest quality of water, rather than matching the quality to the task; the analogy to our wasteful practice of heating houses with electricity is flushing toilets with drinking-quality water. We are seeking illusory economies of large scale. We are charging ourselves

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L. Hunter Lovins



Amory B. Lovins

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The Task Force called Lefever's criticism of religious critics of the infant formula industry "irresponsible and inflammatory":

Denominational and ecumenical voices and groups who are supportive of the proposed WHO regulatory Code do not necessarily "hate corporate power." Such phrases as "compassion-coated revolutionary

rhetoric" and "self-appointed custodians of rectitude" are not worthy of a thoughtful social critic. We affirm the integrity of those within the church, no matter what their point of view, who are concerned about the survival and are championing the rights and well-being of infants who are born into Third World poverty.

Lefever's position in the Reagan Administration is worrisome to Carl E. Taylor, chairperson of the Department of International Health at the Johns Hopkins University and a prestigious supporter of the Code. "Lefever is clearly on record to work against the Code," he said. But "if the US tried to block the Code now, after helping to get it downgraded to a recommendation, it would be disastrous for [the US] image around the world."

The Code is not perfect, Dr. Taylor feels, "but it is absolutely essential to keep the pressure on the formula companies." He laughs at the companies claims to lead the promotion of breastfeeding. "They are being dragged

along kicking and screaming to cooperate with the Code," and have been forced to move "grudgingly" to back breastfeeding because of the pressures of the boycott and the WHO debate.

Anita Anand, a member of the Task Force who attended the January WHO executive board in Geneva, thinks the companies are frustrated because "WHO is not in their pocket. WHO, riding justifiable praise for eradicating small pox, is in nobody's pocket."

UNICEF's Grant also responded to Lefever's article and in doing so turned a nice phrase that might point the companies in a new direction. "It is hard to see the disadvantages for responsible manufacturers if a general Code of Marketing is implemented that prevents less responsible producers from using undesirable forms of brand competition."

Which recalls the time in 1960 when Marine Commandant Shoup wanted to get rid of the "swagger sticks" most officers carried. "Any officer who needs to carry one is authorized to do so." They went. □

## Surprises

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for additional water supplies often a tenth or a hundredth of what they really cost. And we are spending water as if there were no tomorrow.

Much of our agriculture depends on the mining of groundwater. For example, in the four dry months of the year, we pull from the Ogallala Aquifer (a geological formation underlying the High Plains states) more than the entire *annual* flow of the Colorado River through the Grand Canyon. We draw down the Ogallala Aquifer at least four feet a year. It recharges less than a quarter of an inch a year. Half of it is already gone. Grain grown with that water feeds two-fifths of our feedlot cattle. Worse, every bushel of corn that we grow in that manner erodes over two bushels of topsoil. Our colleague, Dr. Wes Jackson of The Land Institute [Rt. 3, Salina, Kansas, 67601], estimates that to grow enough corn with Ogallala water to add enough weight on a feedlot steer to put an extra one pound of meat on your table consumes about a hundred pounds of lost, eroded topsoil and over 8,000 pounds of mined, uncharged groundwater. Enjoy your

hamburger—or alcohol fuel made from that same unsustainable corn crop.

From all of these causes the surprises are coming.

AMORY LOVINS: As this unsustainability starts to manifest itself in our latter-day Epiphany, we may have to concern ourselves less with the multiplication of loaves and fishes than with their division and subtraction; less with the changing of water into wine than into the PCB's, trichlorethylene and other industrial wastes that have already poisoned more than a third of the water-wells in this country. Indeed, mindful of all of this, we increasingly suspect that by the end of the 1980's, energy may be the least of our worries, as other resource crises such as land, food and water irresistibly remind us of the fragility and intricate interdependence of the natural world.

Our mentor, David Brower, has said that if the earth were the size of an egg, then all the water we will ever have, if collected together, would be one drop spread over most of the surface of that egg. All the air, condensed to the density of water, would be a droplet about a fortieth as big. All the arable land would be a not quite visible speck of dust. That drop, droplet and speck are all that make the earth enduringly different from the

moon. Within this decade, if we remain unmindful, we will see still more unmistakable evidence that that drop, droplet and speck are unraveling, unable to repair the damage.

### Security and Danger

But to life, that most miraculous and surprising of manifestations, the greatest threat today remains that of nuclear war, a threat now vastly intensified by the most explosive mixture in human history: nuclear power and its concomitant spread of nuclear bombs, the nuclear arms race and imported oil. The Hopi prophecy that a gourd of ashes will be scattered over the earth seems daily more plausible, as the number and dispersion of bombs—already well over one million Hiroshimas' worth—swell ever more monstrously.

Having read and written a good deal about nuclear bombs, Hunter and I thought we had some understanding of what they do. But last spring we made a pilgrimage to the Peace Museum at Hiroshima, and quickly found that our understanding was only intellectual, not emotional. Words cannot describe a miniature sun so intense that its flash instantly fused bone with melted ceramic roof tiles and transformed the granite

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steps of a bank into different mineral forms—save in one place where the form of a human being sitting on the steps left forever a shadow in the stone.

Today, thanks to technological progress, there are more than 50,000 nuclear bombs in the world, most of them far more powerful than the ones that the United States exploded over Hiroshima and Nagasaki. This country, for example, has not only land-based missiles and bombers but also a submarine fleet, including 31 essentially invulnerable Poseidon submarines, of which about half are on station at any one time. Any *one* of those submarines can carry enough nuclear warheads (each, on average, three times as powerful as the Hiroshima bomb) to incinerate *all* 218 Soviet cities of over 100,000 people.

Yet, we are told that we have too few bombs, that our national insecurity is not yet great enough, that our national survival depends on sacrificing the welfare of our poor in order to provide mass transit for MX missiles.

Mary Catherine Bateson likens our nuclear predicament to that of a man who has the habit of nightly drinking himself into oblivion and who, perhaps once a year, gets out a revolver and plays solo Russian roulette. He is killing himself in three ways: the annual gamble with instant death, the slow death of cirrhosis and the daily rejection of the reality of his being. But these three modes of death feed on each other; they're mutually reinforcing. When the revolver fails to fire, he thinks he is all right and continues to drink himself to death. He doesn't think too much about what the alcohol is doing to his body because of his overwhelming fear that the Russian roulette will kill him first. The daily oblivion that this fear compels him to seek keeps him from noticing the creeping cirrhosis or resisting the temptation of the revolver. And so the three go round and round, despair feeding on itself.

In our culture, perhaps once a year, various nuclear alerts are proven false and the nuclear gun doesn't quite go off. We kill ourselves slowly with chronic pollutions and privations, to which we deaden ourselves with the electronic oblivion and "entertainment" to which our fears drive us. These two feed on each other. The steady revolving of the insane merry-go-round can be jammed only by minute particulars of work and hope, of

grace and works. But first, like the alcoholic, we must recognize the depths of our addictive predicament. Breaking that numbed silence of dread, facing the reality of nuclear bombs, must precede any attempt at healing.

So great is our need for atonement, for convincing ourselves that some good can come from the sin of the physicists, that we have been reluctant to admit that our use and promotion of nuclear power is today the strongest driving force behind the spread of nuclear bombs. Yet this energy source, after three decades and over \$40 billion of subsidies, delivers to the United States today about half as much energy as firewood. The collapse of nuclear power (insignificant as a potential energy source) from an incurable attack of market forces, however, offers a fleetingly unique opportunity to craft an effective and sustainable energy future based on nonviolence technologies, genuine development for the world's poor and a psychological climate in which

foreign policy no longer relies on threats of nuclear violence—threats that our Government has reportedly made at an average rate of one per year.

The good news is that because investments in nuclear energy actually *slow down* our replacement of foreign oil by diverting resources from other measures that can save more oil faster and cheaper, accepting the verdict of the market and arranging an orderly terminal phase for our nuclear program is not a sacrifice but a positive opportunity. The vital alternatives—wringing more work from our energy and, next, harnessing appropriate renewable sources already available—are starting to be implemented with astonishing speed.

In 1979, about 97 percent of our economic growth was fueled by energy savings, only 3 percent by all expansions in energy supply put together. We now know that just two highly cost-effective measures—weatherizing buildings and paying people to scrap their gas-guzzling

### Further Readings

Further information on and documentation of the themes of this article are available from the sources listed here:

—On "resilience": A.E. Lovins, Op Ed page, *The New York Times*, July 17 and July 24, 1977; A.E. Lovins and L.H. Lovins, *Energy Policy for Resilience and National Security*, a Federal study now in preparation, to be published in 1981.

—Oil drilling in the Beaufort Sea, W.J. Campbell and S. Martin, *Science* 181:56 (1973); cf. also *Science* 186:843 (1974).

—Nitrogen fertilizers: papers cited in S. Schneider, *The Genesis Strategy* (Plenum, 1976).

—On krypton: W.L. Boeck et al, *Bulletin of the American Meteorological Society* 56:527 (1975).

Surprises generally: A.B. Lovins, "Long-term Constraints on Human Activity," *Environmental Conservation* (periodical; Geneva) 3(1):3 (1976).

DDT in Borneo: E.D. Gray, *Why the Green Nigger: Remything Genesis* (Bolton Institute, 4 Linden

Square, Wellesley, MA 02181; 1979).

—Ogallala Aquifer: Wes Jackson, *New Roots for Agriculture* (Friends of the Earth, 124 Spear Street, San Francisco, CA 94105; 1980).

—Nuclear proliferation and war: A.B. Lovins and L.H. Lovins, *Energy/War: Breaking the Nuclear Link* (Friends of the Earth, 1980, and Harper & Row Colophon paperback, in press, May 1981).

—Soft energy: Cf. *Energy/War*, above, and the following:

*National Geographic*, special energy issue (February 1981), pp. 34-57, 73;

*Shining Examples* (Center for Renewable Resources, Suite 510, 1001 Connecticut Avenue NW, Washington DC 20036; 1980);

*The Energy Consumer*, free periodical issued by the Office of Consumer Affairs, US Department of Energy, Washington DC 20585; special issues on solar, alcohols, preparedness, communities, etc; *Soft Energy Notes*, periodical (1978-) issued by the International Project for Soft Energy Paths, 124 Spear Street, San Francisco, CA 94105.

cars—could together eliminate US oil imports, before a new power station or synthetic-fuel plant ordered today could deliver any energy whatever, and at a tenth of its cost. In a genuinely competitive marketplace, the energy technologies now endangering our security and survival would not stand a chance of being built. Surprise!

**HUNTER LOVINS:** The exciting surprise of the past few years is the discovery that if people have incentive and opportunity, they can go far to solving their own energy problems, perhaps pointing the way to solving even tougher problems.

Consider the San Luis Valley in Colorado. It's an area about the size of the state of Delaware—a cold, high plateau with only a 90-day growing season, containing some of the poorest counties in the United States. The traditional Hispanic communities there heated with wood gathered from their commons-land—until a few years ago, when a corporate landowner bought the land, fenced it and started shooting at people who came in to cut wood.

The people there had an instant, homegrown energy crisis. But they were lucky; there was in the Valley a couple, Maria and Arnie Veldez, who knew how to build very-low-cost solar greenhouses. And so people who were too poor to buy wood or oil or any other commercial form of fuel joined together in community “hands-on” greenhouse workshops—barn-raising, if you will. They've now gone from a documented *four* to over *eight hundred* of these greenhouses in just a couple of years. There are solar trailers, a solar Post Office, a solar mortuary. Now the local Baskin & Robbins ice cream parlor has gotten into the act with a high-tech solar system. Wind machines are springing up. The farmers are building a geothermally heated alcohol plant run on cull potatoes and barley washings—wastes that were previously a disposal problem.

### **Preparing for the Future**

All of this is happening, and the people of the San Luis Valley are well on their way to energy self-reliance, because they were too poor to use anything *but* solar energy. And they are rediscovering the benefits of year-round food-growing and the greater coherence that working together can give to a community.

The same process is going on now in

poor rural areas such as San Luis, in affluent suburbs such as Davis, California, in New York City. It is happening around the country, and around the world. New tools are becoming available, including low or zero-interest conservation loans by utility companies now representing a fifth of national generating capacity—loans which can completely remove the capital burden on consumers while keeping the utilities from going bankrupt. The bewildering range of information about individual and community energy opportunities is becoming widely available in intelligible form from grassroots groups and local energy offices. The soft energy path is becoming a way of life for millions of people.

Perhaps the greatest incentive to take our energy potential into our own hands is the knowledge that when, not if, the oil supply is again cut off—the biggest non-surprise of the next few years—the Federal Government will be able to do very little to help communities. Each community will suddenly find that it must evolve new ways to help itself. As this realization occurs, many also realize that efficiency and appropriate renewable sources are the only technologies that can be installed fast enough.

If the oil were cut off today with at most a six months' supply left in the pipelines, what would you do? I think an efficiency-and-renewables mobilization would seem a sensible course, and that like the people of Fitchburg, Mass., who weathered about a fifth of their houses in ten weeks by door-to-door citizen action, you and your neighbors would simply get on with the job.

Indeed, many communities are at this moment doing precisely that. Newly aware of their energy vulnerability, and of the likelihood of surprises of all sorts, they are already acting to reduce that vulnerability: stuffing up the holes in their houses, insulating, putting in efficient lights, recovering waste heat, making their vehicles and factories efficient, building greenhouses and wind-mills, using crop and forestry wastes to create renewable liquid fuels.

These people will not be caught by the energy surprises. What we need is to see that the surprises *are* coming—and to prepare for them by manifesting, in the works that lie before us, the miraculous qualities of the human spirit. □