

ENERGY: THE AVOIDABLE OIL CRISIS

A simple strategy will reduce shortages and keep costs down

By Amory B. Lovins and L. Hunter Lovins

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THE UNITED STATES, having pumped more oil for longer than any other country has largely depleted its cheapest oil. More oil can be found, but only at higher cost and in more remote and fragile places. Foreign oil now costs less to find and extract than ours, and despite American technological prowess, the cost gap will gradually widen. Only three responses to this trend seem to be available at present: protectionism, trade, and substitution.

The protectionist option.

Many U.S. oil companies, like companies in other industries whose products can no longer compete in global markets, want tariffs that will make imported oil look as costly as domestic, or a restoration of recently reduced government subsidies that made domestic oil look as cheap as imported, or both. Tariffs would encourage, and subsidies discourage, the more efficient use of oil. Either move would stimulate domestic exploration and extraction of oil, but with side effects. Either move would make Americans pay more for oil than others pay, making the U.S. economy less competitive. Worse, by making new domestic oil look cheaper than it really is - at least, relative to foreign oil - either move would speed up the very depiction that was supposedly such a worry in the first place.

A more thoughtful variation on the protectionist theme would be to raise the taxes on gasoline and other oil products to discourage consumption. This wouldn't affect oil companies' choices - between drilling for oil at home and importing it from abroad: they would do whatever was least expensive - namely, import. It could, however; keep domestic oil companies in business longer, because reduced consumption would slow oil depiction. Unfortunately, though tax increases would spur oil savings by those who could afford to buy more-efficient cars (half our oil is used on the highway), they would burden those who can barely afford the cars they have. More generally, any tax on final energy products is disproportionately hard on people with low incomes, because they spend a larger fraction of their income on fuel. An oil tax would also further distort investment and purchasing choices between oil and other fuels. Both these problems could be avoided by uniformly taxing *all*

depletable fuels as they come out of the ground or into the country. That might be a good idea, and it could greatly enrich the Treasury, but it's an oblique, long-term response to the depiction of low-cost U.S. oil.

The trade option.

The free-trade alternative to protectionism is to buy the cheapest oil, even if it's foreign. Americans are doing just that. Last year net imports rose to 33 percent of all oil used in the United States-less than throughout 1973-1981, much less than the all-time high of 46 percent, which occurred in 1977, but a bit above the recent low of 27 percent, achieved in 1985. The halving of world oil prices last year, brought about largely by the previous decade's U.S. oil savings, prompted a temporary 3.5 percent boost in domestic oil use while discouraging costly domestic output. If these two trends were to continue (unlikely, since oil prices have about doubled again), they could drive imports above 50 percent of the oil we will use in the 1990s.

Of course, the United States already imports many commodities that others produce better or more cheaply than we do: in 1986, for example, we imported 75 percent of the nickel we used, 92 percent of the bauxite, 70 percent of the tungsten, and 83 percent of the tin. We import coffee and cattle, fish and cheese, perfume and beer, cars and televisions. To pay for these or any other imports, we must export something else that others prefer to buy from us. As Japan has demonstrated, a major industrial power can import nearly all its oil, but if we did that we would have to match Japan's export success as well. To be sure, the potential balance-of-trade burden is easily exaggerated: the U.S. trade deficit for energy, having peaked at \$75 billion in 1980, had fallen to \$29 billion last year. This was a striking reduction, but those gains were more than offset by the years \$110 billion deficit on *non-energy* imports. Nonetheless, if oil again cost \$24 a barrel, as U.S. oil did in 1980, and if we imported as much of it as we did at the 1977 peak, the dollar outflow would match that of 1980.

A deeper fear is that foreign oil can be cut off by war or politics, much as the United States has embargoed wheat and soybean exports to previously trusting trading partners. For many Americans, the possibility of oil cutoffs

suggests not just the inconvenience of gas lines but a threat to this nation's military power although the latter idea is probably an exaggeration, since the Department of Defense uses less than three percent of the nation's oil and is so unconcerned about oil cutoffs that it is depleting its Naval Petroleum Reserve.

National security is too important to be cheapened by invoking it for special pleading. Those who say that national security requires the substitution of costlier domestic oil for foreign oil are glossing over three sets of basic facts.

First, conditions today bear little relation to those of 1973. OPEC now provides only 30 percent of the world's oil output, not 56 percent, and the Persian Gulf only 19 percent, not 37 percent. Oil is plentiful, not in short supply; the oil market favors buyers, not sellers. Once-rich oil exporters, now struggling with budget deficits, can hardly sacrifice revenues, let alone destroy the value of the Western assets that harbor their shrinking cash reserves.

Supplies, stocks, and transportation and marketing arrangements have also become enormously more diverse and flexible than they were fourteen years ago. Overland routes to Red Sea and Mediterranean ports now exist, and other parts of the world (Venezuela, Mexico, Nigeria, Indonesia) have two to three million barrels a day of spare output capacity. Five million barrels of oil a day could be immediately forthcoming if needed. In the first half of this year only about seven million barrels a day came through the Strait of Hormuz - roughly half the early-1980s level.

Second, four specific precautions or countermeasures against oil cutoffs are now available: friendly relations, diversification, stockpiling, and military intervention.

The most effective approach would be simply to behave so that others want to continue doing business with us - specifically, those others with whom we have interests in common. In the 1990s, when most U.S. oil imports will probably come from Mexico, Venezuela, and Canada, we may wish we had devoted to those countries' prosperity, stability, and friendship a tenth of the attention we're now lavishing on arguably less vital relationships in the Persian Gulf. Instead, our policies on such issues as immigration, debt, trade, Nicaragua, and acid rain are souring relations in the Western Hemisphere for decades to come.

The United States has already diversified its oil sources. More than half of our net oil imports last year came from the Western Hemisphere and Britain. Of all oil used by the United States in 1986, just 17 percent came

from OPEC (including such countries as Nigeria, Indonesia, and Venezuela), seven percent from Arab countries, and less than six percent from the Persian Gulf.

Another basic precaution - stockpiling, in the 530-million-barrel Strategic Petroleum Reserve and in private reserves - has already been taken, and not just by the United States. Japan, for example, has about 150 million barrels of crude oil in anchored tankers - a month's worth of oil, for all uses, for the country. Government stockpiles among twenty-one advanced nations now contain about 800 million barrels-more than four times the 1979 level. This very large reserve, bought at high cost, can make up for more than a year the net deficit that might be caused by a sudden cutoff of shipments through the Strait of Hormuz. A year is long enough for fuel switching and the reactivation of shut-in wells to fill the gap: the noncommunist world's spare oil-extracting capacity on such a time scale is about 10 million barrels a day, or more than a fifth of the same countries' total oil demand.

Still remaining is the option (assuming it is considered moral, effective, and safe) of threatening to use or using force to maintain access to foreign oil. This card, however, has already been overplayed, and the stakes are high. Earl Ravenal, of the Georgetown University School of Foreign Service, found that in fiscal year 1985 alone, before the *Stark* attack, the United States spent \$47 billion projecting power into the Persian Gulf- \$468 per barrel imported from the Gulf in that year, or eighteen times the \$27 or so that we paid for the oil itself.

Of course, more is at stake in the Gulf than simply the flow of oil to the United States. We are, however, paying a heavy price to ensure that oil is shipped - from a war zone partly of our own making - to ourselves (we receive about 10 percent of the Gulf's oil) and to our business competitors (about 90 percent). What's more, we're paying the price in money borrowed from those competitors and from the oil exporters themselves.

Persian Gulf oil, whose total purchase-plus-military cost in fiscal year 1985 was \$495 a barrel plus interest, is hardly a competitive fuel for the American economy. Today some 25,000 members of the U.S. military are in the Gulf region. The costs of that expanded presence and its military risks, even spread over more barrels imported from the Gulf, still amount to hundreds of dollars per barrel. To paraphrase a cartoon by Dan Wasserman, we're spending money we don't have, to defend ships that aren't ours, to ship oil we don't use, for allies who won't pay, in pursuit of a policy we haven't formulated.

Third, the premise underlying the national-security argument-that foreign oil is less secure than domestic-is not necessarily valid. Six years ago our study for the

Pentagon (published as *Brittle Power: Energy Strategy for National Security*, summarized in *The Atlantic* of November, 1983) found that a handful of people could cut off three fourths of the oil and gas supply to the eastern states - so efficiently that it would take upwards of a year to restore it - in one evening's work, without even leaving Louisiana. That remains true. Twenty-three percent of all crude oil extracted and 16 percent of all crude oil used in the United States flows through the Trans-Alaska Pipeline System—two and a half times as much as we're importing from the Persian Gulf. Yet the pipeline has already been repeatedly, if incompetently, attacked, and the Army has declared it indefensible. The pipeline is far easier to disrupt and harder to mend than Middle Eastern oil facilities and tanker shipments. We know of many alternative routes for Middle Eastern oil—the Saudis, for example, are completing their second pipeline to the Red Sea, avoiding the Gulf altogether—but none for Alaskan oil. Far more of our oil supply, therefore, is now unavoidably at risk from a single, simple, unattributable act by a lone saboteur in Alaska than could possibly be cut off by an all-out war in the Strait of Hormuz. Seeking additional oil in the Arctic National Wildlife Refuge, where the odds of cost-effectively finding any are at best one in five, therefore would be not just uneconomic; it would also perpetuate one of the gravest threats to U.S. energy security.

The substitution option.

The third option, though largely ignored, works better and costs less. It avoids *all* the problems of the first two options. It increases security instead of risks, saves money instead of spending it, and avoids the damage to our economy and environment that would come from rapidly depleting our domestic oil reserves. This option is to avoid using oil in the first place - that is, to reduce oil use through increases in efficiency, or to substitute alternative liquid fuels, or both.

The lower forty-nine states have two supergiant oil fields, each bigger than the biggest in Saudi Arabia, both nearly as economical (only a few dollars a barrel) and both about four-fifths uncapped. They are the “weatherization oil field” in our attics and the “accelerated-scrappage-of-gas-guzzlers oil field” in Detroit. By saving oil, or natural gas that can replace oil, we could eliminate U.S. oil imports. We could do so before any new power plant or synfuel plant ordered now could be built and before production from any new Arctic oil field could begin - and at a fivefold to tenfold lower cost. In fact, if we spent as much to make buildings heat-tight as we now spend in *one year* on the military forces meant to protect the Middle Eastern oil fields we could eliminate the need to import any oil from the Middle East.

(An impractical kind of oil saving is sometimes proposed instead: building more coal or nuclear power stations. Since less than five percent of our electricity is made from oil, and less than five percent of our oil is used to make electricity, the two have almost no connection. Power plants are virtually irrelevant to the oil problem—except that the huge expense involved in building new ones would draw money away from investment in effective oil savings. The modest amounts of oil and gas still burned in power plants - and, for that matter, most of the coal and all of the uranium, too - can be cost-effectively displaced by superefficient: new lights, motors, appliances, and building components.)

Saving oil isn't just theoretical. From 1977 to 1985 real U.S. GNP grew 21 percent, the number of registered vehicles grew 20 percent, but total oil use *fell* 15 percent. The oil saving in 1985 equaled *three times* our 1986 imports from the Persian Gulf.

Americans now use 38 percent less oil and gas to produce a dollar of GNP than they did in 1973 - and they achieved that saving mainly with caulk guns, duct tape, and slightly more fuel-efficient: cars, not with the powerful new technologies that can now save even more energy at even lower cost. For example, full use of American-made superwindows, which insulate two to four times better than triple glazing, could save the nation more oil and gas than Alaska now supplies. Widespread use of these efficiency measures would cost less, protect the environment, and deplete no critical resource.

Last year the thirteen-year-old “energy-efficiency industry” produced, in effect, two-fifths more energy than the century-old oil industry. We're getting less domestic oil at higher costs each year, but more efficiency at lower costs. Reserves of oil are dwindling, but reserves of efficiency are expanding. Why, then, does federal policy emphasize depleting oil quickly and saving it slowly? The 1986 rollback of new-car efficiency standards from 27.5 to 26 miles a gallon, is wasting more oil than the areas currently off limits in Alaska and offshore California might yield.

Conversely, improvements in the efficiency of the car fleet in use between 1973 and 1986 (from 13.1 to only about 18 miles per gallon) saved over twice as much oil last year as we imported from the Persian Gulf, or slightly more than Alaska's total output. We can do much better: the most efficient four-to-five passenger cars in 1985 were getting more than 55 miles per gallon in commercial models and 70 to 100 mpg in prototypes.

After two previous oil crises, in 1973-1974 and 1979-1980, the United States tried ignoring efficiency and

boosting supply. The result was overbuilt and insolvent supply industries that couldn't respond to the gush of energy savings produced in the marketplace. Today, with the potential for savings bigger than ever, the Reagan Administration seems determined to make the same mistake. When Donald Hodel, now Secretary of the Interior, was head of the Bonneville Power Administration, he proclaimed imminent electricity shortages in the Pacific Northwest and promoted the now notorious nuclear project WPPSS. Instead of the shortage prophesied, the northwestern states found themselves with a seemingly permanent surplus, triggering a \$7 billion deficit. Now Hodel wants to inflict the same genius on the struggling oil industry.

"Drilling" for oil in our inefficient cars and buildings isn't instant or free. But it's faster and much cheaper, safer and far surer, than drilling anywhere else. Energy savings have already cut the national energy bill by some \$150 billion a year. That's an average of more than \$1,700 a year cash savings for each household in the United States – tax-free extra income that largely recirculates in our local economics, supporting local jobs and local multipliers.

But this achievement represents a mere fraction of the amount of energy efficiency available and worth buying. If Americans were now as efficient as our Japanese and Western European competitors are - and even they have a long way to go – we'd save an additional \$200 billion a year, which is more than last year's federal budget deficit. Buying the economically optimal amount of energy efficiency for the rest of this century could lead to net savings of several million dollars - enough, in principle, to pay off the entire national debt.

Energy inefficiency costs American jobs in world markets. Japan's higher energy efficiency, for example, gives all its exports an automatic cost advantage over ours, averaging about five percent - much more for energy-intensive products. Conversely, whether measured per unit of energy saved or per dollar invested, buying - energy efficiency creates several times as many American jobs as supplying more energy: not jobs in boom-and-bust frontier towns but jobs right in the communities of the people who need them.

The efficient use of oil can also buy time for the decades-long switch to the renewable sources that, one

way or another we'll adopt as oil becomes too costly. This transition won't be quick or cheap, but that's all the more reason for getting-started now - before the cheap oil and the cheap money made from it are gone. Already, American oil is becoming costlier than imported oil, and the faster oil is used, the sooner other oil-supplying nations will find their oil becoming costlier than OPEC's huge reserves. The problem that we have now, others will have later, though Saudi Arabia (according to our present knowledge of petroleum geology) will have it last of all.

The short-term oil savings and diversification in our sources of oil extraction that have resulted from the past two oil shocks now offer a unique opportunity: roughly a two-decade-long respite (longer if the exploration of new areas is unexpectedly successful, shorter if federal policy continues to stifle gains in efficiency) from Middle Eastern dominance of the global oil supply. If this interval is frittered away, it could end with the United States, its alternative options expired, needing Middle Eastern oil more than ever. If, instead, we increase our oil efficiency and make sensible use of diverse alternative fuels, this grace period could expire on a United States that no longer substantially depends on oil from the Middle East or anywhere else outside our borders. Without efficient cars, no liquid-fuel future makes sense for long. *With* efficient cars, alcohols and other liquid fuels made from natural gas and sustainably grown biofuels - abundant or even inexhaustible resources, whose use poses little or no risk to the world's climate - can meet our energy needs at reasonable cost. Efficiency and alternative fuels are natural partners. With both, we can with confidence, buy American.

-Amory B. Lovins and L. Hunter Lovins

Amory B. Lovins and L. Hunter Lovins ("Energy: The Avoidable Oil Crisis") are the Director of Research and the Executive Director, respectively, of the Rocky Mountain Institute (www.rmi.org), which they established in 1982 to promote the efficient use of global resources. Amory B. Lovins is the author of numerous books, including *Soft Energy Paths* (1977), and is the co-author, with L. Hunter Lovins, of several books on energy policy, including *Brittle Power* (1982), an excerpt from which appeared in *The Atlantic* in November, 1983. Their most recent book is *Energy Unbound* (1986).

*Letters and response from The Atlantic, pp. 10-11, Vol. 261, #4, April 1988.
The next-to-last sentence, through an editorial error, changed the value; as phrased,
it should read "...every nine days, forever."*

AVOIDABLE OIL CRISIS

I disagree with many aspects of "The Avoidable Oil Crisis," by Amory B. Lovins and L. Hunter Lovins (December *Atlantic*). Here are the ones that bothered me most:

The Lovinses reject a tax on oil because it would (a) be a hardship for low income people and (b) "distort investment and purchasing choices between oil and other fuels." With respect to (a), if a tax on oil is effective in reducing the consumption of oil, it accomplishes a most desirable objective. The low-income people who are adversely affected, since they account for only a small percentage of total oil consumption, can have the impact ameliorated through such devices as tax credits or rebates. Sales taxes and excise taxes have the same adverse impact on the poor, but because they are deemed to provide an overall good, they are enacted, and their impact on the poor is assuaged by other means.

As for (b), to the extent that a tax on oil encourages the use of other, more available sources of energy (electricity, for example), that, too, is good. It achieves the objective of reducing the demand for oil—something essential for our national health.

The Lovinses toss away any thought that a cutoff of foreign oil could be a threat to national security. After all, they say, the Department of Defense uses less than three percent of the total national consumption, we have a strategic reserve, and we have many sources of supply with an expandable capacity for producing oil. However, in a war situation the military requirement would balloon, the sea lanes by which we obtain oil from foreign sources would be under attack, and the sources themselves might be involved in one way or another and might require the oil for their own use.

The article also points out the reduced role of OPEC in world oil supply. What is overlooked is that Arab OPECs oil reserves are far greater than those of other countries from which we purchase oil. Thus, as domestic demand in those other countries increases, and their resources decline, less of their oil will be available for export. Moreover, while our imports from Arab OPEC in recent years were much below those of the late seventies and early eighties, in 1986 they increased sharply to the highest level since 1981.

The fact of the matter is that oil is essential to a viable industrial economy, and the United States could be facing a severe oil problem in the future. It is vital that we find ways of reducing demand (or constraining its increase) and increasing supply. We must also look to the future and develop an alternative to oil for transportation. As of now, we are many years away from one. Not only must we find an alternative fuel but we must also develop an infrastructure to produce and distribute it, and provide for a transition from an existing fleet of vehicles to one that can use the new fuel. I find little in the Lovinses' article to help us along the way.

—SAUL HOCH *Silver Spring, Md.*

Opening the Arctic National Wildlife Refuge to oil and gas leasing is hardly at odds with the economic and strategic benefits of energy conservation, as Amory, and Hunter Lovins contend in their otherwise excellent article. As the Lovinses' article correctly recognizes, "the decades-long switch" from oil to renewable sources of energy will not be quick or cheap, and oil will play a major role in this transition. During these critical years it plainly does not make sense to refuse to explore the area that is, by all accounts, the nation's best prospect for a major domestic oil find.

I strongly endorse the Lovinses' energy-conservation arguments and hope that the makers of our national energy policy will act on them. But it simply does not follow that shutting down oil exploration on Alaska's North Slope would help achieve the many benefits of energy conservation.

—STEVE COWPER *Governor of Alaska, Juneau, Alaska*

Amory B. Lovins and L. Hunter Lovins reply:

Our article and Hoch's letter seek a secure, affordable, post-oil energy future. We think his preferred means (oil taxes and finding lots more oil somewhere) cost too much and do too little.

Favoring some fuels over others has historically caused vast, unforeseen mischief: federal price meddling helped create shortages of both oil and gas. But the worst problem with oil taxes is that they work slowest where oil is hardest to replace: in transport.

In the early 1980s Americans did, in effect, pay huge oil taxes to OPEC. Users who could switch away from oil (chiefly in industry) did so, often permanently. But in transport most savings came from new-car standards, *not* price. Airlines and truckers largely passed higher costs on to customers. Poor people, who own the least efficient cars, couldn't afford to replace them with efficient new ones. Yet even for the affluent, gasoline at \$1.35 a gallon in 1981 was, and at \$2-\$3 a gallon would be, a weak signal to buy efficient cars. Why? Because fuel cost is only a fifth of the total cost of owning and operating a car (as of 1984), and efficient cars tend to cost about as much more to buy as they cost less to run.

Standards, car taxes, and rebates *can* rapidly upgrade vehicles. The best five-passenger prototype car-safe, peppy, comfortable, and 71 mpg-would save an ANWR every three years. A 3-mpg gain in our 18-mpg fleet eliminates Gulf imports.

We didn't casually "toss away" the national-security threat of an oil cutoff, though we showed why it's probably an exaggeration. Rather, we showed the fastest and cheapest way to get rid of it. Further, unless the proposed war is on American soil, U.S. oil wells won't help; tankers sailing from Houston are as vulnerable at sea as those sailing from the Persian Gulf. In a nuclear war, oil would be among the least of our worries. Fighting a non-nuclear war in the Gulf could easily use more oil than the United States gets from the Gulf. And in a war with an unconventional adversary like Iran, American pipelines (especially in Alaska), reserves, and refineries could be among the first casualties of sabotage, so new oil wells drilled in the name of national security would be useless.

If Governor Cowper thinks ANWR oil is a good buy, he should welcome prior scrutiny of its economics before rushing to expand exploration into a unique area already reserved for other important public purposes. If Congress doesn't know better, it may choose ANWR oil at more than \$30 a barrel, assuming any is found; there's about 90 percent odds of finding none but a 100 percent chance of trashing the refuge. But if Congress looked seriously at efficiency, it would find (our preliminary analyses suggest) a full practical potential to save about three fourths of all oil now used in the United States, at an average cost below \$10 a barrel. That's equivalent to finding ANWR's projected average annual output every *month*, forever. If we work together to develop much of this capacity, then the oil we don't agree about will become superfluous.

—Amory B. Lovins and L. Hunter Lovins, Rocky Mountain Institute

ENERGY OPTIONS

Having recently collaborated on a major energy study for the U.S. Department of Energy, we feel compelled to make a number of observations regarding Amory B. Lovins and L. Hunter Lovins's article "The Avoidable Oil Crisis" (December *Atlantic*). In our analysis we examined the oil-import consequences of various energy futures in order to assess the risks associated with each.

Conservation, the Lovinses' principal solution to overdependence on Persian Gulf oil, is a powerful force, but the Lovinses make two mistakes. First, they needlessly set conservation up in competition with conventional energy development, when history has shown (and common sense suggests) that they work in tandem. And second, the Lovinses apparently forget that, like the use of any commodity, energy use responds to price. Since 1973 most energy savings have been driven by skyrocketing oil prices or the expectation of them.

This surprises energy analysts, who should know better. But so should conservation advocates, who today assume low demand for newly cheap oil. In fact world oil demand in 1987 exceeded forecasts by nearly a million barrels a day.

Even the conservation gains of the past did not obviate the need to find new sources of energy, both to meet growth and to replace depleted resources. In fact, historical data show that more than 90 percent of all the additional U.S. energy required from 1973 to 1987 came from coal and nuclear power. Absent the growth in these two domestic sources, oil imports would have soared, rather than declined. Thus it is something of a puzzle that the Lovinses; pronounce coal and nuclear power as having “almost no connection” with oil. Indeed, oil use in the electric sector today is more than a million barrels a day below its peak level, and some 2 million barrels a day and \$14 billion a year below what it would have been without the construction of new coal and nuclear plants. The Lovinses needlessly continue to denigrate the role of conventional technologies in order to promote conservation and alternative energy.

—CHARLES K. EBINGER

Senior Associate, Center for Strategic & International Studies

—MARK P. MILLS

*President, Science Concepts, Inc.
Washington, D.C.*

Amory and Hunter Lovins say, “The 1986 rollback of new-car efficiency standards, from 27.5 to 26 miles a gallon, is wasting more oil than the areas currently off limits in Alaska and offshore California might yield.” In 1986 and 1987 the average fuel economy of vehicles actually purchased in the United States was 27.9 miles per gallon. Through the first three months of the 1988 model year purchases averaged 28.2 mpg. This is happening at a time when the standard is at 26 miles per gallon and fuel prices are at their lowest levels in real terms since the early fifties.

An even more critical error is the Lovinses’ supposition that the federal government must force energy conservation and renewable energy upon the nation whether people like it or not. This is an approach that places its confidence in government regulations and controls rather than in the common sense of the American people.

One of the largest improvements in the efficiency of home energy use is not even mentioned in the article—that of household appliances. Since 1972 the average energy efficiency of refrigerators purchased by American consumers increased by more than 79 percent, freezers improved by about two thirds, and clothes washers showed a gain of more than 50 percent. This occurred without federal regulations but with the help of government - and industry-funded research.

The Department of Energy will spend approximately \$300 million dollars in this fiscal year for energy conservation and renewable-energy-technology research and development. Many millions more will be spent on private sector R&D and product development. We believe that as R&D provides Americans with more energy-technology options and as those options become competitive in the marketplace, the common sense of Americans, rather than the heavy hand of government, will lead consumers to the right choices.

—DONNA FITZPATRICK

*Assistant Secretary Conservation and Renewable Energy
U.S. Department of Energy Washington, D.C.*

Amory B. and L. Hunter Lovins reply:

Ebinger and Mills’s familiar refrain – Mills’s firm is the chief source of data for many pro-nuclear ads – is dangerously misguided. Efficiency and major supply expansions do not cooperate but compete. Trying to get both risks getting neither - or, as lately, *succeeding* in getting both, and hence bankrupting the energy industries, which need new demand to pay for new supply.

The United States has recently spent \$200 billion on unneeded coal and nuclear power plants. America imports oil today because so much was spent on those plants rather than on energy efficiency. Furthermore, overbuilt utilities are now trying to recover their costs by ordering their efficiency staffs to market more electricity instead. The Electric Power Research Institute estimates that this will deliberately create 35,000 megawatts of new on peak demand by 2000. So much for “working in tandem.”

Efficiency, by softening oil prices, has undone not itself but its supply-side competitors: virtually all efficiency expansions, but no supply expansions, can still compete at or below \$10 a barrel. Technological efficiency gains are irreversible: people don’t deinsulate their attics when oil prices dip.

Ebinger and Mills say coal and nuclear plants have already saved so much oil that we need more of them. Both premise and inference are false. Department of Energy statistics show that energy savings outpaced the coal-plus-nuclear contribution by threefold since 1973, fourfold since 1979, and sevenfold since 1985. Without the 1973-1986 coal-plus-nuclear expansion, 1986 oil imports, being nearly offset by oil savings elsewhere, would have risen by at most five percent. And displacing, by Ebinger and Mills’s generous reckoning, \$14 billion worth of oil a year by spending some \$200 billion on coal and nuclear plants, plus more than \$100 billion in federal subsidies, plus their fuel and maintenance costs (which for the average nuclear plant exceed those of an oil plant), was a bad buy—especially compared with saving the same oil-fired electricity, which would have cost about 99 percent less and been completed sooner.

More coal and nuclear plants would make even less sense, because utilities’ share of U.S. oil consumption has fallen by three fifths, to four percent in 1984-1986. Since most oil burned in power plants has already been saved, at least 27 percent of new nuclear plants have displaced not oil but coal, America’s most abundant fuel. For the non-utility uses that consume 96 percent of U.S. oil, such as auto transportation, electricity is impractical or uncompetitive.

Worst, buying power plants retards effective oil savings, and in the transition beyond oil the scarcest resource is time. Efficiency could shrink or phase out imports while preserving domestic oil to fuel the transition to sustainable alternatives. Delaying efficiency by diverting resources to unneeded power plants and frontier oil projects depletes domestic oil fruitlessly, potentially throwing the nation back onto import dependence at the worst possible time. Further dithering is thus perilous. Ebinger and Mills are wrong to encourage it.

We, like Fitzpatrick, prefer market competition, but, as realists, we acknowledge market failures. The failure caused by high fuel prices’ weak signal to buy efficient cars (Letters, April Atlantic) made Congress pass the 1975 fleet-average efficiency standards and gas-guzzler tax. These “force” nothing: Americans may buy any car in the world and, if it’s under 6,000 pounds and 22.5 mpg, pay a tax (up to \$3,850 for a 10 mpg 1987 Rolls).

Sales of 1986 and 1987 cars beat the 27.5-mpg pre-rollback standard only because Americans bought record numbers of foreign cars averaging over 30 mpg. Domestic cars’ 26.6 and 26.7 mpg flunked, as their gas consumption has done for six years.

The Reagan Administration rolled back the 1986-1988 standard to levels GM and Ford could beat so that they could retroactively offset with credits for “over-compliance” more than \$1 billion in uncollected penalties for 1985 noncompliance. This rollback competitively penalized Chrysler’s consistent compliance, told GM and Ford they can defy Congress with impunity, and emboldened them to intensify ferocious marketing of less efficient models. Their sales crusade - aided by the inability of two thirds of new-car buyers to get a copy of the government’s “Gas Mileage Guide,” whose print run was reduced 70 percent - helped cut the 1985-1986 gain in U.S. car-fleet efficiency by 81 percent, to a ten-year low of 0.12 mpg. The 1986 stall in light-vehicle efficiency gains doubled U.S. oil imports from the Persian Gulf.

Appliance efficiency has indeed improved, but not through Fitzpatrick’s efforts. Congress annually makes her spend more, over her vehement protests, than she requests for efficiency R&D, but her growing department has still cut real spending for that work by 71 percent, and she continues to fight for far deeper

cuts: In fiscal year 1989, a further 50 percent reduction in R&D and 96 percent in the state and local programs that deliver efficiency information.

Further, builders and landlords buy most appliances, and seek the cheapest, often least efficient, models. Congress told the Department of Energy to correct the resulting market failure with national efficiency standards. It refused, so many states passed standards that propelled national improvements but were inconsistent. In 1986 the major appliance-manufacturing and utility companies and environmental groups sponsored uniform national standards. Congress passed them without a single dissenting vote. President Reagan pocket-vetoed them. Only when they were promptly re-passed did he reluctantly sign them. They'll save consumers \$26 billion net by 2000. No doubt Fitzpatrick will take credit for that, too.

—Amory B. Lovins and L. Hunter Lovins, Rocky Mountain Institute