The Way It Should Be: Clean, Cheap, and Practical

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ABSTRACT

Few areas of government policy affect so much of our lives as energy, yet it is given so little attention by the public.

Whether it's gasoline for the car (or SUV), electricity for the home or office, or natural gas for a factory, energy is just something consumers, large and small, expect to be able to count on. It should always be there when we want it, and should always work reliably. It should be cheap, or at least not expensive, and it should be safe, clean (at least at the end use), quiet, and unobtrusive. Energy has now come to permeate nearly all aspects of our economy and lifestyles, but we don't want to have to think about it.

In fact, when Americans do consider energy policy, it's usually for negative reasons. Sometimes it's a rise in gasoline prices due to conflict in the Middle East, other times, a sweltering summer sprinkled with news stories about global climate change. Or it could be a persistent feeling that natural gas or electricity prices are being manipulated by large corporations, or the anxiety that comes with the announcement that a new power plant is being built nearby. It could be wondering whether a California-style crisis will come to their homes and workplaces. Or the news stories of security problems at a nuclear power plant… of a refinery explosion or coal mine accident… of terrorists or tyrants thriving on oil riches. The list of negatives goes on and on.

ENERGY EFFICIENCY

Promoting desirable traits while avoiding the undesirable ones is the *raison d'etre* of smart energy policy. Making the job even more challenging for energy policymakers is that energy has so many characteristics that individual consumers don't see but are of great concern on state, national, and global levels. Energy is heavily polluting to our air, water, land, and climate—locally, regionally, and globally—and consumes finite resources, often unsustainably. Energy is capital-intensive and of such a large scale that investments are high stakes. Much of our energy—particularly oil—is imported, resulting in, at best, trade imbalances and, at worst, geopolitical and national security dangers. Some forms of energy, such as natural gas and electricity, don't easily lend themselves to free-market competition and may well be natural monopolies. Much energy development takes place on publicly owned lands, from river valleys to ocean coasts, challenging conservation goals. And while R&D in energy may be no more speculative than R&D in other fields, it is particularly difficult to capture the rewards of successful research.

Several other key factors make the substance and politics of wise energy policymaking particularly challenging. One, nearly all the energy and energy services in the U.S. are ultimately delivered by the private sector[2]—thereby making the goal of energy policy, by and large, the use of policy carrots or sticks, or both, to get private entities to provide (or not provide) specific products and services. Two, the breadth and stakes of energy decisions mean that on any given energy issue there are likely to be many interested parties involved (typically with quickly converging or diverging goals), lots of money to be made, and pollution to be avoided. Three, many energy issues are set by state or local bodies, while others are global in nature (notably oil markets and climate change), so the federal government does not set policies unilaterally. Four, "energy policy" is often determined in other policy settings—such as transportation, environment, tax, fiscal, public lands management, and public health—where the consequences for the energy system may scarcely be considered.

As a virtually inescapable necessity in every walk of modern life, energy decisions often take place on an enormous scale, measured in dollars, resource consumption, pollution generation, and more. As a result, when things go wrong in the energy field they can go really wrong: oil shocks spark economic recessions, at home and abroad[3], nuclear waste can become nuclear weapons, and fossil fuel emissions can trigger cataclysms of the climate. Americans, for reasons both good and bad, are enormous energy consumers: with less than 5 percent of the world's population, the U.S. consumes one-quarter of the world's energy and 40 percent of the world's gasoline, leading to concerns of international equity and long-term global sustainability. (See Figure 1, "Motorization Levels in Selected Countries.")

With challenges of that breadth and depth, it's no wonder that the Bush-Cheney administration and Congress are in their third consecutive year of debating "once in a decade" national energy legislation. Two characteristics saturate the spoken debate. First, because the U.S. is both a major energy producer and the world's leading energy consumer (and energy waster), policymakers talk regularly about seeking *balance* between enhancing energy supplies and reducing unneeded energy demand.[4] Two, there is a regular cry for an *energy policy*, singular, while in fact the reality is about the aggregation of *energy policies*, plural.

A single energy policy for the U.S. that is both worthwhile and workable is as elusive as a unified field theory in physics. And, similarly, there is no single energy resource at this time that can meet all of the attributes that we seek: affordable, reliable, clean, domestic, flexible, abundant, safe, and sustainable.

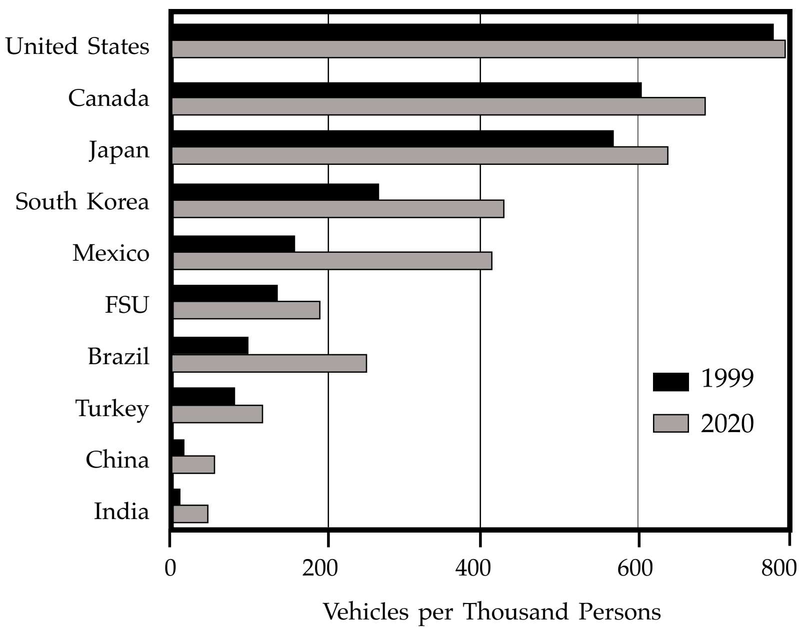


Figure 1. Motorization Levels in Selected Countries, 1999 and 2000
Source: Energy Information Administration, World Energy Projection System (2001).

But one stands heads and shoulders above all others. It produces no carbon emissions and virtually no pollution. It's extremely reliable, can be found in vast quantities and won't run out any time soon. Domestically produced, it generates no profits for terrorists. And it's very low cost, it is the least capital-intensive energy choice, and can be used in all sectors, by all customer classes, today. That resource is, of course, energy efficiency.

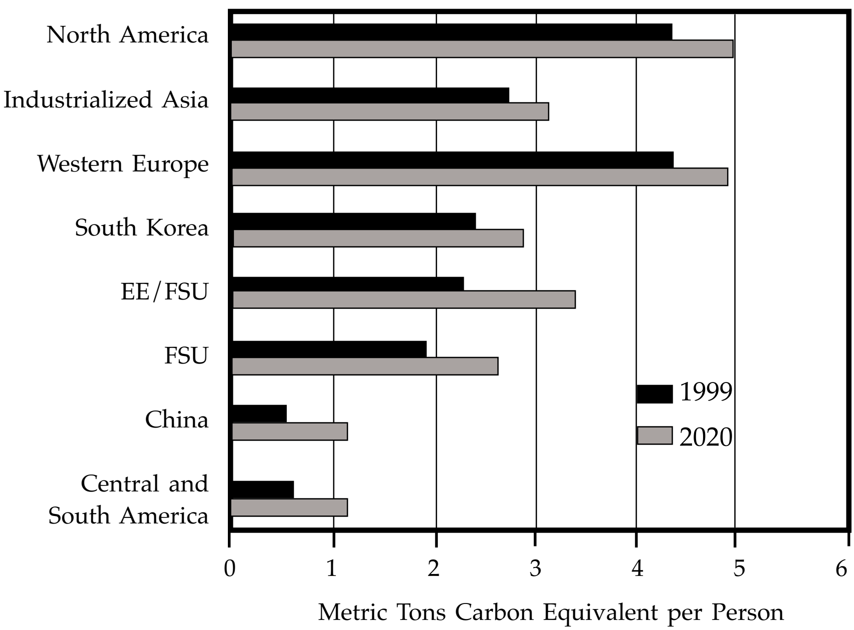
A Proven Winner

The benefits of using energy efficiently are well documented. *Energy Innovations*[5], conducted by the Alliance to Save Energy and other energy efficiency organizations in 1997, is typical of energy studies in its conclusions about the advantages of an efficiency rich energy future for the U.S. versus business as usual:

- U.S. energy consumption is held to 89 Quads in 2010 and is cut to 69 Quads in 2030 (compared with business as usual of 105 Quads in 2010 and 119 Quads in 2030).
- Energy savings result in job creation, with a net employment boost of nearly 800,000 jobs nationwide by 2010.
- Net savings amount to $530 per household per year in 2010.
- Fossil fuel dependence drops from today's 85 percent to 79 percent by 2010 and to 68 percent by 2030.
- Energy intensity declines at 1.9 percent per year, falling 32 percent by 2010.
- Carbon dioxide emissions are cut to 1,207 million metric tons of carbon per year (MTc), 10 percent below the 1990 level, by 2010; reductions continue, pushing emissions down to 728 MTc, or 45 percent below the 1990 level, by 2030. (Business as usual: global warming as emissions rise steadily from 1,338 MTc in 1990 to 1,621 in 2010 and 1,892 in 2030.)[6]

A March 2000 Rand Corporation study of utility energy-efficiency programs in California found numerous economic and environmental benefits. Rand found that the reduction in demand for electricity achieved by these programs prevented a 40 percent increase in stationary source air pollution in California. In addition to these findings, it is important to note that Rand documented a return of roughly $1,000 for every dollar spent on commercial and industrial energy efficiency by utilities between 1977 and 1995 and asserted that 3 percent of the 1995 California state gross state product can be attributed to these investments.[7]

Energy efficiency's myriad merits are now, with rare exception, beyond debate in this country, and rightfully so.[8] Two central questions do, however, remain. One is: Why, a quarter-century after Robert Stobaugh and Daniel Yergin wrote in their seminal book *Energy Future*, "Unhappily [energy efficiency] does not receive the emphasis and attention it deserves,"[9] is that still true? Two: What policies should be adopted to promote the efficient use of energy?



Sources: 1999: Energy Information Administration (EIA). *International Energy Annual 1999*, DOE/EIA-0219(99) (Washington, DC, January 2001). 2020: EIA, World Energy Projection System (2001).

Figure 2. Per Capital Carbon Dioxide Emissions in Selected Regions and Countries, 1999 and 2020.

The Invisible Energy Resource

Reminiscent of Shakespeare's protagonists, energy efficiency's great strength is also its tragic flaw: it's largely invisible. Whether hidden in attics as insulation, under car hoods as continuously variable transmissions, or silently using automatic controls to turn off HVAC and lighting systems, efficiency is designed not to be noticed—and to make products look and behave no differently for the consumer. That invisibility is essential in the marketplace, but politically it is crippling. It requires the observer to regard saved or unused energy as created energy in the same way that oil comes out of the well and coal comes out of the mine. Very few members of Congress appreciate that they "represent" energy efficiency the way those who represent districts that produce oil, coal, or autos and trucks do.

Despite its invisibility, energy efficiency has proven to be a very plentiful energy resource. As shown in Figure 3, "Where Does U.S. Energy Come From?" energy efficiency is the second leading source of energy for U.S. consumption and among domestic energy resources, it's the greatest. Using 1999 data, the Alliance to Save Energy has calculated that energy efficiency provided the nation with 27 quadrillion Btus (quads), approximately 22 percent of U.S. energy consumption. While energy efficiency trails our mammoth oil consumption, it significantly outstrips the contributions of natural gas, coal, nuclear, or hydroelectricity.[10]

An example of efficiency's potency can be seen by examining the often-cited projection by the U.S. Energy Information Administration that the U.S. would need at least 1,300 additional power plants to satisfy our new electricity needs through 2020. But that need not be the case if more energy efficiency is brought on-line through the following measures. First, the appliance efficiency standards for clothes washers, water heaters, and air conditioners, passed by the Clinton administration and agreed to by the Bush administration, will reduce demand by 127 power plants in 2020. Second, if the SEER 12 level residential central air conditioner standard announced by the Bush Administration in 2001 and currently before a federal court is replaced by the Clinton-adopted SEER 13 level, another 43 plants would be saved. Third, by adopting strong standards for commercial air conditioning, we would save another 50 plants. Fourth, additional programs to reduce energy use in new buildings, such as building energy codes, tax credits, and public benefit programs, would avoid 170 power plants. Finally, programs to improve

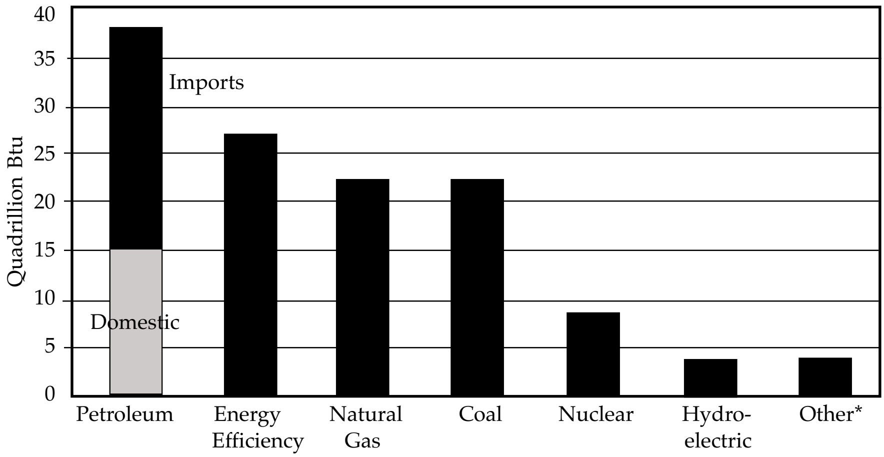


Figure 3. Where Does Energy Come From? (1999)

existing buildings, by targeting residential air conditioners, commercial lighting, and commercial cooling, can trim demand projections by another 210 power plants. In sum, 600 powerplants—almost one half of the projected need—could be met through these energy efficiency measures.[11]

Heading for the Promised Land

Policies to promote the efficient use of energy—or at least to temper barriers to efficiency—are numerous and diverse. Five such policies are discussed in this article. These were chosen based upon the following criteria: if adopted they would save significant amounts of energy; there is sufficient experience with them historically or among other jurisdictions to have confidence in their workability and efficacy; they have been debated as part of national energy policy considerations; and they are specifically designed to promote energy efficiency.

Accordingly, numerous important and potentially powerful policies are not discussed in this article, typically because they are not at present politically viable in the U.S. (such as high gasoline taxes or pay-at-the-pump auto insurance) and/or because they are considered not efficiency-specific (such as a tax shift from income taxation to consumption and pollution taxation or an economy-wide carbon cap-and-trade program). The non-inclusion of various policy options in this article does not indicate the author's assessment of whether they would succeed in promoting energy efficiency if adopted.

1. *Increased Fuel Economy*
   The fuel economy of today's cars and light trucks is at the lowest point in 22 years. While fuel economy has fallen, U.S. oil imports continue to rise, more than doubling over the past 20 years as the cost of importing petroleum and products exceeds $100 billion annually. Cars and light trucks consume over 40 percent of the oil used in the U.S. daily, and emit 20 percent of U.S. carbon pollution.

   The National Academy of Sciences recently found that the current fuel economy standards currently save the nation 2.8 million barrels of oil each day. The NAS goes on to note that there are over two dozen current and emerging technologies that can help increase vehicle fuel economy without compromising vehicle safety, size, or performance. Many of these technologies are being used in some cars and light trucks today, but tighter fuel economy standards are needed to have them used across the auto, SUV, and pickup fleets. Fuel economy should be increased to at least 40 miles per gallon for cars and light trucks, giving automakers adequate time to adopt the efficient technologies, a recommendation consistent with the NAS findings.

   Additional fuel economy policies: Establish efficiency labeling and/or standards for replacement tires. Ensure that the fuel economy cred-

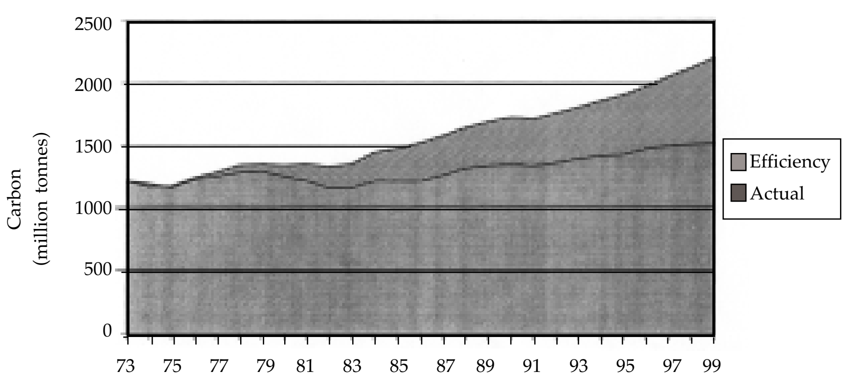


Figure 4. Carbon Emissions: 1973-1999
Actual and Avoided Due to Energy Efficiency

its for "dual fuel capable" vehicles (those capable of using gasoline or alternative fuels) actually represent usage of alternate fuels. Correct the testing procedures for the fuel economy of vehicles to represent real-world driving. Correct or terminate the $100,000 deduction for the purchase by small businesses of vehicles 6,000 pounds or heavier. Provide tax credits for hybrids and fuel-cell powered vehicles. Establish a flexible but mandatory national fuel savings target that allows this and future administrations to adopt a range of measures to meet the target.

2. *National Public Benefits Trust Fund*
A national "public benefit trust fund" would collect a non-bypassable fee on electricity, thereby providing a significant resource to invest in energy efficiency and other public goods, and removing the competitive disadvantage to any utility or state that wanted to collect a fee unilaterally. A federal match of state public benefit spending would raise over $1.5 billion annually for efficiency, renewable energy, low-income programs, and R&D. The residential share of this would amount to about $6 per year per family—about 50 cents a month.

The efficiency benefits are projected to include: 92,000 megawatts of electric capacity savings by 2020 (equivalent to about 300 powerplants); 1.24 trillion kWh saved over 20 years, cutting consumer energy bills by $100 billion; and avoiding 150,000 tons of nitrogen oxides emissions.

Additional electricity-sector efficiency policies: Require each utility to increase energy efficiency by 1 percent per year. Accelerate the adoption of new, more efficient generation and transmission technologies through the tax code and/or rate regulation. Stimulate investments in the power grid that would make it "smarter" and more demand-responsive, both by deploying technologies such as advanced meters and by promulgating regulations such as more accurate time-of-use prices.

3. *Enhanced Research, Development, and Deployment (RD&D)*
In 1996, the U.S. General Accounting Office concluded that just five of the efficiency technologies developed or assisted by the U.S.

Department of Energy resulted in $28 billion in energy savings over 20 years. DOE's updated results for those programs credits them with returning $50.9 billion to the U.S. economy through 1999; savings from other DOE-administered efficiency program brings the total to over $100 billion. These savings are many times DOE's spending of $12 billion on all efficiency RD&D programs over that time period. Similarly, the EPA-DOE Energy Star efficiency labeling and benchmarking program has already returned more than $40 billion in energy savings to the economy from less than $1 billion in federal spending. These dollar returns are from just lower fuel and energy bills—they do not include the additional economic value of reductions in pollution, increases in productivity of employees and comfort of consumers, or national security benefits of lessened oil imports.

The federal government should increase spending on efficiency RD&D, while carefully ensuring that its programs are sensitive to the needs of the private sector and don't duplicate private efforts. In particular, the government should greatly expand its RD&D in promising short and medium-term automotive technologies, including those for internal combustion engines and gas-electric hybrids, while simultaneously aggressively researching hydrogen and fuel cell technologies.

One sector deserves special note: the federal government's own energy consumption. The U.S. government is the largest single energy consumer in the world, spending approximately $8 billion annually, and wasting over $1 billion of that total. The federal government should lead by example by, among other measures, updating agency energy reduction targets; extending and expanding energy savings performance contract (ESPC) authority and including transportation-sector projects, water savings, and new replacement buildings; requiring all cost-effective metering so that federal energy officials can know what to measure and manage; increasing performance standards for new federal buildings; tightening federal procurement requirements; and strengthening federal fleet fuel-economy requirements.

4. *Expand the Federal Appliance Standards Program*

One of the true top performers in energy efficiency has been the appliance and equipment standards program at the Department of Energy. Every refrigerator that is sold today is well more than twice as efficient as the comparable model from 25 years ago, and the same is true for a variety of other products. Through the year 2000 the standards program had reduced U.S. electricity use by 2.5 percent (88 billion kWh annually) and reduced peak generating demand by approximately 21,000 megawatts. Even greater energy savings potential remains. By the year 2020, projected savings are expected to reduce U.S. electricity consumption by 7.8 percent—enough to displace 240 large (500 MW) fossil fuel power plants and reduce carbon emissions by 75 million metric tons. At the same time, consumers will save $186 billion, about $1,750 per household. Additional substantial energy savings are possible for numerous products including those that use, in aggregate, significant amounts of energy when they are turned off but remain in stand-by mode. Additionally, certain highly efficient products, such as compact fluorescent light bulbs, do not need efficiency standards but would benefit from mandatory quality and reliability standards. Congress should provide sufficient funding for this program to ensure timely research and analysis of pending issues; the administration should get beyond ideology and technology "status quo-ism" and adopt aggressive and cost-effective standards for products, particularly those that are currently being regulated on a state-by-state basis.

5. *Tax Credits for Energy Efficient Products and Technologies*
Members of both parties in both the House and Senate have introduced legislation to promote tax incentives to spur energy-efficient technologies and products. Tax credits can speed the adoption of efficient products, making unfamiliar technologies and practices commonplace. Tax incentives should be designed to ensure that the qualifying products are neither so familiar that the incentive is unnecessary nor so exotic that the incentive is inadequate. Additionally, qualifications need to be carefully written to promote efficiency and reduce cheating.

Tax incentives—credits, deductions and/or accelerated depreciation schedules—should be provided for at least the following:

- Construction of highly efficient new homes (at least 30 percent

more efficient than the model code) and substantial efficiency upgrades of existing homes.
- Purchases of hybrid gas-electric and fuel cell vehicles.
- Highly efficient refrigerators and clothes washers.
- Construction of commercial buildings.
- Combined heat and power systems and stationary fuel cells.
- Other energy-efficient equipment.

WOULDN'T IT BE NICE?

We will need new energy production in this nation, but not before adopting improved energy efficiency measures. A balanced, comprehensive energy policy must take aggressive steps to save energy wherever it is cost effective and feasible. Energy efficiency is our second largest energy resource, but it should be our first energy priority.

Maybe when energy is seen not as a series of risky, expensive, and polluting choices, but as a means to lessen climate and environmental risks, avoid foreign policy entrapments, and—perhaps most importantly—improve our living standard with domestic, sustainable, and lowest-cost technologies, Americans will want to start paying attention again. The politics may not be clean, cheap, and practical, but the energy choices certainly should be.

Reference

1. The Alliance to Save Energy is a coalition of prominent business, government, environmental, and consumer leaders who promote the efficient and clean use of energy worldwide to benefit consumers, the environment, economy, and national security. The views expressed herein are the author's own.
2. The few notable exceptions of energy services directly provided by government include the Strategic Petroleum Reserve, municipal and other public electric power, and low-income weatherization and fuel assistance.
3. Oak Ridge National Laboratory has estimated losses to the United States due to oil market turmoil—and the subsequent macroeconomic losses—at $7 trillion as of 1998.
4. Alternatively, "balance" is sought between traditional energy resources and sustainable resources, such as energy efficiency, and solar, wind, biofuels, and other renewable resources.
5. *Energy Innovations: A Prosperous Path to a Clean Environment*, a report by

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the Alliance to Save Energy, American Council for an Energy-Efficient Economy, Natural Resources Defense Council, Tellus Institute, Union of Concerned Scientists, 1997.

6. Due to normal turnover of capital stock, approximately 60 percent of U.S. carbon emissions in 2013 will come from equipment not yet purchased, according to EPA estimates.
7. Unfortunately, California cut back drastically on its world-class efficiency programs in the late '90s, in part leading to the state's electricity crisis. In turn, restoring and expanding efficiency and conservation efforts became a key element in California's emerging from its power shortfalls.
8. Certainly the most prominent recent criticism of energy efficiency came in 2001 when Vice President Dick Cheney criticized efficiency as not being worthwhile energy policy (while complementing it as a "personal virtue"). After a maelstrom of criticism, from Republicans and Democrats alike, the Vice President avoided public criticism of energy efficiency per se.
9. *Energy Future: Report of the Energy Project at the Harvard Business School*, edited by Robert Stobaugh and Daniel Yergin, 1979, Random House, page 136.
10. This analysis was conducted by Dr. Douglas L. Norland of the National Renewable Energy Laboratory.
11. This analysis was initially performed by William R. Prindle, then with the Alliance to Save Energy and now deputy director of the American Council for an Energy-Efficient Economy.
12. The technologies are low-emissivity windows, electronic ballasts, advanced refrigerator compressors, flame retention head oil burner, and DOE-II building design software.
13. Two major studies released in 1995—the Galvin Commission, which studied the national laboratories, and DOE's Yergin Task Force, which looked at energy research and development—concluded that foregone federal research and development in energy technologies would not likely be replaced in kind by the private sector. Among the barriers to corporate efforts cited were high R&D costs, internal cost-cutting which has resulted in widespread downsizing of companies, uncertainty of intellectual property rights and the ability to capture all the benefits of R&D, and high initial investment in R&D capability.