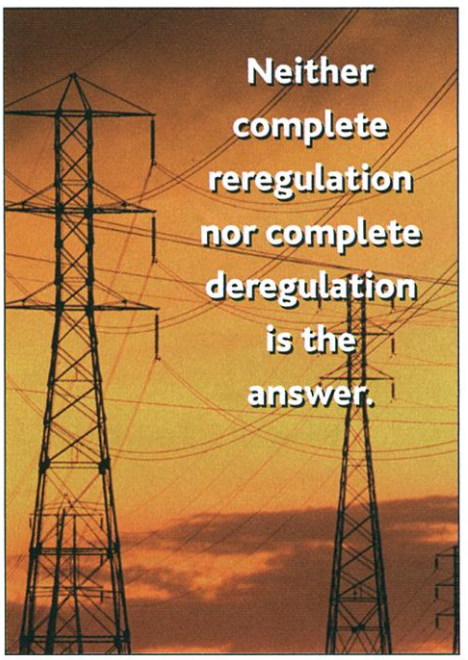
Meeting the Energy Challenge

Affordable energy in ample quantities is the lifeblood of the industrial societies and a prerequisite for the economic development of the others. Not surprisingly, access to and the cost of energy have long been political issues within and among nations. Wars have been fought at least in part over access to prime energy resources and may be again. Energy may also be the most intractable element of the world's environmental problems. This is because energy's effluents drive many of the most dangerous environmental problems at every scale (from the health impacts of woodsmoke in Third World village huts to the disruption of global climate by anthropogenic greenhouse gases) and because the energy system characteristics at fault are often costly and time-consuming to change.



Despite energy's pervasive importance to the human condition, it attracts the widespread attention of publics and their political leaders mainly in times of short-run supply-price "crises," the latest being the electricity fiasco in California. Minimizing society's vulnerability to supply-price crises in the short term will require addressing several interlinked problems. The current partly free-market, partly regulated characteristics of energy supply systems need adjustment to better dampen the propensity of commodity markets for extreme price fluctuations. This should include more scope and better ways for retail consumers to perceive and respond to the high wholesale costs of electricity at times of peak demand. Ways must also be found to encourage larger investments in reliability, which is partly a matter of transmission infrastructure and partly a matter of diversity in sources of supply. The United States has repeatedly stumbled by putting too many energy eggs in the cheapest basket of the moment. Oil imported from the Middle East in the 1960s and early 1970s and domestic natural gas for combined-cycle electricity generation in the 1980s and 1990s are only two examples.

Neither complete reregulation nor complete deregulation of energy markets is the answer. Capturing the cost savings available from the appropriate play of market forces in the energy sector is too appealing a proposition to abandon. But energy is too burdened with public-goods dimensions (including national security, environmental sustainability, the macroeconomic ramifications of reliability, and society's commitment to meet the basic needs of its poorest members) to allow complete deregulation. The directions for addressing our short-term energy challenges are easier to describe than designing and implementing the details will be. But more daunting still are the energy challenges looming in the longer term. These include providing a sustainable energy basis for maintaining prosperity where it already exists and achieving it where it does not, limiting dependence on imported oil, reducing the risks from greenhouse gas–induced climate change, and minimizing the contributions of nuclear energy to nuclear weapons dangers.

Meeting these challenges will require increased efforts to maximize the capabilities and minimize the liabilities of the full array of energy options: improvements in end-use energy efficiency in vehicles, residences, and industries; renewable energy sources; advanced fossil fuel and nuclear fission technologies; and nuclear fusion. There is no silver bullet in this array nor are there any that we can be confident we can do without. Current levels of public and private investment in energy R&D and demonstration are not remotely commensurate with the long-term challenges and opportunities, either in the United States or in any other country. U.S. federal expenditures on applied energy technology R&D are about what they were, in real terms, just before the oil price shock of 1973–74, although today's economy is more than twice as large. U.S. private sector investments in energy R&D have been falling since the mid-1980s.

Strengthening R&D is only part of the answer. Incentives must also be strengthened for deploying a wider array of the most attractive options from the menu available at any given time. And increased international cooperation in energy innovation is warranted, because U.S. and other countries' economic, environmental, and security interests are served thereby. Although markets have a large role to play in all this, the government must also be involved. The large public benefits attending the right choices—and the large public costs attending the wrong ones—require it.

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