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Contents

This eighteenth annual Highlights issue of Resources *gives an account of events and issues that were of special interest in 1981 and will be of continuing concern for some time to come. The intent is to report events accurately and readably and to provide relevant background information and comment. The treatment is selective, representing the judgments of a number of RFF staff members, and does not purport to be a comprehensive roundup of resource and environmental issues. The views reflected here are those of individual contributors and are not official points of view adopted by Resources for the Future.*

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An era of limits?

DURING THE 1970s, at the peak of environmental awareness, the federal government grew—a lot. New laws and increased budgets expanded the size and scope of federal agencies. Administrative reformers organized new agencies and tightened regulation. Trends in federalism favored national solutions.

In the 1980s, the national mood seems to reflect a philosophy of limits. With major environmental laws of the 1970s—the Endangered Species Act, the Clean Air Act, the Clean Water Act, and the Safe Drinking Water Act—up for reauthorization in 1982, environmentalists find themselves in the unaccustomed position of resisting innovations proposed by others. Budgeting has become a battle over which programs to cut back most. Administrative reform usually now means curtailing regulation and bureaucracy. And the tide in federalism favors efforts to limit the federal government and turn more power back to the states and localities.

The budget squeeze

Items of government spending traditionally have been decided individually, but recent efforts to limit the seemingly uncontrollable growth of the federal budget have pitted environmental and natural resources programs against one another and against those in other fields.

Early in his presidency, Ronald Reagan successfully persuaded Congress to cut many programs below Jimmy Carter's proposed budget for the 1982 fiscal year (which began in October 1981). After the president in February 1982 presented budget proposals for the 1983 fiscal year (see table 1), a coalition of eleven national environmental groups presented their "Alternative Budget Proposals for the Environment," at a cost 7.5 percent higher than the administration's.

Many environmental and natural resources programs are in the 26 percent of the federal budget considered "relatively controllable"—so that, unlike, say, Social Security, their appropriations can be cut without a change in law. But perhaps in part because of their political popularity, these programs did not suffer actual cuts in 1981 or proposed ones in 1982 as deep as those sustained by programs specifically intended for the poor.

Saving dollars and the environment. Not that budget cuts necessarily are bad for environmental quality. In the view of many environmentalists, some past federal spending on natural resources has been environmentally harmful. In 1981 they joined with budget cutters to obtain funding reductions for water projects by the Army Corps of Engineers, the Bureau of Reclamation, and the Soil Conservation Service, and are now backing the FY 1983 proposal to increase charges to the users. Similar alliances in 1981 helped to end the federal practices of funding sewage treatment plants large enough to accommodate—and thus encourage—decades of future growth, and subsidizing flood insurance for construction on undeveloped coastal barrier islands, which often hastened their erosion. Environmental and budgetary arguments narrowly failed in 1981 to stop the funding of the Tennessee–Tombigbee waterway and the Clinch River breeder reactor,

two projects that the administration supported. The requested increase for the Bureau of Reclamation may be an issue this year.

Intensifying land management. Among nondefense activities, the public lands have been among those least touched by budget cuts. Congress resisted 1982 cuts proposed by the administration in the National Park System and the National Wildlife Refuge System, and the administration now seeks increases for 1983.

Although spending for the Bureau of Land Management (BLM) and the Forest Service fell in 1982, the administration proposes an increase in 1983 and Congress is likely to expand on that. The new budget proposes significant increases in certain functions within these agencies (energy and minerals in BLM, timber sales in the Forest Service), but also includes cuts in other areas such as wildlife, recreation, and research. Again, the administration proposes to all but end the acquisition of land by federal agencies, diverting the funds to managing the national parks, although Congress rejected this proposal the first time around in 1981.

"Revenue enhancement." In an effort to keep the proposed deficit under $100 billion without raising taxes, the 1983 budget proposals project that, through offering more offshore oil and gas leases, revenues will more than double to $18 billion in 1983 from an estimated $7.9 billion in 1982. They also project that in the same period the volume of National Forest timber sales would increase by 12 percent, yielding $225 million more. These projections may be overly optimistic in light of weakening demand and prices for petroleum and timber, and any acceleration in sales carries with it added environmental cost.

Cutting grants. The heaviest budget cuts have been made in grants to states and localities. Grants eliminated in the 1982 fiscal year included those for land acquisition; planning for water quality, solid waste, and land use; endangered species, and anadromous fish. Significant 1982 cuts that the administration proposes to widen in 1983 include grants for pollution regulation; coastal zone management; state and private forestry; energy conservation; and mass transit. The administration again is trying to eliminate the Historic Preservation Fund and the Urban Park and Recreation Fund despite congressional rebuffs in 1981. In part because Congress often restores funds for popular grants, agencies generally are more willing to have the president's budget propose cuts in the grants they administer rather than in their own personnel and operations, cuts which Congress is more likely to accept.

Table 1. Spending Authority for Selected Purposes
(millions of dollars)

Type of spending[a]	Congressional appropriations FY 1981	Congressional appropriations FY 1982	Administration request FY 1983
Council on Environmental Quality	2.5	.9	.9
Water Resources Council (includes grants)	20	4	0
Environmental Protection Agency			
Salaries and expenses	562	555	538
Research and development	250	154	109
Pollution abatement, control, and compliance	325	148	130
Department of Agriculture			
National Forest System	1,021	967	1,037
Forestry research (includes grants)	128	111	98
Technical assistance by the Soil Conservation Service	312	311	337
Financial assistance under the Agricultural Conservation Program	190	190	56
Department of the Army (Corps of Engineers)—civil construction	1,594	1,417	1,209
Tennessee–Tombigbee Waterway	212	189	186
Department of Energy			
Clinch River breeder reactor	122	122	254
Commercial nuclear waste program	246	263	315
Solar and conservation research and development	803	289	90
Department of the Interior			
Public Lands (Bureau of Land Management)	421	371	376
National Wildlife Refuge System	62	65	74
National Park System	524	619	677
Federal land purchases under the Land and Water Conservation Fund[b]	142	149	69
Office of Surface Mining (operations)	33	34	29
Bureau of Reclamation–Construction	576	549	667
Department of Commerce			
National Oceanic and Atmospheric Administration (incudes grants)	840	849	776
Grants to states and localities			
Coastal zone management (Commerce)	45	33	2
Energy conservation (DOE)	420	59	4
Soil conservation (USDA)	0	0	9
State and private forestry (USDA)	42	35	26
Urban parks and recreation (Interior)	1	8	0
Land acquistion (Interior)	171	10	1
Fish and Wildlife Management (Interior)	124	145	159
Historic preservation (Interior)	26	25	0
Mine regulation (Interior)	29	24	33
Mine reclamation (Interior)[c]	1	68	120
Pollution abatement, control, and compliance (EPA)	210	225	182
Sewage treatment plants (EPA)[d]	1,605	2,400	2,400
Mass transit (DOT)	4,662	3,495	3,150
Highways (DOT)	9,045	8,271	7,800

Source: Budget of the U.S. Government, Fiscal Year 1983.
[a] Agency figures exclude grants to states and localities except where otherwise noted.
[b] Land Acquisition for National Forests, National Parks, National Wildlife Refuges, and the Bureau of Land Management.
[c] Appropriations were low because of implementation of new legislation in 1981 and 1982, but direct federal spending was $44 million and $73 million, respectively.
[d] Appropriations were kept low in 1981 during debate on new legislation. Actual outlays in 1981 were $3.9 billion.

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Energy roundup

FORECASTERS OF DEVELOPMENTS in energy markets have begun to take on an uncomfortable resemblance to those who predict stock market movements on the basis of the results of the Super Bowl. The major difference seems to be that the stock market people have been correct more often.

Few years illustrate the difficulty of anticipating energy trends better than 1981. Amid today's oil glut, it is difficult to remember that as late as the last half of 1980 pessimism about the world oil market was widespread. In the summer of 1980, before the war between Iraq and Iran broke out, widely respected oil economist Walter J. Levy had written an article for *Foreign Affairs* with the forbidding title, "Oil and the Decline of the West," in which he foresaw an imminent series of "major oil crises," possibly involving wars among oil-importing countries and "economic-financial" chaos.

When the Iran–Iraq conflict began, such headlines as "If oil facilities are ablaze, can $2-a-gallon gas be far behind?" and "Yamani sees oil rising to $50" were commonplace. In its outlook for 1981, the oil industry's closely watched newsletter, *Petroleum Intelligence Weekly*, on January 5, estimated there would be a 2 million barrel-per-day (mmbd) shortfall lasting into the summer unless production from the Organization of Petroleum Exporting Countries increased to 27 mmbd.

Falling use, falling prices

OPEC output did not increase to 27 mmbd; instead, it averaged 22.4 mmbd for the year.[1] But if there was a shortfall of any size, it was a well-kept secret. Starting in February, nominal world oil prices fell steadily throughout the year, dropping on average approximately $5.00 per barrel on the spot market, and were down even more taking inflation into account. This occurred despite no substantial increases in Iraqi and Iranian production. By the end of 1981, few people were predicting significant oil price increases for any time in the near future.

Several reasons are offered for this unexpected turnaround. Some attribute it to the increase in non-OPEC production. Others cite the final lifting of oil price controls by President Reagan. And still others point to the stagnant economy. Each of these may contain a kernel of truth. But the most convincing explanation is that, through price-induced conservation and increased use of other energy sources, the oil-consuming nations are making the transition away from an oil-based economy faster than anyone had anticipated.

The United States provides an excellent example of this trend. According to the American Petroleum Institute, in 1981 petroleum consumption dropped approximately 5 percent from 1980 levels, and imports of crude oil and petroleum products fell 15.7 percent—to 5.7 mmbd. These reductions followed substantial cutbacks made in the previous year. In the last four years, imports have dropped more than 3 mmbd.

Certainly, some of this can be chalked up to the sluggish economy. But the drop in oil consumption has outpaced the economic slowdown. And other energy sources also are being used more efficiently. The energy/Gross National Product coefficient, which measures the relationship between energy consumption and GNP growth, has fallen from 59.4 thousand Btus per GNP dollar in 1972 to 46.7 in the third quarter of 1981.[2] The drop is real, not just apparent.

Other industrialized countries, notably Japan, also made solid success in reducing oil use. The Department of Energy estimates that consumption in the non-Communist countries has fallen 2.7 mmbd in 1981.[3]

As a result, the oil sales of those OPEC members demanding the highest prices suffered. Countries such as Nigeria, Libya, and Algeria saw exports plunge, in some cases by more than 50 percent, and demanded that Saudi Arabia, which was producing more than 10 mmbd until September 1981, reduce production. The Saudis, probably motivated more by concern for the long-term value of their huge reserves than by sympathy for oil consumers, demanded that the other OPEC members reduce prices to make them consistent with the $34 level the Saudis desired for their Arabian Light crude oil.

This was the basis for the September Geneva OPEC agreement establishing $34 as its "benchmark" price, with other members allowed to charge no more than $38, depending on the quality and location of the crude oil involved. But this so-called unification did little to ease the pressures caused by the drop in demand. In December Saudi Arabia reduced production to 8.5 mmbd to help maintain the $34 benchmark price, and most other OPEC members adjusted their prices slightly downward. February 1982 saw further weakening of prices, by both OPEC and non-OPEC countries, and a further cut in Saudi production to 7.5 mmbd.

A Reagan atmosphere

This easing of pressures on the international oil market gave the Reagan administration the atmosphere it needed to proceed toward the free-market energy policy the president espoused during his campaign. The lifting of oil price controls, eight months prior to their scheduled expiration under President Carter's timetable, was the first step in this effort.

This was followed by proposals for drastic cuts from the energy budget drawn up by the Carter administration. Special targets for reductions were programs to stimulate conservation and solar energy. Outlays for conservation programs were reduced by 10 percent in fiscal year (FY) 1981 and 40 percent in FY 1982 even though Congress eventually funded these programs at levels above what the president had requested.

Budget cuts also hit the infant synthetic fuels effort that only a year earlier had been proclaimed a cornerstone of the U.S. energy program. U.S. Department of Energy subsidies to several synfuels projects were eliminated. The Carter administration had requested $886.3 million for coal liquefaction and $216.4 million for coal gasification. Congress, responding to the Reagan administration's proposals, appropriated $98 million for liquefaction and $52.6 million for gasification. The Synthetic Fuels Corporation also moved more slowly than earlier was planned to provide financial support to synfuel projects.

The only major exception to the administration's energy budget cutting was made for nuclear power programs. The Carter administration's budget request for nuclear was increased by approximately $200 million, including funds for the controversial Clinch River breeder reactor project, designed to demonstrate the commercial feasibility of one type of breeder reactor. After a difficult floor fight, the administration prevailed and the program was funded for an additional year.

The administration also announced its intention to reduce the regulations that it claims are obstructing nuclear power de-

[1] *Oil and Gas Journal*, vol. 79, no. 52 (December 28, 1981) pp. 86–87.

[2] U.S. Department of Energy, *Monthly Energy Review* (December 1981) p. 14.

[3] U.S. Department of Energy, "The Outlook for World Oil Supply and Demand Through 1983" (December 1981) p. 2.

velopment. Despite this, the industry continues to be plagued by a variety of problems. As in each of the last three years no new plants were ordered in 1981, and a number that had been ordered were canceled or deferred, including some already under construction. Prospects may not have been enhanced this year by the late January accident that caused the release of radioactive gas from a plant outside Rochester, New York. The facility may be shut down for several months.

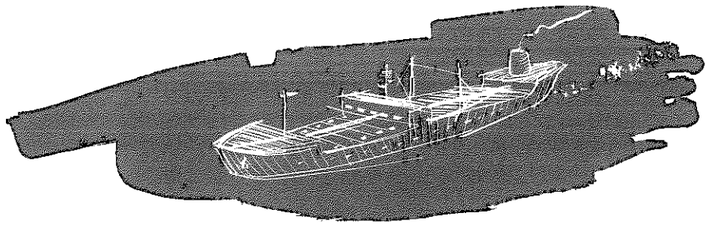
The difficulties encountered in attempting to revive nuclear power have not swayed the administration from its energy policy course. The FY 1983 budget request maintained funding for nuclear power and called for further cuts in other programs. In the new budget request, 47 percent of energy funding goes for defense-related work, 20 percent to fill the Strategic Petroleum Reserve, and only 27 percent for other energy programs. The solar energy and conservation budget is reduced to $101 million from the previous year's $518 million.

The new budget also followed through on the president's pledge to dismantle the Department of Energy. The latter proposal, which would disperse most of the agency's functions to other parts of the government, is receiving only a lukewarm response on Capitol Hill from both Republicans and Democrats. In particular, many lawmakers are having trouble with the proposal to transfer much of DOE's defense-related functions to the Commerce Department.

Natural gas pricing looms as another political battleground. Under the Natural Gas Policy Act of 1978, price controls on some categories of natural gas will be phased out by 1985. Accelerating this process and including in it all types of natural gas would seem logical, in light of the administration's emphasis on letting the market determine energy prices. However, the short-term price increases that are thought likely to result from this policy could make it unpopular in an election year, and some observers feel that, in order to get accelerated decontrol through Congress, the president may have to break his pledge to veto a windfall profits tax on producers. The clash of interlocking and sometimes conflicting interests makes natural gas pricing a fascinating spectator sport, and one for which it is impossible to predict an outcome.

All bets off if glut evaporates

All of this could be eclipsed if the world oil market returns to the instability that characterized it in 1979 and 1980. The consensus is that it will not. In its December 1981 report DOE predicts no growth



in demand for oil and in the non-Communist countries. Combined with some expected increases in exports from Iraq and Iran and higher production from non-OPEC countries such as Mexico, the prognosis is for continued downward pressure on prices, with no important change expected until the Western economies renew sustained economic growth in 1983 and beyond. In this view, the only factor working to maintain prices at or near their present level is Saudi Arabia's willingness and ability to reduce production, possibly to levels as low as 6 mmbd.

But those who predicted stability in past world oil markets have been just as wrong as those who made gloomy forecasts for 1981. The intricate economic models failed utterly to predict the price increases of 1973–74 or 1979–80. Their careful calculations of supply and demand were overpowered by unforeseen production cutbacks, political instability, and economic and political opportunism. No one needs to be reminded that the Middle East remains a volatile area and any event or decision that significantly affects Saudi Arabia's production levels once again could send spot market prices through the roof.

Such a development might lead to a new spate of articles fretting over the imminent "decline of the West." But wise observers will know that future predictions may be as exaggerated as those of the past. As some facetiously suggest, perhaps the best thing to do would be to look back at the Super Bowl. Historically, oil prices never have risen significantly in a year when a National Football Conference team was the winner. The victorious San Francisco 49ers of the NFC thus may have assured U.S. consumers of a year of breathing space. On the other hand, the OPEC countries play soccer, not American football. The national and world energy economies remain vulnerable to swift kicks.

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Energy Discussion Papers

RFF's Center for Energy Policy Research announces the availability of Discussion Papers presenting early results of two of its ongoing research projects.

Energy and national security

The vulnerability of the world's oil market to sudden disruptions and the importance of oil in the U.S. economy combine to face the United States with significant economic risks. Under a contract with the U.S. Department of Energy, RFF and the Brookings Institution are studying the nature of threats to energy supplies, likely consequences of supply disruptions, and ways of preparing for and reducing the impact of disruptions that do occur.

- Discussion Paper D-82A, "Social Cost of Imported Oil and the U.S. Import Policy," by Douglas R. Bohi and W. David Montgomery, lays out the analytical foundations of the notion that the social cost of imported oil is greater than the market price.
- Discussion Paper D-82B, "Tariffs and the Economic Costs of an Oil Disruption," by Bohi and Montgomery, focuses on the nature of market response to disruption risks and the ability of tariffs policy to improve that response.
- Discussion Paper D-82C, "Review and Analysis of Oil Import Premium Estimates," by Harry G. Broadman, explores efforts to estimate the oil import premium in order to determine how much uncertainty surrounds the size of the premium and whether and how that uncertainty can be narrowed.

Energy in the developing world

The developing countries' contributions to the demand for world oil and other energy sources is small compared with their population, but their rate of growth is high. As economic development continues, the role of these countries in world energy will grow. RFF is devoting a major effort under a Cooperative Agreement with the U.S. Agency for International Develop-

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(Era of limits, cont'd.)

Spending more effectively. The continuing budget crunch has begun to reveal that some longstanding conservation programs do not distribute funds effectively. The Agricultural Conservation Program (ACP) over the years since 1936 has spent $8.6 billion to share with farmers the cost of conservation practices, but each county receives a similar amount of money, and the proportions received by different states have changed little in decades—even though the distribution of the soil erosion problem is not even and has shifted over the years. President Reagan is proposing an even greater cut in ACP than he did in 1981 when, refusing any cut, Congress did nothing to see that these conservation dollars would be spent more effectively.

The president's budget proposes an actual increase in spending on technical assistance offered to farmers by the Soil Conservation Service (SCS), as well as a new state grant program administered by the agency, but again, too little progress is being made to reallocate the funds where they will do the most good.

Keeping programs in perspective. Priorities must be set not only within programs, but also among them. For example, although a big program like mass transit may improve environmental quality by lessening reliance on the automobile, more environmental "bang for the buck" almost certainly could be achieved in other ways. But this sort of cross-departmental comparison is not yet part of the budgetary process. It is even less common to ponder the fairness of fighting moderate cuts in environmental programs when poverty programs are being cut more deeply.

Reform and reorganization

Whereas environmental groups once were the major advocates of administrative reform, now they find themselves opposing many changes. In contrast to such procedural reforms of the 1970s as the National Environmental Policy Act, today's movement toward regulatory relief seeks to cut red tape and to streamline, or entirely abolish, various regulations (see Portney article on page 17).

Lowering profiles. Administrative reorganizations of the 1970s produced such new agencies as the Council on Environmental Quality (CEQ), the Environmental Protection Agency (EPA), Interior's Office of Surface Mining (OSM), and the Department of Energy (DOE). Charging that the bureaucracy had become inefficient and intrusive, the Reagan administration undertook reorganizations, backed up by budget cuts, that sought a lower profile for many agencies, and no profile at all for DOE. CEQ was deemphasized, with greater responsibilities going to a Cabinet Council on Natural Resources and Environment and to the Office of Management and Budget (OMB). In addition to its strengthened duties in budgeting and regulatory review, OMB administers governmentwide personnel limitations, under which the president is pledged to reduce the number of federal employees by 75,000 between 1981 and 1984. Nearly all nondefense agencies are experiencing some decline in personnel under this initiative.

Relatively little controversy met the modest reorganizations begun in 1981 in the National Park Service, the Bureau of Land Management, and the Fish and Wildlife Service. But a continuing effort to eliminate more than a quarter of the personnel in OSM between 1981 and 1983 and to make it more responsive to state governments has led to complaints from three committees of the House of Representatives that the law was being weakened. Also running into some political flak is the president's attempt to fulfill his campaign promise to abolish DOE and transfer its functions to the Departments of Commerce and the Interior. Like President Carter's short-lived 1979 effort to create a Department of Natural Resources, Reagan's proposal requires legislation, and it is far from clear that Congress will agree even in part.

Controversy at EPA. The most debated reorganization effort of 1981—and possibly also of 1982—was that affecting the EPA. EPA's public affairs functions were sharply curtailed, and its planning and management division was split up. The enforcement office was eliminated, with some duties going to the agency's legal counsel, and others being placed at low levels within the program offices for air, water, toxics, and so on. Decision making became centralized in the administrator's office and, more than a year after the administration entered office, many key positions were vacant. The administration's 1983 budget proposal represented a decline of 29 percent below EPA's 1981 appropriations. In addition to budget cuts, the agency was scheduled to sustain a large drop in authorized personnel of 17 percent by 1983 from a high of 12,700 in 1981. Meanwhile, many discouraged employees were leaving voluntarily, and they and others took the unusual step of forming a group—"Save EPA"—to defend the organization. They argue that the agency is being cut at the very time its workload is increasing because of new duties to regulate toxic and hazardous substances, drinking water, groundwater, and so on.

Amid the charges, some undoubtedly correct, that the reorganizations at the OSM or EPA would weaken the agencies, it is easy to forget that after years of growth and confrontation, such agencies do suffer from some inefficiency and unresponsiveness. Still, the administration is vulnerable to the charge that it has singled out regulatory programs while leaving relatively untouched many others, including most water projects and defense programs. In any case, the strong rhetoric on both sides suggests that environmental and natural resources questions will be important in the 1982 congressional elections and perhaps in 1984 as well.

The New Federalism

In January 1982, President Reagan devoted his first State of the Union message to proposals to "make our system of federalism work again" by turning greater responsibility over to the states and localities. Increasingly in the past two dec-

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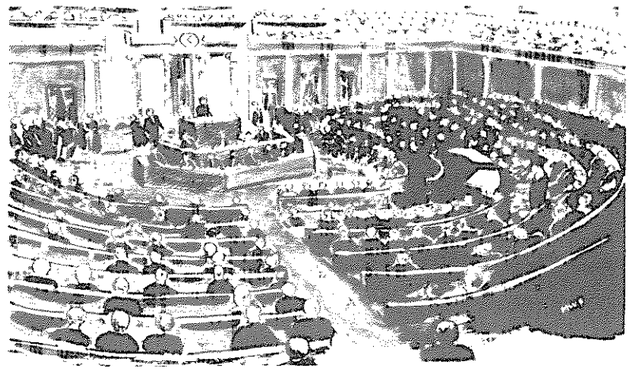
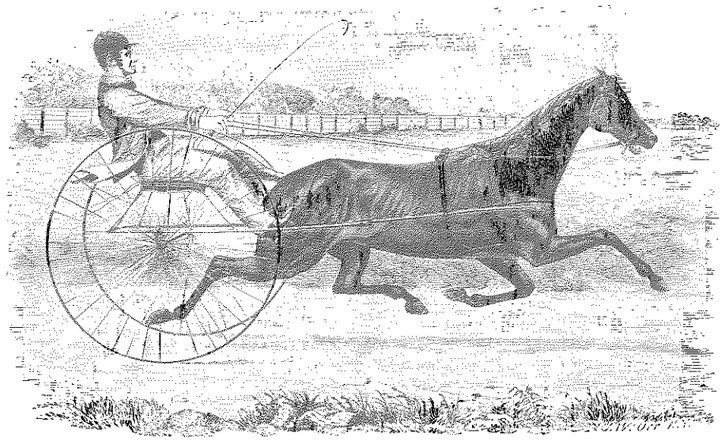


Down on the farm. . .

The news from RCA



THE SOIL AND WATER Resources Conservation Act of 1977 (RCA) authorized a major appraisal of the nation's soil and water conservation problems and policies. Given the expectations that the project excited, to many participants the final outcome as expressed in the program document and recommendations to Congress must have seemed an anticlimax.

Dust storms and gullies

Federal soil and water conservation programs had their origin half a century ago in the dust storms of the Plains and the gullies of the Eastern Piedmont. At a time when nature and economics added to the tribulations of an already distressed farm population, the evangelical message of conservationists took root both in the countryside and the federal bureaucracy. Grassed waterways, check dams, conservation districts, and idle acres spread quickly, all aided by Uncle Sam's money and ubiquitous conservation officials.

From the beginning, conservation programs had an incestuous relationship with farm price- and income-support programs and their effectiveness in controlling erosion probably was diluted in consequence. Despite immense changes in the farm economy over ensuing decades—changes that literally have altered the rationale for these programs—they were not subjected to searching review of their need or effectiveness. The RCA process, undertaken at congressional initiative, was meant to remedy this neglect.

After collecting an immense amount of information, assessing the major problems, and analyzing alternative policies, the final RCA program report, reflecting the views of a new administration, drew back from the more daring policies that were considered along the way. In particular, it shunned novel economic incentive programs to induce farmers to employ conservation practices and came down in favor of traditional technical assistance and subsidy measures. Although the report did support the extension of conservation tillage, the major innovation proposed was a shift in institutional arrangements toward giving states a greater role.

Coming late in the year, the recommended changes were only partially noted by Congress in passing the 1981 farm bill. Neither the final report nor the farm legislation pays special heed to the evolution of the farm economy, nor do they respond fully to the concern for conservation expressed in the RCA background studies. The result is a course that may not be much more effective than existing programs. Indeed, the program seems to reflect caution on the part of influential constituencies at a time when prospects seem bleak for new federal money to ease the way to new programs.

Erosion and flood damage

The RCA study covered a range of issues, from wildlife habitat to water supply and quality and rural waste management problems, with soil erosion and upstream flood damage receiving priority attention in the program report. The heart of the analysis was an attempt to model the erosion problem for expected future dates (out to 2030) using an elaborate model developed at Iowa State University. From this exercise future erosion losses were calculated under a variety of assumptions, and an attempt was made to translate these losses into equivalent acres of farmland.

A commonly used standard for judging the severity of erosion is the so-called T value or tolerance level—a rate of soil loss that can be tolerated continuously without imparing the long-term agricultural productivity of the land. This value permits a maximum annual soil loss of 5 tons per acre on cropland, as it happens, just above the national average soil loss on cropland. But averages are notoriously misleading. While on more than three-fourths of the nation's cropland the erosion rate by water does not exceed 5 tons, the average masks much higher losses on some lands, including highly productive acreage in the Cornbelt subject to water erosion and many acres on the Plains that are vulnerable to wind erosion. More than half of all cropland erosion by water, and 90 percent of all that over the 5-ton level, occurs on a mere 10 percent of the land. There is no "average erosion." Rather, excessive erosion is a local phenomenon, the product of particular circumstances.

Targeting erosion control

This suggests that programs to deal with erosion should be focused with equal sharpness. Past programs have been criticized for their "first come, first served" approach to the problem, an outgrowth of the government's emphasis on voluntary participation by farmers and the propensity of federal agencies to provide "delivery systems" throughout the land. What is needed is a better targeting of erosion control policies and practices, so that they are focused on the lands where the problem is most severe.

In presenting this program to Congress, Secretary of Agriculture John R. Block stressed the need for better targeting—a clear advance if it can be accomplished. However, the criteria for establishing priority areas to receive attention are vague. Presumably the amount of gross erosion in excess of the T value will be a major consideration, but this does not necessarily correlate closely with loss of productivity or with the off-site economic damage done by erosion. Finally, it must be noted that the politics of soil conservation always favor the broadest geographic dispersion of effort.

New Federalism farming

Placing more responsibility on the states is a major policy theme of the Reagan administration, and it is reflected in this report. Soil conservation programs always have stressed voluntary compliance and strong local involvement, and states undoubtedly will continue to make use of federal agencies' technical expertise in carrying out their programs. In the absence of major new funding, however, it is unclear how effective the changes will be in controlling erosion. By giving states responsibility, the aspiration to target programs more carefully on a national basis is sure to be weakened. On the other hand, within their own jurisdictions states may be tougher in assigning priorities for action. Also, some states faced with grave problems may be more willing than federal agencies to enforce mandatory rules, and they may well be more innovative in exploring new and more cost-effective means of achieving program objectives.

The RCA report is not very rewarding in other important respects. The need for action is based on assumptions about demand, technology, soil loss, and productivity that can be challenged at each step. But even if the assumptions are granted, adjustments need not be confined to soil conservation policies. The nation could, for example, reduce erosive use of the land by limiting grain exports, or by increasing research on new technologies, or in other ways. And there is little discussion of the concept of society's responsibility for what is legally a private resource. What is society's stake in reducing erosion on private land, and how should it relate to the private costs and benefits implied by various methods of attaining a particular level of control? Finally, if there is a social interest in reducing erosion (presumably a long-term interest), why are the states more logical custodians of that interest than is the federal government?

A still-open question

This will not be the final chapter in the RCA process; congressional oversight will extend to another round. On federal lands, management agencies have been required by legislation over the past two decades to provide a more coherent system of planning and accounting for their programs. A Congress accustomed to this standard for public lands programs is sure to ask similar coherence in objectives and cost-effectiveness for programs on private lands. The RCA study, by its very caution on recommendations, inevitably opens these matters for discussion in future years. In a leaner fiscal world, conservation programs will have to face basic questions of purpose, scope, and equity that they still avoid today.

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A shortage of agricultural land?

Concern about the supply of agricultural land is not new in the United States, but it mounted steeply in the 1970s, and with apparent justification. Responding to sharply rising demand for exports during the decade, farmers brought almost 60 million additional acres under crops, reversing the declining trend of the previous twenty years. At the same time, agricultural land continued to be converted to urban and other uses, which for practical purposes removes it permanently from agriculture. Many people concluded that these trends in demand and supply portend a looming crisis of agricultural land.

Responding to this sense of impending crisis, then Secretary of Agriculture Bob Bergland and Charles Warren, chairman of the Council on Environmental Quality, agreed in 1979 that their agencies jointly would undertake a National Agricultural Lands Study (NALS). Other federal government agencies also participated.

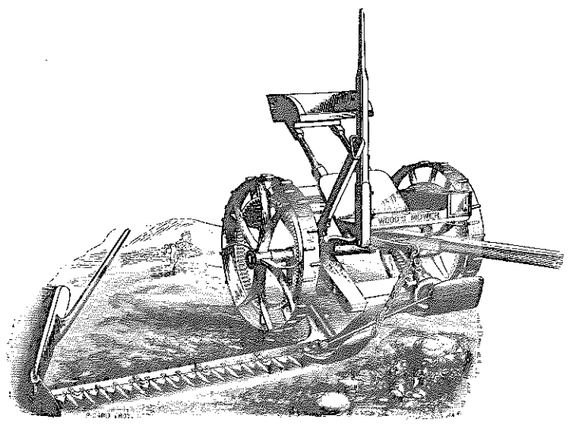
The Final Report of the NALS was published in January 1981 to considerable fanfare for a government report. Accounts of the report appeared widely in the national press, and editorialists commended it to legislators and the general public. At a follow-up conference, held in Chicago in February, former Secretary Bergland spoke warmly of the report, as did former Secretary of the Interior Cecil Andrus and other notables. New Agriculture Secretary John R. Block addressed the Chicago conference by telephone and stated that the NALS had made a strong case for a national policy to protect agricultural lands.

The NALS clearly had a major impact on discussion of agricultural land issues in 1981, and many states and local jurisdictions are using it as the basis for proposals to slow or prevent the conversion of agricultural land to other purposes.

Results of the NALS

According to the Final Report of the NALS, the study was designed to answer three questions. How much agricultural land is being converted to nonagricultural uses and why? What are the economic, environmental, and social consequences of conversion? And what are the methods for slowing conversion, if these are found necessary?

The study concludes that trends in demand for food and fiber plus likely growth in crop yields per acre combine to indicate sharply increasing pressure on the nation's agricultural land, with rising economic and environmental costs of production the consequence. In this perspective, continued conversion of land to nonagricultural uses at current rates threatens capacity to produce at acceptable economic and environmental costs. While not now of crisis proportions, it is argued, conversion poses serious long-term risks to the nation. The study draws an analogy between the agricultural land preservation issue as it now stands and the energy conservation issue as it appeared at the beginning of the 1970s, before the Arab oil embargo and the first of the massive price hikes. The conclusion is that the federal government should actively support state and local government efforts to preserve agricultural land. And federal agencies should take steps to assure that their activities do not needlessly result in its conversion to other uses.



Two questions may be asked about the study's conclusions. What is the evidence for an emerging serious capacity problem? And is preservation of agricultural land the best way to deal with the problem, if there is one?

Examining the evidence

The argument for an emerging serious problem is based on analysis of three trends:

- Foreign demand for grains and soybeans and domestic demand for corn to produce gasohol
- Yields of grains and soybeans
- The amount of agricultural land converted annually to nonagricultural uses.

The export projections used by the NALS, prepared by the U.S. Department of Agriculture (USDA), show annual growth of from 4.5 to 6.5 percent between 1980 and 2000. These are one and a half to two times as high as the projections made by others, including RFF researchers. This, of course, does not make the NALS–USDA projections wrong, but there are good reasons for suspecting that they may be. First, the projections are based heavily on experience in the 1970s, when U.S. exports "took off," in large part because of the sharp decline in the value of the dollar after 1971. This greatly increased the competitiveness of U.S. exports in world markets, and comparable devaluation is unlikely in the future.

Second, the USDA projections assume no increase in the real (inflation-adjusted) prices of U.S. crop exports. In fact, however, the NALS concludes that increasing pressure on the land and rising prices of fertilizer, water, and other production factors will force real crop prices higher, which tends to depress U.S. exports.

Third, the USDA projections assume increasing U.S. shares of world trade in grains and soybeans. It is not obvious why this should happen, even if the real prices of U.S. exports remain constant. If prices rise, as the NALS concludes is likely, the United States would be hard put to maintain its shares of trade, let alone increase them. On these grounds some skepticism about the NALS export projections is justified.

This is true also of the study's projection of the demand for corn in gasohol production. The study uses a figure of 4 to 6 billion gallons of ethanol (the mostly corn-derived ingredient of gasohol) in 2000, which would require a net addition of some 7 to 11 million acres of cropland. But Fred Sanderson (*Resources*, No. 67) has shown that by the 1990s gasohol is unlikely to be competitive with alternative liquid fuels, suggesting that the NALS projection of the demand for corn as a gasohol feedstock is high.

The NALS uses three projections of crop yield growth rates: .75 percent, 1.25 percent, and 1.5 percent (annual rates, 1980 to 2000). These numbers are in line with those currently used by other analysts, although most probably would feel that .75 percent is too low. The yield projections are divided into the projections of crop output to get projections of the amount of land needed to produce main crops (mostly grains and soybeans) in 2000. The low rate of yield increase indicates that, compared with 1980, an additional 113 million acres would be needed, while the high rate would require 78 million more. The net increase in demand would be less because some land now in nonexport crops, such as hay, likely would be converted to grains and soybeans. Nonetheless, the NALS projections indicate net increases of at least 65 to 100 million acres in demand for cropland by 2000.

The conversion controversy

Against these prospects for increasing demand, the NALS points out that urban and other nonagricultural uses will continue to bid away cropland and potential cropland over the next several decades, reducing the supply available for crop production. This is the third key trend supporting the NALS conclusion of a capacity problem, and is the most controversial aspect of the study. Critics charge the study with careless, if not deceptive, use of numbers on the amount of agricultural land converted in the past and likely to be converted in the future.

The NALS leaned heavily on a USDA study showing that, on average, about 3 million acres of agricultural land were converted to nonagricultural uses each year from 1967 to 1975, considerably more than the annual rate in the preceding decade. But "agricultural land" is a broad category that includes not only cropland and potential cropland but also covers marginal lands that never have been used for crops and never will be. Agricultural land and cropland sound like interchangeable generic terms to the public but they are not, and the difference is critical. Of the total 3 million acres, for example, only 675,000 acres were cropland, with perhaps another 200,000 acres classified as potential cropland.

The NALS Final Report distinguishes between the conversion of cropland and potential cropland—the real issue—and conversion of all agricultural land. But somehow in press reports about the study the distinction usually was lost, and the 3 million acre figure now is firmly embedded in the popular literature as the key measure of the conversion problem. Those responsible for the NALS perhaps were not as careful as they might have been in assuring accurate reporting on this issue.

How large a problem; how apt a solution?

Does the study make its case that mounting pressures on the land and other resources presage an emerging capacity problem? If one accepts the study's projections of production and yields, the answer almost surely is yes, even if the rate of conversion of agricultural lands declines. Efforts to bring an additional 65 to 100 million acres under crops by 2000 almost surely would encounter rising economic and environmental costs (especially those associated with erosion). As suggested, the NALS projection of crop demand may be high. However, a forthcoming RFF study using lower demand projections concludes that trends in demand and yields nonetheless imply rising costs of agricultural land and production over the next two to three decades.[1] There is cause for concern about a capacity problem, although the NALS probably overstates its severity.

But is slowing the conversion of agricultural land the best way to deal with the problem? Here the answer surely is no. Despite the press fascination with the 3 million acres per year figure, the NALS does not give a specific projection of cropland conversion from 1980 to 2000. But Robert Gray, director of the NALS, stated separately that 20 to 25 million cropland acres likely will be converted over the next two decades. A background study prepared for the NALS suggests that these figures are high.[2] But even if they prove correct, much the greater part of the increased demand for cropland would come from the demand for crop production (65 to 100 million acres), not for nonagricultural uses (20 to 25 million acres). Thus, even if conversion to nonagricultural uses were halted completely, which not even the most ardent conservationists think is possible, the contribution to solving the emerging capacity problem would be small.

High costs and equity

Moreover, significantly slowing the conversion of agricultural land would exact high economic costs and raise potentially divisive equity issues. Land shifts from agriculture to urban and related uses because it is economically more productive in those uses: the economic return to society is higher than if the land stayed in agriculture. Since the difference between the value of land in agriculture and in nonagricultural uses typically is large, significantly slowing conversion would exact a high cost in income foregone.

Those urging retention argue that the land market does not give proper weight to future demands for agricultural land, thus understating its present value in agriculture relative to its value in nonagricultural uses. This is the point of the analogy between agricultural land and energy. But no evidence is presented to support this argument for overriding the market. It rests simply on the assumption that those making it can perceive the future more accurately than can the market.

Restricting conversion of agricultural land also causes shifts in income. If farmers are not free to sell their land to whomever they wish, including developers, they are deprived of the capital gains they otherwise would reap, and owners of nonagricultural land benefit because the supply of such land is less than if conversion were permitted. Those who subsequently rent or buy nonagricultural land pay more for it than they would otherwise. In some areas, government bodies purchase development rights from farmers, on condition that the land remain in farming. In these instances the farmer enjoys a capital gain, but taxpayers bear the burden. And owners of nonagricultural land benefit, as indicated above. Another approach permits developers to purchase development rights from farmers. The farmer receives a capital gain and agrees to keep his land in farming. The developer uses the purchased right to develop other land not thought necessary for farming. This approach, when it works, defuses the equity issue, but typically increases costs because it forces development onto inferior land.

Poor strategy

Restricting the conversion of agricultural land holds little promise as a national strategy for dealing with emerging pressures on its supply. Even if highly successful, the policy would make little contribution to solving the problem, it would come at high cost, and it would cause arbitrary—and therefore divisive—redistributions of income. Emerging pressures on agricultural land may well present a national problem justifying a federal government response. But the road mapped out by the NALS does not appear the way to go.

An alternative

A far more effective set of strategies would aim at the larger and more tempting target—the growing demand for land for crop production. In the past the United States has eased growing pressures on its resources by developing technological substitutes for them. This strategy yielded spectacularly successful results in reducing the demand for cropland from the end of World War II until the early 1970s. It can be done again if we will increase the resources devoted to research for development of higher-yielding, less-erosive technologies. The private sector can contribute to this, but much of the needed research is in the basic sciences—for example, how to enhance photosynthetic efficiency—for which the federal government should take prime responsibility. "More research" may not compete with "save our farmland" as an attention getter, but it is almost certainly a more effective investment of national time and treasure.

Author Pierre R. Crosson is a senior fellow in RFF's Renewable Resources Division. His latest RFF book, The Cropland Crisis: Myth or Reality, *will be published by The Johns Hopkins University Press in April.*

[1] Pierre R. Crosson and Sterling Brubaker, *Resource and Environmental Effects of U.S. Agriculture*, RFF Research Paper. In preparation.

[2] David L. Brown and Calvin L. Beale. "Sociodemographic Influences on Land Use in Non-Metropolitan America," in U.S. Senate. Committee on Agriculture, Nutrition, and Forestry. *Agricultural Land Availability* (Washington, D.C., July 1981).

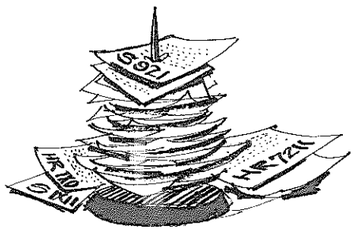
New directions for the Clean Air Act

WHAT HAPPENED to derail the slated 1981 reauthorization of the Clean Air Act, indisputably the major piece of environmental, safety, or health legislation enacted during the 1970s? Since both business groups and environmentalists were dissatisfied with parts of the act and the way it was being enforced, one might have guessed it would have been high on the 1981 congressional agenda. Moreover, the Reagan administration announced early that reform of federal regulation—particularly environmental regulation—would stand along with tax reductions and budget cuts as a major component of its economic recovery program. Instead, 1981 has come and gone without so much as a single proposed amendment to the Clean Air Act reported out of committee.

A slow year

What factors explain the "Clean Air Inaction" of 1981? Most important was the administration's on-again, off-again approach. After missing a number of self-imposed deadlines by which it was to have submitted specific proposed changes in the act, the administration finally settled for enunciating a dozen or so "principles" it would like to see Congress adhere to in revising the Clean Air Act. Congress mostly treaded water waiting for an administration package that never came.

In addition, neither Sen. Robert T. Stafford (R–Vermont), the chairman of the Senate's Environment and Public Works Committee, nor Rep. Henry A. Waxman (D–California), chairman of the Subcommittee on Health and Environment of the House Energy and Commerce Committee, was anxious to see major changes made in the act, even if some of their colleagues were eager to do so. Thus, bills to amend the approaches to both stationary and mobile source air pollution controls in the Clean Air Act got nowhere in the House and never even came up in the Senate. The year ended with observers wondering whether 1982 would see any more progress, especially given congressional reluctance to embrace other than cosmetic changes in popular statutes during an election year.



Looking ahead

The debate almost certainly will sharpen. With at least the first round of the tax and budget fights behind it, the administration can be expected to devote more attention to regulatory matters, the Clean Air Act foremost among them. In January, in fact, the administration threw its weight behind H.R. 5252, a bipartisan bill that would make a number of important changes in the Clean Air Act while leaving intact some of its more controversial features.

Briefly, the bill would relax considerably the emissions standards required of new automobiles; give states more time to meet the National Ambient Air Quality Standards established by the Environmental Protection Agency; permit more air pollution in some parts of the country that are cleaner than what is required by the EPA standards; streamline the process by which the states plan the controls they will impose on polluters; and make other changes—generally relaxations—as well. Because the thrust of the bill is to weaken an act they view as unnecessarily strict and complex, business groups have rallied around H.R. 5252. Environmentalists and many state and local officials, who argue that the act should be made *more* strict, predictably are alarmed by the bipartisan support the bill appears to be attracting. Thus, battle lines are being drawn.

"Inviolate" principles?

In light of these developments, it is interesting to see what changes are *not* being suggested in the act, since they sometimes affect those that are. When debate began on the Clean Air Act last year, one target of the business community as well as many policy analysts was Section 109, which describes the way uniform national air quality standards are to be set. Briefly, these standards are to provide a margin of safety against adverse health effects, even among the most sensitive population groups (asthmatics and angina patients, for example), and are *not* to depend on the costs of attainment.

These provisions are unsettling, because most researchers have come to believe that there is *no* level of pollution below which exposures are completely safe, thus implying that zero emissions are the only safe levels for the common air pollutants. As much as we like clean air, surely no one would argue that we should pursue that goal by ceasing all fossil fuel combustion in cars, homes, factories, and power plants. Moreover, even if there were some safe level, an EPA Administrator, if permitted to do so by the act, might conclude that the adverse health effects avoided at that level were not worth the extra costs incurred in getting there from some slightly higher level. (This argument cannot be dismissed lightly: some studies suggest that we now may be spending several thousand dollars to prevent one person's unhealthy exposure to air pollution for *one hour*.) Since budgetary constraints do not permit the nation to make all its highways, airports, hospitals, and foods absolutely free from risk, it may be asked why we pursue this approach in air quality.

Although H.R. 5252 contains no proposal to revise the standard-setting process, it certainly reflects the effects of the current approach. Indeed, one can argue that the reason many states need more time to meet the standards is because these standards are to apply uniformly to all areas and because they are set without regard to costs. Thus, one alternative to the current approach might be to balance the health benefits associated with tighter standards against the costs of their attainment. In fact, since meteorological and geographic conditions can make it extraordinarily difficult for particular areas to meet the standards for certain pollutants (Los Angeles and ozone being the best known example), it might be worth considering slightly different standards for different areas, as opposed to nationwide uniformity. No such proposal is likely to be entertained soon, however.

H.R. 5252 fails to address another important issue on the agenda of many would-be reformers—the long-range transport of pollution from a source in one region to receptors in others ("acid rain" is one such example). The evidence is mounting about the apparently serious dimensions of this problem. Yet because the Clean Air Act takes a local approach to air pollution control—each district can regulate only those polluters within its jurisdiction—it is nearly impossible to do anything about sources which "air mail" pollution from one region to another. Unfortunately, neither the sponsors of H.R. 5252 nor the administration has expressed much interest in this problem. This is somewhat surprising in the latter case because, unlike some environmental problems, interregional air pollution does not lend itself to solution at the state or local level, and thus appears to call for federal involvement.

Of course, both the standard-setting process and acid rain may come up in later debate. Other important issues not currently addressed in H.R. 5252 no doubt will be raised as well. These include the current requirement that new electric power plants scrub their stack gases regardless of the sulfur content of the coal they use; the controversial regulations protecting visibility that EPA is developing; controls on toxic or hazardous air pollutants; and perhaps even the expanded use of economic incentives in environmental policy, in place of or in conjunction with more traditional regulatory approaches.

Finally, one can only hope that administrative, if not legislative, changes are made in the way that compliance with air quality rules is monitored and enforced under the Clean Air Act. Without an expanded and improved national network of ambient and source monitors, it will be impossible to know for sure whether the nation is making progress or losing ground in the expensive fight for clean air. Nor will we know where to crack down, even if it becomes clear that the effort is not producing the results it should.

The Clean Air Act has important effects on both public health and the economic health of the nation. It also is important as a symbol of committment to environmental quality. For these reasons, the disposition of H.R. 5252 and the other proposed changes in the act should be watched closely. They may signal the shape of things to come.

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ades, the federal government has used the states and localities as conduits for regulation and spending.

Between 1960 and 1980, Congress adopted thirty major statutes (fifteen of them in the environmental and natural resources fields) that imposed regulatory requirements on the states and localities. By the end of 1980, federal grant programs numbered 538 (about fifty of them in the environmental and natural resources field), representing more than one-fifth of all federal domestic spending. Growing state and local dependence on federal aid became a powerful lever for enforcing the proliferating regulations. Aside from the many requirements specific to certain programs, fifty-nine requirements were cross-cutting (that is, applying to activities funded by any federal grant program), fifteen of which involved some kind of environmental assessment (endangered species, clean air, NEPA, and so on).

Block grants and turnbacks. The hotly debated Omnibus Budget Reconciliation Act of 1981 and other legislation reduced the number of federal grant programs in 1982 to about 400, including nine block grants, mostly in the social policy field. Block grants carry with them few federal restrictions and generally do not require a state to match federal aid from its own funds. In 1982 President Reagan further proposed to turn back to the states another forty-three federal programs, this time with revenue sources that he said would be enough to pay for them.

Making exceptions. Most existing environmental and natural resources grant programs have not been included in proposals for block grants or turnbacks to the states, partly because the states already have significant freedom in spending their grants. Also, most of these programs are less costly than other grant programs (and are being cut back further); two of the biggest—mass transit and sewage treatment—were the only ones included among the forty-three that the president proposes to turn back to the states.

Reagan's new federalism has left untouched the water projects field, where the states share almost none of the cost of the up-front financing of federal construction. Senators Pete V. Domenici (R–New Mexico) and Daniel P. Moynihan (D–New York) propose a block grant for water projects, under which the states would share 25 percent of the cost, and the three federal water project agencies essentially would act as their advisors and contractors. The greater flexibility in spending would, for the first time, make federal money available for eastern municipal water distribution systems, which in many cases are badly in need of repair. However, it also would cut back the currently free benefits going to southern and western areas, the president's strongest political base. The administration has not yet endorsed the Domenici–Moynihan proposal, but its desire to reduce subsidies and turn more responsibilities over to the states could lead it to a similar position.

The Sagebrush Rebellion. The sagebrush rebels propose that some western federal lands be given to the states. However, few of the governors of the states concerned have been willing to follow through on this issue. They realize that currently the federal government is spending hundreds of millions of dollars to manage the lands while giving the states payments-in-lieu-of taxes, half of the mineral receipts, one-quarter or more of the timber receipts, many other subsidies, and significant control over the land (including the unlimited ability to tax its energy, mineral, and timber production)—more benefits than would come with ownership, with few of its accompanying costs.

The Reagan administration has emphasized that its "good neighbor policy" in the West reduces the need for much outright turnover of federal land, but several piecemeal exchanges have gone forward and, early in 1982, proposals emerged to sell land to the private sector, in part to reduce the impending budget deficit.

New duties, few dollars. An irony of the effort to turn federal responsibilities over to the states is that, except for about a dozen that are gaining large revenues from the energy boom, most states are in their worst financial shape in years. With state tax collections falling because of depressed economic conditions and the effects of the tax limitation movement, federal aid cutbacks are adding to the pressures on state-level programs of all kinds. Since even deeper cuts are being made in federal aid to state social programs, state environmental programs may find it hard to compete for ever scarcer budget dollars. The extremity to which this can lead was suggested in 1981 when the state of Idaho entirely eliminated its Air Quality Bureau and turned over all its responsibilities under the Clean Air Act to the federal EPA.

Throughout 1982, pitched battles will be fought in many state legislatures over whether and how much to cut environmental and natural resources programs.

The states take the lead? Nevertheless, in the coming decade the states rather than the federal government may be the new centers of environmental reform. While federal debates increasingly have been dominated by struggles over whether to cut back existing programs, many innovations have emerged at the state level. The state of Oregon alone has pioneered with a bottle bill, the prohibition of fluorocarbon sprays, land use controls, and tax incentives for the protection of riparian areas. Taxpayers in fifteen states now can earmark funds for endangered or nongame species—an option not allowed at the federal level.

The traditional view that the states are development-oriented and the federal government more concerned about the environment is harder to justify today. Environmentalists are turning away from the federal government to the states to plead their case, as in the questions of how much coal to lease in Montana and Wyoming, whether to lease more oil and gas off the shores of California and Massachusetts, and whether to begin to store nuclear wastes in New Mexico—all issues where the federal government is on the side of development. The longstanding federal presence in addressing environmental spillovers across state boundaries certainly will continue, but added to it may be a new role, that of ensuring that in their accelerating quest for environmental protection the states do not impose unfair economic costs on one another.

In any case, we may be seeing a change—perhaps even a reversal—in the historic pattern of federal leadership stretching back eighty years to when President Theodore Roosevelt first placed conservation on the political agenda.

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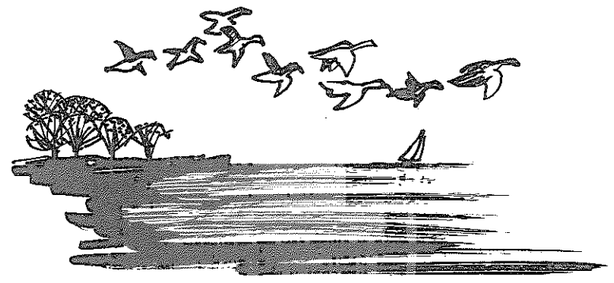


Housing and inflation

Record rise, record fall

LAST YEAR WAS DISASTROUS for everyone involved in U.S. housing—home builders, the forest industry and other suppliers of building materials, labor, local governmental finance in important forest areas, and above all, potential home buyers who could not muster the necessary down payments or manage the monthly costs.

Residential construction in the United States has been highly cyclical for one hundred years or longer. It also has been seasonally variable, but what follows is based on Bureau of the Census seasonally adjusted and smoothed data, from which the seasonal variations are supposed to be (but are not fully) eliminated. There were marked cycles in residential construction between 1900 and 1950, modified by two world wars and the Great Depression.

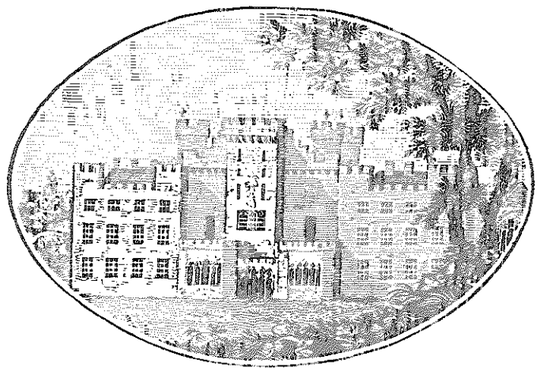
Since 1950, eight residential building cycles may be identified. They vary somewhat in length and in amplitude of their swings from high to low and back again, but they have averaged fifty months in length from trough to trough or from peak to peak, and the rise from trough to peak and the fall from peak to trough has averaged between 35 and 40 percent of the peak volume.

Since 1950, the cycles have grown in severity, or at least the two most recent ones have been the most severe of the whole period. Residential building cycle No. 7 began in January 1970; the rate of new building rose for thirty-four months to a peak in October 1972, a rise which was 49 percent of the peak volume; then it fell for twenty-nine months until February 1975, with a decline of 60 percent from the peak. Up to that time, this was the most severe cycle—measured either by length or by amplitude—since 1950.

But cycle No. 8, in which we still seem to be, has been much more severe. It began from a trough in February 1975 and rose for forty-one months to a peak in June 1978, for a rise which was 54 percent of the peak. This rise was a record, both in length and in amount. But the fall since June 1978 has really been breathtaking, and may well continue.

The fall from the peak has twice been interrupted. Briefly in the late spring and early summer of 1979, the rate of new building rose by about 10 percent, but by late summer and early fall 1979 it dropped sharply to new depths. In the spring of 1980 there was another brief rally of nearly 50 percent from the severely depressed levels, but by the end of 1980 and the beginning of 1981, the fall resumed, swiftly and far, to a rate not previously encountered in any month since the end of World War II.

In each of these brief rallies, many observers (including the author) thought the building cycle had ended and a new one had begun. With that recent experience, one is hesitant to suggest that cycle No. 8 indeed did run its course at the end of 1981, though the next year or two may show that it has done so. Unfortunately, the prospects for residential building in 1982 are not bright, and further declines are not impossible. More likely, a long and inconclusive trough may continue. But even if the construction rate turns up in early 1982, the falling phase of cycle No. 8 to the end of 1981 has set new records for length (about forty-four months) and for distance (almost 60 percent down from the peak). A record long rise (forty-one months) and a record long fall (forty-four months) obviously add to a record total cycle length of eighty-five months (or perhaps more), which is approaching double the length of the average cycle. The magnitude of the swing from trough to peak and from peak to assumed trough is also a record breaker, averaging close to 60 percent of the peak number. Thus, by any standard, 1981 was a severely cyclical year for the home building industry.



Effect of inflation

Inflation has affected housing construction and in turn has been affected by the housing market, including new construction. Under inflationary circumstances—when there is a rise in prices of all goods or services, or a cheapening of the dollar—there is always some flight from money to real property, as consumers correctly understand that their real income and wealth positions are more likely to be maintained by owning property than by holding cash. Under the pressure of general inflation, national average prices of both new and old houses rose rather steadily from the mid-1960s until the end of the 1970s—from under $20,000 as late as 1965 to well over $60,000 by 1979.

The interest rate on new mortgages—less than 10 percent through 1978—seemed high at the time, but it seems moderate by standards of the 1980s, and credit generally was available to households with enough capital for the down payment and with enough income to swing the monthly payments. The year-to-year percentage rise in average house prices was greater than the average interest rate on new mortgages, and far higher than the interest rate on older mortgages. Moreover, interest paid is deductible from income in calculating income taxes, thus reducing the bite of the higher interest rates. During those years from 1965 to 1979, the real rate of interest (the apparent rate minus the gain in capital value of the house) was *negative*: many homeowners and buyers had housing at zero cost. The buyer might have a cash flow problem, since the gain in house value was postponed until sale or until a larger mortgage was taken out, but on an accounting basis the position of the house buyer was cozy indeed.

Cause of inflation

Naturally enough, millions of households responded to this favorable financial incentive by buying a house, typically assuming a larger mortgage; and many owners who did not sell also took out a larger mortgage in order to spend some of the money generated by rising house prices. Total residential mortgage debt rose from $338 billion in 1970 to almost $1.1 trillion in 1980. This rather closely paralleled the

Resources cumulative index

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rise in the federal debt, although it started a little lower in 1970 and rose to a little higher level by 1980.

Most economists agree that a rising federal debt is one factor in inflation, but rising residential mortgage debt has been less noticed in the professional and popular literature, though it may reasonably be argued that its effect on inflation is just as serious. The great expansion in residential mortgage debt constituted a massive transfer (over $300 billion in 1980 prices) of real capital from lenders to borrowers. The expectation of continued inflation was a further factor in rising house prices; by 1979, it appears that about $10,000 of the U.S. average house price of about $60,000 was in response to the expectation of continued inflation.

Rising house prices contributed directly to inflationary forces. First of all, housing costs in the Consumer Price Index (CPI) are based in part on rates paid for new mortgages, and the rising CPI in turn is used to adjust wages in many union contracts, with wages in nonunion occupations often following closely, and to adjust Social Security and other retirement payments. As wages rose, costs naturally also rose, with the effect of higher housing prices and higher mortgage payments being translated into still higher prices for consumer products. Multipliers work upward in prices as well as in total economic activity.

Rising house prices and mortgages contributed directly to inflation in other ways. In part, the increased prices and mortgages were simply a transfer of money (and purchasing power) from one household to another, and to this extent were not inflationary. But to some extent they also constituted "new money." As the new mortgages were sold to investment corporations, the larger sums became the basis for expanded lending by the primary lenders, and so on, round and round; the recipients of the higher house prices and of the larger mortgages used part of the funds so received to finance additional purchases of other consumption goods. Money in effect was created without goods being added to the same extent—the classic characteristic of inflation.

Countereffects

Although inflation tended to increase house prices and residential mortgages, other developments arising out of inflation had contrary or dampening effects. As the rate of interest on new mortgages shot up in late 1980 and through most of 1981, partly as a result of the Federal Reserve Board's efforts to control inflation through credit restrictions, the cost of borrowing for house purchases rose sharply.

Even at the higher interest rates, residential mortgage credit for long-term, fixed-interest rates was not available in unlimited amounts. These credit restrictions sharply inhibited further increases in house prices and greatly reduced the marketability of houses: the time required for a house sale increased greatly, or concessions had to be made on price, or special credit arrangements were necessary, or some combination of these was required if either old or new houses were to sell.

For the first time since the rate of inflation rose during the Vietnam war, the rise in house prices was less than the rate of inflation; in other words, the real price of houses fell slightly. Moreover, doubt was sowed about the future trend in house prices. The apparent $10,000 addition to the average house price at the end of 1979, in expectation of continued inflation, declined to about $4,000 by the end of 1980

and almost surely shrank some more in 1981. Housing no longer seemed such a good buy or such a good hedge against inflation, even for those who could swing the financing, and, of course, large numbers of households lacked the capital and the income for house purchase.

Continuing decline

A declining rate of residential construction has obvious effects. Construction firms suffer a loss of income, and some go broke or withdraw from the business; their employment of workers directly or through specialized subcontractors declines; consumption and prices of lumber, plywood, paper, and other forest products, and of other building materials, fall off, and employment in the production of these materials also shrinks. All of these declines in employment affect local economies, so that in turn service businesses and workers of many kinds are adversely affected; and these economic effects get translated into reduced income and other taxes and into higher government costs for unemployment relief and even for welfare. While these effects are national in scope, they fall with particular severity on some important forest product regions.

The Pacific Northwest generally, and the state of Oregon in particular, have been hard hit. Oregon's constitution requires the state to balance its budget over two-year periods. Substantial reductions in appropriations and, consequently, in services have been made up to the end of 1981, but further reductions in appropriations or increases in taxes, or both, will be required if the state is to meet its legal commitment for budget balancing during the biennium. A substantial part of the increased unemployment, reduced revenues, and higher governmental costs results from the reduced level of residential construction nationally. Colleges and universities, to cite but one example, already have suffered serious funding cuts, and worse lies ahead. The ramifications of a depressed national residential construction industry are many and severe.

Short-term, long-term effects

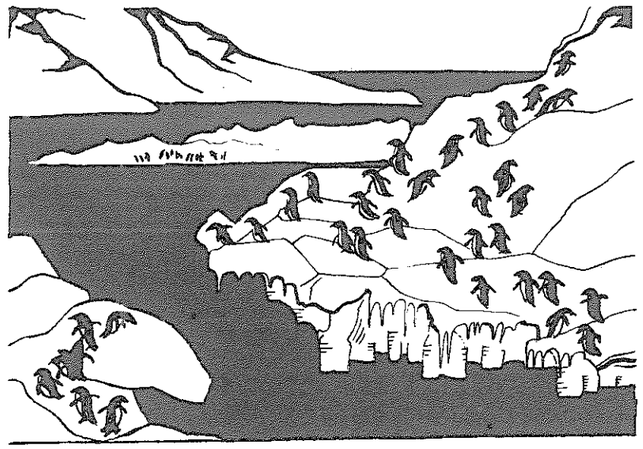
The problems of the residential construction industry—and of everyone associated in any way with it—fall into two general categories. For the short term—the next one to three years—the basic problem is to increase the level of new construction, from the general level of 900,000 units to 1.5 to 2 million units, and to finance the sale of the new structures in some way that will not set off further inflation in the price of existing structures. If the rate of new construction could be increased greatly, this would solve most of the severe problems. For the long term—meaning more than three years, and extending indefinitely—the basic problem is to stabilize the rate of new residential construction or at least to reduce substantially the magnitude of the swings in such construction.

Cyclical instability in residential construction is costly to the nation: average annual costs, on whomever they may fall, are on the order of $50 billion because of cyclical instability alone. When businesses must expand and contract as if on a yo-yo string, the real costs to society are high. The key to stability in residential construction seems to lie in separating the means of financing sales of new houses from those for financing sales of older houses, to stabilize the one without inflating the other. While reducing the real costs of housing requires action on many fronts, the most important single step would be to stabilize the rate of new construction. If that were achieved, great economies would arise from operations of the private economy, aside from further steps by government at any level.

Author Marion Clawson is senior fellow emeritus in RFF's Renewable Resources Division.

Apportioning Antarctica

IN FEBRUARY 1981, President Reagan made the United States the seventh party to a new convention governing the world's largest ecosystem—the Southern Ocean that encircles Antarctica. With one-fifth of the world's ocean water by volume, its abundant life, including fish, zooplankton, penguins, other birds, seals, and whales, depends mostly on a single species that may be the most prolific animal species on earth, *Euphausia superba*, better known as Antarctic krill.

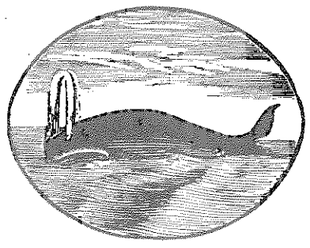


Krill fishing

The krill have become the object of intensive search by Soviet and Japanese fishing vessels ever since their whale catches in the Antarctic declined abruptly in the mid-1960s. Last year, fishermen may have taken from 120,000 to 500,000 tons. The shrimplike little animals are rich in protein and often swarm near the surface in large patches (one seen in March 1981 may have contained 10 million tons—or one-seventh of the world's fish catch!). Swarming makes krill easy prey for birds and other predators—including the fishermen.

Although some say the fishery can sustain annual catches of 70 million tons, marine biologists in several countries are concerned that krill fishing, especially if it expands to a million tons per year or more, would take away food from the whales. Whales fast for eight months a year in temperate oceans and come to the Antarctic in the austral spring to feed. Food availability in this huge ecosystem is not well understood. As one species gets more numerous, does it mean the others are taking less? Or is there a krill "surplus" for everyone, including humans?

The new agreement, titled the Convention for the Conservation of Antarctic Marine Living Resources, commits those nations that are parties to the 1959 Antarctic Treaty and others who fish in the region to assure that overfishing does not harm the ecosystem. As with most fishing treaties, the major fishing powers, including the USSR and Japan, are signing on, hoping to influence the new commission to be as lenient as possible. Indeed, the agreement has no provision for national quotas or any of the other, usual tools of fisheries regulation. Protection of the fishery will depend on nations such as the United Kingdom, Norway, and the United States that historically have been concerned with whales and with international environmental issues. They will have to undertake the research needed to patrol what happens here.



How many krill?

How are krill to be counted in view of standing stock estimates that range from 180 to 1,400 million metric tons? Even if the swarms could be measured accurately, how many other krill swim individually? How many are "hiding" under the pack ice? Over the years, detailed estimates of whale and seal populations have been made, but the area's fish and squid populations are unknown, let alone the amount of krill they consume each year. No firm knowledge of longevity exists, nor a means of determining krill ages, because their body types regress after reproduction. Many such questions must be answered in order to regulate this fishery.

A major issue in Antarctica's future is what role, if any, the United States will play in the evolution of this enormous potential protein source. Several nations carry out krill research, but the U.S. Antarctic program, which traditionally funds university basic research, has not yet taken up the fisheries question. A National Academy of Sciences committee report issued last year did recommend that the United States undertake a program aimed partly at satisfying basic research needs—such as the physical oceanography associated with krill swarms—and partly at supporting the new convention. But so far, no program has been mounted, despite the fact that the treaty may take effect as soon as 1983. A major drawback to U.S. participation is the lack of an oceangoing polar research vessel that can work systematically in the stormy, icy seas of the southern ocean.

Mineral questions

More is at stake in Antarctica's future than krill and the Soviet and Japanese fishing fleets pursuing them. Ownership of the continent and the disposition of its minerals now are under negotiation as well. The new krill convention was negotiated by the consultative parties to the 1959 Antarctic Treaty,[1] an arrangement that quieted territorial disputes and the threat of military action there. Resource questions were too contentious for the signers to agree on in 1959, so the treaty does not address them. But now that the group has concluded one related agreement on krill, it is forging ahead to negotiate another that would allocate rights to Antarctic minerals, including likely reserves of hydrocarbons offshore.

But, unlike fish, minerals do not drift in the high seas, available to the first comer. They are tied to the land and are inseparable from the question of who owns it. So it will be difficult to decide on rights to Antarctic minerals—to give a mining company, say, clear title to its product—when the Antarctic Treaty powers disagree so deeply about who has title to the land in which the minerals occur. Territorial claims seem to be the treaty powers' stone of Sisyphus: every time they roll it uphill and can breathe a little, it rolls back down to burden them again. Somehow, this impediment will have to be set aside or circumvented if they are to reach accord.

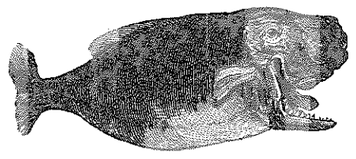
The U.S. role

As with krill, the United States is playing a key role in the diplomacy concerning Antarctic minerals. American diplomats want to continue the treaty through 1991 (when it can be reviewed and changed). By then they hope to have in force—in addition to an earlier sealing agreement and the current one on krill—a minerals accord and perhaps one on criminal jurisdiction. Thus, in 1991 the treaty could be renewed as a secure jewel in a crown of administrative arrangements for this enormous region.

But will the rest of the world buy it? Will they get anything from the treaty and these satellite agreements on resources? Or will they denounce the whole system as a cover for a few nations to appropriate their common heritage for themselves? From a U.S. viewpoint, is the path down which we are leading the others a wise one?

The United States is helping to commit the treaty powers, and itself, to a risky international course, whose success will depend on both the quality of knowledge about the region and the appearance of international equity. Things could get dicey in Antarctic politics over the next decade. In a sense, President Reagan's signature on the krill convention was only the beginning.

Author Deborah Shapley, a guest scholar in RFF's Center for Energy Policy Research, is completing a book on Antarctica.



[1] The Antarctic Treaty consultative parties are Argentina, Australia, Belgium, Chile, the Federal Republic of Germany, France, Japan, New Zealand, Norway, Poland, the Republic of South Africa, the Soviet Union, the United Kingdom, and the United States. The Antarctic Treaty acceding powers are Brazil, Bulgaria, Czechoslovakia, Denmark, the German Democratic Republic, Italy, the Netherlands, Papua New Guinea, Peru, Romania, and Uruguay.

Energy and equity

SO BECALMED IS THE ENERGY scene that it took the coldest January in decades, raging blizzards in the Plains, snow in Atlanta, and 34-degree temperatures in Miami to remind us that all is not well: energy costs remain a high and sometimes crushing burden. This winter's massive heating bills came on top of 9-percent unemployment, with industrial centers of the cold Midwest hit especially hard. Looking ahead, there is the prospect of falling real wages, shrinking welfare programs, and still higher natural gas prices. The country is face-to-face again with the question of how fairly energy costs are being borne by different sectors of the public.

Are we satisfied with the way we have managed the human side of the transition to high energy prices? Not really, it seems, and one reason why is that the story is complicated. Energy prices are high everywhere, but they affect different people differently by income group, region, industry, and place of residence, to name just most obvious variables.

Who are the poor?

Take the position of the poor. How do we determine who they are statistically, and, having done so, how do we find them in the flesh? There is a wide choice of statistical measures: the number of poor can range from about 24 million, if one accepts the so-called Poverty Line, to 45 million if the gauge is the Bureau of Labor Statistics' Lower Living Standard.

Going behind statistics to real people, diversity is the rule. Some live in the Northeast or Midwest where high heating-oil prices, cold winters, and old housing combine to squeeze especially hard. Some live in the Southwest and West. There, residential energy needs are much lower, and controlled natural gas prices and low-cost hydro power help ease the strain—but gasoline plays a bigger role in the budget. Some are homeowners, others renters, some live in relatively energy-efficient apartments, and some in dilapidated, one-family dwellings. Some have their incomes indexed. Some can draw on assets. Aid "in kind" helps out some, and confuses the statistics because it is not counted as income. The averages on which so much social policy is based are particularly flawed when energy burdens are being assessed.

Policy choices

How should the nation make assistance available? The efficient and simple way—and one dear to economists—is to neatly separate energy and income. High energy prices make poverty more oppressive, but they do not cause it. Thus, an ideal policy would supplement income to alleviate poverty and allow recipients to decide whether to spend those extra dollars on energy, food, education, entertainment, or whatever. Freedom of choice and incentives to conserve energy are preserved. This remedy need not get involved in determining what makes people poor, but simply raises incomes that fall short of meeting necessary expenditures.

Tradition runs the other way. Governments seem to prefer to subsidize specifics, as in food stamps, subsidized housing, and Medicare. Energy assistance has taken the form of paying people's fuel bills, winterizing their houses, and basing added payments on some estimate of a shortfall in meeting energy costs. These policies may be far from the economists' abstract ideal, but in the real world, they may be the way to go, especially when aversion to welfare schemes is on the upswing. Somehow it seems less wrenching for government to appropriate funds to keep poor people from freezing than to raise their income.

The current trend is to get the federal government out of the whole issue of energy assistance and let the states handle it, a thrust with much to recommend it. The energy dimension of poverty varies so heavily with the where and how of a person's or family's living conditions that local control makes sense. But the history of some state-managed assistance schemes, such as Aid to Families with Dependent Children, suggests that different states will tend to adopt widely differing standards of how well off recipients should be. New inequities almost surely will take the place of old ones. Moreover, what happens to energy prices is still strongly influenced by policies made in Washington. Should the federal government be allowed to withdraw, however gradually, from the consequence of its decisions?

The whole problem of fairness in sharing the energy burden deserves a fresh look by Congress and the administration. Unresolved fundamental issues have been dormant, but they will not lie still much longer.

A final intriguing thought. Until now, poor people dependent on fuel oil in the Northeast and Midwest have been hardest hit. But barring unexpected events, the natural gas and electricity consumers West and South of the traditional sufferers will be next. Misery will not seek company, but it will get it.

Author Hans H. Landsberg, senior fellow in RFF's Center for Energy Policy Research, is co-author with Joseph M. Dukert of the recently published High Energy Costs: Uneven, Unfair, Unavoidable?, *on which this article is based.*

Beleaguered electric utilities

THE POPULAR PASTIME of knocking the folks who send your monthly electric bill may deserve an agonizing reappraisal, for the utility industry has some big problems of its own. Some companies are more troubled than others, but certain trends and conditions exist nationwide.

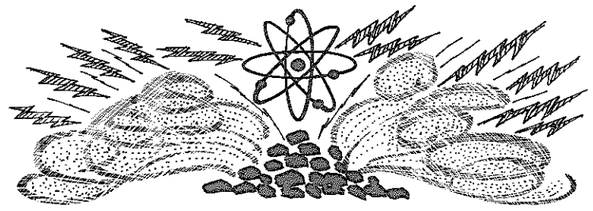
An underlying reality is that electricity use in the United States is drastically below levels expected a decade ago. Electricity generation between 1973 and 1981 went up at the average annual rate of 2.7 percent, in contrast to the preexisting, long-term historic rate of around 7 percent. Prior to the sharp increase in electricity prices—dating from the early seventies—projections of electric power demand continued to reflect judgments of growth near historic rates. For example, the Federal Power Commission's (FPC's) *1970 National Power Survey* projected 1970–80 generation growth at 7.2 percent yearly, a rate that assumes a doubling of demand within ten years.

Overcapacity

Compare that strikingly poor, if understandable, projection, with corresponding estimates of growth for installed capacity. The FPC's 1970–80 growth estimate was 6.7 percent annually, only modestly higher than the 6 percent actually recorded. In this case, of course, accuracy was no virtue. Capacity additions had to be premised on expected needs; those needs failed to materialize, and the result is reflected in a steadily diminishing degree of capacity utilization. The average "plant capacity factor" in the early 1970s stood at about 54 percent; toward the end of the decade, it had dropped to about 47 percent.[1] A related indicator tracks the same basic course of events: the "gross peak margin"—the spare generating capacity available at highest-demand periods—rose from 19 percent in 1970 to 31 percent in 1980.

To be sure, some portions of both the decline in the rate of demand growth and the reduction in capacity utilization were brought about by dampened economic growth. But a good part of it seems unmistakeably related to more efficient use of electricity in both the residential and business sectors of the economy, a tendency spurred by higher prices.

These developments have affected electricity planning. A recent Department of Energy (DOE) report, bringing



together generation and capacity projections of the country's Regional Reliability Council areas, shows 1981–90 capacity growth of 3 percent per year and generation growth of 3.6 percent.[2] For the time being, however, the abnormal surplus in plant investment imposes on the utilities costs whose recovery is impaired because of lagging rate relief. (Between 1976 and 1980, according to the Edison Electric Institute—the industry's trade association—the average *authorized* return on common equity rose from 12.8 to 14.2 percent; yet the return actually *earned* fell from 11.5 to 11 percent.[3] This at a time when rates of return of industry in general were rising steeply.) Enlargement of the rate base against which utilities are allowed to earn their rate of return is itself impeded by construction delays on nuclear and other projects subject to rapidly escalating capital costs. High interest rates have further compounded the utility liquidity situation: they have contributed to erosion of (quasi-fixed income) stock prices and, in cases of new common stock offerings at market prices substantially below book values, diluted the equity of existing stockholders. Many utility systems have seen their bond ratings deteriorate. The January 4 issue of *Forbes* magazine describes electric utilities as ranking "near the bottom of American industry in profitability. . . ." Only recently has there been some scattered evidence of improvement.

Regional, company differences

This nationwide profile masks differences among regions and companies. For example, a recent DOE report shows "adjusted reserve estimates" (which allow for such factors as probable outages and power exchanges) for the twenty-three electric regions making up nine Regional Reliability Council areas ranging from a margin of 53 percent (Oklahoma) to a deficiency of 3 percent (for the Virginia–Carolinas group).[4] Not surprisingly, utilities with strained capacity margins have shown a greater disposition to encourage conservation by customers than those with ample actual or prospective reserves. Thus, Jersey Central Power and Light, its own capacity tight and its former power supply from the damaged Three Mile Island nuclear installation halted, is participating in an interesting experiment. The company "buys" substantiated residential energy savings from a third-party management concern (which arranges improvements such as weatherization) at a cost no higher than that of the additional electricity supply otherwise required. The program is not without its complications, but it does illustrate an innovative departure.

In the years ahead, some areas can anticipate substantially faster electricity demand growth than others. And, irrespective of growth, many systems must give serious attention to replacing aging facilities. But even aside from those perennial planning dilemmas, the country may have reached a juncture at which some fundamental questions might be raised about the role and operation of utilities. For example:

- Does sluggish electricity demand growth mean that the more modest increments to generating capacity in prospect can be economically accommodated by "innovative" resources and technologies (for example, power from municipal solid-waste combustion) rather than traditional central power stations?
- Do changes in electricity economics and technology raise doubts about the continuing "natural monopoly" rationale for regulation of power generation?
- Should utilities routinely be obliged to evaluate the economically optimal means of meeting customers' future needs—through conservation, conventional expansion of capacity, decen-

(Continued on page 21.)

[1] U.S. Department of Energy, *Trends in the Capacity Utilization and Fuel Consumption of Electric Utility Power Plants, 1970–78* (Washington, D.C., 1980); and *Power Production, Fuel Consumption, and Installed Capacity Data, 1980 Annual* (Washington, D.C., 1981).

[2] U.S. Department of Energy, *Electric Power Supply and Demand for the Contiguous United States 1981–90* (Washington, D.C., July 1981).

[3] *Utility Financing*, Hearing of the Subcommittee on Energy Conservation of the U.S. House Committee on Energy and Commerce, 1981.

[4] U.S. Department of Energy, *Estimating Electric Demand and Supply for Winter 1981–82* (Washington, D.C., 1981).

Regulatory reform

GOOD REGULATORY POLICY requires a balance of benefits and costs, a careful weighing of what the policy will accomplish against what society must give up in exchange. While some regulatory statutes encourage or require such balancing, several major pieces of environmental and occupational safety and health legislation have been interpreted to *prohibit* this weighing of pros and cons when specific rules are designed. For this reason, one goal of many would-be regulatory reformers has been to introduce at least a qualitative, if not a quantitative, balancing of benefits and costs into the laws which empower agencies to issue specific regulations.

Executive efforts

In spite of its stated intention of rationalizing federal regulation, the Reagan administration to date has shied away from embracing this sort of reform. For instance, the administration has made no effort to introduce benefit–cost comparisons into either the Clean Air or Clean Water Acts, even though both are up for reauthorization before Congress. However, like the Ford and Carter administrations, the present administration is forcing regulatory agencies to pay attention to and publicize the costs of their regulations, even where they are prohibited by law from taking costs into account in setting regulatory standards. The vehicle for this effort is Executive Order 12291, issued less than a month after President Reagan took office. Among other things, it requires all regulatory agencies to conduct "regulatory impact analyses" to identify and, where possible, quantify the costs and benefits expected to result from a proposed regulation. Moreover, agencies are required (to the extent permitted by law) to choose regulations to "maximize the net benefits to society," a goal dear to the hearts of many economists and policy analysts.

While this oversight role will be of some use, meaningful balancing of environmental and other social goals will require changes in all the regulatory enabling statutes that now prohibit economic and other costs from being considered in standard setting. Such changes will be difficult to win, but would accomplish another worthy aim in the process—standardizing regulatory legislation. It makes little sense to maintain, as at present, that costs *should* be taken into account when protecting the public against pesticide hazards or unsafe consumer products, but *should not* be considered in setting ambient air, water, or workplace exposure standards. Comprehensive regulatory reform could address this schizophrenic approach at the same time it introduced balancing into the law.

Congressional reforms

Not to be outdone by executive branch efforts, Congress is considering several important regulatory reform bills. One bill, S.1080, which would amend the Administrative Procedure Act (APA), would, with some differences, add the force of law to the mandate in Executive Order 12291 that regulatory agencies identify the costs and benefits associated with proposed rules. And it would make other important changes in the regulatory process. For instance, it would amend a section of the APA and require more justification from regulatory agencies on the validity of their action; it would encourage more public participation in rulemaking, including the possible cross-examination of those whose work or findings were used in establishing proposed regulations; and it would direct all regulatory agencies to review and analyze within ten years all their existing major rules and regulations and their impacts.

However, even this approach does not address the real cause of many regulatory problems—inappropriate enabling legislation. Rather than mandate Band-Aid requirements for economic analysis, Congress would do better to review the prohibitions on using such analysis in standard setting. While it is at it, Congress might address one part of the Clean Air Act where many feel it went too far in the direction of specificity—the emissions standards for automobiles. In the 1970 amendments to the Clean Air Act, Congress itself specified these emissions standards rather than directing the administrator of the Environmental Protection Agency to do so, as it has done with emissions standards for stationary sources. Since current research suggests that these mobile source standards are very difficult to justify in light of their costs, Congress could direct the EPA to review these standards and propose new ones where the evidence seems to warrant. As a general rule, moreover, Congress ought to focus on establishing broad directions for policy and delegate to regulatory agencies the responsibility for highly detailed standards.

Simpler reforms

Not all regulatory reform initiatives involve introducing benefit–cost comparisons to standard setting. Much less controversial are reforms that reduce the cost to society of meeting some predetermined environmental or other social goals, and opportunities abound for such savings in the regulatory arena. They arise mainly where existing regulation takes the form of uniform controls on offending activities that are insensitive to special circumstances, or where regulations specify not only *what* is to be accomplished, but also *how* it should be done. In the latter cases, relatively inexpensive means of accomplishing the same ends often are precluded. To their credit, both the current and past administrations have worked to permit more flexibility in specifying individual controls and to allow those regulated to meet social goals however best they see fit.

The EPA has led the way in reforming its rules to save society money while at the same time accomplishing its goals. This is the effect of its "bubble" policy—whereby a plant can increase its emissions of a pollutant from one source if it effects an equal reduction in emissions of that same pollutant elsewhere at the plant—as well as its "offset" policy, which allows a new polluter to enter a dirty area if it strikes a bargain with another polluter in that area to reduce its pollution by even more than the prospective newcomer would emit. Both these policies implicitly attach an economic value to clean air and assure that any given amount of environmental quality is "purchased" as cheaply as possible.

Both policies could be expanded considerably to the benefit of both the economy and the environment. Given this fact, and the often-expressed commitment of the Reagan administration to use the market rather than direct governmental intervention to achieve social goals, it is surprising that the current EPA leadership has been so unenthusiastic about these marketlike approaches to environmental quality. While they have recently "rediscovered" the Carter administration's bubble policy, top management at the EPA appears to view the more promising offset as anathema. In so doing, they ignore a rare opportunity to relieve the regulatory burden on business while preserving or even improving the quality of the environment.

Author Paul R. Portney is a senior fellow in RFF's Quality of the Environment Division. This article has been adapted from "Regulatory Reform: 1982," which appears in the March 1982 F.A.S. Public Interest Report, *a publication of the Federation of American Scientists.*

Measure for measure, what's the trend?

KNOWLEDGE ABOUT THE STATE of the environment still is not what it ought to be, but what facts there are now are more accessible. Anyone interested in the environment can turn with profit and pleasure to *Environmental Trends*, published by the President's Council on Environmental Quality at the end of last year.

A handsome volume of charts and maps in many colors, *Trends* is strikingly designed and amplified by a succinct, well-written text. Its 346 pages cover the full range of environmental concerns, from basic facts about population and land to the environmental consequences of energy use and toxic substances. One might ask for another chapter—one presenting the results of public opinion surveys on public attitudes toward environmental issues—but that is a small quibble, given the great breadth of what is offered.

If the data were better, the book would be better—an old story. Unfortunately, the limits of what is known about the environment are readily apparent. Gaps are noticeable and many charts are not as up-to-date as they ought to be.

The book can be scanned in a sitting, but it is not likely to be read closely from cover to cover. It essentially is a reference work that will appeal to browsers as well as to those seeking evidence to support or refute various assertions. Sources of the data are painstakingly presented, frequently with considerable explanatory material. Still, a good deal is taken for granted. It is advisable to keep a dictionary nearby, unless you are confident of the definition of chaparral, say, or of taiga.

A positive sampling

Among the signs of progress in protecting and improving the quality of the environment are charts showing the following:

- The number of acres dedicated by the federal government to wilderness preservation increased from 9 million to 19 million acres during the 1964 to 1979 period. Twenty-five river segments were designated as wild, scenic, and recreational rivers.
- Levels of coliform bacteria declined from 1967 to 1976 in a number of large rivers (especially in the Willamette and Red), although they rose in the Missouri and Susquehanna and remain high in the Mississippi.
- Emissions of sulfur dioxide and total suspended particulates from stationary sources such as power plants and factories declined, in part because of pollution control devices.
- In monitored areas, the concentrations of carbon monoxide declined 35 percent from 1972 to 1978. Sulfur dioxide and total suspended particulates also declined. Photochemical smog dropped in California, but increased in some other areas where it had not previously been a problem.
- Nearly 90 percent of the major industrial sources of air pollution were in compliance with federal and state standards in 1979.

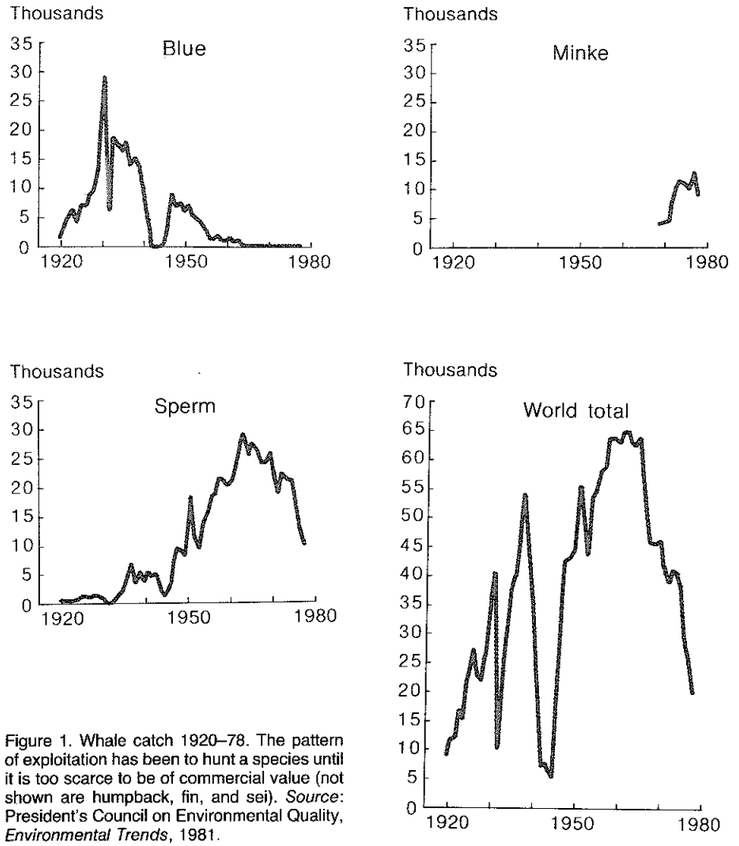


Figure 1. Whale catch 1920–78. The pattern of exploitation has been to hunt a species until it is too scarce to be of commercial value (not shown are humpback, fin, and sei). *Source*: President's Council on Environmental Quality, *Environmental Trends*, 1981.

On the other hand . . .

Illustrative of continuing problems are the following items:

- About 10 percent of all industrial waste potentially is hazardous to human beings or other living organisms; 60 percent of this material comes from seven industries, the most important of which are metals and organic chemicals.
- Consumers generate about as much waste as industry (150 million tons in 1978, or about 3.7 pounds per person per day). Only about 8 percent of this waste is recycled (primarily paper and paperboard, and an increasing number of aluminum cans).
- The biggest polluters of fresh water in 1977—measured by six important pollutants—are municipal sewage plants. Close behind are power plants, the organic chemical industry, agricultural feedlots, and pulp and papermills.
- Most freshwater lakes are under stress. The rate of eutrophication caused by excessive loads of nutrients and sediment is accelerating. The number of lakes showing signs of increased acidification is also increasing, especially in the Northeast.
- Acid drainage from mines in Appalachia and the Ohio River basin has polluted some 10,500 miles of streams.

Tidbits

Odds-and-ends information include such items as the following:

- The Great Smoky Mountains in Tennessee and North Carolina attract twice as many visitors as any other on the list of the ten most popular national parks. Yellowstone is in ninth place, the Grand Canyon seventh.
- Nearly 90 percent of workers commuted to their jobs by auto in 1977; only 5 percent used public transportation. More than one-third commuted ten miles or more to work.
- Two-thirds of insecticides are applied from aircraft; 25 to 50 percent of this amount reaches the plants, and only about 1 percent reaches an insect.
- There is a 13-percent chance that a hurricane will hit Key West in a given year and a 2-percent chance it will be a great hurricane. On the average, about six hurricanes form each year in the South Atlantic, and two hit the U.S. coast between Texas and Maine.

The larger question

Environmental Trends, despite some faults, represents substantial progress over its predecessor volume, *Environmental Statistics 1978*, also published by CEQ, which was limited to tabular presentations only. Unfortunately, *Trends* is likely to be a one-shot government effort rather than the first in a series: plans for future CEQ editions died with cutbacks in the federal budget. However, the project director has joined the staff of the Conservation Foundation, a nonprofit Washington research organization, and will carry on the work under private auspices.

Meanwhile, the underlying need for a more systematic and extensive collection of environmental data remains as great as ever. Although the immediate prospects are even bleaker than they were a year ago, the issues raised in last year's issue of Highlights ("The Environmental Data Dilemma") deserve high priority on any agenda for environmental improvement.

Author Herbert C. Morton is a senior fellow in RFF's Quality of the Environment Division.

Environmental regulation—Direct and indirect costs

ENVIRONMENTAL REGULATIONS are not the key source of U.S. economic difficulties, according to a new RFF study. Indeed, say the contributors to *Environmental Regulation and the U.S. Economy*, the direct effects of pollution control expenditures on the economy have been rather small. On the other hand, they find the form that environmental regulations have taken to have substantial implications for the economy.

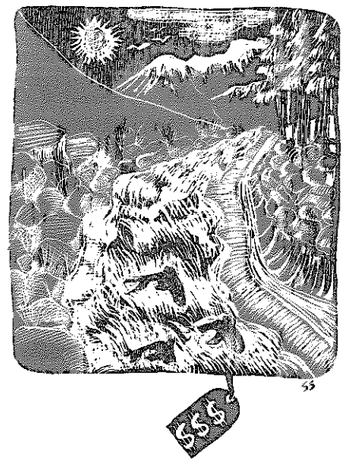
Critics partly right

Critics of regulation are correct, conclude the researchers, in asserting that environmental regulation has had an adverse effect on price levels, economic growth, productivity, and international trade. But so far the effect has been small, and often far outstripped by other factors. Moreover, these economic indicators reflect the costs but ignore the benefits that result from environmental controls and thus give a poor indication of the overall effect of environmental regulation on social well-being.

Take, as an example, the notion that regulation may be a principal cause of lagging U.S. rates of productivity growth. This has gained a good deal of credibility because it sounds so plausible. But many other factors—the energy "crisis," changes in the age–sex composition of the labor force, and shifts in the composition of production from manufacturing to services, to name just a few—also have contributed to productivity declines. Indeed, probably only 8 to 12 percent of the recent decline in growth rates should be attributed to the direct costs of environmental regulation.

Chilling effect

Perhaps more important than the direct costs, however, are the adverse effects on the economy that often result from the poor implementation and administration of regulations. It is impossible to account fully for costs associated with regulatory delay, for example, or from increased paperwork burdens, but the costs are nonetheless real. An especially important indirect cost is the uncertainty inherent in the regulatory process: industry does not know how or to what degree regulations will be implemented and whether standards may change in the future. The result is a chilling effect on investment, new plant construction, technological innovation, and thus on growth and productivity.



The study proposes other ways of protecting the environment that are designed to be cheaper and more effective while producing the same or higher levels of environmental quality. In general, approaches based on economic incentives are preferable to the standard regulatory approach currently used. The Environmental Protection Agency's experiments with its "bubble" and "offset" policies are steps in the direction preferred by the authors, but they also would recommend wider use of marketable pollution permits and effluent charges in place of present standard-setting and enforcement regulations. The result, they assert, would be greater efficiency and less interference with the functioning of the economy.

Efficiency makes sense

The book concludes that regardless of whether environmental regulation has a small (or large, for that matter) adverse effect on the economy, the search should continue for ways to reduce its cost where it can be done at little or no loss of environmental quality. As the authors put it, regulatory reforms to reduce the cost of maintaining the same level of environmental protection make sense at any time—why, after all, pay more for anything that can be had for less? Given the economic tenor of the times, however, such reforms not only may be sensible, but also essential if environmental protection is to be afforded increasing or even current levels of support.

This partial abstract of Environmental Regulation and the U.S. Economy *was written by* Resources *editor Kent A. Price. General editors of the study are Henry M. Peskin, Paul R. Portney, and Allen V. Kneese. A description of the book appears on page 23.*

The 1981 farm bill

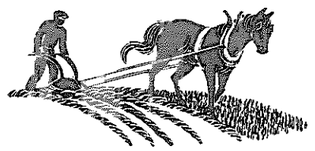
IN LATE DECEMBER, after months of sometimes rancorous congressional debate, President Reagan signed the Agriculture and Food Act of 1981. The act provides broad policy directions and authorizes a wide range of agriculturally related programs for the four years 1982–85.

The new legislation contains few fundamental policy changes. For the most part, it continues policies established in counterpart acts of 1973 and 1977. Provisions for price support of agricultural commodities and management of commodity stocks remain the centerpieces, and program instruments authorized for use by the secretary of agriculture also are familiar. Food stamps and commodity distribution for low-income persons are reauthorized for one year, albeit with several amendments affecting eligibility and program administration. Authorization for support of agricultural research, extension, and higher education is extended through 1985, with much the same purpose and form as in the past four years. And foreign food assistance programs (Public Law 480) also are extended through 1985, with a one-third increase in annual spending authorization.

New emphases

Some other modifications are worth noting. Agricultural trade is emphasized, for example, reflecting concerns about the use of agricultural export subsidies by competing nations and the U.S. objective of expanding agricultural exports. In this regard, the act supplements existing authority of the secretary by authorizing the establishment of an export-credit revolving fund and a special standby export subsidy program. And a new provision was added to require compensation of producers in the event of future agricultural-specific trade embargos, an obvious reference to the 1980 embargo of grain shipments to the USSR and the mid-1970s soybean embargo.

National concern about the availability and quality of natural resources prompted new or modified provisions related to resource conservation. One effect is to permit more precise geographic targeting of soil, water, and related conservation programs. Another provision, the Farmland Protection Policy Act, directs the secretary to take greater cognizance of the effects of federal programs on farmland conversion and to develop educational programs stressing the importance of retaining productive farmland. Matching grants to local governments and small loans



to producers to encourage natural resource conservation are authorized to augment existing technical and financial programs.

A mélange of other special provisions and technical changes is found in the 145-page bill, including creation of the position of assistant secretary for research and education, a cost-of-production review board, and a task force to study the feasibility of farm income protection insurance, to mention a few.

Politics and dissatisfaction

Enactment of a new agricultural policy bill in 1981 was in itself a major legislative achievement. Given more than the usual political pulling and hauling of interest groups, the fracturing of a traditional and powerful coalition of agricultural commodity organizations, the constraining effects of an unusually well-disciplined congressional budget resolution, and a new administration espousing less government intervention and reduced budget outlays, in some respects it is remarkable that any new legislation was enacted. As it was, the bill passed by only a two-vote margin in the House, and some believe it may be the last of such omnibus legislation. Deep political divisions within the farm bloc, diminishing political power of agriculture in the urban-dominated Congress, and changing economic characteristics of agriculture all undermine the very purpose and political rationale for traditional farm policies.

Under the circumstances, it scarcely is surprising that the act's mosaic of politically compromised programs leaves many persons dissatisfied. The administration achieved some of its goals but failed to secure the added market orientation it sought through elimination of income transfers in the form of deficiency payments to producers when prices fall below specified target prices. And, depending on economic conditions in agriculture, budget exposure estimated at $11 billion over the four-year life of the act for agricultural commodity provisions alone may prove embarassingly high for a cost-conscious administration.

Many farmers, particularly cash grain farmers, beset by high costs and relatively low farm-product prices, are unhappy with what they regard as excessively low price guarantees. Consumers and some farm groups are upset by favorable programs for sugar, dairy, tobacco, and peanut producers, who generally managed to retain supply-restricting, highly supported programs. And environmentalists are foremost among those who would like to have seen more stringent provisions in the act related to resource conservation.

The ink was barely dry on the new bill when legislation was introduced to amend its commodity provisions. Whether residents of the nation's capital will be confronted by a new "tractorcade" in the immediate future is anyone's guess, but clearly the new legislation has disillusioned many. Coupled with the 1982 congressional elections and no immediate market relief in sight in the farm economy, efforts to amend the legislation almost certainly will accelerate in the months ahead.

Authorization versus implementation

Just how well suited is the 1981 act to U.S. food, agriculture, and natural resources public policy issues? No easy, unequivocal answers exist. While the legislation provides a policy framework, it leaves a great deal of discretion to the secretary to develop and implement programs to attain policy objectives. Further, the act merely authorizes implementation of specified programs; it does not appropriate funds for their execution. Thus, the scale and even the existence of several program activities remains uncertain. It is not unusual for the executive branch to defer requests for appropriation, or for the Congress to fail to appropriate funds for legislatively authorized programs. With the distinct possibility of further reductions in the federal budget and outlays, some authorized programs will be implemented only at modest levels or not at all. Until the Congress and the secretary give more precise shape and form to the legislation, judgment of its effectiveness is not possible.

The Agriculture and Food Act of 1981 should be viewed as but one component—albeit a large and important one—of more comprehensive food and agricultural policy. For example, value added in the farm sector comprises only 14 percent of the final retail value of food. A comprehensive food and agricultural policy would incorporate those other sectors of the food system, such as food safety and quality, and transportation, that contribute 86 percent of added value. Many of the components of a more inclusive policy already exist in scattered pieces of legislation, and they need to be integrated into a more explicit, consistent, and comprehensive policy framework.

Viewed for what it is—a partial and contributory component to food and agricultural policy—the new act incrementally extends the evolutionary change of the past two decades toward reduced governmental intervention in agricultural commodity markets. There are no bold new initiatives that would alter the course of food and agriculture in the next four years. The strengths, weaknesses and anachronisms of policies of the recent past remain largely intact. If, in fact, the act is the last such omnibus legislation for agriculture, the challenge is to begin constructing more suitable and effective policies in light of the realities of the 1980s.

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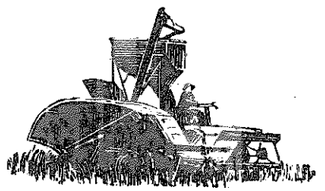

(Beleaguered utilities, cont'd.)

tralized generating modes, renewable resources?

- Should utilities be allowed to engage in—and can they be excepted to perform efficiently—the marketing of energy conservation services?
- Do state public utility commission decisions adequately balance the interest of ratepayers, investors, and the public at large, or do political constraints render such a balancing act hopeless?
- What broad legal and institutional changes might be needed at the federal, state, and local levels?

The issues raised by these and other questions are not all clear-cut. For example, a particular outcome—say, trash-generated power that may save more in landfill costs than it adds to electricity costs—may confer a distribution of costs and benefits not easily dealt with within the traditional regulatory framework. That is, by what means does one motivate the individual utility when the payoff is to the community as a whole?

Imaginative ideas for addressing the problems and opportunities confronting utilities and the nation in the years ahead are badly needed, and right now questions outnumber answers. That is far from discouraging, however. Ten years ago, most interested observers did not even grasp the outlines of the questions that now seem so urgent. Of course, present analysts might be mistaking the current situation for long-term reality, but it would seem that the kinds of questions being raised will serve the nation—and the industry—well regardless of now-unforeseen shifts in supply and demand.

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(Energy Discussion Papers, cont'd.)

ment to clarify problem areas in developing nations and to analyze possible solutions to help energy policy planners in developing areas and in donor organizations.

- Discussion Paper D-73A, "Industrial Energy Demand and Conservation in the Developing Countries," by John E. Jankowski, Jr., challenges the popular supposition that similarity in technology makes industrial energy use for comparable output near uniform across countries.
- Discussion Paper D-73B, "Interfuel Substitution in the Indian Economy," by Ashok V. Desai, illustrates the feasibility and the difficulties of major dependence on coal, and indicates the actions that had to be taken to retain a major role for coal.

Ordering information. A very limited number of these papers is available without charge to interested members of the research and policy communities. Specify the paper desired in a written request to Resources for the Future, Box 600, 1755 Massachusetts Ave., N.W., Washington, D.C. 20036. Discussion papers are tentative presentations only and are not considered to be published material. As such, they are available only as described and may not be ordered from The Johns Hopkins University Press nor from RFF's Publications Office.

Food supply and demand uncertain

DESPITE LARGE CURRENT SUPPLIES and relatively low prices of commodities in the United States, world food supply and demand are tenuously balanced and uncertain even in the short run. A major reduction in crop production in the United States or abroad in 1982 could very quickly trigger sharp increases in commodity and food prices.

World food production was highly unstable during the 1970s, and U.S. agricultural prices and incomes were significantly less stable than in the preceding two decades. Prospects for global food production in the 1980s are for more of the same—alternating years or short periods of relative abundance and scarcity. Given the international interdependence of U.S. agriculture, fluctuating global food production coupled with price-inelasticity of demand for food translates quickly into unstable commodity prices, farm income, and, to a lesser extent, food prices in the United States.

Flexible policies needed

Flexible program design and instrumentation—a policy for "all seasons"—are critical requirements if public policy is to cope with the inherent instability of agricultural production. Paramount among such needs is that for interannual storage of basic crop commodities. In this respect the 1981 farm bill contains many of the essentials: production management provisions, authority to influence farm prices above specified minima as incentives or disincentives to production, and grain reserves or storage authority. Whether they will be effective or not, of course, depends upon how the secretary of agriculture chooses to view and operate these programs, and on actual production and supply conditions in the next several years. In the past, the temptation has been strong to view the reserves program as a farm income maintenance or enhancement program, objectives not necessarily compatible with supply stabilization. □ K.R.F.

Supply-side energy security—Enhancing Third World oil production

THE OIL PRICE DISRUPTIONS of the 1970s and the increasing vulnerability of oil importers to future energy shocks have focused attention on a range of devices, such as strategic petroleum reserves, import tariffs, oil substitutes, and international sharing agreements in the event of sudden oil shortfalls. These instruments by and large fall on the demand side. While supply-side factors are not wholly neglected, an important element of the problem has been largely overlooked—how to bring about additional oil supplies in non-OPEC developing countries. Indeed, attempts to explore for and develop petroleum resources in non-OPEC developing nations are in the interest of both the developing and the developed countries.

The developing nations

In the developing nations, the critical importance of energy to economic development is underscored by the increasing shift from traditional fuels to commercial energy dominated by petroleum and natural gas. These fuels provide almost all commercial energy used in transportation and a major share of the energy used in the industrial, household, and electricity-generation sectors of most developing countries. Moreover, oil product consumption is still growing rapidly in most of these countries. For example, in the countries that are net oil importers, the annual consumption growth rate of 9.4 percent in the period between 1960 and 1973 declined only to 7.7 percent between 1973 and 1978.[1] Developing indigenous sources of commercial energy also provides an opportunity for these countries to reduce their enormous financial debt (largely with Western banks) and save foreign exchange for other investment needs.

The industrialized nations

Energy development in the Third World also enhances the energy security of the industrialized nations. Diversifying the sources of oil could reduce the developed economies' vulnerability to oil supply disruptions. Moreover, increments to the world oil supply would foster price and output flexibility in the structure of international oil markets, and expanded petroleum supplies from non-OPEC developing countries could create excess production capacity to be drawn upon in the event of a disruption. In brief, developing oil in these countries could well generate large social benefits for *all* oil importers.

A skewed pattern

Prior to the early 1970s, the discovery of low-cost Middle Eastern crude kept oil prices low and generally diverted resources from investment in higher-cost supply areas. Thus, since the oil price hikes, known reserves in developing countries that were uneconomic because of their small size or high transport costs in principle should have been developed, and exploration in areas adjacent to known reserves should have been increased. Similarly, we should have seen exploration in new areas. By and large, this did not happen. Indeed, the pattern of petroleum exploration and development is skewed away from these countries. Large international petroleum companies have tended to concentrate exploration in sedimentary basins that have been developed previously, particularly in North America. Although exploration worldwide reached record levels at the end of the 1970s, a relatively small amount occurred in the oil-importing developing countries. Exploratory drilling statistics suggest an overall trend. For example, 390 exploratory wells were drilled in all such countries in 1978, up by 15 percent from 1970. In the United States and Canada, however, 13,821 exploratory wells were drilled in 1978, a 49 percent increase over the 1970 level.[2]

To be sure, enhancing Third World oil production is generating a great deal of interest, but mostly among a relatively small group of energy analysts. Moreover, analyses of the prospects for boosting production are burdened by two controversial elements of the problem. First, is it geology or politics that dictates the relatively low level of petroleum exploration and development investment in the non-OPEC developing countries? And second, what can be done to stimulate such investment? Is there a need for public sector intervention? And if so, what form of public sector intervention would be most effective?

On the first issue, one school of thought maintains that the most important determinant of the geographic distribution of world oil exploration and production is the location of so-called giant fields—petroleum deposits of at least 500 million barrels. Another group asserts that political or governmental conflicts dominate the purely geologic factors. But both arguments lose sight of the fact that a continuum of promising petroleum resources exists throughout the world, and that the commercial viability of these deposits depends on a diverse set of factors, including resource potential, economics, politics, and institutions.

Oil production potential

Any given area exhibits a wide range of estimates of undiscovered petroleum deposits, primarily because assessment of oil potential is based on geologists' imperfect and partially subjective judgments. Furthermore, knowledge of an area's resource potential depends strongly on the amount and quality of past exploration in that area.

Keeping in mind, then, the inherent "softness" of estimates in general, still it is noteworthy that some geologists believe the non-OPEC developing countries contain a significant proportion of the world's undiscovered petroleum; of a total 30 million square miles of promising sedimentary basins, they are thought to account for 13 million square miles. A World Bank study concludes that "vast sedimentary areas that probably contain 75 percent of potential petroleum reserves in Latin America, 82 percent of those in Africa, and 85 percent of those in Asia and the Far East, are yet to be intensively prospected and developed."[3] Drilling density (the number of exploratory wells drilled per thousand square kilometers of prospective area) in non-OPEC developing countries, however, has been a fraction of that in the United States and Canada. While it is likely that the former countries' reserves will be in relatively modest pools, (true also for future U.S. and Canadian reserves), total amounts could be significant on a global or at least a national scale. Indeed, as U.S. Energy Secretary James Edwards has remarked:

> Our experts estimate that 50 percent of the potential reserves are in countries where only 5 percent of the drilling has been done. . . . We ought to be drilling more wells and developing more fields in the developing countries than we are. . . . Many of these countries have reserves of oil. They may not be large, but as oil becomes more scarce, they will become more economic to develop, especially for domestic use. . . . International oil companies have to start redirecting their sights toward these smaller—but vital onshore fields in other countries.[4]

Public sector intervention

Regarding the second issue—how to stimulate petroleum exploration and development in these countries—many urge that multilateral institutions such as the World Bank take on the role of honest broker between private international oil firms and non-OPEC developing countries. But there are potential problems lurking within this near-consensus.

This prescription appears to be based on the conventional wisdom that excessive political risk is the primary reason behind private sector reluctance to commit itself to petroleum investment in these countries. But is such risk as strong a deterrent to foreign investment today as it has been in the past? The threat obviously cannot be wholly downgraded, but casual observation suggests movement in the direction of reduced political risk to companies.

More important, the relationship between developing country governments and foreign enterprise increasingly is symbiotic; both parties have become more pragmatic, recognizing that cooperation can be a positive sum game. In Angola, for example—a nominally Marxist country not even recognized by the United States—U.S. and European firms apparently are willing to invest a large amount of capital in petroleum exploration and development no matter who is in power.

More generally, a shift has begun in the form of petroleum company–host government contracts. In the recent past, host governments were entitled to some share of oil revenues generated by private companies' exploration and production efforts, yet the companies were exposed to the risk of expropriation even before their exploration investments had been fully realized. Now more common, are arrangements under which state-owned oil companies increasingly share some of the financial responsibility in the exploration phase, and private foreign companies are contracted to develop promising fields in return for a share of profits earned in production.

Furthermore, the proposed schemes involving public sector intervention do not fully take into account that the petroleum industry is not homogeneous. The private international petroleum companies pursue diverse competitive strategies of direct foreign investment depending on their size and other firm-specific characteristics. A uniform industrywide policy—whether involving an honest-broker scheme, outright financing, or other instruments—though modifying some firms' investment decisions in the "right" direction, also may result in unintended and undesirable consequences vis-á-vis other firms.

And there are considerable differences among the countries involved: some have received more foreign investment in petroleum than others, even after differences in resource endowments have been accounted for. Reasons for this cross-country disparity are unclear, but it may well be that a policy designed to promote petroleum investment in one country is ineffective or even deleterious for another country. In short, a diverse and flexible set of policies may be called for.

Yet a role may exist for, say, a World Bank Energy Affiliate, for beyond strict commercial viability lie possible social benefits that are not captured by the private sector. For example, the energy security of both industrialized and developing countries would be enhanced by developing Third World petroleum resources, the strain on the international monetary system could be relieved, and developing countries' governments could begin to reorient their development plans to other pressing problems if progress were made in the energy area. These all unquestionably are benefits, but they do not normally enter into the public cost–benefit calculations for any individual country, and they are not realized by private petroleum companies. Thus, even if the private gain from some petroleum investments were to be less than production costs, the full social benefits could well surpass them.

Optimal policies

The central policy problem is how to bring about an optimal amount of petroleum investment in non-OPEC developing countries. Specifically, the issue may not be so much how much support is given, but rather what form it takes. As suggested, multilateral financing can be justified on "public benefit" grounds, but it appears that policies emphasizing the private sector and alternative modes for its collaboration with governments will be the most productive.

Author Harry G. Broadman is a fellow in RFF's Center for Energy Policy Research.

[1] Joseph Shaw, "The Investment Requirements of the Oil Importing Developing Countries in the Petroleum Sector." Paper presented at the 8th International Conference on Long-Term Energy and Global Economic Cooperation, Boulder, Colorado, August 1981.

[2] John Foster, Efrain Friedman, James W. Howe, Francisco Parra, and David H. Pollock, *Energy for Development: An International Challenge* (New York, Praeger, 1981).

[3] R. Vedavelli, *Petroleum and Gas in Non-OPEC Developing Countries: 1976–1985*, World Bank Staff Working Paper no. 289 (Washington, D.C., World Bank, April 1978).

[4] "U.S. Needs Commonsense Free Market Energy Policy," *Oil Daily* (Nov. 19, 1981).

New RFF books

Deposit–Refund Systems: Theory and Applications to Environmental, Conservation, and Consumer Policy. Peter Bohm. 192 pp. $22.00.

"No deposit—No return" may represent efficiency and profits for container manufacturers and supermarkets, but throwaway cans and bottles consume more raw materials than do resuables and they contribute to roadside litter. Hence, the effort in several states—initially Oregon—to pass laws requiring refundable deposits on consumer containers.

Bohm cites bottle bills as being but one application of deposit–refund systems—economic incentives designed to encourage desirable behavior on the part of business and the public. Primarily theoretical, his book carries the reader from the foundations of the deposit-refund systems to some successful examples of their use.

In the use of government-initiated deposit–refund systems, the author distinguishes between and evaluates consumer-paid and producer-paid deposits and indicates how the latter could be used to provide performance incentives for government agencies. He also reviews the empirical evidence on the effectiveness of deposit–refund systems and describes two potential applications—encouraging maintenance of spare-parts stocks and controlling the fate of chlorofluorocarbons used in refrigeration units, a probable source of stratospheric ozone depletion.

Environmental Regulation and the U.S. Economy. Henry M. Peskin, Paul R. Portney, and Allen V. Kneese, editors. 172 pp. Hardcover, $15.00. Paper, $5.95.

Governmental regulations in general and environmental regulations in particular have been singled out as a major cause of recent declines in the rate of growth of the U.S. economy, the productivity of our work force, and the value of our dollar. If this accusation is valid, it may affect not only the future course of environmental policy but also the choice of strategies to improve the economy.

In an effort to separate truth from rhetoric, this volume explores many facets of the relationship between environmental regulations and the economy. The authors assemble and evaluate the available

data and models describing the sources of recent economic difficulties, including the probable role of environmental policies. They also investigate the converse—how both short-run and long-run economic conditions may affect future regulatory initiatives. In addition, they analyze the measures commonly used to assess economic performance, such as the Gross National Product, to see how they relate to environmental activity. Finally, they identify elements of regulatory policy that have the potential for adverse effects on the economy, and discuss alternatives.

Throughout the book there are a number of useful suggestions for data improvement, model development, and policy design. Perhaps the most important finding is that it is unwise to focus on environmental policy and other social regulations as the key source of U.S. economic difficulties. The evidence clearly indicates that many other factors often have a far more significant influence. Recognition of this fact is a necessary prerequisite for a rational reassessment of both environmental and general economic policies.

Explorations in Natural Resource Economics. V. Kerry Smith and John V. Krutilla, editors. 368 pp. $35.00.

The papers in this volume reexamine the economics of natural resources from the viewpoint of three major issues.

First, is traditional perception of mineral availability in natural resource economics been consistent with the geochemistry of their natural occurrence?

The second is the failure of economic models to reflect the effect of economic activities on such nonmarket resources as air and water, and what this may mean for estimates of resource availability.

Finally, they look at the simplified neoclassical representation of physical transformations in the production process and ask if the role of natural resources is properly modeled. Underlying all of these concerns is the question of whether there are adequate institutional mechanisms to provide relevant information for prudent public natural resource policy choices.

This is a pathbreaking theoretical work with contributions by Morton Kamien, Nancy Schwartz, Geoffrey Heal, Partha Dasgupta, A. Myrick Freeman III, Lawrence Lau, Raymond J. Kopp, DeVerle Harris, Brian Skinner, Shanta Devarajan, and Anthony Fisher.

Rural Energy Development in China. Robert P. Taylor. RFF Research Paper. 288 pp. $10.50.

The author presents a detailed analysis of the development of energy resources for rural household consumption and agricultural production in the People's Republic of China. He pays particular attention to the development of decentralized energy systems, including small coal mines and hydroelectric plants, biogas digestors, and afforestation programs to supply fuelwood.

Currently, many developing countries are facing serious difficulties in providing adequate fuels for cooking, heating, and agricultural uses in the rural sector. Since China has faced similar problems in the past, her experiences with both centralized and decentralized energy systems will prove invaluable to other countries in their search for solutions.

Drawing on data from a wide variety of sources, Taylor presents the first comprehensive description of the Chinese experience in rural energy development. An annotated bibliography of both Chinese and non-Chinese sources is included for the reader's further study.

U.S. Household Consumption, Income, and Demographic Changes, 1975–2025. Philip Musgrove, with Adele Shapanka. RFF Research Paper. 264 pp. $10.00.

A companion volume to Ridker's and Watson's *To Choose A Future: Resource and Environmental Consequences of Alternative Growth Paths*, this Research Paper complements RFF's previously published study. Using the same population assumptions and sectoral breakdown, Musgrove focuses on population effects by examining a set of scenarios assuming no growth in labor productivity, a set not used by Ridker and Watson, and another set assuming an annual productivity growth of less than 2 percent, which is used in the previous book.

Musgrove uses cross-sectional data to derive consumption functions by household categories and goes far beyond previous studies in his use of the 1972–73 Consumer Expenditure Survey of the Bureau of the Census and the Bureau of Labor Statistics to analyze consumption.

While its findings should not be construed as forecasts, this study does make a major contribution to the methodology and analysis of consumer expenditures and projections of consumption patterns. The results also suggest some interesting insights as to the effect of the demographic composition on expenditure patterns which can be tested by further research.

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