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ECONOMIC AND POLITICAL ASPECTS OF ENERGY CONSERVATION AS A PART OF U.S. NATIONAL ENERGY POLICY

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ABSTRACT

This paper focuses on the role that the U.S. Government can play in promoting energy conservation as a part of U.S. energy policy. A brief review of the role the government has provided is presented. A review and critique of various definitions of conservation are presented. We also discuss the context in which energy conservation should be viewed. Conservation represents more than a decline in living standards. Lastly, the question of why the government has a legitimate role to play in energy conservation is addressed. Characteristics of capital investment decision making by consumers, decision making in the presence of capital rationing, latent demand for a cleaner environment, the general lack of information on future costs when investment decisions are being made, and the role of the government in mitigating adverse impacts of rising energy prices on the economically disadvantaged are presented as justifications for government involvement.

INTRODUCTION

As the title suggests, this paper focuses on energy conservation as a part of U.S. energy policy. We have four objectives. First, we seek an economic definition of energy conservation. Second, we present a brief review of the role of energy conservation in domestic energy policy, and more generally, in resource use policy. Third, we discuss the extent to which oil and natural gas decontrol may substitute for specific conservation programs. That is, are there characteristics of the decision making problem for energy use which are not accounted for by current market incentives? Fourth, we examine the economic rationale for government involvement in energy conservation. Lastly, what can we say about the effect of rising prices on the distribution of income? Those least able to cope with rising energy prices are also those people most affected by them. Can lump sum transfers to the disadvantaged offset the inequity of rising fuel prices.

THE MEANING OF CONSERVATION

To some, conservation represents simply all that is "good" in the use of natural resources. It symbolizes prudence, caution and sensitivity to the possibility of scarcity. It is clearly concerned with the temporal pattern of use for a given natural resource. Barlowe defines conservation as "the wise use of resources over time " (1, pp. 226-228). Earl Heady has defined soil conservation as preventing diminution in the future production of a given area of soil from a given input of labor and capital (3, pp. 374-378). This means retaining a particular production function longer than might be the case in the absence of a conservation action. The land component of the production relationship is the important element to be conserved in this case. Four basic themes emerge from the energy conservation literature: (1) economic efficiency (10, p. 76), (2) conservation as a source of supply (6, p. 118), (3) behavioral change, (9, p. 362), and (4) technical efficiency (6, p. 120).

Conservation is not a source of new supply. It is a demand management policy which reduces the quantity of energy consumed at each price. Behavioral change is really one method of reducing energy use rather than being a consequence of conservation.

Economists focus on the concept of efficiency when defining conservation. The general purpose of any conservation activity is to maximize the net present value of a flow of returns associated with the resource. Conservation behavior seeks the time allocation of consumption which maximizes net return.

We may also view conservation in terms of technical efficiency. That is, we seek to accomplish a given level of output from the least amount of the resource possible. Or we may seek the greatest possible output from a quantity of the resource. In either case we are seeking more efficient use of a resource deemed to be limited in overall supply by achieving output levels with as little of the resource as possible. We might consider conservation of energy, for example, to be concerned with reducing the energy input per unit of real gross domestic product or some other appropriate measure of output. Technical efficiency is a necessary but not sufficient condition for economic efficiency. A proposed technical innovation may reduce the amount of energy, or change the kind of energy required to perform some task, but, if the cost of implementing the change exceeds the returns, the change would be economically inefficient.

There are elements to all of these definitions in conservation of energy. Energy itself is not in limited supply, but certain forms of energy do have absolute physical constraints. Hydrocarbon fuels, for example, are likely fixed in physical supply, though the actual dimensions of that supply are uncertain. Attributes of hydrocarbon fuels, however, have many different substitutes. The real question in energy conservation is whether the technology for using fuels of different types can be adjusted sufficiently to respond to the physical characteristics of certain energy sources. Preserving hydrocarbon fuel for future use extends the useful life of that resource and its role in the production functions of future commodities.

Conservation decisions involve judgements about allocation of risk over time. A risk averse person will be willing to pay some amount X to obtain the option of using that resource in the future by foregoing use in the present. One's decision on whether or not to preserve the opportunity for future resource use is based partly on how the decision to conserve affects them in the present. A farmer, for example, who depends on his soil resources for annual income to meet financial obligations must balance potential increased future returns resulting from conservation with the need to derive sufficient income to meet current obligations. Those interests for whom the costs of reductions in current use relative to the future benefits of this behavior are relatively small may be willing to forego current development on behalf of the possibility of future use of the resource. Any risk bearing behavior is a function of the consequences of being wrong.

There is clearly a cost to being too conservative in the allocation of resources over time. Preserving a production function for future users may in fact lock those future consumers and producers into a production relationship that is out of step with the technology that will exist at that future time. The result may be to reduce the incentive to develop resource replacing technology that will facilitate higher levels of growth both in the present and in the future. Public actions to encourage conservation may change the price signals that indicate shortage of the resource in question. Adjustment comes in response to pressure. Removing that pressure can reduce the incentive to change. Balanced against the cost of being too conservation is the cost of conserving too little for the future. The result may be to destroy the future option to employ the natural resource of interest. If there is no resource replacing technology or if scarcity of that resource and subsequent price increases fail to generate new sources of supply (as in the case of oil, gas or coal) future generations may experience shortage, scarcity, or even Malthusian limits to growth.

At the same time, we must remember that energy produces things which people value. Demands for these things are functions of their price and the prices of availability substitutes and complements. There are many substitutes for virtually any product one can identify. As the price of those products that are highly dependent on hydrocarbon fuels increases relative to products which use less hydrocarbon fuels there is a tendency by consumers to shift to these relatively lower priced commodities.

ENERGY CONSERVATION AND U.S. ENERGY POLICY

Concerns about an explicit role for energy conservation as a policy target may be relatively recent, but the role of resource conservation in national policy is well established. Back in the 1930s three national boards were established in response to perceived problems of monopoly in energy industries (2, p. 6). Their objective was to plan the use and development of natural resources and to this end, they analyzed alternatives to allowing the competitive market determine resource allocation. One report (2, pp. 6-7) identified conservation as the broad rationale for resource planning.

More recently, in 1976 the Ford Administration submitted legislation to Congress to extend the life of the Federal Energy Administration (FEA). Congress transformed this legislation to support energy conservation (2, p. 549). According to the authors, the FEA was to (a) guarantee $2 billion for industrial, state, local government, small business borrowing to finance conservation investments, and (b) to provide financial assistance to home weatherization (2, p. 540).

Moving to the Carter Administration, in April 1977 the National Energy Plan was unveiled. Conservation appeared as the first of the plan's ten components. Policies to pursue conservation of energy in the transportation sector were a gas guzzler tax, fuel efficiency standards, and the 55 mph speed limit (2, pp. 564-565). A residential energy conservation program for existing structures was also included (2, pp. 564-565). After Congressional debate, the National Energy Plan became law as the National Energy Act of 1978. One component of this Act was the National Energy Conservation Policy Act (The Act). Three policy measures included in The Act are (a) utility conservation programs for residences, (b) weatherization grants for low income individuals, and (c) solar energy and energy conservation loan programs (2, p. 584).

The Reagan Administration has taken a different approach to energy policy. The intentions are clear. During his confirmation hearings, Secretary of Energy Dr. Edwards asserted that "...the market place is the most efficient way to accomplish even more towards this objective..." [reducing waste in energy use] (4, p. B6). This view was reiterated by Roger Sant in a New York Times editorial where he argued that President Reagan believes that energy should be treated like any other commodity with uncertain price and supply: the market should perform the allocation function and it should not be regulated (8, p. 31).

Administration views on energy conservation are further articulated in the National Energy Plan (11). Along with reaffirming the correctness of allowing the marketplace to determine resource allocation, they also argue that individuals and businesses will be better able to make the capital investments required to reduce energy use because of the Administration's income tax reductions, accelerated depreciation and the inflation fighting reduction in the rate of growth for federal spending and borrowing (11, p. 15). Furthermore, "unnecessary" federal support will be withdrawn from programs where sufficient market incentives exist.

A cursory review of the Fiscal 1983 budget for energy illustrates the extent to which the "free" market will be relied upon. Table 1 presents budget requests for energy which are contained in President Reagan's 1983 budget proposal.

From these data, the shift in focus towards hard technology (nuclear in particular) and away from soft path solutions to energy supply and demand is unmistakeable. Total budgetary requests for energy related programs in DOE and Commerce Departments is $14.7 billion. Of this amount, nearly half ($7.1 billion) is earmarked for nuclear energy development.

Table 1
SELECTED 1983 BUDGETARY PROPOSALS FOR ENERGY

Function	Requested Funding (Million U.S. Dollars)
DOE, Total	11,800
Nuclear Weapons Development and Production	5,500
DOE, Energy Related	6,300
Energy R&D, Total	2,200
Energy R&D for Nuclear Fission and Fusion	1,500
Oil Purchases for the Strategic Petroleum Reserve	2,300
Fossil Energy, Total	107
Coal, Total	91
Environmental Analysis of Impacts of Increased Coal and Synthetic Fuel Use	169
Solar and Renewable Energy	83
Photovoltacis	27
Biomass	47
Wind Energy	5.5
Solar Energy and Energy Conservation Bank (HUD)	Discontinue the Program
Commerce Department Energy Funding	
Energy Research and Technology Administration, Total	8,400
Energy Infor. and Emergency Prepardness and Conservation Grants	73
Nuclear	5,600
Conservation Grants Program for State and Local Govt.	4

Source: Compiled from: Any Plattman, "Reagan Asks Dismantlement of Energy Department, Increase Weapons Funding", Congressional Quarterly Weekly Review, pp. 261-264.

GOVERNMENT AS A PLAYER IN THE ENERGY CONSERVATION GAME

First, it must be understood that government is not a neutral player in any economic game. Government responds to the preferences of a particular set of constituents on any given issue. Government also will influence that mood and as a result, government affects the states of nature which occur.

Government proposes new rules and changes in old ones, acts on these proposals, and then interprets and enforces those proposed rules which become law. In turn the exchange value of an asset is a direct function of law. Exchange value exists because of the government granting of rights to private property, and the enforcing of contracts among parties.

Public Policy on Energy Use and Conservation

Most people would probably agree that both energy conservation and solar energy are plagued by problems of imperfect information and uncertainty. Investors, be they homeowners or stockholders are concerned about the value of their investment.

When an energy conservation or solar investment is made, the investor is substituting a capital asset for a variable input (fossil fuel use) with the expectation that the investment will be recouped through future savings on operating costs and resale value of the asset. Will an investment in conservation be reflected in the market value of the asset, to which the investment is applied? Does the current value of the asset (price of the appliance, home, car, etc.) reflect anything about energy savings? Addressing the first question leads directly to the to the issue of imperfect information and uncertainty. Future operating costs are imperfectly considered in investment decisions in part because of a lack of information. Another reason is the bias towards minimizing the initial cost of a capital asset in the residential sector.

Capital rationing in the nonresidential private sector and the public sector may also lead to investment choices which have a lower fixed cost but a higher operating cost arising from greater fuel consumption. As a result, incentives such as tax credits for conservation investments would reduce the bias towards substituting fuel for capital. Investments in retrofitting and new less energy intensive technology may have been less attractive than alternative investment opportunities based on any measure of return on investment. From the firm's point of view this is rational decision making. From society's viewpoint greater investment in energy conservation may be the rational choice.

Why might this be true? The case of acid rain provides an example. Sulfer oxides (SO_x) and nitrogen (NO_x) are the primary sources of acid rain and are emitted from burning coal and oil. To the extent that we use motor vehicles, electricity, or heating oil, each of us contributes to this problem. Do we take this social cost into consideration in deciding on the use of our autos and heating our homes? When third parties, such as the commercial fishing industry, suffer losses because of the impacts of acid rain on the fish population, they suffer as a result of the decisions made by other individuals. In this and similar cases, social costs exceed private costs.

Now, for any one individual the cost of determining the effect of individual decisions on the quantity of power plant emissions is very costly. Combined with high information costs and the fact that one's own change in consumption will have little impact on emissions leads to the conclusion that there is little incentive to change habits. Further, there probably are many individuals and groups who would like to see a reduction in sulfer oxides and nitrogen, but are unable to make a bid for that cleaner air. Combined with the high cost of searching for other bidders, the good which would be produced (clean air) has a MC=0 for each additional user, and the costs of excluding nonbidders from enjoying the good are high.

Similar characteristics exist in energy conservation. An individual or business has an incentive to invest in energy conserving capital to the extent that the investor is able to capture part of the potential benefit. Another part of the benefit accrues to other individuals and groups in the form of reduced fuel prices. As more and more people engage in conservation, energy demand decreases, and overtime, this will put downward pressure on price. Since this reduced price can be "used" by any number of individuals without affecting anyone else's ability to reap the gain of the price reduction, energy conservation has some public good aspects. Since the cost of excluding other people from this gain is prohibitive, these gains cannot be captured by the investor. A subsidy from the treasury to investors in conservation can be used to reflect the value which the politician places on (a) these uncaptured gains, and (b) reduction in sulfer dioxide and hydrogen sulfide emissions.

Another characteristic of the problem of energy conservation is the intertemporal allocation of consumption. Some economists argue that since scarcity is reflected in the market by the price of a good, decreasing supply of fossil fuels relative to demand will be reflected by rising relative price of fossil fuels. In turn, the increase in relative prices will act as the allocation mechanism among uses and among time periods. Shifting fossil fuel consumption from this period to future periods by conservation imposes costs on current users and lowers the price to future generations (ceterus paribus). From their view, we would be lowering the price to individuals who will be better able to pay the higher price.

One counter argument is based on the role of government as an insurance market representing the claims of future generations to a source of relatively inexpensive fossil fuels. By reducing current consumption, the supply of oil, coal, and natural gas available in the future is greater than it otherwise would have been.

WHOSE CONSUMPTION AND PRICE?

This brings us to issues of distributive justice. With a relatively inelastic demand, useage of fossil fuels will not decline very much as price increases. As a result, individual consumers will have to absorb the loss in purchasing power of their budget by cutting back on other expenditures, assuming constant income.

On average, low income individuals consume more energy in space and water heating than do individuals and families with higher incomes. Some of the factors which contribute to this include the poor quality of housing generally available to low income individuals, old appliance stock, and more time spent at home. At the same time, fewer low income individuals own their own home. Where the resident pays all utility bills or where the return to conservation is very risky, landlords have little incentive to invest in energy savings.

For the most part, individuals least able to adjust to rapid increases in fossil fuel prices are the ones who will be hit the hardest. At the same time, federal and state government financial assistance to defray the cost of fuel for low income recipients has been reduced. The Reagan Administration articulated its views on this matter in July 1981. In part they argued that the impact of rising energy prices on the poor should not be ignored "...but it is a broad social problem that does not relate exclusively to energy and should not prevent a national energy and economic recovery program that is designed to help all Americans and restore a sound economy that is most helpful to the poor" (11, p. 17). They went on to state that assistance to the "neediest" households would be provided through the Energy and Emergency Assistance Block Grant Programs. Block grants are to be allocated and administered by State and local government (11, p. 17).

Alfred Kahn has said that "the question of what is the best measure or definition of social welfare, which is the function of the economy to serve, is a political or philosophical, not an economic one." (5, p. 67). Allowing price to be established by the interaction of supply and demand, allocative efficiency can be attained. Any adverse effects arising from removal of price ceilings is better treated through lump sum transfers. As a result, while initially some people are adversely affected, if sufficient gains arise so that some of the gain can be funneled to the losers so they are made no worse off, a pareto optimal change has occurred. Any reasonable reader will undoubtedly argue that the costs required to perfectly compensate the losers from part of the gains inhibit perfect compensation from ever occurring; and that the chances of compensation actually occurring are slim at best. This is precisely one of the problems with allowing oil and natural gas decontrol.

To date, equity considerations in energy policy have not satisfied the potential pareto criterion. With decontrol of oil prices came a windfall profits tax bill. One component of the bill was a statute requiring that 25 percent of the revenue from the tax be allocated to helping poor and low income individuals pay their high fuel bills. According to testimony by Senator Metzenbaum, revenues from the Windfall Profits Tax (WPT) totaled about $26 billion in 1981 (12, p. 27). Only $1.85 billion (about 7 percent) was expended on the energy assistance program (12, p. 27). At the same time, it is reported that the purchasing power of low income families declined by about $6 billion during the year following oil decontrol. Windfall profits estimates for 1981 were $40 billion, $20 billion in additional revenue and a Reagan Administration funding request for the energy assistance program of $1.4 billion (12, p. 88).

CONCLUSIONS

Conservation in general and energy conservation in particular have been conceptualized in a number of different ways. Conservation has been viewed as a decline in living standards and as an increase in technical efficiency which results in improved environmental quality. It has been defined in terms of economic efficiency, technical efficiency, behavioral change, avoiding waste, the maintenance of a production function over time, and the maximization of consumer satisfaction over time. Energy use reductions below a projected trend which arise from (a) increased real prices of a fuel from decontrol, general price inflation, tax policy or (b) reduction in the capital cost of investing in more fuel efficient technology can be viewed as a reduction in energy use or conservation.

In our judgement, energy conservation need not suggest a lowering of our standards of living today on behalf of future generations. Characterization of energy conservation as "being too cold in the winter and too hot in the summer" simply is insufficient. Conservation should not imply a return to more primitive lifestyles or the making of major development sacrifices today so that future energy users may wallow in that resource at will. Conservation should not be the watershed term separating those who are pro-development from those who are anti-development. Instead, conservation represents careful and systematic attention to the role of the natural resource in production activities of various kinds, potentials for substitution over time, and attention to the economic consequences to groups of people of different strategies for temporal allocation of the resource.

Further, as we have seen, conservation of resources has played a role in resource policy for at least 50 years. As a matter of fact, the first federal level committees to address the problem of resource conservation were formed in response to imperfect competition in energy industries.

Today government should play an active role in directing U.S. energy policy. First, government cannot be neutral. Eliminating tax incentives for investments in conservation and alternative energy systems and financial assistance for low income individuals is not reducing the role of government in the market. Percentage depletion, investment tax credits, foreign tax credits, accelerated depreciation, and the expensing of certain intangible drilling costs all influence the relative prices of oil, natural gas, solar, wind energy, and conservation.

Government also has a role to play in structuring incentives in such a way that the information available to the market is increased. As it stands, investments in consumer durables are made primarily on the basis of initial cost. Since any technology which results in lower rates of fuel use appears also to have a higher capital cost, investment criteria which ignore operating costs bias decisions against the energy saving technology. Motor vehicle fuel efficiency standards, appliance efficiency standards, and building thermal standards are ways of providing operating cost information to decision makers. A switch to mortgage lending which explicitly considered the operating cost for fuel would reduce the bias against more energy efficient homes which also have a higher initial cost than comparable homes which use more fuel to heat and cool.

Fossil fuel consumption also results in pollution which results in gains for some and losses for others. As a society we have determined that clean air (or at least cleaner air) is something we value. Where individuals cannot get together and negotiate the level of dirty air they will tolerate, a third party must step in. This third party is usually the government.

Government is also responsible for anticipating future social problems. As a result, risk averse behavior with respect to oil and natural gas supply would be expected. While oil and natural gas decontrol can be expected to lead to a greater supply of oil and natural gas, the shape of the supply and demand curves are important. While four combinations are possible, decontrol with an elastic supply combined with an inelastic demand would lead to a greater increase in current supply and little reduction in current consumption. Concern about the level of consumption would suggest that policy be aimed at reducing the amount of oil and natural gas used at each and every price.

Another reason for government to know the relative elasticities of demand and supply for various forms of energy is to formulate equity policy. In the case above, as in all possible cases, transfers of income from consumers to producers will occur. The real effect of rising energy prices on the economically disadvantaged leads to the conclusion that government must play a role in energy markets. Preferences are reflected in the market only when individuals own the economic resources to articulate these preferences. This is precisely the problem with the disadvantaged, they simply do not have the income and/or right to the future return on an investment in insulation, weatherization, etc., to be able to articulate a preference for these goods. Furthermore, deregulation of oil and natural gas may be a potential pareto optimal change in property rights, but without the redistribution mechanism to compensate the losses from the gains of the winners, potential pareto optimality is like a glass without a bottom--it doesn't hold water.

REFERENCES

1. Barlow, Raleigh. Land Resource Economics, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1978.

2. Goodwin, Craufurd D., ed. Energy Policy in Perspective, Today's Problems, Yesterday's Solutions, Brookings Institution, 1981.

3. Heady, Earl O. and Scrill, O.J. Principles of Conservation, Economics and Policy, Iowa State College of Agriculture Experiment Station, Research Bulletin 382, July 1951.

4. Hershey, Robert D., Jr. "Energy Choice Backs Faster Decontrol", New York Times, Vol. CXXX, No. 44,827, January 13, 1981.

5. Kahn, Alfred. The Economics of Regulation Principles and Institutions, Vol. 1.

6. Landsberg, Hans H., Chrm. Energy: The Next Twenty Years, Report by a study group sponsored by the Ford Foundation administered by the Resources for the Future, Ballinger Publishing Co., 1979.

7. Plattner, Andy. "Reagan Asks Dismantlement of Energy Department, Increased Weapons Funding," Congressional Quarterly Weekly Review, Congressional Quarterly, Inc., February 13, 1982.

8. Sant, Roger. "Energy in Round 8", New York Times, Vol. CXXX, No. 45,066, September 9, 1981.

9. Shipper, Lee. "Another Look at Energy Conservation", American Economic Review, Vol. 69, No. 2, May 1979.

10. Shipper, Lee; Holander, Jack M; Levine, Mark; Craig, Paul P. "The National Energy Conservation Policy Act: An Evaluation," Natural Resources Journal, Vol. , No. , Oct. 1979.

11. U.S. Department of Energy, Securing America's Energy Future the National Energy Policy Plan, A Report to the Congress, U.S. Department of Energy, July 1981.

12. U.S. Senate, Committee on Human and Labor Resources, Subcommittee on Aging, Family, and Human Services, Low Income Energy Assistance, 97th Congress, 1st Session, Government Printing Office, Mary 24, 1981.