RESPONSIBLE INDIVIDUALS AND THE NATION'S ENERGY FUTURE

Richard Stroup and *John Baden*

Since October of 1973 many Americans of various political persuasions have called for a clear and coherent energy policy. Those on the left tend to believe that Americans, lacking the foresight or self-discipline required to make appropriate adjustments to energy shortages, must have their use of energy controlled. Mileage standards for automobiles, the fifty-five miles-per-hour speed limit, thermostat control in buildings, and other limitations on individual freedom have been legislated because of this belief. Those on the political right tend to be less enthusiastic about controls of this kind, yet even some of them have called for certain kinds of governmental control for reasons of national security. Apparently they believe that since individuals in their market decisions will place too little weight on national security matters as such, energy supplies and energy capacity reserves may become too small. The necessity of military and economic preparedness in the face of external political and military threats thus provides their excuse for governmental interference.

We will show that the concerns of both the right and the left are based on faulty assumptions about market outcomes. We will demonstrate that a nation of free individuals, held responsible for their decisions by the market mechanism, is much more likely to be prepared for the future than is a nation of precisely the same individuals, with the same perceptions and expectations, whose energy decisions are made instead in a collective, even perfectly democratic, fashion. It is a sad commentary on the state of economics and

---

Cato Journal, Vol. 1, No. 2 (Fall 1981).

Richard Stroup is Professor of Economics and Co-Director of the Center for Political Economy and Natural Resources at Montana State University, Bozeman 59715. John Baden is the center's Director.

economic education that most people, including a large number of economists, will find several parts of our analysis to be novel and counterintuitive.

Our reasoning is based on three basic points. The first, drawn from Austrian economics, is that the expectations on which all decisions concerning the future are based are subjective. These expectations will differ, often dramatically, from person to person. Points two and three are emphasized in the legal and economic literature of property rights. Point two is that in a market it is the high bidder (not the person with the median opinion) who controls. The third point is that because information and educated hunches about the future are costly (and they always are), decision makers will allocate their time and effort according to where they think the greatest returns to them lie.

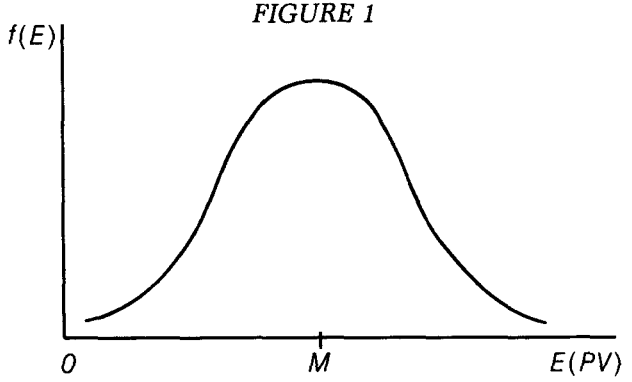
In the pages that follow we will show that *(a)* preparedness, in terms of stored energy, facilities to supply fuels in times of reduced supply or increased demand, and available energy raw materials, is enhanced by secure and transferable private property rights; *(b)* promising innovations are more likely to be funded when both the supply of funds and the demand for output are decided in the free market; *(c)* expectations about the future will be better informed when bid and asked prices in open markets gather and reflect what sellers and buyers want rather than when democratic votes perform that function; *(d)* we can expect less waste as well as more innovation when decisions on innovation are made privately rather than democratically; and *(e)* we can expect that the central government will be systematically unable to attract and hold good forecasters. After discussing each of these points in turn, we will return to our basic theme: A strong and effective concern for the future is much more likely in a marketplace with free and responsible individuals than in even a perfect democracy.

Energy Preparedness in a Market Setting

Consider a tanker filled with diesel fuel recently produced at a refinery. Should the fuel be put into storage for future contingencies or should it instead be put on the market immediately? To help answer that question, as well as to aid in the discussion to follow, we will introduce a simple model enabling us to compare a perfectly democratic setting with a free market in the same society with exactly the same people holding the same expectations.

To decide whether the fuel should be sold now, the decision maker compares its current value with what he anticipates will be its highest-valued future use (net of storage costs and discounted to

FIGURE 1



the present). If current sale yields more net benefits than any expected future sale, then the decision maker will choose to sell rather than keep the fuel.[1] A major difficulty is how to estimate the future value of the fuel, which depends on several conditions, all subject to change. For example, how much fuel will be available in the future? How much future demand will there be for diesel fuel? What substitutes will be available? Each person is likely to have different answers to these questions, as well as a different discount rate.

The views of the populace on the present discounted value of future use can be depicted in a diagram (see figure 1). The abscissa (or horizontal axis) indicates an individual's *estimated present value E (PV)* of storing the fuel, which is a single value in dollar terms, expressing the sum of all the conditions listed above. The ordinate (or vertical axis) indicates the frequency with which each estimate is held. The curve is low on the left, indicating that few people expect that the fuel will have a low value. Similarly, the curve is low at the right, indicating that few people place a very high expected value on conserving the fuel. If we locate on the abscissa a value of *M* equal to the market value of the fuel if sold now, all *E (PV)* greater than that value indicates that preservation is more highly valued. Similarly, all those whose *E (PV)* falls short of *M* (the current development value) presumably must conclude that current use of the fuel is the better choice.

Consider now the most straightforward kind of democratic political decision-making regarding the fuel. Each voter expresses

[1] A similar analysis in a different setting was presented by Richard Stroup in "Property Rights and the Rate of Resource Exploitation," given at the 1976 meetings of the Public Choice Society, New Orleans, La., March 1976, and in Richard Stroup and John Baden, "Property Rights and Natural Resource Management," *Literature of Liberty* 2, no. 4 (October-December 1979): 5-40.

his opinion of whether the fuel should or should not be sold currently, and the majority rules. (We assume that each individual is not simply self-interested but votes for what he believes will benefit society most.) To predict the outcome of such a vote, we simply ask whether the majority of the preservation value estimates fall to the right or to the left of *M*, the current market value of the fuel. If the majority is to the left, current sale will be mandated; if to the right, conservation is supported. Put another way, if the median voter has *E (PV)* greater than *M*, storage of the fuel will result, while current development wins if his *E (PV)* is less than *M*. In a very real sense, the median judgment prevails.

By contrast, consider a simple market situation—involving the same people with the same tastes, expectations, and discount rates—where the fuel is simply controlled by the highest bidder. One type of bid is *M*, for current sale, made by sellers to current diesel fuel users. The highest such bid represents the fuel's worth in current use. The other type of bid is from those who want to store the fuel for future use. We can assume either altruistic or totally selfish motives for these bidders. In either case, each bid reflects the bidder's belief as to the fuel's future value. Obviously, if anyone with sufficient funds or credit or the ability to convince fellow risk-takers believes that the fuel will be sufficiently more valuable in the future than now, the fuel will be preserved. If the believer *cannot* convince even a small percentage of the people, his vote would surely be cast on the losing side. The median opinion does not control decisions in the market. The tendency instead is for control to go to those with the strongest bias to conserve the fuel. Such a conserver is one who believes that the value of the resource will rise rapidly; he is usually called a speculator.[2]

Speculator is widely used as a derisive term, and we have long been puzzled about the general condemnation of speculators. Apart from the monopoly case, such criticism seems to be at variance with the announced preferences of those who would look to the future. Saving for the future is, after all, exactly the function of a speculator. Only by paying a higher price than those who prefer to consume now can he conserve the fuel for his profit and for the future. While *current* consumers have good reason to object to speculators for driving up prices and hence reducing current consumption, those in the future should shower speculators with

[2]This "ready reserve" of fuel is handy for emergencies, during which its readiness makes it extremely valuable. Energy is most cheaply stored by leaving the crude oil in the ground and thereby avoiding the carrying costs of early refining and aboveground storage.

praise and rewards—if the speculator has guessed correctly. Indeed, we have argued that such speculation might logically be subsidized.[3] The central point, of course, is that successful speculators benefit the community in the future at the expense of resource consumption in the community now. Their actions in markets over time are analogous to those of distributors of goods over space. The distributor of oranges buys in Florida on behalf of New Yorkers. Orange prices would be lower for Florida consumers if interstate trade were forbidden; but this prohibition would not benefit New Yorkers who desire Florida oranges.

Those who speculate may have a long view, encompassing a future when the resource will be developed. Even if they have a short view, however, they can sell the property rights to the fuel, consuming the benefits of their speculation long before society reaps the benefits of the resource reallocation. So long as they can transfer the property rights they hold, the fuel remains a salable asset and a good investment. As time passes and the higher-valued time of use approaches, the present discounted value rises. Note that in the market setting, unlike the democratic setting, we have not assumed that speculators care at all about the future users. Although simple self-interest (even greed) is sufficient to motivate the speculator, the market forces him to act *as if* he cared. It is difficult to imagine a mechanism other than market speculation that could be devised to give current voters an incentive to consider the wants of future citizens. When rights are democratically controlled, future voters must depend on the generosity of present voters to sacrifice current consumption of governmentally controlled fuel.

It should be clear that one who is truly interested in seeing more fuel saved for future use would want to be sure that the fuel is privately rather than democratically controlled. Control by the private sector systematically increases the likelihood that the fuel will be preserved by ensuring that if even a few citizens really believe that a stockpile of fuel is worth storing, they will find it in their interest to see that it is in fact saved. They need not convince half the population that their view is correct. In addition, they have a strong incentive to act on their beliefs. In the process of doing good for the community, they can do quite well for themselves.

It is important to note that our current policy of increasing governmental control, especially in times of emergency or fuel shortage, works strongly against the private alternative. We would

[3]Our tongue-in-cheek suggestion was offered in "Trial Balloon," *Taxing and Spending* 3, no. 3 (Summer 1980): 67.

surely see more fuel storage in the private sector if it were not for price controls and the fear of price controls in the future. The owner of fuel or oil in storage bears all the costs of forgoing consumption, yet runs the risk that when the value of the commodity rises sharply in the future, price controls or outright confiscation of his property will transfer the benefits away from him. Saving for one's own future benefit is one thing; bearing the cost of that saving while others may get the benefits in the future is another.

In short, with enforceable and transferable private rights to fuel, we would expect more fuel storage than the median voter would prefer. Yet if private rights are attenuated by the threat of fuel confiscation or price controls, this privately financed resource is lost.

Energy Supply Facilities

Will private investors be willing to build the sort of excess capacity that would help ensure against future reductions in external fuel supply or dramatic increases in demand? The answer to this question is closely analogous to our foregoing analysis: If the market is allowed to work and if even a few investors believe that the current cost of excess capacity is justified by great returns in the future, reflecting relative scarcity of capacity at that time, then there is again an incentive to speculate and to divert investment resources away from other promising projects into building some excess capacity in fuel production facilities. Once again, those who hold such a belief need not convince 51 percent of their fellow citizens of its correctness. And once again, the incentive to do well for oneself buttresses the opportunity to do good for society.

Energy, Raw Materials, and the Market

Is the world running out of oil? Will "quick-buck" oil corporations develop our limited supplies of crude oil too rapidly? Our model applies once more. A speculator who saves an oil well from early exploitation, when the price is lower than the discounted present value of future exploitation, will tend to be a successful (and rich) speculator. Whether he is lucky, a good predictor, or simply listens to those who are good predictors, the result is the same. If a contemporary energy speculator could predict our energy future as accurately as Joseph of Egypt predicted famine in biblical times, the true believers would become wealthy indeed.

Innovation and the Market

A crucial part of our energy future will be determined by the success of innovation in energy development, but uncertainties abound. Will potential innovators be allowed to experiment? Will

markets be available for energy innovations? Will innovators be able to obtain funding for their ventures? In answering these questions it is once more productive to consider the model above. If energy innovations are handled privately rather than democratically, the innovator need only round up the funds rather than convince 51 percent of the electorate that his "wild idea" is indeed worth pursuing. A smoothly functioning democracy is much more likely to discourage innovative activity than is a market, where all sorts of harebrained schemes can be (and are) financed.

A particular innovative venture might be financed by a J. P. Morgan–like financier, by a partnership, by an ordinary corporation, or by a speculative corporation selling penny stocks. The point is that any potential innovation that cannot attract the necessary funding from *any* source would also obviously have a great deal of trouble in a perfectly democratic setting, where approval from the majority is required.

The demand for innovations can be just as easily suppressed by governmental (democratic) activity as can the supply. Many alternative energy sources currently touted by the "soft path" advocates were once in great demand in the United States. These include wind, hydroelectric power, and fuel alcohol. In a market as large as the United States, much diversity is to be expected. Almost any good or service produced in the world will be demanded somewhere in this huge market area. Scattered rural farms, for example, were a large market for wind-powered electric generators. Diversity provides a buffer to the economy. If a Middle East crisis makes oil scarce, it is useful to have a variety of well-developed alternative technologies on hand. Is collective action required to support diverse energy alternatives? Not if markets for the alternatives have existed for years in various parts of the nation.

Table 1 indicates the time path of interest in three alternative energy sources. After the turn of the century there was a growing interest in windmills, small-scale hydroelectric power, and fuel alcohol. The declining interest in fuel alcohol following the mid-1930s can probably be explained by the declining price to consumers of gasoline. A similar fate apparently overtook wind power and hydroelectric power generation, but with an important difference from society's point of view. The major market for small-scale hydroelectric generation and wind power had always been the remote rural areas of the country. Far from the cheap power of central generating stations, these markets supported a very large windmill industry in the United States up to and including the early 1930s. Central station electric power became cheaper because of the de-

TABLE 1

NUMBER OF ARTICLES CONCERNING SOLAR ENERGY FORMS IN *THE INDUSTRIAL ARTS INDEX* 1913–1940

	Solar (cookers, power, heaters, electricity)	Wind (power, windmills)	Hydroelectric Power	Alcohol as Fuel
1913	3	1	1	3
1914	10	0	4	1
1915	7	2	18	3
1916	3	1	20	6
1917	0	1	23	5
1918–19	0	6	39	11
1920–21	4	14	33	16
1922–23	6	8	17	19
1924–25	1	17	19	8
1926–27	2	6	12	9
1928–29	0	11	22	9
1930–31	5	11	15	7
1932	9	2	10	6
1933	11	1	7	63
1934	8	6	15	12
1935	13	3	10	7
1936	23	4	6	19
1937	4	4	4	6
1938	7	3	4	9
1939	8	1	3	2
1940	19	0	5	4

velopment of larger-scale, more efficient plants; in addition, however, political pressures on the federal government caused the introduction of important federal subsidies to rural power customers.

In order to make power available at an artificially low price to rural residents, the Rural Electrification Administration (REA) arranged guaranteed low-interest loans, subsidized expertise, and exemption from income taxes to rural power cooperatives. Rural customers, some of whom would have been customers for alternative sources of power, were thus subsidized in their use of central station electricity. Additional subsidies to all electrical utility customers were (and are) in the form of rate regulation. Electricity is available to rural residents at the same rate that it is available to residents of more densely populated areas, although the latter are much cheaper to serve. One result of the governmental interven-

tion was to hasten the demise of some markets for alternative energy producers.

To the extent that decision making in a democratic setting leads directly toward a standardization of services available to all citizens, or indirectly toward standardization via egalitarian measures, an important form of national resiliency is lost. Just as a biological "monoculture" is much less likely to withstand environmental shocks than a biologically diverse community, so too is a "monotechnological" society more prone to serious and perhaps mortal danger from external shocks. Like biotic diversity, economic diversity is a healthy state of affairs. Unless and until we are prepared to control our external environment as carefully as a farmer controls the external inputs to his wheat field, we are likely to be much better off preserving the economic diversity fostered by free markets than to indulge in the uniformity fostered by collective, democratic decision-making.

Informed Expectations: The Role of the Market

Our energy future poses a number of tough questions. Which energy paths show the most promise? Which capital investments make sense now? Will coal gasification pay? Which parts of the Overthrust Belt in the northern Rockies should be investigated first? In judging which institutional environment is best suited for the development of successful energy strategies, we must pay close attention to the ways in which alternative institutional environments foster the best answers to these and other questions regarding a highly uncertain future. In a collective, democratic setting, answers to these important questions are selected ultimately by the voter. By contrast, in a market the answers are chosen first by investors and then ratified or rejected by consumers. In comparing these two settings, then, the important question becomes, who will be better prepared to choose, the voter or the same person choosing among various markets in which to invest and spend his own money?

Rational Ignorance and the Voter

When information is as costly as it is regarding future states of the world, decisions must be based on limited information. Individuals allocate the time and efforts needed to make decisions, as they allocate all scarce resources, toward those uses that yield greater personal benefits.[4] The search for an analysis of informa-

[4]This section condenses some of the material found in chapters 4 and 32 of James

tion on alternatives will be undertaken on those matters that are both important to the concerned individuals *and* significantly influenced by them. The average citizen will fail to study national energy policy options, even though they are extremely important, because he will have essentially no *personal* impact on energy policy. Consider an analogous situation: the farmer and next season's weather. Although the weather is probably the most important factor in the determination of a farmer's success, a rational farmer does not study meteorology because he knows quite well that no matter how much he learns he will be unable to control the weather. He may make some attempt to *anticipate* the weather, but he will seldom study intensely something over which he has no control. In a similar fashion, the average citizen has precious little knowledge about the many alternatives that would be relevant to the national energy policy. Indeed, the average citizen is rationally ignorant about most political matters. The fact of the matter is that the average American of voting age cannot even name his congressman, much less make a sound judgment on a national energy policy. Table 2 makes this point while simultaneously showing that throwing a matter into the political arena is scarcely the way to "even the odds" between classes of voters: white and nonwhite, rich and poor, or rural and urban. Returning briefly to our farming analogy, if our farmer raises dairy cows the one political matter that he probably does study is the issue of dairy price supports. Politicians such as John Connally are justly famous (infamous?) for recognizing this fact and giving (selling?) to such farmers the policy they want at the expense of the general public. Our point here is that only on issues in which the person has a special interest is rational ignorance likely to be overcome. As we shift our gaze to the private sector, we note that in the market each individual's input regarding a particular enterprise is likely to be precisely in proportion to that individual's interest as a consumer or investor in that enterprise.

Information in a Free Market

Decision makers in the private sector also must act on imperfect information. The crucial difference is that each decision is made with the decision maker in full control of the particular situation. When a person decides what heating is best for his home, for example, or how much fuel efficiency he will choose in an automobile, he gets what he chooses. He also lives with any mistake he makes.

Gwartney and Richard Stroup, *Economics: Private and Public Choice* (New York: Academic Press, 1980).

TABLE 2

POLITICAL KNOWLEDGE AND ITS DISTRIBUTION

		Location		Race		Income	
	Total Population (%)	City (%)	Rural (%)	White (%)	Black (%)	Under $5,000	Over $15,000
Correctly identified their congressman	46	37	55	50	17	38	50
Did not know or failed to identify their congressman correctly	54	63	45	50	83	62	50

SOURCE: Louis Harris Poll, conducted for the U.S. Senate, Committee on Governmental Operations. Published as *Confidence and Concern: Citizens View American Government (Part 2)* (Washington, D.C.: Government Printing Office, December 1973), pp. 215–516.

Unlike his choice at the voting booth, the costs and benefits of market choices are borne by the very person doing the choosing.

Every investor, even one choosing to buy penny stocks in a mining company, has an incentive to investigate and to choose the right industry, and the right firm within that industry, in which to invest. A person interested in a particular form of solar conversion should have special knowledge about that particular option. However, that person's enthusiasm will probably be tempered in an investment decision by whatever realism and self-interest he can muster. He may wish to put unlimited amounts of *other* people's money into an energy pipe dream, but his own resources are likely to be too dear if such a venture does not appear promising.

The Power of Investors

Investors are powerful people in a market system. In effect they set the agenda from which all of us may choose. Note, however, that investors who provide attractive choices tend to prosper, while those who provide unattractive choices tend to lose personal wealth and with it control over future investments. An enterprise that fails to deliver will fail to prosper, and a thoroughgoing failure usually means bankruptcy. In this way the resources of society are redirected along avenues judged by investors to be promising. Of course, in a collective setting we may choose not to allow individuals who have made poor choices to bear the negative results

of their choices. We may choose to tax the successful and transfer the proceeds to those who made bad choices. The Lockheed and Chrysler bailouts are fine examples of such a choice. In a truly free market, however, the careful choices of consumers and investors are honored.

Subsidies to hold resources in inefficient uses are not the only way in which political decision-makers override the good sense of private decision-makers. Whole new industrial developments, barren of innovation and other saving features, can also be sponsored by subsidies and price distortions. All that is required is an organized lobbying effort on behalf of resource owners favored by the new program. The farm lobby, for example, has been able to channel huge numbers of tax dollars into their program to use grain in the production of ethanol. Gasohol, a mixture of 90 percent gasoline and 10 percent ethanol, can be used to stretch our gasoline supplies. However, it is so expensive that some agricultural economists have compared that process to stretching our supplies of hamburger by adding a few extra pounds of tenderloin steak. The value of the resources necessary to produce the gasohol is simply a great deal more than the value of the resources (even at high crude oil prices) necessary to produce straight gasoline. The politically powerful farmers have been able to get both gasoline tax exemptions at the state and federal level and an implicit subsidy from the entitlement program. These forms of subsidy add up to more, per gallon of ethanol, than the total cost per gallon of manufacturing gasoline from expensive OPEC crude oil. In addition, the farmers have arranged for a further 10 percent investment tax credit on top of the normal tax credit for facilities producing ethanol from grain. And in addition to this tax credit, at this writing more than $100 million is available from the federal government in the form of grants, loans, and loan guarantees for alcohol production facilities, and more billions are proposed. When energy decisions are made collectively, we must expect that political power, not economic (or other social) efficiency, or even commonly held notions of equity, will rule.

Expectations and Energy Choices

It is not difficult to see why we believe that energy choices for the future will be based on sounder expectations and better logic if left to the private sector. Rational ignorance is far less a problem in the private sector. Both the incentive to gather more information regarding important choices and the "reality checks" on decisions once they are made are much stronger there.

Innovation and Waste

Innovators have more freedom to act in the private setting than in the democratic one. To obtain resources for their activities, they need to convince only a small fraction of all potential investors, rather than 51 percent of all voters. Innovators and their backers are also held responsible for their actions. Incorrect choices and inefficient management reduce the wealth of those who make such bad decisions. It is difficult to admit that one has been wrong and painful to abort the efforts based on mistaken decisions, but in a market there is a clear signal (losses) and a strong incentive to move on. There is every reason to allow sunk costs to sink.

Those directly involved in an enterprise (private or public) nearly always have the best information, if not the soundest judgment, regarding that enterprise. In a market setting, the enterprise is watched carefully by the few people with a direct profit or loss interest in that enterprise. The story is quite different for a public enterprise or one financed by government money. Seldom does anyone outside the enterprise have a large stake in the enterprise's success or failure. Such operations are typically nonprofit, so that there is no clear signal of success or failure. Indeed, success within a bureaucracy is generally associated with the growth of that bureaucracy rather than with reduced cost or greater production as such. As Paul Craig Roberts has pointed out in the *Wall Street Journal*, Department of Energy officials would be out of a job if somehow they saw to it that the energy crisis evaporated tomorrow. As Niskanen, Tullock, Buchanan, and other public-choice economists have indicated, social efficiency is hardly a goal for the rational decision-maker in a bureaucracy. The pain involved in a shrinking bureaucracy is intense; the rewards to those who make it shrink are not, however great the social benefit might be. Public decisions really are public goods, just as would be the elimination of smog in Los Angeles.

Energy and the Residual Claimant

Decisions about the allocation of energy are made differently in the private sector than they are in a democratic setting. Most of the differences come down to how tightly each system links responsibility with authority. In other words, the institutional systems differ substantially in the degree to which they hold decision makers accountable for their actions. In a market situation with private property rights, the transferability of those rights holds the individual decision-maker responsible for his actions. Suppose that

we have a free market in gasoline and that an individual buys 100 gallons. He might use it for a family vacation or to move his cows to a new pasture. In either case, he is fully accountable for the cost of the gasoline he uses. He has paid at least as much for that gasoline as was offered by those who wish to store it for the future, burn it in an outboard, or use it in any other conceivable fashion. Did the user "waste" the gasoline? It is extremely difficult for anyone else to know in detail about the user's business or pleasure. More importantly, no one need care because, by using the 100 gallons of gasoline, the decision maker forgoes the opportunity to purchase that amount (in value terms) of any other resources in the world. The decision maker has paid the cost and will receive the benefits. He is thus held fully accountable for the fact that the world has 100 gallons less gasoline.

There is simply no comparable mechanism in the public sector by which this degree of accountability is possible. "Accountability" in the public sector has always been and always will be an elusive goal, sought after primarily by more detailed planning statements or applications in advance of actions and more detailed record keeping as actions occur—i.e., "red tape." Given the subjectivity of costs and benefits, as well as our inability to make interpersonal utility comparisons, the concept of a "social optimum" is hollow, devoid of any real meaning. There is simply no way that we can hold decision makers responsible for the accomplishment of what we cannot, even in theory, establish as the socially appropriate goal. Since socially preferable outcomes cannot be defined or measured, special interests can be expected to dominate public decisions.

In the private sector, the owner of a resource becomes the *residual* claimant on the value produced by that resource. If any way can be found to increase the value produced by the use of that resource, its owner will be able to capture that value—provided, of course, that title to the resource is established and transferable. For example, the owner of an oil well wants to be sure that nothing diminishes the value of his assets. Even if he personally never uses the oil, or even lives to see it pumped out, anything that increases the cost of extracting it or decreases its value after extraction will instantly decrease his wealth by decreasing the value of the asset for which he has title. Similarly, if he can seek out someone who can find a better use for the oil than any existing bidder, then he can instantly increase the value of his assets and his wealth.

The cost of not having the residual claimant making decisions on a valuable resource can be seen currently in the case of the Bon-

neville Power Administration (BPA), a federal agency in charge of selling federally owned hydroelectric power in the Pacific Northwest. Because the dams producing the power were built at the best river sites in the Pacific Northwest, their electricity production has a very low cost. At the same time, it has a very high value. Alternative means of producing the same electricity are far more expensive and are being undertaken today. Yet the BPA power is sold at cost, largely to huge aluminum plants established many years ago to take advantage of the cheap power. Other users of electricity in the region would pay very high prices to obtain that electricity, but the rights are not transferable, and there is no residual claimant owning that electricity. Thus we have the spectacle of the BPA delivering electricity to the aluminum plants at about one-tenth of the cost at which utilities must pay to generate power at the many coal-fired power plants springing up all over the region.

Could the BPA power be conserved by the aluminum industry and some of the power be sold to other customers? Physically, a good deal of conservation could be achieved. At a cost, aluminum plants could be modified to use new processes that consume at least a third less electricity per ingot of aluminum than is now being used. Less aluminum could be used in automobiles or in other products that use aluminum. Since electricity is steadily growing more expensive, items that use aluminum should logically also become more expensive and carefully economized on. But since neither BPA nor their aluminum customers own the electricity in such a way that they can benefit from conserving electricity at a cost, and selling that electricity to the users now busily constructing new coal-fired power plants, the conservation and the socially efficient transfers never take place. Those with the authority to make the desirable changes are not fully responsible for the effects of their decisions, and the more comfortable thing for them to do is to delay the painful transition – or more accurately, to force others to make even more costly adjustments instead. Those who control the electricity are not residual claimants.

Energy Controlled by Residual Claimants

One of the most chaotic, independent, seemingly uncoordinated, and generally "messy" industries in the United States is agriculture. America has approximately two million commercial farms and ranches, the overwhelming majority of which are family operations. (In reality the fabled "corporate farm" is almost always a family corporation.) The managers of the farms are noted for their distrust of formal programs and social planning. Although they

tend to favor subsidies to agriculture, these are the only coercive programs they are likely to support. Such individuals are unlikely to be influenced by "moral-equivalent-of-war" appeals to make sacrifices or similar efforts to generate social concern as a mask for the primary causes of the energy problem.

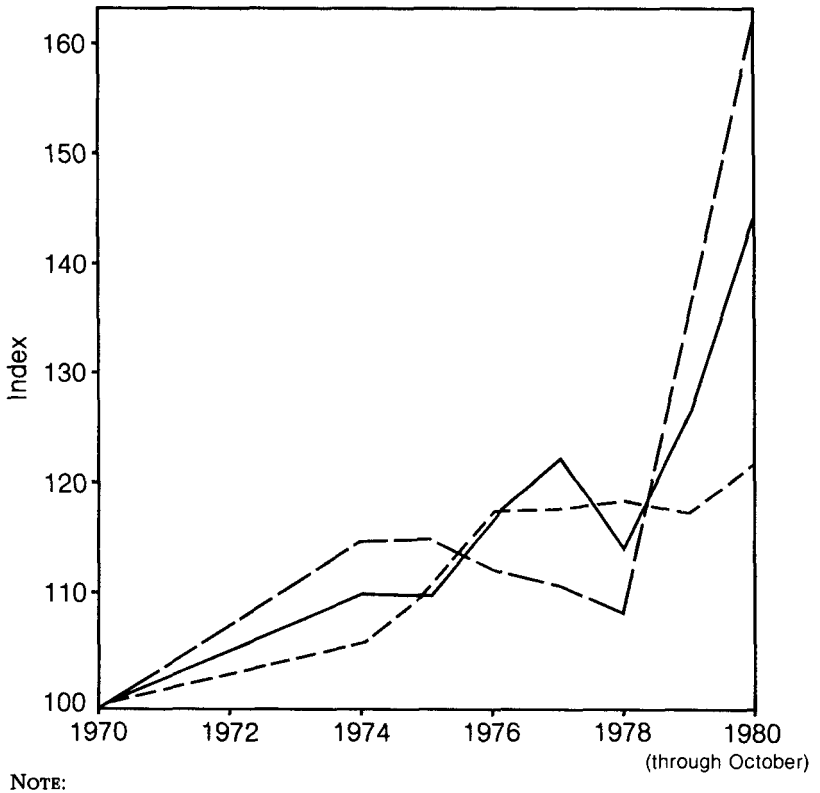
Aside from some range sheep and cattle operations, American agriculture has become highly energy intensive, which is what we would expect because nearly all current operations were developed on seventeen cents a gallon diesel fuel while labor has been relatively expensive since at least 1950. The farmer knows that he must pay people their opportunity cost of employment. In contrast to muscle power from labor, the marginal cost of using hydraulic cylinders is usually very low indeed. While people in New York and California are discussing the virtues of going back to the land, farmers are calmly equating at the margin, computerizing their decision-making processes, and removing themselves from direct contact with the land. Agriculture and agriculturists are fundamentally dependent on inanimate energy. Further, they are not especially sensitive to moralizing pronouncements about the "need" to conserve.

These facts may seem to paint a dismal picture at best for conservation, but fortunately farmers and ranchers are, like others, predominantly self-interested. In addition, the farmer normally operates as a residual claimant. While farmers and ranchers tend to be wealthy (in terms of assets), they also tend to be "cash poor." They are usually rich only when they sell out, and thus they tend to be highly sensitive to expenses, particularly when fuel bills are often due ten days from delivery.

If one considers energy conservation and innovation from the perspective of those more concerned with behavior than with moral motivations for behavior, farmers and ranchers may be considered ideal citizens. Because they consume substantial amounts of energy, it pays them to be sensitive to conservation. An increase in the relative price of fuel thus creates a powerful incentive for entrepreneurs to develop energy-saving tools and techniques.

Large farm tractors consume more than ten gallons per hour of tillage work. When fuel was seventeen cents a gallon, the expense was small, if not trivial; at one dollar per gallon it is trivial no longer. Popular farm magazines such as *Farm Journal* and *Successful Farming* regularly feature articles on no-till and minimal-till farming, with tables and charts demonstrating variations in yield under alternative methods. Obviously, the firms that manufacture farm machinery are eager to exploit the energy-saving advantages that

FIGURE 2
FARMERS AND ENERGY



NOTE:

Number of pages devoted to energy conservation and on-farm energy generation in *Successful Farming* and *Farm Journal*.

Index of gasoline prices.

Index of electricity prices.

they are increasingly designing into their equipment.

The content of the popular farm magazines clearly evidences a high degree of concern with energy conservation and, to a lesser degree, with energy production from crop residue and other unusual sources. In recent years every issue of the magazines we surveyed featured numerous articles dealing with topics such as solar grain-drying, farrowing houses and building orientation, low-energy irrigation systems, energy supplies from crop and animal residue, insulation, engine-tuning and maintenance for fuel savings, engine conversions for fuel economy, single-trip planting, cogeneration, and energy-saving or -producing innovations by single individuals in remote locations (see figure 2).

In American agriculture's response to the real cost of energy, we find harmonious and spontaneous adjustment to changing circumstances. In the absence of coercion, national plans, or anything other than responses to market signals, individuals conserve, innovate, and act in a socially responsible fashion when driven by self-interest. Rewards are individual and direct. Reward or punishment is evidenced at the bottom line. It is difficult to imagine a more successful method of coping with increasing scarcity than leaving it to a residual claimant such as a farmer.

Government and the Successful Forecaster

A final point to make, and a simple one at that, is nevertheless crucial. To the extent that energy policy alternatives are considered and evaluated by professionals and experts within the government, reliable forecasting is essential. Even a proper presentation of reasonable policy alternatives that the people (or their elected representatives) may vote on requires predictions of future supply and demand conditions. Yet it is likely that a governmental unit will be systematically unable to attract a successful forecaster in any arena so important as the energy market. The services of anyone who can forecast energy demands or supplies better than the market in general will be worth hundreds of millions, if not billions, of dollars in the private sector. No matter what personal, professional, or charitable goals a forecaster might have, more help toward reaching those goals is likely to be forthcoming if his work is done in the private sector. To use Donald Gordon's example, not since Joseph of Egypt has a government forecaster compiled a truly enviable record regarding truly important forecasts.[5]

[5]See Donald F. Gordon, "Comments on 'Conservation of Resources and the Price System,'" in *Economics of Resources*, ed. Robert Leiter and Stanley Friedlander (New York: Cyrco Press, 1976), pp. 36–42.

RESOLVING THE TRAGEDY OF THE COMMONS BY CREATING PRIVATE PROPERTY RIGHTS IN WILDLIFE

Robert J. Smith

During man's relatively brief existence on this planet, he has relied on the bounty of its flora and fauna for his existence. He has harvested wildlife for food, clothing, shelter, medicines, beasts of burden, pets, and companionship. Over most of this period, this harvesting and exploitation had little impact on those resources. Human population was very low, and most animal and plant populations were relatively large. Animal and plant communities, populations, and species that became extinct did so from other than human causes. Only in recent centuries has man's exploitation of wildlife begun to have a deleterious effect. This was the result of rapid population growth, more efficient means of capture and kill, and expansion into new continents, especially islands and tropical areas where many species of wildlife had evolved with small, localized populations and without contact with man or his camp followers, such as dogs, cats, and rats. Western exploration and colonization quickly created serious problems of overharvesting and overexploitation of wildlife and led to a slow development of human-caused extinctions.

However, there is increasing evidence that primitive man also had a profound impact on many species. Humans did not live in the idyllic harmony with nature that has been so rapturously portrayed by the more romantic environmentalists who question the direction of modern life and call for a new environmental ethic. At least

---

Cato Journal, Vol. 1, No. 2 (Fall 1981).

The author is an economic consultant in Washington, D.C.

This paper was prepared for "Property Rights and Natural Resources: A New Paradigm for the Environmental Movement," a conference held in December 1980 and sponsored by the Cato Institute and the Center for Political Economy and Natural Resources, Montana State University, Bozeman.