The Battle for Energy Independence: How Much of a Good Thing?*

By Timothy H. Hannan

Abundant low-cost energy has been fundamental to the American way of life for a long time. It's hard indeed to imagine Americans without their climate-controlled houses, aluminum cans, and large gasoline-burning automobiles. Yet, as anyone who cooled his heels in a gasoline line last year can testify, a stable source of abundant low-cost energy can no longer be taken for granted. Domestic demand for energy has increased rapidly in recent years; domestic supply has not. To help fill this widening gap, Uncle Sam has relied increasingly on imports from the Middle East, where a volatile mixture of oil and politics has already resulted in one serious embargo and poses an ever-present threat of future embargoes.

As the recent gasoline lines and closed factories so dramatically demonstrated, a sudden curtailment of foreign oil can cause considerable economic disruption in a nation grown accustomed to relative energy abundance. To reduce the threat of similar economic disruptions in the future, the nation has embarked on a policy of energy self-sufficiency. Government funds are being allocated to stimulate research and development of alternative sources of energy, voluntary conservation efforts are being promoted, and—just to help voluntary conservation along—tariffs are being imposed on imported oil.

All of this brings up the question of the desirability of these efforts and the degree to which they should be pursued to bring about energy self-sufficiency. As economists never tire of proclaiming, resources are not limitless. The economy cannot at the same time satisfy all desires for more goods and services, higher quality environment, and greater reliance on domestic production of energy. In the area of energy policy, this means that hard choices must be made not only among the various methods of reducing

*This article deals primarily with the economic issues involved in seeking energy independence. Political or diplomatic considerations also may be important in determining the degree of energy self-sufficiency appropriate for the United States.

energy dependence but also among the various levels to which energy dependence should ideally be reduced. Because resources are scarce, complete energy self-sufficiency in the near future may come at a very high price indeed.

ENERGY DEPENDENCE: HOW CAN IT BE REDUCED?

Uncle Sam's arsenal contains many weapons to combat the energy problem. Most are designed to cut U. S. consumption of energy, boost domestic production of energy, or perhaps achieve some combination of the two. But as the current debate over energy policy serves to emphasize, the various methods of reducing energy dependence are not identical, and much controversy remains concerning the appropriate path to follow. Consider a few of the more important alternatives available.

Research and Development. Government-funded research designed to accelerate development of alternative sources of energy can play an important role in enhancing the nation's domestic production of energy, particularly in the long run.[1] The future availability of low-cost energy from nuclear, solar, and geothermal sources, or from synthetic fuels and oil shale deposits, may require substantial investments in research and development. Although the return to such investments may prove quite significant, so too may be the time required for these investments to pay off in the form of abundant low-cost energy. Thus, research and development of new technologies is generally viewed as having only long-run significance.

Voluntary Conservation. In addition to efforts designed to increase domestic energy production, a reduction in dependence on foreign sources of energy can also be achieved by policies designed to reduce domestic demand. Voluntary conservation is a currently practiced example of such a policy, and it has met with at least limited success. However, often self-interest and the goals of voluntary conservation don't jibe. An individual who believes his neighbors will adequately conserve energy may find it in his self-interest not to do so. Because of this "free-rider problem," as economists often call it, conservation on a voluntary basis is generally recognized as having significant limitations. For this reason, policymakers have increasingly called for mandatory, and perhaps less palatable, means of reducing energy dependence.

Rationing. Mandatory conservation through rationing is one such policy and has in fact been proposed by a number of national leaders. The problems involved in developing an equitable rationing system, however, are simply enormous. Decisions would have to be made on how to allocate gasoline, fuel oils, jet fuel, diesel fuel, and many other refinery products to the thousands of categories of consumers—a function which, according to Treasury Secretary William E. Simon, would require 15,000 to 20,000 full-time employees, incur $2 billion in Federal costs, and require 3000 state and local boards to handle the exceptions.[2] Perhaps more important, rationing does not provide the needed incentives for suppliers

[1] Although the private sector must be counted on to undertake most of the energy research and development, Government-funded research may prove to be quite important. Development of new energy technologies often involves expanding basic knowledge of fundamental processes. In such cases, research and development may provide a large gain to the economy as a whole, but there may be little opportunity for any one firm to derive a large enough part of this gain to warrant undertaking the research. Hence, Government participation in such efforts is needed.

[2] Statement of the Hon. William E. Simon, Secretary of the Treasury, before the Ways and Means Committee of the U.S. House of Representatives, January 22, 1974, *Department of Treasury News,* pp. 9–10.

of domestic energy to increase domestic production. Without new energy production, rationing would continue to be needed many years into the future.

The Tariff. Imposing a tariff on imported oil is another tool available to policymakers. A tariff is simply a tax placed on each unit or the value of each unit of an imported good, and its imposition on oil is designed to increase the price paid for imported oil. Of major significance is the tariff's effect on the price of domestic oil. With the imposition of a tariff, domestic oil becomes relatively more attractive to consumers of energy. As long as the price of foreign oil exceeds that of domestic oil, users will try to buy from domestic producers. When this happens (and as long as at least some domestic oil is not subject to Government price controls), the average price of domestic oil will be bid up to a higher level.[3]

Because of the dual role of prices in discouraging consumption and promoting production, this whole process results in less dependence on foreign energy sources. First, the rise in the price of oil, both foreign and domestic, will cause domestic purchasers of energy to review their expenditures and cut down on the more easily avoided uses of energy. In the industrial sector, for example, firms that did not consider energy conservation measures worthwhile when energy prices were low will now find it profitable to eliminate heat leaks, switch to less energy-intensive technologies, or improve waste-heat recovery systems. Consumers who once drove large automobiles 30 miles to work and failed to insulate their homes will now find public transportation, small cars, and six-inch insulation remarkably "good buys."

Second, unlike a policy of voluntary conservation or mandatory conservation through rationing, the impact of the tariff in reducing energy dependence is not limited to that of simply discouraging consumption. This is because a price rise brought on by the tariff will also increase the incentives of domestic producers to bring more energy to the market. Economic rewards are important. Faced with a rise in the price of energy, producers of coal, oil, and other sources of energy can be expected to search for and develop additional sources. Energy deposits identified by geologists but previously too costly to work—such as the vast oil shale deposits in Colorado and Wyoming—may now be tapped simply because higher prices make doing so profitable. And efforts to develop new technologies in the production of energy may be stimulated for the same reason.

Thus, by raising the prices we must pay for energy, a tariff on imported oil both reduces domestic consumption of energy and increases domestic production—making the nation less dependent on foreign sources of energy.

The Quota. Unlike the tariff, the quota restricts imports in terms of quantities, rather than in terms of a tax on each unit or on the value of each unit. Its impact, however, is quite similar. Like the tariff, the quota (by directly reducing the supply of imported oil, rather than by directly increasing its price) causes an increase in demand for domestic energy. Since a significant portion of domestic energy production is not subject to price controls, this means that the average price of domestic energy will rise, performing the dual function of discouraging domestic consumption and encouraging long-run domestic production. Thus, the quota, like the tariff, provides policymakers with a double-barreled weapon that can be used to make the nation more self-sufficient in energy.

[3]Government price controls are currently in effect on only a portion of domestically produced crude oil. In applying price controls, a distinction has been made between "old oil" and "new oil." New oil is defined as all oil produced on a property in excess of output in the same month of 1972. New oil and oil from wells producing less than ten barrels per day are not subject to price controls. Domestic "old oil," however, is currently held at a price of $5.25 per barrel.

The tariff and the quota can differ in terms of the revenue that they generate for the Government or in terms of the predictability of their economic impact (see Box 1). In general, however, the similarities are more striking than the differences. Both provide an incentive for domestic production, both discourage domestic consumption, and, to bring about these results, both require that we pay higher prices for energy.

Oil Storage. Policies such as Government-funded research and development, voluntary conservation, rationing, and quota or tariff arrangements are designed to reduce imports by either reducing domestic consumption of energy, increasing domestic production, or achieving some combination of the two. But as some economists have been pointing out, there are also ways to soften those periodic blows from the Middle East without significantly reducing overall imports of oil, and a policy of oil storage is perhaps the most frequently mentioned example.

Storage performs the function of being an alternate source of supply when the going gets rough. By stockpiling oil bought from

BOX 1

TARIFFS AND QUOTAS: THE SIMILARITIES AND THE DIFFERENCES

The economic impact of tariffs and quotas can be quite similar. In fact, for any given tariff, there is a theoretically equivalent quota. If supply and demand responses to price changes are known with certainty, it is possible to predict the level of imports that will result under a certain tariff and simply impose that quota to achieve the same result.

There are, however, some potential differences between the two means of restricting imports. One potential difference is the revenue that they generate for Uncle Sam's coffers. Since a tariff is a tax, it provides revenue for the Treasury as long as it doesn't discourage all imports. But a quota is not a tax. It simply sets the level of imports allowed into the country and therefore does not generally provide revenue to the Government. Both means of restricting oil imports cause the domestic price to rise above the world price, but the difference goes to the Government in the case of the tariff and usually to the oil importers in the case of the quota. However, even this distinction can be eliminated if, under a quota, the Government chooses to auction off import licenses. By pursuing such a scheme, the Government could obtain roughly the same funds from selling import licenses under a quota as could be collected under a tariff. With the right conditions, both approaches can generate the same revenue.

A potentially more important difference between a tariff and a quota stems from the fact that it is often not possible to predict future changes in supply and demand conditions. Under these circumstances, tariffs and quotas thought to be the same can have divergent results. For example, if world oil prices decline unexpectedly, a tariff will result in an unexpected increase in the percentage of the domestic market supplied by foreign oil, while a quota will not. Also, the failure of domestic supply to expand as expected will lead under a tariff to an increase in imports, but under a quota it will cause an unanticipated increase in the price of domestic oil. Because of uncertainty, the tariff and quota can lead to unexpected and different results.

foreign sources or by storing domestic oil in the ground in the form of reserve capacity, sudden shortages of imported oil can be partially or totally filled by dipping into a stockpile accumulated for just such a rainy day. Oil storage, then, is another of the many potentially useful steps that can be taken to ensure a steady supply of energy.

REDUCING ENERGY DEPENDENCE: THE GAINS AND THE COSTS

Clearly, there is a potential gain to all such efforts designed to reduce the nation's vulnerability to oil embargoes.[4] When the spigots are turned off temporarily in the Middle East the resulting economic disruptions can cause considerable hardships. This is because domestic supply patterns and domestic consumption patterns cannot be changed readily at a moment's notice. It takes time to expand domestic energy production and introduce expensive production technologies which are not required when Middle East oil is flowing freely. And on the consumption side, it takes time to change over to more energy-efficient applicances, smaller automobiles, better-insulated buildings, and less energy-intensive technologies in commerce and industry. Because of this short-run inability to adjust to less energy, sudden embargoes can mean production bottlenecks, factory layoffs, cold homes, and other hardships. Therefore, the advantage of policies designed to avoid or reduce their impact can be large. This can be true even of policies such as a tariff or a quota, which are designed to replace temporary curtailments in imported oil with a permanent one. Because periodic sharp reductions in imported oil can be so severe in the short run, there may be a positive gain from policies designed to discourage imports gradually in the long run. These long-run policies can cause the economy to make adjustments without the major disruptions associated with sudden embargoes.

By cutting consumption, increasing production, or stockpiling reserves, the country can help protect itself from future embargoes. Of particular importance, the nation's foreign and domestic policies do not have to be unduly influenced by foreign producers of oil.

But while there's something to be gained from such policies, there are also significant costs. Because resources are indeed scarce, reducing the nation's vulnerability to foreign oil embargoes requires sacrifice. If it is to be achieved through increased domestic production, large expenditures may be required for further exploration and for research and development of alternate sources of energy. If it is to be achieved by reducing domestic consumption, money will have to be spent on better insulation, more efficient engines, and improved heat-recovery systems. Moreover, we will have to get along on less energy consumption even when embargoes are not underway. Tariffs and quotas also impose these kinds of costs since they are simply tools designed to increase production and decrease consumption. And because they do so by raising the price of energy, they also bring about higher gas prices, higher heating fuel costs, and higher prices of goods whose production requires large amounts of energy. Even an oil storage policy, which is not designed specifically to reduce consumption or increase production, may require considerable sacrifice in the form of large expenditures on oil storage facilities.

THE QUESTION OF POLICY

As is the case with so many economic problems, hard choices must be made among competing ends. To protect the nation from

[4]In addition to avoiding or reducing the impact of embargoes, policies designed to make the nation more self-sufficient in energy can also help the balance of payments problem. However, since fluctuating exchange rates tend to correct imbalances in the balance of payments, this advantage may not be a very significant one.

future oil embargoes, substantial sums may have to be expended and hardships may have to be endured. This means that the benefits of reducing the country's vulnerability to foreign oil embargoes must be weighed against the costs of bringing about such a result.

In such circumstances, economists often apply a simple rule: increase the activity so long as the additional gain that results exceeds the additional cost. In the present case, this means that it is worthwhile to increase activities such as research and development efforts, oil storage programs, tariffs or quotas, and conservation programs only to the point where the additional gain associated with insulation from embargoes equals the increased costs of such efforts. Beyond such a point, devoting more resources to the effort simply will not pay.

Where this point lies is always difficult to determine without further information.[5] This framework, however, does establish the probability that a number of policies designed to reduce our vulnerability to foreign embargoes—tariffs, research and development, and oil storage, for example—may indeed be justified *up to a point*. But perhaps more important, it can prove useful in analyzing the desirability of a much publicized goal—that of achieving complete energy self-sufficiency.

COMPLETE ENERGY SELF-SUFFICIENCY?

To reduce the nation's dependence on unstable sources of foreign energy is one thing; to eliminate it is another. This difference in degree can be extremely important. It is no doubt possible to achieve total energy self-sufficiency even in the near future if we are willing to pay the price for it. Imports of foreign energy can be prohibited by quota, extreme conservation measures can be imposed, or tariffs can be set high enough to discourage all imports of oil, causing the price of energy to rise until the domestic supply of energy satisfies domestic demand. (See Box 2.) All of this can be done, but is a policy of energy self-sufficiency, carried *to this extreme*, worth the costs? There are a number of reasons to suggest that striving for total self-sufficiency, at least in the near future, may not be worth the sacrifice.

Those Last Steps toward Self-Sufficiency. One reason is that as the U. S. approaches energy self-sufficiency, the cost of taking such additional steps may increase, while the advantage of making an already relatively self-sufficient nation still more sufficient may not be great. The additional costs are particularly important. The nation moves toward energy self-sufficiency by expanding domestic production and reducing domestic demand, but the further that either of these activities are pursued, the greater will be the sacrifice required. Expanding domestic supply in the near future will require that we turn to increasingly costly methods of energy production, and reducing domestic consumption will require that increasingly high-valued uses of energy be abandoned. The sacrifice required to change the thermostat from 75 to 65 degrees may not be great, but that required by an additional 10-degree twist of the dial may be substantial. It is for these reasons that total energy self-sufficiency, at least in the near future, may be too much of a good thing. Put simply, the gain from making those last steps toward energy self-sufficiency may not be worth the higher costs required to complete the trip. It may be better to settle for something less.

Risk-Free Sources of Foreign Energy. Not all of the oil currently being imported into this country comes from the politically volatile

[5] On the one hand, if the probability of a recurrence of last year's embargo is low, as many believe, then the fruits of even the smallest efforts to reduce the nation's vulnerability to foreign oil embargoes may not be worth the cost. On the other hand, if the probability of recurring embargoes is high, then substantial efforts may be justified.

BOX 2

THE "PRICE" OF ENERGY SELF-SUFFICIENCY

A rough idea of the energy prices required to achieve energy self-sufficiency by 1980 can be obtained from a number of supply and demand estimates presented below.

ENERGY EQUILIBRIUM IN 1980

Fuel	Millions of Barrels of Oil per Day Equivalent, at Prices Per Barrel*		
	$7	*$9*	*$11*
Domestic Supply			
Crude oil and natural gas liquids	10.6	10.7	10.9
(including Alaskan)	(2.0)	(2.0)	(2.0)
Natural gas	14.7	14.5	14.4
Coal	6.1	8.0	8.0
Uranium and hydroelectric	5.2	5.2	5.2
New technology	0.0	0.0	0.1
Total Supply	36.6	38.4	38.6
Domestic Demand	44.2	42.4	40.6
Net imports	7.6	4.0	2.0

SOURCE: *Energy Self-Sufficiency, An Economic Evaluation* (Washington: American Enterprise Institute for Public Policy Research, 1974), p. 8.

*A fuel is made "oil equivalent" by finding the number of barrels of oil which has the same heating value as a given quantity of that fuel.

These estimates, which were derived from a number of statistical studies, indicate the supply of different fuels and the total domestic demand for energy that can be expected at the prices of $7, $9, and $11 per barrel (in constant 1973 dollars). As economic theory would suggest, higher prices mean more energy will be produced domestically and less of it will be consumed.

But here is where part of the problem of energy self-sufficiency emerges. As should be noted from the Table, the expected supply of various types of energy in 1980 is relatively unresponsive to price increases. In addition, the reduction in domestic demand for energy that can be expected to result from a price increase is estimated to be quite small. This means that in order to reach the point at which domestic supply equals domestic demand, which is required if no energy is to be imported, we may have to pay prices significantly higher than $11 per barrel (in constant 1973 dollars). As can be seen, this is significantly higher than the price of energy that would be required if we relied on some imports.

Middle East. Much comes from countries that are less likely to institute embargoes. A sufficiently restrictive policy can eliminate imports from relatively secure sources just as well as it can eliminate those from insecure sources. But why bear the cost if little is to come out of it? The primary gain from reducing imports is the reduction in periodic disruptions resulting from embargoes, but if a source of supply is relatively secure, there is little reason to incur the higher costs required to eliminate such imports. This means that policies should be less restrictive toward secure sources of foreign energy than those required by insecure sources—yet another reason to question the advisability of total energy self-sufficiency.

Oil Storage. If the goal of complete energy self-sufficiency means eliminating all oil imports, then the advantage of oil storage policies is another reason why the goal may not be desirable. If the cost of storing oil and using it during embargoes is not excessive, it may well pay to store at least some oil to smooth out the disruptions when they occur.[6]

But if a policy of oil storage is undertaken, what does this mean for the goal of self-sufficiency? Simply stated, it reduces the need to eliminate all imports. A substantial part of the gain from reducing imports is the resulting reduction in the economic impact of embargoes. But if a storage policy is instituted, embargoes become less serious, thus reducing the gain to be obtained by eliminating all oil imports. This does not necessarily mean that all efforts to increase energy self-sufficiency should be abandoned in the presence of a storage policy. Some movement toward self-sufficiency may still be justified. However, it does provide yet another reason to question the goal of independence from all sources of foreign energy.

CONCLUSION

Uncle Sam's arsenal contains many weapons that can be used to reduce the nation's vulnerability to periodic oil embargoes. Some, such as voluntary conservation programs and mandatory conservation through rationing, are designed to reduce domestic consumption. Others, such as efforts to develop alternative sources of energy, are designed to increase domestic production. Still others, such as oil storage policies, are designed to soften the blow of periodic embargoes without significantly reducing overall imports. Because all are costly, however, a proper balance must be struck between the gains and costs resulting from their use. Reducing the nation's vulnerability to a sudden oil embargo is important, but so too are the substantial sacrifices required to do it. Since periodic oil embargoes can cause serious economic disruptions, it may well pay to reduce our dependence on foreign sources of energy, at least to a degree. But running the full distance to achieve total self-sufficiency in the next few years may simply not be worth the cost required.

[6]Storage can take the form of either increasing domestic reserve capacity or stockpiling oil purchased abroad. The question of whether reserve capacity or storage from foreign sources is better is a simple cost calculation. If the landed price of foreign oil plus storage is less than the incremental cost of developing domestic capacity, then storage of foreign oil is preferable, and vice versa.