

THE ENERGY QUESTION: ITS NATURE AND SCOPE

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The Resources for the Future (RFF) book, Energy in America's Future: The Choices Before Us (1979), contains a wealth of both interesting and boring facts. A boring fact is one that is not related to a coherent view of the world. An interesting fact is related to a coherent view of the world, either because it supports that view, or because it contradicts it. RFF offers two alternative visions of the world by which their mountains of otherwise boring facts can be integrated and rendered interesting. These basic views on the nature and scope of the energy crisis are set forth explicitly in Chapter 15, "Conflicting Perceptions of Energy's Future Role," and are referred to as the "Expansionist View" and the "Limited View." RFF thought this chapter interesting enough to reprint in their bulletin Resources. They point out that "Energy has become the testing ground for conflict over broader social choices" (p. 543). These broader social choices also are rooted in the Expansionist vs Limits conflict.

For those familiar with Amory Lovins' work, the Expansionist View underlies the Hard Energy Path and the Limited View underlies the Soft Energy Path. These two views will be considered in detail later, but first some preliminaries.

(1) To call the view that limits are real and important the "Limited View" may signal a slight prejudging of the issue, or it may just be careless writing. I suggest we change the name to "Limits View," because I will argue that in fact it is the Expansionists who hold a limited view, who are dealing with a special case, and that it is the Limits View that deals with the general case.

(2) There is a confusion about compromise. RFF states, "Two diametrically opposed world views have tended to influence broad energy policy choices. The inability of adherents of these extreme views to agree has stymied progress toward solving energy-related problems, and the conflicts that have occurred have already poisoned the prospects for compromise in the future." Notice that the authors are looking for a compromise between what they have just called "two diametrically opposed world views." This reflects a deep confusion. Compromise is a good way to settle conflicts of interest—it is not a proper method for resolving conflicting judgments of fact, conflicting views about the way the world really is. Reality is undemocratic and uncompromising.

RFF wants to play the game of "let's be judicious and choose the middle between two extremes." Moderation has its virtue, but also its limits. For one thing the "extremes" can be arbitrarily placed so that the halfway point coincides with one's own preferred position. But I hasten to add that RFF did not do this. I think they played fair in defining the two "extreme" positions. They took them as they found them. But I think they are wrong to look for a compromise somewhere in between.

Let me clarify that with an analogy. If one group of extremists says the world is a flat, infinite plane and the other says it is a finite sphere, then RFF would search for middle ground. It would probably say the world is a cylinder. To the flat earth school it would say, yes, the earth is a plane, but it is a plane wrapped around a sphere. To the round earth people it would say, yes, the world is a sphere, but it

has a plane wrapped around it. Both sides would save face by being partly right, RFF would win a reputation as being wise and judicious, the cylindrical view would prevail, and policies could then be enacted on that consensus, and a good feeling of cooperation would replace the stress and bitterness of conflict.

But--are we better off with the compromise? Think about it! Before the compromise at least some people were correct--afterward everyone was wrong. But we feel good about it. One might reply that everyone is half-right and no one is totally wrong anymore. But I would insist, with apologies to Mercator's projection, that the world is not a cylinder, and even if that were considered a half-truth I reply that a half-truth is often more dangerous than a total error because limited success with it breeds unwarranted confidence, setting us up for the really big mistake--like a stinging operation.

Yet RFF says, "The best hope for achieving a workable national energy policy, in fact, lies in the strong likelihood that a large number of U.S. citizens fall in the broad spectrum between those opposing attitudes. Therein rests our optimism about achieving a nationwide consensus on energy policy."

I want to take issue with that. I want to argue that the Limits View is correct, the Expansionist View is wrong, and that our best hope for consensus lies not in a pseudo-compromise between contradictory judgments of both fact and value, but rather lies in our commitment to objective truth and our willingness to argue and disagree honestly until consensus emerges as a by-product of the quest for truth. It is not enough that a policy be politically workable--it must be right. Understanding comes from "standing under" the dictates of things as they are, not as they would have to be in order to reconcile conflicting popular views. The literal meaning of compromise is a "mutual promise." Mutual promises help us resolve conflicts of interest; but it makes no sense for us to promise each other that the world is a cylinder, just so we can stop arguing and start doing something. Twenty years ago there was a nearly unanimous consensus in support of the Expansionist View. But it was a very unfortunate consensus. True, the consensus rendered policy-making easier; and those expansionist policies led right to the present crisis.

Instead of a compromise we need a paradigm shift. We need to reorder our perceptions and actions according to the Limits paradigm rather than the Expansionist paradigm. That is a radical change, not a compromise. Once we have accepted the Limits View, we must reorient our policies. There is a legitimate role for compromise in deciding how fast we can change directions and with what speed we should try to move from an expansionist society to a steady-state society.

It remains now to consider RFF's characterization of the two opposing views, and to present reasons for rejecting the Expansionist View and accepting the Limits View. I will use RFF's definitions of the two views.

Expansionist View

1. The expanded production of goods and services and the increases in per capita consumption that have characterized western economies since the industrial revolution are good, and have yet to run their course.

2. The benefits of economic growth have yet to be spread as widely as they might be.

Limits View

1. Expansion has already overshoot the ability of the earth to sustain it, and its benefits have been overestimated.

2. Redirection of output, restructuring of production, and redistribution of wealth are urgently required if disaster of various types is to be avoided.

3. While some redirection of effort may be necessary to accommodate such growing problems as environmental degradation and population explosion, no fundamental change is needed now.

3. Changes in value systems and life-styles are required and can be achieved; these changes demand that new institutions gain ascendancy.

Let's go back and take these three sets of contrasting tenets one at a time and analyze them.

1. "Expanded production is good, and has yet to run its course." Do they mean expanded or expanding? Is it the very process of expanding that is good, or is it the act of having expanded to some sufficient level after which there is no further expansion? The notion that expansion has yet to run its course seems to suggest that some point it will have run its course, and that the expanded state will not be subject to further expansion. This implies a recognition of limits—but at some vague intermediate date. But our economy is designed for growth, not stability, not even stability at an expanded level. Since no attention is given to the problem of maintaining stability at the expanded level, one suspects that maybe they really mean ever-expanding, not just expanded, production. This ambiguity runs throughout the book. But let's take them literally at their word and assume expanded refers to a state, albeit undefined.

Expanded production is declared good. But does not that depend on what has been expanded to what? On whether production has been expanded from starvation to subsistence; or from subsistence to sufficiency; or sufficiency to luxury; or from luxury to self-indulgent extravagance. Whether "expanded production" is good depends on what level is being expanded.

The idea that expansion has yet to run its course seems to mean that there are limits in the future, but we are not there yet, and we don't need to worry about them until we get a lot closer.

The Limits view says expansion has not only run its course, it has overrun its course—we have overshot sustainable capacity and that further growth costs us more than it is worth. The marginal benefits of growth fall as the expansion is less from subsistence to sufficiency and more from sufficiency to luxury; and the marginal costs rise as greater energy use becomes more polluting, more dangerous, and leads to faster depletion. We have underestimated costs and overestimated benefits. Costs are rising faster than we thought; benefits are falling faster than we thought, in the margin.

Direct evidence that we have overshot the sustainable capacity of our renewable resource base has been compiled by resource economist Lester Brown.

The renewable resource base consists of four natural systems: forests, fisheries, rangelands, and croplands. Even an industrial society remains totally dependent on these natural systems. The natural productivity of these systems has been increased by subsidies and nonrenewable fossil fuel and mineral inputs. Even with the aid of these subsidies there is good evidence that global per capita productivity of each of the four natural systems has peaked and is now declining. (See Lester R. Brown, "Trends and Population Policy: A Time for Reassessment," *Worldwatch* No. 29, May, 1979, Washington, D.C.)

a) Forest productivity as measured by cubic meters per capita per year, peaked in 1967 (at 0.67 cubic meters).

b) Fisheries productivity as measured by kilograms of fish caught per year per capita, peaked in 1970 (at 19.5).

c) For grasslands we can look at annual per capita output of wool, mutton, and beef. Wool peaked in 1960 (at 0.86 kilograms); mutton in 1972 (at 1.92 kilograms); and beef in 1976 (at 11.81 kilograms).

d) Croplands productivity as measured by kilograms of cereals per capita per year, peaked in 1976 (at 342 kilograms).

Several caveats could be raised about the interpretation of these numbers: falling wood use per capita may reflect the substitution of other materials for wood, particularly plastics and aluminum; likewise reduced wool per capita may reflect the substitution of artificial fibers for wool rather than the limits of rangeland capacity. The statistics on fish catch pretty clearly reflect natural limits because fishing effort has increased at the same time that catch has fallen. Nor do there seem to be any substitutes for basic cereal crops.

But the effect of substitution does not really change the overall picture of limits, for two reasons: First, the prevailing levels of productivity were reached in the first place only with the aid of large subsidies of non-renewable fossil fuels and minerals in the form of fertilizers, insecticides, irrigation systems, mechanized equipment and transport. It is difficult to believe that existing levels of output per capita can be maintained, much less surpassed, as we deplete the remaining petroleum reserves, and as world population continues to grow. Second, it is also sobering to note that most of the substitutes for natural products (such as plastics and artificial fibers) are themselves petroleum derivatives. During the era of petroleum bonanza annual world oil output per capita rose from 1.52 barrels in 1950 to 5.29 barrels in 1977. In 1978 it fell slightly to 5.23, and it looks as if 1977 will prove to have been the peak year for per capita oil consumption. As the oil subsidy dries up, the productivity of renewable resource systems is sure to fall more rapidly. As this happens there is a danger that in trying to maintain our accustomed standards we will overexploit renewable resources systems, thereby lowering their future sustainable yields, and thus reducing the capacity of the earth to support life in the future.

It is the explicit goal of most nations to attain a standard of consumption equal to that of the United States. This may be possible for a few nations, but not for the vast majority of the world's 4.5 billion people. It now requires one-third of the world's annual output of mineral resources, including energy, to support less than six percent of the world's population residing in the U.S. It follows that present world resource flows could support at most eighteen percent of the world's population living at average U.S. standards. That would leave nothing for the other eighty-two percent, who must get at least a subsistence, or else the rich eighteen percent would have to do their own dirty work in which case being rich wouldn't mean much. To generalize U.S. consumption standards to the entire world would first of all require about a six or seven-fold increase in current resource production flows. When we add the further increase required to make up the difference in past accumulations, plus the effect of diminishing returns resulting from our having exploited the most accessible resources first, then it would seem conservatively that we are talking about a twenty-fold increase in world resource flows. Even assuming that such an increase could by some miracle be achieved, for how long could it be sustained? There is already persuasive evidence that current flows are unsustainable. Therefore the first step in thinking about economic development should be an impossibility theorem: a U.S.-style high mass consumption economy for a world of

or and a half billion people is impossible. Even if it could be achieved, it would be mortlived. Even less possible is the expansionist dream of an ever growing standard consumption for an ever-growing population. Conclusion: on the first and crucial premise the Expansionists are wrong and the Limits adherents are right.

2. The second thesis of the Expansionist view is that "the benefits of economic growth have yet to be spread as widely as they might be." It makes little sense to say "might be--they really mean should be." Anything can be more or less than it ought be--who cares? Witness the economists' acute embarrassment at making a value judgment. "That the benefits of economic growth have yet to be spread as widely as they should be" is a statement with which I heartily concur. What conclusion follows from it? That we need more growth? No, that is a total non-sequitur. It says "past growth has not improved distribution very much, therefore more growth will." A non-sequitur. If the benefits of past growth have yet to be distributed fairly, then we need fairer distribution, not more growth.

It might be argued that the expansionists' plan is for the growth dividend to go entirely or mostly to the poor, thereby effecting redistribution by means of growth. But our economy is not designed to grow in such a way as to benefit mainly the poor. What grows is the reinvested surplus and that belongs to the rich not the poor. They do not get the trickle down benefit of full employment. They are allowed to share only in the economy's toil, but not in its surplus. More growth does not reduce inequality unless specific redistributive measures are taken. But no such measures are advocated by most expansionists. The expansionists' message to the hungry is, "eat them eat growth."

From the Limits perspective, there is no alternative to redistribution. We cannot substitute growth for redistribution any more than we can substitute technology for morality. As the burden of scarcity becomes heavier, it becomes all the more necessary that the burden be borne equitably. The Expansionists with their non-sequiturs, yet-to-be's and might-be's simply have not faced the issue. They believe that all need for sharing will be washed away in a sea of future abundance, guaranteed by the amazing grace of compound interest.

3. Recall the third tenet: "While some redirection of effort may be necessary because of pollution, etc., no fundamental change is required now."

If one mistakenly believes that expansion has yet to run its course, and further mistakenly believes that expansion solves problems of distribution, then it is vitable that one should also mistakenly believe no change is required now. Let's give credit for logical consistency. But this emphasis on now does indicate a certain willingness to dump problems on the future. If current actions lead to problems only in the future, then we need not make any changes now--let the future make the necessary changes, whenever.

In contrast, the Limits view urges changes in behavior and institutions now. The changes required do not so much require "new values" as new behavior that is in conformity with the traditional Judeo-Christian idea of the brotherhood of man under the Fatherhood of God the Creator. The responsibility of man as steward vice-regent of God's creation is taken with new seriousness; brotherhood and the aims of social justice receive new emphasis, and the concept of brotherhood is extended to include future generations and sub-human creatures, in some appropriate degree. The capacity of the earth to support life is limited and must be shared not only among those now living, but also with future people and sub-human life. If limits exist then sharing is necessary. If one doesn't want to share, then it is

convenient to deny the importance of limits. Technology can loosen the limits but cannot remove them. We should avail ourselves of sound technologies, but should not grow to the scale at which we desperately have to accept every technical adventure that comes along just to satisfy our bloated energy appetite.

The opposition between the Expansionist and Limits view is like that between the special case and the general case: like Newtonian versus Einsteinian physics. Physicists do not speak of a compromise between the extreme views of Newton and Einstein. The accepted general view is that of Einstein. Newtonian physics is a special case that is valid for phenomena that are far away from the physical limits of smallness of size and speed of movement. As we approach the limits of the speed of light and the size of elementary particles, the special case breaks down. Likewise the Expansionist view works in the special case when the economy is far from the limits of the carrying capacity of its environment. But as the limits are approached, we must shift from the special case to the general case. There is no question of compromise--the issue is one of subordination of the special case to the general case, subordinating the Expansionist view to the Limits view. As evidence that this subordination is occurring, I point to RFF itself. Ten years ago they were totally in the Expansionist camp. Now they are looking for a halfway point. I predict that their attempts to compromise with the Limits view will lead to their being swallowed by it, because the general case always swallows the special case. I used to be an Expansionist, too, and I predict that what happened to me will happen to others.

But one should not underestimate the strength of the Expansionist view because it is sustained by devout faith in technology and science. To illustrate that faith, let me offer a quotation from one Nobel laureate criticizing the views of another.

Robert A. Millikan writing in 1930 was commenting on the view expressed earlier by Frederick Soddy that there might be a great deal of energy to be tapped in the atoms of radioactive elements--and that this would be a mixed blessing at best, because if history was any guide, mankind would use this energy to make bombs of great force. Here is Millikan's comment:

Since Mr. Soddy raised the hobgoblin of dangerous quantities of subatomic energy, science has brought to light good evidence that this particular hobgoblin--like most of the hobgoblins that crowd in on the mind of ignorance--was a myth. . . . The new evidence borne of further scientific study is to the effect that it is highly improbable that there is any appreciable amount of subatomic energy to tap. (Scribner's Magazine 87 (2) 1930, p. 121, "Alleged Sins of Science")

With hindsight we can see that Soddy was the true prophet and that Millikan was whistling in the dark. But that is not the main point, for Millikan went on to tell those who had been frightened by Soddy's hobgoblin that they,

May sleep in peace with the consciousness that the Creator has put some foolproof elements into his handiwork, and that man is powerless to do it any titanic physical damage. (Ibid., p. 121)

I suppose hardly anyone would say that today. It now appears that the only protective element the Creator put into his handiwork is humanity's capacity for moral insight and self-restraint--and that is far from foolproof. And yet I believe that this naive faith expressed by Millikan is still tacitly held by many Expansionists.

he Expansionist drive for more energy and bigger technology rests on the faith that our scientific and technical ventures will not, in the words of Robert Sinsheimer, displace some key element of our protective environment and thereby collapse our ecological niche."

Such a collapse of our ecological niche (brought about perhaps by CO2 buildup, contamination of the biosphere with plutonium, depletion of the ozone shield, or of course nuclear warfare) is still usually regarded as a hobgoblin that crowds in on the minds of the ignorant. In fact those hobgoblins are as real as the one Soddy saw. The happy technologists just never learned about ecology or about the problem of oil back in Nuclear Science 101. While the Expansionists urge us on in our blind, overextended quest to maximize present pleasure, the Limits school tells us that we should better worry instead about minimizing future regrets.

We Christians must never abandon hope, but we would do well to abandon optimism. The Limits view is not optimistic in the bullish sense of Chamber of Commerce boosterism, but it is hopeful in its faith that we can discern the truth about limits and sufficiency and bring our individual and collective attitudes and behavior into conformity with that truth. Toward this end the first step is to withdraw from the cheering Expansionist pep rally long enough to give the dust of nitride and the pallor of evil a chance to settle properly and sink into our perceptions, lest our Christian hope become confused with the wooden idol of technological optimism.