

ERDA AND THE CONGRESSIONAL ACTS

This section weighs issues regarding ERDA's Plan and Program against provisions in two Congressional Acts. The purpose is to compare ERDA's direction with Congressional intent.

The specific issues used in the comparison are the 16 major issues identified by OTA's Overview Task Group. These are explained in detail in Chapter I.

The laws applied as yardsticks are (1) the Federal Nonnuclear Energy Research and Development Act of 1974 (PL 93-577), and (2) the Energy Reorganization Act of 1974 (PL 93-438). The first law established the comprehensive Federal program for energy R, D&D, and the second law established ERDA and designated it as the lead agency in the program.

1. The Nature of the National Energy Policy Goals

Issue: The national energy policy goals as stated by ERDA deserve review and clarification.

The R, D&D Act: Sec. 3(b)(1): "The Congress declares the purpose of this Act to be to establish and vigorously conduct a comprehensive national program of basic and applied research and development including but not limited to demonstrations of practical applications of all potentially beneficial energy sources and utilization technologies within the Energy Research and Development Administration."

Critique: ERDA's Plan states five national energy goals to which energy R, D&D should contribute. Summarized briefly, they are national security and policy independence, . . . a healthy economy, . . . preservation of life style options, . . . aid to world stability. . . and protection of the environment.

These goals and the emphasis among them warrant careful Congressional review.

Such review would seem important first because the goals provide the policy framework for ERDA's Plan and Program. Unless there is agreement between the Administration and

Congress on these fundamental policy guides, serious disagreement and delay could well occur with respect to ERDA's establishment and implementation of the R, D&D effort.

And Congressional review would seem to take on additional importance when the great potential impact of priorities among the goals is considered. For instance, ERDA's emphasis on the goal of self-sufficiency as opposed to the goal of environmental concerns will have major consequences for future quality of life and economic well-being. Similarly, the emphasis on self-sufficiency rather than international cooperation will have major impacts on our foreign policy.

2. Overall Level of the Federal Budget for Energy R, D&D

Issue: The overall level of the Federal budget for energy R, D&D (about \$2.3 billion for FY 1976) was largely an outgrowth of decisions made prior to the Arab oil embargo, and should be re-examined.

The R, D&D Act: Sec. 2(c): "The Congress hereby finds that the urgency of the Nation's energy challenge will require commitments similar to those undertaken in the Manhattan and Apollo projects; it will require that the Nation undertake a research, development, and demonstration program in nonnuclear energy technologies with a total Federal investment which may reach or exceed \$20 billion over the next decade."

Critique: The scale of the present Federal energy R, D&D program appears heavily influenced by two factors.

First, in December 1973, there appeared the Dixy Lee Ray Report to the President on energy R, D&D. This report, largely prepared before the oil embargo, was geared to an \$11 billion 5-year program of energy R, D&D.

The second factor is the \$20 billion, 10-year guideline supplied by Congress in Section

2(c) of the energy R, D&D Act, as quoted above.

The proposed Federal energy R, D&D budget is now within the guidelines set forth by the Dixy Lee Ray Report. However, in view of the country's post-embargo emphasis on energy independence, it is by no means clear that this budgetary framework is adequate.

As possible alternatives, ERDA should prepare R, D&D programs for higher overall budget levels, e.g., \$20 billion and \$30 billion for the 5 years beginning FY 1976. (It should be noted that the Congressional guideline cited above provides that the budget might reach or exceed the ten-year \$20 billion level,)

3. The International Aspects of ERDA's Plans and Programs

Issue: The ERDA program does not place sufficient emphasis on international considerations,

The R, D&D Act: Sec. 6(b)(2) establishes a basic objective for the R, D&D program. "This program shall be designed to achieve solutions to the energy supply and associated environmental problems in the immediate and short-term (to the early 1980's), middle-term (the early 1980's to 2000), and long-term (beyond 2000) time intervals, In formulating the nonnuclear aspects of this program, the Administrator shall evaluate the economic, environmental, and technological merits of each aspect of the program."

Critique: If ERDA's program is *to achieve* solutions to energy problems, its concern should reach beyond our national borders. In today's interdependent world, the goals of energy independence, economic well-being, and environmental quality are unlikely to be fulfilled without considering international factors.

In its overall plan, ERDA identifies such international considerations. But in its implementing program, it barely recognizes them.

Under a program truly designed to solve energy problems, ERDA might well launch vigorous research efforts with respect to the global environmental effects of energy generating technologies; the management of energy supply technologies significantly affecting the seas; the joint creation of targets of energy conservation among the major energy consumer nations,

4. Coordination of Programs Between ERDA and Other Federal Agencies

The Issue: ERDA's plans for coordination with other Federal energy agencies need to be more fully developed,

The Energy Reorganization Act: Under this Act, ERDA was established as a key instrument to meet national energy objectives: Sec. 2(b): "The Congress finds that, to best achieve these objectives, improve government operations, and assure the coordinated and effective development of all energy sources, it is necessary to establish an Energy Research and Development Administration to bring together and direct Federal activities relating to research and development on the various sources of energy, to increase the efficiency and reliability y in the use of energy, and to carry out the performance of other functions, including but not limited to the Atomic Energy Commission's military and production activities and its general basic research activities. In establishing and Energy Research and Development Administration to achieve these objectives, the Congress intends that all possible sources of energy be developed consistent with warranted priorities. "

Critique: As the above provision indicates, Congress has given ERDA a strong mandate as the lead energy R, D&D agency with responsibility to integrate and coordinate national efforts,

However, the ERDA Plan indicates a timidity in accepting this leadership. It is not evident in the Plan whether a comprehensive framework is being established to permit ERDA to perform the role.

The consequences could be costly,

For instance, three separate Federal agencies are now exploring technologies for coal cleanup. Without a formal structure to bring together these diverse efforts, much waste could ensue without any assurance that a technology will be successfully developed,

And without coordination, agencies concerned with different elements of a given energy technology might work at cross purposes, Regulatory requirements might clash with economic policies; technological priorities might conflict with environmental standards.

5. Cooperation Between ERDA and State and Local Governments

Issue: Success of the ERDA Program will depend in large measure on close and continuous coordination with State and local governments. The ERDA Plan does not indicate procedures or mechanisms for accomplishing this coordination.

The R, D&D Act: In Sec. 8(D)(1)(A), ERDA is instructed to establish procedures to insure that Federal energy R&D assistance addresses the full range of energy problems—from extraction to end-use—in various regions under “real life” conditions. “The Administration shall, within 6 months of enactment of this Act, promulgate regulations establishing procedures for submission of proposals to the Energy Research and Development Administration for the purposes of this Act. Such regulations shall establish a procedure for selection of proposals which (A) provides that projects will be carried out under such conditions and varying circumstances as will assist in solving energy extraction, various *areas and regions*, under representative geological, geographic, and environmental conditions . . .”

Critique: If the Federal R&D program is to be realistically conceived and effectively implemented, an objective emphasized by Congress in the above provision, full State and local participation would seem essential.

For instance, the success of energy programs will depend heavily on appropriate water allocation, reasonable land use regulation, realistic taxing policies, consistent environmental controls, and ultimately, on public acceptance. In all of these areas, State and local levels possess strong capabilities and valuable experience.

In its language, the ERDA Plan gives recognition to the need for a strong State and local role. But in its specifics, the Plan does not provide procedures or mechanisms for accomplishing this participation.

6. Near-Term Energy Problems

Issue: ERDA’s Program gives very little attention to near-term (next ten years) energy problems.

The R, D&D Act: Sec. 6(b)(2): “This program shall be designed to achieve solutions to the energy supply and associated problems in the immediate and short-term (to the early 1980’s), middle-term (the early 1980’s to 2000), and long-term (beyond 2000) time intervals. In for-

mulating the nonnuclear aspects of this program, the Administrator shall evaluate the economic, environmental, and technological merits of each aspect of the program.”

Critique: Rhetorically, ERDA’s Plan recognizes the need to address the Nation’s immediate, practical energy problems, as well as the basic, longer term questions. In fact, the plan’s first strategic element is to “insure adequate energy to meet near-term needs until new energy sources can be brought on line.”

And specific aims are cited in ERDA’s near-term program: Enhanced gas and oil recovery, direct use of coal, more nuclear reactors, shifting demand away from petroleum, and increased conservation practices.

But these intentions are not reflected in the “bottom line”—in the actual ERDA budget. Of the agency’s total FY 1976 budget of about \$1.8 billion, the only items relevant to the next decade are \$80 million in funds for energy supply efforts and less than \$7 million for end-use energy conservation.

7. Socio-Economic Research

Issue: ERDA’s program of R, D&D does not give enough attention to socio-economic analysis and research in addressing the Nation’s energy problems.

The R, D&D Act: Sec. 5(a)(2): “The environmental and social consequences of a proposed program should be considered in evaluating its potential.”

Critique: ERDA’s program plans, budgetary commitments, and professional staffing do not seem to give adequate priority to social, economic, environmental, and behavioral research needs, even though the Congressional mandate makes clear that ERDA is given responsibility beyond “technological” R, D&D.

“Nonhardware” research is needed for two reasons: (1) to better understand the relationships of energy and the quality of life, and (2) to identify nontechnological constraints to increased energy supply or reduced energy demand.

For instance, the Nation’s energy R, D&D effort is confronted with this major issue: The social concern and community resistance which have become associated with virtually every energy supply technology.

Unless this “nonhardware” question—the attitude of the public—is examined and carefully

weighed in evaluating energy options, massive investments in new energy supply or conservation technologies may never bear fruit.

8. Balance Between Supply Versus Demand R, D&D

Issue: ERDA's Program overemphasizes supply technologies relative to energy consumption.

The R, D&D Act: Sec. 5(a)(1): "Energy conservation shall be a primary consideration in the design and implementation of the Federal non-nuclear energy program, For the purposes of this Act, energy conservation means both improvement in efficiency of energy production and use, and reduction in energy waste."

Critique: Most of the programs inherited' by ERDA emphasize large-scale projects to increase energy supply, especially through nuclear and coal technologies,

Yet as is clear in the above provision, Congress directs that a strong emphasis also be given to R, D&D on the consumption side of the energy equation.

Such a priority has not yet been fully developed by ERDA. In fact, only about two percent of the revised FY 1976 budget sent to Congress can properly be termed applicable to "conservation" activity.

Additionally, ERDA's conservation program focuses primarily on the near-term, underestimating long range potential.

In weighing the long-term advantages between "supply" and "consumption" technologies, ERDA should give fuller consideration to cost-effectiveness, time to pay off, environmental benefits and costs, and demand on resources.

9. ERDA's Basic Research Program

Issue: The goals of ERDA's basic research program have not yet been established. Considerable effort is required to organize a pertinent program of basic research.

The R, D&D Act: Sec. 3(b)(1): "The Congress declares the purpose of this Act to be to establish and vigorously conduct a comprehensive national program of basic and applied research and development."

Critique: Applied R, D&D aside, ERDA's program for basic research has largely been inherited from the agencies which it incorporated.

For instance, in the FY 1976 budget, virtually all the basic research funds are devoted to nuclear power and high energy science.

While these activities are important, the basic research program should be organized to better reflect the needs and objectives identified in ERDA's R, D&D Plan,

For instance, there is a need to strengthen basic research efforts in nonnuclear aspects of materials, combustion, fuel chemistry, environmental processes, social sciences, and other disciplines pertinent to the non-nuclear ERDA programs,

10. Commercialization

Issue: The development of effective commercialization policies and procedures is not adequately addressed in the ERDA Plan,

(a) The R, D&D Act: Subsections 5(b)(1) and (2):

"(1) Research and development on non-nuclear energy sources shall be pursued in such a way as to facilitate the commercial availability of adequate supplies of energy to all regions of the United States.

"(z) In determining the appropriateness of Federal involvement in any particular research and development undertaking, the Administrator shall give consideration to the extent to which the proposed undertaking satisfies criteria including, but not limited to the following:

"(A) The urgency of public need for the potential results of the research, development, or demonstration effort is high, and it is unlikely that similar results would be achieved in a timely manner in the absence of Federal assistance.

"(B) The potential opportunities for non-Federal interests to recapture the investment in the undertaking through the normal commercial utilization of proprietary knowledge appear inadequate to encourage timely results,

"(C) The extent of the problems treated and the objectives sought by the undertaking are national or widespread in their significance.

“(D) There are limited opportunities to induce non-Federal support of the undertaking through regulatory actions, end-use controls, tax and price incentives, public education or other alternatives to direct Federal financial assistance.

“(E) The degree of risk of loss of investment inherent in the research is high, and the availability of risk capital to the non-Federal entities which might otherwise engage in the field of the research is inadequate for the timely development of the technology.

“(F) The magnitude of the investment appears to exceed the financial capabilities of potential non-Federal participants in the research to support effective efforts. ”

Critique: The need for ERDA attention to “non-technical” concerns is well illustrated by the question of marketability.

For research supervised by the Department of Defense or NASA, there is little question of “a customer” for a new product or process. The agencies’ own needs usually will guarantee acceptance of the R&D results.

But the “market” for ERDA R, D&D output will be both diffuse and, in some cases, poorly defined. The potential outlet for the results of successful programs may range from large energy companies to the local homeowner.

Thus, it would appear that ERDA will need to undertake special efforts to insure that it does not develop products or processes that simply “won’t sell.”

Such protection could be provided in part by including comprehensive industrial and consumer participation in the planning phase of new projects. These groups probably would have the best perception of society’s requirements and the marketability of R&D output,

ERDA’s Plan does not recognize or recommend the utilization of this type of input into its decisionmaking, although the R, D&D Act appears to provide ample latitude for it to do so; as follows:

(b) The R, D&D Act: Sec. 7(a): “In carrying out the objectives of this Act, the Administrator may utilize various forms of Federal assistance and par-

ticipation which may include but are not limited to—

“(1) joint Federal-industry experimental, demonstration, or commercial corporations consistent with the provisions of subsection (b) of this section;

“(z) contractual arrangements with non-Federal participants including corporations, consortia, universities, governmental entities and nonprofit institutions;

“(3) contracts for the construction and operation of Federally owned facilities;

“(4) Federal purchases or guaranteed *price of* the products of demonstration plants or activities consistent with the provisions of subsection (c) of the section;

“(5) Federal loans to non-Federal entities conducting demonstrations of new technologies; and

“(6) incentives, including financial awards to individual inventors, such incentives to be designed to encourage the participation of a large number of such inventors, ”

Critique: Another major problem involved in bringing ERDA programs to the commercial stage is that of “blurred competitive horizons. ”

For example, although it is possible to estimate fairly accurately the cost of producing gasoline from oil shale, the oil-exporting nations can always lower the prices of oil to undercut the potential market. Thus, the construction of shale-oil extraction and refinement facilities will depend on some form of Federal subsidy.

Projects of this type may, therefore, never reach “commercialization” in the purest sense. It may in fact be desirable for the government to form special public agencies, such as Amtrak, to manage enterprises of this type. The formation of such enterprises could have significant impacts on the Nation’s basic economic structure.

The present ERDA Plan does not appear to address this important problem, Yet the R, D&D Act clearly provides the authority for wide-ranging study and use of Federal incentives and participant ion.

11. Resource Constraints

Issue: It is essential that careful attention be given to assessing energy resources, since they represent assumptions basic to the ERDA program plan.

The R, D&D Act: Sec. 4(a): "The Administrator shall review the current status of nonnuclear energy resources and current nonnuclear energy research and development activities, including research and development being conducted by Federal and non-Federal entities; . . ."

Critique: Incorrect assessments of the Nation's energy resource base could result in huge waste in the ERDA effort.

For instance, overestimates could lead to the development of a new energy infrastructure that would quickly run out of fuel.

Yet there is still a great deal of uncertainty regarding the nature and extent of our energy resources. Estimates vary widely for natural gas, oil, coal, and uranium.

Clearly, ERDA should give high priority to improvements in the methods used to estimate energy resource potential.

12. Physical and Societal Constraints

Issue: Numerous physical, institutional, and social constraints may limit the orderly development and implementation of the ERDA energy Plan.

The R, D&D Act: Sec. 6(a) requires the preparation and annual updating of the ERDA R, D&D Plan. It also contains the stipulation that the Plan be solution-oriented:

"Such plan shall be designed to achieve—

"(1) solutions to immediate and short-term (to the early 1980's) energy supply system and associated environmental problems:

"(z) solutions to middle-term (the early 1980's to 2000) energy supply system and associated environmental problems; and

"(3) solutions to long-term (beyond 2000) energy supply system and associated environmental problems. "

Critique: The above provision would appear to be critically important. It mandates an R, D&D effort directed not towards a means, such as new

hardware, but towards an end-workable answers to energy system problems.

The distinction is essential to make. Because of the pervasive nature of the energy problem, the solutions will only partly involve technology. They will require as well the identification and analysis of a myriad of nontechnological factors.

For instance, there are key institutional and social considerations: Manpower, capital needs, information access and dissemination, regional and community impacts of mining.

And there are crucial physical factors: water requirements, materials limitations, air pollution, land use, and net energy.

With Section 6(a), ERDA appears to have strong authority to comprehensively address these potential constraints, "

In its overall response, however, ERDA has taken a much narrower view. It concentrates on developing the technologies. This approach is apparent across the full spectrum of the ERDA R, D&D package—from conservation to nuclear power.

This narrow interpretation of the law gives rise to a fundamental concern: ERDA's R, D&D may produce a wide range of new technologies, without providing the wherewithal to implement them in the "real world."

And it poses a key policy choice: If the congressionally directed solutions-oriented effort is to be carried out, ERDA should broaden its approach . . . or the job of addressing the "non-hardware" issues should be assigned elsewhere,

13. Overemphasis on Electrification

Issue: The ERDA Plan appears to lean toward an overemphasis in electrification. This lack of diversity, especially in the long-term "inexhaustible" sources, may not be the most effective approach.

The R, D&D Act: Sec. 6(b)(3): "The Administrator shall assign program elements and activities in specific nonnuclear energy technologies to the short-term, middle-term, and long-term time intervals, and shall present full and complete justification for these assignments and the degree of emphasis for each. "

Critique: Breeder reactors, solar-electric systems, and fusion reactors all have basic characteristics in common: All are capital-intensive, have a low fuel cost, and are producers of electricity.

ERDA's emphasis on these as the three major

“inexhaustible” energy sources for the long-term poses serious concerns.

For instance, there may not be sufficient private capital to support almost total reliance on capital-intensive energy technologies. As a consequence, massive Federal subsidies might be required.

And while electricity has advantages, there are major uncertainties with respect to its complex generating systems. The concerns include environmental impact and the danger of equipment malfunction or sabotage.

ERDA’s heavy emphasis on electrification R, D&D should be thoroughly reviewed now, before long-range alternatives are lost by default.

Other possible approaches include production of synthetic fuels by solar or nuclear energy, increased emphasis on hydrogen and biomass fuels, and expanded direct use of solar, geothermal and other direct heat sources.

While these approaches do not appear to have the ultimate potential of the major “inexhaustible,” they could be vital ingredients in the future energy mix.

14. Methodology and Assumptions Used in Developing the R, D&D Plan

Issue: The ERDA Plan relies on a methodology and assumptions for developing R, D&D priorities which appear to bias the priorities toward high technology, capital-intensive energy supply alternatives and away from end-use technologies.

The R, D&D Act: Sec. 3(a): “It is the policy of the Congress to develop on an urgent basis the technological capabilities to support the broadest range of energy policy options through conservation and use of domestic resources by socially and environmentally acceptable means. ”

Critique: ERDA relies on a number of questionable assumptions which tend to distort its R, D&D priorities, overemphasizing some options and neglecting others.

These assumptions include the following:

- ERDA’s projections of future U.S. energy options assume the same set of final demands. The possibility of major reduction in energy growth because of higher costs is not taken into account;

- In calculations of the capital needs for new energy supply systems, consumer costs are not included. This could result in overoptimistic

projections of the society’s ability to pay for expensive new energy technology;

- ERDA assumes that the strategy of improved efficiency in the “end use” of energy—in the home, in transportation, etc.—will have significant value only for a limited period, after which the agency expects exponential energy growth to resume.

Based on these assumptions, ERDA justifies its heavy tilt towards the high technology, capital-intensive energy options which hopefully would produce massive new energy supplies.

In fact, simpler, less-expensive technologies may prove to be essential, major components in the Nation’s energy future. This would be especially so if energy growth permanently slows and the availability of capital and key natural resources is permanently constrained.

15. ERDA Management Policy

Issue: ERDA’s present management policies could hinder achievement of its goal,

The R, D&D Act: Sec. 4(b): “The Administrator shall formulate and carry out a comprehensive Federal nonnuclear energy research, development, and demonstration program which will expeditiously advance the policies established by this Act and other relevant legislation establishing programs in specific energy technologies . . . ,”

Critique: Present ERDA management practices have three recognizable flaws. These could serve as serious drawbacks to the agency’s effective implementation of the R, D&D program.

The problems are as follows:

- Internal project management tends to impose excessively detailed restrictions on R, D&D programs;

- Project management delegated to outside agencies or firms has been awarded to organizations having excessively detailed management structures. The result has been a loss of ERDA program control;

- Systems analysis—an important tool—has been used excessively in lieu of actual, experimental testing of the feasibility of technologies,

At this early stage of ERDA’s development, these difficulties could be easily remedied. As a new agency, ERDA has excellent opportunities to

benefit from the experiences of older groups and to adopt up-to-date management procedures and techniques.

16. Net Energy Analysis

Issue: Net energy analysis can aid in decisions as to which existing and developing technologies deserve emphasis, but this methodology must be employed with caution.

The R, D&D Act: Sec. 5(a)(5): "The potential for production of net energy by the proposed technology at the stage of commercial application shall be analyzed and considered in evaluating proposals."

Critique: Net energy analysis is used to determine the quantity of energy that is needed to produce energy. For instance, to produce shale oil, a certain amount of energy must be used to mine, transport, and heat the shale.

This analytical technique can aid in evaluating the potential of various energy technologies. However, a great deal of research is needed before it can be a consistent and widely accepted method.

The ERDA Plan does not address the problems with respect to the "net energy" approach or establish criteria for its use.

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