THE VOICE OF SCIENCE ON CAPITOL HILL

F.A.S. NEWSLETTER

FEDERATION OF AMERICAN SCIENTISTS — Founded 1946 —
A national organization of natural and social scientists and engineers concerned with problems of science and society.

SPECIAL ISSUE ON
ENERGY POLICY

Vol. 26, No. 2 February, 1973

FAS CALLS FOR ENERGY REORGANIZATION

Energy seems to be the concern of every agency and the responsibility of none. Fourteen Congressional committees, six White House offices, nine departments of the Executive Branch, six independent commissions—in all, about 65 Government agencies are devoted to it. Whether, in toto, their recommendations are coherent or contradictory, adequate or inadequate, no one knows. (Existing oversight by a Subcommittee on the National Energy Situation of the Domestic Affairs Council is only a stop-gap.)

America needs a coordinated energy policy that will assure adequate supplies of energy while providing suitable protection of the environment. It is patently evident that this overall policy does not exist; indeed, calls for such a policy come from every quarter. We endorse the suggestion for a Council on Energy Policy (CEP) in the Executive Office of the President. Such a group would advise, report on, and try to develop a general energy plan much as the Council on Economic Advisers functions in the field of economic policy and the Council on Environmental Quality (CEQ) functions in the field of environment.

A coordinated approach to development of new sources of energy is also required. Too often, promising new sources of energy do not happen to be of sufficient special interest to either industry or government to get their fair share of development funds. We can no longer afford to develop only those schemes for which vested interests already exist. Someone must be responsible for new approaches.

President Nixon's 1970 plan for Government reorganization called for a Department of Natural Resources (DNR) which was to contain an Energy and Mineral Resources Administration (EMRA). DNR would have included such AEC functions as civilian power, uranium raw materials and peaceful uses of nuclear energy (Plowshare). But DNR was part of a massive reorganization plan to merge six Government Departments into four new ones—a plan that never had a serious chance of passage. The President is now seeking to effect parts of this reorganization by ad hoc delegations of White House authority. This is no long-term solution.

—Council of the Federation of American Scientists

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DIMENSIONS OF THE ENERGY CRISIS

There are several dimensions to the energy crisis. The newest ingredient has been the environmental movement, with its emphasis on such things as sulfur-free fuels to prevent air pollution and its opposition to strip-mining. Both of these attitudes were a heavy blow to the fossil fuel in greatest abundance—coal. Coal normally has a higher sulfur content than oil or gas. Indeed, all of the easy-to-mine coal east of the Mississippi has unsuitable quantities of this pollutant (more than 1%). No one has yet developed a currently competitive method for coal-gasification—a process that would remove the sulfur while turning the coal into gas as a prelude to shipment by pipeline. Unfortunately, also, the coal west of the Mississippi is not near the locations that need it. Worse, 40% of all the coal available would have to be strip-mined.

The air pollution restrictions have been a boon for suppliers of natural gas; it has the least sulfur of the fossil fuels. Suddenly, natural gas use exceeded the most optimistic forecasts. Suddenly, it became evident that natural gas was in short supply. In part, because the Federal Power Commission regulates the prices of natural gas and has historically kept them low, exploration and development of natural gas had declined. In 1971, gas reserves for the contiguous 48 states were at the lowest level since 1957. To meet anticipated demand for natural gas, the United States would have to add 38% more *each year* than was ever added to new gas reserves in the historic peak year of 1956. Without imports of gas, or ways of making synthetic natural gas, the U.S. could run out of all recoverable domestic natural gas—depending upon various estimates—in anywhere from 15 to 30 years.

Because it is easier to handle, oil had been making inroads on coal consumption since 1900 when coal was the dominant source of energy. But American oil wells are now working at capacity and it is estimated that U.S. imports of oil will rise from 25% to 55% of consumption by 1985. This could cost upwards of $15 billion a year!

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FAS CONCERNED OVER NUCLEAR REACTOR SAFETY – *See Page 4*

CALL FOR ENERGY REORGANIZATION, from Page 1

Another approach to energy development has been widely mentioned. This approach would turn the Atomic Energy Commission (AEC) into an Energy Agency. AEC already has the authority for certain non-nuclear energy projects. AEC is self-evidently the strongest of the government agencies in scientific talent for this purpose. From a bureaucratic point of view, a better balance of nuclear and non-nuclear development may result from giving overall responsibility to a reorganized AEC than from trying to beef up other government agencies to the point where they can compete. In any case, a reorganization of AEC would not require a massive government reorganization. And the energy problem cannot wait forever.

Such a change in the structure of the AEC would require corresponding change in Congress. Presumably, the Joint Committee on Atomic Energy would be reorganized into a Joint Committee on Energy; representatives of other committees interested in energy would be placed upon it. The power of the Joint Committee would then be harnessed to the entire energy problem and its otherwise necessarily parochial emphasis on nuclear energy only might be ameliorated. In principle, it would be more natural to have a Senate Committee on Energy and a House Committee on Energy rather than a Joint Committee. But this proposal would add to the enemies of any reorganization, the opposition of the existing Joint Committee. It seems preferable to advocate a reorganization that is as feasible as possible.

One advantage of this reorganization plan lies in the opportunity it would afford to separate the regulatory responsibility of AEC from its promotional responsibilities. We believe that AEC has done a poor job in its research and experimentation on safety methods for light-water cooled nuclear power reactors. This is a direct result, we believe, of a bureaucratic system in which research on safety and responsibility for safety regulation are housed in the same agency that seeks to promote nuclear power. This arrangement is not only infeasible, it is also unseemly; public confidence in nuclear reactors demands a reorganization even if public safety does not. With the regulatory responsibilities for nuclear power should go, also, the resources and responsibility for nuclear safety research.

We believe, in general, that a separate regulatory agency should absorb the regulatory responsibilities over nuclear energy, gas, oil and coal which are now scattered throughout the AEC, Federal Power Commission and Interior Department and so on. We would maintain the integrity of the Environmental Protection Agency, however.

In short, we see the need for a coordinated planning body, a coordinated development agency, a Congressional committee charged with overseeing the coordinated task, and a coordinated regulatory body.□

ENERGY CRISIS, from Page 1

Without imports or synthetic oils, American petroleum might last, as with gas, only about 15 to 30 years.

As far as synthetic methods are concerned, no suitably economic process now exists for coal liquidification. The use of oil bearing shale is not clearly economical at present and using shale would require a form of strip-mining. As for imports, 76% of the world's hydrocarbons are thought to be in the Middle East; dependence upon these suppliers is not a pleasant prospect.

As far as the absolute quantity of fuel is concerned, we could nevertheless, in the short run and medium run, simply cease to put a quota on importation of oil. But this is no long-run solution. As things stand, our 6% of the world's population is using 35% of the energy. The rest of the developed world is rapidly increasing its use of oil as well. It is estimated that in 50 years, the world supply of oil may be depleted.

The heat from the earth (geothermal energy) and the heat from the sun (solar energy) are two large sources that we do not know how to tap efficiently. One major argument for the Energy Development Agency proposed in this newsletter is to encourage research into these new methods.

But for the near and medium run—perhaps for the long run—nuclear energy is an indispensable source. The first stage of nuclear power development is based on the conventional fission reactor. It uses about 1% of the

energy to be found in uranium. While this is not an efficient use of the uranium, this source would provide several decades of all U.S. energy needs—at current rates of usage.

The second stage of nuclear energy development will presumably use the now-being-developed breeder reactor, of which a first commercial version is expected in the early 1980s. The breeder will use approximately 70% of the energy in the uranium and could supply the United States with effectively unlimited energy at current rates of usage.

Unfortunately, nuclear reactors produce plutonium that could be used in nuclear weapons. The result may be to encourage proliferation. Safeguards for fissionable material will become especially important.

The third stage of nuclear development will involve fusion reactions. Based on widely available deuterium, even a thousand years of steadily increasing usage of energy would become possible. Also—at least at the present time—it seems that this method, which might become feasible early in the next century, would have the least environmental problems of nuclear methods.

Nuclear power is the obvious answer but it too has its problems. One problem is the disposal of nuclear wastes. A 1000-megawatt nuclear plant now produces a cubic yard of nuclear waste each year which must be kept in perpetuity. (But the comparable fossil plant produces 10 million pounds of particulates, 46 million pounds of nitrogen oxides, 100 to 190 million pounds of sulfur dioxides, and 300 to 380 million pounds of ash per year.) This waste must be guarded for thousands of years. However, the United States is already in the business of managing waste as a result of its weapons program; by the year 2000 we will have produced only as much additional nuclear waste through reactors as we have already salted away through weapons production.

There is a problem also of low-level emissions of nuclear radioactivity from the plants, with its attendant necessity to keep scrutinizing the standards to which man is exposed. And finally, most important, there are the safety problems of reactor operations.

Reactor Safety is the Most Serious Nuclear Problem

The reactor now most in vogue uses water as a coolant. If the water pipes should break, the reactor will turn itself off immediately but it will continue to generate heat nevertheless. Unless an emergency cooling system operates immediately, the fuel would melt through its container and large quantities of the radioactivity inside the reactor could be distributed over county-size areas. Such accidents are not especially likely. Hopefully, before any such rupture of the pipes, other abnormal indications would lead to shutdown of the plant. Still, the accident is possible; indeed, sabotage of some kind is a possibility. To protect against these possibilities, reactor safety research on emergency measures should be pursued vigorously.

The AEC originally planned to destroy a test reactor to check on the dispersal of the radioactivity. Later it was decided that this would not prove anything, and the idea was dropped. Concern over public awareness of the radiation hazard may have played a role. Instead, it was decided to use the reactor to test safety devices such as the Emergency Core Cooling System (ECCS). The AEC Division of Reactor Safety first showed its concern that the test might not work out so well by insisting on building the reactor to even better standards than the average plant! This undermined the value of the experiments to be done.

The AEC says that these tests of ECCS are a year or two behind—considering when it was decided to undertake them. After some equivocation, AEC spokesmen say that a "proof-test" of ECCS is still planned. But there is a good deal of quibbling over what constitutes such a test and one wonders if AEC will, at any point, have the courage to risk the destruction of the reactor—with all the adverse publicity that might result—in order to see if ECCS works in at least one realistic full-scale experiment. As things stand now, at best, at least a hundred plants may be constructed before any integral test of their emergency core cooling systems is undertaken; conceivably, this test may never be done.

While all of these sources of energy have problems, the demand for energy continues unceasingly. Energy demand has grown at about 3.5% a year for decades; this is a doubling time of 20 years. Demand for electric energy has been growing however at 7% per year or doubling every decade. Considering the production shortages of gas and oil, this demand means that there must not be any missteps in planning for the production and distribution of fuel.

Energy Should Not Be Subsidized

In the meantime, a mix of energy sources must be expected. How best to see that the different forms of energy

NEW TECHNOLOGY "RUNNING LIKE A DRY CREEK"

". . . There is no longer a debate over whether the Nation needs a stronger energy R & D program. This is one of the few points on which the energy industry, the Government, environmentalists and concerned citizens all agree. We want clean air and energy too. But what we have are shortages of clean energy and an abundance of pollution. The Nation is on a collision course between environmental goals and the growing appetite of the American consumer for more energy. Yet the flow of new technology to produce energy in an environmentally acceptable way is running like a dry creek. . . . What is lacking, in my view, are the institutional arrangements and the financial commitments in government and industry to carry these options through the development stage promptly and effectively. In a word, the problem areas are the management and funding of our energy R & D programs."

—Statement of S. David Freeman before the Senate Committee on Interior and Insular Affairs,"Energy Research Policy Alternatives, June 7, 1972, pages 209 and 210

are distributed efficiently to those who need them?

It has long been U.S. policy to keep the price of energy low. This has undoubtedly stimulated the economy but it tends to depress the energy industry itself. Thus, very low prices for gas, enforced by the Federal Power Commission, can make it unprofitable to search for gas, especially the gas that is least profitable to find and produce.

In a period of potential energy shortage, therefore, we should be sure energy consumers pay at least the marginal costs of the energy they consume. Otherwise, if they pay less, and energy production is subsidized, the consumer does not need to recognize how expensive the energy that he is using really is. Hence he makes no effort to conserve it. If, however, he finds that the products that use energy intensively are becoming more expensive, he can exercise his desire to produce products or services that are cheaper.

Thus, while Government intervention in the development of new sources of energy can be very necessary, some Government intervention in the economic markets for energy can be counterproductive. While consumers use about 25% of the energy consumed in the country, industry uses about 40% so that the preponderance of rate increases would be passed along indirectly through industry adjustments.

Costs of Energy Consumption Should Be Internalized

Those who burn coal, or drive cars, or spill oil, have tended to pollute the environment without paying the costs of either protecting the environment or setting to rights the depredations they have caused. When we argue that the consumer should pay the true costs of energy, we should include these external social costs as well.

One very important case in which this occurs arises from the pollutant sulfur which is present, in varying quantities, in coal, oil and gas. One method of internalizing the cost of the air pollution that results is simply to put a tax on the sulfur emissions. FAS has long supported a tax of 20¢ per pound of sulfur pollutants, as have many other organizations. Another example arises in strip-mining. Why should not the price of coal include the costs of restoring the land that has been disrupted by strip-mining?

Another set of costs of energy production that should be internalized are the health costs. Rather than have the Congress pay more than a billion for protection of black lung disease—an affliction of miners—the coal industry should pay for it. And the price of this protection should be included in a somewhat higher price for coal. Needless to say, this would not help make the coal industry competitive. But if the subsidies for gas and oil were ended, this method of pricing would permit a fair decision among energy sources in the light of their true costs.

Still another case concerns the Price-Anderson Act which limits the liability of nuclear power corporations in the case of accidents. Why should liability be limited? The price of the electricity should include the full insurance costs necessary to award damages. (Although, presumably, the Government would have to be the insuring agent.) This would conserve energy, protect the public in the case of accidents and keep nuclear energy on an economic par with other sources of energy which have internalized their health costs.□

FAS CONCERNED OVER NUCLEAR REACTOR SAFETY

A large nuclear power plant, during full operation, contains an enormous quantity of radioactive substances comparable to those produced by a thermonuclear bomb. The power plant cannot detonate but, should anything occur to spread its contents into the open air, even a fraction of them *is enough to* endanger life in a county-size or even larger region to a dangerous level, demanding instant evacuation of all residents. It seems likely that such an accident could mean death to tens of thousands of people under an unfortunate set of circumstances. Therefore, the use of nuclear reactors to meet our energy needs—and they can greatly help—depends on prudent design, careful construction and scrupulous *operation.*

Naturally, such an accident is not expected but, while it remains possible, we cannot ignore it. It can happen by the laws of chance. Of course, a single such event would likely end for a long time any public acceptance of the genuinely useful possibilities of nuclear energy. Therefore, we see great importance in the recent Union of Concerned Scientists documents on light-water power reactors. We believe *that UCS has performed a most useful public service* in forcing a public debate on the questions of reactor safety in general, and the Emergency Core Cooling Systems in particular. In the opinion of some of us, who have examined the problem, their documents have shown that existing Government studies do not support the reliability of the emergency systems designed to cool the reactor in the event that its cooling water is suddenly withdrawn due to accident or *sabotage.*

All things considered, we believe that a prudent course of action would include:

1. **a priority reexamination of the licenses of operating light-water cooled reactors with a view to lowering their permitted power levels where necessary, as a secondary line safety measure against the inadequacies of present emergency systems.**
2. **the same strict reduction of power rating for reactors under construction or on order.**
3. **a new emphasis on alternative reactor systems which promise greater inherent safety against *such unlikely but terrifying catastrophe.***
4. **an increase in the development of long-range alternative sources of power, especially solar, fusion, and geothermal power.**
5. **a crash program of stepped up reactor safety research.**

In general, we believe that the AEC should seek to bring the great resources of the national laboratories squarely to bear on these problems of reactor safety and should not discount arbitrarily the conclusions of outside research.

—Council of the Federation of American Scientists

RESOURCE DEPLETION ESTIMATES

While the immediate, short-term energy crisis concerns cleanliness and distribution of fuels, the prospect for medium and long-run absolute shortages of fossil fuels is a real one. The material below, and the graphs on the next page are taken from an excellent report of a "Cornell Workshop on Energy and the Environment" sponsored by the NSF RANN Program, and issued by the Senate Committee on Interior and Insular Affairs.

"If past history is any guide, 30 to 50 years are required before a new, acceptable, and feasible technological concept makes a significant, sustained impact on society. This societal inertia can be overcome, of course, by a concerted developement and implementation effort on the part of the federal government, but such an effort is fraught with political and economic difficulties. Thus, while there is no doubt that these technological solutions to energy supply problems deserve significantly increased attention and funding, it will be necessary to rely on more conventional energy sources over the next 30 to 50 years.

The question, then, is how to extend present supplies of energy (and how far they can be extended) until some of the new technologies are able to pick up the burden of supply.

We have examined four basic cases for each of two models of growth in demand (an extrapolated growth model—EGM—which assumes past exponential growth in demand for gas, petroleum, and electricity continues at 6.2 percent, 3.9 percent, and 6.1 percent per year, respectively; and a reduced growth model—RGM—which assumes that growth in total demand for gas, petroleum, and electricity drop to 3 percent, 3 percent, and 4 percent per year, respectively). The four cases are: (1) neither imports nor synfuel are available—all demand must be met by domestic supplies; (2) imports are not available but synfuel production begins phasing into the supply picture in 1980, and grows until it meets all of the annual incremental demand for petroleum and gas by 2000; (3) synfuel is not available but imports increase according to the NPC estimates until they supply 60 percent of domestic demands, and remain at 60 percent thereafter; and (4) both synfuel and imports are available as described above.

These results are summarized in Table 5.

The results are striking in several respects.

(1) If the low rather than the high estimates of ultimately recoverable resources are correct, the outlook for domestic gas and petroleum supplies is grim, despite massive imports and accelerated development of synfuel production facilities. Even the abundant coal resources will be exhausted by the mid-twenty-first century unless growth rates in demand are reduced significantly.

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RECENT PROPOSALS REORGANIZING ENERGY ADMINISTRATION

The President's Advisory Council on Executive Organization proposed, in January 1971, that the Federal Power Commission become a Federal Power Agency headed by a single administrator. In addition to FPC responsibilities (mainly supervision of gas and electricity in interstate commerce), the FPA would administer the Public Utility Holding Company Act now in the province of the Securities Exchange Commission. (See "A New Regulatory Framework," sold at GPO)

A "New Energy Sources Corporation" was proposed by Senator Frank E. Moss (D., Utah) which would, in particular, pioneer in the development of energy from oil shale, tar sands, and the sun. (S.2510, 92nd Congress)

A Joint Committee on Energy was proposed by Senator Henry L. Bellman (R., Okla.). It would not have legislative powers but would do appropriate studies and make suitable annual reports. (S.J. Res. 58, 92nd Congress)

A Council on Energy Policy was proposed by Senator Warren G. Magnuson (D., Wash.) and Senator Ernest F. Hollings (D., S.C.). CEP would have its membership appointed by the President and would be responsible for setting national energy policy. (S. 3802, 92nd Congress)

Formation of an Energy Agency (or Energy Development Agency) out of the Atomic Energy Commission (AEC) was proposed by S. David Freeman (statement to House Committee on Science and Astronautics, May 25, 1972) and by Dr. Glenn T. Seaborg, former AEC Chairman (Science Magazine editorial, June 16, 1972).

An Energy Commission for research, regulation and planning was proposed on November 14, 1972 by a committee of the Association of the Bar of the City of New York. In a book-length report, "Electricity and the Environment: the Reform of Legal Institutions," it also proposed an Energy Agency to consolidate development research on all forms of energy sources.

TABLE 5.
RESOURCE DEPLETION ESTIMATES FOR VARIOUS SCENARIOS

Fuel and case description	Year in which all ultimately recoverable resources are depleted			
	Low estimate		High estimate	
	EGM	RGM	EGM	RGM
Natural gas:				
No imports, no synfuel	1989	1991	2000	2007
No imports, synfuel	1990	1992	2008	2016
Imports, no synfuel	1993	1997	2010	2025
Imports, synfuel	1996	2000	2037	(1)
Petroleum:				
No imports, no synfuel	1988	1988	2011	2014
No imports, synfuel	1989	1989	2027	2030
Imports, no synfuel	2001	2003	2031	2038
Imports, synfuel	2006	2008	(1)	(1)
Coal:				
No synfuel	(1)	(1)	(1)	(1)
Synfuel	2032	(1)	2044	(1)

[1] Beyond 2050.

RESOURCE DEPLETION, from Page 5

(2) If the domestic resource base is represented more by the high estimates than the low, the outlook is somewhat brighter. In this case each of the three options buys some additional time; and all three taken together can provide sufficient time for the introduction of new supply technologies.

(3) The most significant action that can be taken, in terms of extending the availability of domestic fuel supplies, is to embark on an expanded import program. This is, at best, only an interim solution for at least two reasons: (a) the implications for national economic health and security of essentially total dependence on foreign fuel supplies are not presently known and could be serious, and (b) world requirements for energy supplies are growing more rapidly than our own, so that there is the possibility that depletion of world energy resources could occur on the same basic time scale as for United States resources." □

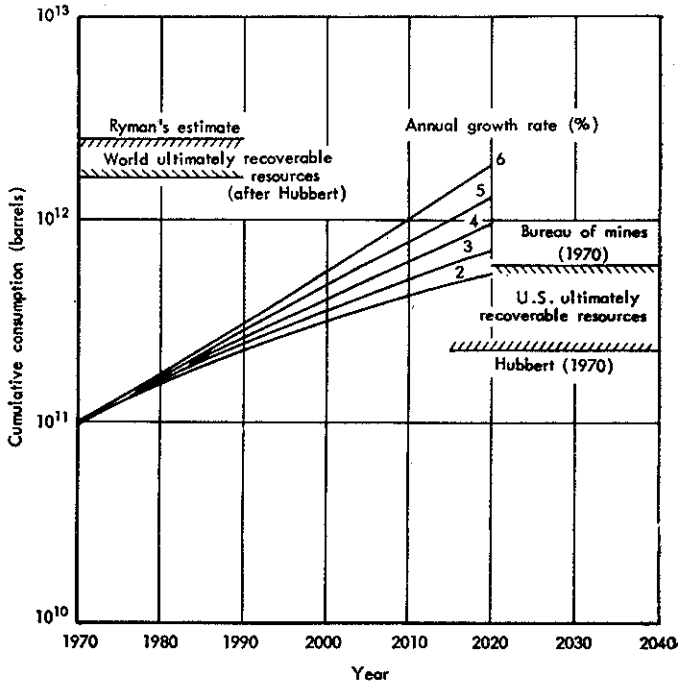

Fig. 11— Cumulative U.S. requirements for petroleum (Crude + NGL)

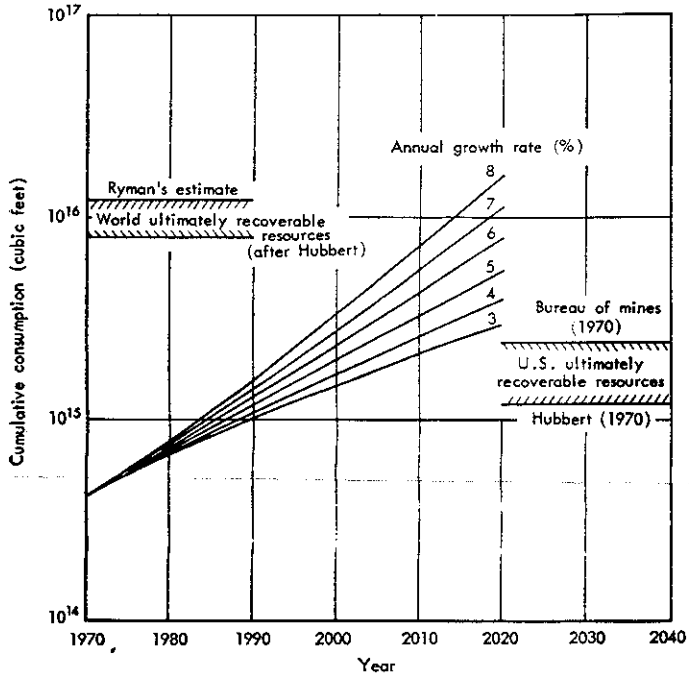

Fig. 10 — Cumulative requirements for domestic natural gas

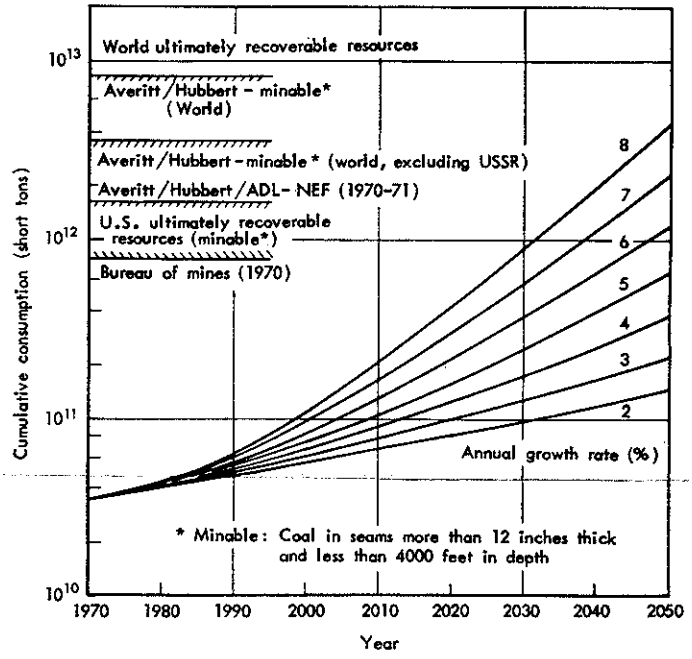

Fig. 12 — Cumulative U.S. requirements for coal

CIA DIRECTOR RESPONDS TO DECEMBER FAS NEWSLETTER

The December FAS newsletter discussed the intelligence community and suggested reasons why it was time to review its operations—particularly the Directorate for Plans of CIA in which political operations ("dirty tricks") are mounted. A copy of the newsletter was sent to the Director of Central Intelligence designate James R. Schlesinger and the following forthright response was received: "Thank you for your letter of January 10 and for your attachment of the FAS Newsletter. I shall keep all of the suggestions in that document in mind during the months ahead. When changes seem to be required by the passage of time, by the changing of world scene, or by changes in American attitudes, they will be acted on."

Subsequent to the FAS Newsletter, Thomas Braden—the former high official of the Directorate of Plans who initiated the infiltration of the National Student Association—published a syndicated column suggesting that these activities were no longer necessary.

HARLOW SHAPLEY DIES AT 86

Today, FAS contains 40% of American Nobel prize winners, but none of our scientists was more eminent than Harlow Shapley, none more courageous, and none participated more vigorously in public affairs. An original sponsor of FAS, Dr. Shapley had intellectual and human qualities which we cherish, hold important, and seek to live by. At the December 27, 1972 meeting, the Council requested that the newsletter carry these sentiments; excerpts from a lengthy and excellent New York Times obituary appear below.

"Dr. Shapley used a newly discovered yardstick of astronomical distances to displace our planet from its last claim to special status in the universe. The yardstick, based on a relationship between the intrinsic brightness of certain variable stars and their pulse rates, enabled him to show that the earth and the sun are nowhere near the center of the Milky Way Galaxy, as had been supposed.

During the first half-century of his life, his accomplishments as scientist, educator, administrator and author established him as the dean of American astronomers.

But when World War II and then Hiroshima gave proof that mankind had the means to destroy itself, the learned Harvard astronomer and professor began to shift his attention from distant galaxies to the plight of the inhabitants of his home planet.

Having willingly left the sanctuary of the academic and scientific worlds, he entered the lists of public affairs to do battle against ultranationalism, greed, hunger, pride and prejudice. He espoused unpopular causes that he believed to be right; he condemned the cold war that broke out in the late nineteen-forties, and he urged in its stead a policy of coexistence.

In November, 1946, Dr. Shapley was subpoenaed by the House Committee on Un-American Activities to answer questions about the Massachusetts Independent Citizens Committee of the Arts, Sciences and Professions, of which he was chairman.

After a heated wrangle with Dr. Shapley, Representative John E. Rankin, Democrat of Mississippi, who had been sitting behind closed doors as a one-man subcommittee, emerged with the angry comment, "I have never seen a witness treat a committee with more contempt." He threatened contempt of Congress charges.

"Gestapo methods," retorted Dr. Shapley, who concededly was scornful of the committees methods of investigating allegedly subversive groups. He advocated abolition of the House committee, which, he said, was making "civic cowards of many citizens" and was using the "bogey of political radicalism" to suppress liberal thought.

Mr. Rankin let the matter drop. A month after the incident, Dr. Shapley was elected president of the American Association for the Advancement of Science, a move that was interpreted at the time as a rebuke to the committee and a token of the scientists' faith in Dr. Shapley." □

TECHNOLOGY ASSESSMENT BOARD NEARS OPERATION

How did it happen? The first new addition to the legislative branch since 1923, the Office of Technology Assessment (OTA), joins the Government Accounting Office (GAO) and the Congressional Research Service (CRS) as the third resource arm of Congress. With an authorization of $5 million a year, OTA may have 85 or 90 staff people by the end of the next fiscal year. Moreover, the ruling Technology Assessment Board (TAB) turns out to be composed of six Senators and six Congressmen—in effect, the composition of a joint committee. It is now official that Senator Kennedy will be the Chairman of the TAB.

The conventional wisdom has it that the power of Chairmen or Congressional Committees would be so affronted by a creation of this kind that OTA could never come into being. Indeed, if the OTA had been first proposed as a Joint Committee with an enormous staff, it probably would not have passed. Instead, it was proposed to have outside experts on the Board until, late in the game—in the name of Congressional control—it was amended to have Congressmen preside. But even so, one would have expected that some kind of charge of lost jurisdiction, or diffusion of power, would have been raised. It looks, however, as if most Senators hardly noticed the bill's passage; in the House of Representatives, they may well have—rightly—considered the OTA to be a useful addition.

In any case, it is an extraordinary creation. Its hearings will have the impact of a Joint Committee since it will have the Congressmen and Senators to draw the press.

In addition, OTA will do six or eight month studies, much as GAO does in-depth studies of Government affairs. Alternatively, OTA can recommend that the National Science Foundation (NSF) do the studies. Since Senator Kennedy is the Chairman of the Subcommittee on the National Science Foundation of the Labor and Public Welfare Committee, NSF will presumably agree.

Finally, OTA will undertake short studies at the suggestion of Congressional Committees. Here, it will function as a kind of Congressional Research Service with more analysis than CRS usually has time to produce.

The subjects available to OTA are very broad. OTA is defined in a related staff study as the "thorough and balanced analysis of all significant primary, secondary, indirect and delayed consequences or impacts, present and foreseen, of a technological innovation on society, the environment or the economy." Thus, studies could be done on energy, computers, medical technology, oceans, mass transit, and so on.

Still to be decided is the identity of the Director—although this seems likely to be former Congressman Daddario. OTA will also have a Technology Advisory Council of ten persons whose names have not been decided. They will choose their own Chairman. And there will be a series of ad hoc committees similar to the President's Science Advisory Committee (PSAC) but not restricted only to scientists. Technologists, environmentalists, consumer advocates and so on would apparently be welcomed also.□

FAS GIVES MATTHEW S. MESELSON SECOND ANNUAL PUBLIC SERVICE AWARD

On December 27, at the FAS Annual Council meeting, Matthew S. Meselson of Harvard University was awarded the highest FAS award for public service for his work on the prevention of biological and chemical warfare. The citation read as follows:

"In the history of public interest lobbying, no one has worn more hats that MATTHEW STANLEY MESELSON. Single-mindedly devoted to preventing the use of chemical and biological weapons, he has overlooked no avenue of attack upon this problem: the highest councils of the United States Government; the most senior Committees of Congress; the relevant Government agencies; the United Nations Secretariat; the public interest lobbies; the academies of science; international scientific conferences; and even interested officials throughout the world. In the study of chemical and biological warfare during the last decade, all roads have led to Matt.

He has been uncommonly successful. Consider some of the accomplishments on the top of this iceberg. His 1965 petition against chemical and biological weapons got 5,000 signatures and gave the issue its first real visibility. His 1969 appearance in closed session as the sole witness before the Senate Foreign Relations Committee sensitized the Senate to the issue. His was the impetus required to bring the Geneva Protocol before the Senate, and his advice was taken on the subsequent handling of the Vietnam-war-related reservations.

He successfully urged the American Association for the Advancement of Science to study the use of herbicides in Vietnam. He became the Chairman of the resulting Herbicide Assessment Commission. And then he went to Vietnam and brought back the facts—and the pictures—that revealed the detailed results of the use there of herbicides. No one has had more influence than Matt in persuading the Administration to renounce the use and possession of germ and toxin weapons, and to reaffirm our no-first-use policy for lethal chemical weapons.

We honor him for the example he has set for us. He saw an important and often ignored problem and worked to solve it. Diligent, energetic, persuasive and patient—working both inside and outside the Government—he gave freely of his time and talent.

Because of Matt's efforts, the nation and humanity are safer." □

NOMINATIONS FOR COUNCIL SUBMITTED

The FAS Constitution requires at least 9 nominees for the six Council positions that become vacant in June. The Nominations Committee has proposed: Denis Hayes, Organizer of Earth Day and of Environmental Action; Jack M. Hollander, Assistant Director for Energy and Environmental programs of the Lawrence Berkeley Laboratory; Garrett Hardin, Professor of Human Ecology at UC Santa Barbara and widely read author on environmental matters; Raphael Littauer, Professor of Physics at Cornell University and principal architect of the famous Air Way Study; James J. MacKenzie, Chairman of the Union of Concerned Scientists whose investigations on nuclear safety are commended in this issue; Marc J. Roberts, Associate Professor of Economics at Harvard University and a campaign adviser to Senator George McGovern on environmental economics; Carl Djerassi, Professor of Chemistry at Stanford University, President of Zoecon Corporation, and Chairman of the Board on Science and Technology for International Development of the National Academy; David Baltimore, MIT Professor of Biochemistry, 1971 winner of the Eli Lilly award and Adviser to the Center for Science in the Public Interest; Martin Perl, Professor of Physics at Stanford Linear Accelerator Center and Chairman of the APS Forum on Physics and Society.

Members who wish to nominate other candidates for Council should submit petitions signed by five FAS members. □

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