ERDA Recasts Nation's Energy Goals

In a major policy change this week, the Energy Research and Development Administration (ERDA) sharply decreased its emphasis on breeder reactors and elevated solar-generated electricity to a new high priority as a long-range energy source. ERDA issued a sweeping "National Plan" for energy development, called for a reassessment of the breeder reactor question, and announced proposed budget changes strongly reflecting the new shift of emphasis.

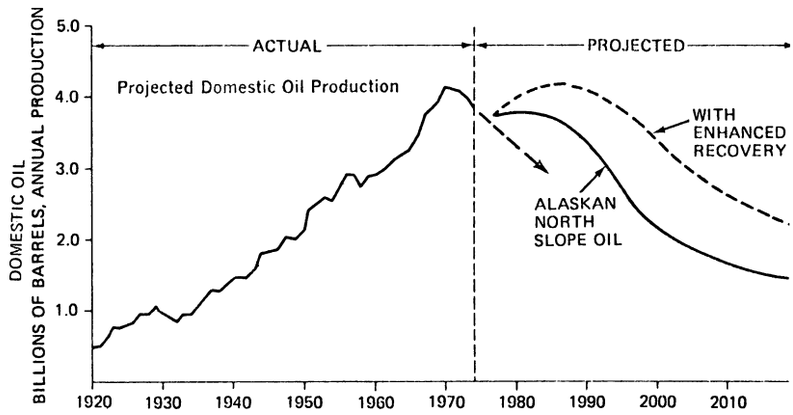
Citing the "critical need" for alternative energy sources and the danger of overemphasizing a single approach, ERDA's National Plan calls for five major changes in the country's energy R&D effort:

- A new attack on technical problems associated with existing systems, particularly coal and light-water reactors.
- An immediate focus on conservation, with primary targets being automotive transportation, buildings and industrial processes.
- A Synthetic Fuels Commercialization program to extract environmentally desirable gaseous and liquid fuels from coal and shale.
- Boosting solar electric power to a higher status, comparable to fusion and breeder reactors, as a long-range energy option.
- Implementation of "under-used" technologies, such as solar heating and cooling and the use of geothermal power.

The goal of these efforts will be to decrease the nation's dependency on petroleum fuels, which now account for 75 percent of domestic energy consumption. By the year 2000, ERDA hopes petroleum, coal and uranium will each produce about 30 percent of needed energy, with solar and other sources contributing small, but rapidly increasing amounts. Coal now accounts for 20 percent of the nation's energy; uranium, for only about two percent.

While discussing the latest report—which will be periodically updated, beginning next January—ERDA Administrator Robert C. Seamans Jr. noted that the United States has twice before made such a major shift in its energy sources: from wood to coal in the 19th century and to oil and gas in this century. But each of these transitions took nearly 60 years, he said, and the present transition must be accomplished in perhaps half that.

Seamans also ruled that a previous Atomic Energy Commission environmental impact statement on the breeder reactor was inadequate, and that more research—including a study of alternatives—must be conducted before the reactor can be cleared for commercial development. The original AEC plan had called for a $1.7 billion program to demonstrate feasibility of breeders by 1983, clearing the way for commercial power generation using breeder reactors by 1987. The new ERDA plan does not call for any significant amounts of power generation by breeders in this century, while the AEC report projected that they might supply half the nation's electricity by the year 2000.



Underscoring the shifts in emphasis is ERDA's supplemental appropriations request to the Congress for fiscal year 1976, which begins this week. Solar energy is to receive an additional $19 million—of which $10 million will go for solar-generated electricity development. An additional $32 million is requested for energy conservation efforts, $26 million for fossil fuel research, and $42 million for uranium fuel-cycle activities. The breeder reactor is the biggest loser—down $60.5 million.

Under the most optimistic circumstances, ERDA still expects U.S. energy consumption to roughly double during the next 25 years. If no new initiatives were taken to develop alternative sources or conserve energy, ERDA estimates consumption might rise by a factor of 2.5. A previous estimate by the Federal Power Commission showed energy tripling.

An electron theory for cancer

In spite of the billions of dollars poured into the search for the cause of cancer, scientists have yet to show how chemicals, viruses or radiation manage to trigger cancer at the basic molecular level. Nor have they identified the essential chemical difference between a normal cell and a cancer cell.

Now a bold new explanation for cancer is being proposed by Albert Szent-Györgyi, Nobel Prize-winning biologist working at the Marine Biological Laboratory in Woods Hole, Mass. The theory is that cancer cells lack a vital electron transfer system, and hence engage in reckless cell division. Szent-Györgyi outlined his theory and scientific evidence for it at a meeting of Nobel laureates held in Lindau, Germany, last week. He will also be publishing a book on the subject.

Cancer theories are a dollar a dozen, of course, but what makes Szent-Györgyi's plausible is that it is buttressed by both his and other scientists' experimental findings. What's more, Szent-Györgyi is one of the world's distinguished biochemists.

A Nobel Prize-winner in 1937 for his discovery of vitamin C, he has also been recognized for his pioneering work in how food is converted into energy, which led later to the discovery of the Krebs cycle, and for being the first scientist to reproduce the contractions of muscle in a test-tube. Szent-Györgyi's research in oxidation, proteins and the chemistry of the body's energy system led him to further study the way energy travels between living cells and most recently, how the body's electrochemical energy system might relate to cancer.

Just over two years ago, Szent-Györgyi reported his first significant evidence leading to his electron theory for cancer. He established, to the surprise of many in the scientific community, that the structural proteins of the body are able to perform the role of semiconductors, which is not the case with soluble proteins.

Specifically, he found that structural proteins in cells are the color of "a good Swiss chocolate." He then found that the color is due to the presence of an electron transfer system in these proteins which transfers them into free radicals—substances which contain an imbalance of electrons.

Subsequently, he has found that,

whereas the structural proteins in the normal liver are colored, those in cancerous liver are practically colorless, suggesting that the electron transport system in structural proteins is missing in cancerous tissues. How might lack of an electron transport system lead to cancer? Szent-Györgyi offers several explanations.

Some of the products of the protein electron transport system, he has found, are chemical molecules known as dicarbonyls, which are capable of stopping cell division. Since one of the major features of cancer cells is that they cannot stop dividing, it appears plausible that a lack of a protein electron transport system in cells might allow them to engage in irresponsible cell division, that is, to become cancer cells.

The enzymes peroxidase and catalyse, Szent-Györgyi reports, also play a vital role in the protein electron transport system, and these enzymes, other scientists have found, are inoperative in tumors. So here again is evidence suggesting that cancer cells might lack a protein electron transport system.

How might chemicals, viruses or radiation manage to alter the electron transfer in structural proteins, then lead to cancer? Szent-Györgyi told SCIENCE NEWS that he would not care to speculate on possible links since "they are fields I know so little about." Szent-Györgyi simply views his theory as "a first step on a new road, hence its incomplete nature." □

A galaxy halfway to time zero

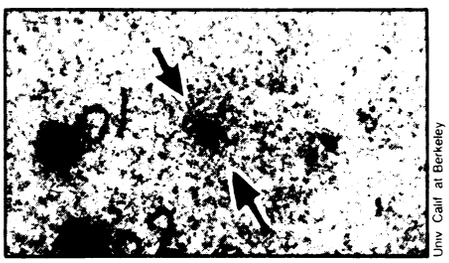
The inventors of image intensifier tubes promised that they would be a boon to astronomical studies of faint objects, and they are certainly proving to be. Their latest coup is enabling Hyron Spinrad, an astronomer at the University of California at Berkeley, to determine that a galaxy called 3C 123 is eight billion light-years away or slightly more than halfway to the beginning of the universe, according to the latest estimates of the time since the big bang (15 billion years).

The most distant galaxy previously known is only five billion light-years away and was discovered 15 years ago. In that time no one has succeeded in determining a more distant one until now.

The designation 3C 123 refers not to the usual catalogs of optical galaxies but to the third Cambridge catalog of radio sources. The object has been known as a strong radio source for 20 years, but its optical image is extremely faint, 21.7 magnitude. (In a dark environment an unaided eye with good sight can see stars only to about 6th magnitude, a million times as bright as 3C 123.)

Even the best telescopes unaided can't make much of 21.7 magnitude, which is actually fainter than the general night-sky background brightness. That's where the image intensifier comes in. This device converts light to electronic impulses which are stored by a computer that builds up an image by heightening contrast during successive scans across the object until a readable picture results. The procedure is especially helpful in getting spectrograms, which are harder to take than simple photographs.

The image intensifier that Spinrad uses was developed at the University's Lick Observatory by Lloyd Robinson, Joseph Wampler and Joseph Miller and is used with Lick's 120-inch telescope at Mt. Hamilton, Calif. With it Spinrad could obtain a readable spectrum of 3C 123 in four nights of scanning, and on that he found a prominent emission line of the element oxygen from which he calculated a redshift of 0.637. From that, using the current cosmological assumptions about the expanding universe he could find the distance and 3C 123's relative speed of recession from our own galaxy, 45 percent that of light.


Univ Calif at Berkeley

3C 123: Eight billion light years away.

3C 123 is not the most distant object known. A few quasars are known to be farther away. But as the most distant galaxy it will give important clues to the history and development of galaxies in the universe. When the light that now reaches us left 3C 123, there was no earth and no sun. The sun is believed to be definitely a second- or later-generation star, and there should be few or none of its ilk in 3C 123. One of the things Spinrad will look for in the future is a bluish cast to 3C 123's light that would indicate that most or all of its stars are in an early state of evolution.

Like most galaxies, 3C 123 comes in a cluster, and Spinrad wants to examine the spectra of other members of the cluster. They should all be extremely distant, and some may be more distant than 3C 123. Another important question is the physical relation of the powerful radio source to the optical object. The radio emission appears to be generated by the synchrotron process, but Spinrad finds no evidence for synchrotron or other nonthermal processes in the optical spectrum. His paper will be published in the July 1 ASTROPHYSICAL JOURNAL LETTERS, which did not appear on July 1 because the journal is about a month behind its publication schedule. □

Whaling industry harpooned by IWC

Whales have become, to many, the symbol of endangered species, and "Save the whale" has become the conservationist's battle cry. Little wonder—these deep sea evolutionary cousins with their humbling size, awesome migratory ranges and mysterious language have been wantonly overhunted. Conservationists got an encouraging message, therefore, from this year's meeting of the International Whaling Commission: The 15 member nations are beginning to take whale conservation seriously.

Meeting in Millbank, England, the last week of June, the commission made sharp cuts in whaling quotas, particularly for the finback whale; instituted quotas in areas never before regulated, and agreed to two conservation principles—one broad and one specific—which will help prevent the further dwindling of whale populations.

The 1974-75 whale quota for all whale species totaled 37,300. The 1975-76 quota was reduced to 32,578, based on population, mortality and reproduction figures and on last year's total catch—a blending of input from science and industry. The finback whale receives substantial protection from this reduction—it can no longer be hunted in the North Pacific, its quota will be cut in the Antarctic and its hunting will be regulated for the first time in the North Atlantic and the Southern Hemisphere (outside of Antarctica). A U.S. delegate to the meeting, National Oceanic and Atmospheric Administration foreign affairs officer Prudence Fox, says that taking into consideration the reduction of approximately 5,000 whales in the total quota and the other catches that would have occurred without quota regulation in those two areas, "we should see about a 20 percent reduction in whale hunting worldwide."

The cuts are likely to have a substantially greater impact on the Japanese whaling industry. Japan and the Soviet Union together hunt 80 percent of the total whale catch. This year, Japanese whalers will be severely limited in finback hunting in the Southern Hemisphere. Less stringent quotas were set for other species including sei, Minky and Brydes whales. "The Japanese have claimed this will amount to a 50 percent reduction in their whaling industry," Fox says.

The Commission members agreed to two important conservation principles. The first says anytime a stock of whales drops 10 percent or more below the minimum sustainable yield level, all hunting will stop. This move falls short of the United States' proposed 10-year hunting moratorium, but is a safeguard against annihilation. It has resulted already in the cutbacks to finback and sei hunting in the North Pacific and Antarctic where stocks