

Nobel Laureate, Hans Bethe, Speaks on Energy Crisis

by L. R. Bickford

Professor Hans A. Bethe, Nobel Laureate (1967) theoretical physicist from Cornell University, presented a lecture on "The Energy Crisis and Nuclear Power" at the San Jose Research Laboratory on March 11, 1975.

Throughout his long and distinguished career, Professor Bethe has been very much concerned with the sociological and political consequences of the advances made in nuclear science and technology. To a degree uncommon among scientists, he has done his best to translate his concerns into public awareness and action. For example, after his World War II experience as director of the theoretical physics activity at Los Alamos, he joined other concerned scientists in giving emphatic public warning of the effects of radioactivity on human life in the event that nuclear warfare should break out.

Today, characteristically, Professor Bethe is very much involved in the public debate about the energy crisis. His position, after a careful analysis of the situation, is that 1) the United States must achieve energy independence, and 2) its only hope, at least until the end of this century, is nuclear fission. In his address at San Jose this position was developed logically and carefully, on the basis of known facts and statistics.

Conservation is vital

No matter what happens technologically, Bethe warned, the only way we can achieve energy independence is to practice energy conservation. In addition, it will be necessary both to increase the efficiency of our recovery and use of fossil fuels like coal and oil, and to develop new energy sources.

Professor Bethe had kind words to say about many of the proposed non-fossil energy sources such as nuclear fusion, laser fusion, solar power, and geothermal energy. He feels that development of these and other approaches should be stepped up by increased R&D appropriations. However, he argued convincingly that it would be most unrealistic to count on any of them to supply the public with any significant amounts of power before the year 2000. Professor Bethe then turned to a subject which is embroiled in bitter controversy; namely, power from the fission of uranium. Enumerating the seven major objections which have been made against nuclear fission, he proceeded to argue eloquently that each of them, save one, could be contained safely. Bethe considers the only real danger from nuclear power to be the possible misuse of nuclear power plants in some of the less stable countries. Specifically, the possibility that fissionable material may be withdrawn from the reactor and made into nuclear weapons is of great concern.

Rebuts objections

His position on some of the other objections is as follows: The danger that the release of radioactive effluents from power reactors in routine operation may cause cancer is negligible. The probability that an accident will cause the release of dangerous radioactive material contained in the reactor is extremely low. It represents a smaller risk to the individual than do most other facets of our industrial life. The claim that nuclear

reactors are unreliable simply isn't true. Waste disposal is an important but definitely soluble problem. Known and expected high-grade uranium ores in the United States will suffice to fuel the required reactors until about 2010 using current technology. They will last much longer than that, if technology advances properly.

The economic objection that nuclear power does not pay its way could easily be overcome, according to Bethe. The cost (energy and money) of building a nuclear power plant and equipping it with power is lower than is generally believed; in fact, the energy requirement for starting a nuclear plant could be recovered by only two months' operation of the plant. Experience alone is needed in order to increase the efficiency of continuous operation. Experience can be gained only by building and operating plants.



Professor Hans Bethe speaks at the San Jose Research laboratory.

Finally, Professor Bethe pointed out some real advantages of nuclear power. In routine operation it is essentially free from pollution. Mining uranium causes far less environmental damage than would strip-mining of coal. Loss of life and health in uranium mining and use is only a fraction of that for an equivalent amount of coal. Fuel would be assured for millenia, once we have breeders or near-breeder reactors. Nuclear power is now about 40 percent cheaper than fossil fuel power, in spite of the fact that the construction of nuclear power plants is appreciably more expensive than that of conventional ones.

Consider the alternatives

Professor Bethe summarized his position as follows: "Nuclear power involves definite risks, notably that of reactor accidents and the proliferation of nuclear weapons to new countries. But we must not consider nuclear power in isolation; if we do this, there are reasons to reject every source of power in turn. Instead, we must consider the alternatives: dwindling supplies of energy, permanent recession and depression, mass unemployment, social upheavals, quite possibly wars, bankruptcy first of the western European countries and then of ourselves. Compared to these specters, the risks of nuclear power seem small."

An article presenting Professor Bethe's arguments in some detail will appear in the *New York Times Magazine*.