of the expected *NPV* for developing a new energy technology is the social rate of discount. At the moment, the Office of Management and Budget imposes the use of a 10 percent rate of discount for the evaluation of federal expenditures. *Such a discount rate strongly favors programs with short-term benefits* (emphasis added —ed.). This is apparent if one computes the discount factor at *r* equals 10 percent for a time interval *t* equals 20 years. The value of a dollar of benefit achieved 20 years in the future is only 15 cents when discounted to the present, and a dollar benefit achieved 40 years into the future has a present value of only two cents. *It is little wonder that the 10 percent discount rate has caused some concern among people who believe that the future of this nation lies in the development of long-term, renewable or inexhaustible energy sources, and who feel intuitively that the development of these sources should be economically justified* (emphasis added —ed.).

...The problem using standard benefit-cost analysis to analyze long-range energy research and development such as fusion research is that, for any particular research program...standard benefit-cost analysis is quite likely to result in a negative net present value, particularly at a 10 percent social rate of discount. In fact, it is generally true that a standard benefit-cost analysis yields *pessimistic* results when used to analyze advanced research programs for the development of major new technologies. This is primarily due to the fact that this methodology does not allow for decisions to be made in the future under a state-of-knowledge that is better than that which exists today.

And this benefit-cost basis is what Schlesinger has presented to Congress as a "scientific" justification for his sabotage of the nation's most vital long-range energy research and development programs.

Cinci Mechanical Engineers Back USLP On Nuclear Energy

The nine-member executive board of the Cincinnati chapter of the American Society of Mechanical Engineers endorsed the nuclear energy policy of the U.S. Labor Party on Jan. 24. The statement, reprinted below, will now be submitted to the national executive board of the ASME.

I. Introduction.

An economically viable global energy policy demands

A. nuclear fusion power

B. nuclear fission-based technologies

C. fission-fuel breeders leading to fission-fusion breeders as the critical intermediate-term energy technologies

II. The Cases of Brazil and the Mideast.

A. Brazil is cited as an example of a nation which has committed itself to developing a cadre of nuclear scientists and engineers, nuclear support technologies, and nuclear power plants as a national policy — up to eight 1200 MW (megawatts—ed.) plants and $15 billion over 15 years. It would cost roughly the same as the oil equivalent of 10 GW of nuclear power annually, graduating 9000 nuclear technicians and engineers, 150 geologists, and 300 physicists. West German banks and nuclear industry have provided support for this program. By contrast, U.S. policy has lost us an early nuclear foothold in Brazil.

B. The Mideast development plan should be:

1) By 1985 a nuclear electric grid should be under development

2) The required capital could be generated by increased oil and gas production

3) The Mideast has been one of the fastest-growing producers and consumers of electricity. Even so, industry in Iran, for example, cannot exceed 60 percent of capacity.

4) Mass production of nuclear plants is required to provide an increase of from 95 to 345 GW (gigawatt), with about 200 additional GW nuclear between 1981 and 1985. This is worth about $200 billion in nuclear industry sales.

The ultimate payback would be in Gross National Product capita of the advanced nations.

III. The Scientific Principles of Energy Policy.

Rates of profit and capital formation must have a tendency to exponential increases in a healthy economy. The quality of any energy-generating technology is generally determined by:

A. the thermodynamic efficiency of the entire fuel cycle

B. the flux density (energy-unit area-time) is the most basic figure of merit

Because nuclear energy is denser than other historical sources, it is more efficient and cheaper overall. Fusion power and its accompanying technologies, such as laser technologies will create a new industrial, scientific, and economic revolution.

There are no limits to economic growth. The only issue is whether the fruits of growth are invested to insure future prosperity and profitability.

IV. The Transitional Energy Program.

The long-range solution is fusion energy and its self-reproductive effects within a fusion-based economy. To get from here to there, however, an entire spectrum of fission and fusion-fission power systems must be developed and built. But even at the current dismally low projected nuclear power growth rates, U-235 will run low in about 20 years. The Liquid Metal Fast Breeder Reactor (LMFBR) program must be accelerated and a program for developing the fission-fusion reactor must be implemented to increase the fissile fuel supply by nearly 200 times.

Fusion energy from deuterium in sea water might supply 10 million years of energy. Fusion-produced plasmas might yield technologies that will increase mineral supplies millions of times by breaking rocks or ores into their elements.

The cost of light water reactor-produced electricity is much cheaper than from oil and generally somewhat cheaper than from coal.

V.The Effect on Industry and the Economy.

An expansion of material orders, construction projects, equipment manufacturing, machine tools etc. will create hundreds of thousands of skilled jobs. Indirect effects will occur in the steel and other extraction industries. New processes can produce massive quantities of useful byproducts such as methanol and ammonia for fertilizer.

A 1 GW nuclear plant today requires 35,000 tons of steel, 300,000 tons of concrete, and requires 1900 machine tools, 4000 skilled workers, plus 200 scientists and engineers.

The nuplex concept makes use of the 65-70 percent of thermal energy wasted in electricity production to reclaim desert lands by desalinating water, pumping water, producing fertilizer, and providing energy to the complex.

VI. Development Policy.

Congress must enact a nuclear development policy to maximize the rate of energy production from more advanced technologies as they become commercially feasible:

A. Immediately: Begin assembly-line production of light water reactors, accelerate and commercialize the Clinch River Breeder Reactor, complete and expand spent fuel reprocessing facilities, and redouble Apollo Project-style fusion effort.

B. Early 1980's: Phase in LMBFR's consistent with fueling the growing numbers of light water reactors, begin significant fusion-fission hybrid breeder development.

C. Later 1980's: Increase LMBFR production, commercialize hybrid reactors, and complete R and D on early fusion reactors and plasma torch technologies.

D. Early 1990's: Phase out LWR's, bring hybrids and LMFBR's on line commercialize early fusion and plasma torch technologies.

E. Late 1990's: Produce significant power from early fusion reactors and commercialize second generation fusion and plasma torch technologies.

F. Early 21st century: Full transition to fusion-based economy.

The following Research and Development projects are needed:

1) Existing fission reactors. Political restrictions on plant construction and licensing must be replaced by standardized guidelines and inspection procedures. An immediate investment fund of about $10 billion is needed to get the industry moving again, financed by a "Third National Bank" with export sales facilitated through the expanded role of the U.S. Export-Import Bank.

2) The breeder: The $2 billion Clinch River project must be completed and another $5-6 billion invested in commercialization of standardized LMFBR's. Several billion dollars should be allocated for development of backup or better systems such as the Pacer concept, molten salt, and high-temperature gas-cooled breeders.

3) Fusion-Fission Hybrid Breeder: An electron-beam hybrid or a Tokamak core and test breeding modules should be developed ($5-10 billion).

4) Pure Fusion: A broad-based scientific and engineering crash program must be developed along the lines of the Labor Party's proposed Fusion Energy Research and Development Act of 1977, a multi-trillion dollar investment program just in basic energy technologies.

Nuclear power is an idea whose time has come!