year for each operating reactor, reducing the amount of spent fuel to be disposed of by approximately one-third, and serving U.S. nonproliferation policy interests by making the reprocessing of such spent fuel even more uneconomical.

Greenhouse Gas Emissions Reduction

Department of Energy nuclear research has resulted in 92 percent of all carbon dioxide emission reductions realized in the electric utility sector since 1973, avoiding 1,615 million metric tons of carbon emissions. Also, nuclear energy has mitigated 27 million tons of nitrogen oxide and 65 million tons of sulfur dioxide emissions in the United States alone. Internationally, emissions avoided from 1973 through 1991 through the use of U.S. nuclear energy technology is 4,300 million metric tons of carbon dioxide, 70 million tons of nitrogen oxide, and 160 million tons of sulfur dioxide.

Advanced Light-Water Reactors

The Department of Energy supports research and development to make the next generation of nuclear powerplants, certified advanced light-water reactors, available at the earliest possible date to the marketplace, to ensure the light water reactor is an option in contributing to the new electrical energy capacity required by 2010. In 1994, Final Design Approval, a major milestone toward certification, was achieved for two 1,350 megawatt evolutionary advanced light-water reactor designs. The Senate noted this success in its report on the Energy and Water Appropriation Bill of 1995. Building on research and development sponsored by the Department, the **General Electric Company recently sold two advanced boiling water reactor plants to Tokyo Electric Power Company,** kicking off sales of the next generation in advanced lightwater reactors.

Reduced Enrichment Fuels for Research and Test Reactors

During the 1980s, the Department of Energy's Reduced Enrichment Research and Test Reactor Program at Argonne National Laboratory developed and qualified a high-density dispersion fuel that **serves U.S. nonproliferation policy interests** by significantly decreasing the amount of weapons grade uranium being used for civil programs throughout the world. The Uranium silicide dispersion fuel has received the Innovation Research 100 award (1985), has been accepted by all major research reactor regulatory authorities, and is currently being manufactured commercially in the United States, France, and Denmark. Additionally, fuel fabricators in Canada, Indonesia, and the United Kingdom are in the process of adopting the Uranium silicide fuel. Through 1994, seven foreign and seven U.S. reactors have converted or begun to convert to this low-enriched fuel. Ten other reactors were converted to low enrichment uranium using lower density fuels also developed by the program.

Isotopes

As a direct result of energy research, Department of Energy national laboratories have been producing and distributing isotopes and isotope services and meeting national isotope needs in nuclear medicine, industrial, and research applications for nearly 50 years. Continued domestic isotope production and its ongoing transfer to private industry fulfills a vital national need. In the United States, isotopes are used in 36,000 diagnostic procedures and 50,000 therapeutic applications daily, **with more than 30 million medical uses valued at $7 billion to $10 billion each year.** One promising new medical therapy uses Yttrium-90, currently supplied to several major U.S. cancer treatment institutions. **The precommercial research and development success of Yttrium-90 cancer therapy has interested a number of commercial pharmaceutical companies**. Savings to U.S. patients could approach hundreds of millions of dollars in improved cancer treatment. The Yttrium-90 is obtained from Strontium-90, a nuclear waste product.

Radioisotope Thermoelectric Generators