

Report Urges DOE's Spent Nuclear Fuel Reprocessing Program to Be Scaled Back

The research and development component of the U.S. Department of Energy's Global Nuclear Energy Partnership (GNEP), a program that aims to reprocess spent nuclear fuel, which could then be shared with partner countries, should not go forward at its current pace, said a new report from the National Research Council.

DOE's Office of Nuclear Energy, of which GNEP is a part, should instead assign the highest priority to facilitating the startup of new commercial nuclear power plants, a program that is currently falling behind schedule due to funding gaps.

Amid renewed interest in nuclear power, the Office of Nuclear Energy's budget has grown nearly 70% since 2003. In light of this growth, the administration's 2006 budget requested that funds be set aside for the Research Council to review and prioritize all of the office's programs, which besides reprocessing and new plant assistance, include development of new types of nuclear reactors, the use of nuclear energy to create hydrogen, and the upgrade of facilities at the Idaho National Laboratory.

The purpose of reprocessing spent nuclear fuels is to remove materials from the radioactive waste that can be recycled for use at another plant. In the past, the United States has resisted reprocessing because the methods available at the time created a plutonium byproduct that would have increased the risk of nuclear proliferation. But in recent years, the federal government began to reconsider reprocessing as new technologies emerged that could recycle the spent nuclear fuel without separating plutonium. This process is a main technical goal of GNEP; the committee that wrote the report did not review or comment on the international aspects of the partnership.

However, the technologies required for achieving GNEP's goals are too early in development to justify DOE's accelerated schedule for construction of commercial facilities that would use these technologies, the report said. DOE said that the program will save time and money if pursued on the commercial scale, but the committee believes that the opposite will likely be true and found no economic justification. Although a stated goal of the program is to reduce the overall amount of radioactive waste, which would in turn decrease the need for a second geological repository in addition to Yucca Mountain, it was not clear to the committee that such a need currently exists. Moreover, there has been insufficient peer review of the program.

While all 17 members of the committee concluded that the GNEP R&D program, as currently planned, should not be pursued, 15 of the members said that the less-aggressive reprocessing research program that preceded the current one should be. However, if DOE returns to the earlier program, called the Advance Fuel Cycle Initiative (AFCI), it should not commit to a major demonstration or deployment of reprocessing unless there is a clear economic, national security, or environmental reason to do so. Two committee members advocated holding DOE's spending on reprocessing research to pre-AFCI levels and that DOE should not develop commercial reprocessing technologies beyond the early laboratory stage. In addition, three other committee members said a technology not currently being explored by GNEP would be better suited for reprocessing.

Although the GNEP R&D program should be scaled back, the Office of Nuclear Energy should place greater emphasis on the Nuclear Power 2010 program, the committee said. Key elements of this program include identifying sites for new nuclear power plants, completing the design engineering of advanced light water reactors, and assisting the Nuclear Regulatory Commission in its efforts to grant both construction and operating licenses in one action. The office has focused on many parts of the program, such as finalizing designs, and has established a good working relationship with industry, but overall progress has been slower than expected, the committee found. The Nuclear Regulatory Commission and industry need to improve the pace of specific licensing reviews for nuclear power plants, avoiding review of previously settled issues and setting a tighter schedule. If nuclear power is indeed going to play an increased role in meeting U.S. energy needs and reducing greenhouse gas emissions, Nuclear Power 2010 needs full funding in all aspects of the program, the committee said. While an increase in funding has been proposed in the administration's fiscal year 2008 budget, it would not be enough for the program to meet all of its goals.

Similarly, the committee found that another program of the office, called Generation IV, is unlikely to achieve its goal of a next-generation nuclear power plant in operation by 2017 because of the focus on GNEP. The office's Nuclear Hydrogen Initiative, a program to generate hydrogen using nuclear energy, is dependent on the success of the Generation IV program, so its budget and timetable should reflect this connection,

the report said. The committee also reviewed the Idaho National Laboratory, which represents a significant part of the Office of Nuclear Energy's management responsibilities and budget. While the site will provide the office with important capabilities for research and development of nuclear technology, funding for the program is substantially less than what is necessary to upgrade the facilities.

The report, *Review of DOE's Nuclear Energy Research & Development Program*, is available from the National Academies Press at www.nap.edu.

Congressional Subcommittee Examines Benefits, Challenges of Coal-to-Liquid Technologies

Members of the Science & Technology Committee's Subcommittee on Energy and Environment considered the policy and technological measures potentially needed if the U.S. is to move forward with an energy strategy that includes the production of liquid transportation fuels from coal sources.

As the price of petroleum and natural gas remains high, there has been an increased interest in developing the commercial potential of producing synthetic liquid fuels from coal (CTL). Nick Lampson (D-Texas), subcommittee chair, led members in discussing the need and scope of additional research, as well as development and demonstration programs that should be employed by the Department of Energy and other agencies to accomplish this.

"I recognize there may be economic and strategic benefits of advancing coal-to-liquid technologies from both the regional and global perspectives. We need to have a comprehensive strategy to build an energy future that is sustainable," said Lampson.

"Today's hearing was very informative and underscored the benefits of coal-to-liquid fuels in the near term and the need for greater federal investment in developing carbon capture and sequestration technologies," said Rep. Jerry Costello (D-Ill.).

Witnesses testified on the host of challenges, benefits, and policies to be taken into account in discussing coal liquefaction, including carbon dioxide management, infrastructure improvements, water usage, and energy security, among others.

Among its benefits, the use of CTL in the transportation sector could help secure energy supplies by displacing imports of non-U.S. sources of diesel or jet fuel. Reports also show that CTL produces tailpipe emissions that are almost completely free of sulfur, unlike conventional transportation fuels. Another benefit

would be the ability to reduce carbon dioxide emissions by as much as 20% over the fuel cycle through the use of carbon dioxide (CO₂) capture and storage, which would be made easier because the CTL process can employ technologies that concentrate the CO₂ stream for removal.

Members also examined the challenges with CTL, including competition for coal in electric power generation, the low-octane gasoline produced by CTL, competition with domestic natural gas use, and concerns about the ability to guarantee a dependable, sustained market for CTL fuels, which could deter investment from the private sector. To date, the most common U.S. process for coal liquefaction has been criticized for being inefficient and costly. Witnesses also discussed balancing environmental policy objectives with the goal to reduce the country's reliance on non-U.S. energy sources.

"I am aware that there are significant environmental challenges associated with using coal to produce liquid fuels. I believe it is essential that we continue to examine our energy strategies with attention to the issue of global warming and other environmental concerns, such as management of our water resources," said Lampson.

Witnesses at the hearing included Robert L. Freerks, director of product development, Rentech Corp.; John Ward, vice president, marketing and governmental affairs, Headwaters, Inc.; James T. Bartis, senior policy researcher, RAND Corp.; David G. Hawkins, director, Climate Center at Natural Resources Defense Council; Richard D. Boardman, head of The Secure Energy Initiative, Idaho National Laboratory; and Joseph Romm, former acting assistant secretary at the Department of Energy during the Clinton Administration, senior fellow, Center for American Progress and director/founder, Center for Energy and Climate Solutions.

China Launches Project to Enhance Collaboration on New and Renewable Energy

China's Ministry of Science and Technology (MOST) and the National Development and Reform Commission of China (NDRC) held a press conference on November 12, 2007 to issue the International S&T Cooperation Program on New and Renewable Energy. The program is formulated by the government of China to speed up the industrial development of new and renewable energy with great bearing on energy restructuring, energy security, energy efficiency, greenhouse gas emission reduction, low-carbon economy, and sustainable development.

Benefits of the program include sharing

of advanced technologies and innovation in technology. It is expected to give impetus to international collaboration, to solve outstanding problems in energy application, to enhance the innovation strength in new and renewable energy, to develop energy technology with proprietary IPR, and to encourage the participation of the international community and the sharing of achievements.

The program gives priority to five areas: solar power generation and building-integrated solar energy, biomass fuels and biomass power generation, wind power generation, hydrogen energy and fuel cells, and gas hydrates.

The program also identifies six major tasks: basic research, commercialization demonstrations, scale applications, go-out strategy, international exchanges, and nurturing high-caliber professionals. International cooperation could facilitate China's efforts to introduce advanced technology, innovate in energy technology, develop the innovation system of energy technologies, and set up a batch of demonstration projects of industrialization so as to meet the strategic goal of developing new and renewable energy.

MOST and the U.S. National Institute of Science and Technology will set up a Steering Committee on international cooperation by coordinating other government bodies, international organizations, and research institutions. Worldwide senior experts will be invited to establish an Expert Consultation Committee to provide suggestions on priority fields, major tasks, and cooperation patterns of the program to the Steering Committee. Special funds will be arranged for the launch of the program with a view to attracting financial input from foreign governments and international organizations. Equal attention will be given to soliciting capital from the business sector, especially the international energy giants.

New European Nanoelectronics R&D Program Announced

MEDEA+, a European-wide collaborative research program centered on microelectronics and part of the EUREKA initiative, has announced that CATRENE (Cluster for Application and Technology Research in Europe) is to be the follow-on program designed to take electronics into the nanoscale era. The new program has two important features: (1) the Lighthouse Project, which will address major socio-economic needs such as transportation, healthcare, security, energy, and entertainment; and (2) a new structure that will focus on large application markets, identified in a roadmap of required technologies.

The MEDEA+ program, which will finish in 2008, supported 77 projects, involving 20,000 person-years and around 450 partner organizations. The work resulted in important innovations within a number of areas, including automotive and traffic control, broadband communications, secure society, energy efficiency, and healthcare. The new CATRENE public-private partnership is expected to ensure the continued development of European expertise in semiconductor technology and applications. Like MEDEA+ and its predecessors, MEDEA (Microelectronics Development for European Applications, 1997–2000) and JESSI (Joint European Submicron Silicon, 1989–1996), the new program involves all the key actors in the value chain, including those working with applications, technology, and materials, as well as equipment suppliers. Industrial companies, both large and small, universities, and research institutions will take part with the support of public authorities.

Jozef Cornu, MEDEA+ chair and CATRENE chair-elect, said, "For more than a decade, the EUREKA JESSI, MEDEA, and MEDEA+ programs have made it possible for Europe's industry to reinforce its position in semiconductor process technology, manufacturing, and applications to become a key supplier to markets such as telecommunications, consumer electronics, and automotive electronics."

The start date for CATRENE was scheduled for January 1, 2008. It will last four years, extendable by another four years, and will operate under the auspices of the EUREKA program. Commercial participants in EUREKA projects can get half their costs paid by their national governments, while academic institutions can get up to 75% of their costs paid. The program has been earmarked to make use of 4,000 person-years of effort each year, equivalent to €6 billion for the extended program.

Key technology goals contained within the program include maintaining and increasing Europe's strength in intellectual property (IP) across the entire electronics supply chain, as well as sustaining and strengthening leadership in lithography and silicon-on-insulator materials and component packaging, and reinforcing European expertise in applying semiconductor process technology to efficient design for new electronics applications.

"Nanoelectronics will offer enormous opportunities to those who are first to master and bring to market new technologies and applications, and we believe that CATRENE will play a vital role in helping Europe's microelectronics industry to go from strength to strength," said Cornu. □