

U.S. gives informal OK to \$300 million Argonne upgrade

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Argonne National Laboratory in Illinois has a baseball stadium-size X-ray machine that enables scientists to examine a vast array of materials in slivers as tiny as several atoms wide, work that some believe is key to breakthrough research on everything from curing cancer to making the perfect fuel cell.

But, its advocates suggest, Argonne's [Advanced Photon Source](#) may be growing obsolete.

The federal Department of Energy in late April gave preliminary approval to start designing a \$300 million upgrade, which would enhance the brightness of Argonne's X-ray beams by 100 times and add more beams. That upgrade would substantially advance scientists' ability to examine materials at the atomic level and in shorter snatches of time, an improvement that is expected to lead to a greater understanding of how things work.

"The percentage of materials we use today compared to those we could make is a very, very tiny percent," APS Director J. Murray Gibson said. He and other scientists call that shortage "a bottleneck" standing in the way of breathtaking scientific achievements.

The APS' capacity to "look deep inside materials and watch what's happening while they're being created" has led to discoveries in disease prevention and energy conservation, Gibson and others at Argonne said.

One of the more recent examples is the 2009 Nobel Prize in Chemistry, won by three biochemists who performed extensive research at Argonne's APS. In addition, other recent APS research has helped develop the anti-HIV drug Kaletra and the cancer-fighting drug Votrient. Scientists also are using the APS to gain a clearer understanding of the turbine engine, concrete's role in global warming and [alternative fuels](#).

"It's giving us the opportunity to take leadership worldwide," Gibson said of the planned upgrade. Similar facilities exist in Japan and France.

Opened in 1996, the APS serves more than 3,500 researchers every year, Gibson said, more than any other scientific user facility in the Western Hemisphere. Hundreds of U.S. companies and universities use the APS.

But scientific advances in this area occur rapidly, said Gibson and Harriet Kung, associate director of science for Basic Energy Sciences at the U.S. Department of Energy. As those advances occur, the equipment needed to move the research forward needs enhancement, the scientists said.

"It's vital to our mission to sustain our nation's position at the frontiers of materials characterization," Kung said. Materials characterization develops new energy technologies and more efficient substances. To maintain that leadership and "to improve our tools for research aimed at laying the foundations of a new energy economy," the Department of Energy on April 22 authorized Argonne to begin conceptual designs, she said.

While Argonne, which is near Lemont, Ill., designs the upgrade, the Department of Energy will work to find the money at a time of acute public sensitivity to government spending.

"I am not pessimistic about it at all," Gibson said "because I think it has

tremendous economic impact."

He said the improvements would create several hundred more jobs at Argonne, excluding the construction jobs that will emerge. "And," he said, "it will create new capabilities that will be very critical for new industries."

Congress may be engaged in "partisan battles" now, said Fred Dylla, executive director of the American Institute of Physics. But he said he was optimistic representatives would understand that providing space for thousands of scientists conducting practical, potentially groundbreaking research is a wise investment of tax dollars.

"It sounds expensive," Dylla said, "but given the number of scientists that use it, the number of experiments that can come out of it and given that the first machine was designed about two decades ago, this is really bargain science."

U.S. Rep. Judy Biggert, R-Ill., whose district includes the 1,500-acre lab, called Argonne "the most widely utilized DOE user facility in the entire United States." She added that she is "very optimistic" that the upgrade will "receive strong bipartisan support," if her colleagues "are fully aware that this project is both a scientific priority and an investment in America's long-term economic competitiveness."

Those "scientific applications ... are boundless but the facility is not," Biggert said. The upgrade "will exponentially improve our X-ray capabilities and open the facility to as many as 50 percent more users. Research in the material sciences could leap forward, and economic returns for the U.S. would not be far behind."

If Congress funds the upgrade, construction could start by 2012, Gibson said, and be complete in 2017.

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