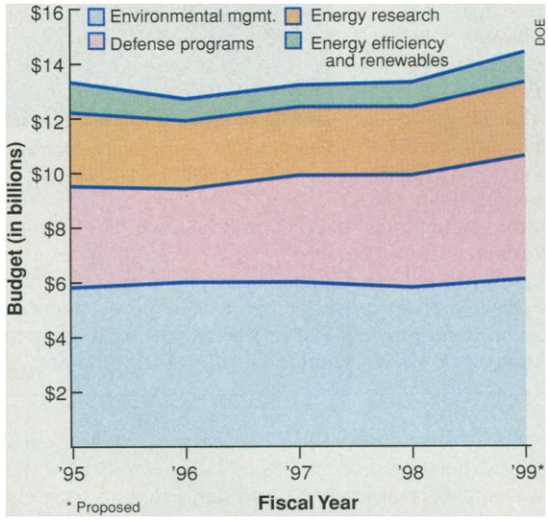
DOE Moves to Higher Ground

After 3 years of rocky budgets and partisan criticism, the Department of Energy appears to be on the upswing. But will the good times translate into better lab management?

The Department of Energy (DOE) is the agency that, like comedian Rodney Dangerfield, gets no respect. A hodgepodge of missions—from cleaning up waste from nuclear weapons production to examining quarks to working with industry on solar panel technology—has generated a diverse and, at times, competing set of customers. Some legislators want to wipe it out, lab managers bemoan its byzantine bureaucracy, and last week its chief, Energy Secretary Federico Peña, announced that he would leave in June after barely a year on the job.

It may sound like a mess, but many DOE watchers in Congress, the Administration, and academia forecast a banner time for the department's research effort over the next few years. Some problems, including cleaning up a half-century of nuclear waste and reforming DOE's sprawling network of laboratories, still loom large. Yet Republican talk of shutting down DOE has abated, money is pouring into its politically popular effort to maintain the nuclear stockpile, and civilian basic science is riding high both in the White House and on Capitol Hill. In addition, a host of new scientific facilities will soon be opening (see below). "DOE was a four-letter word 3 years ago," says William Madia, director of the Pacific National Laboratory in Richland, Washington. "It's much more respected now."

That situation is a far cry from the spring of 1995, when a panel chaired by Motorola CEO Robert Galvin took DOE officials to task for its management of the department's 26 laboratories. The post–Cold War era had led to a hard questioning of the role of the country's three nuclear weapons laboratories. Worse, the new Republican Congress was preparing to cut the federal deficit by slashing programs such as fusion research, if not killing DOE itself. "Let's face it, 3 years ago the [Superconducting Super Collider] had been lost, the financial house was in considerable disarray, and basic science was hurting," says Charles Curtis, former DOE deputy secretary and now a Washington lawyer. But today, he says, there has been "a very, very significant change."



Defensive measures. A growing share of DOE's budget goes to preserve the nation's nuclear capacity, while research tries to hold onto its share.

Into the limelight

Four major factors have contributed to that change. The most important may be a brighter budget picture. In 1995, Congress slashed DOE's budget by $700 million to $16.4 billion, and even the Administration projected a continuing decline for energy research. Instead, DOE's overall budget stabilized at about $16.6 billion, and the president has requested $18 billion for the 1999 fiscal year. "Where we are headed now is a very positive change," says Martha Krebs, DOE energy research chief, whose $2.5 billion budget is projected to increase modestly through 2003. These changes augur well for basic science efforts ranging from synchrotron research to high-energy physics to genomics. Some areas, however, including fusion and renewable energy, are likely to face static budgets for years to come.

Second is a shift in the political winds. Calls by then-freshmen Republicans to dismantle the department have faded. Peña's arrival last spring has also cooled tempers. His predecessor, Hazel O'Leary, sparred with Republican legislators, and her travel practices were a lightning rod for criticism. "With her departure, a lot of the controversy has gone away," says one Republican staffer. Madia agrees: "DOE's image and reputation are better on the Hill and in the Administration."

Third is a new prominence for its once-obscure missions. "The department has emerged with a central role in major Administration-

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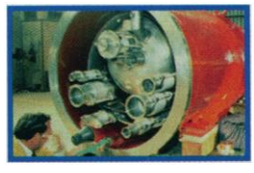
BOOM TIMES FOR DOE FACILITIES

High-Energy Physics

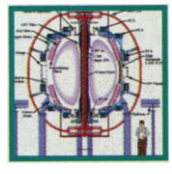
B-Factory
Stanford Linear Accelerator Ctr., CA
Cost: $293 million • Start-up: Fall 1999
Electron-positron collisions explore matter, antimatter asymmetry

Main Injector
Fermilab, Illinois
$259 million • Summer 1999
10-fold increase in proton collisions to hunt for heavier particles



Large Hadron Collider
CERN, Geneva, Switzerland
$450 million* • 2005
European accelerator to hunt for Higgs and other particles

Fusion



National Spherical Torus Experiment
Princeton Plasma Physics Lab, NJ
$21 million • 1999
Generates data on plasma confinement and stability

*DOE contribution

An Energetic Scientific Presence

His wavy long hair, fast talk, and enthusiastic manner mark him as more professor than bureaucrat, but Ernest Moniz is a long way from his job as chair of the physics department at the Massachusetts Institute of Technology (MIT). Last October the 53-year-old theoretical physicist became the third-ranking official in the Energy Department, with the job of overseeing its myriad science and technology efforts, including more than two dozen labs. No stranger to Washington, Moniz spent 18 months as associate director for science in the White House Office of Science and Technology Policy before returning to MIT for 9 months.

Last week Moniz spoke with *Science* about his R&D strategy. Following is an edited version of his comments.

SAM KITTNER

On the budget: The future projections for [civilian] science are decent. The growth is not at an enormous rate, but it does have a somewhat rosier outlook than was the case. Yet while energy research and stockpile stewardship have pretty positive outlooks, other parts of DOE, such as environmental management, do not.

On the Strategic Simulation Initiative: The idea is driven by the Advanced Strategic Computing Initiative [a multilab effort to increase computing capacity to test weapons]. We need to raise by orders of magnitude our ability to do simulations, and we are looking at other missions—such as global systems issues relevant to climate change, combustion simulations, advanced materials, functional genomics, and subsurface transport—of obvious relevance to radionuclide migration questions. Increasing simulation capabilities in the next 5 to 10 years would have enormous benefits for us—and for American science.

On stockpile stewardship: When the program was first put forward about 3 years ago, $3.5 billion [annually] was the preliminary estimate. Now the budget profile from 1999 on is $4.5 billion—but there is no current expectation of that growing. The first bottoms-up calculation exceeded $5 billion—and not by just pocket change. We finally got down to $4.5 billion, a figure that made everyone a little uncomfortable. But historically, the cost of the [nuclear] stockpile was over $6 billion in today's dollars—and it went up to $10 billion in the 1980s.

On the need for laboratory reform: The laboratories are accused by some of lacking discipline and mission focus. We have to improve the system and the clarity and articulation of what our corporate missions and goals are. It would be foolish for the country to take these multiprogram labs and focus them into narrow, single missions. I'm not saying everything is perfect. But there is objective evidence that the labs are a major engine of American technological innovation. There is still the need for improving efficiency, but let's not throw the baby out with the bath water.

On Oak Ridge's High Flux Isotope Reactor: Clearly there were some very similar problems at Oak Ridge to [Brookhaven National Laboratory's High Flux Beam Reactor, which remains shut]. But people have learned. The shutdown of HFIR [which reopened last week] took place before any major problem occurred. Attention was brought to bear and there were management changes. I'd say that was an example of our line managers doing the job.

On lowering costs for the International Thermonuclear Experimental Reactor: Given the inability of the collaboration to move forward, I think the U.S. is just being realistic [in asking for consideration of a cheaper design]. We're not eliminating ITER or something close to ITER as a possible option. I'm very encouraged by the dialogues going on within our community and with our partners in Europe and Japan on how to reduce its costs or look at alternate concepts. I'm pleased—the ground is being laid so that we can continue to be partners.

On Sandia's proposed pulsed-power fusion machine: We're all very impressed with Sandia's progress in the last year or so. On the other hand, we shouldn't minimize the remaining challenges—there are major issues of symmetry and stability, and Sandia is proposing a very major leap. And I want to make it absolutely clear that this will not interfere with the National Ignition Facility [now under construction at Lawrence Livermore]. The Russians are quite active in pulsed power as well, and we may expand collaboration with them. They have a lot of experience and facilities, and we know that the Kurchatov Institute and Minatom are interested.

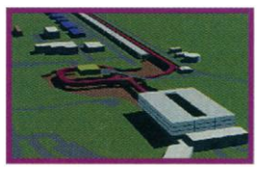
On managing DOE: We have such a diversity of missions. With stockpile stewardship, you have one program office, three labs, and one customer. It's a very closed loop. Energy, by contrast, is a very open system, with huge numbers of players and market realities. These missions have very different cultures. That makes for differences in how programs are managed, and often that invites criticism because people feel we are being inconsistent. But they're not recognizing that those differences are necessary.

Nuclear Physics

Relativistic Heavy-Ion Collider
Brookhaven National Laboratory, NY
$617 million • Summer 1999
Plasma from collisions simulates early universe

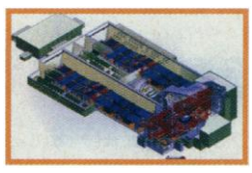
Sudbury Neutrino Observatory
Sudbury, Canada
$13 million* • Summer 1998
Underground tank searches for solar neutrinos

Synchrotrons



Spallation Neutron Source
Oak Ridge National Lab, TN
$1.3 billion • Fall 2005
Accelerator produces neutrons for wide range of research

Defense



National Ignition Facility
Lawrence Livermore National Lab, CA
$1.2 billion • 2003
192 lasers create thermonuclear burn for research tool

(Continued from page 368)

wide policy issues like the comprehensive nuclear test ban treaty, nonproliferation, energy technologies, climate change, and electricity restructuring," says physicist and DOE Undersecretary Ernest Moniz. The $4.5 billion nuclear stockpile stewardship program is central to the proposed treaty, he says, and DOE efforts to work with Russia to limit proliferation of weapons have earned widespread praise. Although Congress is unlikely to support an Administration plan to spend $330 million more for energy technologies in connection with climate change, the request has raised the profile of energy issues.

Fourth is President Bill Clinton's push to increase spending on civilian basic science. In addition to being welcome news for managers like Krebs and Moniz—who was brought in last fall to oversee the department's science and technology programs and the DOE labs—the campaign has meant increased White House attention to DOE. Vice President Al Gore, for example, visited Oak Ridge National Laboratory in Tennessee in February to announce plans for the $1.3 billion Spallation Neutron Source, and Peña was one of five Cabinet-level officials who joined Gore at a February briefing on the Administration's R&D initiatives.

Plodding progress

But although DOE's financial and political outlook is far sunnier today than in 1995, its internal problems have not gone away. An inspector general's report released last week criticized DOE for failing to coordinate R&D efforts across the department. And the Government Accounting Office (GAO), in an upcoming study requested by the House Science Committee, is expected to fault the department for relying on self-regulation in running its own facilities rather than following federal environmental, safety, and health regulations devised by other agencies.

DOE officials admit that R&D efforts are poorly coordinated but say they have a pilot program to follow external regulations. They also cite steps such as linking contractor pay to performance, a more streamlined procurement system, and simpler safety regulations. "We were doing roughly an audit a day, and now we're down to a few a year, which is about right," says Oak Ridge director Al Trivelpiece.

Another GAO study for the committee that's due out this spring will criticize the department's progress in achieving the type of overall lab management reform that Galvin and others have proposed, sources say. "Don't expect dramatic change," says Curtis. "The political system only permits incremental improvements, and I don't think the system has a desire to change." Adds one former DOE official: "It is all tied to politics. If you try to close down the DOE field office in Albuquerque, [Senator Pete] Domenici [R–NM] won't let you."

Reforming the way DOE runs its labs may be Moniz's toughest job. One big problem is getting the issue onto an already crowded agenda. Subjects like waste cleanup and deregulation of the electric utility industry "are what make you toss and turn at night," recalls Curtis, leaving little time for back-burner topics such as lab management.

Although the labs have made progress in reducing their own red tape and improving ties with universities, they also share the blame, according to some observers. "The labs are pretty much responsible for their own goldbricking," says former Secretary O'Leary, citing stockpile stewardship's ballooning costs as an example of the labs' ability to influence their own programs. "It's the most inflated budget in town." Advocates like Moniz disagree, saying that the program has a solid technical basis and that its costs are reasonable.

Moniz does admit that DOE has made only "modest" progress on lab reform but adds that his plan to lay out clear missions for each lab is a necessary and important step in achieving reform. "It's like turning a big tanker," says Moniz. "It would be counterproductive and probably not possible to make dramatic changes in course." Adds one former DOE insider: "For any major change, you would have to have the president and Domenici agree."

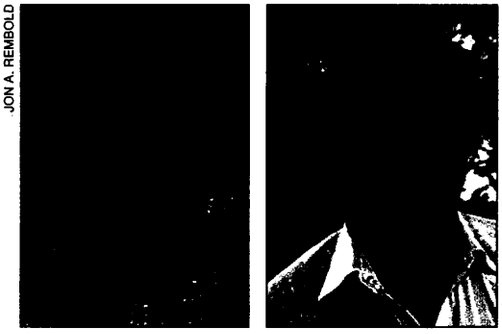
Although Moniz's appointment signals a new focus on DOE science that heartens R&D supporters, the department's future depends on Peña's successor. Deputy Secretary Elizabeth Moler is the favorite, but other names were emerging last week. Whoever is selected will have the chance to parlay a bigger budget, higher political profile, and bipartisan support for civilian and defense science spending into a level of respectability for the agency that was unthinkable just a few short years ago.

–Andrew Lawler

BIOMEDICAL RESEARCH

Kansas City Institute's Big Plans

A new biomedical research organization is taking shape in Kansas City, Missouri, that may one day rival some of the world's large biomedical charities. On 9 April, the Stowers Institute for Medical Research announced a $125 million tax-exempt state bond for building construction. The money allows it to start renovating a 55,000-square-meter medical center in Kansas City, where it plans to house an initial staff of 100 (20 of them with Ph.D.s), possibly growing to 600. According to the institute's co-founder, financier James Stowers Jr., 74, the organization will focus on the genetics of development and growth, including cancer. It will not be involved in clinical studies but will concentrate strictly on "cutting-edge basic science."



JON A. REMBOLD

CALIFORNIA INST. OF TECHNOLOGY, PASADENA

Prime movers. Leroy Hood *(left)* and Eric Davidson are helping define the Stowers Institute's agenda.

For scientific leadership, Stowers has been relying heavily on geneticist Leroy Hood of the University of Washington, Seattle, and Eric Davidson of the California Institute of Technology (Caltech) in Pasadena, both members of the National Academy of Sciences. Hood, best known for his work in developing automated DNA sequencing, is the chair, and Davidson, who studies genes that control development, is a member of the institute's scientific advisory board.

Stowers and his wife Virginia, 68, are both cancer survivors, and, Stowers says, "that's what motivated us" to consider giving their wealth to medical research. "My wife and I wanted to give back something more than money to the people who made our success possible." They launched the institute in 1994 by donating shares in the investment company they founded, American Century Funds. In January 1998, J. P. Morgan & Co. bought an interest in the company, converting the donated shares into a $327 million cash endowment for the institute. The Stowerses plan to leave the remainder of their assets—currently estimated at more than $1 billion—to the institute upon their death. They hope others will make gifts, too. Stowers says if these funds grow as rapidly as those he's managed in the past, the endowment may be worth $30 billion in 25 years.