

examples to others—for example, during a recruiting weekend for students accepted for graduate study the physics department hosts a breakfast for females to meet with female faculty members. Another example is a problem-solving course that Durand and her husband, also an emeritus faculty member, developed to help students prepare for the qualifying exam. “Not a single woman who has gone through the course has failed,” says Durand. “Our experience is that each and every review has made a positive impact,” says a DOE spokesperson. “If deficiencies in a program have been found, the institutions have acted promptly on our recommendations.”

If a department were found to not comply with Title IX, “NASA would not move to impose the ultimate sanction of funding withdrawal unless all efforts to bring the school into voluntary compliance failed,” says Sharon Wagner, the agency’s Title IX program manager. And, although NASA has not found noncompliance, she adds, the reviews provide recommendations “for enhanc-

ing existing equal opportunity efforts.” For example, NASA has suggested that universities and departments publicize information about their Title IX coordinators; revise internal procedures for filing complaints about harassment and discrimination; determine whether complaints of alleged inappropriate behavior have merit; portray gender diversity on websites; and conduct ongoing self-evaluations on admissions, enrollment, graduation rates, financial aid, and treatment of students.

Are universities nervous about these reviews? “If a university is not in compliance, there is danger. But we were confident that our practices were along the guidelines,” says Balantekin. “While we are at it,” says Rolison, “the data need to be looked at across ranks—students, staff, faculty—and then disaggregated by sex, race, and ethnicity. Title IX has never not worked to make things more equitable. It can also be applied on behalf of men.” And, she notes, “no university ever lost money for sports” for not complying with Title IX.

Toni Feder

DOE invites partners in green technology

“Entrepreneurs-in-residence” aim to spin off labs’ energy technologies.

The US Department of Energy is more than doubling the number of its national laboratories that are partnering with venture capital firms to bring green energy technologies to market. While DOE is still waiting to see if any new businesses will be spawned by a first round of “entrepreneur-in-residence” agreements initiated earlier this year at three of the labs, the department in November invited venture capital firms to bid for the opportunity to place an EIR in five others. The winning firms will hire an entrepreneur to work at one of the labs for up to a year, looking for renewable energy and energy-saving technologies that are ripe to spin off into commercial businesses.

“The EIR program is fundamentally changing the way we conduct business by helping our innovations reach the marketplace much faster,” Energy Secretary Samuel Bodman said in a statement. Although the EIR has been under way since spring at Sandia and Oak Ridge national laboratories and the National Renewable Energy Laboratory (NREL), a DOE official says it’s too soon to tell if the program has worked as planned. Rather, says the official, who

asked not to be identified, the agency thought that a larger sample of labs was needed to adequately judge how well the program will work. Participating venture capital firms say they have made good progress in narrowing down the hundreds of lab inventions to a few spinoff candidates. Still, the process has taken longer than DOE had anticipated when the program got under way. It was expected then that entrepreneurs would need just a few months to find a technology and get the commercialization process going. That pace would have allowed multiple entrepreneurs, and multiple technologies, to leave the labs during the year-long contract.

According to DOE’s 19 November program announcement, the next batch of EIRs will be taking up residence at Argonne, Brookhaven, Lawrence Livermore, Lawrence Berkeley, and Pacific Northwest national laboratories. For the new round, DOE is offering \$50 000 to each entrepreneur to help defray salary and other expenses, and the awardees must at least match that amount. DOE’s share is only half the \$100 000 the agency agreed to pay each

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LBNL director Chu to head DOE

Physicists reacted with elation to President-elect Barack Obama's selection of Steven Chu to be secretary of the Department of Energy. If confirmed by the Senate, Chu, a Nobel laureate physicist and director of the Lawrence Berkeley National Laboratory since 2004, will become the first working research scientist to head DOE since the agency's inception in 1977.

Chu, a staunch supporter of renewable energy and a forceful advocate of urgent actions to curb global warming, shared the 1997 Nobel Prize in Physics for developing methods that use lasers to cool and trap atoms. At LBNL, he has built up the lab's portfolio of R&D in carbon-neutral alternative-energy and energy-saving technologies. With other national laboratories and universities in the San Francisco Bay area, Chu, 60, organized the Joint BioEnergy Institute, one of three DOE-funded centers that are conducting basic research to lower the cost of producing ethanol and other renewable fuels from a variety of biomass. He also was instrumental in bringing together the University of California, Berkeley; LBNL; and the University of Illinois into a BP-funded collaboration known as the Energy Biosciences Institute.



Speaking at a 15 December press conference at which Obama announced his nomination, Chu said he believes "the US and the world can and will prevail over our economic, energy security, and climate change challenges." Obama said Chu has been "working at the cutting edge of our nation's effort to develop new forms of energy," noting that "the scientists at our national labs will have a distinguished peer at the helm." Obama added that his selection of Chu "should send a signal that my administration will value science, we will make decisions based on the facts, and we understand that the facts demand bold action."

"My reaction is hooray," said Nobelist Burton Richter, retired director of SLAC. "He's a great scientist and a very good administrator," he said, adding that from Chu's interactions with Silicon Valley businesses, he also has a good understanding of how industry works. "It's the finest appointment to that position that has ever been made," said Richard Muller, a physics professor at UCB and author of *Physics for Future Presidents: The Science Behind the Headlines* (Norton, 2008). "He has the management experience, the political finesse, and solid scientific credentials." Under Chu, said Muller, LBNL has developed "the most diverse set of energy and environmental research projects in the US."

"He's a wonderful scientist and is passionate about energy," said Mildred Dresselhaus, institute professor at MIT and a former director of DOE's Office of Science. "We will need some national and world leadership on energy. A few individuals can make a big difference there."

All three applauded Obama's selection of a scientist for a post that has typically gone to individuals with little or no background in physical sciences. Previous secretaries have included an economist, lawyers, former members of Congress, a retired admiral, and a dentist. An exception is the outgoing secretary, Samuel Bodman, who holds a doctorate in chemical engineering.

Chu will vault from managing a lab with a budget of around \$600 million and 4000 staff to an agency with annual expenditures of more than \$23 billion and more than 100 000 federal and contractor employees. About two-thirds of the department's budget goes for nuclear weapons maintenance, environmental cleanup of cold war-era weapons production, and disposing of spent nuclear fuel from the nation's commercial nuclear industry.

"I hope he will have some time left over for science," cautioned Richter, who said DOE lab managers are hopeful that Chu may "rein in the bureaucracy overload" at the department and restore a partnering relationship that Richter said once existed between the agency and the labs. Today's relationship is more arms-length; DOE treats the labs as it might if it was making a purchase from a supplier. "That's not healthy," he said.

The selection of Chu is in line with Obama's campaign promises to spend \$150 billion over 10 years on clean energy R&D and to increase the amount of energy from renewable sources to 10% of total US energy supplies by 2012 and 25% by 2025. As a member of the National Research Council committee that wrote the 2006 *Gathering Storm* report, Chu has emphasized the report's call for the creation of an "advanced research projects agency-energy" office within DOE. ARPA-E would fund high-risk projects that could lead to new clean energy technologies and big gains in energy efficiency (see *PHYSICS TODAY*, June 2006, page 27).

Obama also named former Environmental Protection Agency administrator Carol Browner to a new White House post that will coordinate energy and climate change policy throughout the federal government.

David Kramer

of the three venture capital firms that are already in place. "No one's doing this for the money," the DOE official explains, admitting that the award size won't come close to meeting a firm's cost to participate. The smaller grant size also means that DOE will get five entrepreneurs for less than the amount it paid for the first three.

Requirements are relaxed

To be eligible, venture capital firms must have a minimum of \$5 million in funds available for energy efficiency and renewable energy technology investment, and an overall fund size of at least \$50 million. Those levels are half the minimums that first-round participants had to meet. After signing a nondisclosure agreement, the entrepreneurs hired by the selected firms get full access to all the lab's inventions—except those that require a security clearance. Once a promising technology is identified, the entrepreneur prepares a business plan, assembles a management team, and raises capital for the startup company. DOE and established venture capital firms have negotiated in advance a 17-page agreement spelling out the share of equity, royalties, or both that the lab will receive. The only variable in the agreement is the lab's share of the equity.

Michael Bauer, the entrepreneur-in-residence at Oak Ridge, says he has waded through some 1500 invention disclosures since April and found five or six that are ready to be spun off in a new venture. "There are a large number of interesting technologies at Oak Ridge, from materials processing to nanotechnology and computational biology to hybrid motors, but there are not that many that fit a startup company," he said. And few are sufficiently mature to build a company around in a 12-month time frame, he adds. Most lab technologies having commercial potential will require an additional 6 to 12 months of development work before they can attract venture capital, he said. DOE's Office of Energy Efficiency and Renewable Energy, which runs the EIR program, has provided some funding to mature a number of technologies, generally in the \$200 000 to \$250 000 range.

Of the half-dozen viable technologies Bauer has brought to the attention of his colleagues at venture investment firm Foundation Capital, one or two may be spun off with the help of venture funding. To qualify for funding, a technology must fit a host of criteria—a multibillion target market, five times or better price-to-performance advan-

tage over competitors, limited customer and supplier concentration, and others. In addition, Bauer says he has identified other technologies that should be of interest to the 50 or more technology companies in Foundation Capital's investment portfolio.

"Technologies that present a 20–50% improvement over the state of the art may not be able to support a new start-up, but can be a great addition to the product portfolio of an established company," he said.

The EIR program does not preclude other parties from working directly with the lab on commercialization opportunities, but the EIR receives a right of first refusal for up to 180 days to allow for the negotiation of licensing agreements to the one or more inventions that will be needed for a spinoff. The bidders for DOE's new solicitation, which closes on 6 January, are asked to specify which labs they'd prefer to do business with.

"Planetary emergency"

David Wells, a partner at Kleiner Perkins Caufield & Byers, said the firm was responding to an open solicitation from DOE when it applied last year to place an EIR at NREL. "We are very clear at this firm that we are facing a planetary emergency," and that KPCB

"should overlook no opportunity" to address climate change and the need for clean energy, he said.

The first six months at NREL "has been a learning process" both for KPCB and DOE in that the EIR program "wasn't designed down to the last detail," Wells said. "The belief that there are great [technology] resources at NREL is on the way to being proven correct."

Like Bauer, Wells declined to be specific about technologies of interest. He said the firm looks only for "disruptive innovations," as the basis of a new company. "The culture of KPCB is to seek the home runs." It's too soon to say if the company will suggest improvements in the labs' tech transfer process or whether KPCB might continue with the EIR at NREL or another lab when the current program ends in March, he said. But Wells said the program has already shown itself to be "enormously successful," since KPCB's expectations were "more nuanced" than the single goal of discovering a startup opportunity. "Our goals included strengthening our relationships with DOE and its lab system and enlarging our network." For DOE, the program has provided "insights into the way venture capital firms do business," he added.

David Kramer

NASA sells technology rights to highest bidder

History was made in Chicago this past October at a public auction that saw the first-ever sale of rights to government-owned patents. A bidder picked up an exclusive license to a group of NASA patents for signal-processing technology at the event, which was organized by intellectual property managing firm Ocean Tomo LLC. Darryl Mitchell, a technology transfer manager at NASA's Goddard Space Flight Center, which filed the patents, says technical applications under that license range from voice recognition to financial market modeling.

Known as the Hilbert–Huang transform, the technology covered by the license is a set of algorithms to convert nonlinear, nonstationary signals, such as from ocean or acoustic waves, into frequency data. The patents netted \$55 000 plus an undisclosed percentage in ongoing commercialization royalties for Goddard and inventor Norden Huang, a former NASA oceanographer. Goddard's revenue from the sale will go back into R&D and technology transfer

programs, says the center's innovative partnerships program office chief Nona Cheeks.

Circumventing hurdles

It took about a year for Goddard and Ocean Tomo to navigate regulations and get the go-ahead for the auction. "We can't do that" was the gut reaction for many people across the agency," says Mitchell. "Our main goal was to demonstrate that this could work." The auction was also the first time Ocean Tomo had sold licenses rather than patents.

The biggest hurdle to NASA's participation in the auction, says Mitchell, was a federal requirement that any exclusive licensing be subject to public comment, which could nullify the transaction. "[That] doesn't work so well in an auction," he notes. NASA's legal team addressed the requirement by licensing the patents before the auction to an Ocean Tomo subsidiary that then transferred the license to the winning bidder. Potential bidders also had

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