

The Regents of the University of California

**COMMITTEE ON OVERSIGHT OF THE
DEPARTMENT OF ENERGY LABORATORIES**

May 14, 2014

The Committee on Oversight of the Department of Energy Laboratories met on the above date at the Sacramento Convention Center, 1400 J Street, Sacramento.

Members present: Regents Blum, De La Peña, Gould, Island, Pattiz, Reiss, Schultz, and Zettel; Ex officio members Brown, Lansing, Napolitano, and Varner; Advisory member Gilly

In attendance: Regents Feingold, Flores, Kieffer, Lozano, Makarechian, Ruiz, and Sherman, Regents-designate Engelhorn, Leong Clancy, and Saifuddin, Faculty Representative Jacob, Interim Secretary and Chief of Staff Shaw, General Counsel Robinson, Chief Compliance and Audit Officer Vacca, Chief Investment Officer Bachher, Provost Dorr, Executive Vice President and Interim Chief Financial Officer Brostrom, Senior Vice President Dooley, Vice Presidents Andriola, Budil, Duckett, Lenz, and Sakaki, Chancellors Dirks and Drake, Interim Chancellor Hawgood, and Recording Secretary McCarthy

The meeting convened at 11:50 a.m. with Committee Chair Pattiz presiding.

1. APPROVAL OF MINUTES OF PREVIOUS MEETING

Upon motion duly made and seconded, the minutes of the meeting of March 20, 2014 were approved.

2. UPDATE ON THE DEPARTMENT OF ENERGY LABORATORIES AND PRESENTATION ON THE FUTURE OF BIOMANUFACTURING AND THE CALIFORNIA BIOECONOMY

[Background material was provided to Regents in advance of the meeting, and a copy is on file in the Office of the Secretary and Chief of Staff.]

Committee Chair Pattiz asked that the recent report from the University of Pennsylvania Graduate School of Education “From Master Plan to Mediocrity: Higher Education Performance and Policy in California” be provided to the Regents. He expressed support for the concerns of earlier public comment speakers from Fossil Free UC regarding climate change and noted the ongoing work of the National Laboratories in this area. He encouraged the University and the National Laboratories to make use of their resources to help deal with the serious problem of climate change.

Committee Chair Pattiz introduced new Vice President for Laboratory Management Kimberly Budil, chosen from many highly qualified applicants. Vice President Budil introduced Lawrence Berkeley National Laboratory (LBNL) Associate Director for Biosciences and UC Berkeley Hubbard Howe, Jr. Distinguished Professor of Biochemical Engineering and Chief Executive Officer and Vice President for Fuels Synthesis at the Joint BioEnergy Institute (JBEI) Jay Keasling. JBEI is one of three Bioenergy Research Centers established by the Department of Energy (DOE) in 2007 to accelerate fundamental research breakthroughs for the development of advanced next generation biofuels. Mr. Keasling is one of the world's foremost authorities on synthetic biology.

Mr. Keasling spoke about biomanufacturing, and its potential to improve the California economy and people's lives. Artemisinin is the world's most effective anti-malarial drug; however, its availability and price have proved inadequate to treat the 250 million people who have malaria, of whom 100 million die each year, two-thirds being children under age five. In 2004 Mr. Keasling received a \$42 million grant from the Bill and Melinda Gates Foundation and his laboratory was successful in engineering yeast to produce artemisinin quickly in an effort to reduce price and supply variations. The Regents hold the patents to these discoveries; the patents were then licensed by UC Berkeley's technology transfer office, which, in an innovative process, gave the licenses away, royalty-free for use in the developing world, with the condition that the companies with the licenses not make a profit. The French pharmaceutical company Sanofi sells the drug at cost in the developing world, and uses profits on sales of the drug in the developed world to reduce the cost in poor countries. There is the capacity currently to produce 60 tons of artemisinin annually, enough to treat half of the population that has malaria. Work was in progress to license the drug to other companies so that everyone who has malaria can be treated.

Mr. Keasling turned to the production of biofuels, which could help solve the problem of carbon emissions from fossil fuels by producing carbon-neutral fuels renewably. A microbe could be produced that would create biofuels, which could replace petroleum-based jet fuels and gasoline. In addition, microbes could be engineered to produce materials that could replace petroleum-based non-fuel products such as plastics. This work would require much time and funding.

Work was in progress at LBNL to develop a biomanufacturing center involving three main components. The first would be a Foundry for Biological Components to develop and supply interchangeable biological components for industry, particularly industry located in California. Second, an Open Collaboration Facility would be developed where users would gain access to the most advanced, proof-of-concept technologies so they could undertake their own projects to solve other world problems. The third component would be an Advanced Synthetic Biology Center that would benefit students and faculty from all UC campuses and other institutions around the world. Mr. Keasling explained that all the DOE National Laboratories support excellent user facilities. LBNL already runs several excellent user facilities such as the Advanced Light Source and the National Energy Research Scientific Computing Center, and has a depth of talent in biological engineering that would greatly benefit this developing biomanufacturing center.

Mr. Keasling discussed the center's potential affect on the national and California economies. For example, it was estimated that the 2010 national revenues from genetically modified products were more than \$300 billion, more than two percent of the gross domestic product and growing at a rate of ten to 20 percent annually. California's healthcare biomanufacturing in 2011 was estimated to generate approximately \$70 billion, and the state's 2013 agricultural revenues were roughly \$45 billion. The future center in biomanufacturing at LBNL would greatly benefit and help further develop these economies.

Regent Blum complimented Mr. Keasling on his work and asked whether biodiesel fuels had become economically competitive. Mr. Keasling noted that biodiesel fuel reduces greenhouse gases by 80 percent when used 100 percent in diesel engines. However, it would be very difficult for biodiesel fuel to be competitive at current fuel price levels in the United States; biofuel was still about twice as expensive as conventional diesel fuel. It may become competitive first in places with higher fuel prices, like Europe. Using biofuel in airplanes was a realistic possibility and several California biofuel companies were currently testing their biofuels in trials with major airlines.

Regent Blum asked why bed nets were still being produced to protect against malarial mosquitoes if artemisinin was widely available and inexpensive. Mr. Keasling explained that access to high-quality drugs was only one part of eradicating malaria. Other simple precautions like bed nets, pesticides, and vaccines were also necessary. The overall effort would take decades.

Governor Brown asked Mr. Keasling to relate his work to California's low-carbon fuel standard. Mr. Keasling responded that a challenge with the low-carbon fuel standard is the ten percent blend wall, or limit on the proportion of ethanol in gasoline. One way to put more renewable fuels in gas tanks would be to increase the blend wall to 15 or 20 percent. Much evidence demonstrates that gasoline automobiles could run on gasoline with 15 percent ethanol, but using such fuel would currently invalidate a car's warranty. The benefit of biofuels is that they can directly substitute for the molecules in gasoline, unlike ethanol, so cars can use 100 percent biofuel without harming their engines. If the amount of biofuel in gasoline could be increased, production of greenhouse gas would be reduced. To be practically feasible, biofuel would have to be affordable. Governor Brown asked Mr. Keasling for his opinion about the economic feasibility of adding biofuels to California gasoline blends. Mr. Keasling expressed his view that it would be very difficult for biofuels to be competitive at the current level of gasoline prices. The technology was available, but adding biofuel would increase the price of gasoline.

Committee Chair Pattiz asked whether electric cars were helping provide cleaner energy. Mr. Keasling responded that it depended whether the source of the electricity used to charge the cars was sustainable. Batteries hold much promise for passenger vehicles, but probably would not be feasible for airplanes or large trucks in the near future. Substitutes for petroleum-based fuels for those larger vehicles would have to be found.

Committee Chair Pattiz said he was eager to work with Ms. Budil in her new role as Vice President for Laboratory Management. Ms. Budil said she was honored to join the team at the Office of the President (OP) to build on the outstanding work of her predecessor Glenn Mara. Her roots at UC run deep; she came to UC Davis as a graduate student. She looked forward to building an effective partnership between OP and the Laboratories and enhancing the connections among the Laboratories and the campuses through research partnerships, graduate student engagement, and work with UC faculty.

Committee Chair Pattiz introduced William Goldstein, who assumed the positions of the 12th Director of the Lawrence Livermore National Laboratory (LLNL) and President of the Lawrence Livermore National Security LLC on March 31. Mr. Goldstein is a 29-year veteran of LLNL, with extensive experience as a scientific leader in senior management across a wide variety of Laboratory programs. Mr. Goldstein's prior position was as LLNL's Deputy Director for Science and Technology.

Mr. Goldstein said he was deeply honored to be named Director of LLNL and was conscious of the great institutions he was serving and the tremendous responsibility the position holds. He was privileged to represent the 6,000 men and women who work at LLNL. In her recent visit to LLNL, President Napolitano said that LLNL's first director, Herbert York's description of the founding idea of LLNL as "a new ideas laboratory" dedicated to probing the "technological extremes" is highly aligned with the University's academic ethos. Mr. Goldstein expressed his commitment to ensuring that LLNL continue its role as a new ideas laboratory, changing things for the better, and making an impact on the nation's well-being.

3. **APPOINTMENT OF ROBERT POWELL TO THE EXECUTIVE COMMITTEES OF THE LOS ALAMOS NATIONAL SECURITY LLC AND LAWRENCE LIVERMORE NATIONAL SECURITY LLC BOARDS OF GOVERNORS**

The Chairman of the Board and the President of the University recommended that:

- A. The appointment of Robert L. Powell as a Governor of the Executive Committees of the Boards of Governors of the limited liability companies known as Los Alamos National Security, LLC and Lawrence Livermore National Security, LLC replacing William R. Frazer, be approved.
- B. The President be authorized to issue any terms of appointment necessary to implement such appointment.

[Background material was provided to Regents in advance of the meeting, and a copy is on file in the Office of the Secretary and Chief of Staff.]

Committee Chair Pattiz stated that this item proposed the appointment of UC Davis Professor Robert Powell as a Governor of the Executive Committees of the Boards of Governors of the Los Alamos National Security, LLC (LANS) and Lawrence Livermore National Security, LLC (LLNS) in place of William Frazer. As Chair of the Boards of

Governors of LANS and LLNS, Committee Chair Pattiz would subsequently appoint Mr. Powell chair of the Boards' joint Science and Technology Committee. The Regents were familiar with Mr. Powell from his tenure as Faculty Representative to the Regents while he was Vice Chair and Chair of the Academic Senate.

Upon motion duly made and seconded, the Committee approved the Chairman of the Board and the President's recommendation and voted to present it to the Board.

The meeting adjourned at 12:25 p.m.

Attest:

Interim Secretary and Chief of Staff