

Evaluation of the Advanced Research Projects Agency - Energy (ARPA-E)

Committee

Pradeep K. Khosla

Chair

Dr. Pradeep Khosla is Chancellor at the University of California-San Diego. He has had an outstanding career as a researcher in the fields of electrical and computer engineering, and possesses critical technical, leadership, and technology commercialization experience essential for this committee. An internationally renowned electrical and computer engineer with three published books and over 100 published articles and book chapters, Dr. Khosla previously served as Dean of the College of Engineering and Philip and Marsha Dowd University Professor at Carnegie Mellon University. He spent the majority of his career at Carnegie Mellon, rising through the ranks from his first position as Assistant Professor in 1986 to his appointment as Dean of the College of Engineering in 2004. From 1994 to 1996, he also served as a Defense Advanced Research Projects Agency (DARPA) Program Manager in the Software and Intelligent Systems Technology Office, Defense Sciences Office and Tactical Technology Office. He has direct experience commercializing technology through spin offs of his own research into private companies as well as service on boards for several companies.

Dr. Khosla became UC San Diego's eighth Chancellor on August 1, 2012. As UC San Diego's chief executive officer, he leads a campus with more than 30,000 students, six undergraduate colleges, five academic divisions, and five graduate and professional schools. The campus is the third largest employer in San Diego County and one of 10 campuses in the world-renowned University of California system. At UC San Diego, Khosla initiated and led a comprehensive, all-inclusive strategic planning process to unify the campus and define UC San Diego's future. The initiative resulted in a Strategic Plan that outlines five overarching goals, four grand research themes, and 13 strategies to fulfill a sharpened mission and vision as a student-centered, research-focused, service-oriented public university.

Dr. Khosla is an elected member of the National Academy of Engineering and the American Society for Engineering Education. He has served on three prior National Research Council ad-hoc study committees, and served as Vice Chair of the Charles Stark Draper Prize Committee in 2014. He is a Fellow of the Institute of Electrical and Electronics Engineers, the American Society of Mechanical Engineers, the American Association for Advancement of Science, the American Association of Artificial Intelligence, and the Indian Academy of Engineering. He is an Honorary Fellow of the Indian Academy of Science. Khosla is also the recipient of numerous awards for his leadership, teaching, and research, including the 2012 Light of India Award, a Lifetime Achievement Award from the American Society of Mechanical Engineers, and the George Westinghouse Award for contributions to improve engineering teaching. In 2012, he was named as one of the 50 most influential Indian-Americans by SiliconIndia.

Maxine L. Savitz

Vice Chair

Maxine Savitz has extensive experience in energy technologies and has served on numerous energy-related committees at the NRC. She is currently on the Committee on Determinants of Market Adoption of Clean Energy and Energy Efficient Technologies. Other committees include: the Committee to Evaluate Energy-Efficiency and Sustainability Standards Used by the DOD for Military Construction and Repair; Committee on Assessment of Solid State Lighting; Board on Energy and Environmental Systems; Committee for America's Energy Future; Panel on Energy Efficiency (vice-chair); Panel on Redesigning the Commercial Building and Residential Energy Consumption Surveys of the Energy Information Administration; Committee on Review of the Quality of the Management and of the Science and Engineering Research at DOE's National Security Laboratories - Phase 1; Committee on Prospective Benefits of DOE's Energy Efficiency and Fossil Energy R&D Programs, Phase 1 and 2 (chair); Panel on Benefits of Lighting R&D (chair); Committee on Alternatives and Strategies for Future Hydrogen Production and Use; Committee on Benefits of DOE's R&D on Energy Efficiency and Fossil Energy; Charles Stark Draper Prize Committee (chair, vice chair, and member); among others. Dr Savitz is an elected member of the National Academy of Engineering.

Dr. Savitz is the retired general manager for Technology Partnerships at Honeywell, Inc., (formerly AlliedSignal) and previously, was the general manager of AlliedSignal Ceramics Components. Dr. Savitz was employed at the U.S. Department of Energy (DOE) and its predecessor agencies from 1974 to 1983 and served as Deputy Assistant Secretary for Conservation. She currently serves on the board of the American Council for an Energy Efficient Economy and on advisory bodies for Pacific Northwest National Laboratory, Sandia National Laboratories, and Jet Propulsion Laboratory. She serves on the MIT visiting committee for sponsored research activities. In 2009, Dr. Savitz was appointed to the President's Council of Advisors for Science and Technology. She is a fellow of the California Council on Science and Technology. Past board memberships include the National Science Board, Secretary of Energy Advisory Board, Defense Science Board, Electric Power Research Institute (EPRI), Draper Laboratories, and the Energy Foundation.

Pierre Azoulay

Member

Pierre Azoulay is an Associate Professor of Technological Innovation, Entrepreneurship, and Strategy at the Sloan School of Management, Massachusetts Institute of Technology. He is also a Research Associate at the National Bureau of Economic Research.

Dr. Azoulay is an applied economist deeply interested in understanding the forces that shape the rate and direction of scientific and technological progress. Currently, he is studying the career choices of postdoctoral fellows in the life sciences and how they impinge on long-term research productivity; the impact of scientific retractions on the fate of scientific fields and authors embroiled in scandal; and the effects of public investments in biomedical research on the patenting rates of private-sector biopharmaceutical firms.

In the past, he has investigated the effects of alternative funding schemes on risk-taking behavior in science, and contributed to the public policy debate on the reform of the peer review system for the funding of basic research.

Dr. Azoulay earned his Ph.D. from the Massachusetts Institute of Technology in 2001. From 2001 to 2006, he was an Assistant Professor of Management at the Graduate School of Business, Columbia University. A native of France, he resides in Newton, Massachusetts with his wife and two daughters.

Terry Boston, P.E.

Member

Terry Boston is the president and chief executive officer of PJM Interconnection. In this role, Mr. Boston oversees the largest power grid in North America and the largest electricity market in the world. Mr. Boston also is president of the Association of Edison Illuminating Companies, Inc., and immediate past president of the GO 15, the association of the world's largest power grid operators. Prior to joining PJM, Mr. Boston was the executive vice president of the Tennessee Valley Authority, the nation's largest public power provider. In his 35 years at TVA, Mr. Boston directed divisions in transmission and power operations, pricing, contracts and electric system reliability. In his roles at PJM and at TVA, Mr. Boston has had to plan for and manage technological changes in power generation, transmission, and delivery technologies and developed particular expertise in power storage systems. Mr. Boston is a member of the board for the Electric Power Research Institute and previously served as chair of the North American Transmission Forum. Mr. Boston currently serves on the National Research Council's Committee on Analytical Research Foundations for the Next-Generation Electric Grid. Mr. Boston holds a M.S. in Engineering Administration from the University of Tennessee and a B.S. in Engineering from Tennessee Technological University.

Erica R. Fuchs

Member

Erica Fuchs is an Associate Professor in the Department of Engineering and Public Policy at Carnegie Mellon University. Her research interests include the role of government in technology development and the impact of organizational culture on technology innovation. She has studied the impacts of offshoring and location on the development and competitiveness of new technologies and national innovation systems. Recent work includes an analysis of the impact of subsidies on direct-drive electric vehicle sales in the U.S and China and a techno-economic analysis and optimization of lithium-ion batteries for vehicle electrification. Dr. Fuchs currently serves on the U.S. Advisory Committee to the International Commission for Optics and previously served on the National Research Council's Committee on Harnessing Light: Capitalizing on Optical Science Trends and Challenges for Future Research. She is a member of the Advisory Editorial Board for the journal Research Policy. Dr. Fuchs earned her Sc.D. in Engineering Systems, her S.M. in Technology Policy (2003) and her S.B. in Materials Science and Engineering from the Massachusetts Institute of Technology.

Supratik Guha

Member

Supratik Guha is the Director of Physical Sciences at IBM Research and is responsible for overseeing IBM's worldwide research in the physical sciences. His technical work on high dielectric constant oxide materials led to IBM's high-k/metal gate silicon CMOS technology, widely used today and considered one of the major progresses in microelectronics. His current research has been on new materials and devices for computing and energy conversion applications and, increasingly, on sensor based physical analytics for precision agriculture and environmental monitoring. As a manager he has initiated or expanded several successful programs at IBM such as silicon photonics, quantum computing, carbon electronics, photovoltaics, and physical analytics. He is a member of the National Academy of Engineering, and a Fellow of the Materials Research Society and the American Physical Society. He is also an Adjunct Professor at Columbia University. Dr. Guha earned his Ph.D. in Materials Science from the University of Southern California in 1991.

Disclosure of Conflict of Interest: Supratik Guha

In accordance with Section 15 of the Federal Advisory Committee Act, the "Academy shall make its best efforts to ensure that no individual appointed to serve on [a] committee has a conflict of interest that is relevant to the functions to be performed, unless such conflict is promptly and publicly disclosed and the Academy determines that the conflict is unavoidable." A conflict of interest refers to an interest, ordinarily financial, of an individual that could be directly affected by the work of the committee. As specified in the Academy's policy and procedures (<http://www.nationalacademies.org/coi/index.html>), an objective determination is made for each provisionally appointed committee member whether or not a conflict of interest exists given the facts of the individual's financial and other interests and the task being undertaken by the committee. A determination of a conflict of interest for an individual is not an assessment of that individual's actual behavior or character or ability to act objectively despite the conflicting interest.

We have concluded that for this committee to accomplish the tasks for which it was established, its membership must include, among others, at least one person who possesses a combination of the following current experience and expertise: (1) technical expertise in both organic materials synthesis and semiconductor development for applications in energy-related applications; (2) recent experience in translating science and engineering breakthroughs into industry-relevant technologies; and (3) current experience in industrial and general management at an organization that focuses on applied research and translating nanoscience research to industrial applications.

To meet the need for this expertise and experience, Dr. Supratik Guha is proposed for membership on this committee even though we have concluded that he has a conflict of interest. In September 2015, Dr. Guha became director of the Nanoscience and Technology Division at the U.S. Department of Energy's Argonne National Laboratory (ANL). Dr. Guha has a conflict of interest because ANL receives current funding from ARPA-E.

As his biographical summary makes clear, Dr. Guha has broad technical expertise in new materials for energy

conversion devices and technologies, such as materials for thin film solar cells, sensor networks, and semiconductors. Dr. Guha served as director of Physical Sciences for IBM Research through August 2015 where he led the firm's worldwide research enterprise of labs and researchers engaged in fundamental and applied science research, including moving scientific discoveries into the market. At ANL, Dr. Guha will continue to work in a research environment that ranges from fundamental research to applied research on nanoscale materials with connections to industry. We believe that Dr. Guha can serve effectively as a member of the committee and that the committee can produce an objective report, taking into account the composition of the committee, the work to be performed, and the procedures to be followed in completing the work.

After an extensive search, we have been unable to find another individual who does not have a similar conflict of interest and who also has a comparable combination of specialized scientific and technical knowledge with corresponding expertise in translating research into products for the market. Therefore, we have concluded that the potential conflict of interest described above is unavoidable.

Mark E. Jones

Member

Mark Jones is Executive External Strategy and Communications Fellow for Dow Chemical, reporting directly to Corporate Vice President of Research & Development A.N. Sreeram. Among other duties, in this role he provides technical support for Dow's Renewable Chemistries Expertise Center (RCEC). Dr. Jones's work has also focused on developing processes to produce battery materials, with an emphasis on improving lithium-ion batteries. This work built on Dr. Jones's experience with processing inorganic materials, fuel cell development for portable power applications, and technology exploration. Much of Dr. Jones' professional work has centered on the discovery, scale-up and commercialization of technologies, and on process improvements. Other recent efforts at Dow have focused on the market and production hurdles faced by biomaterials. Dr. Jones served on the National Research Council's Committee on Sustainable Development of Algal Biofuels. Dr. Jones completed post-doctoral work at the Cooperative Institute for Research in Environmental Science in Boulder, CO. He earned his Ph.D. in Physical Chemistry from the University of Colorado-Boulder and his B.S. in Chemistry from Randolph-Macon College.

Eric Landree

Member

Eric Landree is a senior engineer at the RAND Corporation where he specializes in research and development strategic planning, the evaluation of emerging technologies, and research program evaluation. He has contributed to projects across the spectrum of national security, emerging technologies, and economic development and innovation. Recent work includes developing and piloting a method for evaluating the impact of nanotechnology research by the National Institute for Occupational Safety and Health, creating a framework to identify the roles and responsibilities of those implementing Department of Defense policies and to identify potential conflicts, ambiguities, gaps, inconsistencies in those policies. Dr. Landree also supported the National Institute for Occupational Safety and Health's preparations for evaluation of the relevance and impact of their research and development programs by the National Academies. Prior to joining RAND, Dr. Landree served as an American Association for the Advancement of Science Defense Science & Technology Policy Fellow in the Department of Defense Office of the Director for Defense Research and Engineering. After finishing graduate school, Dr. Landree earned a National Research Council Postdoctoral Fellowship where conducted research on thin film material at the National Institute of Standards and Technology. Dr. Landree earned his Ph.D. in Materials Science and Engineering from Northwestern University and his B.S. in Physics from Allegheny College.

Gilbert E. Metcalf

Member

Gilbert Metcalf is a Professor of Economics at Tufts University and a Research Associate at the National Bureau of Economic Research. During 2011 and 2012, he served as the Deputy Assistant Secretary for Environment and Energy at the U.S. Department of Treasury. Dr. Metcalf's current research focuses on policy evaluation and design in the area of energy and climate change. Other research has investigated the economics of energy security, incentives to drive investment in energy infrastructure, and policies to spur low-carbon energy technologies. Dr. Metcalf has edited three books, and has contributed chapters to several books on energy and tax policy. Dr. Metcalf previously served on the National Research Council's Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption. Dr. Metcalf received a Ph.D. in Economics from Harvard University, a M.S. in Agricultural and Resource Economics from the University of Massachusetts Amherst, and a B.A. in Mathematics from Amherst College.

John Plaster

Member

John Plaster is a Managing Director in the Global Power Group and Head of Alternative Energy at Barclays, based in New York. Mr. Plaster has over 18 years of investment banking experience with Barclays and Lehman Brothers. He has extensive experience with renewable energy companies (wind, solar, geothermal, and waste to energy), IPPs and regulated utilities across a wide spectrum of disciplines including financial advisory, equity and equity-linked finance, leveraged finance, structured finance, restructuring and commodities. Prior to joining Lehman Brothers, Mr. Plaster worked as an attorney in the Corporate Finance Group of Shearman & Sterling. Mr. Plaster holds a JD degree, highest honors-Order of the Coif- from Vanderbilt University Law School and a BA in Economics, cum laude, from Wabash College.

Louis Schick

Member

Mr. Lou Schick is Founding Partner and Chief Technology Officer at NewWorld Capital Group. His investments at NewWorld include energy infrastructure and production such as several megawatt solar installations in the United States and Canada. Other investments include novel inverter technologies and air-conditioning technology that reduces energy use and requires no chemical coolant. Mr. Schick has also worked as an independent consultant specializing in business applications of environmental technologies and manager of private equity investments in clean energy companies. Prior to his investment work, Mr. Schick worked at General Electric, mainly at Corporate Research. In his various roles, Schick led evaluation of Disruptive Technologies for GE Energy, supported installation and repair of gas turbine power plants worldwide, served as developer and lead of a solid oxide fuel cell program and a low-carbon technologies program, carried out technical diligence on multiple fuel cell companies, and evaluated and ranked Gen III and Gen IV nuclear power cycles. Earlier, he was a Product Manager for MTI Micro Fuel Cells and ran the military product development team, where he managed several state and federal grant programs, and developed patent applications. Mr. Schick holds technology patents in gas turbine parts, vehicle telematics, and other fields. Mr. Schick earned his M.S. in Physics from Cornell University and his B.S. in Physics from Union College.

Charles V. Shank

Member

Charles Shank is a Senior Fellow at the Howard Hughes Medical Institute. He previously served as Director of the E.O. Lawrence Berkeley National Laboratory from 1989 until his retirement in 2004. Under his leadership, Lawrence Berkeley National Laboratory emerged as a leader in the field of supercomputing and joined with two other national labs to form the Joint Genome Institute, a major contributor to the decoding of the human genome. Dr. Shank also held a triple appointment as professor at the University of California at Berkeley in the Department of Physics, Department of Chemistry, and Department of Electrical Engineering and Computer Sciences. His research focused on ultrafast processes in solid state materials and molecular systems. Prior to LBNL and Berkeley, Dr. Shank conducted research at Bell Labs, introducing the use of short laser pulses to the study of ultrafast events, allowing researchers to gain a better understanding of how energy is stored and transferred within materials. Dr. Shank has extensive experience serving on National Research Council committees, most recently serving as co-chair for the Committee to Review the Quality of the Management and of the Science and Engineering Research at the Department of Energy National Security Laboratories – Phase II. Dr. Shank earned his Ph.D., M.S., and B.S. in Electrical Engineering from the University of California at Berkeley.

Stephanie S. Shipp

Member

Stephanie Shipp is the Deputy Director and Research Professor at the Social and Decision Analytics Laboratory (SDAL) at the Virginia Bioinformatics Laboratory at Virginia Polytechnic Institute and State University. Her research focuses on developing of statistical methodology and tools for using big data to address social science policy questions quantitatively.

Dr. Shipp's work spans topics related to innovation and competitiveness with recent emphasis on creation of smart cities, use of big data to advance policy, advanced manufacturing, the role of federal laboratories, and funding of high risk/high reward research. She previously served as the Director of the Economic Assessment Office in the Advanced Technology Program at the National Institute of Standards and Technology. Dr. Shipp also led economic and statistical programs at the Census Bureau, the Bureau of Labor Statistics, and the Federal Reserve Board.

Dr. Shipp previously served on the National Research Council's Committee on Assessing the Value of Research in Advancing National Goals and the Steering Committee for the Workshop on Future Directions for the National Science Foundation National Patterns of Research and Development Program. She is a fellow of the American Association for the Advancement of Science and an elected member of the International Statistics Institute. She is a fellow of the American Statistical Association and has held several leadership positions within the ASA. She was a member of the international advisory board for VINNOVA, Sweden's innovation agency, and has led evaluation panels for the Swedish Research Council's Linnaeus Grant programs in 2012 and 2014. Dr. Shipp received her Ph.D. in Economics from George Washington University and her B.A. in Economics from Trinity University, Washington DC.

Scott Stern

Member

Scott Stern is the David Sarnoff Professor of Management and Chair of the Technological Innovation, Entrepreneurship, and Strategic Management Group at the Massachusetts Institute of Technology Sloan School of Management. His research in the economics of innovation and entrepreneurship focuses on entrepreneurial strategy, innovation-driven entrepreneurial ecosystems, and innovation policy and management. Recent studies include the impact of clusters on entrepreneurship, the role of institutions in shaping the accumulation of scientific and technical knowledge, and the drivers and consequences of entrepreneurial strategy. He has advised start-ups and other growth firms in the area of entrepreneurial strategy, and worked with governments and other stakeholders on policy issues related to competitiveness and regional performance. Dr. Stern co-founded the MIT Regional Entrepreneurship Acceleration Program, advised the development of the Social Progress Index, and served as the lead MIT investigator on the US Cluster Mapping Project. Dr. Stern is the director and co-founder of the Innovation Policy Working Group at the National Bureau of Economic Research. Dr. Stern previously served on the National Research Council's Committee on the Impact of Copyright Policy on Innovation in the Digital Era and the Committee to Study the Future of Supercomputing. Dr. Stern holds a Ph.D. in Economics from Stanford University and a B.A. in Economics from New York University.

John C. Wall

Member

John Wall serves as the Vice President and Chief Technical Officer for Cummins Inc. In this role, he oversees more than 6,000 engineers working to design internal combustion engines, power generation systems and related technologies in Cummins technical centers around the world. Dr. Wall's earlier positions at Cummins include Chief Engineer – Heavy-Duty Projects, Director - Emissions Research, Vice President - Research & Development, and Vice President -Advanced Engineering and Technology Planning. Prior to joining Cummins, Dr. Wall held research and engineering positions at Chevron Research Company, most recently serving as the Unit Leader of Diesel & Aviation Fuels Research. Dr. Wall's interests include advanced internal combustion engine design, emissions control and fuels, and engineering in a global environment. He serves on advisory boards at MIT and Purdue University. Dr. Wall currently chairs the National Academy of Engineering Bernard M. Gordon Prize committee and has previously served other NAE committees. Dr. Wall earned his S.B., S.M. and Sc.D. degrees in Mechanical Engineering from the Massachusetts Institute of Technology.

Valerie Williams

Member

Valerie Williams is Senior Program Evaluator at the University Corporation of Atmospheric Sciences (UCAR) where she leads evaluation efforts for UCAR Community Programs and serves as UCAR's alternate appointee to the World Meteorological Organization (WMO) Climate Services Taskforce on Monitoring and Evaluation. Prior to working at UCAR, Dr. Williams worked at the RAND Corporation where she led several government strategic planning and evaluation projects, including providing technical assistance to seven NIOSH programs preparing for external review by the National Research Council. In addition to evaluation, Dr. Williams also participated in defense and intelligence projects at RAND, including research support for DARPA's Controlled Biological Systems program and technical assistance to the FBI's Inspections Division. Dr. Williams is a member of the American Evaluation Association (AEA) and served on the AEA 2012 Presidential Task Force. She was invited to participate in the National Research Council's Expert Evaluation Meeting for the NRC review of NOAA's Education Program in 2010 and has continued to provide evaluation guidance to NOAA Education as a Senior Evaluation consultant. Dr. Williams earned her Ph.D. in Chemistry at New York University and completed postdoctoral training in Biophysical Chemistry in the Department of Pharmacology at the Mayo Clinic in Rochester, MN.

Peidong Yang

Member

Peidong Yang is the S. K. and Angela Chan Distinguished Chair Professor in Energy and Professor of Chemistry in the Department of Chemistry, Materials Science and Engineering at the University of California, Berkeley. Dr. Yang's main research interest is in the area of one dimensional semiconductor nanostructures and their applications in nanophotonics and energy conversion. Specific lines of inquiry include developing excitonic solar cells – including organic, hybrid organic-inorganic and dye-sensitized cells (DSCs) – that hold promise for developing inexpensive devices for large-scale solar energy conversion. Dr. Yang also investigates the application of nanostructures in direct solar energy conversion to storable fuels such as hydrogen (H₂). Yang also undertakes significant research on artificial photosynthesis. He was a founding member of, and has served as a research leader at, the Department of Energy's Joint Center for Artificial Photosynthesis. Dr. Yang also has valuable experience translating discoveries from the lab into commercializable products having co-founded two startups based on his research: Nanosys Inc. and Alphabet Energy Inc. Dr. Yang earned his Ph.D. in chemistry from Harvard University and his B.S. in chemistry from University of Science and Technology of China.