

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

**Board on Energy and Environmental Systems Membership
Biographies**

CHAIR

Jared Cohon, (NAE) is university professor of Civil and Environmental Engineering and Engineering and Public Policy and President Emeritus at Carnegie Mellon University in Pittsburgh. He recently chaired the National Research Council Committee on Fuel Economy Technologies for Light-Duty Vehicles and the Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption. He was a Professor of Geography and Environmental Engineering at Johns Hopkins University, where he also served as Vice Provost for Research from 1986 to 1992, Associate Dean of Engineering from 1983 to 1986, and Assistant Dean of Engineering from 1981 to 1983. Following his tenure at Johns Hopkins, he became Dean of the School of Forestry and Environmental Studies and Professor of Environmental Systems Analysis at Yale University. Dr. Cohon also served as Legislative Assistant for Energy and Environment on the staff of U.S. Senator Moynihan from 1977 to 1978. President George W. Bush appointed him in 2002 and President Barack Obama reappointed him to serve on the Homeland Security Advisory Council. In January 1995, Dr. Cohon was appointed by President Bill Clinton to the Nuclear Waste Technical Review Board. In 1997, he assumed the role of Chairman of the Board, a position he held until 2002. Dr. Cohon co-chaired the Commission to Review the Effectiveness of the National Energy Laboratories from 2014 to 2016. He serves on the Boards of Director of Ingersoll Rand and Unisys and five non-profit organizations, including the Health Effects Institute and the Center for Responsible Shale Gas Development. Dr. Cohon is a national authority on environmental and water resource systems analysis and is the author, co-author or editor of more than 80 professional publications. He holds a Bachelor of Science degree in Civil Engineering from the University of Pennsylvania, and a Masters degree and Ph.D. in Civil Engineering from Massachusetts Institute of Technology.

MEMBERS

David T. Allen is Melvin H. Gertz Regents Professor in Chemical Engineering at the University of Texas in Austin. He is also director of the university's Center for Energy and Environmental Resources. Dr. Allen serves as chair of the U.S. EPA Science Advisory Board. He is Editor-in-Chief of the American Chemical Society journal: Sustainable Chemistry & Engineering. His research focuses on urban air quality and the engineering of sustainable systems, and he has been lead investigator for multiple air quality studies, which have had a substantial impact on the direction of air quality policies. Dr. Allen served on several NRC committees and the Board on Environmental Studies and Toxicology and is currently a member of the NRC Committee on Scientific Tools and Approaches for Sustainability. He holds a Ph.D. in chemical engineering from the California Institute of Technology.

Vicky A. Bailey is Principal and partner, Anderson Stratton Enterprises LLC, and prior owner of BHMM Energy Services, LLC a certified minority owned energy facility management company. She was appointed to the U.S. Department of Energy in 2001, as Assistant Secretary for both the Office of Domestic Policy and International Affairs during the first term of President George W. Bush. In the aftermath of Sept. 11th, she was chair of several bilateral international working groups with the goal of implementing our national energy policy and strengthening our relationships with other nations to foster energy security. Also, in this role, she served as Vice Chair and the U.S. representative to the Paris based International Energy Agency (IEA), working with all the energy producing nations gaining her international experience and stature. Bailey oversaw the development and implementation of domestic energy policy in the areas of clean coal technologies, nuclear power, oil and natural gas, and LNG production. Previously, in 2000, she returned to the corporate arena as President of Cinergy/PSI now Duke Indiana the largest utility in Indiana. From 1993 to 2000, she was a Commissioner, Federal Energy Regulatory Commission (FERC) appointed by President William J. Clinton where she was one of the architects of Order No. 888 (open access rule for electric transmission) and worked on implementation of Order No. 636 (the rule restructuring natural gas pipeline services) and from 1986 to 1993, Commissioner, Indiana Utility Regulatory Commission (IURC) appointed by Gov. Robert Orr and reappointed by Gov. Evan Bayh. Board positions include, EQT Corp, Cheniere Energy, and Battelle Memorial Institute, Resources for the Future and the Girl Scout Council of the Nation's

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Capital. Pres. Bush appointed her to the Presidential Commission, National Museum of African American History and Culture (NMAAHC) which opened on the Mall in 2016, Secretary of Energy Steven Chu at the direction of President Barack Obama appointed her to the Blue Ribbon Commission for America's Nuclear Future, and Secretary of Energy Ernest Moniz appointed her to the National Petroleum Council. In May of 2013 to the present, Ms. Bailey became the first female Chairman of the Board, United States Energy Association (USEA). A native of Indianapolis, Ms. Bailey is a graduate and distinguished alumna of the Krannert School of Management at Purdue University and graduated from the Advanced Management Program, The Wharton School, at the University of Pennsylvania.

Carla Bailo is the president and CEO of the Center for Automotive Research (CAR). Ms. Bailo is a leader in engineering and vehicle program management with 35 years of experience in the automotive industry. In addition to her role at CAR, Ms. Bailo is the 2016-2018 vice president of automotive for SAE International, a global association of more than 138,000 engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries. Prior to joining CAR, Ms. Bailo was the assistant vice president for mobility research and business development at The Ohio State University. In that capacity, she assisted the university in accelerating sustainable mobility and transportation innovation, while integrating related research and education across Ohio State's academic units. She also helped coordinate Ohio State's involvement as the primary research partner for Smart Columbus, a \$140 million program to transform central Ohio into a premier transportation innovation region. Ms. Bailo has 25 years of experience at Nissan North America, Inc., where in her most recent role at Nissan she served as senior vice president of research and development. She was responsible for vehicle engineering and development operations in Michigan, Arizona, Mexico, and Brazil, managing a \$500 million budget and 2,500 employees. In this role, she improved the efficiency of Nissan's R&D functions. Ms. Bailo has a M.S. degree in mechanical engineering from the University of Michigan and a B.S. degree in mechanical engineering from Kettering University.

W. Terry Boston (NAE) is president and CEO, Terry Boston, LLC. Previously, he served as CEO of PJM Interconnection, the largest power grid in North America and the largest electricity market in the world. Mr. Boston is a 2017 U.S. Presidential appointee to the National Infrastructure Advisory Council (NIAC/DHS). Mr. Boston is past president of the Association of Edison Illuminating Companies and past president of GO 15, the association of the world's largest power grid operators. He also served as a U.S. vice president of the International Council of Large Electric Systems and is a past chair of the North American Transmission Forum. He also was one of the eight industry experts selected to direct the North American Electric Reliability Corporation (NERC) investigation of the August 2003 Northeast/Midwest blackout. In 2011, Mr. Boston was honored with the "Leadership in Power" award from the IEEE Power and Energy Society. He also was chosen by Intelligent Utilities Magazine as one of the Top 11 Industry Movers and Shakers, and led PJM to win Platts Global Energy Awards in Industry Leadership 2010 and Excellence in Electricity in 2012 and in December 2015 he was unanimously selected the winner of the Global Energy Life Time Achievement Award. He received a B.S. in Engineering from the Tennessee Technological University and an M.S. in Engineering Administration from the University of Tennessee. He has served on NAE study committees on Mathematical Science for the Next Generation Electric Grid, An Assessment of ARPA-E and Enhancing the Resilience of the National Electricity System.

William F. Brinkman (NAS) is currently a research physicist in the Physics Department at Princeton University. He previously served as Director, Office of Science, U.S. Department of Energy from 2009 to 2013. He retired as vice president of research from Bell Laboratories/Lucent Technologies on September 30, 2001. In that position his responsibilities included the direction of all research to enable the advancement of the technology underlying Lucent Technologies' products. He is a member of the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences. He has served on a number of NRC committees, and he chaired the NRC's Physics Survey Committee and the Committee on Solid-State Sciences. He is past president of the American Physical Society. Dr. Brinkman was the recipient of the 1994 George E. Pake Prize. He received a Ph.D. degree in physics from the University of Missouri, Columbia.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Deepakraj Divan (NAE) is Professor and Director of the Center for Distributed Energy at the Georgia Institute of Technology in Atlanta, GA. Dr. Divan is also John E Pippin Chair and GRA Eminent Scholar. His field of research is in the areas of power electronics, power systems, smart grids, and distributed control of power systems. He works closely with utilities, industry and is actively involved in research, teaching, entrepreneurship and starting new ventures. Dr. Divan also serves as Founder and Chief Scientist at Varentec, in Santa Clara, CA, and was President and CTO from 2011-14, leading the company as it developed its suite of innovative distributed real-time grid control technologies. Varentec is funded by leading green-tech Venture Capital firm Khosla Ventures and renowned investor Bill Gates. Dr. Divan is an elected Member of the US National Academy of Engineering, a Fellow of the IEEE, past President of the IEEE Power Electronics Society, and is a recipient of the IEEE William E Newell Field Medal. He has 40 years of academic and industrial experience, 65 issued and pending patents, and over 400 refereed publications. He has founded or seeded several new ventures including Soft Switching Technologies, Innovolt, Varentec and Smart Wires, which together have raised >\$150M in venture funding. He received his B. Tech from IIT Kanpur, and his M.S. and Ph.D. degrees from the University of Calgary, Canada. He has been a Professor at the University of Wisconsin-Madison from 1985 to 1995, and has been with Georgia Tech since 2004. He has taken time off from academia to found and run two companies – Soft Switching Technologies from 1995-2004, and Varentec from 2011-2015.

Marcus Extavour is Senior Director of Energy and Resources at XPRIZE Foundation. He applies his unique background in research physics, technology development, and public policy to the world's grand challenges in energy and climate. At XPRIZE this involves the strategic development of prizes and programs in energy and resources, including the \$20 million NRG COSIA Carbon XPRIZE, a global prize competition to incentivize breakthrough solutions to recycling carbon dioxide emissions into valuable products. Dr. Extavour previously served as Director of Government and Corporate Partnerships in the Faculty of Applied Science & Engineering at the University of Toronto. There, he built strategic partnerships between academia, the private sector, and government to drive commercialization of technologies spanning sustainable energy, robotics and AI, quantum computing, and internet-of-things. In the private sector, Dr. Extavour developed optical telecommunications hardware at Nortel Networks, and electricity market software tools at Ontario Power Generation, one of Canada's largest utilities. Dr. Extavour's work in public policy has spanned both the U.S. and Canada. As a Science and Technology Policy Fellow in the U.S. Senate, he held the portfolios of renewables, heavy oil, and critical minerals under U.S. Senate Energy and Natural Resources Committee Chairman Senator Jeff Bingaman (D-NM). This work included development of the Helium Stewardship Act of 2013. At the Council of Canadian Academies in Ottawa, Dr. Extavour served as a consultant to the Federal Government of Canada on the safety of conducted energy weapons. Dr. Extavour has co-authored over 25 publications; given dozens of invited policy, science, and technology keynote presentations, internal briefings, and public talks across three continents and the Caribbean; raised over \$30 million for commercialization of clean energy technologies; and led policy-oriented international science assessments. Dr. Extavour obtained a BAsC in Engineering Science, and both MSc and PhD in Physics from the University of Toronto, where his research focused on quantum optics and atomic physics. He is a member of the American Physical Society, the Optical Society of America, the International Society for Photonics and Optics (SPIE), and the National Society of Black Engineers. In 2010 Dr. Extavour was awarded the Arthur H. Guenther Congressional Fellowship from the Optical Society of America and SPIE.

TJ Glauthier is president and CEO of TJG Energy Associates, LLC. He also is an executive, board member, and advisor for public and private organizations in the energy sector. He currently serves on the boards of directors of two companies. One is VIA Motors, a manufacturer of electric drive delivery vans and pickup trucks for the international market, including through a partnership with Geely Motors (the owner of Volvo) in China. The other is California Bioenergy, which works with large dairies in California's Central Valley. The firm captures methane and produces energy either as electricity for the grid, or as compressed natural gas for use as a clean transportation fuel. He also advises Stem, an energy storage and management company headquartered in Silicon Valley. Earlier, Glauthier served on the board of directors of EnerNOC, Inc., the leading demand response company, for ten years until it was sold in 2017. He was also on the boards of Union Drilling, an oil and gas drilling company, and EPV Solar, a manufacturer of thin film solar panels, and has been an advisor to a number of high-tech energy companies. Glauthier is also an advisor to Booz Allen Hamilton's energy practice, including its work for the Department of Energy, the National Nuclear Security Agency, and the National Laboratories, and on innovative management approaches to government programs. He has served on the Lawrence Berkeley National Laboratory advisory board

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

since 2010. He recently rotated off of Stanford's Precourt Institute advisory council after serving since its inception in 2006, and also off of the Policy and Global Affairs Committee of the National Academy of Sciences, having served from 2012 to 2018. In 2014-15, he was co-chair of the Congressionally-mandated and Presidentially appointed Commission on the Effectiveness of the National Energy Laboratories, which reviewed all 17 of DOE's National Labs and their working relationships with the DOE. Prior to that, he served as a Congressionally-appointed member of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise, which focused on the management of the nuclear weapons program. In the Clinton Administration, he held two Presidential appointments: at the White House as Associate Director of OMB for Natural Resources, Energy and Science, and as the Deputy Secretary and COO of the Department of Energy, the second-highest position at DOE. At DOE, he was responsible for overseeing all of DOE's 120,000 federal and contract employees, 17 national laboratories, and annual budget of over \$19 billion. In 2008, he served on President Obama's transition team. After leaving the government in 2001, he was CEO of the Electricity Innovation Institute, an affiliate of EPRI. Earlier, he was a vice president of the management consulting firm Temple, Barker & Sloane, and director of energy and climate change at the WWF. He is a graduate of Claremont McKenna College and the Harvard Business School.

Nat Goldhaber is managing director and a co-founder of Claremont Creek Ventures (CCV). He brings more than 30 years of information technology experience across Internet, networking, energy, healthcare, and transportation sectors as a successful investor and entrepreneur. Goldhaber has a strong record investing in technology startups across broad-impact industries. He has represented CCV on the boards of Clean Power Finance, Building Robotics, EcoFactor, RidePal, and DNAnexus. He also served as Director at Adura Technologies (acquired by Acuity Brands). Prior to co-founding Claremont Creek Ventures, Goldhaber was founder and CEO of Cybergold and founding CEO of the multimedia joint venture between IBM and Apple, Kaleida Labs. He was also the founder and CEO of Centram Systems West, developer of the first IBM/Macintosh local area network (TOPS), and acquired by Sun Microsystems where Nat served as Vice President. Goldhaber was the President of the venture fund Cole Gilburne Goldhaber and Ariyoshi. His prior investments include Ask Jeeves, Shiva and Macromedia and InterTrust. Previously, Goldhaber served as Special Assistant to Pennsylvania's Lt. Governor, William Scranton, III and ran Pennsylvania's Energy Agency as its Interim Director. He is an Advisory Board member of the Lester Center for Entrepreneurship and advisor to the Center for Entrepreneurship and Technology (CET) at UC Berkeley. He serves as a member of the US Secret Service Electronics Crime Taskforce and is an Emeritus Board Member and Advisor to the Federation of American Scientists. Goldhaber holds Masters and PhD (h.c.) degrees in Education and is an emeritus member of the Executive Board of the College of Letters and Science at UC Berkeley.

Barbara Kates-Garnick is Professor of Practice at The Fletcher School. Most recently she served as the Undersecretary of Energy for the Commonwealth of Massachusetts where she was responsible for guiding energy policy. She also served as the Co-chair of Massachusetts' Global Warming Solutions Act Implementation Advisory Committee that oversees the implementation of the Commonwealth's Global Warming Solutions Act. She has had an extensive career in energy, environment, and clean technology that has spanned the private and public sectors and included the creation of a clean technology incubator at New York University Polytechnic School of Engineering where she also taught courses on energy policy. She served as corporate officer at a major U.S. utility, a consultant on strategic energy initiatives, and as a public utility regulator. At Fletcher, in addition to teaching, she is a Fellow at the Center for International Environment and Resource Policy where she pursues her interests in energy innovation, clean energy technology, and energy policy. Kates-Garnick holds a Ph.D., Master of Law and Diplomacy, and an MA from The Fletcher School, Tufts University, and an A.B. cum laude from Bryn Mawr College.

JoAnn Milliken is currently self-employed as a Senior Energy Consultant. She has 34 years of Federal program management experience, more than 20 of those with the Department of Energy, where she developed and directed clean energy R&D portfolios having budgets of up to \$200 million per year. She has a strong track record of success in advancing energy efficiency and renewable energy technologies, practices and policy, working in collaboration with industry, universities, small businesses and national laboratories. Dr. Milliken is a recognized expert in hydrogen and fuel cell systems, and experienced in leading Federal programs in energy efficient buildings, solar, wind, and geothermal energy. Prior to joining DOE in 1994, Dr. Milliken was a research chemist at the U.S. Naval Research Laboratory and a program manager at the Office of Naval Research where she conducted and managed mission-related materials research. She earned a B.A. degree in chemistry from LaSalle University and a Ph.D. in chemistry from the University of Pennsylvania, researching electronically conducting polymers under Nobel

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Laureate Professor Alan MacDiarmid. She also worked on carbon materials as a post-doctoral fellow under Professor Jack Fischer at the University of Pennsylvania. Dr. Milliken retired from DOE in 2015.

Dorothy Robyn is a Senior Fellow at the Institute for Sustainable Energy at Boston University and writes and consults on public policy issues related to energy and infrastructure. From September 2012 to March 2014, she served as the Commissioner of the Public Buildings Service (PBS) in the U.S. General Services Administration (GSA). PBS is the real estate arm of the federal government and has been a leader in making federal buildings more energy efficient and sustainable. Prior to joining GSA, Robyn spent three years as the Deputy Under Secretary of Defense for Installations and Environment, where she provided Department-wide oversight of U.S. military bases around the world, an \$850 billion portfolio. She was DoD's senior environmental official and led DoD's facility energy initiative. From 1993 to 2001, Robyn served as Special Assistant to the President for Economic Policy and a senior staff member of the White House National Economic Council. Previously, she was an assistant professor at Harvard's Kennedy School of Government and a principal with The Brattle Group. She serves on the board of the Information Technology Innovation Foundation—the leading U.S. technology policy think tank. She is co-author (with William Baumol) of *Toward an Evolutionary Regime for Spectrum Governance: Licensing or Unrestricted Entry?* (Brookings Press, 2006) and author of *Braking the Special Interests: Trucking Deregulation and the Politics of Policy Reform* (University of Chicago Press, 1987). She holds a B.A. from Southern Illinois University and a Ph.D. and M.P.P. in public policy from the University of California at Berkeley.

Kelly Sims Gallagher is Professor of Energy and Environmental Policy at The Fletcher School, Tufts University. She directs the Center for International Environment and Resource Policy at Fletcher. From June 2014-September 2015 she served in the Obama Administration as a Senior Policy Advisor in the White House Office of Science and Technology Policy, and as Senior China Advisor in the Special Envoy for Climate Change office at the U.S. State Department. Gallagher is a member of the board of the Belfer Center for Science and International Affairs at Harvard University, where she previously directed the Energy Technology Innovation Policy (ETIP) research group. She is also a faculty affiliate with the Harvard University Center for Environment. Broadly, she focuses on energy and climate policy in both the United States and China. She specializes in the role of policy in spurring the development and deployment of cleaner and more efficient energy technologies, domestically and internationally. A Truman Scholar, she has a MALD and Ph.D. in international affairs from The Fletcher School, and an AB from Occidental College. She speaks Spanish and basic Mandarin Chinese, and is a member of the Council on Foreign Relations. She is the author of *China Shifts Gears: Automakers, Oil, Pollution, and Development* (The MIT Press 2006), editor of *Acting in Time on Energy Policy* (Brookings Institution Press 2009), *The Global Diffusion of Clean Energy Technologies: Lessons from China* (MIT Press 2014), and numerous academic articles and policy reports.

Alexander Slocum (NAE) is the Walter M. May and A. Hazel May Professor of Mechanical Engineering at MIT. His focus is the design of precision instruments and machines with applications from medical devices to manufacturing equipment to energy systems. Dr. Slocum has been at MIT since 1991 and is a MacVicar Faculty Teaching Fellow, and a Fellow of the ASME. He has 130+ patents and has helped develop 12 products that have received R&D 100 awards for “one of the one hundred best new technical products of the year”. He pioneered the deterministic design of kinematic couplings including the standard for all semiconductor wafer transport carriers (SEMI E57-1296). He has helped start several successful precision manufacturing equipment companies and has a passion for working with industry to solve real problems and identify fundamental research topics. Dr. Slocum received the Martin Luther King Jr. Leadership Award in 1999 and the Massachusetts Professor of the Year in 2000. For his research he was awarded the Society of Manufacturing Engineer's Frederick W. Taylor Research Medal, and the ASME Leonardo daVinci, Machine Design, and Thar Energy Awards. In 2016 he received the Capers and Marion MacDonald Award for Excellence in Mentoring and Advising. Slocum is also an elected Member of the US National Academy of Engineering. He earned his Ph.D. in mechanical engineering from MIT. He served on the DoE Science Team working on the Deepwater Horizon Gulf Oil Spill, and served in 2013 in the Office of Science and Technology Policy in the Executive Office of the President as the Assistant Director for Advanced Manufacturing.

John Wall (NAE) is retired Vice President and Chief Technical Officer for Cummins Inc. In this role, he oversaw 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

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

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.

Robert Weisenmiller was appointed as member and Chair to the California Energy Commission in January 2011 by Governor Jerry Brown and re-appointed in January 2015. He fills the Engineer/Scientist position on the five-member Commission where four of the five members by law are required to have professional training in specific areas - engineering or physical science, environmental protection, economics, and law. Commissioner Weisenmiller brings more than 40 years energy experience to the Commission including expertise in electricity and gas markets and California regulatory policies. He has served as an expert witness in more than 100 state and federal regulatory commission proceedings and has authored numerous publications on electricity and natural gas markets. Chair Weisenmiller is the lead commissioner on the Energy Commission's budget and management, legislative and intergovernmental matters, international relations, military partnerships, energy research, development, demonstration and deployment, climate change, combined heat and power and electricity and natural gas markets. Before his appointment, as a co-founder of MRW & Associates, he used his expertise to assist businesses, financial institution, regulatory commissions, and public agencies in strategic planning, policy development, analyzing energy markets and regulations, power pricing for qualifying facility projects, marginal cost analysis, rate design and implications of utility mergers. Commissioner Weisenmiller was also the co-founder and Executive Vice President of Independent Power Corporation. His career also included a previous period of public service with the Energy Commission as Advisor to Commissioner, Manager of the Special Projects Office, and Director of the Office of Policy and Program Evaluation in the period between 1977 and 1982. He holds a Doctorate in Chemistry and a Masters in Energy and Resources from University of California Berkeley and received his Bachelor of Science in Chemistry from Providence College.