



NATIONAL ACADEMY OF ENGINEERING®

ENGINEERING ADAPTATIONS TO CLIMATE CHANGE

2021 ANNUAL MEETING

October 2-4, 2021

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



NATIONAL ACADEMY OF ENGINEERING®

2021 ANNUAL MEETING

October 2-4, 2021

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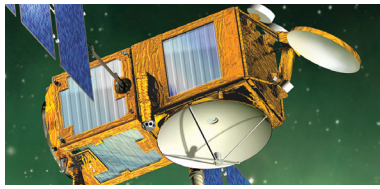
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SCIENCES
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QUICK REFERENCE SCHEDULE



Saturday, October 2

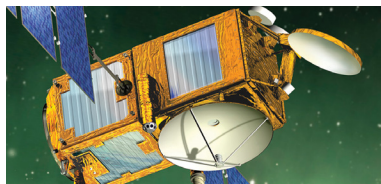
10:00–11:00 am	Home Secretary's Meeting	LINK
	International Secretary's Meeting	LINK
10:00–11:30 am	Women of the NAE - Annual Meeting	LINK
12:00–1:00 pm	Public Program	LINK
2:00–2:30 pm	Awards Presentation	LINK
4:00–4:45 pm	Development Seminar: Estate Planning and Giving in our New Normal	LINK
4:00–5:00 pm	Testifying Before Congress	LINK

Sunday, October 3

10:00–11:00 am	NAE Business Session	LINK
12:00–1:00 pm	Special Lecture in Engineering & Society	LINK
2:00–5:00 pm	FORUM: Engineering Responses to Climate Change	LINK

Monday, October 4

	Section Meetings	LINK
10:00 am–1:00 pm	Section Meeting 7 Section Meeting 10	
	Section Meeting 8 Section Meeting 11	
	Section Meeting 9 Section Meeting 12	
2:00–5:00 pm	Section Meeting 1 Section Meeting 4	
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SATURDAY, OCTOBER 2



10:00–11:00 am

HOME SECRETARY'S MEETING

(by invitation only)

[ZOOM LINK](#)

INTERNATIONAL SECRETARY'S MEETING

(for International Members & their guests)

[ZOOM LINK](#)

10:00–11:30 am

WOMEN OF THE NAE - ANNUAL MEETING

[ZOOM LINK](#)

12:00–1:00 pm

PUBLIC PROGRAM

[ZOOM LINK](#)

Chair's Remarks



Donald Winter

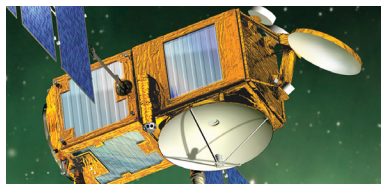
Chair, National Academy of Engineering

Donald C. Winter is an independent consultant, and former professor of engineering practice in the departments of Naval Architecture and Marine Engineering and Aerospace Engineering at the University of Michigan, where he taught graduate-level courses on systems engineering, satellite design, and maritime policy. As the 74th secretary of the Navy (2006–09) he led America's Navy and Marine Corps team and was responsible for an annual budget in excess of \$125 billion and almost 900,000 people. Dr. Winter currently chairs Australia's Naval Shipbuilding Advisory Board, providing advice to ministers and the National Security Committee of Cabinet regarding their plans to reconstruct the Royal Australian Navy's fleet and establish a sustainable shipbuilding capability. He also is a special government employee in the US Department of Defense, where he serves as the senior defense industry advisor for Ukraine.

Dr. Winter's business career in the aerospace and defense industry spanned over 30 years as a systems engineer, program manager, and corporate executive. From 2000 to 2005, he was president and CEO of TRW Systems (later Northrop Grumman Mission Systems), which he joined in 1972. In that position he oversaw operation of the business and its 18,000 employees, providing information technology systems and services; systems engineering and analysis; systems development and integration; scientific, engineering, and technical services; and enterprise management services. He also served on the company's corporate policy council. Previously, he served as vice president and deputy general manager for group development of TRW's Space and Electronics business, and vice president and general manager of the company's defense systems division. In 1980–82 he was with the Defense Advanced Research Projects Agency (DARPA) as program manager for space acquisition, tracking, and pointing programs.

Dr. Winter was elected to the NAE in 2002 for pioneering contributions to high-powered laser technology and defense applications. He is a member of the National Academies' Committee on Science, Engineering, Medicine, and Public Policy and the Intelligence Science and Technology Experts Group; and chaired both the Committee on the Analysis of Causes of the Deepwater Horizon Explosion, Fire, and Oil Spill to Identify Measures to Prevent Similar Accidents in the Future; and the Committee on Options for Implementing the Requirement of Best Available and Safest Technologies for Offshore Oil and Gas Operations. He has served on the NAE Committee on Membership, Special Fields and Interdisciplinary Engineering Section (chair and vice chair), and Special Fields and Interdisciplinary Engineering Peer Committee (chair and vice chair).

He received his BS in physics from the University of Rochester in 1969, and his MS in 1970 and PhD in 1972, both in physics from University of Michigan. Dr. Winter is also a graduate of the University of Southern California Management Policy Institute, the UCLA Executive Program, and the Harvard University Program for Senior Executives in National and International Security.



SATURDAY, OCTOBER 2



12:00–1:00 pm

PUBLIC PROGRAM *continued*

President's Address



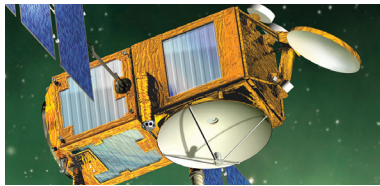
Dr. John L. Anderson

*President, National Academy of Engineering and
Vice Chair of the National Research Council*

John L. Anderson is the president of the National Academy of Engineering since July 1, 2019. He was born in Wilmington, DE, and received his undergraduate degree from the University of Delaware in 1967 and a PhD degree from the University of Illinois at Urbana-Champaign in 1971, both in chemical engineering. He served as president of the Illinois Institute of Technology (IIT) and Distinguished Professor of Chemical Engineering from 2007 – 2015. Before that he was provost and executive vice president at Case Western Reserve University (2004–2007), following 28 years at Carnegie Mellon University including 8 years as dean of the College of Engineering and 11 years as head of the chemical engineering department. He began his professional career as assistant professor of chemical engineering at Cornell University (1971–1976).

Dr. Anderson was elected to the NAE in 1992 for contributions to the understanding of colloidal hydrodynamics and membrane transport phenomena. He was elected an NAE Councillor in 2015 and served on the Executive Compensation Committee and Temporary Nominating Committee on Member Diversity. He has also served on the Membership Policy Committee, Nominating Committee (chair), Chemical Engineering Section (chair, vice chair, section liaison, member), Chemical Engineering Peer Committee (chair), and Committee on Membership (immediate past chair, chair, vice chair, peer committee chair). His service also includes numerous National Academies activities, such as the Committee on Determining Basic Research Needs to Interrupt the Improvised Explosive Device Delivery Chain (chair); Committee on Review of Existing and Potential Standoff Explosives Detection Techniques (chair); Organizing Committee for the National Security and Homeland Defense Workshop (co-chair); Board on Chemical Sciences and Technology (co-chair); and Ford Foundation Minority Postdoctoral Review Panel on Physical Sciences, Mathematics, and Engineering.

In addition to his NAE membership, Dr. Anderson is a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. He was appointed to the National Science Board in 2014 for a six-year term. He received the Acrivos Professional Progress Award from the American Institute of Chemical Engineers (AIChE) and an award from the Pittsburgh Section of AIChE for “Outstanding Professional Accomplishments in the Field of Academics,” and he is listed on the Alumni Wall of Fame at the University of Delaware. In 2012 he received the National Engineering Award from the American Association of Engineering Societies. He has held visiting professorships at the Massachusetts Institute of Technology (fellow of the John Simon Guggenheim Foundation), University of Melbourne (Australia), and Landbouwniversiteit Wageningen (the Netherlands). He has presented guest lectures at universities throughout the United States and is the author of numerous journal articles and book chapters. He has received honorary doctorates from the Illinois Institute of Technology, Rensselaer Polytechnic Institute and the University of Delaware. Dr. Anderson is married to Patricia Siemen Anderson. They have two children and five grandchildren.



SATURDAY, OCTOBER 2



12:00–1:00 pm

PUBLIC PROGRAM *continued*

Introduction of the Class of 2021



Dr. Alton D. Romig, Jr.

Executive Officer, National Academy of Engineering

Alton D. Romig Jr. is the chief operating officer responsible for the program, financial, and membership operations of the Academy, reporting to the NAE president.

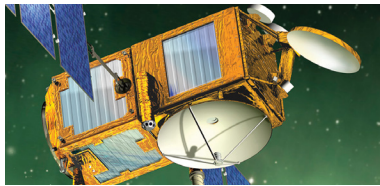
He was previously vice president and general manager of Lockheed Martin Aeronautics Company Advanced Development Programs, better known as the Skunk Works®. He spent the majority of his career at Sandia National Laboratories, operated by the Lockheed Martin Corporation, having joined Sandia as a member of the technical staff in 1979 and moved through a succession of R&D management positions leading to his appointment as executive vice president in 2005. He served as deputy laboratories director and chief operating officer until 2010, when he transferred to the Skunk Works.

Dr. Romig is a member of the Board of Directors of Football Research, Inc., a non-profit entity created and supported by the National Football League to review engineering technology to improve the safety of the sport. He also serves or has served on a number of advisory committees, including those at University of Washington, MIT, Ohio State, Purdue, Georgia Tech, the Colorado School of Mines, and Sandia National Laboratories. From 2003 to 2008, he served on the board of the UK Atomic Weapons Establishment and chaired its program committee. Dr. Romig is a fellow of TMS, IEEE, AIAA, and AAAS, and a fellow and honorary member of ASM International. He is also visiting associate of applied physics and materials science at Cal Tech.

His extensive service to the National Academies includes terms on the Division Committee on Engineering and Physical Sciences, Committee for Technology Insight: Gauge, Evaluate, and Review (chair), Committee on Research, Development, and Acquisition Options for US Special Operations Command, and Air Force Studies Board. For the NAE he has served on the Membership Policy Committee, Committee on Membership (chair), Materials Engineering Section (chair and vice chair), and Materials Engineering Peer Committee (chair and vice chair).

He was elected to the National Academy of Engineering in 2003 for outstanding contributions to the science and technology of materials and for innovative research and development on defense systems, and elected to the Council on Foreign Relations in 2008. He was awarded the ASM Silver Medal for Materials Research in 1988.

Dr. Romig received his BS (1975), MS (1977), and PhD (1979) in materials science and engineering from Lehigh University.



SATURDAY, OCTOBER 2



2:00–2:30 pm

AWARDS PROGRAM

[ZOOM LINK](#)

Dr. Corale L. Brierley

Vice President, National Academy of Engineering

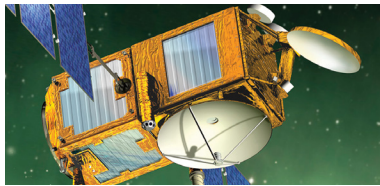


Corale L. Brierley is principal and founder of Brierley Consultancy LLC (1991–present), which provides technical and business consultation to the mining and chemical industries and government agencies. Previously, she was chief of environmental process development for Newmont Mining Corporation (1990–91), general partner at VistaTech Partnership Ltd. (1988–99), president of Advanced Mineral Technologies, Inc. (1982–88), chemical microbiologist at the New Mexico Institute of Mining and Technology (1971–82), and microbiologist with Martin-Marietta Corp. (1968–69). Her interests are in biotechnology applied to mine production and market and business development in this technical area.

Dr. Brierley was elected to the NAE in 1999 for her innovations applying biotechnology to mine production and remediation. She served as NAE councillor (2009–14) and was elected vice president in 2014. She has chaired the Audit Committee and Earth Resources Engineering Section, and served on the Membership Policy Committee, Nominating Committee, Committee on Membership, Earth Resources Engineering Peer Committee, Earth Resources Engineering Section (chair, vice chair, and secretary), and Grainger Challenge Prize and Russ Prize Committees. She chaired the National Academies' Board on Earth Sciences and Resources and congressionally mandated Committee on Coal Research, Technology, and Resource Assessments to Inform Energy Policy, among others, and served on the Committee on the Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin; Panel on Technologies for the Mining Industries; and committees on Novel Approaches to the Management of Greenhouse Gas Emissions from Energy Systems, and on Ground Water Recharge in Surface-Mined Areas. In addition, she has served on two division review committees at Los Alamos National Laboratory and the editorial boards for Elsevier's Hydrometallurgy journal (since 1996) and Minerals Engineering (since 2014).

Dr. Brierley is a member of the Society of Mining Engineers of the American Institute of Mining, Metallurgical, and Petroleum Engineers, and has received the AIME's James Douglas Gold Medal for distinguished achievement in nonferrous metallurgy (2008) and SME's Milton E. Wadsworth Award (2011), which recognizes distinguished contributions advancing understanding of the science and technology of nonferrous chemical metallurgy. She and her husband, James Brierley (NAE), jointly received in 2014 the American Mining Hall of Fame Medal of Merit Award for their scientific partnership with parallel achievements in academia and in business development. Dr. Brierley received the 2018 President's Medal from New Mexico Institute of Mining and Technology for representing her alma mater as a cutting-edge scientist, innovator, and leader.

She received a BS in biology (1968) and MS in chemistry (1971) from the New Mexico Institute of Mining and Technology, and a PhD in environmental sciences from the University of Texas at Dallas in 1982.



SATURDAY, OCTOBER 2



AWARDS PROGRAM *continued*

2:00–2:15 pm

2021 SIMON RAMO FOUNDERS AWARD RECIPIENT



Dr. Wm. A. Wulf

*AT&T Professor of Computer Science and
University Professor Emeritus
Department of Computer Science
University of Virginia*

The Simon Ramo Founders Award, the oldest award presented by the National Academy of Engineering, was established in 1965 to honor an outstanding NAE member or international member who has upheld the ideals and principles of the NAE through professional, educational, and personal achievement and accomplishment.

Wm. A. Wulf, recipient of the 2021 Simon Ramo Founders Award, is being honored “for outstanding accomplishments in academia, government, and industry and reinvention of NAE to serve the nation and engineering profession after a period of organizational turmoil.”

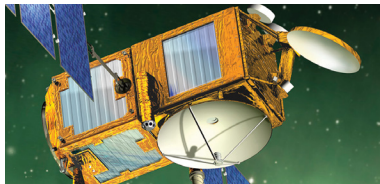
William A. Wulf is a University Professor Emeritus (one of 13 University Professors of 2500 UVA faculty) and AT&T Professor of Engineering (Emeritus) in the Computer Science Department of the University of Virginia. In 1996–2007 he served as president of the National Academy of Engineering (on leave from UVA).

Prior to joining UVA, Dr. Wulf was an assistant director of the National Science Foundation, responsible for computing research, the national supercomputer centers, and the NSFnet (predecessor to the internet as we know it now). Before that he founded and was CEO of Tartan Laboratories, a software company in Pittsburgh that was based on research he did while on the faculty of Carnegie Mellon University. He has conducted research in computer architecture, programming languages, optimizing compilers, and computer security.

Dr. Wulf is a member of the National Academy of Engineering, fellow of the American Academy of Arts and Sciences and American Philosophical Society, eminent member of Eta Kappa Nu, corresponding member of the Royal Academy of Engineering of Spain, past trustee of the Bibliotheca Alexandrina (Library of Alexandria), and foreign member of the Engineering Academy of Japan, Russian Academy of Sciences, and National Academy of Engineering of Venezuela. He is also a fellow of the ACM, IEEE, AAAS, and AWIS. He holds honorary doctorates from Carnegie Mellon University, University of Connecticut, Colorado School of Mines, New York Polytechnic University, and Missouri University of Science and Technology. He is the recipient of the ACM Policy Award, the American Society of Mechanical Engineers Ralph Coats Roe Medal, the ACM Karl Karlstrom Outstanding Educator Award, and the American Association of Engineering Societies Kenneth Andrew Roe Award. He has authored over 100 papers and technical reports and three books, holds two US patents, and has supervised over 25 PhDs in computer science.

His extensive engagement in activities of the National Academies of Sciences, Engineering, and Medicine includes chairmanship of the Computer Science and Telecommunications Board (1992–96) and the newly formed Division Committee on Engineering and Physical Sciences (2001–07), and membership on the *Issues in Science and Technology* Editorial Board and the Advisory Committee for the Engineering Ethics Center (2007–13), which he was instrumental in establishing at the NAE.

Dr. Wulf holds a BS in engineering physics and MS in electrical engineering from the University of Illinois, and a PhD in computer science from the University of Virginia.



SATURDAY, OCTOBER 2



AWARDS PROGRAM *continued*

2:15–2:30 pm

2021 ARTHUR M. BUECHE AWARD RECIPIENT



Dr. John P. Holdren

*Assistant to the President for Science and Technology and Director
Office of Science and Technology Policy
Executive Office of the President of the United States*

The Arthur M. Bueche Award of the National Academy of Engineering recognizes an engineer who has been actively involved in determining US science and technology policy, promoting technological developments, and contributing to the enhancement of relations between industries, government, and universities.

John P. Holdren, recipient of the 2021 Arthur M. Bueche Award, is being honored For national and international leadership in policymaking for arms control, nuclear weapons security, energy resources for sustainable development, and efforts to address climate change.”

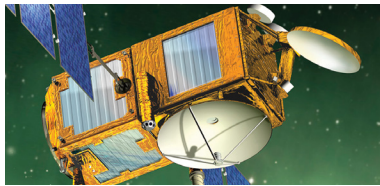
John P. Holdren is a research professor in Harvard University’s Kennedy School of Government and codirector of the Science, Technology, and Public Policy Program in the School’s Belfer Center for Science and International Affairs. He retired in June from Harvard roles as the Teresa and John Heinz Professor of Environmental Policy at the Kennedy School, professor of environmental science and policy in the Department of Earth and Planetary Sciences, and affiliated professor in the John A. Paulson School of Engineering and Applied Science.

In 2009–17 Dr. Holdren was President Obama’s science advisor and the Senate-confirmed director of the White House Office of Science and Technology Policy (OSTP). His responsibilities included advising the president on all science and technology (S&T) issues bearing on the national agenda, including energy and climate change, the oceans and the Arctic, and the space program. He also had major responsibilities around national R&D budgets, interagency S&T programs; developing initiatives in STEM education; advancing scientific integrity and openness in government; and representing the US government in interactions with the science and engineering community.

Before joining the Harvard faculty in 1996, he was a physicist in the Magnetic Fusion Energy Division at the Lawrence Livermore National Laboratory; senior research fellow at Caltech in the Division of Humanities and Social Sciences and the Caltech Environmental Quality Laboratory; and cofounder and coleader, for 23 years, of the interdisciplinary, graduate-degree-granting Energy and Resources Group at the University of California, Berkeley. In an advisory capacity, he has served on the board of the MacArthur Foundation (1991–2005), the NAS Committee on International Security and Arms Control (chair, 1994–2005), and President Clinton’s Council of Advisors on Science and Technology (PCAST; 1994–2001).

He is a member of the National Academy of Sciences, National Academy of Engineering, American Philosophical Society, American Academy of Arts and Sciences, American Academy of Political and Social Science, and Council on Foreign Relations. He is also a foreign member of both the Royal Society of London and the Indian National Academy of Engineering and a former president of the American Association for the Advancement of Science. His honors include a MacArthur Prize Fellowship (1981), the Volvo International Environment Prize (1993), Tyler Prize for Environment (2000), Heinz Prize for Public Policy (2001), AAPSS Moynihan Prize (2018), and Order of the Rising Sun from the government of Japan (2019). In 1995 he gave the acceptance speech for the Nobel Peace Prize on behalf of the Pugwash Conferences on Science and World Affairs.

Dr. Holdren earned SB (1965) and SM (1966) degrees from MIT in aeronautics and astronautics and a PhD (1970) from Stanford in theoretical plasma physics.



SATURDAY, OCTOBER 2



4:00–4:45 pm

DEVELOPMENT SEMINAR: ESTATE PLANNING AND GIVING IN OUR NEW NORMAL

(advance registration required)

[ZOOM LINK](#)



Mrs. Elana Lipka

Director of Planned Giving, NASEM

Learn current and deferred giving strategies that incorporate the latest charitable tax legislation and align with NAE funding priorities. If you would like to submit questions prior to the seminar, please email them to Casey Zia at czia@nas.edu.

Throughout her more than 20-year career, Elana has helped donors create meaningful, tax-efficient gifts and planned and administered the planned giving marketing programs at five different organizations. She has provided leadership as president of the National Capital Gift Planning Council (NCGPC), for which she is immediate past president. Elana serves as Co-Chair of the NCGPC Sponsorship Committee, and, as a former opera singer, treasurer of the Metropolitan Opera National Council Auditions, Mid-Atlantic Region.

4:00–5:00 pm

TESTIFYING BEFORE CONGRESS: A TUTORIAL

[ZOOM LINK](#)

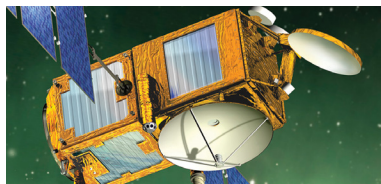


Mr. Christopher King

Executive Director, Office of Congressional and Government Affairs, NASEM

It is essential that congressional policymakers hear a clear and objective interpretation of what science and technology bring to the policy agenda. This communication is a special type of oral presentation, and several elements are key to its success.

CHRISTOPHER KING is the executive director of the Academies' Office of Congressional and Government Affairs. He previously served as acting assistant secretary for Congressional Affairs, director of policy and analysis, and senior advisor at the US Department of Energy. Before joining DOE, Mr. King spent over a decade on Capitol Hill, including as a subcommittee staff director for the US House Science, Space, and Technology Committee.



10:00–11:00 am

NAE BUSINESS SESSION

(members and international members only)

[ZOOM LINK](#)

12:00–1:00 pm

SPECIAL LECTURE IN ENGINEERING AND SOCIETY

[ZOOM LINK](#)



Kate Crawford

Research Professor at USC Annenberg
and Senior Principal Researcher at Microsoft Research Lab–New York City

Kate Crawford is a leading scholar of the social implications of artificial intelligence. Her work focuses on understanding large-scale data systems in the wider contexts of history, politics, labor, and the environment. She is a research professor at USC Annenberg and senior principal researcher at Microsoft Research Lab–New York City (MSR-NYC), and she holds the inaugural visiting chair for AI and Justice at the École Normale Supérieure in Paris.

Her work also includes collaborative projects and visual investigations. Her project *Anatomy of an AI System* with Vladan Joler won the 2019 Beazley Design of the Year Award and is in the permanent collection of the Museum of Modern Art in New York. Her collaboration with the artist Trevor Paglen produced *Training Humans*, the first major exhibition of the images used to train AI systems. Their investigative essay, *Excavating AI*, won the 2019 Ayrton Prize from the British Society for the History of Science.

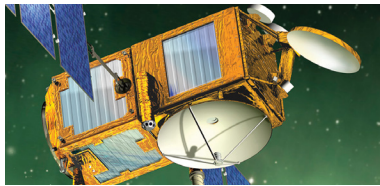
Dr. Crawford's latest book, *Atlas of AI*, was published by Yale University Press in April 2021. It has been described as “timely and urgent” by *Science*, and *MIT Technology Review* notes that it “seeks to stretch our understanding of [artificial intelligence] by unveiling how narrowly we’ve viewed and defined it.”

The Special Lecture on Engineering and Society was added to the annual meeting events to introduce engineers and the public to issues at the intersection of technology and society.

We are grateful to the Special Lecture Committee for their good work in identifying a very timely topic and a thought-provoking speaker.

Committee members are:

	Section Number	Election Year	
Cleopatra Cabuz, Chair	7	2017	Honeywell Safety and Productivity Solutions
Gwynne E. Shotwell	1	2020	SpaceX
Megan J. Smith	10	2017	shift7
Abigail J. Sellen	5	2020	Microsoft Research Cambridge, UK
Lilia A. Abron	4	2020	PEER Consultants, P.C.
Thomas H. Vonder Haar	1	2003	Colorado State University



SUNDAY, OCTOBER 3



2:00–5:00 pm

FORUM:

Engineering Responses to Climate Change

[ZOOM LINK](#)

Welcome

Dr. Alton D. Romig, Jr.

Executive Officer, National Academy of Engineering

Climate Equity and Blue-Green Innovation:

Dr. Leslie Shoemaker

President, TETRA TECH

Infrastructure Implications of Decarbonization:

Dr. Timothy C. Lieuwen

NAE Member

Regents' Professor and David S. Lewis, Jr. Chair,

Executive Director, Strategic Energy Institute, Georgia Institute of Technology

Technologies for a More Sustainable Future:

Dr. Kenneth E. Washington

NAE Member

Vice President, Software Engineering, Amazon

Role of Distributed Power Systems in a Quest for Climate Change:

Dr. Mohammad Shahidehpour

NAE Member

Robert W. Galvin Center for Electricity Innovation, Illinois Institute of Technology

Offsetting Greenhouse Gas Emissions with Carbon Mineralization, Capture, Utilization and Sequestration:

Dr. Catherine A. Peters

George J. Magee Professor of Geosciences and Geological Engineering

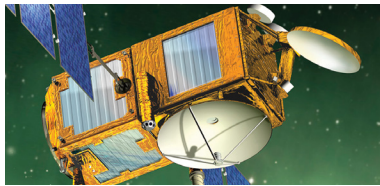
Chair of the Dept. of Civil & Environmental Engineering

Princeton University

Moderator:

Deanne Bell

TV Host and Founder/CEO, Future Engineers



SUNDAY, OCTOBER 3



2:00–5:00 pm

FORUM *continued*



Dr. Leslie Shoemaker

Leslie Shoemaker, appointed president of Tetra Tech in 2019, leads its global operations, strategy, and technical innovation programs. She joined the company in 1991 and has held technical, strategic, and operational responsibilities. She has also served as chief sustainability officer for over a decade, guiding the program to recognize the climate-positive impacts of the company's projects while continuing to reduce carbon impacts throughout its operations. She has focused on connecting Tetra Tech's 21,000 high-end scientists, engineers, and technical specialists to develop sustainable solutions by Leading with Science® in water, environment, renewable energy, sustainable infrastructure, and international development.

Dr. Shoemaker's technical expertise is in the development of analytics and modeling as decision tools to enhance the environment, especially through watershed modeling systems and optimization of sustainable nature-based solutions. She was part of the Louisville MSD/Tetra Tech team that won the 2019 INFORMS Franz Edelman Award for operations research. She led the development of some of the earliest studies on integrated watershed management programs for the US Environmental Protection Agency and supported the landmark development of the BASINS modeling system. Her early work on watershed modeling included the development and application of tools for nonpoint source simulation such as the Generalized Watershed Loading Function model.

Dr. Shoemaker holds a BA in mathematics from Hamilton College, an M.Eng from Cornell University, and a PhD in agricultural engineering from the University of Maryland.



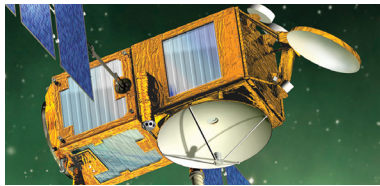
Dr. Timothy C. Lieuwen

Tim Lieuwen (NAE) is a Regents' Professor, the David S. Lewis Jr. Chair, and executive director of the Strategic Energy Institute at Georgia Tech, where he manages the university's overall strategy and external relations for its \$120M/year energy portfolio. He is also founder and CTO of TurbineLogic, an analytics firm working in the energy industry, and his work has contributed to numerous commercialized innovations in the energy and aerospace sectors. He is an international authority on clean energy and propulsion and has authored 4 books and over 400 other publications.

Current and past board positions include governing/advisory boards for Oak Ridge National Lab, Pacific Northwest National Lab, and the National Renewable Energy Lab, appointment by the DOE Secretary to the National Petroleum Council, and board member of the ASME International Gas Turbine Institute. He is also an appointed member of the National Academies' Committee on Accelerating Decarbonization in the United States: Technology, Policy, and Societal Dimensions.

Prof. Lieuwen's contributions have been recognized by his election as a member of the NAE, a fellow of ASME, APS, and AIAA, and foreign fellow of the Indian National Academy of Engineering. Major awards include the AIAA Lawrence Sperry Award, AIAA Pendray Award, and ASME's George Westinghouse Gold Medal.

He has a BS in engineering from Calvin College (Grand Rapids, Michigan) and received his MS and PhD, both in mechanical engineering, from Georgia Institute of Technology.



SUNDAY, OCTOBER 3



2:00–5:00 pm

FORUM *continued*



Dr. Kenneth E. Washington

Ken Washington (NAE) is vice president of software engineering at Amazon, where he leads a team of engineers developing new consumer devices and services.

Before joining Amazon Dr. Washington was chief technology officer at Ford Motor Company, overseeing the development and implementation of the automaker's technology strategy. His portfolio at Ford included propulsion systems, sustainable and advanced materials, additive manufacturing, next-gen vehicle architectures, controls, and automated systems. Prior to joining Ford in 2014, Dr. Washington was Lockheed Martin Corporation's first chief privacy officer, vice president of Lockheed Martin Space Systems Advanced Technology Center, and vice president and chief technology officer for Lockheed Martin IT. He previously served as the chief information officer for Sandia National Laboratories.

In addition to his election to the NAE in 2020, he is the recipient of the 2012 Black Engineer of the Year Award in Research Leadership.

Dr. Washington has a BS, MS, and PhD in nuclear engineering from Texas A&M University and is a fellow of the MIT Seminar XXI program on International Relations.



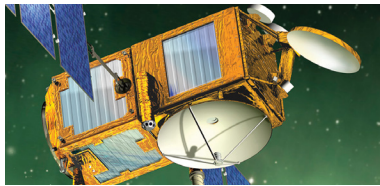
Dr. Mohammad Shahidehpour

Mohammad Shahidehpour (NAE) is University Distinguished Professor, Bodine Chair Professor of Electrical and Computer Engineering, and director of the Robert W. Galvin Center for Electricity Innovation at the Illinois Institute of Technology (IIT). He has 45 years of experience with electric power system operation and planning, and his sponsored project on Perfect Power Systems has converted the entire IIT campus to an islandable microgrid.

For his contributions Dr. Shahidehpour has received the IEEE Burke Hayes Award for his research on hydrokinetics, IEEE Power & Energy Society (PES) Outstanding Power Engineering Educator Award, IEEE/PES Ramakumar Family Renewable Energy Excellence Award, IEEE/PES Douglas M. Staszkesky Distribution Automation Award, and the Edison Electric Institute's Power Engineering Educator Award. In addition to his election to the NAE, he is a fellow of IEEE, the American Association for the Advancement of Science, and the National Academy of Inventors.

He has coauthored 6 books and 800 technical papers on electric power system operation and planning, and was the founding editor in chief of *IEEE Transactions on Smart Grid*.

He earned his BS from Sharif University of Technology in Tehran and his MS and PhD from the University of Missouri, all in electrical engineering.



SUNDAY, OCTOBER 3



2:00–5:00 pm

FORUM *continued*



Dr. Catherine A. Peters

Catherine Peters is the George J. Magee Professor of Geosciences and Geological Engineering, chair of the Department of Civil & Environmental Engineering, and director of the undergraduate Geological Engineering Program at Princeton University. Since 2017 she has led her department through transformative growth, with key faculty hires, multidisciplinary research collaborations, and educational initiatives on the water-climate nexus, future cities, robotics for advanced mechanics, and environmental biotechnology. She teaches courses in environmental chemistry, energy and the environment, and sustainable design.

Dr. Peters is an expert in environmental chemistry and geochemistry, known for her leadership in sustainable energy technologies, with a focus on geochemical strategies for greenhouse gas mitigation. She has given numerous invited seminars and published more than 100 peer-reviewed journal papers, which have been cited more than 5000 times.

She is a fellow of the Association of Environmental Engineering and Science Professors (AEESP), and served as president in 2002. In 2020 she was honored with Honorary Board Certification by Eminence in AAEES, and received a Distinguished Alumnus Award of CEE at Carnegie Mellon University. She is editor in chief of *Environmental Engineering Science* and has served on numerous advisory panels for the US Department of Energy, including the stakeholder group for the National Risk Assessment Program.

She earned her master's and PhD in civil engineering from Carnegie Mellon University and her BSE in chemical engineering from the University of Michigan.

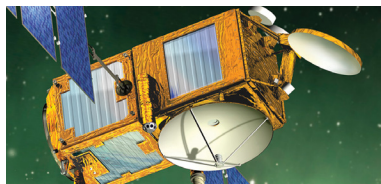


Deanne Bell

Deanne Bell is an engineer, television host, and entrepreneur. Her television hosting credits include PBS, ESPN, Discovery Channel, National Geographic, DIY Network, and CNBC's *Make Me a Millionaire Inventor*. She is also the founder and CEO of Future Engineers, an education technology company that engages students in online contests and challenges. Future Engineers' inaugural competition, developed with the ASME Foundation and NASA, produced historic achievements including the first student-designed 3D print in space. Her company has since become a US Department of Education SBIR awardee, and was selected by NASA to host the Mars 2020 "Name the Rover" contest.

Previously she worked at Raytheon for 3 years as an optomechanical engineer. She focused on packaging FLIR into a helicopter-mounted gimbal, involving the redesign of the afocal telescope and the packaging of the cryo-cooled imager and CCD camera. She then worked for other R&D programs at the company, including as head of the mechanical design and build of a synthetic aperture ladar (SALT) optical test bench.

She earned her BS in mechanical engineering at Washington University in St. Louis and is the 2019 Young Alumni Award recipient for its McKelvey School of Engineering. She is also the featured interviewee in the fall 2019 issue of *The Bridge*.



SUNDAY, OCTOBER 3

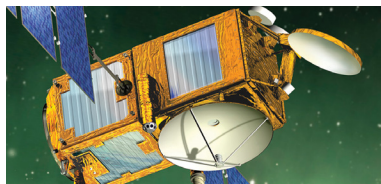


2021 NAE ANNUAL MEETING PROGRAM COMMITTEE

The annual meeting programmatic theme, Engineering Responses to Climate Change, was decided by a committee of NAE members from each section, keeping diversity in mind with respect to gender, ethnicity, work sector (business, academia, other), and tenure of membership. Their mission was to plan a meeting topic and identify speakers that would entice and inspire the members and other attendees during this annual gathering.

	Section Number	Election Year	
Alton D. Romig, Jr., Chair	1	2003	NAE (Lockheed Martin, retired)
Daniel E. Hastings	1	2017	Massachusetts Institute of Technology
Ghebre E. Tzeghai	2	2014	Summit Innovation Labs
Ganesh Kailasam	3	2013	Oil and Gas Climate Initiative-Climate Investments
Ana P. Barros	4	2019	University of Illinois Urbana-Champaign
Katherine A. Yelick	5	2017	University of California, Berkeley
Marilyn A. Brown	6	2020	Georgia Institute of Technology
Stephen R. Forrest	7	2003	University of Michigan
Dianne Chong	8	2017	Boeing Research and Technology (Retired)
Steven J. Zinkle	9	2012	The University of Tennessee
K. R. Sridhar	10	2016	Bloom Energy
Bridget R. Scanlon	11	2016	The University of Texas at Austin
J. Marshall Shepherd	12	2021	University of Georgia
Michaela Curran			NAE - Membership Director
Guru Madhavan			NAE - Programs Director
Steve Olsen			Summary Author

Special thanks to the committee for accomplishing their mission!



MONDAY, OCTOBER 4



SECTION MEETINGS

Note: Numbers following Section Chairs' names denote primary and secondary NAE section affiliations. Terms end June 30 of year shown.

10:00 am–1:00 pm

7: Electronics, Communication & Information Systems Engineering

Stephen R. Forrest (7, 9)
Professor
University of Michigan
(2023)

ZOOM LINK



8: Industrial, Manufacturing & Operational Systems Engineering

Gerald G. Brown (8)
Emeritus Distinguished Professor of Operations Research
U.S. Naval Postgraduate School
(2022)

ZOOM LINK



9: Materials Engineering

John E. Allison (9)
Professor
University of Michigan
(2022)

ZOOM LINK



10: Mechanical Engineering

Nadine Aubry (10, 1)
Provost and Senior Vice President Tufts University
(2022)

ZOOM LINK



11: Earth Resources Engineering

Bridget R. Scanlon (11)
Senior Research Scientist
The University of Texas at Austin
(2022)

ZOOM LINK



12: Special Fields and Interdisciplinary Engineering

Dennis P. Lettenmaier (12)
Distinguished Professor
University of California, Los Angeles
(2022)

ZOOM LINK



2:00–5:00 pm

1: Aerospace Engineering

John J. Tracy (1)
Chief Technology Officer and Senior Vice President
The Boeing Company (Retired)
(2023)

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2: Bioengineering

Kristi S. Anseth (2, 3)
Tisone Professor Distinguished Professor
University of Colorado Boulder
2023

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3: Chemical Engineering

Joan F. Brennecke (3)
Keating-Crawford Professor
The University of Texas
2022

ZOOM LINK



4: Civil & Environmental Engineering

Craig H. Benson (4, 11)
Consulting Engineer
2023

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5: Computer Science & Engineering

Margo I. Seltzer (5)
Canada 150 Research Chair & Cheriton Family Chair
University of British Columbia
2022

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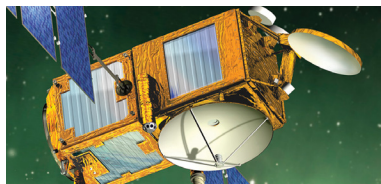


6: Electric Power/Energy Systems Engineering

Vijay Vittal (6)
Regents' Professor Ira A. Fulton Chair
Professor Arizona State University
2023

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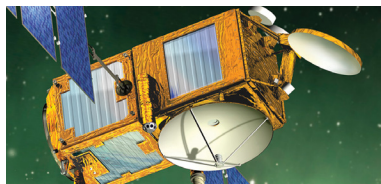
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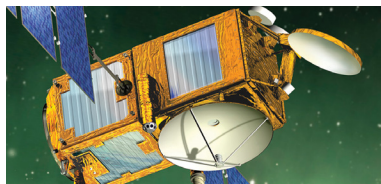
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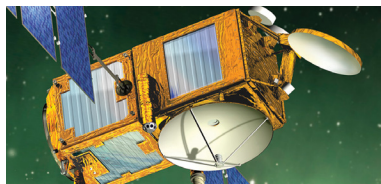
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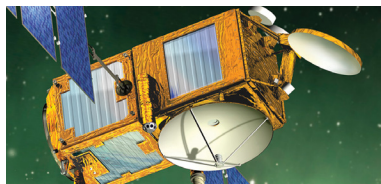
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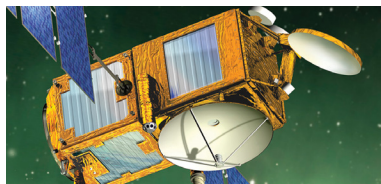
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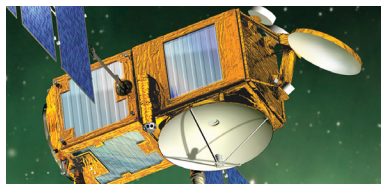
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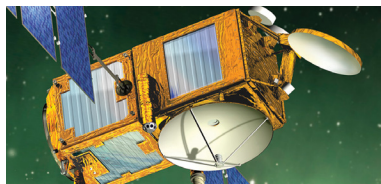


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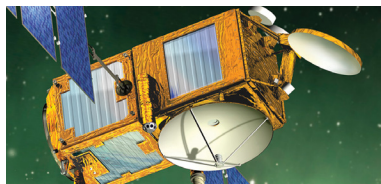
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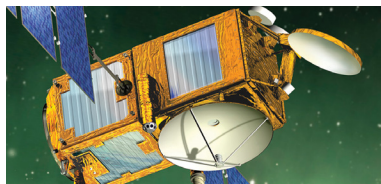
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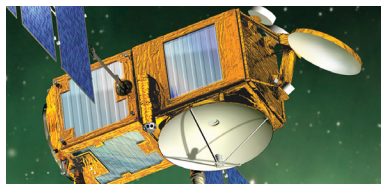


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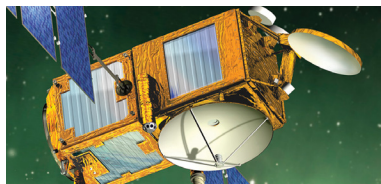
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