Meeting of the

President's Council of Advisors on Science and Technology (PCAST)

January 20-21, 2022

Invited Speaker Biographies

(*in order of presentation*)

DAVID CRISP, PHD

David Crisp is an atmospheric physicist who recently retired from the NASA Jet Propulsion Laboratory (JPL), California Institute of Technology. Since receiving his PhD from the Geophysical Fluid Dynamics Program at Princeton University in 1984, his research has focused primarily on the development of instruments and numerical models for analyzing light reflected, emitted, and scattered by atmospheres and surfaces of the Earth and other planets. He served as a flight instrument provider and science team member on several Earth, planetary and astrophysics missions including the Soviet/French/U.S. VEGA Balloon mission, NASA's Hubble Space Telescope Wide Field/Planetary Camera-2, and Mars Pathfinder science teams, and the European Space Agency (ESA) Venus Express mission. He was the Principal Investigator of the NASA Orbiting Carbon Observatory (OCO) and served as the Science Team Leader for NASA's OCO-2 and OCO-3 missions. He is a member of the Science Team for the NASA Earth Ventures Geostationary Carbon Cycle Observatory (GeoCarb) and a member of the European Copernicus CO2 Monitoring (CO2M) Mission Advisory Group. He also served as the Greenhouse Gas Lead for the Committee on Earth Observation Satellites (CEOS) Atmospheric Composition - Virtual Constellation (AC-VC) and member of the CEOS/CGMS Working Group on Climate Greenhouse Gas Task Team.

YASJKA MEIJER, PHD

Yasjka Meijer gained a Master's degree in Physics and Astronomy at the Vrije Universiteit in Amsterdam, The Netherlands in 1997. He then worked at the National Institute for Water and Atmospheric Research (NIWA) in Lauder, New Zealand, making lidar measurements of ozone vertical profiles. In 2005, he earned his PhD in Atmospheric Physics at the Technical University of Eindhoven, The Netherlands. Later as a scientist at the Dutch National Institute for Public Health and the Environment (RIVM) in Bilthoven, The

Netherlands, he investigated the quality and characteristics of atmospheric measurements from satellite instruments using global, ground-based observations. He was also involved in definition of the GMES Atmospheric Service (now CAMS) and TROPOMI (now on Sentinel-5 Precursor) user requirements. Meijer began work for the European Space Agency (ESA) in 2007. As mission scientist, he managed the mission requirements, initiated study activities and led the Mission Advisory Groups (MAG) during the definition phases of Copernicus Sentinel-4/5 mission and ESA's Earth Explorer candidate missions TRAQ and CarbonSat. Since 2015 he is responsible for defining the mission requirements for the Copernicus CO2 Monitoring (CO2M) mission. In collaboration with the European Commission (EC), he led the CO2 Monitoring Task Force group focusing on the space segment, and then the MAG for the CO2M Mission in the definition phase. He is the lead author of the CO2M Mission Requirements Document (MRD) and ESA's CO2M Mission Scientist for the implementation phase now. Meijer is a member of the EC's CO2 Monitoring Task Force and the Committee on Earth Observation Satellites (CEOS) Greenhouse Gas Task Team. He was second author of the CEOS Greenhouse Gas White Paper describing a joint view on the virtual constellation to measure greenhouse gases.

STEVEN HAMBURG, PHD

Steven Hamburg is chief scientist and senior vice president of the Environmental Defense Fund (EDF), as well as executive manager of MethaneSAT LLC (non-profit subsidiary of EDF). Hamburg had a 25-year academic career at the University of Kansas and Brown University, where he led several units prior to joining EDF. He has served as a lead author for the IPCC, as a consultant to the UNFCCC and was acknowledged as one of the contributing recipients of the 2007 Nobel Peace Prize. He is currently Chair of UNEP's International Methane Emissions Observatory's Science Oversight Committee; a member of the EPA's Science Advisory Committee; and serves in other advisory capacities. Over the past decade Hamburg has led/coordinated dozens of studies focused on quantifying methane emissions from the Oil and Gas Supply Chain globally, resulting in more than 75 peer-reviewed papers. As part of this decade-long effort, he co-developed the idea for a high-precision satellite that could track and quantify in near-real time nearly all methane emissions from at least 80 percent of oil and gas production and processing globally. The product of this effort is MethaneSAT, a small satellite (400 kg) that is near completion and scheduled for launch in the first half of 2023. The New Zealand government is a partner in the MethaneSAT mission and has assembled a science team to utilize MethaneSAT data to quantify methane emissions from agricultural activities. All MethaneSAT data will be publicly available at no cost and in near-real time, including spatially explicit flux rates. The construction of the satellite and development of a novel automated inversion data platform and a global spatially explicit oil and gas infrastructure inventory was funded philanthropically.

LORI BRUHWILER, PHD

Lori Bruhwiler is a physical scientist at the National Oceanic and Atmospheric Administration (NOAA) Global Monitoring Laboratory in Boulder, Colorado. Her research interests include understanding atmospheric budgets of carbon dioxide, methane, and other greenhouse gases using atmospheric transport models and data assimilation techniques. She is especially interested in carbon cycle-climate feedbacks and how they can be detected using observations and models. Much of her recent work has been focused on understanding the budget of atmospheric methane and what may be causing its recent

increase in atmospheric growth. Bruhwiler has spent her entire career so far at NOAA, beginning with her PhD research on stratospheric chemistry at the NOAA Chemical Sciences Laboratory under the guidance of Susan Solomon. She went on to the NOAA Geophysical Research Laboratory in Princeton, NJ where she worked with models of stratospheric chemistry and dynamics to understand climate-chemistry interactions. Bruhwiler then joined the Carbon Cycle Group at the NOAA Global Monitoring Laboratory where she developed her data assimilation and flux inversion skills. She is currently leading an effort to build a high-resolution carbon data assimilation and flux inversion model using the new NOAA Global Forecast System. Bruhwiler earned her undergraduate degrees in Physics and Mathematics from the University of Texas at Austin and her PhD from the University of Colorado, Boulder.

KEVIN GURNEY, PHD

Kevin Gurney is an atmospheric scientist, ecologist and policy expert currently working in the areas of carbon cycle science, climate science, and climate science policy at Northern Arizona University where he is a Professor in the School of Informatics, Computing, and Cyber Systems. Gurney's current research involves understanding elements of the global carbon cycle using a variety of data/model fusion approaches. Over the last two decades, Gurney has focused on quantification of fossil fuel CO2 emissions at the global ("FFDAS"), national ("Vulcan"), and urban ("Hestia") scales. Using data mining and assimilation algorithms, these greenhouse gas quantification efforts are being used by analysts, scientists, and governments for emissions mitigation planning, tracking and assessment. The U.S. work, in particular, is anchoring efforts at National Oceanic and Atmospheric Administration and the National Institute of Standards and Technology to develop prototypes of a multiscale greenhouse gas information system. Gurney is an IPCC lead author, an NSF CAREER award recipient, Sigma Xi Young Scientist recipient, a Fulbright scholar, and has published over 150 peer-reviewed scientific articles with multiple papers in *Nature* and *Science* and a book from MIT Press, *Mending the Ozone Hole*.

HARRY ATWATER, PHD

Harry Atwater is the Otis Booth Leadership Chair of the Division of Engineering and Applied Science, and the Howard Hughes Professor of Applied Physics and Materials Science at the California Institute of Technology. Currently he is the Director for the Liquid Sunlight Alliance (LiSA), a Department of Energy (DOE) Hub program for solar fuels. Atwater's scientific effort focuses on nanophotonic light-matter interactions and solar energy conversion. His current research in solar energy centers on high efficiency photovoltaics and photoelectrochemical processes for generation of solar fuels, and his research has resulted in world records for solar photovoltaic conversion and photoelectrochemical water splitting. His work also spans fundamental nanophotonic phenomena, in plasmonics and 2D materials, and also applications including active metasurfaces and optical propulsion. From 2014-2020, Atwater served as Director of the Joint Center for Artificial Photosynthesis (JCAP), the DOE Energy Innovation Hub for solar fuels. Atwater was an early pioneer in nanophotonics and plasmonics; he gave the name to the field of plasmonics in 2001. Atwater is founder of five early-stage companies, including Alta Devices, which set world records for photovoltaic cell and module efficiency. He is also a Fellow of the SPIE as well as APS, MRS, Optica, and the National Academy of Inventors. He is also the founding Editor in Chief of the journal ACS Photonics, and Chair of the LightSail Committee for the Breakthrough Starshot program. He is the recipient of numerous awards, including the 2021 von Hippel Award of the Materials Research Society.

ANDREW HOLLAND, MSc

Andrew Holland is the Chief Executive Officer of the Fusion Industry Association. Holland has worked at the intersections of science, energy, policy, and politics for two decades, advocating for fusion energy development since 2011, working to author the report, "Fusion Power – A 10 Year Plan for American Energy Security," laying out a roadmap for American leadership in fusion. He started the Fusion Industry Association in 2018, bringing together the leading private fusion developers to support new public-private partnerships to advance commercial fusion energy. With deep experience in energy policy and international strategy, he led the American Security Project's energy and climate work, rising to lead the organization as Chief Operating Officer and worked in the U.S. Senate as Energy and Environmental Policy Legislative Assistant to U.S. Senator Chuck Hagel. He is a Member of the International Institute for Strategic Studies and he holds a MSc. in International Strategy and Economics from the University of St. Andrews.

KATIE RAE, MBA

Katie Rae is the founding CEO & Managing Partner of The Engine, a venture capital fund built by the Massachusetts Institute of Technology (MIT). The Engine invests in early-stage companies solving the world's biggest problems through the convergence of breakthrough science, engineering, and leadership. She has served in this role since March 2017 and has raised two funds with $500M of assets under management. Rae serves as a Board Member at Commonwealth Fusion Systems, Form Energy, Via Separations, Lilac Solutions, WoHo, Boston Metal, Sublime Systems, and VEIR. She founded Project 11 Ventures in 2014 and served as Managing Director. Prior to that, Rae held leadership roles at Techstars Boston, serving as Managing Director from 2011-2014 and Chairman until 2016. She has advised hundreds of founders and invested in more than 100 companies at the earliest stages of formation. Key investments include Flywire, Pillpack (acquired by Amazon for $1 billion), Bevi, GrabCad, and Synack. Rae founded Equity Summit in 2018, an annual event bringing together female and underrepresented minority fund managers and world leading Limited Partners. She serves as the organization's President. In addition to her extensive investing career, Rae has more than fifteen years of experience in senior management and product positions at Microsoft, Eons, AltaVista, RagingBull, Zip2, and Mirror Worlds.

ARMOND COHEN, JD

Armond Cohen is co-founder and Executive Director of the Clean Air Task Force (CATF), which he has led since its formation in 1996. In addition to leading CATF, Cohen is directly involved in CATF research and advocacy on the topic of requirements to deeply decarbonize global energy systems. Prior to his work with CATF, Cohen founded and led the Conservation Law Foundation's Energy Project starting in 1983, focusing on energy efficiency, utility resource planning, and electric industry structure. Cohen has published numerous articles on climate change, energy system transformation, and air pollution; he speaks, writes, and testifies frequently on these topics. He is a member of the Keystone Center Energy Board and board member of the Nuclear Innovation Alliance.

JIGAR SHAH, MBA

Jigar Shah is Director of the Loan Programs Office at the Department of Energy. He was most recently co-founder and President at Generate Capital, where he focused on helping entrepreneurs accelerate decarbonization solutions through the use of low-cost infrastructure-as-a-service financing. Prior to Generate Capital, Shah founded SunEdison, a company that pioneered "pay as you save" solar financing. After SunEdison, Shah served as the founding CEO of the Carbon War Room, a global non-profit founded by Sir Richard Branson and Virgin Unite to help entrepreneurs address climate change. Originally from Illinois, Shah holds a B.S. from the University of Illinois-UC and an MBA from the University of Maryland, College Park.

GINA MCCARTHY, MS

Gina McCarthy is the first National Climate Advisor—the President's chief advisor on domestic climate policy—and leads the White House Office of Domestic Climate Policy focused on mobilizing a whole-of-government approach to tackling the climate crisis, creating good-paying, union jobs, and securing environmental justice. Previously, she served as 13th Administrator of the Environmental Protection Agency (EPA) and then as President and CEO of the Natural Resources Defense Council (NRDC). One of the nation's most trusted and accomplished voices on climate issues, she has been at the forefront of environmental and public health progress in a variety of leading roles for over three decades. In her time leading the EPA, McCarthy oversaw successful efforts to reduce greenhouse gases, mitigate air pollution, conserve critical water sources, and safeguard vulnerable communities from chemical hazards. She spearheaded the Obama-Biden Administration's Clean Power Plan, which set America's first-ever national standards for lowering carbon emissions from power plants and helped pave the way for the Paris Climate Agreement. Prior to her role with the NRDC, McCarthy was a professor at the Harvard T.H. Chan School of Public Health and currently serves as chair of the board of directors of the Harvard Center for Climate, Health, and the Global Environment. Throughout her career, McCarthy has advised five administrations of both Democratic and Republican Massachusetts governors on environmental matters, and she served as Commissioner of the Connecticut Department of Environmental Protection prior to being appointed by President Obama to head up the EPA's Air Office. As EPA administrator, she pursued innovative global collaborations with the United Nations and the World Health Organization, and on global efforts to address pollution. Born and raised in Boston, McCarthy graduated from the University of Massachusetts Boston and earned a master of science at Tufts University.