HEI HEALTH EFFECTS INSTITUTE

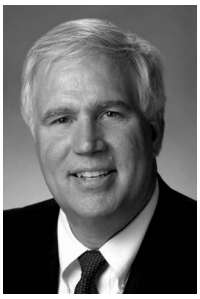
update

SUMMER 2020

Board Welcomes Experts in Engineering, Urban Development

Following approval by HEI's industry and U.S. Environmental Protection Agency sponsors, the Board of Directors voted to add two new distinguished leaders to the Board: Karen C. Seto, Frederick Hixon Professor of Geography and Urbanization Science at Yale University, School of the Environment; and Richard Meserve, senior of counsel at Covington & Burling LLP, president emeritus of the Carnegie Institution for Science, and former chair of the U.S. Nuclear Regulatory Commission.

Karen Seto.



Richard Meserve.

Seto is one of the world's leading experts on contemporary urbanization and global change, pioneering methods to reconstruct urban land use with satellite imagery and to forecast urban expansion. Her research focuses on the links between urbanization and land use, food systems, biodiversity, and climate change. She has served on numerous national and international scientific bodies and is co-editor-in-chief of the journal *Global Environmental Change*. Prior to joining Yale, she was on the faculty at Stanford from 2000 to 2008, where she held joint appointments in the Woods Institute for the Environment and the School of Earth Sciences. Seto is a member of the U.S. National Academy of Sciences, the Connecticut Academy of Science and Engineering, and the American Association for the Advancement of Science. She earned a PhD in geography from Boston University.

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HEI Comments on Proposed EPA Transparency Rule

HEI has formally submitted a response to a rule proposed by the U.S. Environmental Protection Agency (EPA), "Strengthening Transparency in Regulatory Science," that could prevent EPA decisions based on studies for which the data are not made available to the public and to other scientists for confirmation. Under the proposed rule, EPA could potentially omit some study findings from consideration that had previously informed decisions on air and water quality for many years.

HEI has a longstanding commitment to enhancing transparency and data access in its studies, but noted in its comments that the best scientific reviews take advantage of the full range of studies available rather than excluding otherwise very strong studies due to one or another characteristic of data access. HEI posited a more comprehensive mechanism for considering which studies to include, and noted as well, based on its experience in paying for and accessing datasets, that the rule would likely incur substantial data costs on researchers and research institutions which were not accounted for in the proposal.

Members of the HEI scientific committees and staff contributed to the Institute's comments to the EPA, submitted on May 18. In offering the comments, HEI notes that they are based on "our longstanding commitment to producing science of the highest integrity, quality, and transparency, and our support for responsible efforts to enhance transparency in science."

The comments are available for downloading at *www.healtheffects.org/announcements/hei-comments-proposed-epa-transparency-rule*.

Also in This Issue

Review Committee Welcomes New Chair Melissa Perry

The HEI Board of Directors has appointed Melissa J. Perry, chair of the Department of Environmental and Occupational Health at The George Washington University Milken Institute School of Public Health (Milken Institute SPH), to chair the HEI Review Committee. In this role, she will lead this group of external reviewers — representing the fields of medicine, epidemiology, biostatistics, environmental engineering, exposure sciences, and environmental health — as they work with the HEI staff to evaluate and interpret results of funded studies, highlighting the strengths and weaknesses of the research as well as policy implications. The Committee's evaluations are published with reports in the form of a Critique or Commentary.

Melissa Perry.

Perry follows in the footsteps of James Merchant of the University of Iowa, who served as chair from 2014 until this past spring. "We have benefited greatly from Jim Merchant's leadership on the HEI Review Committee," said Dan Greenbaum, HEI President. "We agree with Jim that Melissa Perry will bring excellent science and leadership to the Committee — and very much welcome her to the HEI family."

Perry has a distinguished career as an occupational and environmental epidemiologist. Using epidemiological and preventive intervention studies, she has investigated various factors contributing to occupational injury and disease and the influence of chemical and physical agents on reproduction. Her research has focused on the health impact of pesticide exposure, and she is currently investigating the impact of climate change on properties of pesticides and other chemicals.

In addition, after identifying risks to workers at meat-packing plants, construction sites, and agricultural operations, Perry has developed engineering and behavioral interventions to address these risks. Her laboratory focuses on reproductive epidemiology and hormone disruptors, and she developed new techniques for high-volume identification of chromosomal abnormalities in sperm cells.

Before arriving at Milken Institute SPH in 2010, for 13 years Perry served on the Harvard School of Public Health's Department of Environmental Health faculty. She has received numerous research awards, including grants from the National Institute of Environmental Health Sciences, the National Cancer Institute, and the National Institute for Occupational Safety and Health. She is past president of the American College of Epidemiology. She has chaired federal advisory committees, currently serves on a number of editorial boards, and cochairs the National Academies' Standing Committee on Use of Emerging Sciences for Environmental Health Decisions. HEI

New Investigator Applies Novel Techniques to Study VOC–Ozone Effects

A recently published HEI study aims to shed light on mechanisms by which exposure to air pollution may lead to pulmonary health effects. The findings are presented in HEI Research Report 201, *Understanding the Functional Impact of VOC–Ozone Mixtures on the Chemistry of RNA in Epithelial Lung Cells*.

The study was led by Lydia M. Contreras at the University of Texas, Austin, recipient of a Walter A. Rosenblith New Investigator Award. The award program, initiated in 1999 in honor of HEI's first Research Committee chair, aims to bring new, creative investigators into active research on the health effects of air pollution. It provides three years of funding for a small project relevant to HEI's research interests to new investigators with outstanding promise at the assistant professor or equivalent level.

With the Rosenblith award program, HEI has supported the growth and development of 27 new investigators to date and has been pleased to see a number of past recipients go on to play leading roles in environmental health research.

RNA and Cells

Contreras and colleagues evaluated how exposure to components of air pollution affected the oxidation of ribonucleic acid (RNA) inside lung cells. The role of RNA oxidation in cellular responses is drawing increased attention, because several species of RNA — including messenger, transfer, and micro RNA — play key roles inside cells, particularly in the regulation of protein synthesis. The investigators also studied how the oxidation of RNA might affect pathways inside the cell.

Contreras first created an aged VOC–ozone mixture by mixing acrolein, methacrolein, and ozone in an atmospheric chamber. This mixture was led into an air–liquid interface module containing human lung epithelial cells that were exposed for 90 minutes. Contreras identified specific RNA transcripts that were either up- or downregulated or oxidized by the exposures. She then performed analyses to identify the biological pathways inside the cells that were most associated with these changes in transcription. She also evaluated whether there were changes in levels of specific proteins or lipids in the cells, or in markers of cell injury and death.

Critical Assessment

In its independent evaluation, the HEI Review Committee considered the study to be an exciting new approach to the toxicology of air pollution and an important initial attempt to understand an understudied area: the role of messenger RNA regulation, modification, and oxidation in the effects of exposure to air pollutants. The Committee said the investigators used a logical combination of powerful approaches — including transcriptome analysis, biochemistry, and cell biology — to identify candidate genes and pathways for further evaluation of the effects of exposure to pollutants. At the same time, the Committee identified several limitations that call for further research: the results were based on exposure of cells to a single mixture at only one time point at concentrations of VOCs and ozone that were much higher than would be found even in heavily polluted urban environments and appeared to be cytotoxic.

In addition, the study focused on a single RNA oxidation product, 8-oxoG. In future studies, other potentially more biologically relevant RNA oxidation products need to be identified using more sensitive techniques.

Nonetheless, the Committee considered the study to be an important preliminary demonstration of RNA oxidation in lung cells exposed to a VOC–ozone mixture using a powerful combination of techniques, offering a template for more exact and comprehensive studies in the future. HEI

HEI Thanks Rashid Shaikh for Outstanding Service as Leader and Mentor

HEI friends and staff recently joined outgoing Director of Science Rashid Shaikh via Zoom for a retirement party celebrating his long and distinguished career in identifying and producing quality science to inform important environment and health decisions. Colleagues and staff noted his many scientific contributions, his constant attention to the growth and mentoring of younger scientists, and his central role over many decades in the success of HEI.

Rashid Shaikh.

As director since 2008, Shaikh managed and oversaw the Institute's diverse research initiatives and review activities. In this role he worked closely with the HEI Research Committee and HEI's scientific staff to establish the most pressing research questions, develop requests for investigator applications to best address those needs, and then oversee the selected projects.

Shaikh also collaborated with the HEI Review Committee and scientific staff in evaluating final reports, and in writing and publishing commentaries to interpret the HEI-funded studies and put them in a regulatory perspective.

Among the many HEI accomplishments Shaikh helped lead were the initiation of three major studies of low levels of air pollution exposure and health in the United States, Canada, and Europe; extensive testing of the emissions and health effects of new technology diesel engines (the ACES project); and major Accountability research initiatives. He has also led other key activities at HEI, including assessing the potential health effects of emerging fuels and technologies, ensuring the proactive management of conflicts of interest, overseeing the use of human subjects in research, and promoting transparency and data access.

Previously, Shaikh was the director of programs at the New York Academy of Sciences, where he launched several new programs focused on cutting-edge areas of science. Before that, he was a significant contributor at the earliest stages of HEI. He served during the 1980s as HEI's first director of scientific review and evaluation, overseeing, among other important studies, the review and publication of the signature 1989 multicenter study of carbon monoxide exposure, still an important contributor to CO policy decisions today. In the late 1980s and early 1990s, he served as executive director of HEI's sister organization, HEI-Asbestos Research, which examined the challenging issue of the risks and benefits of removing asbestos from public and commercial buildings.

Shaikh has also been a member of the U.S. Environmental Protection Agency's Mobile Sources Technical Review Subcommittee, the California Air Resources Board's Science Screening Committee, and the Board of Advisors of the University of California Riverside's Center for Environmental Research and Technology.

In April 2020, Shaikh was appointed director of science emeritus; HEI Managing Scientist Annemoon van Erp has stepped in to serve as acting director of science while the search for Shaikh's successor is underway. HEI

Institute Acts to Promote Diversity

HEI has been heartened by the renewed and widespread attention to the persistent racism that excludes certain people and groups from the full opportunity to engage in endeavors of American society, including scientific education and research. As an institution, HEI recognizes that it too may have contributed, even if unconsciously, to the development and perpetuation of these exclusions. We also know that our ongoing work to investigate the potential disparate health effects of air pollution on diverse populations will be significantly enriched by taking concrete action to engage these excluded populations in every aspect of our work.

To renew our commitment to promote inclusion, we seek to focus on individuals from racial and ethnic groups that have been underrepresented for generations in environment and health research (i.e., African Americans, Hispanics, Native Americans, and other groups identified by the National Institutes of Health). HEI will take every step to engage and provide a welcoming environment for underrepresented scientists in the scientific work of HEI; provide a safe and welcoming environment for all at HEI, free from discrimination of all types, including race, gender, LGBTQ+, ethnicity, national origin, and disability; and take both immediate and sustained action. A fuller description of HEI's plan and actions is available for downloading at *www.healtheffects.org/announcements/hei-acts-promote-diversity.* HEI

BOARD WELCOMES NEW MEMBERS *(Continued from page 1)*

Meserve earned a PhD in applied physics from Stanford and a JD from Harvard Law School, and served as law clerk to Supreme Court Justice Harry A. Blackmun and as legal counsel to the president's science adviser. He is the former president of the Board of Overseers of Harvard University and current chair of the International Nuclear Safety Group (chartered by the International Atomic Energy Agency). He is a member of the National Academy of Engineering and a former member of its Council. He is also a fellow of the American Academy of Arts and Sciences and a member of its Council and Trust. Meserve has chaired or served as a member of a wide variety of studies undertaken by the National Academies of Sciences, Engineering, and Medicine and brings to HEI's Board experience in both legal and science matters. HEI

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Richard F. Celeste, *Chair, Board of Directors*
Daniel S. Greenbaum, *President*

HEI is a nonprofit organization funded jointly by government and industry to research and evaluate the health effects of air pollution. An overview of HEI, information on its current research program, and all published HEI reports are available for downloading, free of charge, from the website.

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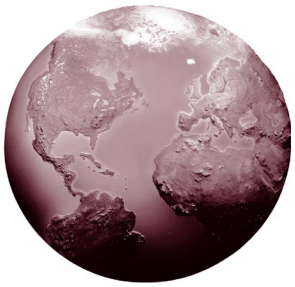

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'Virtual HEI' Maintains Steady Progress

Five months after sending staff home to work safely during the coronavirus pandemic, HEI has continued to adapt well and make scientific progress on a number of fronts.

Meeting remotely, the staff, Research and Review Committees, and Board of Directors have moved ahead with new and ongoing research projects, new scientific publications, HEI input into key policies for the environment and science, and broader communication of HEI results.

After five highly successful spring webinars held in lieu of the Annual Conference, HEI continues to communicate broadly about its work. Its visibility on social media has grown with the addition this year of a Twitter account (@HEIresearch) to share information on core HEI programs along with State of Global Air (@HEISoGA), which joined Twitter in 2019; both have a growing number of followers.

Meanwhile, a request for applications issued in May seeking to study the potential intersections between air pollution and susceptibility to the coronavirus attracted, in a mere three weeks, some 45 letters of intent. HEI was recently invited to provide briefings before Congress on its plans to pursue this new research. The requests came from both Democratic and Republican staff, and from members of two House committees (Energy and Commerce; Science, Space, and Technology) as well as the Senate Committee on Environment and Public Works.

While managing well under uniquely challenging circumstances, HEI has been thinking ahead on how to proceed in light of all the unknowns the pandemic presents. Although some parts of the Massachusetts economy are now slowly reopening, HEI has decided — based on its success at virtual operation, its close following of the latest public health data, and the reality of very limited public transportation on which the staff depends for commuting — to remain in virtual operation at least through the end of the year. HEI

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