



## Two Important New HEI Studies Underway

### Assessing the Value of Air Pollution Reductions in U.S. and Canada, and the Effects of Long-Term Exposure in Asia

**H**EI has funded two new studies under a general request for applications (RFA 17-2) on the health effects of air pollution. Periodically, HEI issues such a general RFA to fund research that falls outside of current RFAs but meets the broader interests of its Strategic Plan.

After review of the proposals by the Research Committee and outside experts, HEI decided to fund the two studies described below.

**Amir Hakami**, associate professor in environmental engineering and associate dean of research and graduate studies at Carleton University (Canada), and colleagues will perform a health impact assessment of decreased emissions of nitrogen oxides, sulfur dioxide, ammonia, primary particulate matter species, and volatile organic compounds. They

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## Launching Top-Priority Research

### HEI to Seek New Studies on Accountability, Enhanced Exposure Assessment, and More

**I**n pursuing the next key steps in implementing its *Strategic Plan for Understanding the Health Effects of Air Pollution*, HEI will, in the coming months, issue three new Requests for Applications (RFAs) to find the best studies to support.

#### RFA 18-1: Assessing Health Effects of Air Quality Actions at the National, Regional, and Local Levels

Continuing its long-term leadership in pursuing rigorous accountability (or intervention) studies, HEI will follow up on its first two waves of accountability studies by issuing RFA 18-1 to solicit a third wave of research to evaluate the effectiveness of air quality regulations and other intended or unintended actions, both short- and longer-term and at various spatial scales (local to national). HEI will also consider studies of regulatory actions implemented for goals other than improving air quality — for example, to reduce climate-change-related emissions or traffic congestion — that are expected to have air quality benefits.

Applicants will be encouraged to (1) carefully think about causality in their study designs and statistical analysis, (2) consider economically disadvantaged communities and susceptible populations in their proposed research, and (3) contribute to the scientific knowledge base in addition to conducting an air quality action evaluation. The RFA will welcome proposals from North America, Europe, and around the globe, including China and low- and middle-income countries with demonstrated commitment to a major air quality intervention, as long as they meet the criteria specified in the RFA. Preliminary applications will be due in February 2019. Invited full applications will be due in May 2019.

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HEI will soon begin reviewing applications from investigators studying efforts to control urban air pollution. ISTOCK PHOTO

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## Diverse Stakeholders Share Expertise for Energy Research Plan

In mid-September, HEI's Energy Research Committee hosted a public workshop in Austin, Texas, the third public event during Year 1 of the Institute's [Energy Research Program](#). More than 70 participants with diverse expertise, and representing a wide range of stakeholder interests, contributed to the Committee's review of exposure literature and its planning for scientific investigations. The literature review and research recommendations will be published in an HEI report.

The Energy Research Program was established, with separate funding, to address important knowledge gaps about potential human exposures and health effects associated with onshore development of oil and natural gas development from unconventional resources.



Nicole Deziel, assistant professor, Department of Environmental Health Sciences, Yale School of Public Health.

trends and their recommendations for exposure research that would inform decision-making by their organizations. Various breakout groups reported out on the types of research they felt would be most useful to aiding decisions by a regulatory authority, industry, nongovernmental organization, or community group. Six additional speakers described past efforts and future opportunities to address research needs with data that are already available.



Among a panel of six federal and state government officials were James Kenney (speaking), senior policy advisor for unconventional oil and gas in the U.S. EPA Office of Congressional and Intergovernmental Relations, and Saba Tahmassebi, agency chief engineer for the Oklahoma Department of Environmental Quality.



Clint Woods, deputy assistant administrator, Office of Air and Radiation, U.S. EPA.

At the September workshop, participants heard from a six-member panel of distinguished staff from the U.S. Environmental Protection Agency and the states of Colorado, Oklahoma, and Texas, all speaking about oil and gas policy



From left: Karlene Lavelle, epidemiologist with ExxonMobil Corporation; Isabelle Cozzarelli, hydrologist with U.S. Geological Survey; and Shari Dunn-Norman, petroleum engineer serving on HEI Energy Research Committee.

Following all presentations, workshop participants deliberated on the most important research priorities, which the Energy Research Committee is considering as it continues its review of the literature and planning for research. The Committee anticipates it will release a Request for Qualifications in 2019. [HEI](#)

PHOTOS BY JANA BIRCHUM

PROPOSALS FOR RESEARCH (Continued from page 1)

### RFA 19-1: Applying Novel Approaches to Improve Long-Term Exposure Assessment of Outdoor Air Pollution for Health Studies

Accurately measuring exposure in air pollution studies, especially for less well-studied pollutants, is critical to being able to interpret the studies to best inform efforts to reduce exposure. To meet this need, RFA 19-1 will invite studies focusing on improving exposure assessment of outdoor air pollutants that exhibit a high level of variation in space and time by applying emerging technologies and novel approaches, especially those with applicability to long-term epidemiology studies. Preference will be given to approaches that result in exposure estimates that can be used to detect associations of air pollutant exposures with clinically and/or policy-relevant health outcomes.

Successful proposals would be well designed, convincingly improve on existing exposure assessment methods, and demonstrate the feasibility and usability of the approach for broad application in current or future health studies. Proposals should describe key study design features (e.g., technologies used, including their

accuracy and precision; exposure assessment approach; and alignment of spatial and temporal exposures and health data). Applicants should also include a plan for data sharing and accessibility at the end of the study. Preliminary applications will be due in March 2019. Invited full applications will be due in July 2019.

### RFA 18-2: Walter A. Rosenblith New Investigator Award

HEI plans to reissue an RFA for the [Rosenblith Award](#) late in 2018. This award has existed since 1999 to support early-career investigators at the assistant professor level. The RFA solicits proposals on air pollution and health by applicants who have between two and seven years of research experience after obtaining their doctorates. The funding level is \$150,000 per year for a maximum of three years. In addition to the quality of the research proposal, HEI's Research Committee considers the career potential of the candidate, institutional support, and mentoring plan. Preliminary applications will be due in April 2019. Invited full applications will be due in July/August 2019. [HEI](#)

Check HEI's [Funding](#) page for more information on deadlines and other details as they become available.

## Walter A. Rosenblith New Investigator Award Recipient Announced

The HEI Research Committee, in its continuing efforts to build the next generation of environmental health scientists, has selected Manabu Shiraiwa, who was recently promoted to associate professor in the Department of Chemistry at the University of California, Irvine, to receive HEI's 2018 [Walter A. Rosenblith New Investigator Award](#) for his proposal "Formation of Reactive Oxygen Species by Organic Aerosols and Transition Metals in Epithelial Lining Fluid."

Shiraiwa received a BSc in chemistry (2006) and an MSc in earth science (2008) from the University of Tokyo, Japan, and a PhD (2011) in biogeochemistry from the Max Planck Institute for Chemistry, Germany. He received postdoctoral training in chemistry at the Max Planck Institute and at the California Institute of Technology, where he conducted kinetic modeling on the formation of secondary organic aerosols. He became assistant professor at the University of California, Irvine, in 2016 and started an independent research group that is focused on multiphase chemistry of organic aerosols and reactive oxygen species (ROS) in the atmosphere to better understand the effects of aerosols on climate, air quality, and public health. Shiraiwa is well published



Manabu Shiraiwa.

and has received several accolades for his work, including a CAREER Award from the National Science Foundation, the [Sheldon K. Friedlander Award](#) from the American Association for Aerosol Research, and the Otto Hahn Medal from the Max Planck Society.

With his New Investigator Award Shiraiwa plans to study the kinetics and molecular mechanisms of formation of ROS by different types of anthropogenic and biogenic secondary organic aerosols (SOAs). A major novelty of his proposed work is to distinguish between ROS formed by pollutants entering lung lining fluid (chemically) and by macrophages producing ROS as an inflammatory response (biologically). His approach will use SOAs produced in a reaction chamber brought in contact with artificial epithelial lining fluid with or without addition of transition metals. Shiraiwa will then measure concentrations of ROS using electron paramagnetic resonance (EPR) spectroscopy with a spin trapping technique and also with the commonly used DTT assay for comparison. A subsequent line of research will be to measure ROS that are produced by rat primary macrophages exposed to particles. In these experiments he will measure ROS by EPR and chemiluminescence. Finally, Shiraiwa plans to construct a kinetic multilayer model for surface and bulk chemistry in the epithelial lining fluid that can be used by regulators.

Named for the first chair of the HEI Research Committee, the Walter A. Rosenblith New Investigator Award supports the work of a promising scientist early in his or her career. In selecting award recipients, the HEI Research Committee considers each applicant's potential for a productive research career in examining air pollution and its effects on health, the support provided by the applicant's institution, and the scientific merit of the research project and its relevance to HEI's mission.

Shiraiwa is the 25th scientist to receive the Rosenblith Award since the inception of the program in 1999.

**Mark Your Calendar!**  
**HEI 2019 Annual Conference**  
**May 5–7, 2019**  
**W Seattle Hotel, Seattle, WA**

NEW STUDIES UNDERWAY (Continued from page 1)

will assess exposure using a new adjoint modeling extension their team built for the Community Multiscale Air Quality modeling system. Monetized health impacts of reductions in air pollution sources will be calculated on a 12-km grid across the United States and Canada for 2002 and 2014. They plan to develop and apply a source- and location-specific database of benefits per ton of emissions reduction for different classes of vehicles and major point sources.

**Roel Vermeulen**, professor of environmental epidemiology and exposome science at the Institute of Risk Assessment Sciences at Utrecht University, the Netherlands, and colleagues will conduct a large cohort study investigating long-term air pollution and cause-specific mortality in Asia, using pooled data from 23 cohorts of the [Asia Cohort Consortium](#), resulting in a study population of 1.2 million Asians. Exposure to air pollution will be estimated primarily using satellite data, building on the methods that have been used in the Global Burden of Disease studies. The study will fill a key gap in long-term epidemiology results in developing Asia, inform efforts to characterize exposure-response functions of long-term exposure to air pollution and (cause-specific) mortality, and provide useful information for decisions about future air quality standards in Asian countries.

These studies recently began and will be completed within two to three years. The investigators will present their work at the 2019 HEI Annual Conference in Seattle, Washington. For more information, contact Allison Patton ([apatton@healtheffects.org](mailto:apatton@healtheffects.org)) about Hakami's study or Hanna Boogaard ([jboogaard@healtheffects.org](mailto:jboogaard@healtheffects.org)) regarding Vermeulen's study.

### Health Effects Institute

75 Federal Street, Suite 1400  
Boston, MA 02110-1817, USA  
Phone: +1-617-488-2300  
Fax: +1-617-488-2335  
[www.healtheffects.org](http://www.healtheffects.org)

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.

Production Staff for *Update*:

Hope Green, *Editor*  
Annemoo M.M. van Erp, *Webmaster*  
Ruth E. Shaw, *Cameographics, Layout and Composition*

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## HEI Welcomes Two New Scientists

This fall two experts in exposure assessment have joined HEI's science staff to help implement HEI's core programs in air pollution and health, and in global health.

**Pallavi Pant** holds a PhD in environmental health from the University of Birmingham, UK, and MSc in Environmental Studies from TERI School of Advanced Studies, India. She completed her postdoctoral research training in exposure science at the Department of Environmental Health Sciences, University of Massachusetts, Amherst. Her research has focused on characterization and assessment of urban air pollution, particularly in India. She serves as the social media editor for the *Journal of Exposure Science and Environmental Epidemiology*, and is also active in initiatives to promote public understanding of air pollution in India and elsewhere.



Pallavi Pant.

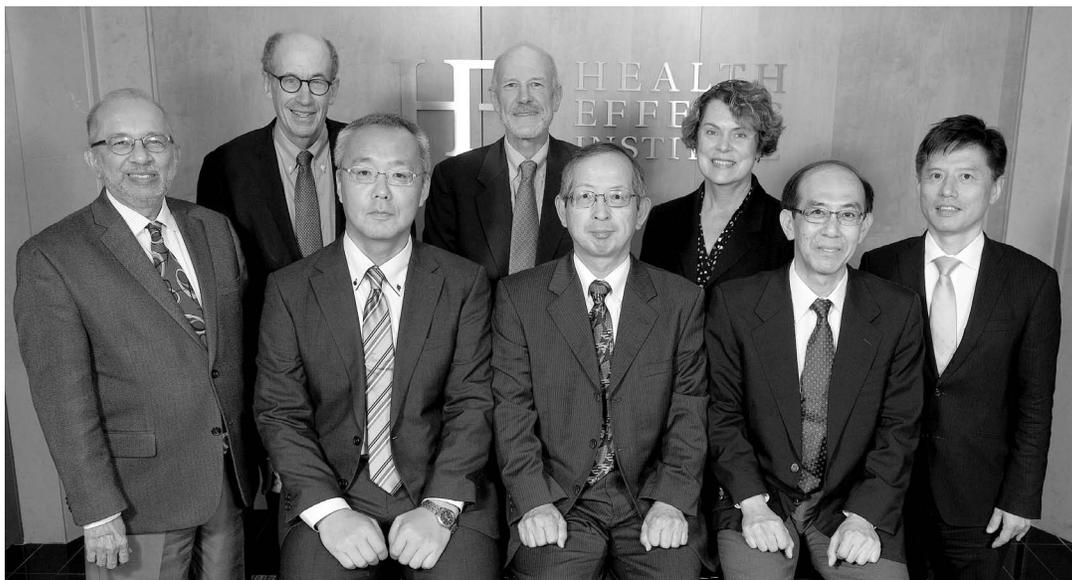
**Eleanne van Vliet** received her MPH degree and DrPH in environmental health from Columbia University's Mailman School of Public Health. She has published

on neonatal exposures and alternatives to phthalates in medical devices, and designed and conducted exposure monitoring field studies to investigate health effects resulting from household air pollution in Africa. As director of research for As You Sow, an environmental health nonprofit organization, she collaborated with state agencies and manufacturers to reduce people's exposure to toxic chemicals in consumer products in accordance with California's Safe Drinking Water and Toxic Enforcement Act of 1986. Van Vliet previously worked in environmental conservation and policy at the Jane Goodall Institute and Worldwide Fund for Nature. Most recently, as a postdoctoral scholar at the University of Southern California, she worked on improving methods to assess personal exposures to air pollution mixtures in various populations, including pregnant women and children. [HEI](#)



Eleanne van Vliet.

## HEI Hosts Japanese Automakers



A delegation from the Japan Automobile Manufacturers Association (JAMA) visited HEI on October 12. Every two years, JAMA sends a delegation to the United States to meet with people at regulatory agencies, including the U.S. Environmental Protection Agency and the California Air Resources Board as well as select research organizations, with HEI usually on the itinerary. At the October meeting, after general presentations on JAMA and HEI research activities in the morning, the afternoon was devoted to a detailed discussion in the context of a study JAMA is planning to test the toxicity of gasoline exhaust.

Pictured are Tsuyoshi Ito (seated, left), Japan Automobile Research Institute; Yoshiaki Shibata (seated, center), Toyota Motor Company; Takuya Ikeda (seated, right), Nissan Motor Company; Tetsuya Yamashita (standing, right), Toyota Motor Company; and Susan Collet of Toyota Motor America. HEI participants (standing, from left) were Director of Science Rashid Shaikh; President Dan Greenbaum; and Vice President Robert O'Keefe. Also participating were experts from Carnegie Mellon University, Michigan State University, the U.S. Environmental Protection Agency, the American Petroleum Institute, and Ford Motor Company. [HEI](#)

PHOTO BY MELISSA OSTROW

# Communicating the Science

## HEI at Leading International Meeting on Exposure, Health

In late August, several HEI staff members presented at the [joint annual meeting](#) of the International Society of Exposure Science and International Society for Environmental Epidemiology, held in Ottawa, Canada.

Staff Scientist Allison Patton participated extensively in the meeting's preparation as a member of its Technical Organizing Committee. In addition, she and Consulting Scientist Johanna Boogaard organized a symposium on "Challenges of Assessing Non-Tailpipe Emissions for Urban Air Quality and Health." In another session, Boogaard spoke on "Interventions for Reducing Ambient Air Pollution and Their Effects on Health: Final Results from a Cochrane Systematic Review."

Staff Scientist Anna Rosofsky discussed HEI's [Energy Research Program](#) in her presentation "Critical Review: Human Health Literature Related to Unconventional Oil and Natural Gas Development." She also presented "Prenatal and Postnatal Ambient Air Pollution Exposure and Weight Growth Trajectories in Early Childhood," based on her doctoral thesis.

HEI Consulting Principal Scientist Aaron Cohen organized and chaired "Milestones in Air Pollution Epidemiology: A Symposium in Honor of Dr. Richard T. Burnett."

At a U.S. Environmental Protection Agency symposium on benefits assessment, HEI Principal Scientist Katherine Walker reported on a workshop HEI convened with Chinese collaborators in Beijing to identify key health studies for use in health impact assessments in China. The work will support a joint HEI-Fudan University assessment of the health impacts of shipping activities in Shanghai and the Yangtze River Delta.

### Energetic Discussions

On October 12, HEI Director of Energy Research Donna Vorhees presented a seminar in Rapid City, South Dakota, hosted by the Department of Geology and Geological Engineering at the South Dakota School of Mines & Technology. In her talk, "Understanding the Intersection Between Geology, Engineering, and Human Health," Vorhees discussed potential exposure pathways associated with unconventional oil and gas development, and the related questions that interdisciplinary teams of geologists, hydrologists, petroleum engineers, and others can help answer to inform the work of health scientists.

The following week, Vorhees participated in the 2018 Energy Governance Forum, hosted by the Energy and Environment Program of the Aspen Institute in Aspen, Colorado. Approximately 50 industry executives, academics, entrepreneurs, regulators, and thought leaders met for a moderated, informal roundtable discussion. They explored how to effectively engage various stakeholders (e.g., regulators, community leaders, oil and gas industry, and nongovernmental organizations) involved with energy development, notably shale oil and gas.

### Perspectives, Priorities

HEI Director of Science Rashid Shaikh was the guest speaker for a September seminar at the Texas A&M Transportation Institute in College Station, Texas, with the theme "Health Effects of Air Pollution: Perspectives and Priorities." Shaikh spoke about the scale and impact of the global air pollution problem, progress on reducing it in the United States, health effects at low levels of air pollution, and [accountability research](#). He emphasized that,

despite progress, many challenges remain and much work is still needed to curb the impact of air pollution.

The seminar was hosted by the Center for Advancing Research in Transportation Emissions, Energy, and Health, a U.S. Department of Transportation University Transportation Center.



HEI contributed to the global air pollution conference at the World Health Organization headquarters.

PHOTO BY KATY WALKER

## Global Health Challenges

In September, HEI Principal Scientist Katherine Walker presented the results from HEI's report on the [Burden of Disease Attributable to Major Air Pollution Sources in India](#) (Special Report 21) in a symposium on megacities, air pollution, and health at the 10th International Aerosol Conference in St. Louis, Missouri.

In late October, Walker moderated a session at the first World Health Organization Global Conference on Air Pollution and Health in Geneva, Switzerland. In the session, speakers reviewed the acute and chronic effects of air pollution, with emphasis on population subgroups and occupationally exposed workers. They discussed how it can influence the most common diseases — heart attack, stroke, lung cancer, lung disorders, childhood pneumonia, and allergies — and described the evidence on the relative toxicity of Saharan dust, a key regional contributor to particulate air pollution.

## Testing the Causality Links for Air Pollution and Health

In October, HEI President Dan Greenbaum gave the keynote address at a multiparty particulate matter causality symposium held at the University of North Carolina, Chapel Hill. The symposium provided the opportunity for presentation and public discussion of three new investigations, funded competitively by an industry consortium, to test different causal inference statistical methods using the U.S. Medicare database.

In his talk, "Seeking the Holy Grail: Searching for Causality in Health and Air Pollution Data," Greenbaum discussed the strengths and challenges of three approaches to determining whether air pollution may cause health effects: the integrated assessment of diverse lines of toxicological, clinical, and epidemiology evidence; accountability/intervention studies testing whether there are health consequences of specific changes in air quality; and causal inference statistical methods. [HEI](#)

To obtain a copy of Dan Greenbaum's presentation, contact him at [dgreenbaum@healtheffects.org](mailto:dgreenbaum@healtheffects.org).



## Health Effects Institute

75 Federal Street, Suite 1400  
Boston, MA 02110-1817

## An Initial, Rigorous Look at Study Results

### HEI to Review, Publish First Findings on PM<sub>2.5</sub> from Its “Low Exposure Levels” Research Program

**H**EI is reviewing and plans to publish a set of first results from a study that it expects will be germane to an ongoing review by the U.S. Environmental Protection Agency (EPA) of the federal standard for allowable concentrations of fine particulate matter in the air. The study is one of three comprehensive studies that HEI is funding to examine the possible health effects from exposure to pollutants at low concentrations. (See [HEI Update, Fall 2015](#).)

Levels of ambient air pollution have declined significantly over the last decades in North America, Europe, and other high-income regions. Nonetheless, as discussed in HEI’s Strategic Plan for 2015–2020, some epidemiological studies have reported associations with adverse health effects even at these lower levels of exposure. To inform future risk assessment and regulation, it is important to know whether adverse effects continue to be observed as levels of air pollution decline still further and what the shape of the exposure–response function is at those low levels. In 2016, as part of the Strategic Plan, HEI funded three studies that will evaluate large populations in North America and Europe to delve into these important questions. One of these studies is being led by Francesca Dominici at the Harvard T.H. Chan School of Public Health. During the first two years of this four-year study, Dominici and her colleagues

have published initial results that have the potential to be important both scientifically and in the context of policy.

The EPA is currently on an accelerated track to review the National Ambient Air Quality Standard (NAAQS) for PM<sub>2.5</sub> (particulate matter  $\leq 2.5$  in aerodynamic diameter), and HEI believes that Dominici’s results, as well as thoughtful comments from HEI’s review of them, can play a constructive role. With that in mind, HEI requested, and the investigators have now submitted, a Phase 1 report — summarizing their key analyses, findings and interpretations — based on the research completed so far. HEI plans to rigorously review and publish Phase 1, with a commentary, in time for EPA’s consideration during the standard setting process.

As it often does when reviewing particularly complex studies, HEI has formed a special panel to review the Phase 1 report for this purpose. Sverre Vedal of the University of Washington, Seattle — former member of the HEI Review Committee and chair of the HEI panel to review the 2003 Special Report [Revised Analyses of Time-Series Studies of Air Pollution and Health](#) — will chair this new panel, which will also include six experts in epidemiology, exposure assessment, and biostatistics. HEI anticipates publishing the Phase 1 investigators’ report, along with the special panel’s commentary, in the spring of 2019. [HEI](#)