

New Initiative to Address Unconventional Oil and Gas Development

HEI Tapped to Develop Plan for Scientific Research on Potential Impacts

The Health Effects Institute has received funding from a consortium of leading foundations in the Appalachian region of the United States for a new initiative to develop a comprehensive research plan for understanding the potential impacts of unconventional oil and gas (UOG) development.

UOG extraction, being pursued with increasing frequency across the United States and around the world, poses many questions relevant to health and the environment. In announcing the grants, HEI Board Chair Richard Celeste said that “the HEI model of providing independent, high-quality research in controversial circumstances is ideal for work in this complex and challenging arena.” The Board was pleased, he added, that the additional funding would enable HEI to continue to focus

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About 25 million children ride school buses daily in the United States.

COURTESY OF NAVISTAR

NEW HEI RESEARCH REPORT

Characterizing Pollutants in and Around School Buses

To reduce human exposure to diesel exhaust from older-technology truck and bus engines, vehicle manufacturers have deployed various retrofit aftertreatment devices in tailpipes and engine components. HEI recently published a study that sheds light on the effectiveness of such devices. Research Report 180, *Characterizing Ultrafine Particles and Other Air Pollutants In and Around School Buses*, details the findings of Yifang Zhu of the University of California–Los Angeles, a recipient of HEI’s Walter A. Rosenblith New Investigator Award, and her colleague Qunfang Zhang.

Previous research suggests that children riding in school buses can be exposed to high levels of diesel emissions. In a number of school buses in Texas and California, the investigators measured levels of ultrafine particles and other air pollutants, such as fine particulate matter and black carbon, inside the bus, directly outside the bus, or close to the tailpipe. Four sets of tests were performed: on-road; during idling; before and after retrofitting with a diesel oxidation catalyst, a crankcase filter system, or both; and before and after operating a high-efficiency particulate air (HEPA) filter inside the cabin.

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on its core air quality and health mission even as it addresses this important new area.

Development of oil and gas from unconventional resources is rapidly changing the face of energy production at the local, state, national, and global levels. With its expansion has come controversy over possible effects on people and the environment in areas with shale gas and oil deposits, including the Appalachian Basin, home to the Marcellus and Utica shale formations. In response to concerns about natural gas and oil extraction in Appalachia, 26 leaders from government, industry, academia, environmental groups, and civic society came together in 2011 to establish the Shale Gas Roundtable. This Pennsylvania-based group was cochaired by Jared Cohon, who was then president of Carnegie Mellon University, and convened by the University of Pittsburgh Institute of Politics. In 2013, after conducting a two-year review, the Roundtable issued its recommendations, emphasizing the need for “efforts to increase balanced research and rigorous monitoring of the possible impacts of unconventional oil and gas development.”

The Roundtable conducted a comprehensive national assessment of research partnership models and identified the Health Effects Institute as “uniquely well suited” to advise it on research in the shale oil and gas area. With the backing of several prominent foundations, the Roundtable approached the HEI Board and asked it to consider taking a leadership role in research planning. After

careful consideration and engagement with core sponsors, the Board expressed strong support for HEI to engage in this challenging new area by preparing a plan to guide future scientific work. It made that approval contingent on the receipt of new, dedicated funding, the ability to add scientific staff to implement the effort, and a minimal impact on HEI’s core activities.

An 18-month planning project supported by the new foundation grants is under way. Applying the HEI model of trusted science and rigorous peer review, HEI has recruited an independent special scientific committee to (1) explore and define the potential human health, ecologic, environmental, and social impacts of UOG development in the Appalachian Basin, and (2) develop a broadly relevant strategic scientific research plan to understand such impacts in both a regional and a national context.

The committee (see box) is chaired by George M. Hornberger, Distinguished Professor of Civil and Environmental Engineering and of Earth and Environmental Science at Vanderbilt University and director of the Vanderbilt Institute for Energy and the Environment. The committee members are highly regarded experts in diverse fields of study directly related to UOG development and its possible impacts.

The committee’s work will begin with an initial review of the existing scientific literature and the preparation, in late 2014, of a draft “summary appraisal” indicating which areas warrant additional investigation. Drawing

on the public response to the appraisal and its own independent work, the committee will then create a draft comprehensive strategic research plan. The plan will undergo public review and HEI peer review in 2015, before a final *Strategic Research Plan for Understanding the Potential Impacts of Unconventional Oil and Gas Development* is published later in 2015. HEI will share and discuss the plan with the broader policy and stakeholder communities at the state, regional, and national levels. Throughout the process, the committee will consult with a wide variety of experts and government officials, as well as with industry, community, and environmental groups, to ensure that it considers the full range of issues and questions.

This initiative is intended to lay the groundwork for future study, communication, and decision making by providing an independent, priority-based assessment of scientific questions and gaps in knowledge. The strategic research plan will complement and expand on previous efforts to define needs for the study of UOG development. It can be used by research funders and the scientific community to inform priority-based funding decisions and also by regulators, oil and gas developers, environmental and public health experts, and other interested parties to better understand its implications. 

For more information, contact Donna Vorhees (dvorhees@healtheffects.org), the HEI senior scientist who is leading this effort.

HEI Special Committee on Unconventional Oil and Gas Development

George M. Hornberger (chair), *Vanderbilt University*

Alison C. Cullen, *University of Washington*

Jeffrey J. Daniels, *Ohio State University*

Alan M. Ducatman, *West Virginia University*

John K. Jackson, *Stroud Water Research Institute*

William (Bill) M. Kappel, *United States Geological Survey (emeritus)*

Vince Matthews, *Principal of Leadville Geology; former State Geologist of Colorado*

Allen L. Robinson, *HEI Research Committee and Carnegie Mellon University*

Dale P. Sandler, *National Institute of Environmental Health Sciences*

Daniel Soeder, *Department of Energy, National Energy Technology Laboratory*

Susan L. Stout, *Federal Liaison, United States Department of Agriculture Forest Service*

Deborah L. Swackhamer, *University of Minnesota*

Raymond S. H. Yang, *Colorado State University*

Junfeng (Jim) Zhang, *Duke University*

Research Committee Welcomes a New Epidemiologist

The HEI Board of Directors has appointed Barbara Hoffmann, an environmental epidemiologist based in Düsseldorf, Germany, to the Research Committee. This multidisciplinary committee is responsible for developing and overseeing HEI's research program.



Barbara Hoffmann
FOTO ARNDT, VOERDE, GERMANY

Professor Hoffmann is head of the Environmental Epidemiology of Aging team at the IUF-Leibniz Research Institute for Environmental Medicine and is on the medical faculty of the Heinrich

Heine University of Düsseldorf. Joining the committee this spring, she replaces Grace LeMasters, professor emerita of epidemiology and environmental health at the University of Cincinnati, Ohio. LeMasters is stepping down after serving two four-year terms, the maximum time of service on scientific committees that HEI bylaws allow.

"Grace has been a very valuable member of the Research Committee," said Rashid Shaikh, HEI director of science. "She has provided very helpful advice and guidance, not only for HEI's epidemiologic studies but also for studies of traffic-related pollution and exposure assessment."

Hoffmann's research focuses on the investigation of acute and chronic cardiopulmonary effects of exposure to air pollution. She received a Ph.D. in lung physiology from the Medical School of Aachen, Germany. After

working in pulmonary and internal medicine, she received a master of public health degree from the School of Public Health in Bielefeld, Germany. Subsequently she worked at the Institute of Medical Informatics, Biometry and Epidemiology at the Medical School of the University of Duisburg-Essen, Germany, where she founded and developed the Unit of Environmental Epidemiology and Clinical Epidemiology.

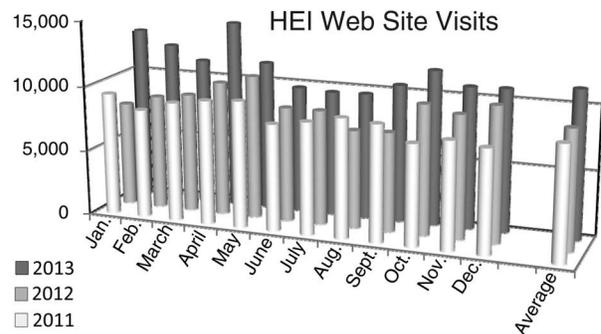
Hoffmann is the principal investigator for several large-scale cohort studies and is involved in many national and international projects. Recently, she was associated with the European Study of Cohorts for Air Pollution Effects and served on the HEI review panel for the National Particle Component Toxicity initiative studies, which were published last October. [HEI](#)

HEI Web Site: High-Quality Information at Your Fingertips

In the coming year HEI is planning to upgrade its Web site, www.healtheffects.org. Underscoring the importance of this effort is a recent tally of visitors to the site, which shows that the institute's online audience around the globe continues to grow.

According to data compiled by HEI staff in January, the average number of monthly visits to the HEI Web site increased slightly in 2013, compared with 2012 and 2011. Peak traffic occurred in January 2013, around the time of the workshop "Understanding the Health Effects of Air Pollution" in Brussels, cosponsored by the European Commission, the World Health Organization, and HEI. A subsequent peak occurred around the time of the HEI Annual Conference in April 2013. In addition to the home page, other popular destinations are "What's New" and "Funding," a page with information for researchers who wish to apply for support.

The numbers of HEI reports and other materials downloaded from the Publications page, pubs.healtheffects.org, have been steadily increasing as well — HEI documents have been downloaded more than 100,000 times over the past three years. Special Report 17, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects*, has generated the most



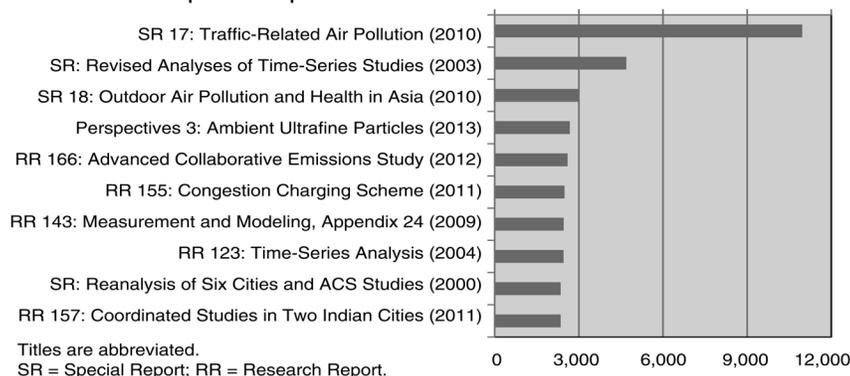
downloads. The Special Report *Revised Analyses of Time-Series Studies of Air Pollution and Health* is solidly in second place. Other Special Reports in the top 10 are *Outdoor Air Pollution and Health in the Developing Countries of Asia: A Comprehensive Review* and *Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality*.

Also popular are Perspectives 3, *Understanding the Health Effects of Ambient Ultrafine Particles*, and Research Reports 166, *Advanced Collaborative Emissions Study (ACES) Subchronic Exposure Results*, by McDonald et al.; 155, *The Impact of the Congestion Charging Scheme on Air Quality in London*, by Kelly et al.; 143, *Measurement and Modeling of Exposure to Selected Air Toxics for Health Effects Studies and Verification by Biomarkers*, by Harrison et al. (Appendix 24); 123, *Time-Series Analysis of Air Pollution and Mortality: A Statistical Review*, by Dominici; and 157, *Coordinated Studies of Short-Term Exposure to Air Pollution and Daily Mortality in Two Indian Cities*, by Balakrishnan and Rajarathnam et al. [HEI](#)

A redesign of the Web site is part of HEI's renewed commitment to providing high-quality and timely information, and HEI welcomes your suggestions for improvement. Send your ideas to Annemoon van Erp (avanerp@healtheffects.org).

GRAPHICS BY ANNEMOON VAN ERP

Top 10 Report Downloads 2011–2013



HEI's 10 most-requested publications account for about 35,000 (roughly 35 percent) of the total number of times readers downloaded various documents from the Web site within the past three years.

Experts Review Diesel Epidemiology Studies

In March, more than 110 people attended HEI's workshop to discuss recent epidemiologic studies of the associations between occupational exposure to diesel exhaust and the risk of lung cancer and to evaluate the studies' utility for quantitative risk assessment. The meeting was part of HEI's ongoing Diesel Epidemiology Project (see *HEI Update*, Spring 2013 and Winter 2013–2014). 



Michael Attfield, National Institute for Occupational Safety and Health (retired); Roel Vermeulen, Utrecht University, the Netherlands; Patricia Stewart, National Cancer Institute (retired); and Debra Silverman, National Cancer Institute.



Front row, from left: Katherine Walker, HEI; Jonathan Levy, Boston University School of Public Health; Susan R. Woskie, University of Massachusetts–Lowell; and David Foster, University of Wisconsin–Madison and HEI Research Committee. Back row: Charles Poole, University of North Carolina Gillings School of Public Health, Chapel Hill; Nancy Reid, University of Toronto, Canada; Martie van Tongeren, Institute of Occupational Medicine, Edinburgh, Scotland; Paul Demers, Occupational Cancer Research Centre, Cancer Care Ontario, Toronto, Canada; Daniel Krewski, University of Ottawa, Canada; and Joel Kaufman, University of Washington School of Public Health, Seattle.



Daniel Krewski, University of Ottawa, Canada, and chair, HEI Diesel Epidemiology Panel.



Kevin Hedges, independent researcher, and Tim Wallington, Ford Motor Company.



Kenneth Crump, private consultant; Charles Ris, U.S. Environmental Protection Agency; and Eric Garshick, Harvard University.

PHOTOS BY PAUL SCHNAITACHER

SCHOOL BUSES (Continued from page 1)

Retrofitting buses with either or both of the aftertreatment devices substantially reduced tailpipe concentrations of ultrafine particles, black carbon, and fine particulate matter during idling. However, retrofitting did not reduce in-cabin levels of the measured pollutants during idling or driving. This finding indicates that external factors — in particular, ambient levels of pollutants, including emissions from nearby vehicles — were more important than the vehicle's self-pollution in influencing in-cabin concentrations. The use of a HEPA air purifier and air conditioner, however, did substantially decrease in-cabin levels of ultrafine particles

and $PM_{2.5}$ (particulate matter with an aerodynamic diameter $\leq 2.5 \mu m$).

The HEI Review Committee, in its independent review of the study, commented that the retrofit and idling tests provided useful information. However, it found that some results of in-cabin measurements were difficult to interpret because in-cabin measurements in the retrofit tests were not adjusted for the influence of ambient pollutant levels.

This study by Zhu and Zhang demonstrates that retrofit devices are effective in reducing tailpipe emissions of particulate matter. However, assessment of in-vehicle pollutant

levels, including the influence of outdoor pollutant concentrations, remains an important area of study. Additional studies are needed to estimate the relative contributions to air pollutant exposures of in-vehicle and other microenvironments, such as home, work, and school, in which children and adults spend most of their time. 

HEI Research Report 180 is available for downloading, free of charge, at <http://pubs.healtheffects.org>; printed copies can be purchased from HEI. For more information, contact Hanna Boogaard (jboogaard@healtheffects.org) or Geoffrey Sunshine (gsunshine@healtheffects.org).

A Conversation with Our Sponsors

In late February, HEI hosted a joint meeting of its Research Committee and sponsors, providing an opportunity for the institute to report on its ongoing work and future plans and for sponsors to discuss their questions and priorities for HEI's Draft Strategic Plan for 2015 through 2020 (now available at www.healtheffects.org). 

PHOTOS BY PAUL SCHNAITTACHER



Tim French, Engine Manufacturers Association.



Bryan Hubbell and Marion Hoyer, U.S. Environmental Protection Agency.



Stewart Holm, American Forest and Paper Association; James Swenberg, University of North Carolina-Chapel Hill and HEI Research Committee; and Uwe Heinrich, Hannover Medical School and Fraunhofer Institute for Toxicology and Experimental Medicine, Hanover, Germany, and HEI Research Committee.



Rashid Shaikh, HEI, and David Eaton, University of Washington-Seattle, and HEI Research Committee.



Susan Collet, Toyota Motor Engineering & Manufacturing.



Mel Peffers and Chad Bailey, U.S. Environmental Protection Agency.



Bruce Copley, ExxonMobil Biomedical Sciences, and Katherine Walker, HEI.



Dan Costa, U.S. Environmental Protection Agency.

Health Effects Institute

101 Federal Street, Suite 500
Boston, MA 02110-1817, USA
Phone: +1-617-488-2300
Fax: +1-617-488-2335
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 Web site.

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Barbara Gale, *Director of Publications*
Hope Green, *Editor*
Annemoon M.M. van Erp, *Webmaster*
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101 Federal Street, Suite 500
Boston, MA 02110-1817

Walter A. Rosenblith New Investigator Award Announced

Nga Lee (Sally) Ng, assistant professor in the School of Chemical and Biomolecular Engineering at the Georgia Institute of Technology in Atlanta, has been selected as the recipient of HEI's 2013 Walter A. Rosenblith New Investigator Award. Named for the first chair of the HEI Research Committee, the award supports the work of a promising scientist early in his or her career.

Ng received a Ph.D. in chemical engineering in 2007 from the California Institute of Technology in Pasadena. In 2010 her thesis work earned her a share of the American Association for Aerosol Research's prestigious Sheldon K. Friedlander Award, which honors the most outstanding Ph.D. thesis in aerosol science of the previous three years. After working at Aerodyne Research in Billerica, Massachusetts, she joined the faculty at Georgia Tech in 2011. Ng's prior and current work focuses on secondary organic aerosols, which are formed by the reactions of compounds in the atmosphere. For her Rosenblith Award project, she will characterize in detail the components of particulate matter, specifically those of secondary organic aerosols generated under defined conditions in smog chambers, and will also characterize the components of aerosols sampled at an urban site in different seasons. She will evaluate the oxidative properties of the components in multiple in vitro systems.



Nga Lee (Sally) Ng.
GEORGIA INSTITUTE OF TECHNOLOGY

In selecting recipients for the Rosenblith Award, the Research Committee considers each applicant's potential for a productive scientific career in air pollution and health research, the support provided by the applicant's institution, and the scientific merit of the research project and its relevance to HEI's mission. The committee thought that Ng's proposed focus on realistic models of atmospheric particles, characterized with advanced instrumentation designed for long-term field deployment, was likely to be useful for future epidemiologic studies. The committee also felt that Ng was in an excellent environment to conduct the study and had the potential to contribute substantially to the interface between atmospheric chemistry and health effects research.

Ng is the 19th scientist to receive the Rosenblith Award since the inception of the program in 1999 (see the list of awardees at www.healtheffects.org/rosenblith.htm). 