

# HEI Energy Research Program

## Introduction to the Energy Research Committee and the Program

George Hornberger, Chair, HEI Energy Research Committee  
Vanderbilt University  
Director of Vanderbilt Institute for Energy & Environment

HEI Annual Conference  
Chicago, IL, May 1, 2018



# Summary of Presentation

---

- Overview of the Energy Research Program
- Governance and the Energy Research Committee
- Vision for a Multi-Year Research Program
- Focus on Year 1: Literature Review and Research Planning
- Next Steps

# Overview of the Energy Research Program

---

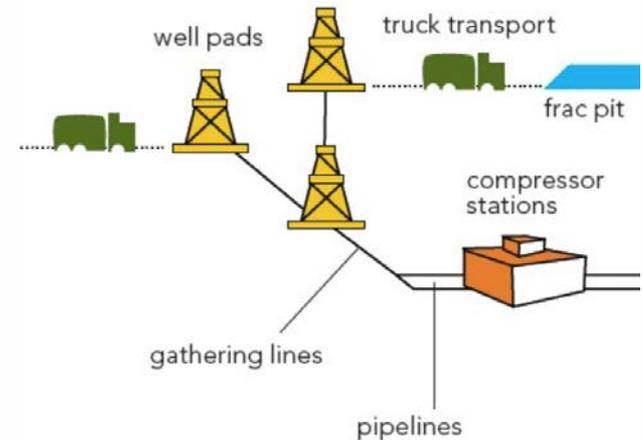
- **Why a new research program?** Fill knowledge gaps left by past and ongoing research about potential population exposures and health effects from unconventional oil and natural gas development (UOGD) across the United States
- **Approach:** The same one HEI has used for 35 years to answer questions about air quality and health
- **Products:** High-quality, impartial literature reviews and original research - all relevant to policy decisions
- **Beneficiaries:** Government officials, communities, industry, NGOs, and others who can use the research to inform policy development



# Unconventional Oil and Gas Development (UOGD) Defined

## Includes:

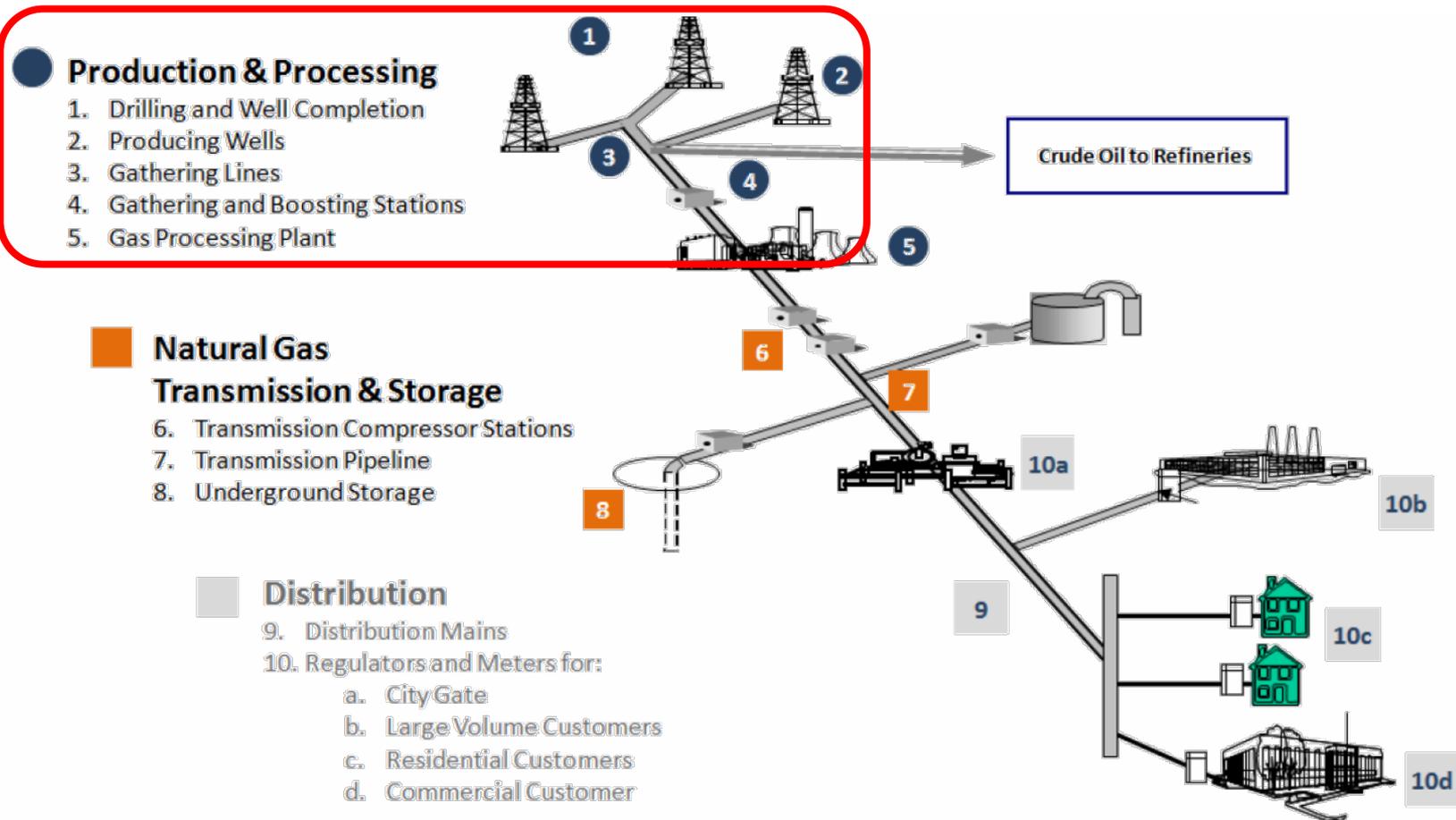
- **DEVELOPMENT:** exploration, site prep, drilling, well completion and multistage hydraulic fracturing, and management of wastes
- **PRODUCTION:** extraction and processing of hydrocarbons; gathering and compression of gas; management of wastes; and construction and operation of field production facilities
- **POST-PRODUCTION:** well closure and site reclamation



## Excludes:

- Distribution networks used to transport oil or gas outside of the production area
- Development from conventional and coalbed methane
- End uses of oil and natural gas
- Potential global climate-change impacts

# Schematic of Oil and Gas Operations



Source: Adapted from American Gas Association and EPA Natural Gas STAR Program



# Governance of the Program

---

- Modeled directly after the one HEI has used for 35 years to answer questions about air quality and health
- Key elements:
  - Energy Research Committee oversees impartial, policy-relevant literature reviews, research planning, and original research
  - An Energy Advisory Committee provides expert guidance to the Research Committee
  - All work is conceived, implemented, and peer-reviewed independently from sponsors of the research program
  - HEI effectively engages and shares data (all + and – results) with stakeholders



# The Energy Research Committee

---



***George M. Hornberger, Chair***

Director, Vanderbilt Institute for Energy & Environment, Nashville, Tennessee



***Howard Hu***

University of Toronto, Ontario, Canada



***Shari Dunn-Norman***

Missouri University of Science and Technology, Rolla, Missouri



***Judy S. LaKind***

LaKind Associates, LLC, Catonsville, Maryland, and Adjunct Faculty, University of Maryland–Baltimore



***Elaine M. Faustman***

University of Washington–Seattle



***Armistead (Ted) G. Russell***

Georgia Institute of Technology, Atlanta



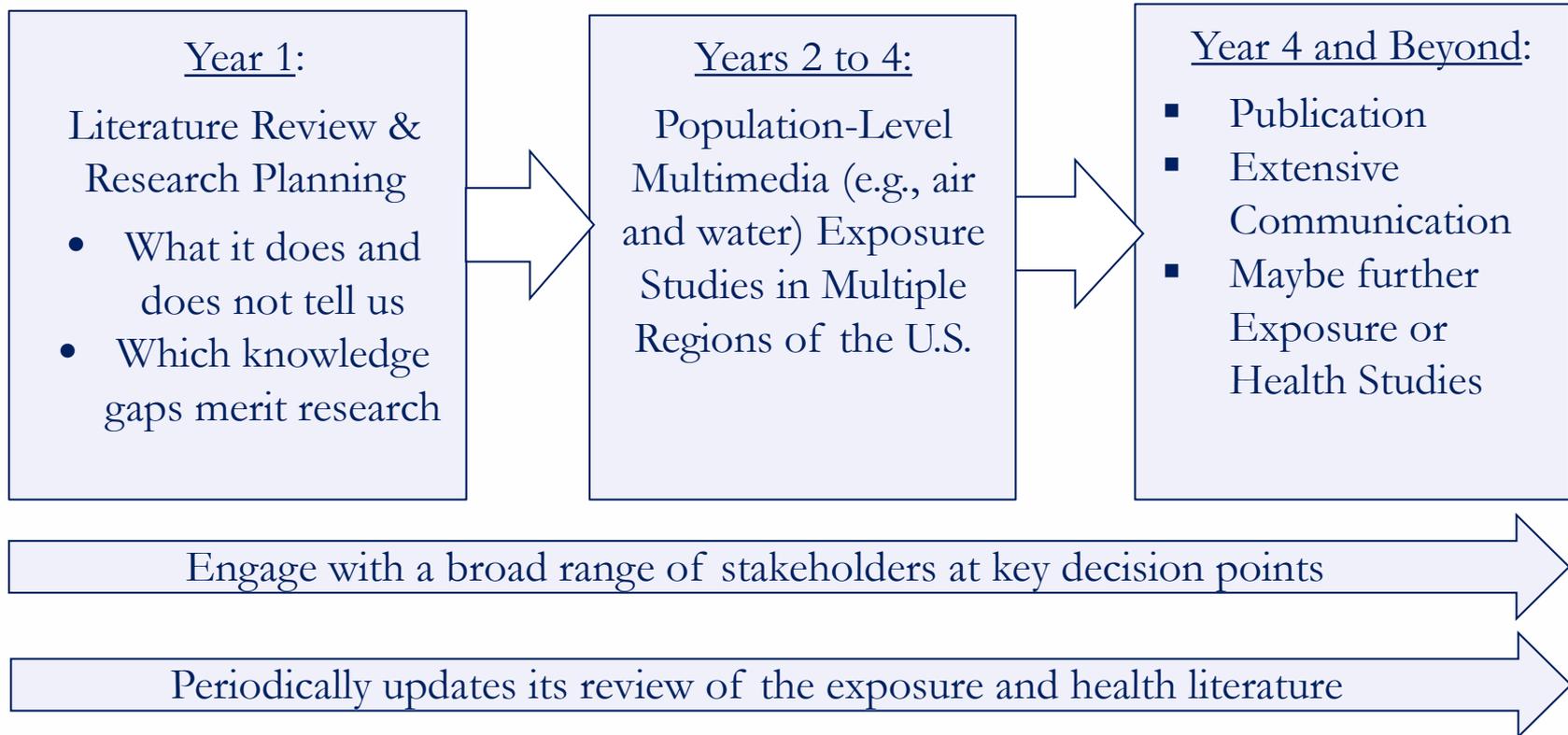
***Stefanie Ebelt Sarnat***

Emory University, Atlanta, Georgia



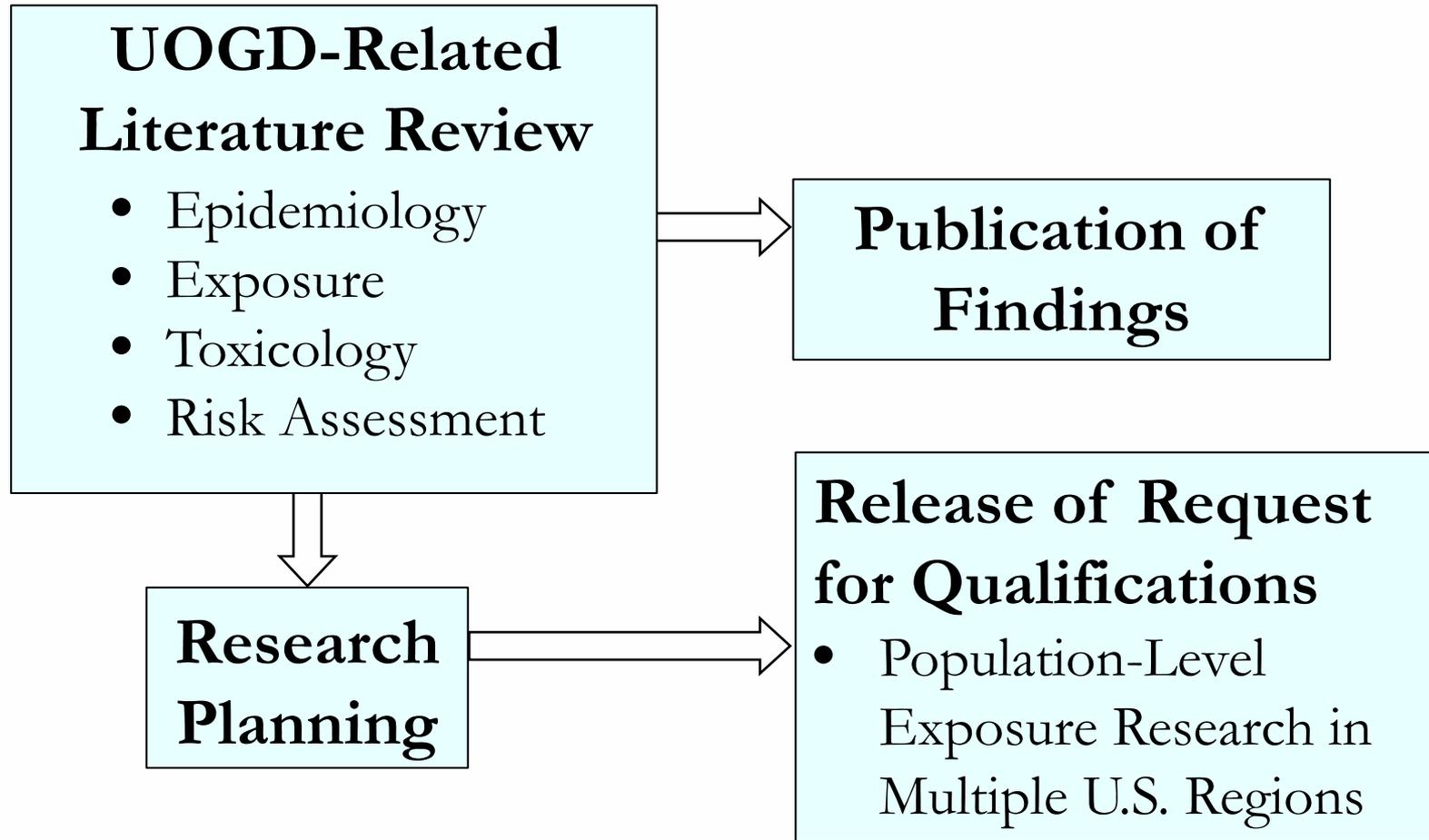
# Vision for a Multi-Year Research Program

---



# Year 1 Tasks and Products

---



# Ongoing Systematic Review of Human Health Literature

---



## Stakeholder Involvement

- January 2018 Scoping Meeting
- 55 participants; HEI Committee and a wide range of experts and stakeholders



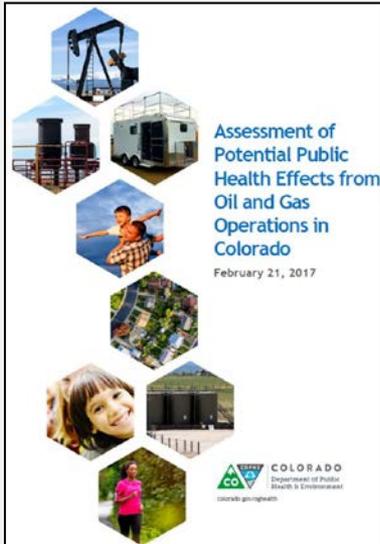
## Systematic Approach

- Modeled after the systematic review process developed by the National Toxicology Program (NTP) Office of Health Assessment and Translation (OHAT)
- Includes explicit quality criteria applied uniformly to all studies



For more information: <https://www.healtheffects.org/meeting/scoping-meeting-human-health-study-critique>

# Review of Exposure Literature: *What does it tell us about potential UOGD Effects on Air Quality?*



February  
2017

“Exposure and health effect studies do not indicate the need for immediate public health action, but do indicate the need for more detailed exposure monitoring and systematic analyses of health effects of residents living near oil and gas operations.”

**ENVIRONMENTAL**  
Science & Technology

Cite This: *Environ. Sci. Technol.* 2018, 52, 4514–4525

Policy Analysis  
pubs.acs.org/est

## Ambient Nonmethane Hydrocarbon Levels Along Colorado's Northern Front Range: Acute and Chronic Health Risks

Lisa M. McKenzie,<sup>\*,†</sup> Benjamin Blair,<sup>†</sup> John Hughes,<sup>‡</sup> William B. Allshouse,<sup>†</sup> Nicola J. Blake,<sup>§</sup> Detlev Helmig,<sup>||</sup> Pam Milmo,<sup>⊥</sup> Hannah Halliday,<sup>¶</sup> Donald R. Blake,<sup>§</sup> and John L. Adgate<sup>†</sup>

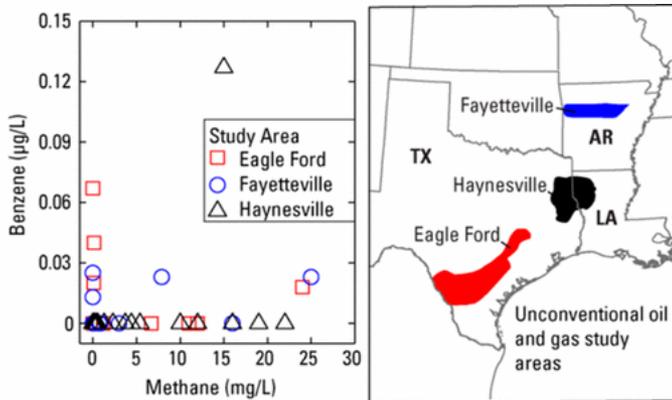
March  
2018

“This study provides further evidence that populations living nearest to O&G [oil and gas] facilities bear the greatest risk of acute and chronic health risk from exposures to NMHC [nonmethane hydrocarbon] air pollutants emitted from upstream O&G facilities.”

# Review of Exposure Literature: *What does it tell us about potential UOGD Effects on Water Quality?*

## Methane and Benzene in Drinking-Water Wells Overlying the Eagle Ford, Fayetteville, and Haynesville Shale Hydrocarbon Production Areas

Peter B. McMahon<sup>†\*</sup>, Jeannie R.B. Barlow<sup>‡</sup>, Mark A. Engle<sup>§</sup>, Kenneth Belitz<sup>‡</sup>, Patricia B. Ging<sup>‡</sup>, Andrew G. Hunt<sup>‡</sup>, Bryant C. Jurgens<sup>¶</sup>, Yousif K. Kharaka<sup>‡</sup>, Roland W. Tollett<sup>‡</sup>, and Timothy M. Kresse<sup>§</sup>



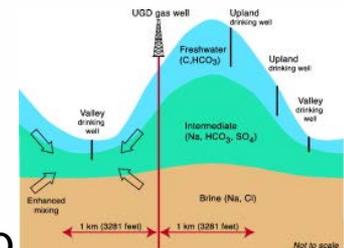
UOG operations did not contribute substantial amounts of methane or benzene to the sampled drinking-water wells. However, ...decades or longer may be needed to fully assess the effects.

## Association of groundwater constituents with topography and distance to unconventional gas wells in NE Pennsylvania

Beizhan Yan<sup>a,\*,</sup>, Martin Stute<sup>a, b,</sup>, Reynold A. Panettieri Jr.<sup>c,</sup> James Ross<sup>a,</sup> Brian Mailloux<sup>b,</sup> Matthew J. Neidell<sup>d,</sup> Lissa Soares<sup>b,</sup> Marilyn Howarth<sup>e,</sup> Xinhua Liu<sup>f,</sup> Pouné Saberi<sup>e,</sup> Steven N. Chillrud<sup>a</sup>

Jan, 2017

The association of these constituents in valley groundwater with distance is observed for the first time using a large industry dataset. The increase may be caused by enhanced mixing of shallow and deep groundwater in valley, possibly triggered by UGD process.



# Next Steps with Technical Work

---

- Completion of the Energy Research Committee's review of the human health literature, scheduled for release in Summer 2018 after undergoing peer review
- Beginning review of the exposure, toxicology, and risk assessment literature
- Findings and recommendations from the human health literature review will be discussed along with exposure, toxicity, and risk literature at the Committee's first of two *Exposure and Risk Screening Workshops* in July 2018
- Workshops provide an opportunity for the Committee to hear from a broad range of knowledgeable stakeholders about the literature and their research priorities



**Thank you**

