

**THE POTENTIAL IMPACTS OF 21ST
CENTURY OIL AND GAS DEVELOPMENT
IN THE APPALACHIAN BASIN:
First Steps Toward a Strategic Research Plan**

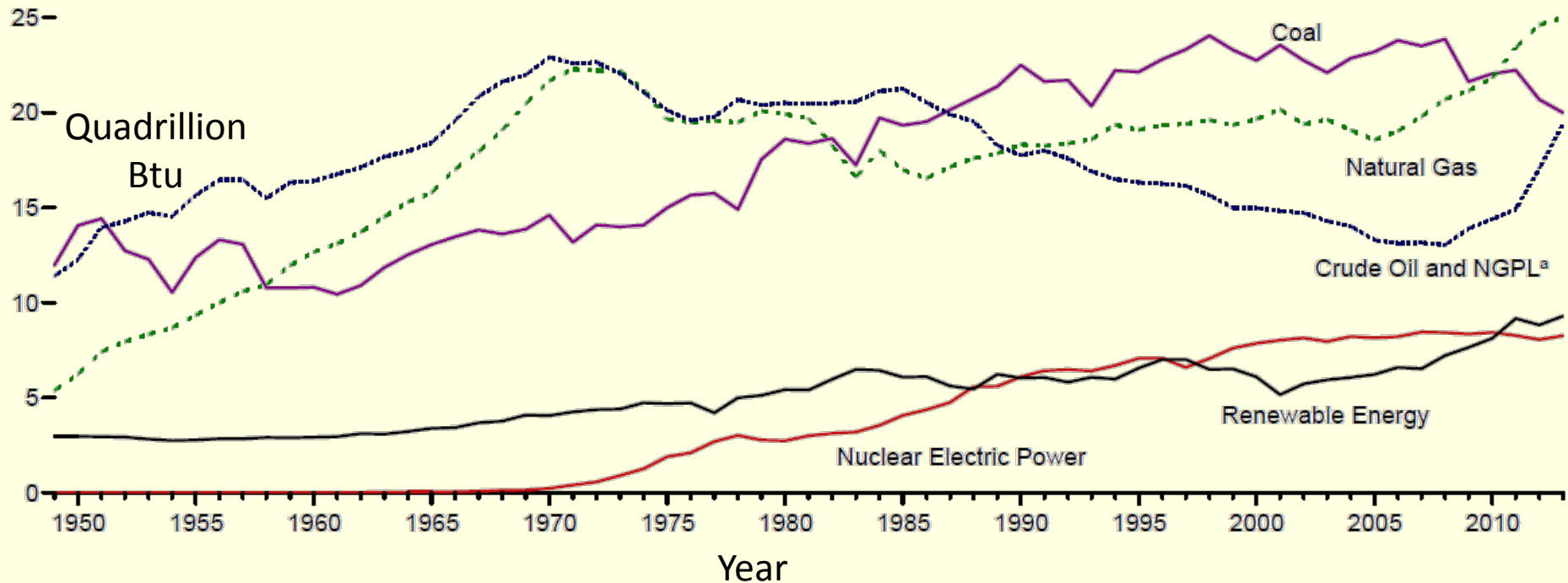
DRAFT

**By the Special Scientific Committee on Unconventional
Oil and Gas Development in the Appalachian Basin
December 2014**

Available at HEI's website:

[http://www.healtheffects.org/
UOGD/UOGD.htm](http://www.healtheffects.org/UOGD/UOGD.htm)

ENERGY PRODUCTION BY SOURCE (1949 TO 2013)



^a Natural Gas Plant Liquids

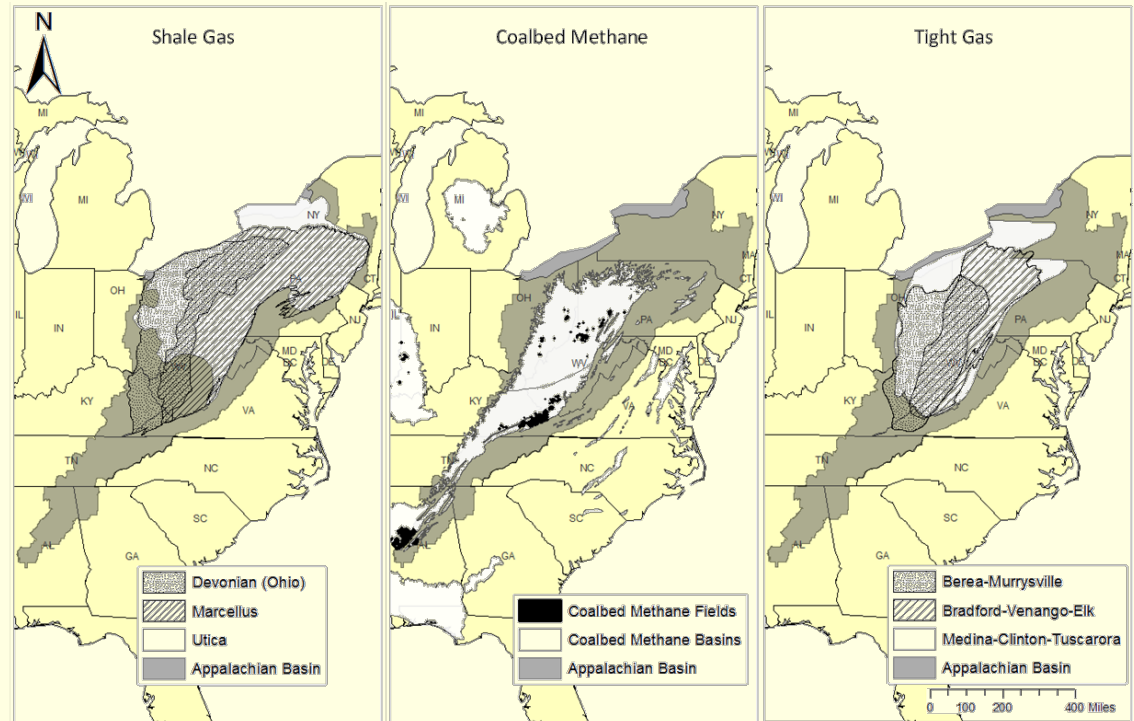
STRATEGIC SCIENTIFIC RESEARCH PLAN

Why? To guide future research to improve understanding of potential adverse impacts of 21st century oil and gas development in the Appalachian Basin.

Research on what types of adverse impacts?

Environmental
Ecological
Human health
Social-community

All research options remain on the table
The committee wants to hear your priorities



Extent of oil and gas resources in the Appalachian Basin (in gray). : (Left) shale plays (i.e., accumulations of shale gas) (data from 2011), (Middle) coalbed methane fields and basins (data from 2006, 2007 respectively), and (Right) tight gas plays (data from 2010). Source of data: US Energy Administration (U.S. Energy Information Administration 2014, http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/maps/maps.htm).

OVERVIEW OF THE DRAFT INTERIM REPORT

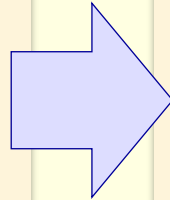
- Overview of Committee's work
- Scope of review and approach
- Summary of potential adverse impacts at the local and regional levels
- Summary of research recommendations from the literature
- Next steps toward development of the Research Plan



SCOPE OF THE COMMITTEE'S REVIEW

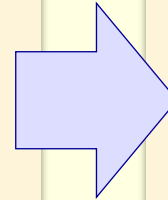
21st Century Oil and Gas Development

- Exploration
- Well site preparation and construction
- Drilling
- Hydraulic fracturing
- Well completion
- Production
- Oil and gas processing (on-site and off-site)
- Roadway and gathering pipeline construction
- Product distribution
- Waste generation and management
- Well closure and site reclamation



Stressors

- Changes in quality of environmental media (e.g., air, groundwater, surface water, soil, sediment, food)
- Chemical and radiological releases to the environment
- Consumptive water use
- Land development
- Seismic activity
- Economic change
- Increased truck traffic
- Waste management (characterization, storage, tracking, treatment, and disposal)
- Light, noise and odor
- Accidents (e.g., spills, leaks, explosions, failed well casing)



Potential Impacts

- Reduced quality of environmental media (e.g., air, groundwater, surface water, soil, sediment, food)
- Water scarcity
- Landscape disruption and habitat fragmentation
- Seismic damage
- Safety hazards (e.g., gas explosions, traffic accidents, workplace hazards)
- Damage to community characteristics (e.g., loss of cultural heritage, connection to land, and aesthetics; changing social norms; community conflict)
- Reduced community infrastructure capacity (e.g., transportation, schools, hospitals)
- Economic stress (e.g., reduced property values)
- Public health concerns (e.g., ineffective waste management, STDs from community change)
- Stress (e.g., from noise, light, odor, split estates, reduced sense of well-being)

APPROACH TO REVIEW OF POTENTIAL IMPACTS

- Reviewed hundreds of reports and journal articles (over 800 papers in the Committee's database)
- Participated in tours of oil and gas operations
- Consulted experts in local geology, hydraulic fracturing, and other aspects of oil and gas development via webinars
- Conducted workshops to seek guidance from a broad range of interested parties in the Appalachian region



SUMMARY OF POTENTIAL IMPACTS

- Brief distillation of an enormous literature regarding:
 - Environmental stressors (organized by stage of oil and gas development and production), and ecologic, human health , and social-community impacts
- For more detailed information, see:
 - Working papers prepared by individual committee members will be posted in early 2015
 - Bibliography (Appendix C in draft report)



SOME NOTES ON THE LITERATURE REGARDING POTENTIAL IMPACTS

- Much is focused on potential impacts related to:
 - Air quality
 - Water quality
 - Induced seismicity
 - Habitat loss and fragmentation
 - Human exposure to and risk from various potential health stressors (e.g., chemicals and proppants used in hydraulic fracturing)
 - Social changes in local communities
- Includes more discussion of potential impacts related to the development phase than the longer production and post-production phases.
- Limited peer-reviewed information and data that define past or ongoing ecologic and human exposures from oil and gas-related activities; this information is important for understanding the potential for health risks
- Even more uncertainty about future potential impacts that are influenced by expected – but not well understood - variability in geology, industry practice, and regulatory environments.

What is next?

Timeline

June 2014



December 2014



Late Spring 2015



Mid-2015

Committee Work

Gather information about potential impacts



Release Draft Interim Report



Prepare and release Draft Strategic Research Plan (subject to peer review)



Release Final Strategic Research Plan

Public Workshops

Workshop #1:

Experts and stakeholders share opinions about potential impacts and research needs



Workshop #2:

Experts and stakeholders share opinions about research needs and criteria for prioritizing them;
Review Draft Interim Report



Workshop #3:

Review Draft Strategic Research Plan

What we ask of you today and over the coming weeks...

- The Committee looks forward to hearing from you by January 5, 2015, so that they can review your recommendations as they develop the Research Plan
- Please send recommendations and any other inquiries to: dvorhees@healtheffects.org, or call 617-488-2317