

Changing Communities Working Group White Paper

Introduction

The exploration and extraction of natural gas from unconventional sources, including the Marcellus and Utica formations, have expanded rapidly in the last 5 years in Pennsylvania. Other states – Ohio, West Virginia, Maryland – are emerging areas, and New York likely will complete their regulatory review and allow the use of hydraulic fracturing within the next 1-2 years. The emergence of this industrial activity has raised critical questions related to social, economic, and health impacts of such activity. While research projects are underway in specific areas of the region to address these questions, there is no comprehensive approach to monitoring and assessing these impacts over time. How can researchers collaborate such that we can effectively build a comprehensive, valid picture of impacts across the region?

The goal of the Working Group discussion at the conference will be to develop networks for collaboration and coordination of research activities such that existing and future efforts can be integrated to develop a comprehensive picture of social, economic, and health impacts of unconventional natural gas development in the region. We believe that there is more to be gained by working in concert than we can accomplish working in isolation.

Toward this end, the discussion at the conference will focus on the following issues:

- mapping of current research activity and interests both conceptually and geographically;
- developing a vision for an integrated, comprehensive research design;
- identifying how our unique expertise areas and relationships can inform and build this vision through interdisciplinary collaboration; and
- developing a set of working principles related to how we conduct our research to ensure coordinated research activities and ethical conduct of research.

To delve further into this topic, we outline below what we believe are the critical research areas and questions that need to be examined. These topics, along with the operational goals outlined above, will inform the agenda for our time together at the conference, and form a basis to build teams and networks to enable future collaboration.

Research issues and questions

Issue 1: Identifying and measuring impacts. One of the critical questions in documenting social, economic, and health impacts of Marcellus activity will be identifying valid and reliable measures of those impacts. Previous literature has focused on a number of indicators, such as crime rates, public health statistics, jobs, business starts, community satisfaction, etc. To what extent are these appropriate indicators? Can we identify the critical indicators for each stage of development? Relatedly, can we come to some understanding of the suite of appropriate research designs and data collection techniques that will allow comparisons across research projects?

Key questions related to this issue:

- Can we develop consistent measures/indicators that can be used across studies, locations, and time? How do we test them for validity and reliability?
- What are appropriate ways to measure these indicators? Can we develop monitoring systems to regularly measure these impacts?
- How do we understand the interconnections across social, economic, and health systems? How do we ensure that the measures we choose will be sensitive to the interconnections and interrelationships among these factors?
- What are effective indicators and research techniques to ensure validity across spatial location within the region and be sensitive to geographic, historical, cultural, political, and economic differences across the region?
- What are indicators and research techniques that can be used across time?
- Can we come to some level of agreement about these indicators and research techniques and share data sources to facilitate comparison and analysis across projects?

Issue 2: Attributing causality to Marcellus-related activity

- How do we collectively understand, develop, and employ appropriate methodologies and techniques to identify impacts and attribute those impacts to natural gas development? Much of the research conducted to date has been associational in nature. How do we move toward establishing causality? Do we have the baseline and time-series data we need to establish causality?
- What are effective combinations of research methods, such as combined qualitative and quantitative techniques, to work toward establishing causality?
- What are appropriate measures and methods for documenting the ways in which impacts are distributed differentially across populations? How do we ensure that the measures/indicators we choose will be sensitive to critical differences among individuals and groups, such as geographic location, economic status, exposure to potential pollutants, and levels of social stress?
- What epidemiological methods do we need to effectively document the factors that can affect health, particularly level, frequency, and duration of exposure, types of pollutants, and media of transport? How do we build the interdisciplinary relationships to conduct this kind of research?

Issue 3: Identifying drivers of impacts. It is vital to understand drivers of differential types and levels of impacts on social, economic, and health characteristics of individuals and communities experiencing Marcellus-related development. Because of the large geographic region affected by unconventional natural gas development in the Appalachian Basin, we have the opportunity to take advantage of the variability in a number of key influences on impacts felt across this space. We focus on three sets of drivers that we feel need concerted research effort to understand how these drivers influence the types of impacts felt.

- What are the organizational structures, cultures, and technical considerations within the multifaceted energy industry that affect the ways in which development occurs, and relatedly, the levels and types of impacts in different regions where these companies work? What are the

economic and political imperatives that drive decision-making by energy companies? What are the organizational rules and procedures, and how do these vary by type of energy-related company? How are sub-contractor relationships structured and enforced, and to what extent do these vary across energy companies? How do human resource policies affect the ways in which work 'gets done' on specific work sites and cumulatively across work sites? Can we then describe how these factors affect the level and types of impacts across places?

- How do existing characteristics of places (such as population and demographic characteristics, local social and economic history, geographic location, and community structure and capacity) influence the ways in which development occurs?
- What are the governance structures (including federal, state, and local policies and regulatory systems) that influence how development occurs in a place, and how that development relates to social, economic, and health impacts? How will regulatory changes, such as Pennsylvania's Act 13, influence the types and levels of impacts felt in affected regions?

Issue 4: Institutional actions to manage impacts. An important issue that is likely to influence the type and degree of impacts felt in particular places will be how social institutions, organizations, and local governments manage the impacts of unconventional natural gas development.

- Recognizing critical differences in mission, stakeholders, and authority across institutions, are there common techniques that those involved in these institutions use effectively to forecast, plan for, and mitigate negative impacts? Are there similar patterns related to how these institutions react to and take advantage of opportunities associated with development?
- What impact do important structures, such as taxing authority, funding structures, and oversight systems, have on the ways in which institutions manage the effects of Marcellus Shale development?

Issue 5: Public engagement and citizen voice in decision-making. A critical issue that has arisen is the role and impact of the public in decision-making related to Marcellus Shale development.

- What are effective techniques for engaging the public around controversial issues such as Marcellus Shale development? Can we create and assess civic engagement models that would enhance citizen voice within public decision-making? What impacts do these kinds of engagement techniques have on policy and decision-making at the local, state, and federal levels?
- Are the key structural differences among individuals or groups of individuals that influence the level of 'voice' they have in the public policy-making context? How do we effectively increase the skills of citizens to engage on controversial issues and public policy-making?
- Do we have a good understanding of the collective action related to Marcellus Shale? What mobilization processes have occurred that allowed the formation of anti-drilling organizations? To what extent can this be considered a social movement? What has been the relative influence of local and non-local organizations in the mobilization? What symbols and frames have been used to mobilize around Marcellus Shale? What kinds of impacts have individual organizations and collective anti-drilling efforts had on regulatory or other policy changes? Similarly, what

kinds of collective action have occurred among the sets of businesses and firms associated with Marcellus Shale development? What influence have the Marcellus Shale Coalition and related organizations had at the federal, state, and local level? What influence have collective actions had on business practices and exploration and extraction methods and techniques?

Issue 6: Science in controversial issues and public decision-making. The highly technical nature of the activities surrounding development of the Marcellus shale lead to the need for engaging citizens with a range of scientific and engineering disciplines. This convergence has led to a number of issues that need further investigation, including:

- What are the relative levels of influence of scientific knowledge and other ways of knowing, including local knowledge, in public discourse and policy-making? How can scientists effectively engage in public discussions that incorporate emotions and values alongside the science?
- How do scientists and the public sort through the sometimes contradictory scientific findings? How do scientists and other institutions (such as the media) bring scientific findings to the public, and how effective are these approaches?
- How do scientists effectively communicate about issues such as uncertainty, risk, probability, and other concepts that form the basis of scientific methods and practices? How do we develop appropriate interdisciplinary research designs and techniques to effectively research these issues?
- How do scientists do their work related to controversial issues such as Marcellus Shale? What factors influence how they do their work, such as university and institutional regulations, disciplinary approaches, funding, and scientists' experiences and values?

Changing Communities Working Group Agenda

May 30

1:30 Provide background, discuss our purpose, and review/amend agenda

1:45 Introductions and mapping activity

- Name and institution
- Current or future research on social, economic and/or health impacts of Marcellus
- Geographic location and scale of current or future research activity

3:00 Discussion

- Where are points of intersection? (topics, scale, geography, expertise, methods, indicators ??)
- To what extent can we use this to build a comprehensive vision, research plan? Do we want to? What would this look like? Are there expertise areas not represented that would be needed?
- Are there logical components of this larger vision that could be separated into individual efforts? Can we build teams around those efforts?
- What would it mean to effectively work in concert with each other? What kind of system would be needed to facilitate this kind of effort? How do we put this kind of system in place?

5:00 adjourn

May 31

8:30-11:30

8:30 Reconvene, form groups around topics identified previous day

8:45 Group discussions

- Outline research questions, goals
- Discuss potential research designs
- What additional expertise is needed on these teams?
- What would it take to accomplish these projects? Are there short-term goals (i.e., white papers, workshops) that can be pursued now? Funding opportunities?
- What kind of plans would help facilitate continued discussion?

10:15 Reconvene, groups report out

11:00 next steps

- Pursue funding opportunities?
- How to facilitate continued dialogue? Future working meetings, workshops?
- Who else needs to be invited to these groups/discussions?