

## Interstate Variation in the Extent of “Fracking” for Natural Gas: Insights from Public Opinion Research



**Michelle Lee**  
Ph.D. Student

School of Public and Environmental Affairs,  
michllhw@uemail.iu.edu



**Olga Schenk**

Visiting Postdoctoral Scholar  
School of Public and Environmental Affairs,  
oschenk@indiana.edu



**John D. Graham**  
Dean

School of Public and Environmental Affairs  
grahamjd@Indiana.edu

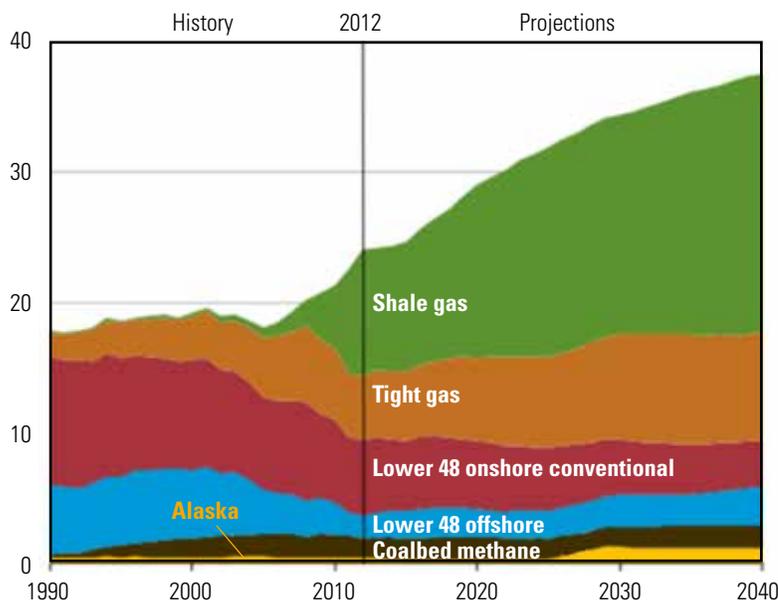
### Introduction

SPEA’s Shale Gas Research Group is an interdisciplinary team consisting of faculty, graduate students, and staff who are exploring key questions concerning the future of unconventional gas development (UGD) in the United States and abroad. One puzzle we seek to solve is why some states in the U.S. have robust development efforts, while others have imposed official or de facto moratoria on the practice. In this issue of *SPEA Insights*, we address whether public opinion may explain some of these interstate differences.

We use the term UGD to refer to the application of two key technologies in natural gas production: high-volume, high-pressure hydraulic stimulation coupled with horizontal drilling. Historically, the term “fracking” has been used in the oil and gas industry in reference to the injection of water, chemicals, and sand into reservoirs to keep fractures open, but more recently, the term has taken on a broader meaning, encompassing the entire suite of processes associated with the development of gas from shale. Thus, we use the terms “UGD” and “fracking” interchangeably in this issue.

As seen in Figure 1, UGD has resulted in an unexpected reversal in the decline in U.S. natural gas production that began in 2000. In 2012, shale gas accounted for 9.7 trillion

**Figure 1: U.S. Natural Gas Production by Source, 1990-2040 (trillion cubic feet)<sup>1</sup>**



<sup>1</sup> EIA. 2014. “Annual Energy Outlook 2014 with Projections to 2040,” available online at: [www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf) (last accessed 30 August, 2014).

cubic feet (TCF) or 40% of total U.S. natural gas production. The U.S. Energy Information Administration projects that almost all of the increase in domestically produced natural gas from 2013 to 2040 will be generated by UGD.

Public acceptance of fracking in the U.S. has not been a straightforward process. Findings from the risk-perception literature suggest that the characteristics of UGD fuel risk perceptions, perhaps leading to stigmatization of this emerging technology.<sup>2</sup>

There have been significant resources devoted to study the extent of the U.S. public's knowledge, attitudes, and perceptions of fracking. We counted at least 59 surveys conducted between 2010 and 2014, some national in scope, but most focused on specific states or regions. The results from these surveys are difficult to compare because they were undertaken at different times and utilized different questions to explore awareness, knowledge, perceptions, and attitudes.

In this issue of *SPEA Insights*, we present initial results from a recent six-state survey that measured public awareness, knowledge and attitudes towards fracking. Our study builds on prior research but is unique in several important ways – two of which we highlight here. First, it is a study of six states that are geologically promising for UGD but are mixed in their level of current shale gas output. Our design also includes oversamples of residents in counties where fracking operations are underway or are considered promising. With this rich targeted multi-state sample, we seek to determine whether public opinion differs in states with robust programs of UGD compared to states that are not yet permitting fracking operations.

## Research Design and Methods

A total of 2,833 adult residents from New York, Illinois, California, Ohio, Pennsylvania, and Texas took part in the online survey, which was carried out by the GfK Group from June 3<sup>rd</sup> to July 2<sup>nd</sup>, 2014. These six states were chosen for study because, although all six states are geologically promising, three have high and/or growing production (Ohio, Pennsylvania, and Texas) and three (New York, Illinois, and California) have little or no UGD due to official or de facto moratoria. The composition of respondents by state is 478, 508, 458, 457, 476, and 456, respectively. Together, the three pro-production states (Ohio, Pennsylvania, and Texas) accounted for over 5.7 TCF, or 55.5%, of U.S. gross natural gas withdrawals from shale gas in 2012.<sup>3</sup> Production levels are increasing in all three states.

<sup>2</sup> J. Graham, J. Rupp, and O. Schenk. 2014. "Unconventional Gas Development in the USA: Exploring the Risk Perception Issues." Conference Paper, Harvard School of Public Health, Harvard Center for Risk Analysis.

<sup>3</sup> EIA. 2014. "Natural Gas Gross Withdrawals and Production. Gross Withdrawals from Shale Gas Wells," available online at: [www.eia.gov/dnav/ng/ng\\_prod\\_sum\\_a\\_EPG0\\_FGS\\_mmcf\\_a.htm](http://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGS_mmcf_a.htm) (last accessed on September 3, 2014).

Respondents were sampled from GfK's KnowledgePanel©, which is a probability-based panel that includes both respondents with and without Internet access and provides nearly complete coverage of the population. Among sampled panel members, the completion rate was 54%. Results presented here have been weighted to reflect Current Population Survey estimates of each state's population on key demographic characteristics.

Respondents were asked a total of 81 questions, though many of the questions were straightforward. The median time to complete the survey was 15 minutes. Questions addressed a respondent's awareness, knowledge, and attitudes about UGD. In our survey, we used the term "fracking" because of its familiarity to the general public. A copy of the survey instrument is available from the authors upon request.

## Awareness

The general Yes/No question, "Before this survey, had you ever heard or seen anything about fracking?" sought to determine respondents' awareness of fracking, prior to a short introduction and a visual of the process that were introduced later in the survey.

Responses to the awareness question varied. Nearly seven out of 10 respondents (68.6%) said "Yes," with a between-state spread of 24.8 percentage points. Pennsylvania respondents – a state with high levels of UGD – disclosed a high level of awareness (82.0%). California and Illinois, with little to no current UGD activities, showed the lowest awareness (57.3% and 60.1%, respectively). However, respondents from New York State have moderate levels of awareness (71.1%) relative to the other states, while in Texas, the leading state in UGD, only 65.6% of respondents were aware of UGD. This suggests that gas-production levels at the state level are not necessarily a good indicator of public awareness.

Comparing our Pennsylvania results to those from surveys conducted by the Mercyhurst Center for Applied Politics, we found that the level of awareness of fracking in Pennsylvania has increased from 70% in 2011 and 74% in 2013 to 82% in 2014.<sup>4</sup> Similarly, comparing our Ohio results to that of a survey conducted by Quinnipiac University in January 2012 shows that awareness of fracking increased from 59% to 76% in under two and a half years.<sup>5</sup> New York also showed increasing awareness from surveys conducted

<sup>4</sup> The Mercyhurst Center for Applied Politics. 2011. "State of the Economy and the Impact of Gas Extraction from the Marcellus Shale Formation," available online at [www.mercyhurst.edu/sites/default/files/uploads/08/04/2014%20-%2008\\_45/Fall%202013%20Economy%20and%20Shale.pdf](http://www.mercyhurst.edu/sites/default/files/uploads/08/04/2014%20-%2008_45/Fall%202013%20Economy%20and%20Shale.pdf) (last accessed on September 7, 2014).

<sup>5</sup> Quinnipiac University Polling Institute. 2012. "January 19, 2012- Ohio Voters Divided on Fetal Heartbeat Bill, Quinnipiac University Poll Finds; Voters Say 3-1 Stop Hydro-Fracking Until More Study," available online at [www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/ohio/release-detail?ReleaseID=1692](http://www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/ohio/release-detail?ReleaseID=1692) (last accessed 09/09/2014).

in August 2011 (57% awareness) and April 2013 (69%) to June 2014 (71%).<sup>6</sup> See Figure 2.

## Knowledge

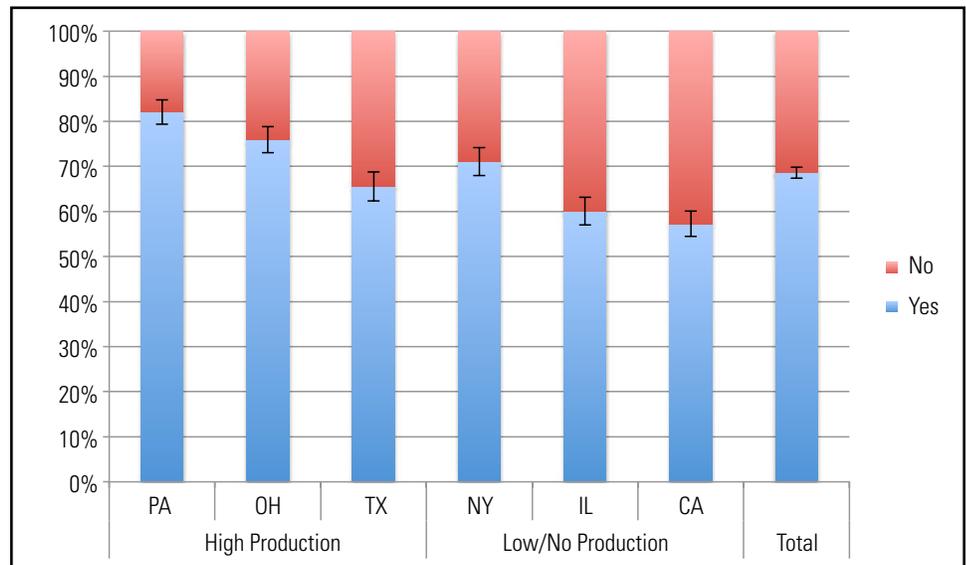
Several basic statements about the process of fracking were posed to respondents who reported that they had heard or seen information about fracking before our survey. Knowledge here is operationalized as the percent of correct answers for three true-false factual statements. If respondents were not sure of the answer, they were encouraged to provide their best guess. A small number of participants did not answer (<1% for each question) and they were excluded from the analysis.

The first item stated, “Fracking is a technique used to extract coal from below the earth’s surface” (Q14). Of those respondents who had heard of fracking prior to our survey, most (78.5%) answered correctly (“False”), indicating that they knew that the practice is not used for coal production (see Figure 3). Pennsylvania had the highest percentage of correct answers (85.1%), while Illinois had the lowest percentage of respondents who answered the question correctly (68.0%). There were statistically significant differences across states.

The next item, “Fracking operations are typically conducted thousands of feet below the earth’s surface” (Q15), shed light on whether respondents knew the actual depths at which fracking operations are typically conducted. The overall percent that answered the question correctly (“True”) was 73.4%. Again, Pennsylvania had the highest percent of correct answers (76.5%) while Illinois had the lowest (69.6%), but the interstate differences were not statistically significant.

The third item tested respondent’s knowledge on whether fracking operations can occur on land or at sea (Q16). Of the three fracking-related knowledge statements, this statement—which is true – elicited the lowest overall percent of correct answers

**Figure 2: Percent of Respondents Answering “Before this survey, had you ever heard or seen anything about fracking” by State: 2014 IU-SPEA Shale Gas Survey**



(68.5%). The between-state spread for this question, interestingly enough, was the smallest (5.7%) and, again, no state differences were statistically significant (Figure 3).

Overall, the lack of consistent differences in knowledge amongst states challenges the assumption that higher levels of production in a state lead to better knowledge of technology and vice versa. Further analysis by proximity to the well and demographic subgroup could provide additional insight.

## Pre-existing Attitudes Towards Fracking

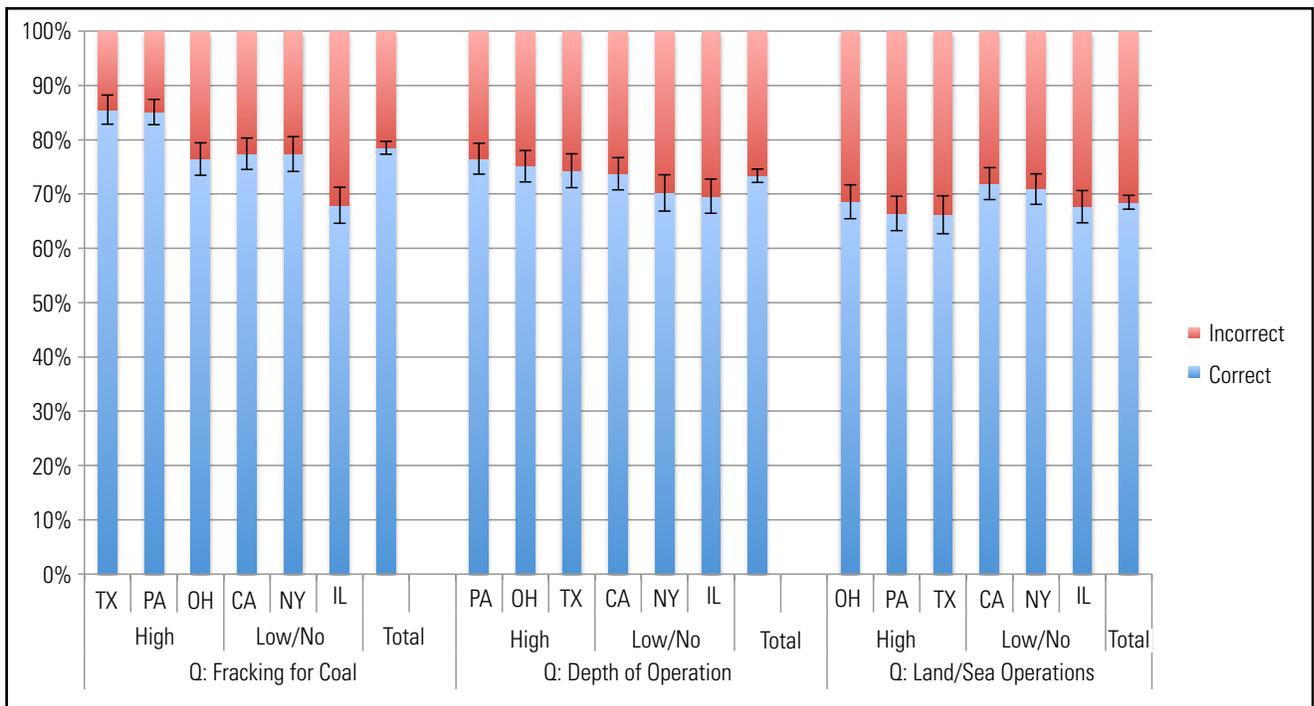
After supplying a labeled visual of the fracking process, and before exposing respondents to various arguments (pros and cons) about fracking, we included a basic attitude question: “Based on the information you just received and anything you may have heard or observed before this survey, how do you feel about fracking as a way to produce natural gas?” A visual depiction of shale gas extraction was presented as part of the definition to ensure that the respondents were clear about the nuts and bolts of fracking. For brevity, we dichotomized the answers from a 4-category “strongly support” to “strongly oppose” scale, to a 2-category “support” and “oppose” measure. The overall percent of respondents who supported fracking was 59.8%, while opposition was 40.2%.

As Figure 4 illustrates, there was some variation across the states – the spread is 22.1 percentage points. Texas, a pro-development state, indicated the greatest amount of support (67.4%) while New York, a state that has imposed a moratorium on fracking, provided the greatest amount of opposition (54.6%). New York residents were significantly more likely to oppose fracking than residents of Pennsylvania, Ohio, Texas, and Illinois. California’s opposition to

<sup>6</sup> Quinnipiac University Polling Institute. 2013. “April 18, 2013- Gas Drilling Divides New York By Region, Quinnipiac University Poll Finds; Voters Say 3-1 Fracking Will Hurt Environment,” available online at [www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/new-york-state/release-detail?ReleaseID=1882](http://www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/new-york-state/release-detail?ReleaseID=1882) (last Accessed 09/09/2014); and

Quinnipiac University Polling Institute. 2011. “August 11, 2011- New York Voters Back Fracking, Despite Concerns, Quinnipiac University Poll Finds; More Women In Government Means Fewer Sex Scandals,” available online at [www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/new-york-state/release-detail?ReleaseID=1635](http://www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/new-york-state/release-detail?ReleaseID=1635) (last accessed 09/09/2014).

**Figure 3: Percent of Respondents Answering Items 14, 15, & 16 by Item: 2014 IU-SPEA Shale Gas Survey**



fracking was significantly higher than what we found in Pennsylvania, Texas, and Illinois.

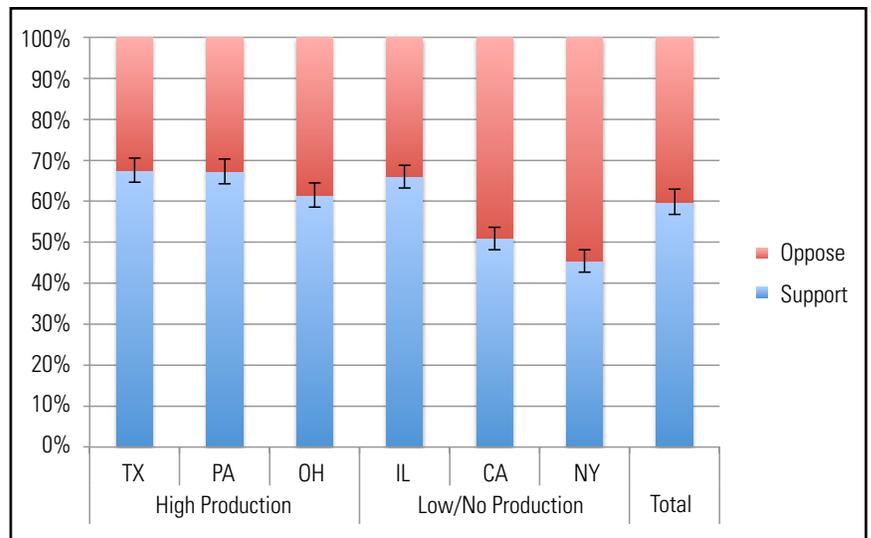
The results in Figure 4 are somewhat consistent with the hypothesis that the extent of fracking is influenced by public opinion. However, overall, the magnitude of the interstate differences is not dramatic, and the opinions in Illinois, a moratorium state, are unexpectedly similar to opinions in the pro-development states.

### Perceived Advantages and Disadvantages of Fracking

We also surveyed respondents on their attitudes toward 11 claimed advantages and 11 claimed disadvantages of fracking. These items ranged from economic benefits such as job creation and energy security to health and environmental concerns such as earthquakes and various forms of pollution. For each claim, respondents were asked to “please indicate how important, if at all, it is in your support of/opposition to fracking” using a scale of “Extremely important,” “Moderately important,” “Slightly important,” and “Not important at all.”

We present here information on eight of the items across the six states, to show a general picture of how the questions fared. The two items with the highest percent and the two items with the lowest percent of “extremely important” responses among the 11

**Figure 4: Percent of Respondents Answering “Based on the information you just received and anything you may have heard or observed before this survey, how do you feel about fracking as a way to produce natural gas?” by State: 2014 IU-SPEA Shale Gas Survey**



advantages and among the 11 disadvantages provide an indication of the spread of responses to the questions. The wide range of responses to the claimed advantages and disadvantages suggests a high degree of variability in people’s reactions toward the claims about UGD. The most important claimed advantage sought to make the U.S. rely less on other countries for energy, while the claimed advantage about benefits through mineral rights payments

was deemed the least important. Of the claimed disadvantages, respondents felt that fracking’s use of chemicals that contribute to pollution of drinking water was the most important, while the disadvantage that was least likely to be rated as extremely important was that fracking would result in more truck traffic (see Figure 5).

## Findings and Implications

Our survey research has shown significant variation in public opinion among the six states with varying levels of UGD. However, the differences do not appear to be dramatic or consistent enough to offer a compelling explanation for the differences in the extent of fracking in the six states. Future studies should explore factors beyond public opinion such as partisan and interest group politics, the history of gas development and regulation in the states, the prevailing industrial, environmental, and regulatory cultures, and differences in economic development. Such factors could greatly enhance our understanding of the rationale behind regulatory policy differences.

Our results, when compared with previous surveys from 2010-2013, suggest that awareness of fracking is gradually increasing. High levels of knowledge on fracking are also suggested, but more effort can be made to educate the public on the basic facts on fracking. On the majority of the attitude questions, the share of respondents with strongly held opinions (pro or con) is not overwhelming. Thus, it seems plausible that public opinion in the future could change significantly based on personal experience with UGD. We urge government, industry, environmental groups, and mass media to provide accurate and unbiased information.

## Future Research

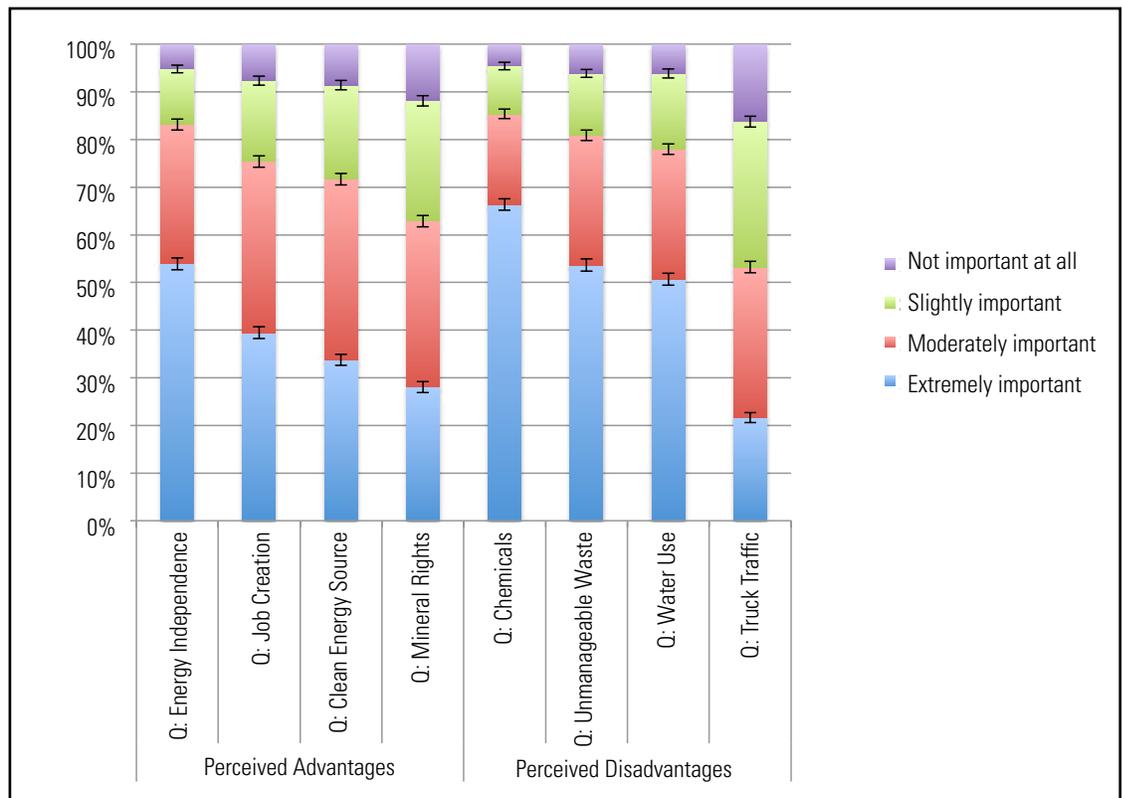
SPEA’s Shale Gas Research Group is engaged in a variety of research projects aimed at shedding light on key policy issues pertaining to shale gas. The Group’s agenda includes the following topics:

- Why do some U.S. states permit UGD and other states restrict it?

- Why do some Member States of the European Union permit UGD and others restrict it?
- How is public opinion affected by a respondent’s residential proximity to UGD?
- How is public opinion toward shale gas development affected by community reinvestment funds that are financed by fees on UGD?
- How do the results of scientific studies of the advantages and disadvantages of UGD compare to public perceptions of the advantages and disadvantages?
- How have the regulatory processes covering pipelines, sand mines and other infrastructure been affected by boosting UGD and what policy-related changes on infrastructure are needed to realize the promise of UGD?

Some of these questions are embedded in doctoral dissertations that are now underway at SPEA. More insights and an overview of SPEA’s Shale Gas Research Group publications will be soon available online through the SPEA Research Working Groups.

**Figure 5: Percent of Respondents Answering a Series of Perceived Advantages and Disadvantages Items by State: 2014 IU-SPEA Shale Gas Survey**



## Acknowledgements

The authors wish to acknowledge and thank Exxon-Mobil Corporation for unrestricted financial assistance to support the survey. The peer reviewers of this issue were Ashley Bowers of the Indiana Center for Survey Research and John Rupp of the Indiana Geological Survey. We also received helpful guidance, support and comments from Sanya Carley, Nikos Zirotiannis, Jessica Alcorn, Yu Zhang, Michael Hill, Celeste Wanner, Zach Wendling, Naveed Paydar, and Becky Snedegar.

## Further Reading

- Boudet, H., C. Clarke, D. Bugden, E. Maibach, E., C. Roser-Renouf, A. Leiserowitz. 2014. "Fracking" Controversy and Communications: Using National Survey Data to Understand Public Perceptions of Hydraulic Fracturing." *Energy Policy* 65: 57-67.
- EIA. 2014. "Annual Energy Outlook 2014 with Projections to 2040," available online at: [www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf) (last accessed 8/30/2014).
- Graham, J.D., J. Rupp, O. Schenk. 2014. "Unconventional Gas Development in the USA: Exploring the Risk Perception Issues,"

Each issue of *SPEA Insights* is peer-reviewed and highlights a major public policy challenge in the USA or the world, along with analysis by SPEA faculty and other experts that will help policy makers address these challenges.

[www.spea.indiana.edu](http://www.spea.indiana.edu)

Conference Paper, Harvard School of Public Health, Harvard Center for Risk Analysis.

- Brown, E., K. Hartman, C. Borick, B. Rabe, T. Ivacko. 2013. "Public Opinion on Fracking: Perspectives from Michigan and Pennsylvania," *The National Surveys on Energy and Environment*. University of Michigan-Ann Arbor, Gerald R. Ford School of Public Policy, The Center for Local, State and Urban Policy.

*The views expressed are solely those of the author and do not imply endorsement by Indiana University or the School of Public and Environmental Affairs.*



**SCHOOL OF PUBLIC AND  
ENVIRONMENTAL AFFAIRS**

INDIANA UNIVERSITY