E-PARCC
COLLABORATIVE GOVERNANCE INITIATIVE

Syracuse University
Maxwell School of Citizenship and Public Affairs
Program for the Advancement of Research on Conflict and Collaboration

# Hydrofracturing in New Frackillvania[1]

# TEACHING NOTE

## About the Role Play Approach

This simulation uses a role play approach to facilitate discussion and allow students to dig deep into "thorny" issues, while applying theory to a real case experience. When used properly, role play encourages students to learn on their own. When using role play, groups should be small (5 – 9 students) to help facilitate small group discussion. Roles should provide some direction, but leave room for interpretation and creativity by students. The case itself should have enough background information that it is realistic, but should provide opportunity for students to do research outside of the case. In this simulation, the roles are based on real NGOs, industry associations, and participants in stakeholder participatory processes. Make sure to leave ample time at the end of class for full class discussion. The case itself can be manipulated to meet a variety of class objectives. Obviously, it might not be feasible to have a class size that is easily divisible by 9. Thus, it may be necessary to add or collapse some roles as suggested below:

- Use the 3 private citizens' roles to expand potential roles. These might be useful if a student shows up late to class, etc.
- Combine the 2 professors in the case. While the engineering professor is more pre-disposed to support drilling; and the environmental sciences / hydrologist is more disposed to oppose drilling; both of these roles are science-advisory roles and can be combined.
- Consider combining the two environmental organizations. NRDC is a relatively mainstream, pragmatic environmental NGO, while Environment New Frackillvania is presented as a more radical environmental NGO, but conceivably these can be combined.
- Other roles that might be developed might be an elderly citizen's organization that is concerned about rental costs for those on fixed incomes; a wind energy industry association representative; or others.
- Consider making the moderator a more neutral facilitator, rather than a member of government who is motivated to try to get a deal.

## Teaching Objectives

Depending on the class, a variety of teaching objectives can be accomplished. However, the case is primarily designed for two types of courses. First, energy or environmental policy or politics courses where the instructor wants students to understand many of the environmental, economic, and social issues surrounding hydrofracturing. Second, more general public policy courses where the instructor is hoping to teach about participatory methods in policy making, as the case mimics a participatory stakeholder policy-making activity. For other types of courses, such as sustainability courses, this case should emphasize the different types of stakeholders that are involved in these sorts of processes, as well as their different perspectives.

- Students will understand environmental, economic, and social issues surrounding hydrofracturing
- Students will learn, by participation, participatory policy analysis (PPA), stakeholder processes, and conflict resolution
- Students will learn how and why politics often precludes the "efficient" policy solution
- Role playing will engage students in active learning and problem-based learning

## Case Background

This case was motivated by Governor David Patterson of New York, who declared a temporary moratorium in 2008 on hydrofracturing until impacts could be better understood. The case

draws on a variety of social and environmental problems related to hydrofracturing across the U.S. States. Specifically, the social ills are drawn from cases in North Dakota; the environmental problems are a combination of problems in Pennsylvania and Texas; the economic issues associated with increasing costs of living are from North Dakota. Problems associated with tremors are from Oklahoma, Ohio, and Texas (as well as the Netherlands). The problems associated with traffic and access to emergency services are from Pennsylvania. Issues pertaining to uncertainty and property rights seem to be varied throughout the states. Ultimately, in 2014, Governor Andrew Cuomo made the temporary ban on hydrofracturing "permanent". Many states continue to struggle with appropriate regulation of hydrofracturing, distribution of revenue from severance taxes, and boom and bust economies of mining communities.

## Setting up the Exercise

Ideally, students will be divided into groups and assigned roles ahead of time so that they can prepare for the class (with absences, etc., it is quite possible that this may not be feasible or a good idea). If there are multiple groups, students can work in groups to research their role. The simulation, as described above, contains 9 roles, plus 3 additional roles (see above for suggestions). However, depending on the goals of the class, other roles can be created or substituted. Students should be instructed to carefully read their roles and to "embody" the role of the character they've been assigned to.

If the instructor wishes to grade students for their engagement in the activity, students could complete peer evaluations at the end of the process that require them to evaluate their peers based on engagement in the exercise.

When students are broken out into groups, they should read (and embody their roles, being encouraged to use some creativity and research to fill out some details). They should introduce themselves to the group by briefly stating their name and the organization they represent. The moderator should take the lead from there. Students should NOT read their roles out loud to the groups. Expect that set-up should take 10 – 15 minutes, and that students will spend another 10 minutes introducing themselves to the group.

The exercise is designed to last 3 hours, or two 1.5-hour class sessions. In the first session, students will spend time discussing all of the problems associated with fracking and begin to brainstorm policy ideas and solutions. It is likely worthwhile to spend 10 minutes at the end of the first session  getting groups to report back on the status of their discussions, the sorts of issues that they're having, and the policy options that they're beginning to consider. The case can be expanded if time is available; it is difficult to do this well with less than 2.5 hours. If faculty wish the students to really understand the policy options and economics associated with hydrofracturing and related social ills, more time is necessary.

Students should be instructed to research fracking on their own and come armed to class on the second day with additional information to support their position. On the second day,

students should be given ~45 minutes to work through the problem and generate concrete policy ideas. Students from each group can then write policy solutions on the board associated with each policy problem. Students can write a short reflection based on what they learned, and fill out a peer evaluation on other group members. At least 20 – 30 minutes should be reserved for broader class discussion where lessons from the process should be discussed.

## Possible discussion questions (based on course objectives)

- On what topics was your group able to / unable to come to consensus?
- Why do you think your group was able to / unable to come on consensus on these topics?
- Which problems did your group prioritize in solving? Why did you prioritize some problems over others? What did you learn about fracking, and the policy issues surrounding it?
- What did you learn about participatory policy analysis and these sorts of stakeholder participatory processes?
- What do you think you did well in your negotiations?
- What would you do differently next time in the negotiations to achieve more of your goals?
- Were you satisfied with the process?
- If, instead, we were to assign policy-making responsibility to a government agency, what do you think would be the same or different?
- What do you think were the advantages and disadvantages of this process?

## References


Accenture. (2012). Water and Shale Gas Development.

Alvarez, R. A., Pacala, S. W., Winebrake, J. J., Chameides, W. L., & Hamburg, S. P. (2012). Greater focus needed on methane leakage from natural gas infrastructure. Proceedings of the National Academy of Sciences of the United States of America, 109(17), 6435-6440. doi: 10.1073/pnas.1202407109

Bloomberg. (2012). Fracking Secrets by Thousands Keep U.S. Clueless on Wells. from http://www.bloomberg.com/news/2012-11-30/frack-secrets-by-thousands-keep-u-s-clueless-on-wells.html

Boudet, H., Bugden, D., Clarke, C., Maibach, E., Roser-Renouf, C., & Leiserowitz, A. (2014). "Fracking" controversy and communication: Using national survey data to understand public perceptions of hydraulic fracturing. Energy Policy, 65, 57-67. doi: 10.1016/j.enpol.2013.10.017

Cantwell, M., Sanders, B., & Coons, C. A. (2011). Shale gas and water impacts.

Chevron. (2014). Natural Gas from Shale. from http://www.chevron.com/deliveringenergy/naturalgas/shalegas/

Cikanek, Z. (2014). Senate bill empowers states on hydraulic fracturing. from http://www.api.org/news-and-media/news/newsitems/2013/aug-2013/senate-bill-empowers-states-on-hydraulic-fracturing

Clarke, C. (2012). Fracking politics: A case study of policy in new york and pennsylvania from 2008-2011. (Masters of Art), Colorado State University, Fort Collins, Colorado.

ConocoPhillips. (2014). Can hydraulic fracturing be done responsibly? From http://www.conocophillips.com/sustainable-development/common-questions/can-hydraulic-fracturing-be-done-responsibly/Pages/default.aspx

Currie, Janet, Michael Greenstone, and Katherine Meckel. "Hydraulic fracturing and infant health: New evidence from Pennsylvania." *Science advances* 3.12 (2017): e1603021.

DEP. (2010). DEP Secretary Issues Open Letter to Citizens of Susquehanna County Community Impacted by Ongoing Gas Migration Issues [Press release]. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=14827&typeid=1

Environmental Leader. (2014). Aquatech Acquisition Creates Shale Gas Water Management Network. from http://www.environmentalleader.com/2013/05/14/aquatech-acquisition-creates-shale-gas-water-management-network/

EPA. (2012). EPA Completes Drinking Water Sampling in Dimock, PA [Press release]. Retrieved from http://yosemite.epa.gov/opa/admpress.nsf/0/1A6E49D193E1007585257A46005B61AD

EPA. (2012). Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources.

EPA. (2013). Response to Congressional Inquiry Regarding the EPA's Emergency Order to the Range Resources Gas Drilling Company: U.S. Environmental Protection Agency.

EPA. (2013). Wyoming to Lead Further Investigation of Water Quality Concerns Outside of Pavillion with Support of EPA [Press release]. Retrieved from http://yosemite.epa.gov/opa/admpress.nsf/20ed1dfa1751192c8525735900400c30/dc7dcdb471dcfe1785257b90007377bf!OpenDocument

EPA. (2014). Basic Information about Injection Wells. from http://water.epa.gov/type/groundwater/uic/basicinformation.cfm

EPA. (2014). EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources. from http://www2.epa.gov/hfstudy

EPA. (2014a). About EPA. Washington, D.C.: United States Environmental Protection Agency.

EPA. (2014b). Basic Information about Injection Wells. from http://water.epa.gov/type/groundwater/uic/basicinformation.cfm

EPA. (2014c). EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources. from http://www2.epa.gov/hfstudy

EPA. (2014d). Natural Gas Extraction - Hydraulic Fracturing. from http://www2.epa.gov/hydraulicfracturing

EPA. (2014e). UIC Program Primacy. from http://water.epa.gov/type/groundwater/uic/Primacy.cfm

ExxonMobil. (2014). Hydraulic fracturing: How it works. from http://corporate.exxonmobil.com/en/engineering/hydraulic-fracturing

Foutain, H. (2012). Disposal Halted at Well After New Quake in Ohio, The New York Times. Retrieved from http://www.nytimes.com/2012/01/02/science/earth/youngstown-injection-well-stays-shut-after-earthquake.html?_r=0

Frank, A. (2013, August 21, 2013). Welcome to the Age of Denial. Retrieved from http://www.nytimes.com/2013/08/22/opinion/welcome-to-the-age-of-denial.html?_r=0

Gandossi, L. (2013). An overview of hydraulic fracturing and other formation stimulation technologies for shale gas production JRC Technical Reports: European Commission.

Gies, E. (2012). Company Aims to Desalinate Fracking Water, a $1.6 Billion Market. Forbes Magazine.

Groat, C., & Grimshaw, T. (2012). Fact-Based Regulation for Environmental Protection in Shale Gas Development: Energy Institute.

Hammer, R., & VanBriesen, J. (2012). In Fracking's Wake: New Rules are Needed to Protect Our Health and Environment from Contaminated WasteWater (pp. 1-112): Natural Resources Defense Council.

Harvey, F. (2012, August 29, 2012). Golden age of gas' threatens renewable energy, IEA warns, The Guardian.

Harvey, H. (2012, January 3, 2012). Natural gas: Cheap, clean and risky, Los Angeles Times. Retrieved from http://articles.latimes.com/2012/jan/03/opinion/la-oe-harvey-natural-gas-20120103

Jiang, M., Hendrickson, C., & VanBriesen. (2014). Life Cycle Water Consumption and Wastewater Generation Impacts of a Marcellus Shale Gas Well. 48, 1911-1920.

Jorgensen, H. (2012). Fracking Nonsense: The Job Myth of Gas Drilling. Retrieved from http://www.cepr.net/index.php/blogs/cepr-blog/fracking-nonsense-the-job-myth-of-gas-drilling

Karion, A., Sweeney, C., Pétron, G., Frost, G., Michael Hardesty, R., Kofler, J., and Conley, S. (2013). Methane emissions estimate from airborne measurements over a western United States natural gas field. Geophysical Research Letters, 40(16), 4393-4397.

Kelsey, T., Shileds, M., Ladlee, J., & Ward, M. (2011). Economic Impacts of Marcellus Shale in Pennsylvania: Employment and Income in 2009: Marcellus Shale Education and Training Center.

Keranen, K. M., Savage, H. M., Abers, G. A., & Cochran, E. S. Potentially induced earthquakes in Oklahoma, USA: Links between wastewater injection and teh 2011 Mw 5.7 earthquake sequence. GEOLOGY -BOULDER-, 41(6), 699-702.

Kim, W.-Y. (2013). Induced seismicity associated with fluid injection into a deep well in Youngstown, Ohio. Journal of Geophysical Research: Solid Earth, 118(7), 3506-3518. doi: 10.1002/jgrb.50247

Logan, J., Heath, G., Macknick, J., Paranhos, E., Boyd, W., & Carlson, K. (2012). Natural gas and the transformation of the U.S. energy sector: Electricity: Joint Institute for Strategic Energy Analysis.

Lund, S., Manyika, J., Nyquiest, S., Mendonca, L., & Ramaswamy, S. (2013). Game changers: Five opportunities for US growth and renewal: McKinsey Global Institute.

Lustgarten, A. (2012). Injection Wells: The Poison Beneath Us, ProPublica. Retrieved from http://www.propublica.org/article/injection-wells-the-poison-beneath-us

Mantell, M. (2011). Produced Water Reuse and Recycling Challenges and Opportunities Across Major Shale Plays. Paper presented at the Proceedings of the Technical Workshops for the Hydraulic Fracturing Study: Water Resources Management, Washington, D.C.

McCurdy, R. (2011). Underground Injection Wells For Produced Water Disposal. Paper presented at the Proceedings of the Technical Workshops for the Hydraulic Fracturing Study: Water Resources Management, Washington, D.C.

MIT. (2011). The Future of Natural Gas: Massachusetts Institute of Technology.

Muehlenbachs, L., Spiller, E., & Timmins, C. (2012). Shale Gas Development and Property Values: Differences Across Drinking Water Sources. National Bureau of Economic Research, 1-37.

NRDC (2013, November 15). [Letter to the EPA Regarding the EPA's Hydraulic Fracturing Research Related to Drinking Water Resources].

NRDC. (2012). EPA's water testing results in Dimock do not let the gas industry off the hook. Retrieved from http://switchboard.nrdc.org/blogs/ksinding/epas_water_testing_results_in.html

NRDC. (2014). Risky Gas Drilling Threatens Health, Water Supplies. from http://www.nrdc.org/energy/gasdrilling/

OpenSecrets.org. (2014). from opensecrets.org

PADH. (2014, January 30,). Fracking wastewater in Debert deemed safe for disposal, The Prince Albert Daily Herald. Retrieved from http://www.paherald.sk.ca/section/2014-01-30/article-3597072/Fracking-wastewater-in-Debert-deemed-safe-for-disposal/1

ProRepublica. (2013). More Than a Matter of Opinion: Ed Rendell's Plea for Fracking Fails to Disclose Industry Ties. from http://www.propublica.org/article/ed-rendell-new-york-fracking-op-ed-disclosure

Rabe, B., & Borick, C. (2011). Fracking for Natural Gas: Public Opinion on State Policy Options. In S. The Center for Local, and Urban Policy (Ed.). Gerald R. Ford School of Public Policy: University of Michigan.

RCC. (2014). Saltwater Disposal Wells Frequently Asked Questions. from http://www.rrc.state.tx.us/about/faqs/saltwaterwells.php

Rich, W. R. (2014). A probabilistic risk assessment of Class I hazardous waste injection wells: EPA.

RT. (2014). Fracking caused hundreds of complaints about contaminated water in 4 states. from http://rt.com/usa/fracking-chemicals-found-well-water-243/

Sider, A., Gold, R., & Lefebvre, B. (2012). Drillers Begin Reusing 'Frack Water', Wall Street Journal. Retrieved from http://online.wsj.com/news/articles/SB10001424052970203937004578077183112409260

Sieminski, A. (2014). Outlook for U.S. shale oil and gas U.S. Energy Information Agency.

Sierra Club. (2014, 2014). Dirty, Dangerous, and Run Amok. from http://content.sierraclub.org/naturalgas/

Skorton, D., & Altschuler, G. (2012, August 24, 2012). Fracking: A Role for Universities, Forbes. Retrieved from http://www.forbes.com/sites/collegeprose/2012/09/24/fracking-a-role-for-universities/

Tiemann, M., & Vann, A. (2013). Hydraulic Fracturing and Safe Drinking Water Act Regulatory Issues (pp. 1-31). Washington, D.C.: Congressional Research Service.

Tollefson, J. (2013). Methane leaks erode green credentials of natural gas. Nature, 493(7430), 12-12. doi: 10.1038/493012a

U.S. EPA. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/236F, 2016.

UNEP. (2013). Gas fracking: can we safely squeeze the rocks? Environmental Development, 6, 86.

Urbina, I. (2011). Regulation Lax as Gas Wells' Tainted Water Hits Rivers, The New York Times. Retrieved from http://www.nytimes.com/2011/02/27/us/27gas.html?pagewanted=all&_r=1&

Warren, K. J. (2010, September). Pennsylvania's regulation of Total Dissolved Solids, The Legal Intelligencer.

Wigley, T. L. (2011). Coal to gas: the influence of methane leakage. Climatic Change, 108(3), 601-608. doi: 10.1007/s10584-011-0217-3

Wilson, J., & Schwank, J. (2013). The Application of Hydraulic Fracturing Technologies to Michigan Oil and Gas Recovery: University of Michigan.