

# 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<sup>1</sup>

### SIMULATION

This exercise simulates a panel of industry, lawmakers, academics, environmentalists, and land-owners, charged by the Governor of New Frackillvania to determine fracking policy for the state.

#### Background

Beneath the state of New Frackillvania, there are enormous shale resources, providing massive reserves of natural gas that can be accessed using new hydrofracturing natural gas extraction techniques (fracking). Fracking uses a high-pressure mixture of water, sand, and chemicals to crack and hold open thick rock formations, releasing trapped oil and gas. Combined with horizontal drilling, it allows access to formerly out-of-reach deposits and has allowed drillers to move closer to populated areas.

Advocates of accessing these resources suggest that fracking will produce enormous numbers of new jobs, revenues for the state and for businesses, and lower energy costs to consumers. The industry insists the method is safe and would create thousands of jobs — possibly 40,000 in the poorest area of

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<sup>1</sup> The author would like to acknowledge Hira Batool, Tanguy Hubert, and David Poyer for providing some background research through their PUBP 6012 group project. In addition, comments from Stephen Bird and an anonymous reviewer have been quite useful at shaping this exercise.

New Frackillvania, according to one study, sponsored by the state's oil and gas mining association. The study estimated that if the entire shale resource were developed, up to 210,000 jobs could be created, largely in rural regions. Fracking jobs pay, on average, \$62,000 per year, in contrast to the average wage in the state at \$42,000 per year. The fracking industry has invested \$4 billion, thus far, in drilling over 5,000 wells and securing property rights and other investments related to developing fracking in the state.

A recent academic study of the Marcellus Shale in Pennsylvania found that fracking accounted for more than 23,000 jobs, generating an annual income of \$1.2 billion (Kelsey, Shileds, Ladlee, & Ward, 2011). At the national level, proponents argue that the production of shale gas and tight oil could add 2 to 4 percent (\$380 billion to \$690 billion) to the annual GDP and create up to 1.7 million permanent jobs by 2020 in the U.S. (Lund, Manyika, Nyquist, Mendonca, & Ramaswamy, 2013). For individual landowners, the royalty payment averages roughly 18.5%, and New Frackillvania has a minimum royalty payment of 12.5%. However, drilling companies often subtract fees, making the payments much lower. Some land owners do quite well – earning up to hundreds of thousands of dollars a year from their wells. Others do not receive much at all, and often feel quite cheated.

While there are promises of economic riches, initial fracking efforts have resulted in numerous environmental and social problems. Despite a drought in the state, one third of total water usage last year was used for Fracking and then sent to deep injection wells, removing the water from the hydrological system. In addition, numerous tremors or small earthquakes have been felt in the area – leading to speculation that these were caused by the injection wells. Farmers have been unable to irrigate crops and ranchers have seen feed prices increase as a result, leading ranchers to reduce the sizes of their herds by as much as 50% in the past year. With expectations of continuing droughts and feed prices skyrocketing, the President and Congress have discussed an aid package in the \$8 – \$16 billion range to ranchers and farmers to compensate them for thinning herds and for foregone income due to a lack of water availability.

Drinking and irrigation water contamination has been an issue as well. Residents have complained of “funny smelling”, “licorice tasting”, and “brownish” drinking water, and people have complained of sinus, respiratory and mood problems, as well as skin irritations. In a few high profile cases, residents have been able to light their kitchen faucets or showerheads on fire, though it is not clear if these cases are the direct result of fracking. Farmers have complained that water in the Killowa River and other streams, used for irrigation in the region, has contaminated crops and has elevated salt content. Ranchers are concerned that river water is unsafe for herds, and several ranchers have reported sick cattle.

While state and industry officials have claimed that fracking is 100% safe, tests of the water have shown elevated levels of toxics including arsenic, benzene, and cadmium – all linked to increased cancer and cardiovascular issues, as well as a large variety of other serious health problems. However, without good data prior to the fracking boom, it's not possible to prove that these chemicals are the result of fracking. Testing by the New Frackillvania Department of Natural Resources has not detected significant levels of pollution, but environmentalists have claimed that these tests have excluded testing for over 100 of the most toxic chemicals suspected to be involved with fracking. The fracking

industry has remained opposed to any efforts aimed at disclosing the chemical composition of its fracking fluid, as these chemical compositions are considered trade secrets.

Recently produced research by economists suggests that while the net benefits of fracking, including environmental and health damages, are roughly \$2,000 per person, there is evidence of some major health repercussions of drilling. Babies born to parents living within two miles of a drilling site are more likely to be in poor health, and babies born within a half mile of a drilling site have a 25% greater chance at being born with low birthweight (below 5.5 lbs) (Currie et al., 2017).

Other environmentalists are concerned about the increased reliance on non-renewable natural gas. While in the short term, natural gas investments are displacing coal electricity imports from the neighboring state of West Virginia, in the long run, natural gas development may make climate change a more intractable problem. Natural gas leaking from wells and “venting” has a global warming potential twenty-one times that of carbon dioxide, over a 100-year time horizon. A number of studies measured methane leakage rates higher than what was previously thought (Alvarez, Pacala, Winebrake, Chameides, & Hamburg, 2012; Karion et al., 2013); these leakage rates could outweigh the positive effects of replacing coal-fired plants by gas-fired units (Wigley, 2011). Climate scientists have estimated that to stabilize the climate at levels that would stave off the most catastrophic impacts of climate change, CO<sub>2</sub> emissions would likely need to be cut by 80%. Natural gas, in contrast, cuts emissions by 50% compared with coal, and concerns have been raised that methane leakage from wells may offset any CO<sub>2</sub> reductions caused by shifting to natural gas.

Natural gas prices have dropped by 50% in the region, and investments in wind energy have ceased, as natural gas generation has displaced wind and renewable investments. Previously, West Virginia was a leader in renewable energy investments, with 800% growth in wind energy over the past 5 years. Ranchers, who have been able to gather payouts of \$10k per turbine on their land while still grazing cattle, are concerned about the loss of income due to the collapse of the wind industry.

Other residents are concerned with the economic and social impacts of resource driven boomtowns. Although the positive impact on the economy is one of the most common arguments used by proponents of hydraulic fracturing, a 2012 National Bureau of Economic Research study found that the presence of fracking in an area has a significant negative impact on the property values of the area. In particular, the risk of groundwater contamination reduces property values by about 24% (Muehlenbachs, Spiller, & Timmins, 2012). Additionally, there have been arguments that the number of jobs created from hydraulic fracturing is greatly overstated (Jorgensen, 2012).

Residents have complained to their state representative about the traffic issues caused by the hundreds of daily tanker truck trips to the region, as well as noise and pollution from the tanker trucks themselves. Heavy truck crashes are up 7.2%, and fatalities are up as well. Roads have begun to crack and deteriorate from the increased burden on roads that were not designed for heavy industrial traffic. The number of 911 calls has increased significantly, while the response times have increased as well. Residents are concerned that taxes will be raised to pay for road maintenance or the burden on social services. Out of state workers are flooding fracking towns in West Virginia, and rents and the cost of living are skyrocketing, schools are over-crowded, and the cost of living has increased and a greater

rate than incomes. Due to housing shortages, an 800 square foot, one bedroom apartment has increased from \$350 / month in 2005 – to over \$2,100 today.

Residents complain that the social fabric of small communities is unraveling. Suicide, divorce, and other social ills have increased. Thefts and property crimes are up; reports of rape are up by 40% and other reports of violence and alcohol- related incidences have increased as well. Even sexually transmitted infections are up 62% (chlamydia and gonorrhea) in highly fracked counties, relative to unfracked counties.

Recently, the drinking water for over 100 residents in Gastown, New Frackillvania was found to be contaminated with numerous heavy metals, salts, benzene, and arsenic, and irrigation water is suspected to have even higher levels of contamination. While the cause of the contamination has not been determined (and fracking operators vigorously deny any involvement with the contamination), the governor of New Frackillvania, has ordered an immediate moratorium on new drilling leases until environmental and drilling issues can be reconciled.

In 2016 the EPA released a report on the impacts of hydrofracturing on drinking water quality (US EPA, 2016). This report suggests that over 1,000 toxic chemicals had been found in fracking wastewater. Contamination of drinking water, one of the main risks posed by hydraulic fracturing operations, can occur at different stages of the fracking process: (1) groundwater aquifers can get contaminated with drilling fluids or natural gas while drilling and setting casing through the shallow zones (usually due to poor drilling techniques); (2) on-site surface spills of drilling fluids, fracture fluids and wastewater from fracture flowbacks can contaminate near-by drinking water resources; (3) inappropriate off-site wastewater disposal can contaminate rivers that supply drinking water.

Oversight responsibilities for wastewater contamination are spread out across the federal and state government. The regulation on the federal level is delegated to the EPA while the states have varying regulation structures often housed in a Department of Environmental Protection, or equivalent. The EPA has the task of enforcing the Clean Water Act and the Safe Drinking Water Act. The Clean Water Act regulates and sets the standard for the discharges into water bodies (Hammer & VanBriesen, 2012). The states are able to impose stricter standards than those required in the Clean Water Act. The Safe Drinking Water Act is the law that regulates the underground injection of wastewater under the Underground Injection Control program (Hammer & VanBriesen, 2012).

The oversight of underground injection can either be conducted by the state or the EPA. It is important to note that the EPA does not have regulatory control over the reuse, handling, storage or transport of wastewater, because these actions have been exempted in the Safe Drinking Water Act and the Resource Conservation and Recovery Act (Hammer & VanBriesen, 2012). Because the EPA does not regulate reuse, handling, storage, and transportation, the regulation of these acts are delegated to the states.

The governor of New Frackillvania has suggested a participatory process to determine the future of fracking in the state. She has convened a panel of industry, lawmakers, regulators, environmentalists, land-owners, and academics. Other states have moved forward with a variety of regulations: Colorado permits fracking but requires the disclosure of chemicals used in fracking. Thirty- one states have

severance taxes, which provide funding to state treasuries from natural gas extraction. New York recently implemented a ban on fracking, arguing that the science was too uncertain to allow it to proceed.

## **Issues to be Resolved**

### **The panel needs to discuss and resolve the following issues:**

1. Should fracking be allowed to occur (ie should the moratorium be lifted)?
2. If so, with what sort of environmental, land use, and water use regulations?
3. Should there be a severance tax? If so, how much? How should the proceeds be allocated?
4. How will land rights (in particular, subterranean land rights) be established, monitored, and regulated?
5. Who owns the shale gas?
6. Who will benefit from the revenues from its extraction and sale?
7. Who is liable in case of land and water pollution damages, or health impacts to the population?
8. What might be done about pollution, noise, and traffic issues caused by industrial traffic?
9. What should be done about the increased demand on social services and the impact of fracking on destroying the “moral fiber” of the community?

## **Facts on Fracking in New Frackillvania**

The fracking process, as currently practiced in New Frackillvania, involves the following steps:

1. Drillers drill vertically and then horizontally, pouring cement into the well as the drilling proceeds. Numerous trucks are needed to drill, pour cement, and remove drilling tailings (the dirt, rock, and water slurry removed from the well). These tailings are dumped into a large pile nearby the drilling site.
2. Tankers bring in fracking fluid, a proprietary mix of water, sand, and chemicals. The fracking fluid is pumped under high pressure, into the well, causing fractures in the shale bed. Gas, oil, and used fracking fluid flow back to the surface. The gas and oil are separated and pumped to pipelines for distribution.
3. Used fracking fluid – contaminated with a variety of heavy metals and salts (in addition to the proprietary chemicals) – is stored in containment ponds until trucks are brought in to remove the fracking fluid. Used fracking fluid is eventually pumped into deep injection sites.
4. While technology exists to treat water on site for re-use in fracking or alternatively for discharge into water bodies (returning it to the ecosystem), the cost and effectiveness of these methods is highly variable depending on the water quality of the used fracking fluid, the flow rate, and how “clean” it needs to be after treatment. While water recycling is gaining

popularity, the fracking industry remains heavily opposed to any water treatment or recycling requirement.

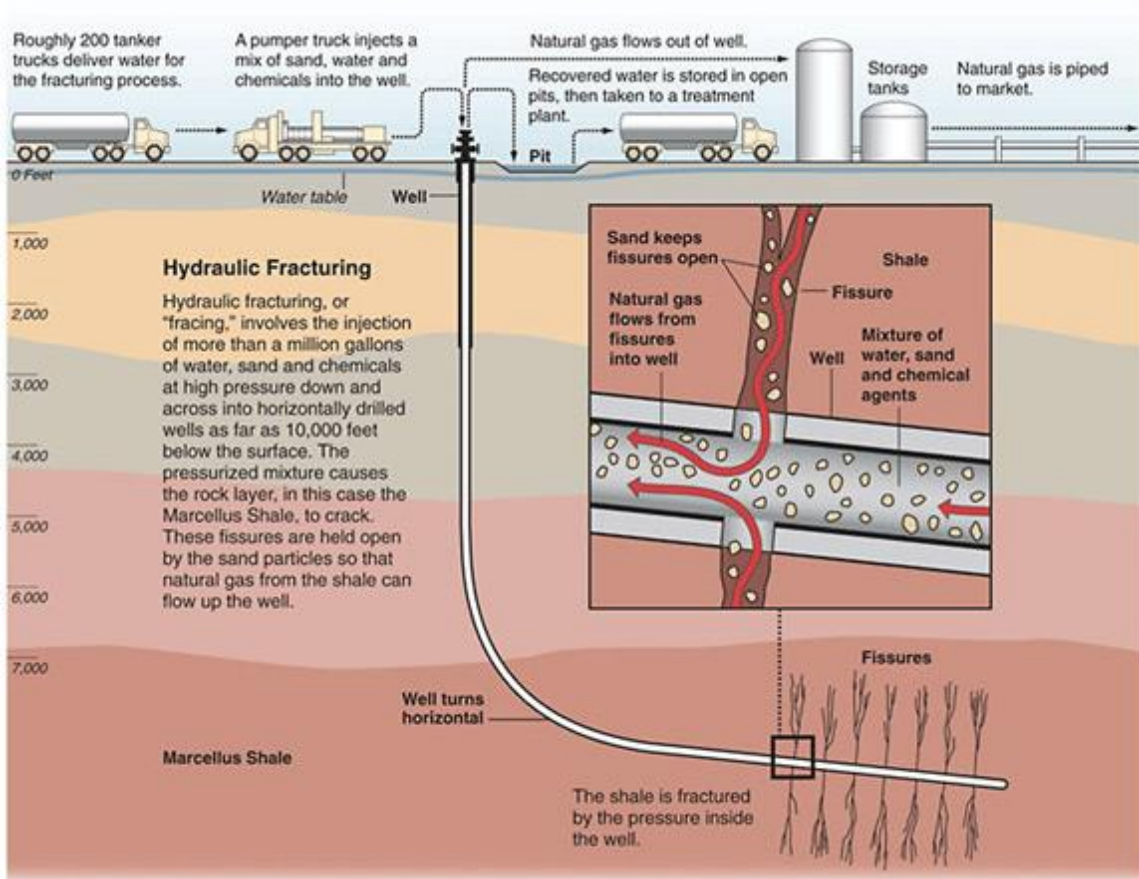
5. An overview of state fracking policies can be found at:  
[http://www.rff.org/centers/energy\\_and\\_climate\\_economics/Pages/Shale\\_Maps.aspx#maps](http://www.rff.org/centers/energy_and_climate_economics/Pages/Shale_Maps.aspx#maps)
6. The EPA Report on the impacts of hydrofracturing on drinking water can be found at:  
<https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990>

## Appendix 1:

Cost-benefit analysis of Fracking (provided by New Frackillvania Fracking Industry Association)

Summary of Economic Benefit-Cost Analysis			
	2010 Dollars per well		
	Minimum	Average	Maximum
Economic value added	2,791,549	3,957,746	5,459,859
<b>Environmental benefits of coal displacement:</b>			
Avoided air pollution	4,420	17,132	50,061
Avoided community health impacts from coal	14,555	29,111	43,666
Subtotal	18,976	46,243	93,727
<b>Economic and environmental benefits</b>	<b>2,810,525</b>	<b>4,003,989</b>	<b>5,553,586</b>
<b>Environmental costs:</b>			
Air impacts from upstream life-cycle emissions	1,089	2,796	7,173
Air impacts from diesel use during hydraulic fracturing	2,091	7,245	20,329
Water pollution using household values	102	193	312
Forest disruption	1,394	3,943	6,493
Subtotal	4,676	14,178	34,307
<b>Economic and environmental net benefits</b>	<b>2,805,849</b>	<b>3,989,811</b>	<b>5,519,279</b>
Without benefits from avoided health impacts from coal	2,791,294	3,943,569	5,425,552
Using Dimock settlement to value water-pollution damages	2,699,878	3,787,941	5,193,317
Without health impacts from coal and using Dimock settlement	2,685,322	3,758,830	5,149,651

## Appendix 2: Fracking Process (including chemicals and well simulation)



Graphic by Al Granberg

## Chemicals Used in Fracking

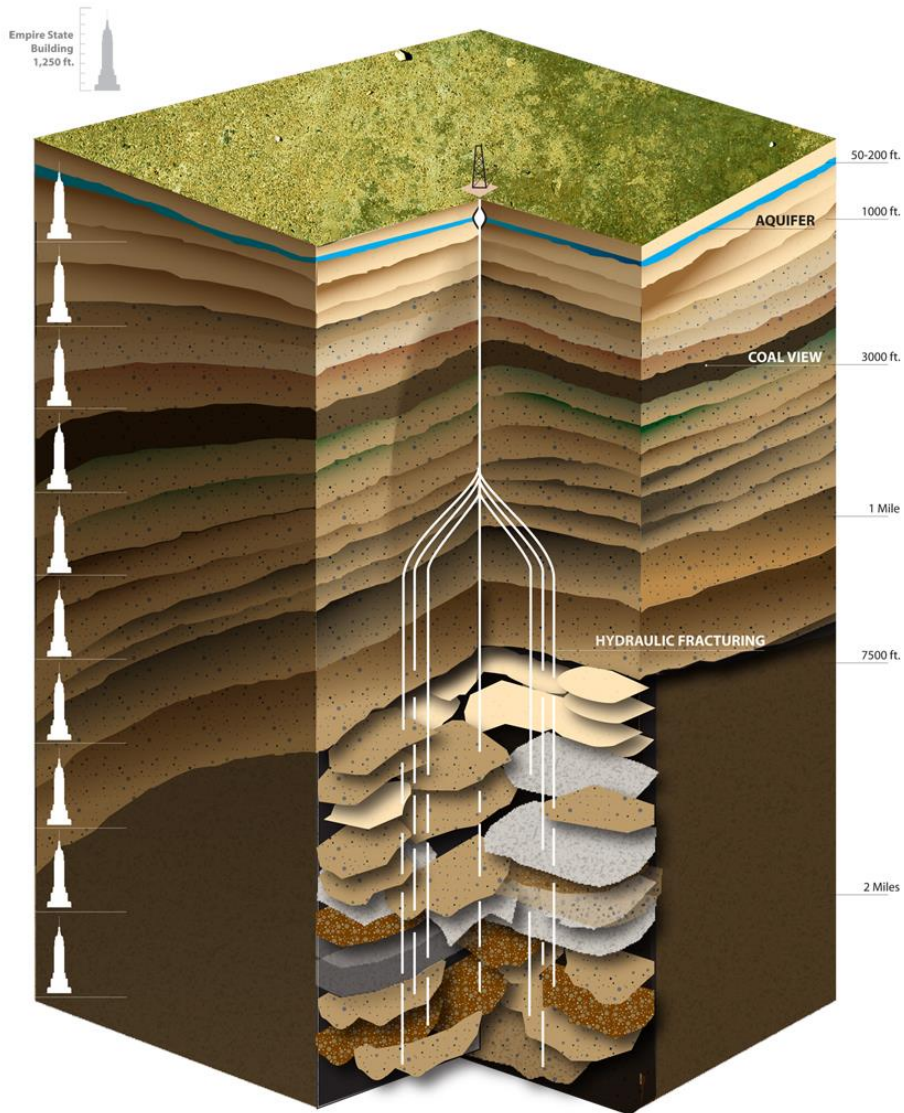
Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium Chloride	Food preservative
Corrosion inhibitor	N,n-dimethyl formamide	Used as a crystallization medium in Pharmaceutical Industry
Friction Reducer	Petroleum distillate	Cosmetics including hair, make-up, nail and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener used in cosmetics, sauces, and salad dressings
Iron Control	2-hydroxy-1,2,3-propanetricarboxylic Acid	Citric Acid it is used to remove lime deposits
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand	Play Sand
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent



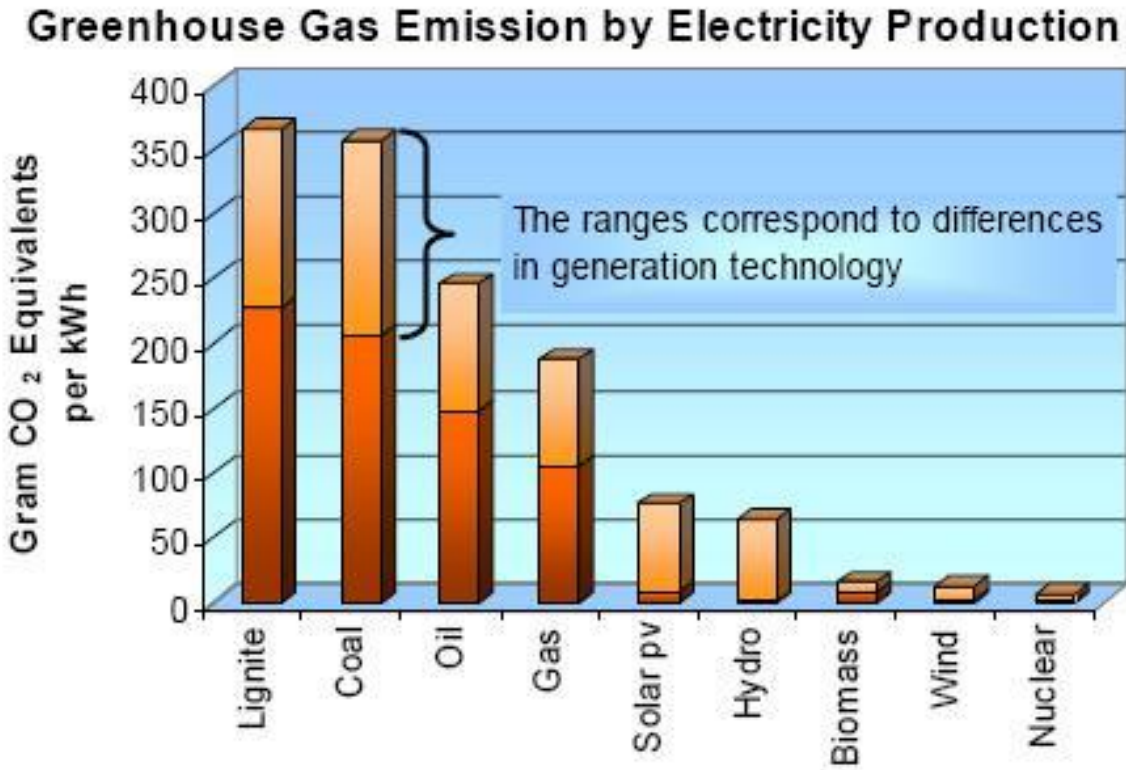


## Going Deep:

WELL STIMULATION TECHNOLOGY DEPLOYED THOUSANDS OF FEET BELOW THE WATER TABLE.



**Appendix 3: Greenhouse Gas Emissions**

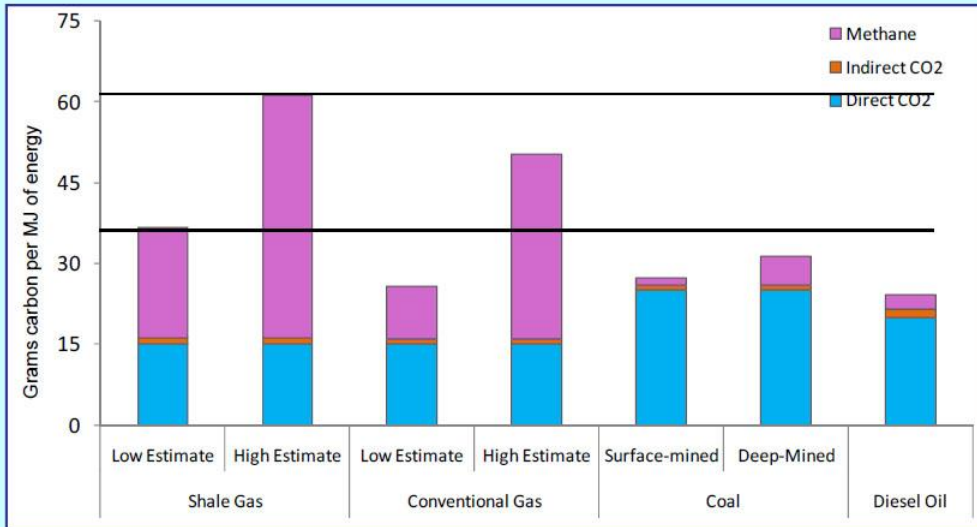


*Greenhouse Gas Emission by Electricity Production Method.*  
(Source: OECD/NEA)

A

Source: MIT, 2010

**Greenhouse gas footprint of shale gas and other fossil fuels  
(20-year analysis; methane given in CO2 equivalents,  
assuming Global warming Potential = 105)**



(Howarth et al. 2011)

## **CONFIDENTIAL Stakeholder Roles**

### **State Representative from Gastown, New Frackillvania (Moderator)**

Your role on the panel is to moderate the process and try to usher participants to an agreement. The shale resources are located in your legislative district. You receive substantial campaign contributions from the oil and gas industry, but at the same time, your constituents are those who have reported contaminated water. However, you recognize the massive economic gains to be had from the shale gas finds. Your interest is to reach an agreement that allows some sort of economic gain as a result of fracking, but controls for some of the worst environmental and social impacts.

#### **Instructions:**

- Establish the purpose of the meeting. Invite each participant to introduce themselves to the group, their role, and how they see the problem.
- For the most part, you should draw a fine line between being a passive moderator, and gently pushing groups towards a solution and showing leadership.
- Go through the problems 1 by 1, and elicit ideas (brainstorm) for possible solutions from the group. Make sure all the issues to be resolved are addressed.
- Narrow down possibilities, identifying points of contention
- See if you can achieve some sort of compromise or aggregate solution. Note that the entire point of this is that the problems and solutions to the problems are not compatible with each other, and all parties will probably need to make some sort of compromises. Focus on solutions, rather than values, and attempt to get participants to generate possible solutions and compromises that they can agree upon.

### **Fracking Industry Association Representative**

The Fracking Industry Association is a non-profit association comprised of all of the businesses involved in fracking in New Frackillvania. Your members believe that fracking will provide low cost energy that will spur economic growth, job creation, and profits for the state. You have sunk \$5 billion into paying landowners for property rights. You oppose any efforts to regulate hydrofracking because any increased costs of production will reduce profits. (Gas is sold at the market price, so profits are simply market price minus production costs.) You oppose any disclosure of fracking fluid composition because this will reduce the proprietary nature of fracking technology and open the industry up to lawsuits. On the other hand, you are concerned that the increasing opposition to fracking may strand sunk investment (say, if fracking were to be banned). While you don't believe this is a major threat, the banning of fracking in New York has made you nervous. You are interested in some minimal regulation and compromise that will ensure the political stability of future fracking in the state.

## **Natural Resources Defense Council Regional Director**

Your non-profit advocates for climate change measures, particularly regulation. You are highly concerned with the long-term environmental impacts of fracking, including climate change impacts, due to methane leakage, and increased reliance on fossil fuels that displace renewable generation. You are also concerned about short-term effects like water contamination and related issues. You're worried that the elected officials will cave very quickly to the oil and gas industry. If fracking is to occur, you'd like to see a long term agreement related to climate change that includes a state program meant to price carbon in New Frackillvania. You also want strict regulations mandating the recycling of fracking water, regulation maintaining the integrity of drilling operations, regulations mandating the disclosure of fracking fluids, and strict liability arrangements to guarantee cleanup for any spills contaminating water supplies. In addition, you will push for stringent permitting, inspections and testing that will ensure that water supplies are not contaminated and will quickly identify contamination issues once they occur.

To bolster your position, you have research produced by independent economic researchers indicating that fracking can be regulated cost-effectively and still allow for fracking development to occur, adding about 7% to the costs of production. This research recommends a series of best practices that you believe should be implemented:

1. Testing of water quality and contaminants prior to drilling
2. Requiring a geological survey of the region in order to minimize earthquakes and other issues caused by deep faults
3. Permitting and regular inspections of wells, guaranteeing the integrity of the drilling casing
4. Regular testing of water quality during drilling and natural gas extraction
5. Mandated water recycling (using reverse osmosis processes), disclosure of chemicals used in fracking fluid, and the return of used water meeting Safe Drinking Water Act regulations to the watershed
6. Prohibiting venting of methane; minimized flaring of methane, and encouraging firms to minimize methane leakage from operations
7. Strict liability for contamination and damages. Required bonding and insurance should be required for industry to protect them from bankruptcy due to damages.

### **Farming and Ranching Bureau Representative**

Your bureau represents the interests of the state's farmers and ranchers. You are concerned about the reduction of water availability that has increased costs and reduced profitability of ranching and farming. In addition, farmers and ranchers have expressed anger about the contamination of water supplies – which they use to feed livestock and water crops. Further, they worry that their way of life has been threatened. While farmers and ranchers are open to income from other activities such as energy development, they enjoy being farmers and ranchers and derive great satisfaction from working the land. Further, they are concerned that horizontal drilling techniques allow drillers to “steal” gas from underneath their land without compensation, which they need to keep their livelihoods going. The reduction in growth of the wind industry has led to decreased profitability and reduced land values. In addition, your constituents worry that fracking will reduce property values if the potential for farming and ranching is reduced. While you are open to fracking in the region, you want your constituents to benefit from fracking, both in the short and long term. Currently, with oil and gas companies leasing millions of acres of land, it's not clear how farmers and ranchers will benefit from current fracking arrangements.

## **New Frackillvania State University Hydrology/Environmental Sciences Professor**

You are an expert in hydrology and environmental sciences. You have conducted research related to water contamination, though the results are preliminary and have not been published. Your research suggests that numerous contaminants have spread through the water supply and that these contaminants both: a) appear to originate from either drilling sites and/or poorly constructed wastewater containment ponds and b) are consistent with the types of contaminants that are used in fracking. While you are not a seismology expert, you have read in journals that deep-water injection produces a higher likelihood of seismic activity, including minor earthquakes, which nearby towns are experiencing. You have also conducted studies that have suggested a link between environmental contaminants and numerous health problems, including nausea, headaches, cancer, and others. You are convinced that if the types of chemicals that are used in fracking get into the water supply, it will result in substantial human suffering. You are concerned that animals and crops that are produced with contaminated water are not safe to consume and believe that testing is imperative. You have considered contacting the USDA to increase testing on food in the area.



### **New Frackillvania Institute of Technology Engineering Professor**

You have conducted research on drilling technology related to fracking. The results of your research suggest that poorly poured wells have resulted in the contamination of water supplies and that poorly constructed containment ponds may have resulted in seepage into the water table and into nearby surface waters. You believe that if drilling is done properly, it can be done safely without water contamination. In addition, you are aware of water recycling technology that can be used to reduce water contamination issues and reduce water consumption in fracking by 95%. Overall, you believe that fracking is the 'inevitable' future, and that the economic benefits promised by fracking are tempting enough to outweigh the costs. In addition, despite a preference for renewable energy technologies, it seems that natural gas will play an important role for a very long time in providing variable and base load electricity generation.

## **Director, Water Recycling Industry Association**

You are the director of a non-profit association that is dedicated to the promotion of water recycling technology. There are about a dozen companies in your organization that hold a variety of patents and technologies that can recycle up to 98% of fracking water and recover many of the chemicals involved in the fracking process for reuse. Your aims are to promote regulations that encourage and/or mandate water recycling. Without regulation, many firms have decided that wastewater injection is cheaper and have chosen not to recycle wastewater. Schlumberger, Halliburton, and Dow Chemical, as well as a variety of smaller firms, possess proprietary technologies that clean water enough to be reused in fracking and are cost-effective relative to waste-well injection. These firms use a combination of mobile water treatment facilities and some built infrastructure and can set up operations in just 4 months. (Desalinization and reverse osmosis technology that would allow water to be clean enough to use in agriculture and even drinkable exists, but is not currently cost-competitive, compared with injecting wastewater or treating for re-use in fracking.)

You believe that stringent regulation concerning water recycling is the only way that fracking will remain viable. You believe that this is good for the environment, good for business sustainability, and good for ensuring the development of fracking in the future.

## **Director, Environment New Frackillvania**

Your grass-roots organization consists of members representing both the political right and left. Those on the right are concerned about the erosion of traditional family values as a result of the boom towns, the rising costs of living, and the potential for “cancer water.” They point to the social impact of fracking and the impact of boom towns on the social fabric of New Frackillvania (including the traffic, crime, alcohol, and erosion of moral values). Your members on the political left are concerned about environmental impacts and the industrialization of a small town, as well as climate change implications. Further, the organization believes that the profits of fracking are flowing to private shareholders, landowners, and corporate executives, while the costs of fracking fall on the community and taxpayers.

Your organization is strongly opposed to any fracking in New Frackillvania and seeks to ban the extraction practice. Because the status quo is a current ban, you will discreetly try to disrupt any potential compromise. (Note, you should do this discreetly, because the rest of the group will ignore you if you seem “extremist.”)

## **Policy Director, New Frackillvania Watch**

New Frackillvania Watch is a citizen's advocacy organization that advocates for transparency, citizen empowerment, and equitable outcomes for ordinary citizens. Your programs and interests span energy costs, health care access and costs, access to fair legal services. On one hand, your organization and constituents are interested in lower heating and natural gas costs that benefit citizens. You are concerned that over the past 10 years, median wages have not increased or kept up with costs of living, while the expense of utilities, including natural gas, have risen. Further, volatile prices of natural gas have finally begun to come down as a result of fracking. The recent moratorium on fracking has sent natural gas, and consequently heating bills – skyrocketing. An average family will now spend \$175/month on natural gas, instead of \$100. For renters and seniors in the community, rents are rising rapidly. For those you represent, this means money that can't be used for groceries, childcare, and other crucial expenses. At the same time, you are highly concerned about reports of unsafe drinking water, the deterioration of municipal services, and inequitable distribution of revenue from fracking.

You are seeking to find a way to balance the responsible development of natural gas resources, improved transparency, and equitable distribution of the benefits of the fracking boom. One possibility that you might be willing to explore is a cooperative ownership agreement, where the community owns the revenue from fracking, manages the proceeds for the betterment of the town and community, and can align the costs and benefits with fracking in a more citizen-friendly approach.

## **Potential Additional Roles**

### **Private Citizen #1 (Charlie Clark)**

You own a farm and signed a deal with a company to allow shale drilling and oil and gas extraction on your property. You receive the industry average payment – roughly 18.5 percent of the value of natural gas – less some fees from the gas extraction. You also received a one-time signing bonus of \$40,000, which you used to build a new barn. Your payment is roughly \$10,000 / month from the fracking activities, and you feel blessed to have gas on your property. You acknowledge that others were not as lucky and did not sign as favorable leases and wonders why the government doesn't step in to regulate the terms of leases so that all citizens receive a fair deal.

### **Private Citizen #2 (Jim Barrett)**

You own a farm, and, despite initial reservations, signed a deal to allow shale drilling and oil and gas extraction from your property. You initially were concerned about impact, but because some of your neighbors were already signing up with the company, you felt you had little choice in the matter – and that you ought to at least reap some financial benefits. You signed what the company claimed was a standard lease, paying 15% in royalties (2.5% above the legal minimum). Now, several years in, despite crediting the fracking industry for saving the town, you feel quite cheated and have joined a lawsuit against Chesapeake Energy. The firm has claimed that transportation and other post treatment costs – due to the mountain location of Barrett's farm, as well as a drop in the price of natural gas, have reduced your royalty payments, and that these were allowed, per the leasing contract you signed. You believe you were promised riches, but only receive a meager \$2,000 a month for the four wells on your property. Further, you now need to sell your farm in order to retire and are worried that the bad deal will get in the way.

### **Private Citizen # 3 (Helen Slottje)**

You moved to New Frackillvania from Boston, where you were a commercial lawyer. Your husband operates a family business in town, and you have a modest house on a small piece of property. You have been horrified at the predatory nature of the fracking firms and the environmental damage. You can smell of toxic fumes from hydrogen sulfide and other toxic chemicals, see the ruttled destruction of the landscape, and are outraged by the seeming indifference by those in power. At a town hall meeting, you noticed that many citizens had little understanding of the contracts that they were signing or the ramifications on their land or on the community. As a result, you have been offering free legal advice to citizens wanting to consult about their land rights before signing lease agreements. Something needs to change.