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Short communication

The insurance industry and unconventional gas development: Gaps and recommendations

Daniel Wetherell^a, Darrick Evensen^{b,*}^a Department of Economics and Department of Environmental Studies, Oberlin College, 122 Elm Street, Oberlin, OH 44074, USA^b School of Psychology, Cardiff University, Tower Building, 70 Park Place, Cardiff CF10 3AT, Wales, United Kingdom

HIGHLIGHTS

- A gap exists in provision of liability insurance for 'fracking'-related risks.
- The market gap is due primarily to uncertainties about probabilistic risk.
- Insurance for risks similar to 'fracking' highlight potential policy options.
- Government regulation and/or industry agreements can effectively fill the gap.
- Policies on insurance and liability coverage necessitate ethical considerations.

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ABSTRACT

The increasingly growing and controversial practice of natural gas development by horizontal drilling and high volume hydraulic fracturing ('fracking') faces a severe environmental insurance deficit at the industry level. Part of this deficit is arguably inherent to the process, whereas another part is caused by current risk information shortfalls on the processes and impacts associated with development. In the short and long terms, there are several conventional and unconventional methods by which industry-level and governmental-level policy can insure against these risks. Whilst academic attention has been afforded to the potential risks associated with unconventional natural gas development, little consideration has been given to the lack of insurance opportunities against these risks or to the additional risks promulgated by the dearth of insurance options. We chronicle the ways in which insurance options are limited due to unconventional gas development, the problems caused by lack of insurance offerings, and we highlight potential policy remedies for addressing these gaps, including a range of government- and industry-specific approaches.

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1. Introduction

High volume, horizontal, slick-water hydraulic fracturing is a controversial form of natural gas and oil development in part because of risks associated with it, although limited information exists about many such risks. Most prominently, water pollution has resulted from and happened during the shale gas development process, though less often because of structural issues with well casings that lead to methane (Llewellyn et al., 2015) or fluid migration (Darrah et al., 2014; Jackson et al., 2013), and more often because of how wastewater known as fracking fluid (a mixture of water, hazardous chemicals, and sand) is handled before and after

fracturing (Souther et al., 2014).

Explosions due to unexpected areas of high pressure known as blowouts may occur, releasing fracking fluids into the nearby environment and in rarer cases may pollute underground aquifers (Dana and Wiseman, 2014). More commonly, used fracking fluid (known as flowback or produced water) contaminates surface waters after being spilled during transportation away from well sites (Dana and Wiseman, 2014). It is released due to human error (as opposed to container or other equipment failure) and is spilled in relatively small quantities (less than 1000 gallons) (U.S. Environmental Protection Agency, 2015). Natural gas development companies are responsible for damages to water supplies, and these risks are likely quantifiable to some extent, but little to no probabilistic information has been compiled. Rozell and Reaven (2012) do estimate a best-case scenario of 200 m³ of contaminated fluids released per well, though they note imprecision in their underlying data. Many suits have been filed against companies,

* Corresponding author.

E-mail addresses: dwethere@oberlin.edu (D. Wetherell), evensend@cardiff.ac.uk (D. Evensen).

though few have been settled, giving little current semblance of a baseline and no maximum estimate for damages (Nicholson et al., 2012).

Drinking water contamination from methane migration, although it has been deemed by the US EPA and state health agencies to not pose a risk to human health, can lower local oxygen concentrations and pose fire and explosion risks in areas in proximity to wells (Jo et al., 2013). Due to interaction with highly saline environments in the shale formations, methane migrating from shale gas extraction could also potentially form toxic trihalomethanes, although there is no documented evidence of this to date (Vengosh et al., 2014). It is still uncertain whether methane migration is inherent to the 'fracking' process or just results from inadequate well safety measures (Osborn et al., 2011). Cases such as *Martin v. Reynolds* have established that in the state of Oregon, the entry of invisible gasses such as methane and subsequent damages caused by these gasses amount to trespass. Although what constitutes a 'trespass' varies slightly by state, *Martin v. Reynolds* demonstrates legal precedent associated with methane pollution risk (Ingelsson et al., 2010).

Beyond water contamination issues, earthquakes capable of causing damage have occurred with an increasing frequency in regions that use injection wells to dispose of wastewater from 'fracking' sites, in addition to produced water from conventional oil development (McGarr et al., 2015; Skoumal et al., 2015). Arkansas has since effectively banned the practice (Zilk, 2011) and Ohio has regulated it heavily (Ohio Dept. of Natural Resources, 2015). Oklahoma and Texas are perhaps best known for having experienced earthquake 'swarms' likely associated with injection wells (McGarr et al., 2015; Keranen et al., 2014; Sumy et al., 2014; Frohlich et al., 2014). Attributing causation from individual wells to unique earthquake events is difficult if not impossible to prove currently, so this poses little risk to natural gas development (NGD) companies, though United States Geological Survey projections expect that regions of Oklahoma and Kansas face the same 5–12% chance of property damage from induced seismicity alone as properties in California face from natural seismicity alone (Petersen et al., 2016).

Finally, 'fracking' may be associated with risks to human health (Adgate et al., 2014; Jacquet and Stedman, 2014, Maryland Institute for Applied Environmental Health, 2014, New Brunswick Department of Health, 2012). Although there is a dearth of research into the matter, health issues such as gastrointestinal, neurological, sensory, and vascular problems have emerged, respiratory problems have been frequently reported, and there is potential for long term cancer risks to emerge (Rafferty and Limonik, 2013). Further research is necessary to establish any extent of risk connected with 'fracking' and its associated processes; these anecdotal cases and relatively isolated studies are worth acknowledging for understanding possible risk areas.

1.1. Currently available insurance options

Many insurers do not offer environmental insurance necessary to cover the aforementioned risks, though those that do have many products that can address and cover risks for NGD companies.

The product featuring most prominently for NGD companies is an Environmental Impairment Liability (EIL) policy which provides coverage for damages to other parties caused by pollution conditions originating from a well site (Dybdahl, 2011, OECD, 2003, Swartz, 2011). 'Pollution' in this context consists of any chemicals, liquids, gasses, and acids that could be used in the development process, a definition broad enough such that companies such as golf courses, factories, farms, and oil refineries utilise similar policies (Dybdahl, 2011). EIL policies are limited by the need of

insurers to both be able to quantify risks and to know the highest possible damages that a claim could carry for the insurer; limited current information on impacts of shale gas development therefore inhibits the potential for NGD companies that use hydraulic fracturing to be issued EIL policies (Gupta, 2008; Nationwide, 2012; OECD, 2003). Oil and gas companies in general accounted for as high as 40% of EIL policies issued from 2011 to 2013, but this is mostly due to 'conventional' development (Nationwide, 2012).

An option for NGD companies similar to an EIL policy is a Commercial Pollution Legal Liability (CPLL) policy. CPLL policies cover the same conditions as EIL policies, except for pollution damages that affect the company itself such as damages to the environment immediately surrounding a well in the event of a blowout (Waeger, 2013). CPLL policies face similar limitations to EIL policies in terms of information needs and issues for insurers.

Also available and of interest for both NGD companies and for the transportation industry associated with 'fracking' is Transportation Insurance, which covers risks associated with accidents that may occur during the transportation of hazardous substances (OECD, 2003). Such policies are rarely issued because of lacking information about the highest possible damages that can be associated with a claim, but could be useful for companies depending on how the unconventional fossil fuel extraction industry develops in the future.

If risk or uncertainty associated with 'fracking' proves to be too large for the insurance industry to capably handle, one alternative for NGD companies is catastrophe-linked (CAT) securities. CAT securities are sold by insurance companies to separate asset markets and are often purchased because catastrophe risk is thought to be independent of financial market risk (Eberl and Jus, 2012; Weiss et al., 2013). These securities either pay off for bondholders at the end of a period if no catastrophe occurs or are used to cover the costs of a catastrophe if one does occur. These securities may only be useful for large scale operations – a majority of all CAT securities issued have been for catastrophes on the scale of high magnitude earthquakes and coastal hurricanes which may cause hundreds of millions to billions of dollars in damages (Artemis, 2015). Therefore, whilst the opportunity exists to rely on CAT bonds, fracking litigation has not reached payout levels on the scale of hurricane or major earthquake damages; thus, it likely does not make sense on the side of NGD companies to pursue this insurance strategy currently.

2. Market gap: Failures of insurance markets to address 'fracking' risks

Although scattered options are available to insure NGD companies, few firms are actually insured for environmental damages specifically. Much of this dearth in coverage is caused by the outright unwillingness of insurers to cover NGD companies, as only five or six insurers will write EIL policies for NGD companies (McLeod, 2013).

This unwillingness stems from the aforementioned lack of information and extreme uncertainty. Insurers such as Nationwide have made publicly known that they do not insure unconventional natural gas and oil development because the vast uncertainty associated with those industries is too large for them to charge a reasonable premium. Insurers rarely work with oil and gas development companies and often have little background with the unique risks associated with development generally, which explains the unwillingness specifically for unconventional NGD companies (Esch, 2012, Nationwide, 2012). Because of what is known as adverse selection, those insurers who do insure NGD companies will additionally need to work with the fact that only the highest risk companies will seek out environmental insurances

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