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Policy decisions on shale gas development ('fracking'): the insufficiency of science and necessity of moral thought

ABSTRACT

A constant refrain in both public discourse and academic research on shale gas development has been the necessity for 'sound science' to govern policy decisions. Rare, however, is the recommendation that effective policy on this topic also include 'sound moral thought'. I argue that: (1) philosophy (particularly moral thought and ethical reasoning) and science must work in tandem for making good policy decisions related to shale gas development, and (2) this realisation is essential for policy makers, journalists, researchers, educators, and the public. By examining the range of normative claims offered within academic and public discourse, the variation in claims across contexts, and the degree to which the normative arguments are well-supported, I illustrate the important role increased attention to moral thought could play in forwarding policy construction on shale gas development. Finally, I offer recommendations for how policy makers, journalists, researchers, and educators can more actively acknowledge the importance of both science and moral thought in policy making related to shale gas development.

Key words: hydraulic fracturing; shale gas; cryptonormativism; energy policy

I. INTRODUCTION

To a philosopher or ethicist, it goes without saying that science, however necessary it may be, is insufficient for designing effective policy. Science helps describe the world around us; explaining, in the broadest sense, what *is*. It can inform normative conversations, but by itself

cannot offer a response to what actions society *should* take. Perhaps Nobel Laureate Lord Bertrand Russell had this in mind when he penned, ‘Almost all the questions of most interest to speculative minds are such as science cannot answer’ (Russell, 1959: xiii).

More recently, academics have noted the import of engaging with other ways of knowing, beyond scientific knowledge, for understanding major environmental issues that society and policy makers often frame as ‘scientific issues’ – for example, climate change (e.g., see Brace and Geoghegan, 2011; Jasanoff, 2010). J. Timmons Roberts and Bradly Parks (2007) argue that discourse about complex environmental risks and related ethical commitments are (and should be) important influences on policy. Some scholars have gone as far as asserting that climate science undermines ethical commitments (Jasanoff, 2010: 233).¹ Nonetheless, discourse about major public policy decisions, particularly in relation to controversial environmental issues, oftentimes ignores the limits of science and/or the importance of moral thought in policy making.

Here I address discourse about policy decisions related to shale gas development via high volume, slick-water hydraulic fracturing. This issue has garnered considerable attention in public and academic realms over the last five years.² The extraction of natural gas via this ‘unconventional’ technique, and associated development (e.g., construction of pipelines and support industries, changes to the landscape, population influxes, etc.), has often been termed ‘fracking’ in both mass media and research literature. I avoid that term here because it fails to

¹ Jasanoff also contends that science conflicts with the ‘normative imaginations of human actors’.

² For example, a search for *New York Times* articles mentioning ‘hydraulic fracturing’ (hereafter, HF) or ‘shale gas’ (hereafter, SG) in the period from April 2008 through March 2013 generated 343 newspaper articles referencing HF and 183 citing SG (several articles cited both terms). In the *Washington Post*, over this same time period, 144 articles cited HF and 93 referenced SG. Regional newspapers have also published extensively on this topic (e.g., four regional newspapers in the Marcellus Shale region of New York and Pennsylvania published a combined total of over 3,000 articles that discussed shale gas development during 2008-2011). In terms of academic discourse, a Web of Science search revealed 323 research articles mentioning HF and 217 mentioning SG from April 2008 – March 2013.

capture the range of environmental, economic, and social effects associated with major industry operating in rural communities, extracting the natural gas, and then exiting the communities (Perry, 2012; Clark, et al., 2012). I use the term ‘shale gas development’ to capture better the broader changes that this development engenders in the physical and socioeconomic landscape.

A constant refrain in both public discourse and academic research on shale gas development has been the necessity for ‘sound science’ to govern policy decisions, sometimes phrased as a call for ‘science-based decision making’.³ This language is akin to US President Barack Obama’s 2009 memorandum to the heads of all federal executive departments and agencies, which began by stating, ‘Science and the scientific process must inform and guide decisions of my administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security.’

Not only mass media coverage and scientific journal articles have demanded sound science; activist groups and industry have made similar entreaties.⁴ Some of these petitions for sound science to inform policy on shale gas development have not explicitly excluded other forms of understanding from also contributing to decision making. Nevertheless, I have been exposed to discourse on shale gas development for over three years, during which I have read over 1,000 newspaper articles, close to 100 research articles, hundreds of blog posts, heard dozens of radio programs, and attended many public meetings on this topic, but I have yet to

³ For example, New York State Governor Andrew Cuomo has been quoted often in mass media as saying ‘let the science decide’ when asked about how to regulate shale gas development. In June 2013, Governor Cuomo was quoted as stating, ‘We have said all along that the decision is a big one and it should be made on the science and the facts, not on the emotion or the politics,’ (Campbell, 2013).

⁴ For example, in March 2013, nyagainstfracking.org had as its first major link on its homepage the phrase ‘Let the science decide’. Also in March 2013, citizenscampaign.org (a group opposed to shale gas development) stated on its homepage, ‘Sound science must inform New York State’s rules governing the controversial and polluting practice of hydraulic fracturing gas drilling.’ In January 2013, a representative of Southwestern Energy Company stated in a webinar through the Yale Center on Environmental Policy and Law that ‘sound science’ and ‘not politics’ need to inform regulations (Boling, 2013).

witness one recommendation (save my own) that effective policy also include sound moral thought.

My argument here is:

- (1) moral thought is equally as important as science for making good policy decisions related to shale gas development, indeed philosophy and science must work in tandem, and
- (2) this realisation, while self-evident to many humanists, is currently unacknowledged by, but essential for, policy makers, journalists, scientists, educators, and the public.

I pursue these arguments by first investigating and describing the range of normative arguments that have been forwarded about shale gas development in various fora. I start by discussing the cryptonormative character of much academic research on shale gas development. The cryptonormativism present in current discourse begins to highlight the insufficiency of science alone for informing decision making on this issue. I follow this with an analysis of normative claims in public discourse on shale gas issues, comparing: (1) extant research on normative constructions by farmers in northern Pennsylvania, USA, and new research on (2) normative assertions in newspaper coverage of issues attending development and (3) normative claims by community leaders in the Marcellus Shale region of New York and Pennsylvania (USA), and in the Frederick Brook Shale region of New Brunswick (Canada).

By examining the wide range of normative claims offered, the variation in claims across contexts, and the degree to which the normative arguments are justified (in the sense of being well-supported by their proponents), I reveal the important role increased attention to philosophy, specifically moral thought and ethical reasoning, could play in forwarding policy construction. Normative claims are already noticeably present in discourse on shale gas development; my argument is that their role in the discourse should be explicitly acknowledged

and that policy makers need to create a space for consideration of moral thought when constructing policy on this issue. Finally, I offer recommendations for how policy makers, journalists, researchers, and educators can more actively acknowledge the importance and proper role of both science and moral thought in policy making related to shale gas development.

II. CRYPTONORMATIVISM IN DISCOURSE ON SHALE GAS

Sound philosophical reasoning, particularly sound moral thought, is essential for regulating shale gas development. As I mentioned previously, this assertion must seem banal and insipid to the philosopher and ethicist; nonetheless, the rhetoric on regulation of shale gas development has all but ignored the role of anything other than science in informing policy on this topic.⁵ While a few proponents of ‘sound science’ explicitly state that normative, philosophical, or value-based judgments have no place in policy construction on ‘scientific’ issues, most proponents do not explicitly use a normative claim of their own to disavow any role for normative claims in decision making. As discourse about regulation of shale gas development currently stands, cryptonormative claims are frequently used to defend ostensibly ‘scientific’ policy recommendations.

I use cryptonormativism to refer to the practice of making one’s normative position cryptic by treating personal judgments about appropriate behaviour as decisions entirely grounded in empirical science (Kolodny, 1996). While the presence of cryptonormative judgments in discourse about shale gas development policy does not, in itself, establish that an explicit role for moral thought is necessary in policy construction, demonstrating such reliance on cryptonormativism elucidates the difficulty of removing normative claims from discourse,

⁵ For a notable exception, see the nuanced treatment that Duggan-Haas, Ross, and Allmon (2013) offer for the proper role of science in decision making related to shale gas development; also see Evensen (2013).

even scientific discourse, on shale gas development. The role of normative claims in such discourse, at present, could strengthen the case for explicitly including a role for moral thought and ethical reasoning in decision making.

III. CRYPTONORMATIVISM IN ACADEMIC RESEARCH

Scientific research is essential for informing policy decisions. Without any understanding of what might happen if different actions were taken, one would not have the knowledge necessary to assess acceptability of policies. Nevertheless, calls for ‘science’ in decision making on shale gas development go beyond demanding a basic level of knowledge.

To explore presence of cryptonormative claims in scientific research, I analysed twenty-one peer-reviewed publications in academic journals that reported findings on environmental impacts related to shale gas development. I collected these articles through a ‘Web of Science’ search in early 2013 for all articles mentioning ‘shale gas’, ‘hydraulic fracturing’, and ‘Marcellus Shale’ that focused primarily on research about shale gas development. I chose the focus on Marcellus Shale to allow for more meaningful comparison with the other, regionally situated, data I present and discuss in this article.⁶ The sample included 15 articles that focused solely on research in the Marcellus Shale region of the northeastern USA; all 21 articles focused primarily on research in shale gas basins within the USA. Nineteen of the 21 lead authors for these publications were from the USA; New York and Pennsylvania were home to the greatest number of lead authors (five lead authors were from institutions in each state).

⁶ Even a cursory investigation into public perceptions of and reactions to shale gas development reveals that perceptions/reactions are very context-specific phenomena. I have seen this in my research in the northeast USA, Atlantic Canada, and the UK. I have also heard this from colleagues working in other shale gas plays throughout North America and Europe. While the research I present in this article is geographically situated, the larger argument I make about the importance of moral thought in policy processes on shale gas development should not be viewed as context-specific.

I analysed the sample by searching each article for normative statements. I designed codes for different types of normative claims that could emerge in advance of reading the articles. While reading the articles, I coded iteratively, allowing additional codes to emerge and then re-coding previously read articles as necessary. Only three articles did not contain language about actions that *should* be taken to allow for better management or regulation of shale gas development (for examples of articles that avoid normative claims, see: Olaguer, 2012, Weber and Clavin, 2012, and Maloney and Yoxtheimer, 2012).

A. '*Scientitized*' research on shale gas

The discourse on regulation of shale gas development could be characterised as 'scientitized' (Sarewitz, 2004). Sarewitz uses this term to refer to the tendency of political figures to cloak normative statements with science as a way of justifying their positions. On the issue of shale gas development, however, *scientists* also mask their normative statements with scientific claims. Sarewitz aptly observes, '...value bases of disputes underlying environmental controversies must be fully articulated and adjudicated through political means before science can play an effective role in resolving environmental problems.'

Similarly, but more broadly, Michael Sandel argues convincingly that major policy decisions must not only account for welfare and freedom, but also for virtue, which he defines as 'cultivating the attitudes and dispositions, the qualities of character, on which a good society depends' (2009: 8). Particularly on the issue of shale gas development, academic publications seem to cryptonormatively favour welfare as a means for decision making, while generally ignoring the role of virtue. Rigorously-conducted scientific research, particularly on a topic as contentious as shale gas development, could easily be dismissed as 'biased' if the research itself contains cryptonormative statements. It would be unfortunate for good science to be excluded

from policy discussions because the researchers failed to distinguish between their science and their normative claims. Equally unfortunate would be for poorly justified normative claims, masquerading as science, to make their way into policy without some explicit discussion of why those normative approaches are appropriate.

Some cryptonormative claims in research articles are clearly scientized; for example, one article on the effects of shale gas development on brook trout states, ‘...development of adequate management and conservation strategies based on science...are needed to balance energy needs and economic incentives with environmental and brook trout conservation concerns’ (Weltman-Fahs and Taylor, 2013: 12). This assertion is not based on science, but rather on the extent to which one values the outcomes of scientific inquiry. Likewise, an article on air quality effects of shale gas development averred, ‘We recommend enforcing a mandatory requirement to conduct baseline sampling and long-term monitoring of local groundwater and air quality, which can greatly improve scientific knowledge and public confidence, as well as environmental safety. After all, “information” is a key to sound management of a complex system’ (Hou, Luo, and Al-Tabbaa, 2012: 386). In both cases, science and data collection serve to justify cryptonormative arguments about management.

Other claims were less overtly scientized, but extremely rare was the instance in which a scientific journal article acknowledged factors, beyond the empirical facts presented therein, that led to a normative judgment. Philosopher Alan Hunt provides insight into how some normative claims are masked in scientific research. Speaking specifically to ethical norms, Hunt (2004: 166) explains, ‘Increasingly morality has come to function through proxies, not in its own voice, but in and through other discursive forms, the two most important and closely related being “harm” and “risk”.’

At least six scientific journal articles in my sample used ‘risk’ as a frame for making normative claims. For example, risk language was used to recommend management of waterways: ‘...we believe a regional strategy is needed to help guide infrastructure development, so that habitat loss, farmland conversion, and the risk to waterways are better managed’ (Drohan, et al., 2012: 1061). Because risk analysis has gained currency as a scientific tool, ‘managing risk’ can present itself as an outcome based on science, rather than fundamentally connected to normative considerations about what *should* be protected, and at what cost. Another article concludes with the assertion, ‘This potential substantial risk suggests that additional steps be taken to reduce the potential for contaminated fluid release from hydraulic fracturing of shale gas (Rozell and Reaven, 2012: 1391).’ The technical evaluation of risk itself, of course, suggests nothing; the degree of concern that people have for the environmental and human health effects of such fluid releases can help us begin to contemplate whether ‘steps should be taken’.

Perhaps the clearest reliance on cryptonormative claims in any of the scientific articles I analysed comes from a point/counterpoint article published in *Nature* (Howarth and Ingraffea, 2011, and Engelder, 2011). This journal’s stature in the scientific community makes the cryptonormative claims, seemingly based on science, especially troubling. The title of the article, ‘Should fracking stop?’ prepares the reader for a well-reasoned normative argument. Yet, both sides offer only a limited enumeration of environmental and economic effects of shale gas development. A large number of recognised impacts of shale gas development are excluded and none of the authors propose any system for weighing or valuing the impacts they identify. On both sides, the authors invoke the language of risks and benefits to justify their claims. This article is perhaps the clearest example of Hunt’s assertion that risk discourse functions as a proxy that masks normative claims in scientific-sounding language.

B. The 'precautionary principle' in research

While less overtly normative than the claims in the *Nature* article, one of the most common cryptonormative statements in the research articles I reviewed was the assertion that additional data or monitoring should inform regulations; at least eight articles made this claim. While it may, at first, seem difficult to disagree with the value of additional data or increased monitoring efforts, data collection comes at a cost. Few articles, however, took up any discussion of who should pay for these costs, or of the opportunity cost of such data collection. Beyond financial costs, data collection takes time. In this sense, recommendations for additional data and monitoring, before regulation can occur, solicit the so-called 'precautionary principle' (i.e., one should not act until one can be certain the action will have no adverse effects).⁷

In its unrefined form, the precautionary principle is 'self-refuting or incoherent' (Sandin, 2007: 101). Cass Sunstein distills this point when asserting, 'The real problem is that the [precautionary] principle offers no guidance – not that it is wrong, but that it forbids all courses of action, including regulation' (Sunstein, 2005: 26). Some academic researchers have called for the precautionary principle by name; others have cryptonormatively invoked it by suggesting that more data is required before regulation can occur. By suggesting that additional information on one or more aspect of shale gas development is needed before the policy process can move forward, scientists operatively claim that regulation should not occur. This claim should be distinguished from claims that shale gas development should be banned; the precautionary principle functionally 'bans' *any* regulation.

⁷ The 'precautionary principle', as I use it here, should be understood as the assertion that an action or process (e.g., hydraulic fracturing for shale gas) should not be permitted until society can be certain that harm will not arise from the process, or until society can be certain that harm is outweighed by the benefits. This could be seen as a strong form of the precautionary principle, which contrasts with a more nuanced form, for example, as put forth in the European Commission's statement on the precautionary principle (2000). Löfstedt (2004) appropriately points out, however, that invocation of the precautionary principle is far more often in line with the strong version, as opposed to the nuanced version.

The problem here is twofold. First, the precautionary principle is being used cryptonormatively in scientific research; it should be presented as a normative claim that is supported by moral argumentation, not science. Second, the precautionary principle, as it is presented in the scientific articles, is not a useful policy recommendation because it perpetually forbids any regulation (either in favour of or in opposition to shale gas development). Unless a principled and non-arbitrary threshold is established for the level of knowledge needed to promulgate regulation, calls for additional data collection are weakly justified.

Henry Miller and Gregory Conko (2000: 95) dub the precautionary principle ‘a neologism coined by opponents of technology who wish to rationalize banning or over-regulating things they don’t like.’ With respect to shale gas development, however, depending on the governance context, Miller and Conko’s assertion or the opposite could be true. In the state of New York, where a de facto moratorium on shale gas development currently exists, calls for additional data and monitoring, before the policy process can move forward, would effectively prevent any use of the new technology for extracting natural gas. In locations such as the commonwealth of Pennsylvania, where development is under way, the precautionary principle could be used to represent interests of parties seeking little regulation. In this case, more data and monitoring could be called for to establish that claims of water contamination have actually occurred, or to establish that tougher regulations are necessary. The precaution here would be to avoid damaging or driving away an extant, viable industry. Scientists’ propensity to be more cautious about Type I (false positive) errors than Type II (false negative) errors suggests that the latter type of precaution could be more readily asserted in research publications (Hansson, 2007).

In summary, appeals to the precautionary principle (often through recommendations that additional data collection and monitoring are needed before the policy process can move forward) represent a common cryptonormative claim in scientific research on shale gas development. These appeals are problematic due to being offered as scientific rather than normative conclusions, and because the ‘principle’, when simplistically applied, effectively prohibits all action (which becomes particularly problematic when we consider that even the decision not to act can, itself, be considered an action).

C. The role of moral thought and ethical reasoning

I am not suggesting that the precautionary principle, or data collection and monitoring, is not useful for policy development. It is, nonetheless, a mistake to determine uncritically that it is necessary for constructing effective policy. Much more thought than I offer here would be needed to justify the normative assertion that such data collection should occur. This intimates a role for moral thought and ethical reasoning in decision making. I do not simply mean that ‘political’ considerations are appropriate and justified in developing policy, but rather that the policy process would benefit if policy makers created open fora for discussing ethical issues related to shale gas development and/or consulted ethicists – experts in normative thought.

As an example of how these public fora and expert consultations could help, consider that ten of the academic journal articles I surveyed made recommendations that specific regulations be adopted to prevent impacts associated with shale gas development. In most cases, these seemed to be consequentialist arguments, based on specific effects of the development process. However, none of the ten articles consider the costs of implementing these regulations or their potential ancillary effects. Therefore, while the policy recommendations seem to be based on the principle that the regulations could lead to an overall better balance of outcomes, little explicit

attention is afforded to accounting for the full scope of potential outcomes or to establishing some unit of commensurate value by which the outcomes could be meaningfully compared. Ethical thought could identify these failures and pragmatically forward the conversation about the value of these regulations.

Eight of the ten scientific articles that recommended new regulations focus on rather narrow policies (e.g., identifying geological fault lines and having setbacks for how close drilling can occur to the fault lines [Myers, 2012], or technological advances to reduce possibility of contaminated fluid leaks [Rozell and Reaven, 2012]). While these articles still do not consider ancillary effects of the recommended regulations, or always make explicit the values on which their recommendations are based, much more concerning are scientific articles that only examine a few potential impacts of shale gas development but then use implicit consequentialist thinking to cryptonormatively recommend broad policy actions. For example, based on a review of some effects of shale gas and coal on the environment and public health, the authors of one article ask, in their conclusion, ‘should shale gas power America?’, which they answer affirmatively (Jenner and Lamadrid, 2013: 451). Without considering any social effects and only tangentially addressing economic effects of shale gas and coal development, the authors make a broad policy recommendation, ostensibly deriving solely from scientific understanding. I am not disagreeing with the authors’ recommendation per se, but rather with the weak manner in which they defend it.

Another article exhibiting similarly weak justification for a policy recommendation asserts, ‘With adequate safeguards in place, shale gas and oil can be exploited effectively and responsibly in ways that protect both the environment and human health’ (Clark, et al., 2012:

259). This article treats fairly the abiotic impacts associated with shale gas development, but does not discuss the host of potential biotic and human health-related effects.

The foregoing analysis exposes substantial gaps in ethical reasoning within policy recommendations in scientific articles on shale gas development. Whether implicitly advocating for a precautionary approach, suggesting ways to limit risk, or encouraging policy makers to adopt regulations that achieve the best overall outcomes, in each case scientists offer normative claims that need justification beyond empirical data. After considering whether a normative claim has been properly justified, one must evaluate the degree to which that claim is justifiable as a rationale for regulating shale gas development in a certain way. For example, two of the research articles in my sample mentioned concerns about the distribution of negative effects of shale gas development (Hatzenbuehler and Centner, 2012; Davis and Robinson, 2012). This is a normative concern and rationale for regulating shale gas development that departs noticeably from the other articles' more utilitarian claims about mitigating risk or achieving outcomes that promote the greatest good. Which normative approach to decision making is more justified? The authors of many scientific articles neglect attention to why their chosen approach is most appropriate. I examine further the justifiability of normative claims by reviewing claims in newspaper coverage of shale gas development (below).

IV. NORMATIVE CLAIMS IN PUBLIC DISCOURSE

Cryptonormative claims in scientific writing on shale gas development highlight the difficulty of removing conversations of what *should be* from discourse about what *is*. They also begin to illustrate that some normative arguments in discourse about shale gas development are weak (in the sense that their authors provide little justification for the claims themselves or for why the

normative approach is germane). While scientists' and policy makers' calls for 'sound science' to inform decision making about shale gas development have been legion, public discourse also influences policy – through informal conversations (i.e., 'interaction rituals') and institutionalised fora, such as mass media outlets (Goffman, 1957). Examining normative discourse in the public sphere helps us understand the range of normative arguments provided for regulating shale gas development in one way or another, and it offers awareness of the ways in which and the extent to which such claims are justified.

A. Neoliberal logic amongst Pennsylvania farmers

Theoretical and empirical evidence suggests that informal local discourse, at least in the areas of Pennsylvania most affected by shale gas development, is leading farmers to rely on neoliberal logic to normalise decision making about shale gas development (Finewood and Stroup, 2012; Malin, 2013). Stephanie Malin argues that this neoliberal normalisation causes farmers to assign greater value to things which the market can readily price. Because many environmental and social goods and services are difficult to value in the market, the economic benefits of leasing one's land trump other considerations under such neoliberal logic, encouraging farmers to lease their land for shale gas development.

While these farmers see their neoliberal logic as helping them to 'develop rational cost-benefit frameworks for assessing fracking's local and regional impacts,' these frameworks ignore or dismiss a large number of impacts to which dollar values cannot readily be assigned (Malin, 2013: 6). Additionally, Malin's interviews with farmers reveal that the 'neoliberal logic that frames non-market-based assessments as irrational helps farmers normalize fracking's potential environmental outcomes' (2013: 7). Again, my purpose is not to argue for or against neoliberal

normalisation of shale gas development, but rather to signal that additional normative arguments exist for taking individual or community-level actions related to shale gas development.

Incorporating a conscious role for sound philosophical/ethical reasoning in discourse on shale gas development would increase the likelihood that people making decisions about how to act in response to development (at individual *and* societal levels) would at least be presented with additional normative frames that could help inform their actions. For example, citizens would not need to feel as if they are ‘irrational’ for disagreeing with neoliberal logic. This ability to recognise and decide between multiple normative approaches is particularly essential for elected officials and policy makers. Examples of additional normative frames that can and do inform decisions appear in newspaper coverage of shale gas development.

B. Normative claims in newspaper coverage

To explore further normative claims in discourse about shale gas development, I conducted a content analysis of 1,037 newspaper articles published between 2007-2011 in four regional newspapers in the Marcellus Shale region (two newspapers from southern New York and two from northern Pennsylvania).⁸ The sample comprises every third article from each newspaper in a chronological list of articles from that paper mentioning ‘Marcellus Shale’.⁹ A review of articles in the four newspapers prior to conducting the content analysis revealed that a sampling frame of articles mentioning ‘Marcellus Shale’ could capture most articles discussing

⁸ The four newspapers were: Binghamton Press and Sun Bulletin (NY), Elmira Star Gazette (NY), Scranton Times Tribune (PA), and Williamsport Sun Gazette (PA). Both NY newspapers are owned by the Gannett Company, a major mass media company in the USA. The Scranton paper is owned by Times Shamrock, a regional mass media company in northeastern PA. The Williamsport paper is independently owned and operated. Each newspaper is a regional paper that serves an urban center in a predominantly rural area, as well as the surrounding small towns and villages. Daily (M-F) circulation for the newspapers ranges from 15,181 (Elmira) to 47,663 (Scranton). I selected these major regional newspapers because survey research I have conducted (unpublished) with randomly-selected households in southern NY and northern PA indicates that local newspapers are the most frequently consulted source for information on shale gas development (almost twice as many survey respondents consulted local papers ‘often’ for information on this topic compared with national newspapers). National newspapers could conceivably have rather different normative foci.

⁹ This sampling strategy generated 292 articles from the Williamsport paper, 266 articles from Scranton, 242 from Binghamton, and 233 from Elmira.

shale gas development while excluding extraneous articles about other topics related to natural gas.

The Marcellus Shale region stretches from central New York through Pennsylvania and into West Virginia and Ohio; it is the largest shale gas basin in the United States and potentially the second largest in the world. With an output of 12.5 billion cubic feet of natural gas per day, as of November 2013, it is the largest natural gas producing region in the US (the second most productive region is the Haynesville Shale, at 6.8 billion ft.³/day) (U.S. Energy Information Administration, 2013). Ninety-two percent of gas reserves in the basin are estimated to lie under Pennsylvania and New York (U.S. Energy Information Administration, 2012).

I coded each newspaper article for the presence or absence of normative claims about ways in which shale gas development should be regulated. If any party cited in the article or the journalist himself/herself presented a normative argument about policy on shale gas development, I recorded a brief description of his/her argument/claim. Some articles contained multiple normative claims. After reading and coding all 1,037 articles, I reviewed the normative claims and sorted them into several themes. Eleven themes emerged, with some themes being divisible into sub-categories (see Table I).¹⁰

I identified normative judgments in a minority of articles from each newspaper.¹¹ To the extent that coverage did include normative statements, the two Pennsylvania newspapers heavily focused on concerns related to distributive justice, while the two New York newspapers concentrated on procedural justice – the *process* by which decisions were/are made (as opposed

¹⁰ For additional background on this research, including other items for which I coded (e.g., presence/absence of a range of environmental, economic, and social impacts related to shale gas development), please see Evensen, Clarke, and Stedman, 2013.

¹¹ 19-36 percent of articles from the various sources included normative statements (19 percent from Williamsport, 28 percent from Scranton, 32 percent from Binghamton, and 36 percent from Elmira).

to outcomes).¹² Distributive justice and procedural justice were, respectively for Pennsylvania and New York, the only normative issues cited in more than ten percent of coverage. Only three additional normative claims were mentioned across all four newspapers; these were also the next most common normative themes: concerns about regulation of shale gas development violating ‘rights’, arguments that utilitarian thinking should inform decision making, and claims that regulation/policy should prevent ‘harm’ from occurring.

Distributive justice: Concerns about distributive justice – the need to regulate shale gas development to prevent unfair distribution of impacts – took many forms. In the Williamsport (PA) newspaper, 15 of the 34 references to distributive justice focused on the need for state-mandated impact fees on shale gas extraction to accrue to local communities. The argument went that local communities most noticeably feel the negative impacts of shale gas development; therefore, they also should benefit most from it. An additional 14 references to distributive justice at the Williamsport newspaper focused on a similar theme – that benefits of shale gas development should be felt by local residents and not primarily or solely by industry. This normative claim was frequently articulated as a need for government to protect citizens and not industry interests.

Procedural justice: Normative statements about the process/procedure for developing regulations also covered a range of concerns. Three concerns dominated attention to this theme in the New York newspapers: (1) affected parties should be consulted and given opportunities to participate in the policy process, (2) adequate oversight and monitoring of industry is essential to complement regulation, and (3) decision makers and local residents need (and should be provided with) good data/facts before making decisions about shale gas development.

¹² I must note that both New York newspapers are owned by the same company (Gannett) and printed many, although not a majority, of the same articles.

Rights: The newspapers mentioned a range of ‘rights’ that could be violated by regulating or failing to regulate shale gas development in one way or another. The Scranton (PA) newspaper focused on ‘rights’ to clean air and water (which are mentioned in the Pennsylvania Commonwealth Constitution). The majority of rights-based arguments in the Elmira paper related to a ‘right’ to protection of one’s land from eminent domain (for major pipelines, for example) or from compulsory integration (the practice of requiring landowners to lease their mineral rights if a certain percentage of adjacent land parcels are leased). The New York newspapers additionally presented a few claims that landowners should be able to dispose of their property as they see fit (including asserted ‘rights’ to ‘life, liberty, and property’). Counter to this argument, which effectively stated that New York regulation should not prevent citizens from benefiting from lease payments and royalties, were claims that shale gas development in one’s community ‘is subverting my pursuit of life, liberty and the pursuit of happiness.’¹³

C. Comparing claims in public and scientific discourse

The normative concerns that most frequently populated regional newspaper coverage on shale gas development differ substantially from normative recommendations in scientific articles, and from public discourse among northern Pennsylvania farmers via informal conversations. While cost-benefit analyses were the most common tool recommended or selected for normative decision making in my sample of scientific articles and in Stephanie Malin’s conversations with Pennsylvania farmers, this approach received minor notice in newspaper coverage (see Table I). The New York newspapers, however, like the scientific research, did give substantial attention to the need for data and good information to inform policy construction.

¹³ Quote from Enfield resident Joshua Dolan at a meeting about shale gas development; reported in: Shackford, 2009.

Variations between coverage in the New York and Pennsylvania newspapers also emerged. In the Pennsylvania newspapers, which lie in regions where shale gas development has been occurring for over seven years, distributive justice concerns were the predominant normative frame. In the New York newspapers, which reside in an area currently experiencing a de facto moratorium on development (and where the debate on shale gas has become increasingly narrow and polarised, reflecting positive economic effects vs. negative environmental impacts), normative claims related primarily to concerns about the processes by which regulation occurs.

D. Normative claims by community leaders

I followed the content analysis with in-depth interviews of individuals heavily involved in facilitating (e.g., by leading public meetings) and/or shaping conversation on shale gas development (e.g., by leading groups in favour of or opposed to development). My ten interviews in Pennsylvania, eleven interviews in New York, and twenty-six interviews in the Canadian province of New Brunswick closely aligned with the newspaper coverage in terms of normative representations of shale gas development. I did not ask interviewees explicitly to cite normative concerns; I merely started by asking them to explain what they think of first when they hear the words ‘shale gas development via hydraulic fracturing’. I followed up by questioning why those initial thoughts came to mind.

Several Pennsylvania interviewees mentioned distribution of impacts. One township supervisor expressed this point succinctly, ‘A big issue here is distribution. Everyone’s taxes have gone down; some people benefit heavily from increased business, others not so much... Traffic is horrible if you live on [the state highway].’ This same individual illustrated issues of distribution not only between persons within a community, but also between communities.

Some communities, due to impact fees, leases, royalties, and increased business make out well financially; for example, the supervisor's township received, in 2012, eight times its annual tax base just from impact fees associated with shale gas development. Communities with fewer wells may see the same noise, dust, road degradation, stress, and social disruption from traffic, but receive far less financial recompense.

In New York, where the conversation focuses predominantly on regulation of development, specifically whether to ban or allow it, procedural justice concerns were manifest in a minority of interviews. One community organiser, speaking about a town board that passed a resolution in favour of gas development stated, '[the town board] acted without consulting its residents; this really p*ssed people off. They started talking to their neighbours and kept coming to the town meetings.' Other interviewees cited a lack of transparency, coming both from town meetings and the state government, as negatively affecting their faith in the regulatory decision making process. Finally, some government officials were concerned about availability of information for municipal governments and citizens. A county planner summed this up in the statement, 'there are so many unknowns out there'.

The interviewees from New Brunswick displayed more concern about procedural justice than the US interviewees. The majority of these interviewees, on both sides of the debate, mentioned that the provincial government provided very little information on the effects of shale gas development to its citizens, and that much information the government did provide came directly from industry. One municipal official summarised his constituents concerns about the government handling of shale gas issues succinctly – a lack of 'transparency and consultation'.

In addition to concerns about government transparency, 22 of my 26 interviewees mentioned that the newspapers in New Brunswick could not be trusted as a source of objective

information on shale gas development. Opponents of development cited a single family's ownership of all English newspapers and most French newspapers in the province as affording coverage an industry bias (this family also owns the largest oil refinery in Canada). Proponents of development cited the tendency of coverage to focus on sensational risks instead of more mundane benefits.

The New Brunswick interviewees also cited distribution of risks and benefits as a dominant theme, but with a different focus than in Pennsylvania. Whereas Pennsylvania interviewees cited disparity in negative and positive outcomes between individuals or between communities; New Brunswick interviewees focused heavily on benefits to industry versus risks to local residents. In the province, all mineral rights are held in trust by the provincial government (i.e., the rights are 'vested to the crown'). Many New Brunswick interviewees opposed to shale gas development believed that the gas industry is under-regulated and not paying reasonable royalty rates (set by the provincial government) for its extraction of the provincially-owned resource.

While representations of distributive and procedural justice did receive substantial attention from my interviewees, by far the most common normative representation of shale gas development in each jurisdiction was how development would affect 'perfectionist' aims. The encyclopedia of philosophy defines perfectionism as 'an ethical view according to which individuals and their actions are judged by a maximal standard of achievement – specifically the degree to which they approach ideals of aesthetic, intellectual, emotional, or physical "perfection".'

Perfectionist goals were manifest through interviewees constantly defining standards for the 'good life' within their communities, and then explaining how shale gas development would

affect their own ability, and the ability of other community members, to achieve those standards. Several interviewees opposed to gas development viewed the ability to be at peace in docile environs as the standard of achievement that promotes the good life. For example, a woman from New York asserted, ‘Peace and quiet is the essence of living here...Heavy industry would destroy all that is important in life.’ Such a claim relates closely to Michael Sandel’s suggestion that virtue must be included as a relevant factor in decisions about major public controversies. Sandel contends, ‘outrage...is more than mindless anger. It gestures at a moral argument worth taking seriously’ (Sandel, 2009: 7). He would likely suggest that the aforementioned woman’s outrage is a moral commentary on a vice that she perceives to be ‘at odds with civic virtue’.

Almost every interviewee in each jurisdiction explained that his/her views on shale gas development are based on whether the development will preserve or destroy opportunities for achieving the good life in his/her community. Unsurprisingly, beliefs about how to achieve the good life differed. A pro-development advocate from Pennsylvania averred, ‘If you truly want to preserve what we have here, then the gas wells will do this better,’ referring to the ability of financial influx to preserve the agricultural landscape from sub-division.

In New Brunswick, pro-development advocates commonly perceived development as a means for creating jobs for youth and establishing a viable economy that could sustain the population. One village councilor remarked, ‘The thing that is killing our community is our youth going out west (for work).’ For such people as this councilor, a vibrant and stable population is needed to maintain good municipal services, which in turn are a standard for the good life. Anti-development activists in NB were concerned, like residents in PA and NY, that industrialisation would change the bucolic essence of their lives: ‘People come here due to the quiet life, slow pace, and sense of community.’ Much of New Brunswick is rural and several

interviewees worried about development changing that. Other residents saw a healthy environment and the public *perception* of a healthy environment as essential to fostering the good life: ‘Clean air and water are the lifeblood of the region...one spill destroys the heart, soul, and identity of [this region]. Without the river, the environment, we are nothing.’

V. IMPLICATIONS FOR POLICY MAKING

The diversity of normative claims in scientific and public discourse reveals that a number of moral arguments have been offered for how and why to regulate shale gas development. While admitting that this collection of normative approaches is by no means exhaustive, the range of moral arguments employed suggests that policy construction could benefit from a conscious and meaningful evaluation of these various claims. I began this article by demonstrating the substantial role afforded, at least rhetorically, to ‘good science’ in shaping public policy on shale gas development. No similar explicit role has been offered for sound moral thought. Creating a space in the policy process for explicit consideration of moral thought will not be a panacea that necessarily improves policy outcomes. Nevertheless, creating such a space would at least shed light on extant normative claims, reveal whether those claims are justified and justifiable, and potentially allow additional and/or more nuanced moral arguments to be considered.

When contemplating the role that explicit consideration of moral thought could play in the policy process, it is worth noting that many of the normative values related to potential effects of shale gas development (or regulation of development) at the local level. In the USA and Canada, most regulation and policy formation related to shale gas development occurs at the state/provincial level. In Europe, regulation occurs mostly at the national level, with opportunity for overarching European Commission/Parliament governance. If policy is to account for

normative considerations and claims related to shale gas development, it needs to evaluate the moral implications of development across all levels of analysis.

Science and public discourse contribute to the policy process at local, state/provincial, national, and international levels. Mass media informs the public and exerts pressure on policy makers. Science, mass media, and interpersonal discourse on shale gas development contain numerous moral arguments (sometimes masked with cryptonormativism). If moral arguments are already important components of the policy process, it is either naïve or disingenuous to assume, recommend, or claim that policy is/should be based on science alone. I contend:

(1) Explicit attention should be given to the panoply of moral arguments that could be useful for decision making about shale gas development,

(2) All moral arguments should be made explicit, rather than presented as scientized cryptonormative claims, and

(3) A cogent and justifiable argument should be provided for each adopted approach.

In terms of selecting a normative approach to decision making, my research reveals that little analysis exists of why particular normative approaches to policy on shale gas development are more appropriate than others (e.g., weighing risks and benefits vs. adopting a perfectionist view). In terms of supporting the approach taken, rare has been the argument that defends satisfactorily the appropriateness of that approach. For example, any recommendation that cost-benefit analyses should be used for regulating shale gas development should, at minimum, consider a broad range of potential effects (which the survey of academic articles reveals is rarely done), should then deliberate over how to weigh these potential outcomes, of very

different types, against each other (which I have never seen addressed),¹⁴ and should justify reliance on cost-benefit analyses over other approaches to decision making.

When recommendations for policy development explicitly or implicitly suggest that regulation be generated based solely on ‘sound science’, this creates an opportunity for poorly justified moral arguments, or cryptonormative claims, to creep into decision making. Because empirical data is, by definition, incapable of providing an answer to what regulation *should* exist, adherence to ‘sound science’ as the Holy Grail for designing regulations encourages use of normative claims that have received little philosophical/ethical analysis. If calls for ‘sound science’ were paired with advocacy for ‘sound moral thought/ethical reasoning’, the normative claims in both scientific and public discourse could be explicitly identified and evaluated for the degree to which they are adequately justified (e.g., are there holes in reasoning or claims that are not defended?) and justifiable (e.g., does this form of decision making address why this approach is appropriate and others are not?).

Cryptonormative as well as outright recommendations for observing a ‘precautionary principle’ exemplify clearly the need for justified and justifiable moral thought about shale gas development. Recommendation of a precautionary principle is only appropriate if its proponent also offers a principled and non-arbitrary threshold for the level of knowledge and certainty of knowledge one must have about the risks in question to make a policy decision. This is reflected in the European Commission’s 2000 statement on the precautionary principle, which asserts that policy makers must ‘avoid unwarranted recourse to the precautionary principle, as a disguised form of protectionism’ (Commission of the European Communities, 2000: 3). Nevertheless, inappropriate application of the precautionary principle is still commonplace (Löfstedt, 2004),

¹⁴ For a thoughtful discussion of some of the problems inherent in comparing environmental and social risks of very different types, see: Lewens, 2007.

including in scientific and public discourse related to shale gas development. Explicit attention to justified and justifiable moral thought in policy recommendations could help policy makers see the relative strength or weakness in such appeals to the precautionary principle.

In the absence of sound moral thought/ethical reasoning about shale gas development, one might more likely accept the rhetoric that ‘political’ decisions need to be made about how to use science. Political decisions are, of course, needed, but those decisions could produce outcomes much more reflective of the interests and desires of the general citizenry *and* of scientists if conscious thought were given to whether the moral arguments put forth in ‘political’ recommendations are justified and justifiable.

On the topic of shale gas development, few policy makers or members of the public would recommend that legislators and executive staff should collect scientific data themselves. For example, I have never come across a recommendation that policy makers themselves measure the presence of contaminants in water; likewise, I have yet to hear a call for policy makers to design tests for measuring induced seismicity (i.e., earthquakes). Such recommendations seem ridiculous because experts in these fields exist who can better collect and analyse these data. In the same manner, experts in moral argumentation and ethical reasoning exist who can review normative claims and determine the degree to which the claims capture and/or ignore important considerations. This ethical reasoning is additional ‘data’ that could inform an eventual policy decision.

VI. CONCLUSION

While ‘sound science’ is essential for effective policy development, so is ‘sound moral thought/ethical reasoning’. For policy makers, this suggests it could be valuable to create public

fora for discussing ethics as they relate to shale gas development, and to include a role for philosophers, ethicists, and, broadly, for the process of moral/ethical analysis in creating regulation on shale gas development. I also call for policy makers to not operate under the misconception that ‘sound science’ (i.e., empirical data) alone can foster useful policy recommendations.

For scientists, journalists, and anyone offering recommendations for how to regulate shale gas development, the importance of sound moral thought/ethical reasoning is a call to acknowledge normative claims in their writing (thus, avoiding cryptonormativism), and to justify their normative approach(es). Particularly for scientists who champion the value of sound science for decision making, these researchers should distinguish better between their scientific results and their normative claims. Not doing so could diminish the credibility and value of their empirical data.

For educators, the importance of sound moral thought/ethical reasoning for decision making means that we must provide our students, or the public we serve, with more than a scientific awareness of the physical, biological, social, and economic phenomena associated with shale gas development. We must teach them ethical tools for thinking about how regulation *should* occur. This applies to educators in K-12, college/university, adult education, and extension/outreach settings. Educators who do not have expertise in moral thought can solicit experts externally to teach these skills. University cooperative extension and outreach educators frequently rely on outside experts to provide specialised knowledge.

The lack of attention to the role of moral thought/ethics in decision making is frightening. This is manifest in all segments of society, from policy makers to scientists to educators. Perhaps this deficiency is most concerning in our elected leaders and their staff, particularly on

the national level. For example, consider the dearth of funding afforded to the US National Endowment for the Humanities (NEH) and the incessant efforts to cut the NEH further. Yet, I am optimistic that state and local politicians, legislative and executive staff, journalists, educators, and the general citizenry can be convinced of the need to pair sound science with sound moral thought/ethical reasoning to produce sound decision making.

Lord Russell (1959: xiv), nearly seventy years ago, articulated presciently the role of philosophy in today's society: 'To teach how to live without certainty, and yet without being paralysed by hesitation, is perhaps the chief thing that philosophy, in our age, can still do for those who study it.' In other words, philosophical thought can greatly aid decision making on complex issues. Lord Russell's words ring true on issues of shale gas regulation as well as for policy more broadly.

Table I. Normative claims in regional newspaper coverage of shale gas development in Pennsylvania and New York

Normative Claim	Williamsport (PA), n=292	Scranton (PA), n=266	Binghamton (NY), n=242	Elmira (NY), n=233
Distributive justice	34	34	9	10
Jobs created should go to local residents	1	0	0	3
Impacts occur locally; therefore, fees/taxes should accrue locally	15	8	0	0
Who pays for clean-up, monitoring (taxpayer or industry)? Industry must pay its share.	0	15	2	1
Broad statement about unfair distribution of impacts	0	3	3	2
Benefits need to accrue to local citizens (not to industry); gov't. needs to ensure this	15	8	4	4
Concerns about growing disparity in wealth distribution (in a community)	3	0	0	0
Procedural justice	9	20	38	45
Consultation with/inclusion of/participation opportunities for affected parties	1	2	7	10
Need good data/facts to make decisions, need more information	3	2	12	10
Need for transparency and disclosure of chemicals in 'fracking fluids'	2	3	2	1
Need adequate oversight, monitoring, and/or regulation	3	12	12	16
Unfair power differential between companies and landowners	0	1	5	8
'Rights'	1	9	8	11
Utilitarian judgments / cost-benefit analysis / need to 'balance' outcomes	5	4	5	7
'Harm' must be avoided when making decisions	6	2	5	8
We should take 'time to get it right', 'err on side of safety', precautionary principle	0	5	5	4
Correctness of policy depends on whether adequate compensation is provided	0	3	4	4
Studies should be science-based, peer-reviewed, lack bias and conflicts of interest	0	2	3	3
Concern for (and responsibility to) future generations	3	0	3	1
Policy should preserve community 'way of life', 'community character'	1	1	0	2
Development should be allowed as it helps farmers to keep their land	0	0	3	1

[Note: Newspapers are identified by the city in which they are located. Next to each city name is the full sample of articles coded from that newspaper. The numbers in the columns refer to the number of articles that included normative statements related to each theme. Indented normative statements are sub-categories, underneath a broader category of normative claim.]

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