

# **Green Criminology and Fracking in the UK: An Application of Utilitarian Ethics**

*Jack A. Lampkin*

## **Abstract:**

Fracking is a controversial hydrocarbon extraction technique with the UK public, but the passing of the Infrastructure Act 2015 has made fracking in the UK imminent. This paper attempts to conduct a cost-benefit analysis of the potential social and environmental risks and benefits of fracking in order to provide a lens through which to guide public policy on the issue. The classic philosophical theory of utilitarianism is outlined and then re-applied to the assessment of the risks and benefits of fracking. This re-application comes to the conclusion that fracking should not be instigated by the UK government under the principle of utility based on the equal consideration of all people's interests. Instead, the paper calls for the increased use of renewable forms of energy as a solution to the utilitarian outlook on the UK's energy policy, in line with the UK public's energy generation preferences.

## **Keywords:**

Fracking; utilitarianism; green criminology; victims

The study of green criminology is complex not least because of the array of far-reaching issues that can be encompassed under the green criminological umbrella. These issues can range from, but are not limited to: access to water resources, the illegal management and distribution of wastes, trades in illegal timber and wildlife, extraction of natural resources, and animal abuse, to reveal a handful of examples. In fact, green criminology

does not just draw the line at attempting to explain green crimes that violate criminal laws. On the contrary, green criminology widens its net by including in its broad scope acts and omissions that cause *harm* which may not necessarily be defined as illegal by criminal justice systems. After all, crime is a social construct that has ‘no ontological reality’ (Hulsman, 1986: 64), and laws are constantly being created, amended and repealed according to the political, economic and cultural attitudes of the times. As a result of this realization, many academics who could be said to be contributing to the concept of green criminology (for it is not a distinct, grounded criminological theory) have noted that the broader notion of ‘harm’ may be a better focus for criminological enquiry (Hillyard and Tombs, 2007; Stretesky et al., 2014) rather than the narrow, orthodox criminological lens that limits itself specifically to tackling actions that violate the law of the day.

Despite such a disjuncture in criminology between crime and (legal) harm, a distinct positive of the subject is the realization that ‘criminology is the application of other disciplines to the study of crime and criminals (and also deviance, harm, incivility, offence and so on’ (Millie, 2016: 7). Therefore, whilst this paper could be seen as interdisciplinary (considering aspects of law, philosophy, victimology, zemiology and social and environmental justice), the overall glue that binds these topics together is criminology itself through the recognition that harm is occurring and that something ought to be done about it.

This paper will focus on the notion of harm, rather than the traditional, man-made notion of crime. The act of unconventional onshore hydraulic fracturing (hereafter “fracking”) in the United Kingdom (UK) will be presented as a legal act that falls within the broad remit of green criminology on the basis that the process creates social and environmental harms and injustices, rather than causing the violation of specific laws. The fact that governments around the world (namely, the United States (US), Australia, South Africa, the UK, and Poland) are currently consenting to the use of unconventional hydraulic fracturing (either at exploratory or production phases), despite the known social and environmental harms the process creates, requires green criminological explanations for such state-corporate interests, and this will be a theme that runs consistently through this paper. The primary aim of the paper however, is to use utilitarianism to show that

fracking does not create the greatest net utility and that, actually, the UK public would rather see the use of less harmful renewable forms of energy creation.

## **Fracking**

Although hydraulic fracturing in a conventional, vertical manner has been undertaken for several decades in both the US and the UK, the unconventional act of hydraulically fracturing a horizontal well is a new technique developed by Mitchell Energy in the US in the 1990s. Mitchell Energy developed 'slick-water fracturing' (Prud'homme, 2014: 29) that could be conducted several times per well and involved the use of water, sand and a small amount of chemicals to fracture rock underground to release the gases trapped inside. This technique is now commonly referred to as *fracking*, to describe the manner in which hydrocarbons are released. It must be noted however, that there is not one definitive way in which to conduct fracking, and the techniques involved vary from company to company and from location to location, respective of the time, resources and funding available to companies and the geological nature of differing underground rock formations of the proposed fracking area.

Fracking is an extremely controversial issue for the British public and there are now hundreds of anti-fracking groups who are organizing to campaign against the expansion of the fracking industry in the UK (Jones et al., 2013). Statistically, a survey from the Department of Energy and Climate Change (DECC, 2016: 9) found that 31% of the public were opposed to fracking with 19% in support of fracking. Conversely, 81% expressed 'support for the use of renewables with 4% opposed to renewables' (DECC, 2016: 7). This clearly indicates that the UK public would prefer renewable forms of energy rather than the use of shale gas, and this is a growing trend over time. There are arguably two main reasons for this state of affairs. Firstly, negative representations of fracking that portray social and environmental harm have caught the attention of the media in the US and the UK leading the public to question the safety and necessity of the industry. Such representations include the documentary film *Gasland* directed by anti-fracking campaigner Josh Fox, and *Promised Land* starring the actor Matt Damon (Jaspal and Nerlich, 2014: 2). Finally, it could be argued that the potential social and environmental costs associated with fracking coupled with the uncertain economic benefits proposed by

the industry could be a factor in the hesitancy of the British public to get behind fracking and to give it their full support.

It is this final point that is extremely important for the UK government in their future decisions with regards to the fracking industry. If the government continues to push the fracking agenda and the public continues to progressively oppose fracking, public resistance to the industry will strengthen and government sovereignty will continue to be questioned. However, it must be noted that *some* of the public, alongside the fracking industry and many MPs are in favour of the expansion of the fracking industry, and these views must be considered equally alongside the views of those who are conversely opposed to the industry. In this respect, it could be argued that a fair solution to the fracking debate (in terms of directing public policy on the issue) would be to conduct a cost-benefit analysis with regards to the potential social and environmental costs that may occur from fracking in comparison with the potential social and environmental benefits that may occur from fracking correspondingly. This fits neatly with the theory of utilitarianism which advocates for the equal consideration of every person's interests. This is shown through the work of J.S. Mill who proposed that 'a society between equals can only exist on the understanding that the interests of all are to be regarded equally' (Mill, 1863: 304).

Table 1 displays a cost-benefit analysis with regards to both the *potential* social and environmental *costs* associated with fracking and the potential social and environmental *benefits* associated with fracking. Table 1 does not aim to identify *all* of the possibilities with regards to these potential costs and benefits, but it *does* intend to bring together the salient issues from both sides of the fracking debate into one particular place. Similarly, Table 1 does not imply that the arguments in each respective column are concrete to that respective column. Arguments overlap between social and environmental issues as well as between benefits and costs. For example, the impact of fracking operations on local air quality could be interpreted as both a social cost and an environmental cost. Similarly, it is unknown to what extent fracking will contribute to an increase in emissions leading to a negative effect on climate change, or whether using gas rather than coal will lead to a positive effect on climate change.

Potential Social Costs	Potential Environmental Costs	Potential Social Benefits	Potential Environmental Benefits
Impact on local air quality from drilling sites (Gear et al., 2014: 7; White et al., 2016: 14).	Surface water and soil contamination from surface spillages (Entrekin et al., 2011: 506; Gear et al., 2014: 7).	Creation of approximately 74,000 jobs (Institute of Directors, 2013: 17; White et al., 2016: 9).	Using more gas and less coal could bridge the gap to a low-carbon future (White et al., 2016: 25).
Traffic, noise, light and dust pollution from drilling sites (DECC, 2014: 4; Gear et al., 2014: 7).	Risk of groundwater contamination from leaks at depth (Gear et al., 2014: 7; Throupe et al., 2013: 206).	Investment of £3.7 billion per year (Institute of Directors, 2013: 17; White et al., 2016: 9).	Creating gas in the UK decreases the need to import liquid natural gas from abroad, the transportation of which contributes to emissions (Institute of Directors, 2013: 46; White et al., 2016: 26).
Landscape disruption (Gear et al., 2014: 7) and habitat fragmentation (Jones et al., 2015: 382; Slonecker et al., 2012: 9).	Sustained Casing Pressure (SCP) and well integrity issues during or after fracking leading to leaks (Jackson et al., 2014: 337-339).	Heightened energy security (White et al., 2016: 27).	
Exposure to chemicals through spillages or water contamination. Exposure also to Naturally Occurring Radioactive Materials (NORM's) and Radon gas (DECC, 2014: 4).	Radiation risks to surface and groundwater from radiation in waste fluids and drill cuttings (Gear et al., 2014: 7).	Investment in UK hydrocarbons could contribute to economic growth (Ochieng et al., 2015).	
Risks to the health of fracking workers caused by continued exposure to radioactive chemical compounds (Esswein et al., 2012).	Risks of spills in transporting chemicals and/or wastewater (Gear et al., 2014: 7; Mash et al., 2014: 333).	Creation of jobs in poorer areas of the UK such as Lancashire (Institute of Directors, 2013: 29-33).	
Depreciation in property value of property in close proximity to well sites, particularly where seismicity occurs (Gibbons et al., 2016). People may decide to move away from the area.	Seismic activity or larger earthquakes resulting from waste disposal through re-injection (Royal Academy of Engineering, 2012: 45-46; Zoback, 2012).	The ability to use fossil fuels for energy both for individual, family and commercial purposes for decades to come (Stacey, 2015).	
Property damage resulting from blast vibrations or seismic activity (Jones et al., 2015: 385).	'Impact on climate change caused by fugitive emissions and the subsequent burning of gas' (Gear et al., 2014: 7) through the techniques of flaring and venting (DECC, 2014: 3).	Increase in jobs could mean more people moving to the area, particularly workers and their families meaning the possibility of higher rental income and money spent in local area.	
Energy prices may not reduce even with the energy created by fracking (House of Commons Energy and Climate Change Committee, 2013: 5)	Use of large quantities of water leading to water depletion in water-scarce areas. Each well could require up to 3.8 million gallons of water (Cooley and Donnelly, 2014: 67)	Communities may receive £100,000 per well at exploratory phase and 1% of revenue at production phase (White et al., 2016: 22).	

Difficulty of the government to abide by legally binding emissions legislation (such as the Climate Change Act 2008) and climate agreements (such as COP21).	Cheaper gas could divert investment from cleaner, renewable forms of energy (White et al., 2016: 26) and towards the continued use of fossil fuels.		
Loss of tourism due to tourists avoiding an area undergoing shale gas operations which could result in a loss of jobs (Shropshire Council, 2014: 2).			

(Table 1: Potential social and environmental costs and benefits).

Table 1 clearly shows the multitude of factors that need to be considered when making decisions on fracking. Whilst communities have the potential to benefit financially from fracking, exactly how communities will use such money, and who the money goes to, is open to interpretation. Most of the social and environmental benefits identified allude to wider benefits to society, largely in economic terms, such as the creation of jobs, creation of fossil fuel energy and heightened energy security. Whilst such arguments often carry political weight, there are alternatives to fracking that also produce similar wider social benefits (jobs, energy security, energy creation) and these are renewable forms of energy. The DECC (2016) public attitudes tracker shows that the public support renewable energy much more favourably than energy created by fracking.

The social and environmental costs of fracking outlined by the cost-benefit analysis (Table 1) cover a range of problems related to human health (from the potential exposure to spilt chemicals), to extremely important climatic considerations (for example, leakages and fugitive emissions from flaring). These costs may be significant for local communities and for the wider global human population and environment. For a fracking industry to develop in the UK, the government is highly dependent on the social benefit arguments of fracking to gain legitimacy for their decisions. However, there is no guarantee that such benefits will materialize. For example, whilst the institute of Directors (2013) report indicated the potential creation of 74,000 jobs for fracking in the UK, Great and Little Barugh Parish Council claimed that the KM8 well at Kirby Misperton in North Yorkshire would ‘not create a single new job for local people’ (North Yorkshire County Council, 2016: 57).

The cost-benefit analysis has shown the complex nature of fracking, making decisions on its usage very difficult. One way to overcome this is to use alternative, renewable technologies that create much less social and environmental cost. An analysis of the classic criminological (and philosophical) theory of utilitarianism helps to explain why fracking does not create the greatest net utility.

### **Principles of Utilitarianism**

Utilitarian ethics are generally attributed to the work of 18<sup>th</sup> and 19<sup>th</sup> century scholars and philosophers such as Cesare Beccaria, Jeremy Bentham and John Stuart Mill. Whilst these figures are exceedingly important in the development of a modern utilitarian ethics, a form of utilitarian thought can be detected much earlier in the works of 5<sup>th</sup> century BC Chinese philosopher Mo Tzū (Scarre, 1996: 23), but also in the teachings of 4<sup>th</sup> century BC Greek philosopher, Epicurus (Mill, 1863: 278; Scarre, 1996: 39). It was Jeremy Bentham however, who developed the 'Principle of Utility' in his formative work entitled *An Introduction to the Principles of Morals and Legislation* (Bentham, 1781: 65), arguably the most well-established concept attributed to utilitarian thought. The principle of utility is a simple concept devised on the idea that all actions result in either pleasure or pain and, 'it is up to them alone to point out what we ought to do, as well as to determine what we shall do' (Bentham, 1781: 65). Because of pleasure and pain, the principle of utility advises that all actions should intend to promote pleasure and reduce pain resulting in the 'greatest good for the greatest number' (Bentham, 1776, cited in Burns, 2005: 46).

Utilitarianism holds that all decisions (whether they be made by individuals or by governments or by companies) must promote happiness and prevent the reverse of happiness; pain or harm. Therefore, it is the perceived outcome of an action that is the deciding factor as to the 'rightness or wrongness' of an action which makes utilitarianism (like Kant's deontological ethics) consequentialist in nature (Millie, 2016: 36). Actions that create happiness and minimize pain are therefore classed as morally right actions under utilitarian ethics, and acts that prevent happiness or exacerbate pain are consequently considered as morally wrong actions. According to Mill (1963: 273) 'a test of right and wrong must be the means... of ascertaining what is right and wrong, and not a consequence of having already ascertained it.' Therefore, actions should be led by what

is right and wrong designed by a code of ethics, here proposed as utilitarian ethics, and should not be ascertained by committing an act regardless of the unknown consequences of that act.

An interpretation of this can be linked to a well-known concept within environmental law known as the *precautionary principle*. According to Wolf and Stanley (2014: 16) 'this principle enables or requires states to take action where a risk to human health or the environment exists, but there is evidential uncertainty as to the existence or extent... of the risk.' Hydraulic fracturing has already been shown to cause environmental contamination and social victimisation in the US in a multitude of ways (Jackson et al., 2014). This, combined with the fact that hydraulic fracturing has not yet begun on a commercial scale in the UK, means that there is evidential uncertainty as to the scale of the risk of human and environmental victimisation in the UK. Until there is succinct evidence to suggest that hydraulic fracturing will not cause any social or environmental victimisation, both the precautionary principle and the utilitarian way of ascertaining right and wrong would condemn the act from taking place.

A critique of this argument manifests itself in the decisions that are made by governments with regards to legalizing acts that promote ecological destruction or human harm. If a company, for example, is actively releasing pollutants into the environment, but acting within the remit of a particular permit or law, then the current legal system permits this as a morally right action (Wyatt, 2013: 62). This is an idea considered in relation to environmental victimology where Hall (2014: 129, emphasis in original) states that:

... most debate concerning how environmental destruction might fit within the corpus of criminology and victimology is whether those harmed by environmentally destructive activities are truly victims of *crime*, given that many polluting activities are frequently not only state sanctioned, but in fact are actively *promoted* by states.

Therefore, although a particular act that causes pollution may at one time be legal, a realization of harm, or over-pollution, may see the same act criminalised in the future. It is for this reason that laws are not always the best way of deciding what is morally just and what is morally unjust, particularly where environmental laws are concerned.

Although this article began by suggesting that green criminology may be a more appropriate way to analyse environmental destruction than traditional notions of criminology (the focus of green criminology being on harm as well as crime), the reality is that laws produced by governments are the social construct upon which different actions affecting the environment are deemed to be moral or immoral by the rest of society. Green criminologists however, are now starting to focus on the relationships that governments have with corporate actors (Michalowski and Kramer, 2007; Stretesky et al., 2014), both of whom may be considered responsible for environmental harm taking place. This is known as state-corporate crime where: 'the state tends not to act in ways that reduce the negative ecological impacts of corporations and the production of ecological disorganization. In this sense, the state facilitates green harms caused by corporations' (Stretesky et al., 2014: 76).

Utilitarian thought does not allow for the state-corporate decision-making that comprises social and environmental well-being at the expense of state-corporate economic objectives. According to Stretesky et al. (2014: 72) 'environmental laws make a trade-off between public and environmental health and economic development and expansion.' These trade-offs are the result of both parties seeking to gain an advantage from the other. For example, a government may pass a law that permits a corporation to undertake a certain amount of ecological disorganisation, and in return for the passing of that law, the corporation provides the government with economic benefits that are a result of that transaction, such as the creation of jobs.

In February 2015, the UK government passed the Infrastructure Act 2015, part 6 of which legally permitted the act of onshore hydraulic fracturing under certain conditions. The Infrastructure Act was passed by government despite the fact that unconventional onshore hydraulic fracturing has been found to cause social and environmental victimisation in the US (Howarth et al., 2011; Ingraffea et al., 2014; Jackson et al., 2014) and also caused seismic activity at the Preese Hall-1 wellsite in Lancashire in 2011 (Green et al., 2012: 1). The fact that the Infrastructure Act has been passed can therefore be seen as a state-corporate trade-off that allows a certain amount of social and ecological destruction taking place, for the return of benefits such as a contribution toward economic growth for the UK government.

Although a certain amount of happiness is created through the expansion of the fracking industry in the UK, this happiness is concentrated in the companies that extract the hydrocarbons and the government who increase their chances of successful re-election. Pain is created through the process of releasing hydrocarbons through the creation of various types of victimisation. This victimisation is forced upon a variety of people who involuntarily suffer from the consequences of extraction processes. These pains can be seen in the social and environmental costs associated with fracking identified in Table 1. Utilitarian morality would not condone the concentration of happiness and the exacerbation of pain caused by fracking as this does not equally promote the principle of utility which is primarily concerned with the greatest amount of happiness for the greatest number of people. Mill (1863: 288) acknowledges that;

... the happiness which forms the utilitarian standard of what is right in conduct, is not the agent's own happiness, but that of all concerned. As between his own happiness and that of others, utilitarianism requires him to be as strictly impartial as a disinterested and benevolent spectator.

Corporations and governments have individual and economic imperatives and motives that influence their actions which does not allow them to make decisions through the eyes of a disinterested and benevolent spectator. On the contrary, state-corporate actions facilitate harms and crimes that contribute to the privation of pleasure and the exacerbation of pain.

It must be noted, however, that fracking has the potential to create a variety of social benefits that are enjoyed by all people which would tend to agree with the utilitarian thought of providing the greatest amount of happiness (or benefits) to the greatest number of people. The development of fracking in the UK, for example, will create jobs (Institute of Directors, 2013: 17), and producing gas in the UK will decrease the need for the importation of gas from abroad (Weijermars and McCredie, 2011: 2). Similarly, investment in fracking is likely to contribute (however minimally or greatly) to economic growth (Ochieng et al., 2015) which, in turn, increases the collective standard of living. However, regardless of this realization, the social and environmental costs of fracking offset the economic potential of the process when the theory of utility is re-applied to fracking. Where there are technologies that create similar social, environmental and economic benefits, technologies that create much less social and environmental risk

(compared with fracking), the theory of utility would always choose the technology that creates the largest nett quantity of utility over the technology that creates a lesser quantity of nett utility (utility being pleasure minus pain, or in this case, benefits minus risks). This is recognised in the work of J.S. Mill who denounces that 'a sacrifice which does not increase, or tend to increase, the sum total of happiness, it (that is, utilitarian morality) considers as wasted' (Mill, 1863: 288).

If both the costs and benefits of fracking were concrete and quantifiable, it would be easier to determine what the morally right outcome would be, in line with the principle of utility. However, it is fair to say that the outcomes of the fracking process in the UK are unknown and any attempts to promote the technology are based on subjective estimates of what might happen, rather than based on concrete evidence which would support the moral legitimacy of any such action. This is because the UK is currently at the exploratory phase of the fracking process, rather than the production phase seen in the US. The theory of utility does not condone acts and decisions that are based on the subjective interpretation of what may or may not happen. To re-quote Mill (1863: 273) 'a test of right and wrong must be the means... of ascertaining what is right and wrong, and not a consequence of having already ascertained it.'

The acknowledgement of this way of thinking is similar to the precautionary principle of environmental law. Similarly, there is another legal justification that follows this same moral reasoning. If the effects of the fracking process on climate change are unknown (see Table 1), then the advancement of the technology by the UK government risks infringing upon both the Climate Change Act 2008, a legally binding climate change commitment target, and the recent United Nations Framework Convention on Climate Change (UNFCCC or COP21) deal. Part One of the Climate Change Act 2008 commits the government of the UK to 'ensure that the net UK carbon account for the year 2050 is at least 80% lower than the 1990 baseline'. If the impact of fracking operations on the UK carbon account is unknown, then the theory of utility would not condone fracking as there is a serious risk that emissions from this activity could hinder, or contribute to the inability, of the UK government to meet this legally binding target. Similarly, the COP21 deal made in Paris in December 2015 reaffirmed 'the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees' (Centre for Climate and Energy Solutions, 2015: 1). The fact that the effects of

fracking in the UK on climate change are unknown, the theory of utility would argue that fracking should not be supported because the moral justification for utilitarianism is that decisions should be made on ascertaining what is right and wrong, and not a result of already having ascertained it. It is with this judgement that it cannot confidently be declared that fracking will aid or hinder the ability to meet objectives laid out in the Climate Change Act 2008 and by the COP21 deal.

As has been mentioned, the UK public are generally more unsupportive of the advancement of the fracking industry than supportive of it. Despite this state of affairs, the government passed the Infrastructure Act 2015 legalising fracking, whilst at the same time removing incentives for forms of renewable energy (Macalister, 2015). This could be interpreted as a sign that the government is overriding the clear public wish to use renewable energy over fracking technology. This sort of political decision-making juxtaposes the utilitarian principles of Jeremy Bentham who sought for the decisions of government to be made in accordance with the interests of the community, the community being 'the sum of the interests of the several members who compose it' (Bentham, 1781: 66). Such decision making also undermines the sovereignty of the government and its overall purpose which is to serve the interests of the people over which it legislates. As a result, the government, by promoting the development of fracking in the UK, can be seen as acting in a way that cements state-corporate relationships.

Similarly, choosing to advance non-renewable industries such as fracking, when less harmful alternatives are available goes against a major aspect of utilitarian thought. *Act utilitarianism* 'maintains that an action is right if it can reasonably be expected to result in a state or affairs at least as good as the alternative state of affairs' (Scarre, 1996: 10). In terms of the potential creation of social and environmental injustices from fracking technologies (identified in Table 1), act utilitarianism would undoubtedly choose renewable energy creation as these forms of technology (solar, wind, geothermal, wave, tidal, biomass) create much less social and environmental injustice, particularly in terms of the creation of emissions.

## **Conclusion**

This paper has moved away from traditional studies of criminology that often focus on the violation of criminal laws and instead, has focused on the notion of legal, environmental and social harm. Therefore, this paper is more akin to discussions within emerging *green criminology* debates that recognise that something ought to be done about harmful activities, irrespective of their legality. The new technology of unconventional, onshore fracking has been put forward as a natural resource extraction process that demonstrates this disjuncture between harm and crime. In a world where non-renewable resources are depleting and new, higher risk extraction techniques are being developed, more research needs to be done to identify the state-corporate relationships that enable such development to take place. Green criminology in particular is well suited to engaging in this area, but there is a lack of research particularly in the US where fracking is an established technology.

This paper has also highlighted the clear UK public desire to use renewable forms of energy more readily than fracking technology which was acknowledged by the recent DECC (2016) public attitudes tracker. This makes for a seemingly easy decision with regards to the development of fracking. If the UK government were truly representative of the wants and needs of the population, then renewable energy would be prioritized over fracking technology. Utilitarianism would support this outcome as, in terms of providing energy, the greatest amount of utility is generated for the greatest number of people.

Utilitarianism has been used as a moral perspective from which to analyse state-corporate decision making. Principles of utility (such as producing the greatest amount of good for the greatest number of people) do not condone fracking because of a combination of environmental and social risks, and a lack of knowledge of the environmental, social and economic benefits associated with fracking. This fits with the precautionary principle of environmental law that urges for increased scientific and factual evidence before new technologies are implemented.

Bentham, J. (1776) 'On a Fragment of Government', in Burns, J.H. (2005) 'Happiness and Utility: Jeremy Bentham's Equation', *Utilitas*, 17 (1), 46-61.

Bentham, J. (1781) 'An Introduction to the Principles of Morals and Legislation', in Ryan, A. (ed.) (1987) *John Stuart Mill and Jeremy Bentham: Utilitarianism and Other Essays* (London: Penguin Books).

Centre for Climate and Energy Solutions (2015) *Outcomes of the U.N. Climate Change Conference in Paris*. [Online]. Available at: <http://www.c2es.org/docUploads/cop-21-paris-summary-02-2016-final.pdf> (Accessed: 14th November, 2016).

Cooley, H. and Donnelly, K. (2014) 'Hydraulic Fracturing and Water Resources: What do we Know and Need to Know?' in Gleick, P.H. (ed.) (2014) *The World's Water: The Biennial Report on Freshwater Resources, Volume 8* (Washington: Island Press).

Department of Energy and Climate Change (2016) *DECC Public Attitudes Tracker – Wave 17*. [Online]. Available at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/519488/PAT\\_Wave\\_17\\_Summary\\_of\\_key\\_findings.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519488/PAT_Wave_17_Summary_of_key_findings.pdf) (Accessed: 10<sup>th</sup> November, 2016).

Department of Energy and Climate Change (2014) *Fracking UK Shale: Local Air Quality*. [Online]. Available at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/277219/Air.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/277219/Air.pdf) (Accessed: 12<sup>th</sup> May, 2016).

Entrekin, S., Evans-White, M., Johnson, B., and Hagenbuch, E. (2011) 'Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters,' *Frontiers in Ecology and the Environment*, 9 (9), 503-511.

Esswein, E.J., Breitenstein, M., and Snawder, J. (2012) 'NIOSH Field Effort to Assess Chemical Exposures in Oil and Gas Workers: Health Hazards in Hydraulic Fracturing', in Institute of Medicine Workshop on the Health Impact Assessment of New Energy Sources: Shale Gas Extraction. [Online]. Available at:

<http://www.ohioeha.org/media/7254/Health-Impact-Assessment-of-Shale-Gas-Extraction.pdf#page=42> (Accessed: 15<sup>th</sup> February, 2016).

Gibbons, S., Heblich, S., and Timmins, C. (2016) 'Fear of Fracking: earthquakes linked to shale gas exploration cause house prices to fall', *Policy Bristol: Policy Briefing 22/2016*. [Online]. Available at:

[http://www.bristol.ac.uk/media-library/sites/policybristol/documents/Briefing%202022 Fracking FINAL v2.pdf](http://www.bristol.ac.uk/media-library/sites/policybristol/documents/Briefing%202022%20Fracking%20FINAL%20v2.pdf)

(Accessed: 12<sup>th</sup> May, 2016).

Grear, A., Grant, E., Kerns, T., Morrow, K., and Short, D. (2014) *A Human Rights Assessment of Hydraulic Fracturing and Other Unconventional Gas Development in the United Kingdom*. [Online]. Available at:

<http://www.sas.ac.uk/sites/default/files/files/UK%20HRIA%20w%20appdx-hi%20res.pdf> (Accessed: 3<sup>rd</sup> March, 2016).

Great Britain. *Climate Change Act 2008*: Elizabeth II. (2008) London: The Stationery Office. [Online]. Available at: <http://www.legislation.gov.uk/ukpga/2008/27/contents> (Accessed: 16<sup>th</sup> May, 2016).

Great Britain. *Infrastructure Act 2015*: Elizabeth II. (2015) London: The Stationery Office. [Online]. Available at:

<http://www.legislation.gov.uk/ukpga/2015/7/contents/enacted> (Accessed: 16<sup>th</sup> May, 2016).

Green, C.A., Styles, P., and Baptie, B. (2012) *Preese Hall Shale Gas Fracturing: Review and Recommendations for Induced Seismic Mitigation*. [Online]. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/15745/5075-preese-hall-shale-gas-fracturing-review.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/15745/5075-preese-hall-shale-gas-fracturing-review.pdf) (Accessed: 10<sup>th</sup> February, 2016).

Hall, M. (2014) 'Environmental Harm and Environmental Victims Scoping out a "Green Victimology"', *International Review of Victimology*, 20 (1), 129-143.

Hillyard, P. and Tombs, S. (2007) 'From Crime to Social Harm?', *Crime, Law and Social Change*, 48 (1), 9-25.

House of Commons Energy and Climate Change Committee (2013) *The Impact of Shale Gas on Energy Markets: Seventh Report of Session 2012-13, Volume I*. [Online]. Available at:

<http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/785/785.pdf> (Accessed: 10<sup>th</sup> February, 2016).

Howarth, R.W., Santoro, R., and Ingraffea, A. (2011) 'Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations', *Climatic Change*, 106 (4), 679-690.

Hulsman, L.H.C. (1986) 'Critical Criminology and the Concept of Crime', *Contemporary Crises*, 10 (1), 63-83.

Ingraffea, A.R., Wells, M.T., Santoro, R.L., and Shonkoff, S.B. (2014) 'Assessment and Risk Analysis of Casing and Cement Impairment in Oil and Gas Wells in Pennsylvania, 2000–2012', *Proceedings of the National Academy of Sciences*, 111 (30), 10955-10960.

Institute of Directors (2013) *Infrastructure for Business: Getting Shale Gas Working*. [Online]. Available at:

<http://www.iod.com/influencing/policy-papers/infrastructure/infrastructure-for-business-getting-shale-gas-working> (Accessed: 11<sup>th</sup> May, 2016).

Jackson, R.B., Vengosh, A., Carey, J.W., Davies, R.J., Darrah, T.H., O'Sullivan, F., and Pétron, G. (2014) 'The Environmental Costs and Benefits of Fracking', *Annual Review of Environment and Resources*, 39, 327-362. [Online]. Available at:

<http://www.annualreviews.org/doi/pdf/10.1146/annurev-environ-031113-144051> (Accessed: 8<sup>th</sup> February, 2016).

Jaspal, R. and Nerlich, B. (2014) 'Fracking in the UK Press: Threat Dynamics in an Unfolding Debate', *Public Understanding of Science*, 23 (3), 348-363.

Jones, P., Hillier, D., and Comfort, D. (2015) 'The Contested Future of Fracking for Shale Gas in the UK: Risk, Reputation and Regulation', *World Review of Entrepreneurship, Management and Sustainable Development*, 11 (4), 377-390.

Jones, P., Hillier, D., and Comfort, D. (2013) 'Fracking and Public Relations: Rehearsing the Arguments and Making the Case', *Journal of Public Affairs*, 13 (4), 384-390.

Mash, R., Minnaar, J., and Mash, B. (2014) 'Health and Fracking: Should the Medical Profession be Concerned?' *SAMJ: South African Medical Journal*, 104 (5), 332-335.

Macalister, T. (2015) 'UK Solar Panel Subsidy Cuts Branded Huge and Misguided', *The Guardian*, 17 December [online] Available at:

<https://www.theguardian.com/business/2015/dec/17/uk-solar-panel-subsidies-slashed-paris-climate-change> [Accessed: 12 May 2016].

Michalowski, R.J. and Kramer, R.C. (2007) 'State-Corporate Crime and Criminological Inquiry'. in Pontell, H.N. and Geis, G.L. (eds.) *International Handbook of White-Collar and Corporate Crime* (New York: Springer).

Mill, J.S. (1863) 'Utilitarianism', in Ryan, A. (ed.) (1987) *John Stuart Mill and Jeremy Bentham: Utilitarianism and Other Essays* (London: Penguin Books).

Millie, A. (2016) *Philosophical Criminology* (Bristol: Policy Press).

North Yorkshire County Council (2016) *Planning and Regulatory Functions Committee Report*. [Online]. Available at:

[http://democracy.northyorks.gov.uk/committees.aspx?commid=12and\\_meetid=3449](http://democracy.northyorks.gov.uk/committees.aspx?commid=12and_meetid=3449)  
(Accessed: 10<sup>th</sup> November, 2016).

Ochieng, E.G., Price, A.D., Egbu, C.O., Ruan, X., and Zuofa, T. (2015) 'Fresh Driver for Economic Growth: Fracking the UK Nation', *International Journal of Energy Sector Management*, 9 (3), 412-431.

Prud'homme, A. (2014) *Hydrofracking: What Everyone Needs to Know* (New York: Oxford University Press).

Royal Academy of Engineering (2012) *Shale Gas Extraction in the UK: A Review of Hydraulic Fracturing*. [Online]. Available at:

<http://www.raeng.org.uk/publications/reports/shale-gas-extraction-in-the-uk>  
(Accessed: 28<sup>th</sup> January, 2016).

Scarre, G. (1996) *Utilitarianism* (London: Routledge).

Shropshire Council North Planning Committee (2014) *Schedule of Additional letters*. [Online]. Available at:

<https://shropshire.gov.uk/committee-services/documents/s4592/Schedule%20of%20Additional%20Letters.pdf> (Accessed: 12<sup>th</sup> May, 2016).

Slonecker, E.T., Milheim, L.E., Roig-Silva, C.M., Malizia, A.R., Marr, D.A., and Fisher, G.B. (2012) 'Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004-2010.' *U.S. Geological Survey Open-File Report 2012-1154*,

1-36. [Online]. Available at: <https://pubs.usgs.gov/of/2012/1154/of2012-1154.pdf> (Accessed: 12<sup>th</sup> May, 2016).

Stacey, K. (2015) 'Dozens of New Fracking Licences Awarded', *Financial Times* [online] Available at:

<http://www.ft.com/cms/s/0/06af0f28-a4be-11e5-97e1-a754d5d9538c.html#axzz48p3NfXqn> (Accessed: 16 May 2016).

Stretesky, P.B., Long, M.A., and Lynch, M.J. (2014) *The Treadmill of Crime: Political Economy and Green Criminology* (Oxon: Routledge).

Throupe, R., Simons, R.A., and Mao, X. (2013) 'A Review of Hydro "fracking" and its Potential Effects on Real Estate', *Journal of Real Estate Literature*, 21 (2), 205-232.

Weijermars, R. and McCredie, C. (2011) 'Assessing Shale Gas Potential,' *Petroleum Review*, 65 (777), 1-3. [Online]. Available at: [http://www.shale-gas-information-platform.org/fileadmin/ship/bilder/The\\_debate/Weijermars.pdf](http://www.shale-gas-information-platform.org/fileadmin/ship/bilder/The_debate/Weijermars.pdf) (Accessed: 16<sup>th</sup> May, 2016).

White, E., Fell, M., and Smith, L. (2016) *Shale Gas and Fracking*. House of Commons Library - Briefing Paper: SN06073. [Online]. Available at:

<http://researchbriefings.files.parliament.uk/documents/SN06073/SN06073.pdf> (Accessed: 28<sup>th</sup> January, 2016).

Wolf, S. and Stanley, N. (2014) *Wolf and Stanley on Environmental Law* (Abingdon: Routledge. 6<sup>th</sup> Ed).

Wyatt, T. (2013) *Wildlife Trafficking: A Deconstruction of the Crime, the Victims and the Offenders* (Basingstoke: Palgrave MacMillan).

Zoback, M.D. (2012) 'Managing the Seismic Risk Posed by Wastewater Disposal', *Earth*, 57 (4), 38-43.

**Jack Lampkin** is a PhD researcher and Associate Lecturer in the School of Law at the University of Lincoln. His research interests include fracking, green criminology, victimology and philosophical criminology.

Email: [14575757@students.lincoln.ac.uk](mailto:14575757@students.lincoln.ac.uk)