



## Licence to Frack

*"The order of creation demands that a priority be given to those human activities that do not cause irreversible damage to nature, but which instead are woven into the social, cultural, and religious fabric of the different communities. In this way, a sober balance is achieved between consumption and the sustainability of resources."*

*- Pope Benedict XVI – 16 October 2006*

### 1. Introduction

Many countries today, South Africa included, are looking for more eco-friendly energy sources, and for several of them natural gas is the preferred choice. Shale gas is natural gas found in shale rock, and is derived from underground shale deposits that are broken up by hydraulic fracturing. Hydraulic fracturing, or fracking, is the procedure of creating fractures in shale, coal-bed and tight-sand formations by injecting fluid (such as water, oil, or propane) into cracks to force them further open. This enlarges crevices which allow more oil and gas (methane) to flow out of the rock and into the well-bore. From there, the gas can be extracted. Fractures can also exist naturally in formations, and both natural and man-made fractures can be widened by fracking, resulting in the possibility of increased extraction of gas from a given area of land. The process of fracking has been a means of increasing well production since the late 1940s but it is only in the last ten years or so that technology has been developed to use the process in order to extract natural gas.<sup>1</sup> Amid controversy due to a lack of public consultation, the government recently lifted a 17-month moratorium on the issuing of licences for exploratory drilling to determine the amount shale gas reserves in the Karoo.

### 2. Arguments For Fracking

Shale gas has the potential to turn the world's

energy industry on its head. It is seen as an opportunity to offer countries a cheap, relatively carbon-friendly way to help meet their energy needs; shale gas has the potential to displace other, more harmful, fossil fuels in selected locations. With deposits being found in areas that previously had no exploitable gas reserves, shale gas production could turn countries that traditionally import natural gas into producers, making them more self-sufficient and boosting development. Also, shale gas deposits are being found in both mature and underdeveloped energy markets, opening the potential to level the playing field when it comes to supply and demand. However, in most cases, shale gas has become a viable energy source only with the use of hydraulic fracturing, or fracking technology to extract it.<sup>2</sup> Fracking in the Karoo might give South Africa's economy a big boost and the potential long-term direct employment opportunities are likely to number in the tens of thousands, with similar numbers in the industries consuming the gas.<sup>3</sup>

On August 15 2012, South Africa's National Development Plan 2030 was presented to President Jacob Zuma. The plan states that, even if economically recoverable resources are much lower than currently estimated, shale gas as a transitional fuel has the potential to contribute a very large proportion of South Africa's electricity needs. "For example, exploitation of a 24-trillion-cubic-foot resource will power about 20 GW of combined cycle gas turbines, generating about

130 000 GWh of electricity a year over a 20-year period. This is more than half of current electricity production,” the report states.<sup>4</sup>

### 3. Arguments Against Fracking

#### 3.1. The regulatory framework

One of the findings of the task team constituted to investigate fracking in the Karoo is that South Africa’s regulatory framework must be robust enough to ensure that, if fracking were approved, any resultant negative impacts would be mitigated. This will require a comprehensive review of the adequacy of the existing framework in order to identify any shortfalls or omissions and to ensure that it is sufficiently detailed and specific. It is recommended that existing regulations from mature regulatory environments in other countries be used to facilitate the development of South African regulations in this matter. Regardless of the fact that existing environmental regulations adequately cover most of these factors, an immediate and important concern requiring additional attention is water usage and disposal: specifically, the volume and transportation of the water. The potential contamination of water resources and the disposal of used fracturing fluid (waste) is a concern. The use and disposal of water in such large amounts certainly requires a water use licence under the National Water Act.<sup>5</sup>

#### 3.2. Expensive and time consuming

The process of exploration and exploitation of shale gas through fracking is expensive and time consuming, with the exploration phase lasting as long as nine years at times. This is longer than the four to five year period it takes to build a coal powered power station.

#### 3.3. Environmental and socio-economic implications

Shale gas development around the world has been met with fierce opposition from local residents and environmental groups due to environmental concerns over the fracking process. With the impact of fracking operations still being studied, the jury is out on the extent to which the process may be harmful to the environment. However, various serious concerns are being raised by environmental groups, media, and regulated companies; among them the following:

- **Groundwater Contamination:** It is feared that the chemicals used in the fracking process could leak into underground rivers and reservoirs and ultimately into drinking water supplies. The health effects of long-term exposure to chemicals commonly used in fracking are being evaluated by regulatory agencies. So far, two cases have been reported in the United States where such contamination appears likely. One instance was in Pennsylvania in 2011, where the Environmental Protection Agency reported that several domestic water wells contained inorganic hazardous substances that are known to be used in hydraulic fracturing.
- **Gasification:** When gas migrates into groundwater, the build-up of pressure due to gasification may lead to tremors or explosions. Aquifer gasification due to shale gas development has been cited as a potential cause for recent minor seismic activity in the United Kingdom, though these claims are largely uncertain at this point and are being investigated.
- **Water Usage Risks:** Fracking can be extremely water-intensive, depending on the precise techniques used. This may pose risks in a semi-desert region such as the Karoo.
- **Surface Water and Soil Risks:** Risks may also arise from the volume of chemicals that need to be stored at the drilling site and from the liquid and solid waste produced during drilling and fracking.
- **Spills and Blow-outs.** Well blow-outs can cause spills that could spread into the surrounding soil and into wetlands, streams and waterways. There are also concerns that wastewater kept in storage ponds could overflow in the kind of sudden, heavy rains that are familiar in the Karoo.<sup>6</sup>
- **Infrastructural impact:** Fracking on the proposed scale is a huge industrial undertaking; there is a concern that access roads, heavy transport vehicles, pipelines and other associated infrastructure will have a long-lasting and detrimental impact on some of the country’s most pristine and delicate wilderness areas.

### 4. Shale Gas versus Conventional Gas

For several years now, but more so since the ‘shale gas boom’ in various parts of the world, there has been a debate about the contribution

that shale gas makes towards greenhouse gas emissions, in comparison to that of conventional gas. In a recent study, *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, a group of scientists led by Robert Howarth from Cornell University raise the question of the reasoning behind the use of natural gas derived from shale formations. The study evaluates the greenhouse gas footprint of natural gas obtained by fracking from shale formations, focusing on methane emissions. Natural gas is composed largely of methane, and 3.6% to 7.9% of the methane from shale-gas production escapes to the atmosphere in venting and leaks over the lifetime of a well. These emissions are at least 30% more, and perhaps more than twice as much, as those from conventional gas. The higher emissions from shale gas occur at the time wells are hydraulically fractured with methane escaping from flow-back return fluids, as well as during drill-out following the fracking.

Methane is a powerful greenhouse gas, with a global warming potential that is far greater than that of carbon dioxide, particularly over the time horizon of the first few decades following emission. Methane contributes substantially to the greenhouse gas footprint of shale gas on shorter time scales, dominating it on a 20-year time horizon. The study concludes that the footprint for shale gas is greater than that of conventional gas or oil when viewed on any time horizon, but particularly so over 20 years. Compared to coal, the footprint of shale gas is said to be at least 20% greater and perhaps more than twice as great on the 20-year horizon and is comparable when compared over 100 years.<sup>7</sup>

## 5. Implications for Renewable Energy

There is a school of thought that argues that the use of and reliance on shale gas will merely delay the progress needed to make our country's energy mix cleaner and more sustainable. Ferri Adams, an energy and climate-change campaigner at Greenpeace, is one such person, suggesting that shale gas be skipped altogether and not be considered as a 'transition energy source' between coal and renewables. She has asserted that South Africa has enough coal and the means to generate power from it, so we should keep using it while we create more 'green power'. Adams's solution is to accelerate and expand green energy. In this regard, the renewable-power producers' programme has

already had two bidding phases. Along with the last one, which has been delayed until next year, this will bring a total of 3725MW of power into the grid by 2016 and the total budget of this programme is R120-billion. The multi-billion rand solar park project near Upington, is nearing the final stages of approval.

Although these projects are not yet supplying power, the prices quoted in their bids provide an indication of how reasonably priced they will be. Onshore wind generation - the big windmills that already dot the landscape of Europe - will produce electricity at 89c/kWh. Solar voltaic, a technology that still has huge space for improvement because it currently wastes a lot of the sunlight it absorbs, will cost R1.65/kWh. In view of the lowering of the prices for this power in the bidding phase alone, industry participants are confident that, as the scale of local operations and expertise grows, these prices will decrease even further.<sup>8</sup> Some critics suggest that the industry's focus on developing shale gas and other unconventional sources is taking attention and resources away from the development of renewables. Low-cost power generated with abundant natural gas supplies could disrupt the economic viability of wind, solar and geothermal projects. As a result, some worry that increased production of shale gas and other unconventional sources of gas could delay the shift to renewables by many years.

## 6. Report Findings

A government-appointed task team has recently completed an investigation into the full environmental, social, economic and legal implications of fracking, and has submitted its report to the Minister of Mineral Resources. The task team comprised the Departments of Environmental Affairs, Science & Technology, Energy, Mineral Resources, and Water Affairs as well as institutions such as the Petroleum Agency, the Council for Geoscience, Square Kilometre Array (SKA) South Africa, the Water Research Commission, and ESKOM.

The release of this report was preceded by the contentious decision to lift the moratorium on shale gas exploration. The rationale behind this decision is to be found in the report, where it is stated that while considering the implications of hydraulic fracturing, it is important to note that the effect of an extended ban, moratorium or stringent regulation will amount to a reduction of

economic opportunity, and will delay, or even prevent, an improvement in our understanding of the real extent of the potential resource, hamper the development of coal-bed methane and other hydrocarbon resources in low-permeability reservoirs, and deny potentially huge economic benefit to severely deprived communities in the Karoo.

The task team made a number of recommendations, the main ones being that exploration (minus the actual hydraulic fracturing) would be allowed under the existing regulatory framework; a monitoring committee would be formed to ensure that the existing regulatory framework is comprehensively augmented over the next 6-12 months in order to effectively govern the exploration process; ongoing research is to be conducted and facilitated by relevant institutions to develop and enhance scientific knowledge in respect of the development of Karoo shale gas; and once all the preceding steps have been completed, hydraulic fracturing may be authorised under strict supervision by the monitoring committee. In the event of any unacceptable outcomes, the process

may be halted.<sup>9</sup>

## 7. Conclusion

It is undeniable that, as the South African population continues to increase and the economy keeps growing, the nation's energy demands will also increase. In our pursuit of adequate environmentally-just energy provision we have encountered many old and new energy sources – fracking is one such source. All its advantages are accompanied by some really consequential disadvantages. An extraordinary amount of thought and research has got to go into determining whether fracking is a suitable energy option for South Africa; it is a debate that is far from being concluded. Let us hope that the decision-makers prioritise the best interests of the population and the environment over narrow economic or profit aspirations.

---

**Palesa Siphuma**  
**Researcher**

---

<sup>1</sup> 'Fracking', *Safe Drinking Water Foundation*. <http://www.safewater.org/PDFS/resourcesknowthefacts/Fracking.pdf>

<sup>2</sup> Shale Gas – A Global Perspective KPMG report. *Shale Gas Shakes Up The World Energy Markets* <http://www.qclub.org.ua/wp-content/uploads/2012/06/shale-gas-global-perspective.pdf>

<sup>3</sup> Moolman, S. 'Experts warn fracking proponents to proceed with caution', *Engineering News Online* – 31 August 2012. <http://www.engineeringnews.co.za/article/experts-warn-fracking-proponents-to-proceed-with-caution-2012-08-31>

<sup>4</sup> National Development Plan

<sup>5</sup> Report On Investigation Of Hydraulic Fracturing In The Karoo Basin Of South Africa - <http://www.dmr.gov.za/publications/summary/182-report-on-hydraulic-fracturing/853-full-report-on-investigation-of-hydraulic-fracturing-in-the-karoo-basin-of-south-africa.html>

<sup>6</sup> Shale Gas – A Global Perspective KPMG report. *Shale Gas Shakes Up The World Energy Markets* <http://www.qclub.org.ua/wp-content/uploads/2012/06/shale-gas-global-perspective.pdf>

<sup>7</sup> *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations* <http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf>

<sup>8</sup> Kings, S. 'Shale Gas Energises Government', *Mail and Guardian* -14 September 2012. <http://mg.co.za/article/2012-09-14-00-shale-gas-energises-government>

<sup>9</sup> Report On Investigation Of Hydraulic Fracturing In The Karoo Basin Of South Africa - <http://www.dmr.gov.za/publications/summary/182-report-on-hydraulic-fracturing/853-full-report-on-investigation-of-hydraulic-fracturing-in-the-karoo-basin-of-south-africa.html>

This Briefing Paper, or parts thereof, may be reproduced with acknowledgement.  
For further information, please contact the CPLO Office Administrator.