DRAWING A LINE IN THE SAND
Agri SA's Response to the Threat to Food Security from Shale Gas Development in South Africa.
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Agri SA promotes the development, profitability, stability and sustainability of agriculture in South Africa by means of its involvement and input on national and international policy and the implementation thereof.

Due to its significant threat to food security in South Africa, Agri SA is highly concerned with the proposed exploration for and development of shale gas resources in South Africa.

The Department of Mineral Resources envisages the production of shale gas in South Africa to come online within 10 to 15 years from the date of this publication (Minister of Mineral Resources’ Budget Speech, 16 May 2017). The position by Government therefore appears to regard the development of a shale gas industry in South Africa as definite.

The current regulatory position with respect to shale and oil exploration and production in South Africa entails that a holder of an exploration right has the exclusive right to apply for and be granted a production right in respect of the petroleum and the exploration area in question. Therefore, should the current applications for exploration rights for shale gas in the Karoo, and KwaZulu-Natal midlands (and elsewhere) be granted, the holders of those rights would automatically be entitled to be granted production rights which will allow for full-scale shale gas production activities and, arguably, the end of the Karoo, KwaZulu-Natal midlands and other regions’ environment as we currently know it.

Agri SA regards it as imperative that any decision-making processes by Government with respect to the establishment of a shale gas industry be exercised with the utmost caution, from the outset.

To this end, Agri SA intends playing a pivotal role in assisting the powers that be in coming to the right decision.

Johannes Möller
President Agri SA
1. WHAT IS
HYDRAULIC FRACTURING?

Natural gas occurring in the Karoo Basin, the KwaZulu-Natal midlands region and certain other areas in South Africa is said to be ‘unconventional’ in that it does not occur in pockets of porous rock reservoirs from which it would flow without stimulation if penetrated by a well. Unconventional shale gas occurs as methane trapped in shale formations of low permeability, from which it can only be released by the process of hydraulic fracturing, popularly known as ‘fracking’.

To extract conventional gas, a hole is drilled into the reservoir and the gas flows out by itself. For unconventional shale gas, the source rock lies very deep below the surface - in excess of 1 500 metres. The gas is tightly held and must be released by fracturing the rock around a wellbore, drilled horizontally for a long distance into the gas-containing shale layer. Hydraulic fracturing involves injecting considerable volumes of water containing a chemical mixture (fracking fluids) and particulate materials into deep cement encased boreholes to create sufficient pressure to cause fracturing of rocks at the level that the gas resource occurs, in order to stimulate the release of gas from the rocks. The released gas, mixed with fracking fluid (called ‘flowback’) that returns to the surface must be managed in an environmentally sound manner.
2. STAGES OF SHALE GAS DEVELOPMENT

‘Upstream activities’ with respect to shale gas development includes seismic surveys, well pad and other site preparations and drilling deep vertical exploration boreholes. If initial exploration results are promising, these activities may be followed by deviated drilling to form horizontal wells that penetrate targeted shale layers, which would be ‘fracked’ to determine gas yields. Gas production activities could follow, involving the establishment of a wellfield(s), with repeated drilling and fracking exercises. There are a number of surface activities associated with this, such as waste management and transportation of equipment, materials and personnel to and from areas of operations.

The production stage of shale gas development operations might last 10-30 years, probably with the highest level of activity in the first 3-5 years. It involves the development of production wells (and access roads to the well pads), the establishment of a gas pipeline network to convey produced gas to a central treatment processing facility, and the export of the treated gas by pipeline for the downstream uses.

Once the production phase terminates, final decommissioning requires a further 5-10 years to be concluded. This involves plugging the wells, dismantling infrastructure and rehabilitating the sites. Monitoring and remediation interventions continue indefinitely.
3. PENDING SHALE GAS EXPLORATION

RIGHT APPLICATIONS

3.1 The Karoo

Exploration right applications have been applied for in respect of a vast part of the Karoo by the following petro-chemical companies:

- Shell International;
- Bundu Gas and Oil Exploration (a subsidiary of Australia’s Challenger Energy); and
- Falcon Oil and Gas (in partnership with Chevron).

The pending exploration right applications in the Karoo are shown below:

While original estimates had the Karoo holding 485 trillion cubic feet of shale gas, new estimates from the Petroleum Agency of South Africa now state the number to be closer to 40 trillion cubic feet. A Shell-commissioned study still contends that such a number would yield returns of 9.6% of South Africa’s GDP.

The Karoo basin was the site of an inland sea, where fossil deposition took place, predominantly during the Permian period. The sea was deepest (and therefore has the thickest deposits) between Graaff Reinet and Somerset East, thinning out completely at the Mvoti River in the north. Over time these deposits formed what is now referred to as the Ecca geological group, comprising shale and sandstone formations.
3.2 The KwaZulu-Natal midlands

The midlands of KwaZulu-Natal is considered an area of interest for potential extraction of shale gas. Two Technical Co-operation Permits (TCP) have been issued for KwaZulu-Natal namely:

- The Sungu Sungu TCP includes areas between Giants Castle and Rosetta, as well as Estcourt, Bergville and along the edge of the Berg, Dannhauser and into the Free State; and
- The Rhino Oil & Gas TCP includes areas around Richmond, Eston, Pietermaritzburg, Hilton, Howick, Karkloof, Balgowan, Dargle, Kranskop, Weenen and as far north as Vryheid. Rhino Oil & Gas has now initiated an Environmental Authorisation Process which must be undertaken prior to the commencement of prospecting activities.

The pending exploration right applications in KwaZulu-Natal are shown below:

In KwaZulu-Natal the shale is thin, which means that it is not the best place to start fracking, as the yields will be low. Where shale and coal are found in same place in KwaZulu-Natal, such as in the Vryheid area, the coal industry will take precedence over fracking.
3.3 Petroleum exploration and production activities in South Africa as a whole

While the pending shale gas exploration right applications for the Central Karoo and KwaZulu-Natal midlands area have garnered the most attention in the media to date, it is of note that in South Africa a far greater part of our terrestrial and coastal areas are in some way or another subject to existing or pending petroleum exploration and production activities.

The Petroleum Agency of South Africa records that onshore applications for petroleum (which includes shale gas) are currently under evaluation in all nine provinces in South Africa.

Credit:
Les Stone, Greenpeace

Role of Petroleum Agency SA

Under section 71 of the above Act, Petroleum Agency SA has been appointed the designated Agency, with the following responsibilities:

- Promotion and regulation of exploration and production activities
- Receive applications, evaluate and recommend the award of permits and rights
- Promotion and regulation of exploration and production on and offshore
- Production Right - exclusive, transferable, 30 years, renewable.

COAL FIRED POWER STATION

MINING LEASE (OIL) - Block 9

TECHNICAL COOPERATION PERMIT

AREAS AWAITING RIGHTS CONVERSION

PETROLEUM EXPLORATION WELL

ANADARKO (Operator) (80%)

Sungu Sungu (100%)

SIMBO (10%) AFRICA ENERGY CORP & Subs (90%)

5000 Being Evaluated

3214 3215 3314 3315 3414

Impact Africa Being Evaluated

3014B TCP

Ibhubesi gas field

LINE

Sungu Sungu E-CE GAS FIELD (PetroSA 100%)

being produced from this Aptian age deep Western Cape

supplement the feed to the Mossel Bay plant.

Possible gas pipeline

SFF Bulk oil storage

Rhino Oil

Silver Wave Energy

Impact Africa

82TCP

3620C 3620D

Silver Wave

3422B

3420D 3420C

3621C 3621D

PetroSA synfuel refinery

(2563m to 2612) but showed depletion.

F-O Field, 4 wells drilled and currently 2 producing.

Where petrol, diesel, kerosene, etc are produced.

to the PetroSA GTL synfuels refinery at Mossel Bay

Separate 91km pipelines convey gas and condensate

in large quantities to the exports.

- Exports 300 million scf/day
- To increase to 370 million scf/day by end 2009

PETROLEUM EXPLORATION AND PRODUCTION ACTIVITIES IN SOUTH AFRICA

Source: Petroleum Agency of South Africa
4. SHALE GAS
AS PART OF THE SOUTH AFRICAN ENERGY MIX

The South African economy is highly dependent upon electricity for industrial, commercial and domestic energy needs. Electricity production, in the hands of parastatal utility company Eskom, is currently based mainly on coal mined in South Africa, complemented by imported oil and petroleum fuels with small quantities of natural gas.

The National Development Plan (NDP 2030) has clear objectives and actions aimed at increasing natural gas use in the energy mix, irrespective of whether that gas is imported or sourced domestically. Actions proposed in the NDP 2030 include investigating shale gas opportunities and exploiting them in a sustainable manner should they be economically viable.

The Integrated Energy Plan (IEP) takes its lead from the NDP 2030 and links the plans for the various energy sectors via a strategic energy planning framework into a plan for the entire South African energy system.

The Integrated Resource Plan (IRP) is the electricity plan for the country. The draft Gas Utilisation Master Plan (GUMP) provides a long-term roadmap for the strategic development of natural gas supply and demand. All these plans are led by the Department of Energy (DoE), in consultation with other government entities and non-governmental stakeholders.

Energy planning in South Africa is performed at the national level, through several interrelated processes. The National Development Plan (NDP 2030) is the overarching planning document for the development of South Africa and aims to reduce unemployment, eliminate poverty and reduce inequality by 2030.
5. WATER REQUIREMENTS

Millions of litres of water (about 20 million litres) are required for one frack per well, as well as thousands of litres of chemicals. These chemicals can range from benign to highly toxic, some of which are known carcinogens, for example benzene.

Large parts of South Africa, particularly the Karoo, are arid environments where the availability of water translates into life. Water resources in South Africa are currently entirely insufficient to allow for hydraulic fracturing to take place.

No viable solution to the issue of water availability and supply to allow for shale gas development in South Africa currently exists.

6. CONTAMINATION CONCERNS

Apart from the intensive water use, the operations of unconventional gas production have caused surface and ground water sources to become contaminated and unfit for human and animal consumption in other countries.

Despite the best assurances provided by shale gas proponents, incidents of contamination and the failure of control measures are certain to occur.
7. COMPETING LAND USE CONCERNS

Should shale gas development in South Africa proceed, the potential for competing land uses that are incompatible with agriculture is a very real threat. Mining activities and other developmental pressures are increasingly taking away or sterilising land which is currently being used for agriculture in South Africa.

Where stocking rates are extremely low and the capital required to be invested in land is extremely high, the threat of competing land interests is a significant concern.

The photo above shows extensive natural-gas operations at Jonah Field in Wyoming in the United States. Credit: EcoFlight.

8. COMPETING INFRASTRUCTURE REQUIREMENTS CONCERNS

Whatever scenario realises from the proposed exploration for and development of shale gas in South Africa, it appears clear that rural areas will experience an influx of people and machinery. This will necessarily lead to increases in road traffic (and the need for increased maintenance and upkeep of roads) and the need for additional housing and other amenities and services for people moving into the area (whether temporary or long-term).

The issue of competing infrastructure requirements, particularly in remote areas, is likely to place severe strain on government. Municipalities are currently severely under-capacitated and in many instances unable to provide even basic services to citizens.
9. LOSS OF A “SENSE OF PLACE”
AND CHANGING OF THE SOUTH AFRICAN LANDSCAPE

Shale gas exploration and production is anticipated to radically transform the existing landscape of South Africa. The construction of well-pads and the visual disturbance it will create is but one concern. Increases in other infrastructure, including roads, housing and other buildings have the potential to severely transform the South African landscape. Lighting of well-pad areas at night will also certainly have an impact on remote areas.

Tourism (including agri-tourism) is a major earner of revenue in South Africa and stands to be lost if the remote areas of country lose their sense of place because of hydraulic fracturing.
10. RISKS AND LESSONS LEARNT INTERNATIONALLY

Areas intended for hydraulic fracturing are noted for their geological complexity. This, together with the precarious nature of its water resources, makes a definitive assessment with respect to the risks posed by shale gas development almost impossible to do.

Experiences abroad have shown, however, that shale gas development is fraught with risk. In certain jurisdictions including Germany, France, Spain, Switzerland, and Ireland, shale gas development has been banned outright owing to its environmental risk.

Even with the firmest mitigation measures in place, the significance of potential surface or groundwater contamination from hydraulic fracturing cannot be overestimated.
11. THE WAY FORWARD

Through its Provincial Organisations as well as its Commodity Organisations, Agri SA is pivotally positioned to influence the decision-making processes around shale gas development in South Africa.

Though mobilising its members and forming strategic partnerships with all concerned stakeholders, Agri SA will bring to bear the necessary influence on all decision-makers to ensure that the right decisions are made with respect to shale gas development.

Agri SA invites all its members as well as concerned stakeholders to form the necessary alliances to be able to:

- Exercise the necessary vigilance in ensuring that government’s decision-making powers are exercised in a risk-averse and cautious manner;
- Attending information sessions and public participation engagements where necessary;
- Inform members and stakeholders of developments with respect to shale gas development;
- Undertake research where such research and comparative studies are required;
- Exercise any and all rights to recourse where government fails in its duties when exercising its decision-making functions in respect of shale gas development; and
- Assisting government to make appropriately considered, correct decisions.

Agri SA is in the process of raising the necessary funds to achieve all the above actions and, in the interest of the agricultural industry as well as the South African society at large, invites you to consider partnering with us.

For further enquiries, or if you wish to contribute to this cause, please contact:

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TIMELINE OF SHALE GAS DEVELOPMENT IN THE KAROO

1965
Soekor (Pty) Ltd formed by the government and begins its search in the onshore areas of the Karoo, Algoa and Zululand Basins.

1999
Petroleum Agency of South Africa formed.

2002
The Mineral and Petroleum Resources Development Act is passed and becomes operational on 1 May 2004.

2008
Oil price rises to reach record high of $147.30 per barrel leading to renewed interest in Shale Gas in the Karoo. Bundu Oil and Gas Energy becomes first entity to apply for an exploration right in the Karoo (not approved).

2009
Petroleum Agency South Africa awards Shell a Technical Cooperation Permit (TCP) for a one-year study to determine the Karoo’s natural gas potential.

December 2010
Shell submits three separate exploration licence applications for areas of approximately 30,000 square kilometres each. These areas are in the Western Cape, Eastern Cape and Northern Cape provinces of South Africa.

February 2011
Minister of Mineral Resources declares moratorium on new applications for exploration rights.

April 2011
Minister of Mineral Resources places on hold the processing of applications received prior to the February 2011 (not Gazetted).

2011
Minister of Mineral Resources appoints intergovernmental Task Team declaring a three-month moratorium on granting of licenses. Moratorium later extended to 17 months.

September 2012
Moratorium lifted.

October 2013

February 2014
Minister of Mineral Resources places a further moratorium on the issuing of new shale gas exploration permits.

May 2015
Portfolio Committee on Mineral Resources requests an additional report on hydraulic fracturing as well as on the applicable legislation. CSIR, SANBI and the Council of Geoscience are appointed to compile a strategic impact assessment (SIA) for the Karoo basin; this report will be available only in 2017.

June 2015
Promulgation of Regulations for Petroleum Exploration and Production.

October 2015
Minister of Water and Sanitation gazettes declaration of hydraulic fracturing as a ‘controlled activity’ in terms of the National Water Act, 1998.

November 2016
Publication of final version of report by CSIR entitled ‘Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks’ published.

March 2017
Minister of Mineral Resources reiterates South Africa’s commitment to shale gas development.

May 2017
Minister of Mineral Resources announces during his budget speech that shale gas development is estimated to commence in 10 – 15 years.