Shale gas exploration in the Parana basin, Brazil

EJOLT Fact sheet
035

Gas

Keywords – title

- Brazil
- Parana basin
- Fracking
- Hydraulic fracturing
- Shale gas
- Unconventional gas

Introduction

Shale gas is methane (natural gas) that is trapped underground in impermeable shale rock. For this reason, shale gas does not flow through the rock like conventional natural gas, so it cannot be extracted simply by drilling a well. The rock needs to be fractured to free the gas.

The exploitation of shale gas requires a highly controversial technique known as hydraulic fracturing, or fracking. This extraction process consists of injecting up to 10 million litres of water in one well alone and 609 chemical substances (some of which are radioactive and carcinogenic). The fluid is injected into horizontal wells at high pressure to fracture the rock and release the natural gas within.

The vertical perforation generally reaches a depth of at least two thousand metres and up to three thousand metres, which means wells pass groundwater and aquifers. Large numbers of wells need to be drilled at regular intervals to extract the same quantities of gas that would be extracted with just a few wells were the gas conventional. This technique has been banned in several countries including Germany, Italy, France and Bulgaria.

A consortium of companies is investigating whether fracking is required to extract shale gas from the Parana basin in the state of Parana, southern Brazil (Figure 1). The Parana basin also covers the states of Santa Catarina and Rio Grande do Sul, all of which are large agricultural states. In Parana, the basin sits above the Guarani aquifer, which is the world's second largest reserve of fresh water.

Background

In November 2013, Brazil's national petroleum agency (Agencia Nacional de Petroleo - ANP) held its 12th licencing round in Rio de Janeiro, in which companies bid for 'blocs' where they can explore for fossil fuels. This round was

Figure 1: Map locating the state of Parana in Brazil (Source: http://wikitravel.org/en/Parana)

aimed specifically at unconventional gas resources.

240 onshore blocs with natural gas potential were auctioned off in seven sedimentary basins spread across 11 Brazilian states - Amazonas, Acre, Tocantins, Alagoas, Piaui, Mato Grosso, Goias, Bahia, Maranhao, Parana and Sao Paulo, covering an area of 168,348,42 km2.

100 of the blocs were in areas containing unconventional natural gas, which will need to be extracted using non-conventional technology. These blocs are located in five basins: Acre, Parecis, Sao Francisco, Parnaiba and Parana.

14 blocs were offered at the 12th licencing round in the state of Parana. Parana is located in the south of Brazil, bordered to the north by Sao Paulo state, to the east by the Atlantic Ocean, to the South by Santa Catarina state and the Misiones Province of Argentina, and to the West by Mato Grosso state and Paraguay. Parana ranks in the top five producing states in Brazil for soybeans, corn, sugarcane, cattle, pork and chicken and also produces wheat, rice, cotton and beans.

11 blocs in Parana were bought for a total of R$21.5million (USD$ 7 572 000), the second largest value of all 13 sectors auctioned . Four blocs were allocated to a consortium of companies for a value of R$12.5million (USD$ 4 403 000), made up of Copel (the Parana state energy company, with a 30% stake), Bayar (30%), Tucumann (10%), and Petra

Figure 2: Map of Parana state Source:http://www.dholmes.com/master- brasil/parana.html

Figure 3: Protest march in Toledo, 3rd June 2014 Source: http://www.oparana.com.br/cidades/caminhada-contra-o-fracking-reune-tres-mil-pessoas-em-toledo-49721/

Figure 4: Protest march in Toledo, 3rd June 2014 Source: http://www.gazetadopovo.com.br/economia/conteudo.phtml?id=1473627

Energia (30%). The value of the consortium's investment over the four year exploration period is estimated to be R$100million (USD$ 35 220 000) and the total estimated investment in the area is expected to be R$174million (USD$61 280 000).

Five blocs in Parana were purchased by the Brazilian state oil and gas company Petrobras (60%) working with another company, Cowan (40%), two more blocs were taken by Petrobras acting alone.

The consortium plans to conduct a four-year study of the Parana basin to determine whether fracking is required and whether it would be economically viable.

The consortium's blocs are located in the west of Parana. The municipalities that suffer the highest risk of being affected by extraction are Cascavel and Toledo (Figure 2). Toledo has a population of 122,502 and Cascavel has a population of 305,615. Cascavel is responsible for 26% of the production of cereals in Parana.

Impacts

The potential risks of fracking are numerous:

- Chemical contamination of soil and water sources occurs during fracking. Up to 600 chemicals contained in the fracking fluid can leak out of the well, which include known carcinogens and toxins such as lead, uranium, mercury, ethylene glycol, radium, methanol, hydrochloric acid and formaldehyde.
- When the rock is fractured methane gas leaks out. Not all of this gas is collected during the process and some can contaminate nearby groundwater.
- Only 30-50% of fracking fluid is recovered, the rest is left in the ground further putting soil and groundwater at risk of contamination. Recovered fluid is left in lined pits where it releases harmful volatile organic compounds (VOCs) into the atmosphere, creating contaminated air, acid rain and ground level ozone.
- Contaminated water can cause sensory, respiratory and neurological damage.

The potential impacts of fracking in Parana include:

- Irreversible chemical contamination of the fresh water Guarani aquifer, will mean that ng in once potable water is no longer fit for drinking. This would have a significant impact on the health of the local population and on agriculture. In Cascavel, the aquifer sits at a depth of 1,800 metres, whereas in Toledo, 45 kms away, it sits at a depth of just 1,100 metres. Gas deposits are believed to sit at between five and seven kms below the surface, so any wells will have to pass the depth of the aquifer.
- There is a serious risk to the sustainability of Parana's agriculture if water sources and soil are contaminated, which would cause a huge blow to the state's economy. At particular risk are pig and poultry farming.
- Air pollution from the release of VOCs into the atmosphere would also have a detrimental impact on the health of the local population and livestock.
- House prices could be affected if water and soil are contaminated.
- Explosions in the sub-soil - ante. otherwise known as seismic shock - caused by the fracturing of the rock, could cause damage to the structure and foundations of buildings.

Conflict and consequences

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Local residents in Toledo and Cascavel have been vociferously opposed to fracking. Those who oppose the practice include university professors, students, scout groups, local businesses, churches, schools and local councillors.

On 3rd June 2014, over 3000 people marched to the headquarters of the state-owned energy company, Copel, in Toledo (Figures 3 and 4). The march was organised by a local councillor, Tita Furlan. Following the protest, on 5th June, the Federal Public Ministry (Ministerio Publico Federal –MPF) initiated a civil action to suspend the licences awarded during the 12th licencing round. The licences will not be valid until the suspension is lifted. The ANP attempted to appeal the suspension but was unsuccessful.

A few days later, on 11th June, a regional public meeting was held in the Councillors' Chamber in Cascavel to clarify to the locals the risks of fracking. Local councillors at the meeting encouraged all the residents of Parana to mobilize against fracking.

The Association of City Councils of the West of Parana (a Associacao de Camaras de Vereadores do Oeste do Parana - Acamop) has been bringing attention to the issue since the beginning of 2014. Acamop set up a petition against fracking in February 2014, which it plans to take to the federal government in the country's capital, Brasilia.

On 9th August 2014, 50 people from the group 'Cascavel Free From Fracking' (Coletivo Cascavel Livre de Fracking), made up of local residents, went out onto the streets of Cascavel with banners, flyers and t-shirts to raise awareness of the risks of fracking and of an upcoming public hearing about fracking, which they had organised at the city council.

Cascavel Free From Fracking have also used social media to raise awareness of the risks of fracking and of how the local population can oppose the technique. They have coined hashtags such as #NaoVaiTerFracking (#ThereWon'tBeFracking) and #XoXisto (#ShooShale). Their Facebook group has 1049 members.

On 21st August 2014, over 800 people attended the public hearing in Cascavel town hall. Representatives from Copel attempted in vain to convince the attendees of the economic benefits of fracking. The following suggestions were approved at the meeting: to create a law prohibiting fracking in Cascavel; to disseminate the meeting minutes to all councils in the country; for all council candidates to declare their position in respect of fracking; to call a municipal energy hearing in Cascavel; and to maintain a state geology commission.

On 26th August 2014, Cascavel city council introduced a law (101/2014) to ban the concession of licences for fracking in the municipality. The law is awaiting sanction by the mayor.

More in this case

- Frack off: Shale gas http://frack-off.org.uk/extreme-energies/shale-gas/
- Copel ignores environmental risks and invests in shale gas exploration http://www.brasildefato.com.br/node/26869
- Councillors in Rondon participate in fracking meeting in Cascavel http://www.camaramcr.pr.gov.br/principal/index.php?option=com_content&view=article&id=1233:12062014-vereadores-rondonenses-participam-em-cascavel-de-encontro-sobre-fracking&catid=40:novidades&Itemid=122
- Parana will have the greatest investment in natural gas exploration http://www.gazetadopovo.com.br/economia/conteudo.phtml?id=1429163&tit=Parana-tera-maior-investimento-em-exploracao-de-gas-natural
- Toledo's population goes to the streets against shale gas exploration http://www.gazetadopovo.com.br/economia/conteudo.phtml?id=1473627
- Dangers of Fracking http://www.dangersoffracking.com/
- Federal government centralizes shale gas in Ibama http://atarde.uol.com.br/economia/noticias/1620303-governo-federal-centraliza-gas-de-xisto-no-ibama
- March against fracking unites 3000 people in Toledo http://www.oparana.com.br/cidades/caminhada-contra-o-fracking-reune-tres-mil-pessoas-em-toledo-49721/
- At a public hearing, Cascavel says no to fracking http://cgn.uol.com.br/noticia/102728/em-audiencia-publica-cascavel-diz-nao-ao-fracking
- Councillors launch legal project to prohibit fracking http://cgn.uol.com.br/noticia/103241/vereadores-lancam-projeto-de-lei-em-proibicao-ao-fracking

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