Market Study on the Oil and Gas Sector in South Africa

July 2021

Report commissioned by the Embassy of Brazil in Pretoria and conducted by Tutwa Consulting Group

Disclaimer

Report commissioned by the Embassy of Brazil in Pretoria and conducted by Tutwa Consulting Group with the purpose of informing Brazilian stakeholders on the situation, perspectives and opportunities of the oil and gas industry in South Africa. The content of this report does not necessarily reflect the views or opinions of the Brazilian government, the Brazilian Ministry of External Relations or the Brazilian Embassy in South Africa.

Contents

Executive Summary

A decade ago, more or less – with commodity prices having picked up after the impacts of the Global Financial Crisis – with new petroleum finds, a group of countries in Sub-Saharan Africa were identified by experts as being on the brink of wealth from their oil or gas deposits. These countries became known as “prospective exporters” by the International Monetary Fund (IMF) amongst others.

As it turned out, many of these countries’ discoveries fell far short of the forecast expectations, with disappointing implications. This is unsurprising as the oil and gas sector is inherently unpredictable and speculation and overinflated forecasts are rife.

During the hype that accompanies a discovery, policymaking tends to be over-optimistic regarding the economic development that will follow the discoveries. Invariably, revenue planning focuses on the oil and gas sector with little consideration for the required economic diversification that brings balanced growth to a country.

Most African countries, for a variety of reasons lack power – be this the long, ongoing droughts which affect hydroelectric power, or the inadequate policy planning and hyper-reliance on coal-driven industries. The lack of power also explains why the ‘African Rising’ narrative set out at the turn of the 21st century, has delivered a rather lacklustre performance. This stresses the understanding that a thriving economy cannot be built without a stable energy supply – for households, industry and transport. Moreover, this energy stability will need to transition to cleaner, greener sources in line with international protocols to which South Africa has signed up.

Building a global coalition for carbon neutrality by mid-century will be the UN's central objective. "All countries need credible mid-term goals and plans that are aligned with this objective".

UN Secretary-General António Guterres
January 2021

Low-carbon growth, as a global imperative is established by the Paris Agreement, a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force in November 2016. This landmark agreement, adopted in 2015 to address climate change and its negative impacts, aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2° Celsius (C) above preindustrial levels, while pursuing the means to limit the increase to 1.5° C.

An industrialised-economy style methodology to eliminating fossil fuels is not realistic in most of Africa. Africa has to find localised means to drive its development needs, including its re-industrialisation and how it will utilise energy technologies and delivery solutions.

Renewables are well suited for this point of transition, and gas – while decidedly a fossil fuel, provides an interim solution to a full green transition. Gas is shown to be a cleaner burning fuel than the current higher polluting alternatives. Gradually eliminating more polluting fuels, while allowing more people to gain access to energy, is both an environmental and ethical decision.

There is a timing issue, however, with global developments regarding gas as an energy source. Gas has an immediate opportunity for development and use within the next 5-20 years. Beyond that, the timeline is hazy, due to global greener developments and policies. Policy windows for investors are also closing for developing countries, and developing countries may be caught in between, subject to developed countries policies around renewal energy sources. However, gas has an immediate opportunity today, including in South Africa.

1. Chapter 1: Political economy and regulatory context

1.1 Policy aspects of the oil and gas sector

When the new administration of President Cyril Ramaphosa took over after the 2019 elections, it attempted to dissociate itself from the previous (Zuma) administration, and has promised increased efficiency, transparency and better governance in an attempt to attract foreign investment.

However, this objective is balanced against the need to address racial inequality stemming from the nation's former apartheid state, as well as the need to generate increased tax income to support struggling public institutions (such as Eskom, South African Airways and arms manufacturer Denel).

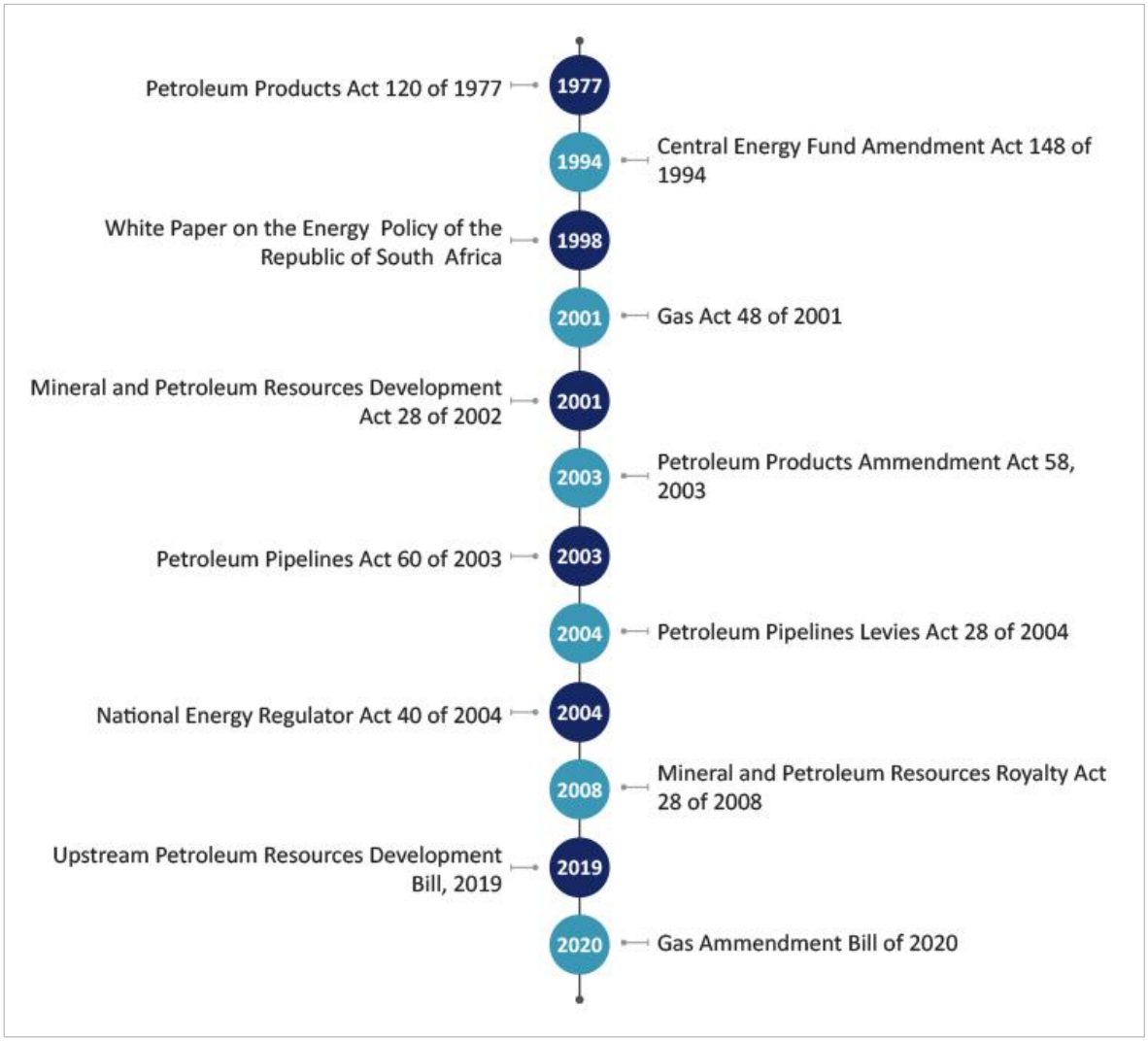
In October 2019, the Integrated Resources Plan (IRP) was approved by Cabinet and published in the Government Gazette. The IRP is an electricity capacity plan, which sets out an indication of the country's electricity demands, how this demand is to be addressed and its costs. The Minister of Mineral Resources and Energy has stated that policy certainty, which the IRP provides, will do much to facilitate investment in power generation and lower costs of doing business in the country. The IRP provides for an additional 3,000 MW of installed capacity for gas and diesel.

In September 2018, it was announced that the Mineral and Petroleum Resources Development Amendment Bill 2013 (which had suffered ongoing delays) was to be withdrawn from further consideration in Parliament. The Bill had initially been introduced to bring significant changes to the regulation of the oil and gas sector. On 24 December 2019, the newly expanded Department of Minerals and Energy published the Draft Upstream Petroleum Resources Development Bill (UPRD Bill).

This chapter provides an overview of the important policy and legislation affecting the sector.

1.2 The legal and regulatory framework of oil and gas activities

Figure 1: Legislation relevant to the oil and gas sector



Source: Consultants' compilation

The principal regulatory bodies overseeing oil and gas extraction in South Africa are the national **Department of Mineral Resources and Energy** (formerly known as the Department of Mineral Resources) and the **Petroleum Agency of South Africa** (PASA) Limited. Environmental matters in respect of oil and gas extraction are regulated by the **Department of Environment, Forestry and Fisheries**.[1]

One of the main issues that organisations in the oil and gas industry are grappling with is an uncertain regulatory framework. The major discovery of gas condensate offshore South Africa in the Outeniqua Basin (Brulpadda), announced by Total on 7 February 2019, shone a spotlight on the regulatory regime governing the upstream petroleum sector in South Africa.[2]

[1] Lizel Oberholzer, Norton Rose Fulbright South Africa Inc, "Oil and gas regulation in South Africa: overview". 2020.

[2] Peter Leon, "Regulation of SA oil sector and a new Petroleum Resources Bill". 05 November 2019: https://www.politicsweb.co.za/documents/regulation-of-sa-oil-sector-and-a-new-petroleum-re (Accessed 20 January 2021).

Upstream sector

Petroleum resources are currently regulated by the **Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA)**, which also governs mineral resources. The MPRDA governs the exploration and production of oil and natural gas (in the **upstream sector**). There have been commitments to address this concern of a **one law fits both industries** approach since 2015, and the intention of Government is to separate regulations for oil and gas from the mining industry.[3] This resulted in the drafting of the **Draft Upstream Petroleum Resources Development Bill in 2019**. The Bill (which is still in draft form and is subject to change) is poised to repeal and replace the relevant sections pertaining to upstream petroleum activities in the MPRDA.

Published to promote policy certainty and to encourage investment in petroleum resources in South Africa, the **Upstream Petroleum Resources Development Bill** proposes to separate the regulatory framework so that petroleum and mineral resources are governed by two separate statutes. The Draft Bill was designed to make provision for equitable access to and sustainable development of South Africa's petroleum resources.[4] However, according to the Bill, the **state will get a 20% free stake in all projects**, which must also have **a minimum of 10% black ownership**. Therefore, it remains to be seen if this will attract the investment needed to kickstart the sector. The Bill has been sent back to the Department of Mineral Resources and Energy for completion of the consultation process.[5] Detailed information of the licensing process is found in the next section below.

In September 2017, the then Department of Trade and Industry (DTI) issued a Proclamation to publicise the intention of the Department of Energy and the Petroleum and Liquid Fuels Industry to align the **B-BBEE Petroleum and Liquid Fuels Sector Transformation Charter, 2000** with the **B-BBEE Act, 2003;** the **B-BBEE Codes of Good Practice;** and the **B-BBEE Policy Framework** to ultimately serve as a **Sector Specific Code of Good Practice**.[6] Petroleum companies (upstream, midstream and downstream) are subject to a BEE code – the **Liquid Fuels Charter**[7] – which sets targets for greater involvement and advancement of HDSA in the petroleum industry. Among other things, it requires upstream petroleum companies to be at least 9% HDSA-owned. However, the regulator is not rigid as far as HDSA participation is concerned, they are able to relax the requirements if there has been *bona fide* effort to find an HDSA partner. [8]

Upstream Petroleum Resources Development Bill licensing dispensations

The salient issues to expect from the UPRDB **licensing dispensations** are as follows:[9]

Firstly, understanding the current state of play is important. The **current system for licensing that is regulated under the MPRDA** is as follows. One, there is an open application system (first come, first served) where anyone can apply at any time; which is how it currently operates. In addition, the bill provides for invitations by the Minister – who puts out a notice for invitations for applications. The default system that

3 PwC South Africa, "Opportune time for Africa oil & gas industry to consider change": https://www.pwc.co.za/en/press-room/opportune-time-for-africa-oil---gas-industry-to-consider-change.html (Accessed 20 January 2021).

4 Draft Upstream Petroleum Resources Development Bill, 2019.

5 Stakeholder Interview: Vania Mahotas, Department of Mineral Resources and Energy (DMRE) (24 February 2021).

6 Marc Derfoldy, "Petroleum and Liquid Fuels B-BBEE Sector Code". 19 February 2019: https://beeratings.com/petroleum-and-liquid-fuels-b-bbee-sector-code/ (Accessed 28 January 2021).

7 The Charter has expired but can serve as a guide.

8 Stakeholder Interview: Tebogo Motloung, Petroleum Agency SA (PASA), 3 March 2021. Note: The Petroleum and Liquid Fuels Charter has expired, but still serves as a guide until the Bill is enacted.

9 Interview with Tebogo Motloung, Petroleum Agency South Africa, 3 March 2021.

applies now is the open application system, as both systems cannot run concurrently. (The invitation system has only been applied once, as it is counter-intuitive to run them at the same time.)

Notably, the Minister of Mineral Resources has currently declared a moratorium on applications in the offshore space. This is to put a break on application process because firstly, the offshore acreage has already been taken up. Second, it would be counterintuitive to allow new applicants if legislation is changing. For onshore, anyone can still come and apply at any time at the moment.

Therefore, new entrants will be governed under the new legislation under the UPRDB.

License dispensation under the new legislation is what is now being introduced as licensing or bidding rounds. It is also referred to as invitation for administrative licencing rounds by government.

The difference with this new bill is that bidding may not be just on the basis of the 'best bidder' (one that proposes the most robust and most explorative work program); it will also be based on some of the multiple policy objectives that government wants to see being met (as government may have a multiplicity of government objectives they want to achieve). Some of these include accelerating exploration – which is a key objective of the bill. Others include opening up the sector to local and indigenous companies in the country i.e., making room for substantial and meaningful participation of historically disadvantaged persons (HDSAs).

The new licencing system is expected to ensure that all the policy objectives such as support for HDSAs, acceleration of exploration, and fast-tracking of acquisition of data are considered. Therefore, bidding will not be the way it has always been known – but considering these policy objectives too.

Therefore, the **process going forward** will be that the **Minister will publish a notice of invitation** which will indicate all the terms and conditions to be complied with at the bare minimum. Those that comply with the bare minimums will be gauged based on what they are also going over and above to provide – to determine the most desirable applicant who will assist in achieving the multiplicity of policy objectives, detailed by government.

Additionally, there will **also be an open application system – however the Minister must still publish a notice of invitation.** This is an alternative option in case the notice of invitations put out by the Minister does not receive much interest in the areas published. This option will open up areas in which there was not much interest before. Applicants can then apply and propose any terms and conditions e.g. their work commitments and any other terms.

The bill also mentions that no one can apply for any permit or right, at any time, except a reconnaissance permit. The bill sets out an **exception regarding the reconnaissance permit** – which is a permit to those who wish to acquire data. This permit is not subject to the requirements that the Minister must invite. Anyone can propose to come to acquire data at any time. Those interested may not necessarily be explorers, but people interested in processing, interpreting and selling the data – these usually work with the regulator and state to help them prepare for licensing rounds. Fast tracking the acquisition of data is also an objective of the UPRDB.

The process is still underway – in terms of revisions to the bill – which may mean further consultations with industry and other organizations which may yield to revisions to some of the provisions subject to the

Minister's approval; this is something to keep an eye of. The nature of the licencing however, will likely remain the same.

Midstream and downstream sectors

Other legislation governs the **midstream and downstream sectors**, these include: the **Gas Act, 2001**, governing the construction and operation of gas transmission, storage, distribution, liquefaction and re-gasification facilities, and trading in gas (including liquefied petroleum gas). Cabinet approved the submission of the **Gas Amendment Bill of 2020** to Parliament at its virtual meeting on February 24 2021.[10] The Bill seeks to align the gas industry to, amongst others, new transportation technologies of natural and unconventional gases that were not catered for in the current Gas Act.[11]

The **Petroleum Pipelines Act, 2003**, governs the construction and operation of petroleum pipelines, loading and storage facilities; the **Petroleum Products Act, 1997**, governs the manufacture, wholesale and retail of petroleum products; and the **International Trade Administration Act, 2002**, governs the import and export of oil (among other commodities) into and out of South Africa.

The South African **National Gas Master Plan** is currently under development, concurrently and in line with the **SADC Regional Gas Master Plan**, where South Africa is part of the Working Group. The National Gas Master Plan, being developed from recommendations from the SADC for a country specific Master Plan, is however not yet finalised and still to be published for consultation.

Black economic empowerment and transformation

It is an imperative of Black economic empowerment (BEE)[12] policy, as also emphasised in the Draft **Upstream Petroleum Resources Development Bill (2019),** to meaningfully expand opportunities for black persons to enter and actively participate in the upstream petroleum sector. This is aimed at benefiting from the exploitation of the nation's petroleum resources. From a regulator's perspective, the requirement for Historically Disadvantaged South Africans (HDSAs) within the bill, is a balancing act between addressing inequalities prevalent in all the economic sectors and opening up the oil and gas sector for investment.[13]

However, while ensuring that South Africa's mineral wealth provides direct benefit to its citizens is an important policy goal, there are challenges in seeing this implemented. **Exploration activities are extremely costly and risky**, with the drilling of a single well costing upwards of US$250 million – and then, on average, only one out of every seven wells are productive.[14] Since commercial banks usually do not fund exploration activities, there is a challenge for black economic empowerment partners to come up with the large capital

[10] Engineering News, "Gas Amendment Bill heads to Parliament for processing" 26 February 2021. https://www.engineeringnews.co.za/topic/gas (Accessed 11 March 2021).

[11] *Ibid.*

[12] South Africa's policy of Black Economic Empowerment (BEE) is a pragmatic growth strategy that aims to realise the country's full economic potential, while helping to bring the black majority (African, Indian and Coloured) into the economic mainstream, many of whom were systematically excluded from meaningful participation in the country's economy. BEE refers to the government's policy, B-BBEE is the implementation of the policy. Both refer to the same strategic framework that seeks to right the wrongs of the past and to distribute the wealth of the nation across all races and genders.

[13] Stakeholder Interview: Tebogo Motloung, Petroleum Agency SA (PASA), 3 March 2021.

[14] Lizel Oberholzer, "Impact of the Upstream Petroleum Resources Development Bill on SA's oil and gas industry".January2020:https://www.nortonrosefulbright.com/en-za/knowledge/publications/f268ce91/impact-of-the-upstream-petroleum-resources-development-bill-on-sas-oil-and-gas-industry (Accessed 26 February 2021).

investments required to meet their obligations in respect of these activities.[15] This is likely to exclude BEE players and thwart the government's ambitions to transform the oil and gas sector.

Tax, finances and environmental management

In relation to tax and finances, the **Mineral and Petroleum Resources Royalty Act 28 of 2008** provides for the imposition of a royalty on the "transfer" of mineral resources extracted from within South Africa. A royalty is payable on production with a current cap at 5%. The Tenth Schedule to the **Income Tax Act 58 of 1962 (ITA)** deals specifically with the taxation of oil and gas companies and contains several favourable provisions applicable specifically to oil and gas companies. The ITA provides for corporate taxation of 28% for oil and gas companies, generous capital uplifts through the exploration phase and uplifts on development and production phases.

Companies are also required to make financial provision for the rehabilitation and management of potential negative environmental impacts in terms of the **National Environmental Management Act 107 of 1998**.[16] In February 2020, the **Centre for Environmental Rights** submitted their comments on the Upstream Petroleum Resources Development Bill. Their overall submission is that the Bill should not proceed in its current form, if at all. They argue that legislation governing petroleum resources must only be put in place to ensure a just transition from fossil fuels to clean renewable energy.[17] One of their main submissions is that the Bill is a replication of the MPRDA, with crucial objectives of the MPRDA having been removed, including issues surrounding the State's obligation to protect the environment, the need for transformation and community development imperatives. The Centre for Environmental Rights also submits that the Minister has failed to consider the implications of the Bill in the context of the climate emergency.[18]

Notwithstanding that South Africa currently does not have significant *proven* oil and gas reserves, there is potential in this sector - the Brulpadda find by Total in 2019 indicates a large oil field. However, further exploration wells will have to be drilled before the parties will be able to decide whether to move to production phase. Exploration activities are notoriously expensive and a company acquiring an oil and gas right in South Africa thus has to commit substantial amounts of capital with the risk that it may not be able to recover its investment.

In recent years, proposed changes to the regulatory regime, especially the 20% State participation, created substantial uncertainty.

In terms of State participation, the **Draft Upstream Petroleum Resources Development Bill**, 2019 grants the State, through PetroSA, an option to acquire a **20% carried interest** in all exploration and production rights (the non-state holders of such rights can recover development and production costs of the State's carried interest from the State's portion of proceeds generated from production operations). Additionally, the Bill

15 *Ibid*.

16 Global Legal Group, "The International Comparative Legal Guide to: Oil & Gas Regulation 2018".

17 Centre for Environmental Rights, Comment on Draft Upstream Petroleum Resources Development Bill, 2019. 21 February 2020. https://cer.org.za/programmes/mining/submissions/comment-on-draft-upstream-petroleum-resources-development-bill-2019

18 *Ibid*.

empowers the Minister to, by Government Gazette notice, direct production right holders to sell a certain volume of South African produced oil and gas to the State to provide for the country's strategic stock.

Provisions of the Bill provide the State with guaranteed participation in successful oil and gas discoveries because the State can decide in which rights they would like to participate, while their costs are partly carried. Although the Bill states that development and production costs can be recovered by non-state holders the details of this cost recovery are not dealt with in the Bill. It is likely to be published in separate legislation by the Minister of Finance. Until this financial legislation is promulgated, it will be very difficult for oil and gas companies to make an informed decision whether to invest or further invest in South African upstream activities. It is expected that the promulgation of such financial legislation is imminent as the delay thereof would frustrate government's objective to accelerate exploration and production activities in South Africa.

Norton Rose Fulbright South Africa Inc.

The favourable tax treatment of oil and gas companies South Africa is therefore encouraging. The tax treatment is dealt with in the Tenth Schedule to the Income Tax Act. It not only provides for oil and gas companies to claim **an 'uplift'** (or additional deduction) **of up to 200%** in respect of capital expenditure during exploration, but it also does away with dividends tax (normally 20%) and interest withholding tax (normally 15%) for oil and gas companies. In addition, it provides for the conclusion of **fiscal stability agreements (FSAs)** between oil and gas companies and the Minister of Finance. An FSA guarantees that the provisions of the Tenth Schedule as at the date on which the FSA was concluded, will continue to apply in respect of that right, as long as the right is held by the oil and gas company.

However, the Minister of Finance has not concluded any FSAs in over five years. In addition, the Minister of Finance announced in his 2019 Budget Speech that the tax regime applicable to oil and gas would be reviewed. To date, no details have been released, nor has the oil and gas industry been consulted in respect of any proposed changes.

The fact that the Minister of Finance has not in recent years concluded any new FSAs is very concerning, especially considering the proposed review of the oil and gas tax regime and the proposed 20% State participation.

In light of the technically challenging exploration environment in South Africa, and the massive amounts of capital required to conduct exploration activities, it is important that oil and gas companies that have the financial backing and the relevant expertise are encouraged to invest in South Africa. There is thus a strong need for more certainty and the conclusion of FSAs to encourage investors to commit to long-term projects within the oil and gas industry.

1.3 How the government is funding its policies for oil and gas

A government department's programmes are the activities that it spends money on during the financial year. Different programmes have different budgets, as shown in the **Tables** below, depending on their objectives and available budgets. The tables below give a presentation of the Department of Mineral Resources and Energy's (DMRE) Estimates of National Expenditure for the last five years (2016 to 2021).

In addition to the budget for the DMRE, oil and gas exploration and development has become an integral part of a number of government development plans and initiatives, such as **Operation Phakisa**, the **Integrated Resource Plan** and the **National Development Plan**, to name a few. In summary, these initiatives envisage *inter alia* diversification of South Africa's energy sources, infrastructure development, foreign investment, and a reduction in South Africa's dependence on energy imports. Operation Phakisa, launched by the government some seven years ago, encouraged an increase of offshore exploration activities and has set a target to achieve at least **30 exploration wells by 2024.** The National Development Plan states that once gas reserves are proven, the development of these resources as well as **gas-to-power projects, should be fast tracked**.[19]

[19] Cliffe Dekker Hofmeyr, "The Brulpadda and Luiperd gas discoveries: A game changer for South Africa's petroleum offshore exploration" 10 February 2021
https://www.cliffedekkerhofmeyr.com/en/news/publications/2021/Oil-Gas/oil-and-gas-alert-10-february-The-Brulpadda-and-Luiperd-gas-discoveries-A-game-changer-for-South-Africas-petroleum-offshore-exploration.html (Accessed 13 April 2021).

Table 1: Vote expenditure trends by programme and economic classification

Programmes					
1. Administration	2. Minerals and Petroleum Regulation	3. Mining, Minerals and Energy Policy Development	4. Mine Health and Safety Inspectorate	5. Mineral and Energy Resources Programmes and Projects	6. Nuclear Energy Regulation and Management

Programme	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Audited outcome	Annual budget	Adjusted appropriation	Revised estimate	Average: Outcome/ Annual budget (%)	Average: Outcome/ Adjusted appropriation (%)
R million	**2016/17**			**2017/18**			**2018/19**			**2019/20**			**2016/17 - 2019/20**	
Programme 1	521.8	560.7	612.2	530.6	576.8	604.9	579.0	586.7	622.1	626.7	624.9	624.9	109.1%	104.9%
Programme 2	351.9	345.9	341.2	449.8	464.4	449.1	484.4	483.4	470.6	538.7	537.8	537.8	98.6%	98.2%
Programme 3	1,096.6	891.7	899.0	901.8	904.9	879.9	977.5	995.2	982.8	1,026.1	1,018.9	1,018.9	94.5%	99.2%
Programme 4	186.7	191.6	191.3	191.2	196.0	205.4	207.0	207.0	210.3	220.6	224.8	224.8	103.3%	101.5%
Programme 5	6,395.1	6,352.1	6,258.5	7,038.8	6,999.5	6,788.1	5,879.1	5,914.2	5,814.5	5,993.9	5,740.9	5,591.9	96.6%	97.8%
Programme 6	662.1	877.6	871.7	780.7	783.2	793.9	808.7	867.7	870.0	1,039.3	1,038.5	1,038.5	108.6%	100.2%
Total	**9,214.2**	**9,219.6**	**9,173.9**	**9,892.9**	**9,924.9**	**9,721.3**	**8,935.7**	**9,054.2**	**8,970.4**	**9,445.2**	**9,185.8**	**9,036.7**	**98.4%**	**98.7%**

Table 2: Budget summary for the Ministry of Mineral Resources and Energy

	2020/21		2021/22		2022/23	
R million	**Total**	**Current payments**	**Transfers and subsidies**	**Payments for capital assets**	**Total**	**Total**
MTEF allocation						
Administration	642.3	621.5	3.5	17.4	683.2	707.8
Minerals and Petroleum Regulation	574.7	373.3	201.4	0.0	608.7	632.7
Mining, Minerals and Energy Policy Development	993.1	181.3	811.7	0.1	892.6	952.2
Mine Health and Safety Inspectorate	232.7	229.4	2.4	0.8	252.0	261.5
Mineral and Energy Resources Programmes and Projects	5,798.1	240.7	5,557.3	0.1	5,977.7	6,829.7
Nuclear Energy Regulation and Management	1,096.1	37.8	1,058.3	–	1,155.8	1,199.5
Total expenditure estimates	**9,337.0**	**1,684.0**	**7,634.6**	**18.4**	**9,570.0**	**10,583.4**

Executive authority: Minister of Mineral Resources and Energy; Accounting officer: Director-General of Mineral Resources and Energy; Website: www.energy.gov.za

1.4 Political risk factors

Political risks in oil and gas are similar to those prevalent in the traditional extractives (mining and quarrying) sector. Like all capital-intensive, long-term and high-risk investments, the oil and gas industry undertakes wide-ranging risk analysis. Part of the risk matrix includes **political and legislative stability risks**, while the key economic factor that host government considers is the expected profits. The oil and gas industry holds different political risks to other industries. This is because mining and petroleum operations are highly sensitive corporate activities given the strategic, sovereign-owned nature of the country's resources.[20] In this regard, communities, farmers and activists oppose exploration activities in most countries.

As in other countries, there are socio-economic and political risk factors that should be considered when planning to invest in the South African oil and gas sector. They can include: [21]

- Political instability,
- Labour unrests,
- Corruption,[22]
- Potential land expropriation without compensation,
- Investment down-grades, and
- Long-term devaluation of the local currency (South African Rand) over the last few years.

There is significant resistance to renewable energy efforts from the mineral-energy complex, which constitutes some of the most influential global corporates and is a collective major employer and contributor to GDP.

[20] Alon, I., Gurumoorthy, R., Mitchell, M.C. & Steen, T. 2006. Managing Micropolitical Risk: A Cross-Sector Examination. Thunderbird International Business Review, 48(5):623-642.

[21] https://www.bbplaw.attorney/oil-and-gas-south-africa-investment/

[22] Corruption here, also encompasses State Capture, which is s a type of systemic political corruption. It's defined as "the efforts of a small number of people aiming to benefit from the illicit provision of private gains to public officials in order to profit from the workings of a government". https://mg.co.za/article/2018-09-14-00-definition-of-state-capture/

2. Chapter 2: The economics of the oil and gas sector

Introduction

The World Bank has paused funding for new coal power generation except in exceptional cases, leaving a question mark over coal as a cure for global energy poverty. But the slowdown in world coal demand is partly due to China's structural shift away from construction and export-led manufacturing, which has significantly reduced coal prices.

Shabbir Ahmad, The Conversation

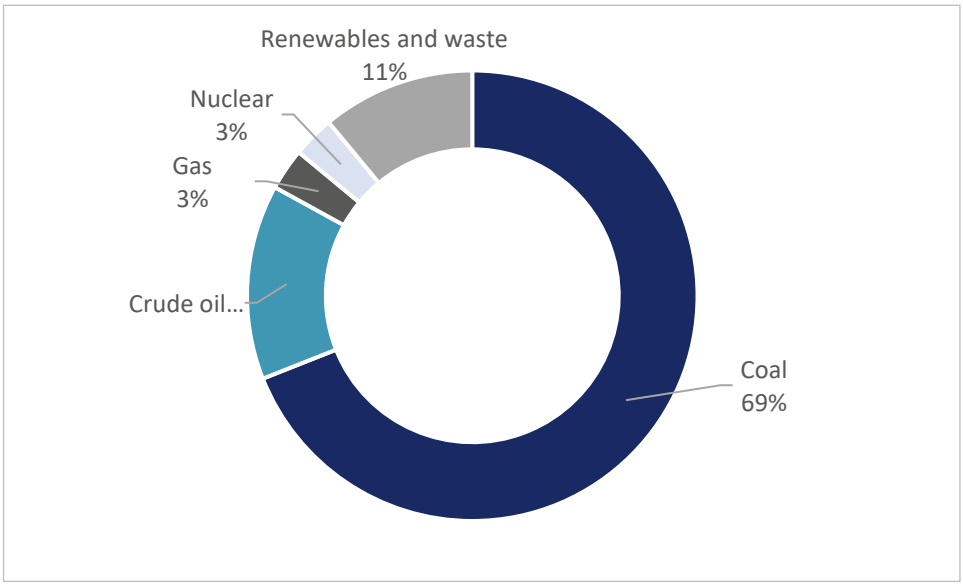
South African energy supply is dominated by coal. In 2019, the Department of Energy reported that coal constituted 69% of the primary energy supply, followed by crude oil with 14% and renewables with 11%. Both nuclear and natural gas contributed 3% each in the same period.[23] There are various reasons behind the vast contribution of coal to the South African energy mix. Firstly, the resource is relatively abundant, therefore, it is cheap.[24] In addition, the coal industry employs a substantial number of people – mostly unionised with high bargaining power within the industry. Furthermore, the energy infrastructure in South Africa was designed over a century ago to accommodate coal. The technology has not changed in any significant way.[25]

[23] Department of Energy, *The South African Energy Sector Report. 2019 http://www.energy.gov.za/files/media/explained/2019-South-African-Energy-Sector-Report.pdf, 8* (Accessed 1 March 2021).

[24] https://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Coal_Power.aspx

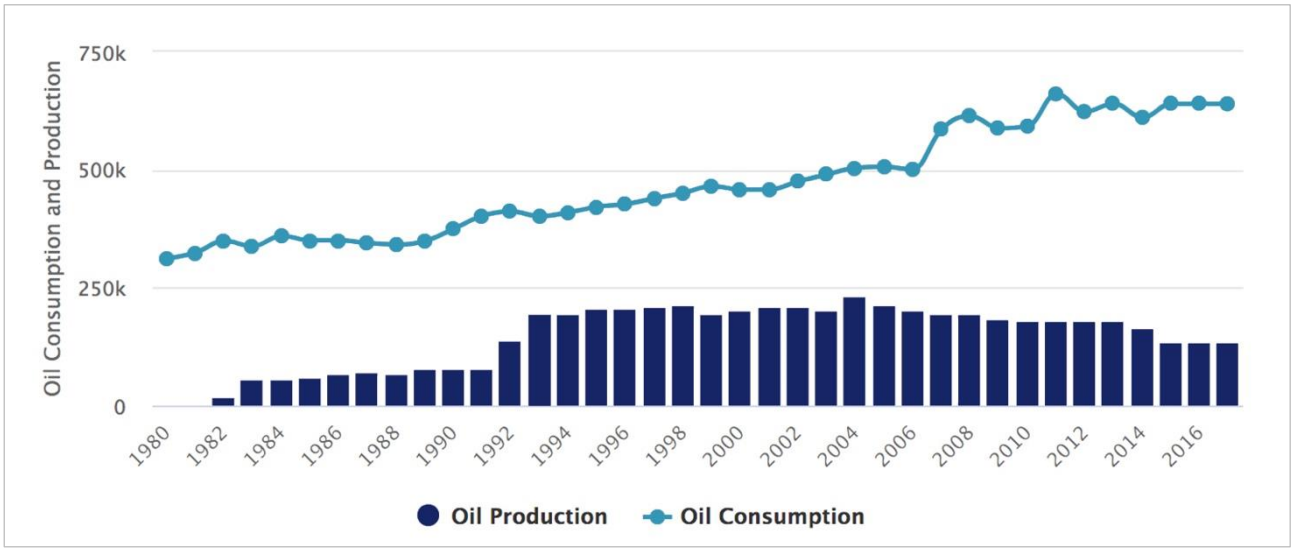
[25] Interview with Kevin Baart, South African Petroleum Industry Association, 25 February 2021

Figure 2: Primary energy supply in South Africa, 2016 (no updated information available)



Source: Department of Energy, 2019; and Consultant's compilation

Figure 3: Production and consumption of crude oil in South Africa, 1980-2016

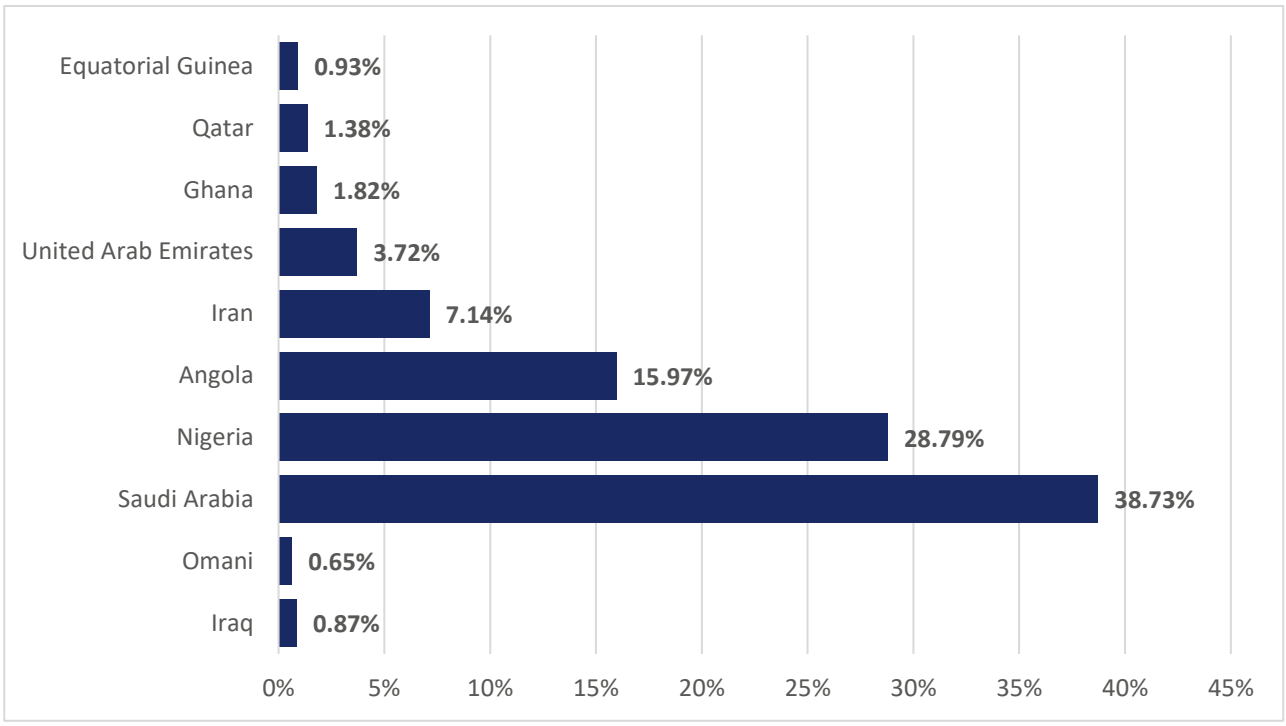


Source: Worldometer, 2021.

Note: The unit of measurement used is barrels per day.

Crude oil, in South Africa, like coal, contributes a far greater portion of the energy mix than natural gas. The main petroleum products consumed in the country are petrol, diesel[26], jet fuel, illuminating paraffin, fuel oil, bitumen, and LPG,[27] The country, however, possesses limited crude oil reserves. Thus, a substantial portion of crude oil consumed in South Africa is sourced abroad.[28,29]

Figure 4: South African crude oil imports



Source: South African Market Insights, 2018; and Consultant's compilation

Given the relatively large contribution of crude oil to the energy mix in South Africa, the country has developed sufficient capacity in crude oil refining and the infrastructure required to deliver products to the end-user. The table below indicates the various oil refineries located across the country as well as their capacity.

[26] It is noted that diesel is also used in generating electricity.

[27] South African Petroleum Industry Association (SAPIA), *'South African fuel industry,'* https://www.sapia.org.za/overview/south-african-fuel-industry (accessed 22 February 2021).

[28] Worldometer, '*South Africa oil*,' https://www.worldometers.info/oil/south-africa-oil/, (accessed 6 April 2021

[29] South African Market Insights, '*Crude oil in South Africa: Where is it coming from?*' [web blog], 23 October 2017, https://www.southafricanmi.com/blog-23oct2017.html (accessed 6 April 2021).

Table 3: Crude oil throughput at South African oil refineries and their ownership, 2013

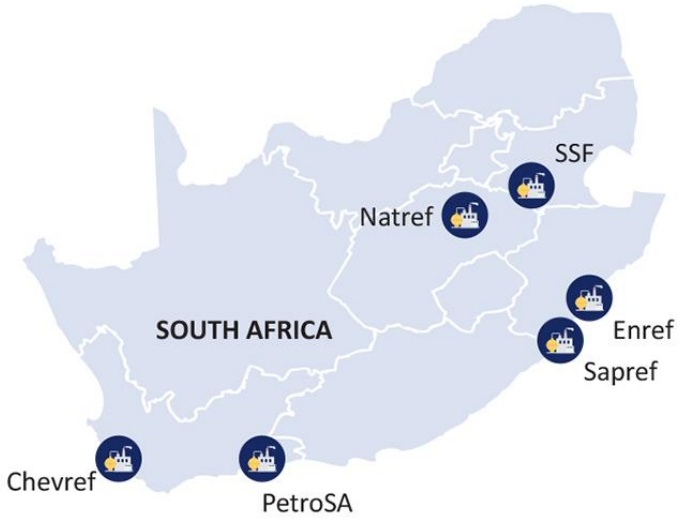
Refinery	Crude oil throughput	Ownership
Chevref	100 000 barrels per day	Chevron South Africa
Enref	120 000 barrels per day	Engen Petroleum
Natref	108 000 barrels per day	Sasol/Total SA (64%/36%)
Sapref	180 000 barrels per day	Shell South Africa/BP Southern Africa (50%/50%)

Source: SAPIA, 2021.

In South Africa, petroleum products are produced through six refineries, with their locations represented below:

- Crude oil refiners, Chevref, Enref, Natref and Sapref
- Coal-to-liquid fuels and gas-to-liquid fuels - synthetic fuel (by Sasol at Secunda)
- Natural gas to liquid fuels - synthetic fuel (by PetroSA)

Figure 5: Refinery locations in the country



Refinery	Location
Natref	Sasolburg
Sapref	Durban
Enref	Durban
Chevref	Cape Town
SSF	Secunda
PetroSA	Mossel Bay

Source: SAPIA, Cleaner Fuels 2018.

Challenges facing refineries

As global **sentiment turns against fossil fuels**, winds of change in the fuel-refining sector have oil companies around the world rethinking the future of their refineries. For South Africa, it is an especially pressing question as some refineries have now closed their doors. The transition to greener and cleaner fuels has not only presented opportunities, but also challenges to the old refineries in the country, however, some challenges in the refining sector are not only a result of the transition to renewable energy sources.

The South African plants owned by Glencore Plc and Petroliam Nasional Bhd (Petronas) making up about 43% of the nation's oil-refining capacity have been closed down, and are expected to stay shut until at least 2022.

Astron Energy Ltd., a unit of Glencore, has yet to restart the 100,000 barrel-a-day Cape Town refinery after a deadly explosion and fire in July 2020. Petronas unit Engen Holdings Ltd.'s Durban plant also stopped production in December after a fire.

The closures will force South Africa to rely heavily on fuel imports. All four of South Africa's oil refineries -- with a total capacity of more than 500,000 barrels a day -- have had accidents or are under review, with the industry already hit hard by the Covid pandemic. A pending national clean-fuels policy is also likely to increase costs to upgrade machinery.

Bloomberg January 2021

South Africa is already acting on climate change. The country has significant investment in renewable energy, public transport, energy efficiency, waste management and land restoration initiatives. The country was a signatory to the Paris Agreement in 2016 to enhance efforts to transition to a lower carbon economy and society.[30] This was followed by the signing of the Carbon Tax Act No 15 of 2019 into law, which came into effect from 1 June 2019.[31]

To comply with the Amendment Regulations regarding Fuel Specifications and Standards (referred to as CF2 Regulations), effective 01 July 2017, oil companies must invest in refinery upgrades because the **current configurations of their refineries do not allow them to produce cleaner fuels** as specified by the CF2 regulations. The **cost of such refinery upgrades** was estimated at US $3.9 billion (in 2009 figures). The oil refining companies have expressed their unwillingness to invest in refinery upgrades because of the size of investments required, coupled with the absence of the guarantee that they are going to recover their investments fully.[32]

Oil refining companies propose, amongst other things**, the imposition of a levy over and above the normal prices** of the regulated products as a means of recovering their investments over a relatively short period of time. This levy would be collected from consumers over and above the CF2 products' prices.[33]

As both crude oil products and coal have a relatively high carbon-intensity, in conjunction with the detrimental reliance on crude oil imports as well as the challenges facing refineries, from the perspectives of energy security and environmental conservation, the current energy mix is unsustainable.

On the point of energy security, **as reported by the South African Economic Reconstruction and Recovery Plan**, this is vital for maintaining a stable economy and enhancing economic growth within the nation. In

30 https://www.environment.gov.za/mediarelease/southafricasignsparisagreementonclimate

31 https://www.iea.org/policies/3041-south-african-carbon-tax

32 Ms. Vania Mahotas,DMRE, Deputy Director: Petroleum Regulation, Hydrocarbons Policy "South African National Workshop on Implementation of Marpol Vi On 0.50% Sulphur Limit : Cleaner Fuels Strategy", 24 July 2019:http://www.samsa.org.za/Documents/Marpol%202019/South%20Africa%27s%20Clean%20Fuels%20Strategy.pdf

33 *Ibid.*

essence, industrialisation and manufacturing in South Africa hinges upon energy security.[34] However, over a decade of rolling blackouts has clearly shown that South Africa is on the brink of a power crisis. Undoubtedly, load-shedding has resulted in costs to society on a broad spectrum, ultimately, affecting living standards within the country and having a profoundly negative impact on industry at large. As such, there is a dire need for a greater degree of diversification and strengthening of the South African energy mix. Interventions aimed at achieving this, as reported by the Recovery Plan, include the use of natural gas. In this regard, it entails finalising a model and partnership for liquefied natural gas (LNG) imports as well as gas to power initiatives.

On the point of environmental conservation, the use of carbon-intensive products is discouraged. This is emphasised by South Africa's commitment to achieving the relevant Sustainable Development Goals (SDGs), targets as per the Paris Agreement within the United Nations Framework Convention on Climate Change, on climate change mitigation, adaptation, and finance, signed in 2016. In addition, the 2019 implementation of a carbon tax.[35,36] The implementation of this tax, however, is not aimed at punishing polluters as much as it is a means of incentivising the move away from carbon-intensive energy sources, such as coal and crude oil. Although natural gas is, indeed, a fossil fuel, it has a relatively lower carbon intensity, hence, lower emissions.[37] **Natural gas could, therefore, play a substantial role in South Africa's *transition* toward a greener economy**.

Given the well-established (however, ageing) infrastructure of Eskom, the undertaking of this project does not aim to pry the energy sector away from the power utility. Instead, the production and marketing of natural gas in South Africa seeks to supplement and replace current sources of energy in the South African energy mix.

Despite the theoretical simplicity of such an undertaking, a practical assessment indicates various industry-related infrastructural constraints in South Arica. An analysis of these constraints highlights the opportunities for the development of the industry, as well as the potential to experience positive spill-over effects. This will be broken down into further detail in section 2.2.

South Africa, which is estimated to have 485 trillion cubic feet (tcf) of technically recoverable shale gas resources, produces slightly more than 34 billion cubic feet (bcf) of natural gas against a national demand of 142bcf. The deficit is imported from neighbouring Mozambique where South Africa company Sasol holds proven reserves of nearly 2.6 trillion cubic feet in Inhambane Province.

Offshore Engineer Digital

[34] Department of Forestry, Fisheries and the Environment, '*South Africa signs Paris Agreement on Climate Change in New York*,' https://www.environment.gov.za/mediarelease/southafricasignsparisagreementonclimate, (accessed 1 March 2021).

[35] Department of Forestry, Fisheries and the Environment, '*South Africa signs Paris Agreement on Climate Change in New York*,' https://www.environment.gov.za/mediarelease/southafricasignsparisagreementonclimate, (accessed 1 March 2021).

[36] International Energy Agency, *'South African carbon Tax,* https://www.iea.org/policies/3041-south-african-carbon-tax, (1 March 2021).

[37] Energy Information Administration, *'How much carbon dioxide is produced when different fuels are burned?'* https://www.eia.gov/tools/faqs/faq.php?id=73&t=11, accessed (1 March 2021).

2.1 South Africa's growing interest in oil and gas

In February 2019, Total made an important discovery in the Brulpadda field offshore South Africa on Block 11B/12B in the Outeniqua Basin (located off the shore of Mossel Bay). Total predicts that the potential for the discovery of the net gas could hold 1.5 to 3 billion barrels.

South Africa has become an interesting region for exploration with several significant underexplored basins. The Total discovery has already resulted in an uptick of interest in reservoir drilling and exploration. The discovery will likely supply South Africa's refineries for almost four years and significantly boost the country's economy. Rough currents in the Outeniqua blocks caused delays in the Brulpadda discovery. In addition, a more suitable rig for the operation and a weather forecasting system was required to assess weather and ocean conditions more accurately.

The Brulpadda find is likely to be a gamechanger in the South African oil and gas space – including refining oil and other downstream activities, transport companies, marine services, and catering supplies. Highly skilled and experienced engineers, extraction experts and artisans will be needed when production starts, both onshore and on the rigs. If the gas is converted into power, it could provide an affordable and reliable source of energy that could boost manufacturing in the country. Sedgefield and Mossel Bay are the closest ports and most obvious beneficiaries, especially since Mossel Bay hosts the PetroSA refinery. Already, there has been off-shore activity at the Ibubesi field off South Africa's west coast, where Australian company Sunbird Energy is the operator with a 76% working interest, with national oil company PetroSA holding the remaining 24% of the licence.

South Africa imports huge quantities of oil, which is 15% of all total imports. If the country can produce more of its own liquefied natural gas (LNG) to replace oil, this would have a significant economic impact. The Brulpadda find is estimated to be in the region of 1 billion barrels of oil equivalent – enough to run all South Africa's refineries (cumulative volume of 700 000 barrels per day) for just under four years.

The first gas from the well-supplied for commercial purposes is estimated to only come online in 2027, given the complexity of the geology and the harsh deep-water environment of the find and policy uncertainty in South Africa. So clearly this find still has a long way to go to truly prove itself and to become a viable resource for exploitation. This provides ripe opportunities for R&D and technology partners to present potential solutions.

Compared to other neighbouring-country gas discoveries that have faced delays – the Kudu in Namibia or the giant fields in the Rovuma Basin of Mozambique and the Block 2 LNG Project in Tanzania – Brulpadda would be able to tap into a pre-existing local market where the infrastructure and demand are already present. This resurgence in gas supply to Mossgas[38] and its potential yield for PetroSA[39] might very well reignite the slowly waning interest in the LNG import options and gas-fired power stations the government

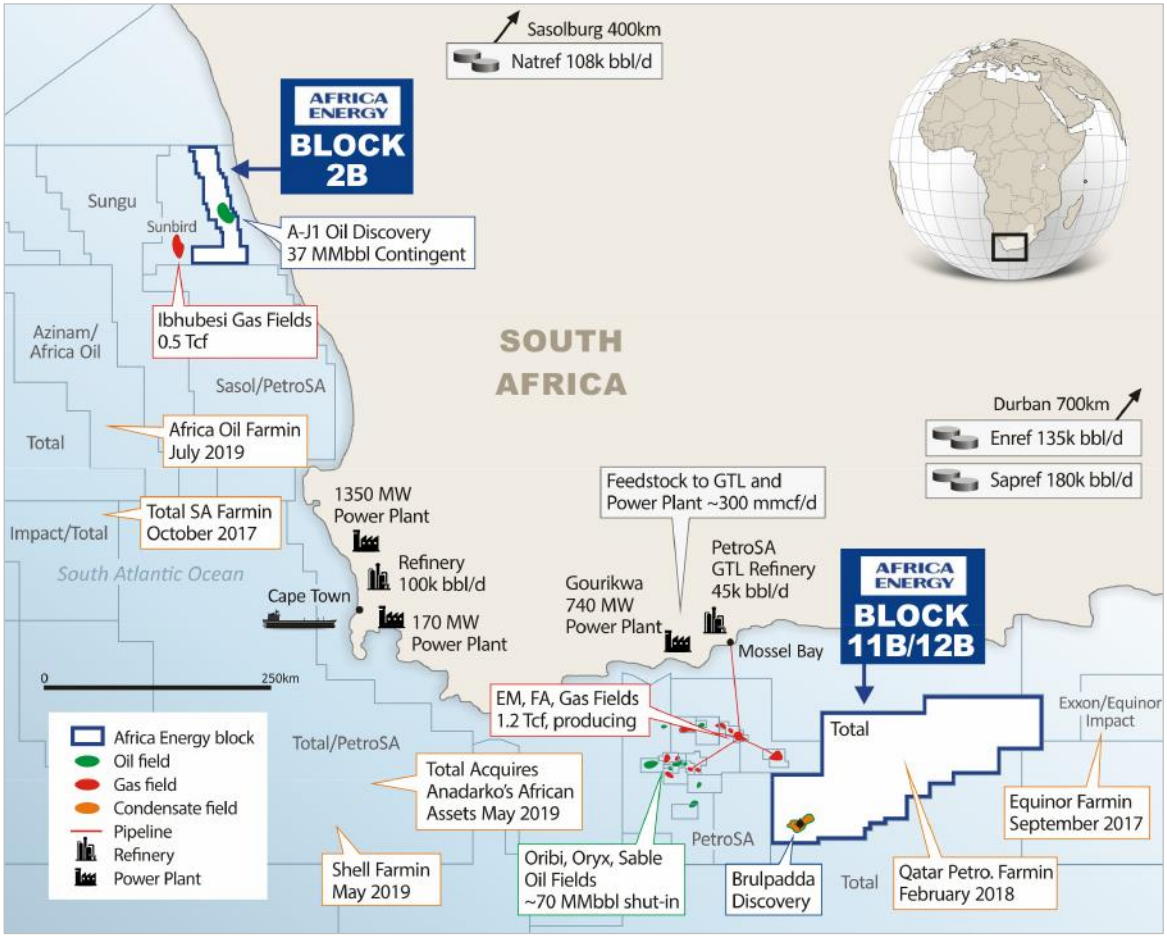
[38] Mossgas is PetroSA's gas-to-liquid plant off the coast near Mossel Bay, Cape Province. The Brulpadda gas discovery is good news for the province because Mossgas was on the brink of closure.

[39] The Petroleum Oil and Gas Corporation of South Africa (PetroSA), is a wholly state-owned company of the Government of South Africa. The core business activities of PetroSA are: (i) The exploration and production of oil and natural gas; (ii) The participation in, and acquisition of, local as well as international upstream petroleum ventures; (iii) The production of synthetic fuels from offshore gas at one of the world's largest Gas-to-Liquid (GTL) refineries in Mossel Bay, South Africa; (iv) The development of domestic refining and liquid fuels logistical infrastructure; (v) The marketing and trading of oil and petrochemicals. http://www.petrosa.co.za/discover_petroSA/Pages/Our-Company.aspx

has been considering without real action over the past few years. Compressing natural gas for long-distance export by sea is an expensive business. **It needs major infrastructure – which South Africa currently does not possess.** Investors and trade partners are watching this space with interest.

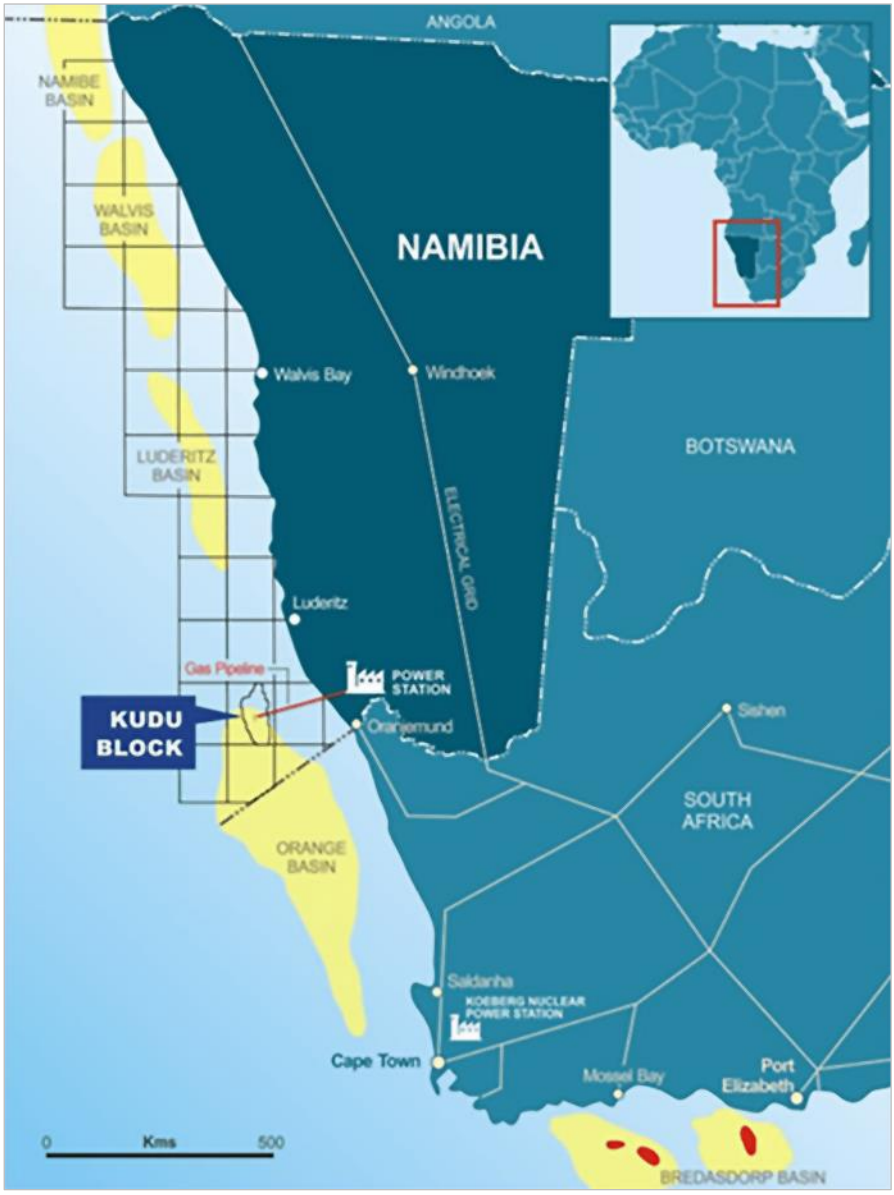
The Brulpadda gas find still has a way to go to prove that it can become viable for exploitation. This provides important opportunities for R&D and technology partners and providers to offer potential solutions.

Figure 6: South Africa offshore oil and gas operations



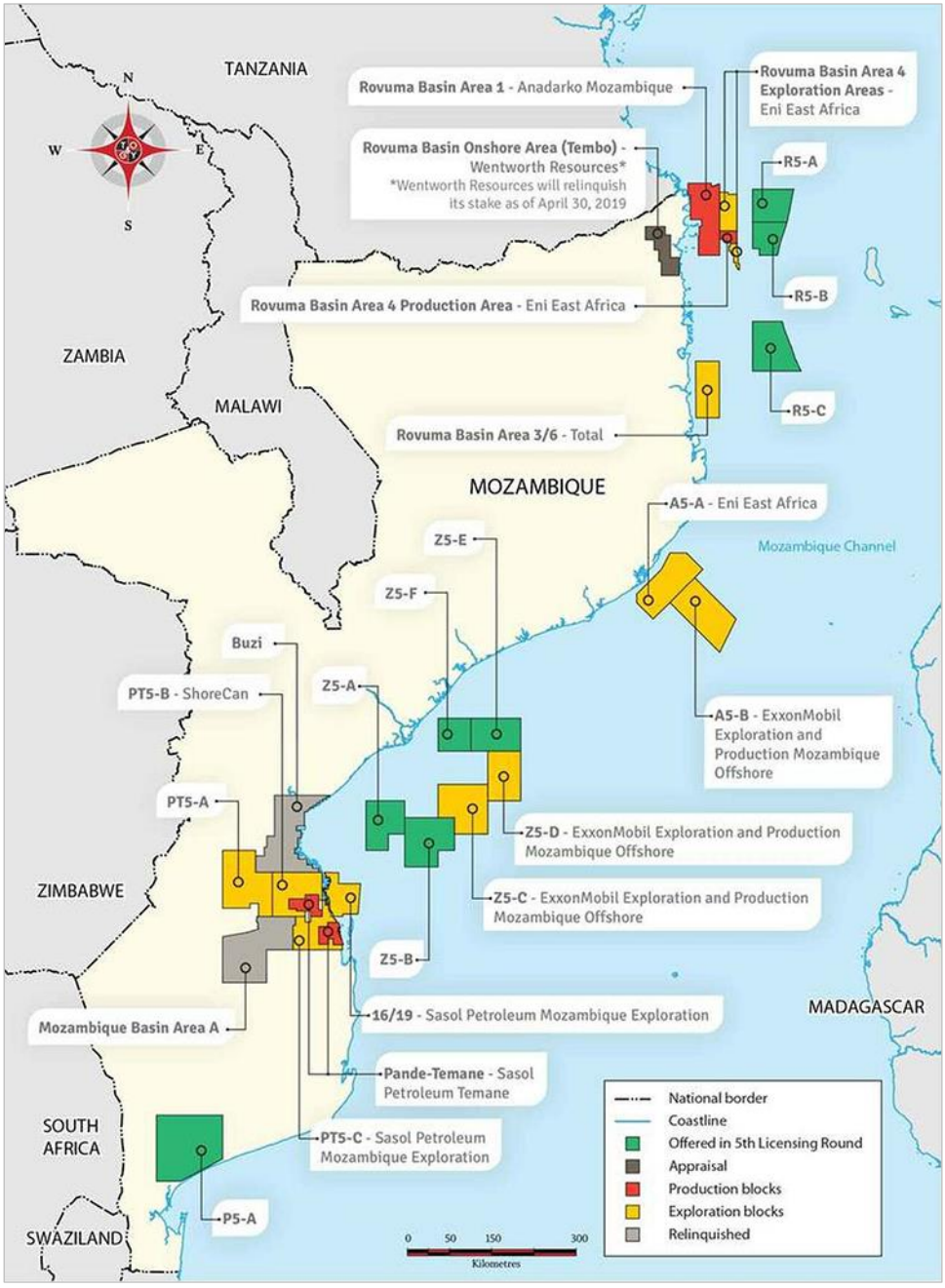
Source: https://www.africaenergycorp.com/site/assets/files/143452/2019-09-09-cp-aec.pdf

Figure 7: Kudu gas find offshore South Africa and Namibia



Source: Offshore Engineer Digital

Figure 8: Mozambique oil and gas operations



Source: https://www.offshore-energy.biz/bw-energy-boosts-interest-in-gas-field-off-namibia/

Anadarko has agreed to be taken over by Occidental Petroleum Corp OXY.N. Anadarko led a liquefied natural gas project in Mozambique, but was replaced by Total after the French oil major agreed to buy Anadarko's African assets for $8.8 billion as part of the Occidental takeover.

Further discussion on the Total discoveries

In addition to the Brulpadda find of 2019, Total made another significant gas condensate discovery on the Luiperd prospect, located on Block 11B/12B in the Outeniqua Basin, 175 kilometres off the southern coast of South Africa. This block consists of 19,000 square kilometres, with water depths ranging from 200 to 1,800 meters an area renowned for having treacherous waters. It is operated by Total with a 45% working interest, alongside Qatar Petroleum (25%), CNR international (20%) and Main Street, a South African consortium (10%).[40]

> "We are very pleased with this second discovery and its very encouraging results, which prove the world-class nature of this offshore gas play," said Arnaud Breuillac, President Exploration & Production at Total. "With this discovery and the successful seismic acquisitions, Total and its partners have acquired important data on the Paddavissie fairway, which will help to progress development studies and engage with South African authorities regarding the possible conditions of the gas commercialization."
>
> **Total SA, Global Africa Network (2020) op, cit.**

If these finds prove as rich as what Total suggests, and if capital is invested to extract the natural gas, then the potential to transform the Eastern Cape is enormous. However, a wait-and see approach with cautious optimism is needed. Watching what Total announces will gauge whether there will be new developments regarding financing the extraction or not. The reality is that **without capital investment, particularly private capital,** these finds could remain 'dead in the water'. Also, the gas extraction may be viable but may come in too late, as it will take 10 years to develop and more time to bring to market, to see returns. With global developments shifting towards greener sources of fuels, the demand may not be sufficient, and the gas find prospects may remain unrealised, as has been witnessed by other regional gas finds in the past such as Kudu, offshore the South African-Namibian coast.[41]

Further insight and analysis suggest that this area looks extremely prospective. It is thought that whether the development is shorter or longer term (in years), a positive outcome is expected, as this the largest find yet (by early indications). However, when production does take place, realizing profits could take time – potentially after 2030. This is due to large capital outlays required. The new 2019 and 2020 finds can, therefore, be considered as game-changers and will create a substantial gas supply for the country.[42] Revenue projections for this, are in the trillions and would substantially boost growth for the sector and GDP for the economy. Despite the large costs of developing the gas industry in SA, investors could experience a substantial return on investment.

Additionally, most exploration and discoveries require private and foreign capital investment. This is **where foreign investors (e.g., from Brazil) can come in**. There have been many gas finds since the 1980s that still have not been monetised, due to a lack of infrastructure, for instance. Capital towards infrastructure and

[40] Global Africa Network, October 28, 2020, https://www.globalafricanetwork.com/company-news/south-africa-total-makes-second-significant-gas-condensate-discovery/ (Accessed 10 February 2021).

[41] Interview with Kevin Baart, from SAPIA. Date 25 Feb 2021.

[42] Interview with Mbuso Xaba from Central Energy Fund. Date 19 Feb 2021

related extractive aspects could make a difference in ensuring that gas finds are not only discovered, but also developed and utilised.[43]

This is in essence what is needed with Total's new gas finds. Another hurdle will be, despite the capital being made available to drill and explore, these conglomerates need to decide whether it is profitable to build the necessary infrastructure and take on the project of extracting the gas. They may very well **cede or share this opportunity to other companies willing to help take on the full project's financial risk**. If they choose to not take the financial risk, the resource is not lost. Another interested party could invest.[44] As this discovery does impact their bottom lines, comments by Total have not been received and it may be difficult to get an angle on this if it has not been made public yet.

The expected changes to the Upstream Petroleum Resources Development Bill (UPRDB), which is currently being developed will see similar **licensing processes** (where foreign players can come in) and could bring about positive changes for investment attraction. The Upstream Petroleum Resources Development Bill licensing dispensations section in 1.2, highlights the expected licensing process in more detail.

One key objective of the new legislation is to accelerate exploration, which is a policy objective by government. Opening the sector to locals is also an objective – which will also allow for substantial and meaningful participation of historically disadvantaged persons. Fast tracking the acquisition of data is also an objective, which will assist the government with data availability. These objectives should lead to higher investments in explorations; however, the market will determine that.

More importantly, the certainty of the regulatory framework will be attractive; therefore the finalisation of the UPRDB should promote investment attraction – barring the extent to which development and production costs remain recoverable, which will be covered in separate legislation by the Minister of Finance. Also, with higher data availability due to the reconnaissance permits, government may issue more notices for application bringing in more exploration companies into the offshore market. With an objective to use HDSA's, investment attraction from local investors and local companies may start to increase in this space, too, because previously the high cost was a large deterrent to local firms.

In creating the Upstream Bill, a key objective of the State is to create legal certainty and stability, the lack of which has been a significant obstacle to investment in the industry in the past, owing to the beleaguered Mineral and Petroleum Resources Development Amendment Bill (of 2013), **which was finally withdrawn in 2018 after repeated delays**. This leaves the MPRDA Act of the 2002 in effect. The Upstream Bill aims to create certainty by providing that the Minster of Minerals, Resources and Energy must determine the terms and conditions of a production right on the granting of the corresponding exploration right. This must be honoured by the State, should the holders of the relevant exploration right ever apply for a production right in respect of the relevant area. The proposed recognition of the Petroleum Agency[45] is a long-overdue and

[43] Interview with David van der Spuy of Petroleum Agency South Africa. Date 18 Feb 2021

[44] *Ibid.*

[45] The MPRDA recognised the Petroleum Agency as a 'state-owned entity' diversified energy company. However, the Upstream Bill formally recognises the Petroleum Agency as 'a juristic person' (Section 9(1)) and provides that every person in the service of the Petroleum Agency, prior to the enactment of the Petroleum Bill, is transferred to the service of the "new" Petroleum Agency – not a new state-owned entity. https://www.cliffedekkerhofmeyr.com/en/news/publications/2020/oil-gas/oil-and-gas-alert-17-march-part-1-draft-upstream-petroleum-resources-development-bill-2019-the-petroleum-agency-of-south-africa.html

positive step towards providing regulatory certainty and a greater degree of transparency, at a time when South Africa desperately needs to attract foreign investment.

Further detail on the consortium at Outeniqua Basin

Block 11B/12B in the Outeniqua Basin is operated by **Total** with a 45% working interest, alongside **Qatar Petroleum** (25%), **CNR International** a Canadian firm (20%), and Main Street 1549 Proprietary Limited, a South African consortium (10%).

The South African-based Main Street consortium is made up of **Africa Energy** (which currently holds 49% interest in Main Street 1549) and **Arostyle Investments** (which owns the remaining 51% stake in Main Street 1549).

As of 24 August 2020, Africa Energy has signed agreements to increase its stake in Block 11B/12B offshore South Africa, from 4.9% to 10%. As per the terms of the deals, Africa Energy will initially secure the indirect financial interest held by **Impact Oil & Gas**. **Africa Energy** will later exercise an option from **Arostyle Investments** to acquire the entire interest, following drilling of the Luiperd-1X well.

According to **Africa Energy** CEO Garrett Soden: "Block 11B/12B offshore South Africa contains one of the most exciting oil and gas exploration plays in the world today…..In anticipation of the Luiperd-1X well results expected later this year, we have agreed with **Impact Oil & Gas** and **Arostyle** to simplify and consolidate Main Street's 10% interest in Block 11B/12B under Africa Energy."

Impact Oil & Gas owns approximately 36.5% and Africa Oil Corp owns approximately 19.9% of Africa Energy.

NS Energy

2.2 Infrastructure constraints and opportunities to developing the industry

According to various sources,[46] South Africa does not possess the infrastructure needed to reap the potential benefits of the discovery by Total. Despite South Africa being capable of processing 700 000 barrels of crude oil a year, the find of one billion barrels of oil equivalent is claimed to be too great for the nation's capacity.[47] To understand the infrastructure constraints facing the country, an illustration of the natural gas value chain is necessary. Such a value chain is divided into three major components: upstream, midstream, and downstream activities.[48]

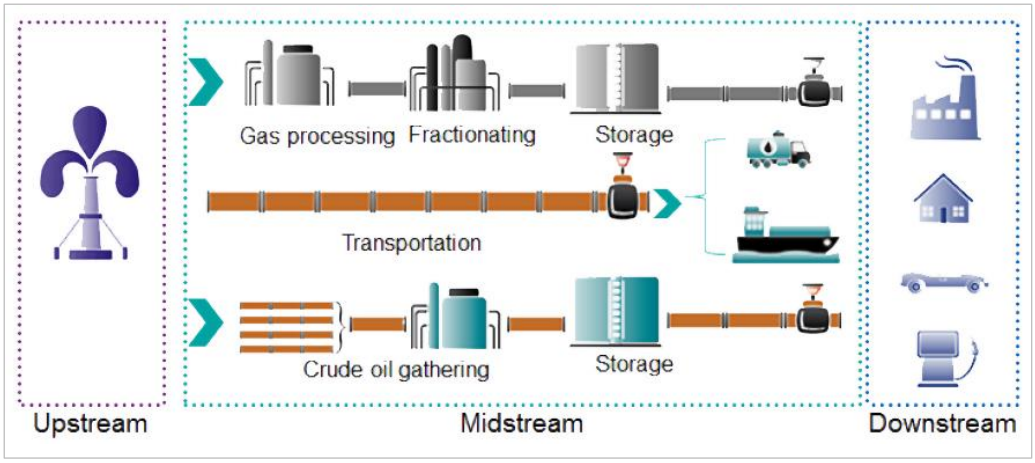
[46] Interviewees for this project largely agree on this.

[47] Robert (Bob) Scholes and Rod Crompton, "What a major offshore gas find means for South Africa's energy future". 13 February 2019: https://theconversation.com/what-a-major-offshore-gas-find-means-for-south-africas-energy-future-111503 (Accessed 17 February 2021).

[48] South African Petroleum Industry Association (SAPIA), *'South African fuel industry,'* https://www.sapia.org.za/overview/south-african-fuel-industry (accessed 22 February 2021).

Upstream	Upstream activities refer to exploration and production. Exploration entails a three-dimensional seismic survey, a geophysical evaluation and design as well as setting up the drilling operation. On the other hand, production entails drawing the gas to the surface. The type of equipment required is specialised and requires a high level of engineering. As such, South Africa is severely lacking in this department. The need for a high level of proficiency is further exacerbated by the treacherous waters in which the recent gas finds lie. Moreover, should the acts of preparation, extraction and production not be conducted with such proficiency, the environmental costs could be high.
Midstream	Midstream activities refer to the processing, transportation, and storage. Processing of natural gas, once it has been gathered, could be conducted onshore or offshore. This refers to the act of separating various components to arrive at the quality of natural gas necessary for transportation and, ultimately, use. Following this, the gas is transported via pipeline or oil tanker to its destination for storage until required. The gas can be cooled to well-below freezing point, which vastly reduces its volume, and stored within insulated tanks.[49] Whilst South Africa may possess the know-how in this area (due to PetroSA and SASOL), the infrastructure which currently exists may not be sufficient.
Downstream	Downstream activities refer to the transportation and marketing of end-user products. In terms of infrastructure, this would require a network of pipelines to connect storage facilities to power stations, manufacturers, households as well as vehicle fuelling stations.[50] In terms providing gas to the end user, South Africa does have infrastructure. However, this is almost negligible. Entities that provide the end user with natural gas in South Africa include Egoli Gas, CNG Holdings as well as SASOL Gas.

Figure 9: The general oil and gas value chain



Source: SAPIA Economic impact KPMG report 2016.

In illustrating the natural gas value chain, infrastructure constraints to the industry and its opportunities become apparent. The requisite infrastructure includes **gathering systems, processing facilities** as well as

[49] EPCM, *'Liquid natural gas value chain- The basics,'* https://epcmholdings.com/liquid-natural-gas-lng-value-chain-the-basics/ (accessed 18 February 2021).

[50] Energy Information Administration, *'Natural gas explained: Use of natural gas,'* https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php (accessed 1 March 2021).

intra- and intercity pipelines (for local use) or **international pipelines** should the gas be exported to continental neighbours.

While South Africa may be lacking in the requisite infrastructure, there is a clear case for its development. Apart from providing industrial processes and households with a clean, reliable source of energy, the opportunities for employment cannot be ignored. The recent gas finds, and the development of infrastructure to exploit it, has the potential to create major employment opportunities on a broad spectrum. These opportunities range from the need for skilled engineers and artisans, transportation services, marine services, as well as linkage supplies. Job creation, however, is not restricted to the construction of the infrastructure. The development of the industry will also see an increase in employment in terms of the individuals who would work as operators in natural gas processing facilities, as well as the additional personnel requirements. The cluster industries – including accommodation, hospitality and other goods and services for the new industry workers – could also receive a needed boost. This would, in turn, lead to increases in the country's Gross Domestic Product (GDP).

Research and development

There is also potential for collaboration, within the R&D space, between nations. Such R&D could add to the stock of knowledge required for the future exploration and extraction; but could also develop international R&D hubs that could lead in technology and skills development. On a practical level, in South Africa, R&D could entail improving the processing capacity of PetroSA, which is in proximity to the latest gas discovery. It could even go as far as design and development of modifications for existing oil refineries, power stations and motor vehicles to accommodate the extracted natural gas.

2.3 Origin of the machinery and equipment for deep-water exploration (National or Imported?)

South Africa lacks the upstream infrastructure required for the natural gas industry. Machinery and equipment are therefore largely sourced from abroad. Norway's Odjfell Drilling is the likely candidate for the provision of the necessary machinery and equipment for extraction. This is the case as the company's *Deepsea Stavanger*, a semisubmersible rig, has previously been stationed within proximity of the gas deposit.[51]

[51] 'Rig Leaves Mossel Bay,' *Mossel Bay Advertiser,* 24 November 2020 https://www.mosselbayadvertiser.com/News/Article/General/rig-leaves-mossel-bay-202011240225 (accessed 26 February 2021).

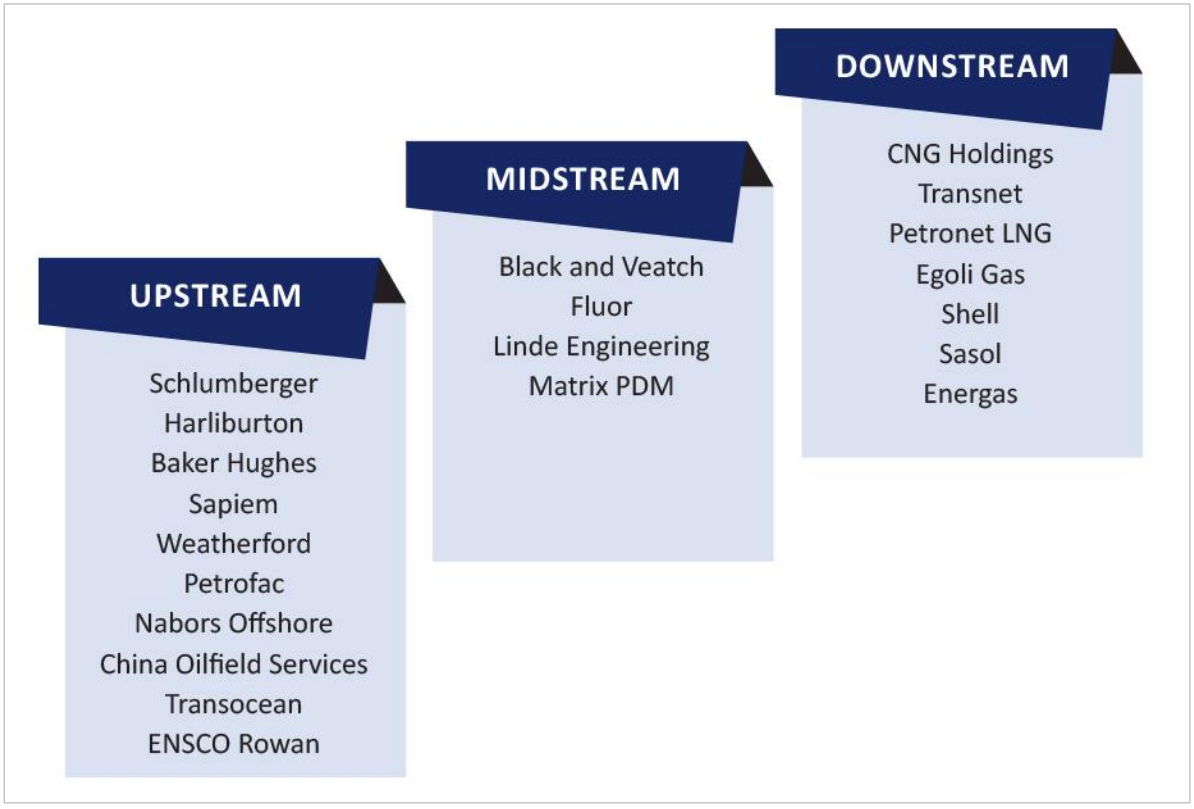
The Brulpadda find is located within depths lower than 800 m of the westward Agulhas current – one of the fastest currents in the world where winter waves can reach 30 metres in height. Things are equally treacherous as the Agulhas Undercurrent flows north at some of the fastest speeds ever recorded. It was therefore unsurprising that Total's first attempt to undertake exploratory drilling in the area in 2014 failed due to technical failures caused by the uncompromising conditions.

Neill Overy, April 2019

https://za.boell.org/en/2019/04/27/total-game-changer-or-just-hot-air-discovery-gas-south-africas-southern-coast

2.4 Who are the main suppliers currently?

Figure 10: The suppliers of machinery and equipment at various stages of the value chain



Source: Consultant's compilation

2.5 Potential of the South African gas market (including infrastructure)

Driven by South Africa's need for energy security, in conjunction with commitments geared at environmental conservation, the potential for the development of a gas market is certainly acknowledged.

In 2019, it was reported that natural gas constituted only 3% of the country's primary energy supply. The majority of natural gas in South Africa is due to imports via an 865 km pipeline from the Temane and Pande gas fields in Mozambique developed by Sasol for the first cross-country delivery in 2004. Reserves in this

region are estimated around 2.6 trillion cubic feet (TCF), while the pipeline has a capacity of 240 million gigajoules (GJ) per annum. It was also reported that approximately 120 million GJ is used annually by Sasol at the gas-to-liquid (GTL) and chemicals plant in Secunda. The balance, on the other hand, is distributed to commercial and industrial customers via a pipeline network covering over 2 000km in the Free State, Gauteng, Mpumalanga and KwaZulu-Natal.

For the sake of the improvement in South Africa's trade balance, if the gas find under consideration comes to market, it could service the needs of those currently relying on imports. In terms of potential users, the South African context offers much promise. Given the 2019 implementation of a carbon tax in South Africa, there is the likelihood that energy-hungry industries will seek a cost reducing move toward cleaner sources.

It must be further understood that the move toward sustainability is not a solely South African concept; it is a worldwide commitment. Therefore, for the sake of relevance in the global market and, indeed, future global markets, it is of interest to the nation that such a commitment is upheld. Thus, there is much potential for the development of a market for natural gas in South Africa. A gradual conversion from current sources of energy to natural gas could see benefits accrue on a spectrum, ranging from household energy needs to that of the health sector.

2.6 Potential uses of natural gas

Household electricity/energy

With the inconsistent supply of electricity from Eskom since 2007, and the need for (expensive) diesel to complement supply at coal stations, the cost-effectiveness of natural gas means that it could be used on a more consistent basis, thus, enabling a steadier (and cheaper) supply of electricity.

The move toward gas for household energy supply, however, extends further than Eskom's inability to meet the requirements with current production methods. Eskom relies on coal fired power stations to produce approximately 90% of its electricity. Eskom uses over 90 million tons of coal per annum.[52] Unfortunately, this accounts for approximately 42% of South Africa's GHG emissions.[53] The move away from coal as a method of generating electricity would be aligned with South Africa's commitment to achieve a greener economy. To accommodate natural gas in these electricity generating plants would require the modification of existing facilities. A convenient way to enable this modification would be to combine the imminent closure of some of Eskom's existing facilities with Sasol's technological expertise. As this transition implies that power plants will be operating during additional hours, simplistically jobs currently at risk of being lost, could be saved. On the other hand, the reduced reliance on coal could result in the loss of jobs in the coal industry. Clearly, the legal implications on employment dynamics would need to be ironed out in this regard. Given that 86% of South African households do, in fact, have access to electricity (despite the intermittence of its supply), infrastructural hurdles are not substantial.

---

[52] Eskom, '*Understanding electricity,'* https://www.eskom.co.za/AboutElectricity/ElectricityTechnologies/Pages/Understanding_Electricity.aspx (Accessed 25 February 2021).

[53] David McKay, "Greenpeace blames Eskom, Sasol for world sulphur hot-spot in SA's Mpumalanga province". 19 August 2019: https://www.miningmx.com/news/energy/38025-greenpeace-blames-eskom-sasol-for-world-sulphur-hot-spot-in-sas-mpumalanga-province/ (Accessed 1 March 2021).

Despite the access to electricity in South Africa being relatively vast, there are still many without consistent and sustained access.[54] For these individuals, energy sources for cooking and space heating are biomass, kerosene, and coal. These sources are associated with poor air quality and concomitant ill-health of users. These sources could be replaced by natural gas, thereby, contributing to the elimination of energy poverty. By ensuring a safe and steady supply of natural gas, benefits will accrue in the form of a cleaner, and safer source of energy.[55] The increased access to energy for the poor will also assist in the eradication of poverty via improvements in education, healthcare facilities as well as a reduction in structural unemployment.[56]

The most obvious infrastructure constraint is the absence of a gas reticulation plant connected to a gas supply as well as a network of pipes connected to the homes in question. Unfortunately, the layout of existing dwellings, especially in the impoverished parts of South Africa, does not allow for this to be provided cost-effectively. In some cases, houses may be too far apart and in other cases, space is too limited to install the necessary connection.[57] Perhaps the provision of gas directly to households is an undertaking to consider once South Africa has developed increased skill in the gas industry.[58] The alternative would be to provide these households with gas-generated electricity. However, the infrastructural hurdle of connection to the grid arises.

Manufacturing

In addition to household energy, natural gas is especially suitable to the manufacturing sector. Although natural gas is concentrated to a small number of industries in the United States (US), it plays a key role of a successful and environmentally sound industry. US industrial uses for natural gas include pulp and paper, metals, chemicals, petroleum refining, stone, clay and glass, plastic, and food processing industries.[59] In the South African context, the food and beverages industry is the largest component of South Africa's manufacturing industry, closely followed by the Petroleum and Chemicals products component, a distant third place goes to Basic Iron and Steel and in fourth place, Wood products, Paper, and Printing. These four industries constitute over 80% of the manufacturing industry – an industry that contributes 14% to the GDP of South Africa.[60]

The manufacturing industry, however, is on a decline in South Africa. The impact of a year's intermittent economic lock-down resulting from the COVID-19 pandemic, along with load-shedding back in full-swing, means this trajectory is suspected to continue. It is further predicted, as businesses hedge their bets against Eskom, that there will be a spike in imports of manufactured goods.[61] Coincidentally, the top four manufacturing sectors in South Africa are almost perfectly aligned with the US industries that utilise gas. Thus, there is room for natural gas within the South African manufacturing space.

---

54 S. A. Sarkodie and S. Adams, 'Electricity access and income inequality in South Africa: Evidence from Bayesian and NARDL analyses', *Energy Strategy Reviews*, vol. 29, 2020, p. 1

55 Alnuaim, S., 'Natural Gas Helps Eliminate Energy Poverty', *Fueling Progress Blog* [web blog], 4 December 2019, "https://www.spe.org/en/energizing-lives/fueling-progress-blog/natural-gas-helps-eliminate-energy-poverty/, (Accessed 24 February 2021).

56 Z. Ismail and P. Khembo, "Determinants of energy poverty in South Africa, *Journal of Energy in South Africa*, vol. 26, no.3, 2015, p. 66.

57 Interview with Kevin Baart, South African Petroleum Industry Association, 25 February 2021.

58 Interview with Mervin Chetty, Transnet, 26 February 2021.

59 NaturalGas.org, *'Uses in industry,'* http://naturalgas.org/overview/uses-industrial/ (accessed 18 February 2021)

60 South African Market Insights, 'South Africa's *Manufacturing Industry,* https://www.southafricanmi.com/south-africas-manufacturing-industry.html (accessed 19 February 2021).

61 *Ibid*.

Given South Africa's commitment towards a greener economy, it is likely that the demand for alternative forms of energy will only increase over time. This requires infrastructure, such as pipelines that pump the gas from storage facilities to manufacturing plants. While these pipelines do exist in South Africa, these are currently insufficient relative to what will be needed. Some manufacturing plants may have the capacity to store gas, however.

Transport

Like those sectors mentioned above, the development of the transport sector is also aligned with South Africa's commitments of a low-carbon economy. Using compressed natural gas to fuel vehicles offers an array of benefits. In addition to reducing fuel costs and contributing less to GHG emissions, natural gas reduces the need for vehicle maintenance and, due to its physical properties, is safer than petrol and diesel. Given the foothold of natural gas within South Africa's public transport system, in conjunction with efforts geared at increasing this, the transport industry also provides a market for natural gas within the country.[62]

It must be noted that natural gas in the transport sector is not restricted to newly manufactured vehicles. Vehicles currently running off petrol, by means of the installation of a compressed natural gas (CNG) cylinder, can be modified to utilise natural gas as fuel. It is further noted that the petrol tank will remain part of the vehicle and will be operational as prior to the conversion. For diesel vehicles, however, further modifications are required. Among these are modification of inlet port, the replacement of the glow plug, replacement of the common rail diesel injection, reduction of compression ratio, emissions control and the introduction of a three-way catalytic converter.[63] In 2019, there were around 1,200 mini-bus taxis using natural gas; Gauteng also had over 830 000 light delivery vehicles which could have made use of natural gas as a cost-effective option. Conversions done to existing vehicles, to run on CNG cylinders, were estimated to cost about R26 000 in 2019. Due to savings on fuel, by using natural gas, these outlays can be offset in a matter of months.[64] In the case of using CNG to power long-haul trucks, cost savings are estimated to be between 15% and 25%. Despite the limited number of filling stations with gas on offer, these facilities are in operation in the country (such as Langlaagte in Johannesburg) and there are more on the way.[65]

In addition to providing road vehicles with their, respective, fuels, the natural gas find could also offer the aviation industry a cleaner alternative. A study conducted on the cost savings experienced by switching from conventional jet fuels to one which was manufactured from natural gas found that operators could cut costs by up to 14% and societal benefits could increase by 12%.[66]

---

62 Department of Transport, *Green transport strategy for South Africa: (2018-2050)* (2018), < https://www.transport.gov.za/documents/11623/89294/Green_Transport_Strategy_2018_2050_onlineversion.pdf/71e19f1d-259e-4c55-9b27-30db418f105a >, 37, accessed 25 February 2021.

63 R. S. Krishna, 'Conversion of diesel engine to CNG engine of commercial vehicles and emission control', *International Journal of Mechanical and Production Engineering*, vol. 6, no. 11, 2018, p. 71-76.

64 R. de Lange, 'Joburg's taxis rev up on natural gas', *City Press*, 22 October 2019, https://www.news24.com/citypress/business/joburgs-taxis-rev-up-on-natural-gas-20191022, (accessed 24 February 2021).

65 Natasha Odendaal, "Regional developments expected to ignite South Africa's gas economy". 28 August 2020: https://www.engineeringnews.co.za/article/regional-developments-expected-to-ignite-south-africas-gas-economy-2020-08-28/ (Accessed 26 February 2021)

66 Withers, et al. 'Economic and environmental assessment of liquefied natural gas as a supplemental aircraft fuel', *Progress in Aerospace Sciences,* vol. 66, 2014, p 17-36.

Health sector

Combined heat and power (CHP) systems that generate power onsite – from sources such as natural gas – and immediately capture and use the heat for space heating or other hospital energy needs, are increasingly of interest to large hospitals. Larger hospitals require more than 5 MW daily of power and are prime sites for CHP systems due to their size, high power demand, and critical need for a reliable energy supply. On-site systems typically yield significant cost savings, as well as improving the reliability of power supply. A constant power source is particularly important for hospitals – whether the setting is a high-income country faced with occasional, but very severe weather-related outages (including wet coal due to heavy rains) or low- and middle- income countries that experience chronic shortages and grid burnouts (like in South Africa). Again, the energy shortages at overcrowded hospitals have come under the spotlight again during the intense infection waves during the past year as a result of the COVID-19 pandemic.

Thousands of hospitals in countries as diverse as the US, Canada, the UK, India and Brazil now use CHP systems. During routine operations, hospitals typically operate CHP power sources interchangeably with grid power, so that the CHP source may feed power into the grid during off-peak hospital times.[67] Such operations are already underway at several hospitals across the country. In 2015, various public hospitals saw a conversion to a gas boiler system. These included Tembisa Hospital, Kopanong Provincial Hospital, Discoverers' Memorial Hospital and Dr Yusuf Dadoo Hospital. In 2016, an additional six hospitals followed suit. Among these were Steve Biko Academic Hospital, Dr George Mukhari Hospital, Dunswart Provincial Laundry and Pholosong Hospital. Regarding the infrastructure, it is possible that the gas be delivered via road transport, while on-site systems must be developed. Given that these systems are already underway in SA, obtaining the necessary infrastructure is not unachievable.[68]

Chemical by-products

It is noted that the processing of natural gas entails the removal of non-waste components to arrive at pipeline quality natural gas. Components extracted from natural gas include propane, ethane and butane.[69] The components removed from natural gas provides feedstock for key organic chemicals as well as plastics manufacturing. Natural gas is also a building block for methanol, which is used to produce the chemicals that are used in products such as foams, plywood subfloors and solvents.[70] Thus, the development of the gas industry gives way to the development of (or a boost in) the chemicals industry. [71] As the volume of extracted compounds tend to be relatively small compared to the gas from which it is removed, this development depends on the volume of natural gas extracted and processed.[72]

---

67 World Health Organisation (WHO), *'Health Sector Strategies,'* https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/sectoral-interventions/health-care-activities/strategies (accessed 2 March 2021)

68 Averda, 'Local hospitals reducing carbon emissions,' https://averda.co.za/news/local-hospitals-reducing-carbon-emissions/ (accessed 2 March 2021).

69 NaturalGas.org, *'Uses in industry,'* http://naturalgas.org/overview/uses-industrial/ (accessed 18 February 2021)

70 The Chemical Company, *'Methanol,'* https://thechemco.com/chemical/methanol/ (accessed 2 March 2021)

71 NaturalGas.org, *'Processing natural gas,'* http://naturalgas.org/naturalgas/processing-ng/ (accessed 24 February 2021).

72 Interview with Vania Mahotas, Department of Mineral Resources and Energy, 24 February 2021.

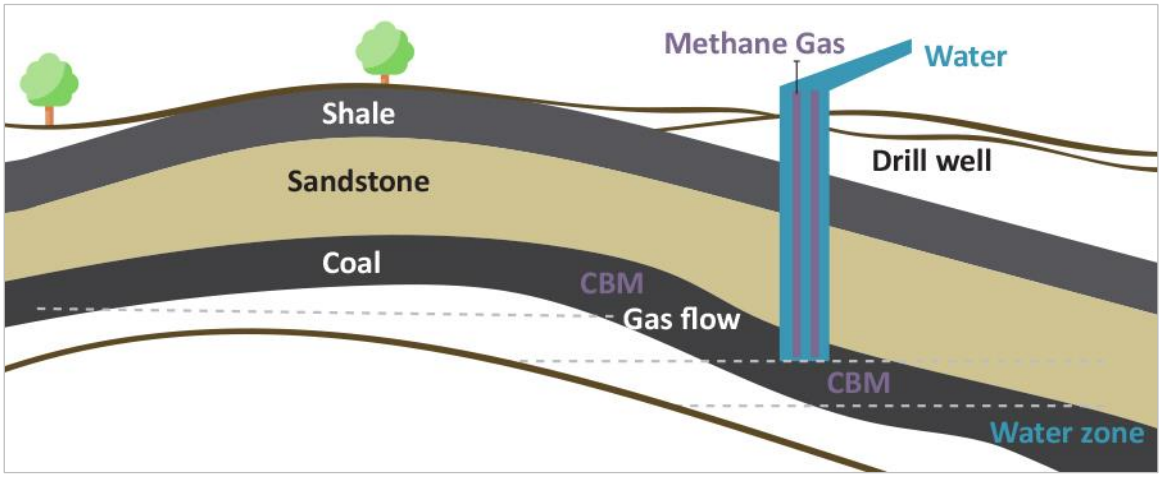
In sum, apart from those currently using gas, there is much potential for the development of a gas market. It can be expected that the ever-growing emphasis on emissions reduction, in conjunction with an increased supply of natural gas, will only spur this development further.

2.7 Unconventional sources of natural gas

Aside from offshore explorations, there are sources of gas worth noting, that are in the country.

Coal bed methane

Figure 11: Schematic view of coal bed methane mining (popular source of clean compressed natural gas used for domestic and industrial purposes)



Source: Elements of Mining

Coal bed methane (CBM) is an unconventional form of natural gas found in coal deposits or coal seams. It is a primary clean energy source of natural gas. The development and utilization of CBM is of great social and economic benefit because it seeks to be a replacement to coal electricity. It is a clean-burning fuel (compressed natural gas—CNG) used for domestic and industrial uses.[73] The extraction of CNG reduces explosion hazards in underground coal mines, if ventilated to ensure safety underground. Large amounts of methane (CH4) are often associated with some coal seams, however, which is 25 times more potent greenhouse gas than carbon dioxide.[74]

"CBM is formed during the process of coalification by transformation of plant material into coal. It is generated by either a microbiological or thermal process as a result of increasing heat at greater depth during coal formation. The coal seams are often saturated with groundwater at high pressure".[75] The coal deposits in South Africa are found within the Karoo basin.

[73] Swapan Kumar Haldar, in Mineral Exploration (Second Edition), 2018

[74] Business Line, Sutirtha Bhattacharya/DN Prasad, Time to tap coal bed methane, (Updated on March 01, 2021) https://www.thehindubusinessline.com/opinion/time-to-tap-coal-bed-methane/article33964626.ece (Accessed 11 March 2021).

[75] *Ibid.*

Shale gas

There was once some appeal around the discovery of shale in the Karoo, however, environmentalists have so far won the war against fracking in South Africa. “South Africa has an estimate of 390 trillion cubic feet (tcf) of technically recoverable natural gas that can be extracted from shale embedded in the Karoo”.[76] The natural gas estimates of the country are technically unproven. Hydraulic fracturing technology (fracking) involves injecting large volumes of water mixed with sand and fluid chemicals into the well at high pressure to fracture the rock, increasing permeability and production rates.[77]

Currently, this is a potential resource and its future remains uncertain. Fracking is currently prohibited, according to a recent Supreme Court judgement. There are also no approved licences for fracking in the country. The future of shale gas is yet to be determined.

Deep biogenic gas

“The Deep Biogenic Gas (DBG) refers to the occurrences of hydrocarbons in the deep mines within the Witwatersrand Basin in South Africa. DBG is an unconventional gas produced at great depth directly by microorganisms during respiratory and fermentative processes (microbial gas). Substantial quantities of hydrocarbon gases have been observed within the Witwatersrand Basin during both coal and gold exploration activities. The gas is composed predominantly of methane, and other hydrocarbons including helium. Gas shows were discovered in the Free State and Evander goldfields several decades ago, and are the most promising target areas for DBG exploration at present.

Most recently, Molopo Exploration and Production (Pty) Ltd in South Africa has been granted the Production Right in the Free State goldfields, with first proven onshore gas reserves for the region. This former mining hazard may therefore become a potential renewable future energy source for South Africa.”

Petroleum Agency of South Africa
https://www.petroleumagencysa.com/index.php/petroleum-geology-resources/frontier-geology.

[76] DMRE, What is Shale gas? https://www.dmr.gov.za/mineral-policy-promotion/shale-gas#:~:text=Shale%20gas%20is%20a%20natural,can%20be%20extracted%20from%20Shale.&text=%E2%80%9CSouth%20Africa%20has%20an%20estimate,Figure%201(a))%E2%80%9D. (Accessed 11 March 2021).

[77] https://www.ucsusa.org/resources/shale-gas-and-other-sources-natural-gas

Biofuels as a fuel source

Biofuels are considered to be solid, such as fuelwood, charcoal, and wood pellets; liquid, such as ethanol, biodiesel, and pyrolysis oils; or gaseous, such as biogas.

1st generation (1G) bioethanol is produced from starch/sugar-rich crops, 2nd generation (2G) bioethanol comes from breaking down the lignocellulosic biomass of the non-food parts of plants and/or from waste products and 3rd generation (3G) bioethanol is produced by algae or microbes that have been modified to produce ethanol from carbon sources. 2nd and 3rd generation fuels are favoured, to reduce the competition between food and fuels. Ethanol can also be produced synthetically from natural gas, coal and ethylene but this is not derived from a sustainable renewable resource.

While bioethanol has been used in road transport for many years, it is becoming more important to the development of sustainable aviation fuels (SAFs) and marine fuels as there is currently no alternate to liquid fuels in the sector. Bioethanol is the term generally used when describing biofuel produced from biomass or renewable resources that results in an ethanol. Bioethanol can be blended with petrol for road transport, converted to aviation fuel and blended with Kerosene, used for marine transport.

Annie Sugrue, Opportunities for the Trade of Sustainable Ethanol Between the EU and South Africa, November 2020

2.8 Hydrogen gas - future source of gas

Hydrogen gas, as a greener alternative, was also of focus at the Africa Energy Indaba Gas Forum, 2021. Green hydrogen is produced by using renewable electricity to split water, using an electrolyser, into hydrogen and oxygen.

Sasol remains a leader in green hydrogen too, in the country. The group is still working on a proof-of-concept for green hydrogen initiatives, and plans to leverage its existing Fischer-Tropsch assets and technology to support South Africa's energy transition. Sasol attests that its Fischer-Tropsch plants could be repurposed to use green hydrogen to produce 'powerfuels', including carbon-neutral kerosene for export into Europe's aviation sector. Sasol is also anticipated to begin implementing small-scale green-hydrogen production within the coming five years. Currently, Sasol produces grey hydrogen from coal and any green hydrogen produced in future would be used incrementally in the existing Fischer-Tropsch assets to begin producing carbon-neutral jet fuel.[78]

Hydrogen gas is said to take time before it becomes mainstream – but it will assist in ammonia value chain (for fertilisers) and for heating and cooling. One also gets a by-product by producing hydrogen gas, which is oxygen - and with shortages of oxygen tanks during the COVID-19 pandemic - that's an important consideration. One can also combine hydrogen with natural gas to create methane which will be used in

[78] Engineering news, Sasol upscales renewables roll-out ambition to 900 MW, starts plotting big green-hydrogen role, 22 February 2021, https://www.engineeringnews.co.za/article/sasol-upscales-renewables-roll-out-ambition-to-900-mw-starts-plotting-big-green-hydrogen-role-2021-02-22/rep_id:4136 (Accessed 11 March 2021)

other industrial processes. Developing a hydrogen economy is seen as a move to decarbonise natural gas emissions over time.[79]

Since carbon-free hydrogen is produced using renewable resources, South Africa has a competitive advantage due to its abundant space, sunshine and the country's solar capacity.[80] Additionally, South Africa's platinum group metals (PGMs) reserves are considered to be the largest in the world, and local PGM players have been noted for being quite pioneering in the hydrogen space as well.[81]

Hydrogen gas is envisioned to power larger trucks but passenger cars will likely be electric.[82] Electric car batteries are produced from hydrogen. The hardware that is used to produce the components that store the hydrogen and produce the energy is derived from the PGMs. Having PGMs locally, is another competitive advantage for the country to develop its hydrogen economy.

2.9 South Africa as a potential gas exporter

As stated previously, local production and consumption of natural gas could (hypothetically) eliminate reliance on imports – if supply could come up to meet domestic demand. In terms of South Africa becoming a major exporter, this is difficult to imagine at the moment. Although the market for gas in South Africa is underdeveloped, several nations across the globe and, indeed, their prominent manufacturing companies, favour cleaner energy sources. Given that a vast majority of the world is aligned with achieving pollution targets as per the sequence of global agreements over the past three decades, there certainly exists a market for cleaner forms of energy outside of South Africa. However, as natural gas is not the cleanest or most sustainable source, there is a limited window in which they can extract, produce, process, and market the gas for export, or even for domestic production.[83]

The export of gas from South Africa, like its exploration and production, is met with various infrastructure constraints. Exports of gas to neighbouring countries on the continent would require a network of pipelines connecting gas storage facilities to their cross-border counterparts. Similarly, exports of gas to regions impossible to connect via pipeline would give rise to the need for costly oil tankers. Infrastructure is not the only aspect impeding the ability of South Africa to export gas. Despite discussions around the development of a regional gas master plan, it is noted that trade policy, among participants within the Southern African Development Community (SADC), are not aligned. To facilitate the export of gas, trade policies must be harmonised. Until then, exports of gas (when there is sufficient supply to allow for this) from South Africa will be quite unlikely.[84]

---

79 Energy Indaba conference 2021.Gas forum discussion: *Repositioning the Southern Africa gas play for agility in a dynamic world.*

80 Engineering News, Southern Africa has 'huge potential' to benefit from the shift to green hydrogen (4 March 2021), https://www.engineeringnews.co.za/article/southern-africa-has-huge-potential-to-benefit-from-the-shift-to-green-hydrogen-2021-03-04 (Accessed 11 March 2021).

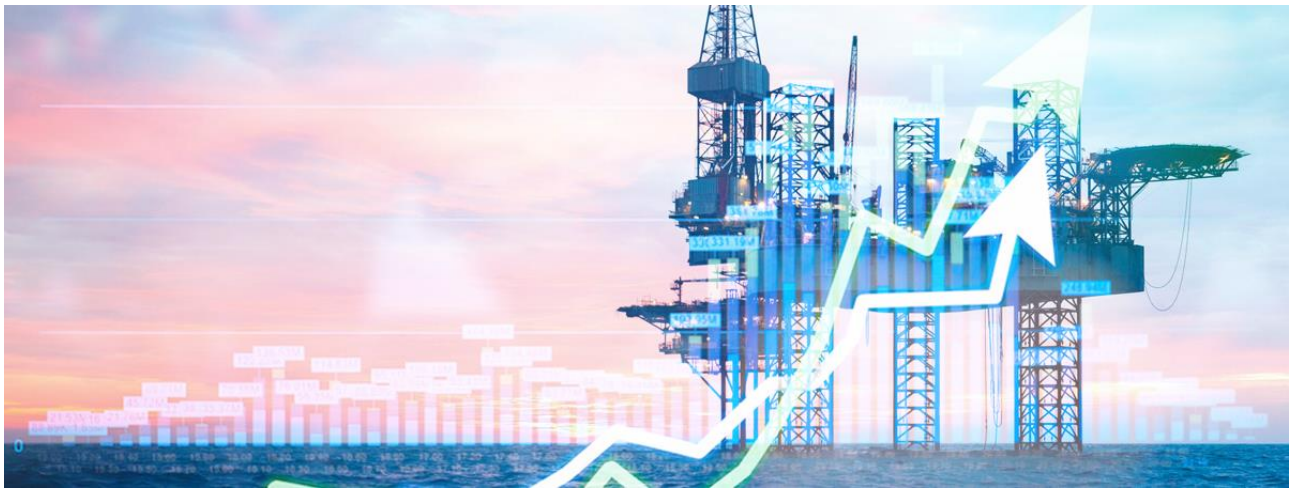
81 *Ibid.*

82 Energy Indaba conference 2021.Gas forum discussion: *Repositioning the Southern Africa gas play for agility in a dynamic world.*

83 Interview with Kevin Baart, South African Petroleum Industry Association, 25 February 2021.

84 Interview with Mervin Chetty, Transnet, 26 February 2021.

3. Chapter 3: Oil and gas investors and their experiences in South Africa



3.1 Legal and tax incentives for investing in the sector

Given the relatively small size of the gas industry in South Africa, investment incentives, like tax breaks, are necessary to stimulate investment. In fact, the tax environment surrounding the oil and gas industry is claimed to be amongst the most attractive in the world.[85] The specifics are addressed in the Tenth Schedule to the Income Tax Act.

Under the provisions regarding capital expenditure, as noted in the section on Tax, finances and environmental management, the tax-paying corporation would receive a benefit of a 200% super-deduction on expenditure incurred in the exploration phase of an oil and gas right as well as 150% super deduction for post-exploration capital expenditure.[86] In addition, dividends tax (normally 20%) and interest withholding tax (normally 15%) is eliminated for oil and gas companies.

There is also a provision for Fiscal Stability Agreements (FSAs) between oil and gas companies and the Minister of Finance. An FSA guarantees, according to the Tenth Schedule as at the date on which the FSA was concluded, will continue to apply in respect of that right, under the conditions that the right is held by the oil and gas company.[87] In essence, an FSA protects the extractor from increases in the royalty rate. If changes to legislation encompass an increase in royalty rates, the extractor will not be liable for the increase. Moreover, in the case of reduced rates, the extractor can benefit from the reduction.[88]

---

85 Interview with David van der Spuy, PASA, 18 February 2021.

86 Deloitte, *Oil and gas taxation in South Africa*, Deloitte, 2016, p. 5

87 Bouwer, A. and Makola, M, "Providing tax certainty in an uncertain oil and gas world". 25 February 2020: https://www.bowmanslaw.com/insights/tax/providing-tax-certainty-in-an-uncertain-oil-and-gas-world/ (Accessed 19 February 2021).

88 Betsie Strydom. "Fiscal stability agreements protect against increases in mining royalties". 11 July 2011: https://www.internationallawoffice.com/Newsletters/Energy-Natural-Resources/South-Africa/Bowman-Gilfillan-Inc/Fiscal-stability-agreements-protect-against-increases-in-mining-royalties , (Accessed 3 March 2021)

As noted in the section on Tax, finances and environmental management, between 2014 and 2019, FSAs had not been concluded. In addition, there is no evidence that any such agreements have been concluded since. The failure to conclude FSAs could be due to the announcement that the tax regime applicable to oil and gas would be reviewed. This uncertainty, in conjunction with the 20% equity "appropriation" by the state, as well as the imposition of B-BBEE regulation may actually drive investment elsewhere.

To overcome the reluctance from investors, government could consider altering their approach. Lessons can be learned from abroad. In the case of Angola, there was an insistence on local participation within the extractives space as well as in associated industries. This policy stance resulted in notable increases in employment, skills development as well as national industrial participation.[89]

South Africa could learn from this experience and formulate a similar policy rather than imposing B-BBEE compliance on corporations that are unlikely to understand its basic workings – and hence may only add to BEE fronting. With regard to the participation of historically disadvantaged entities, should prospective extractors experience extreme difficulty in finding a competent BEE partner, then there may be other alternatives. For instance, there are possibilities of "carried interests"[90] or as other experts advise, this partnership requirement could be waived.[91]

Finally, the government should also consider investing, as partners, in these ventures, rather than claiming a risk- and cost-free 20%. As pointed out by experts consulted during this study, this may improve investment prospects as the backing of the government of the nation in which extractive corporations operate could provide protection on various fronts.[92]

While the Upstream Petroleum Resources Development Bill aims to create certainty by providing that the minister of DMRE must determine the terms and conditions of a production right on the granting of the corresponding exploration right, it is unlikely that the issues outlined above will change with the enactment of the Bill. B-BBEE will be an important imperative under the new bill. In addition, while it is outlined that development and production costs remain recoverable, its extent is not detailed in the Bill- it will be covered in separate legislation by the Minister of Finance. Until this is publicised, various entities operating in this space will be unable to make an informed decision.[93]

89 Oyewole, B, *Overview of Local Content Regulatory Frameworks in Selected ECCAS countries*, (Geneva: UNCTAD, 2018), 1-25.

90 Upstream Petroleum Resources Development Bill – Potential Impacts on Upstream Oil & Gas Companies, 5 May 2021 bowmanslaw.com/insights/oil-gas/upstream-petroleum-resources-development-bill-potential-impacts-on-upstream-oil-and-gas-companies/

91 Interview with Tebogo Motloung, Petroleum Agency South Africa, 3 March 2021.

92 Interview with Mbuso Xaba, CEF, 19 February 2021

93 L. Oberholzer, 'Impact of the Upstream Petroleum Resources Development Bill on SA's oil and gas industry', *Norton Rose Fullbright*, https://www.nortonrosefulbright.com/en-za/knowledge/publications/f268ce91/impact-of-the-upstream-petroleum-resources-development-bill-on-sas-oil-and-gas-industry, (accessed 12 April 2021).

3.2 The main players in the country – government and private

Table 4: Main players in the South African oil and gas industry

Foreign actors	SA Private sector partners	National Actors (and NGOs etc)	SA Government Departments
• Africa Oil Corp (Canada) • Sunbird Energy (Australian) • International Energy Agency (France) • CNR International (Canadian) • Qatar Petroleum • Africa Energy Corp Canadian)	• Sasol Oil • Chevron South Africa • Engen • Total SA • Shell SA • BP Southern Africa • SA Petroleum Industry Association • Renergen Limited • ExxonMobil SA • Africa Oil (Pty) Ltd • Caltex Oil SA (Pty) Ltd	• Petroleum Agency of SA • PetroSA • Industrial Gas Users Association of Southern Africa • Women in Oil and Energy South Africa (WOESA) • Centre for Environmental Rights (CER) • groundWork • Earthlife Africa • The South African Oil and gas Alliance (SAOGA) • African Mineral and Energy Forum • Central Energy Fund (Pty) Ltd	• Department of Mineral Resources and Energy • Department of Environment, Forestry and Fisheries • Department of Trade, Industry and Competition

Source: Consultants' compilation

4. Chapter 4: SADC gas market

4.1 Impact of the energy transition on Africa

The COVID-19 pandemic has shown, significant investment and project delays, with an estimated 19% decrease in oil production in the top five African oil producers[94] for 2020. COVID-19 has caused the largest drop in demand for oil – estimated at 40 times worse than the global financial crisis.[95] But it has accelerated the global transition to renewable energy by as much as five years, hinged to stimulus packages and economic diversification imperatives.[96]

Sweden, Denmark, Morocco, UK and Lithuania are the global climate change leaders,[97] although China and India have committed to carbon neutrality and they are leading the race towards renewable energy installation. Global policies are pushing ahead with greening incentives and adding disincentives for the use of fossil fuels.

This energy transition, however, is set against the backdrop of an increasingly economically precarious African continent, dependent on fossil fuels -- including new gas discoveries that can bring a profound difference to African economic growth and investment. Experts estimate that there is probably a maximum of 15-20 years wherein which even transition fuels, like natural gas, will be permitted to add to the overall energy mix in developing countries. This means that there is an extreme urgency to procced **cautiously** with the development of the resources available to bring the economic growth on which Africa has been waiting.

4.2 Recent developments in SADC

In the SADC region, several important gas finds could be game changers in the context of regional economic growth. The vision of an interconnected gas market has been laid out by the SADC leadership. Natural gas is

94 Nigeria, Angola, Algeria, Libya and Egypt

95 PwC Africa Oil & Gas Review 2020.

96 Ibid.

97 According to the 2020 Climate Change Performance Index - https://newclimate.org/wp-content/uploads/2019/12/CCPI-2020-Results_Web_Version.pdf

becoming more significant to the region's energy sector as Angola, Democratic Republic of Congo (DRC), Madagascar, Mozambique, Namibia, South Africa and Tanzania develop their respective gas-fields. Existing gas producers are Angola, Tanzania, DRC and Mozambique, although Namibia has recently discovered significant reserves of natural gas offshore and South Africa is rich in shale gas and coal-bed methane gas, with recent off-shore natural gas discoveries.[98]

Figure 12: Gas reserves in SADC (circa 2020)

Reserve Name	Country	Reserve Status	Volume (bcm)	Project Phase
Brudulpadda	South Africa	3P	156.99	Exploration
DRC All	DRC	1P	11	Exploration
Ibhubesi	South Africa	1P	15	Exploration
Ikhwesi	South Africa	1P	100*	Exploration
Karoo	South Africa	3P	850	Exploration
Kiliwani	Tanzania	1P		Operational
Kudu	Namibia	1P	62	Exploration
Lesedi	Botswana	3P	1	Exploration
'Offshore South'	Tanzania	1P	1614	Developing
Mkuranga	Tanzania	1P		Operational
Mnazi Bay and Msimbati	Tanzania	1P	100*	Operational
Muzarabani	Zimbabwe	3P	110	Exploration
Pande Temane	Mozambique	1P	300	Operational
Rovuma Area 1	Mozambique	1P	2123	Developing
Rovuma Area 4	Mozambique	1P	2406	Developing
Songo Songio	Tanzania	1P		Exploration
Angola All	Angola	3P	422	Exploration
Waterberg potential	South Africa	3P	283	Exploration

(1P = proven reserves at 90% likelihood), and 3P reserves which are considered as estimates and probable), as well as project phase.
28.32 BCM = 1 trillion cubic feet (TCF)

Source: https://epcmholdings.com/the-sadc-natural-gas-market/

In August 2017 at the 37th South African Development Community (SADC) Heads of State and Government Summit, it was agreed to establish a natural gas committee to promote the use of gas into the regional energy mix. The terms of reference were set out for a proposed Inter-State Gas Committee by the SADC Electricity

[98] EPCM Holdings - https://epcmholdings.com/the-sadc-natural-gas-market/

and Petroleum Gas Sub-committees at the SADC Ministerial Workshop on regional gas infrastructure and market development in Johannesburg in May 2018.[99]

Table 5: Overview of selected SADC countries oil and gas potential[100]

ANGOLA	Angola stands out from the rest of SADC as being the only oil producer. The country's oil industry started commercial-scale production from the off-shore Cabinda fields in the 1960s. Angola has since developed a significant petro-economy with the attendant features of high reliance on oil sector revenues. However, gas exploration activities in the country have taken off. The Angola deep water area in West Africa (water depth from 200 to 2000 m) is located in the Lower Congo-Congo fan basin. Since the 1990s, international oil companies have successively obtained exploration rights block 15, 16, 17 and 18 in the deep-water area as well as block 31, 32, 33 and 34 in the ultra, deep-water area by bidding. After more than 20 years of exploration, a large number of oil and gas fields have been discovered in the area. Natural gas reservoirs are constantly being discovered. Most of Angola's natural gas production is the associated gas at oil fields, which is vented and flared or reinjected into oil wells to enhance oil recovery. Currently, Angola lacks the infrastructure to commercialize more of its natural gas resources. Angola's liquefied natural gas (LNG) plant, located in Soyo, was developed to commercialize more of its natural gas and reduce natural gas flaring. In addition, Angola LNG, the operator of the Angola LNG facility, plans to develop non-associated natural gas fields, particularly in shallow water Blocks 1 and 2. Angola LNG Consortium includes Chevron (36.4%), Sonangol (22.8%), Total (13.6%), BP (13.6%), and Eni (13.6%). According to Angola LNG, the $10 billion LNG project was the largest single investment in Angola's history. The plant was built with a capacity to produce 5.2 million tons per year (250 billion cubic feet per year) of LNG, as well as natural gas plant liquids. With offshore oil exploration continuing at pace, Angola will need to address its capacity for processing the large volumes of associated gas its oil operations will continue to produce. Improving LNG capabilities, developing the domestic market for commercial natural gas, and applying enhanced oil recovery techniques will be important components to Angola's natural gas strategy moving forward.
BOTSWANA	Apart from discussions on a coal-to-liquid refinery that the Botswana government is planning, and talking with Sasol about, exploration activity in the Kavango Delta seems to be underway. ReconAfrica, a Canadian oil and gas firm, to which Namibia and Botswana have given the green light to scour the Kavango Basin in the Kalahari Desert for oil and gas. ReconAfrica has acquired rights to explore more than 35 000 square kilometres in the Okavango Delta watershed, a Unesco-designated World Heritage Site. The firm's view is that drilling in the Kavango Basin makes sense, given the nature of this basin and the tremendous thickness, it should be productive, and provide high-quality oil. Last month, ReconAfrica started exploratory drilling operations on the first of three test boreholes in Kawe, in the ephemeral Omatako riverbed in Namibia.

[99] SADC Energy Monitor, 2018. https://www.sadc.int/files/5515/6837/8450/SADC_ENERGY_MONITOR_2018.pdf

[100] Sources include: EPCM, *op cit*., SADC Energy Monitor, US Energy Information Administration, Gas Processing and LNG (http://www.gasprocessingnews.com/features/201704/african-gas-pipeline-projects-compete-with-coal-and-lng-power.aspx)

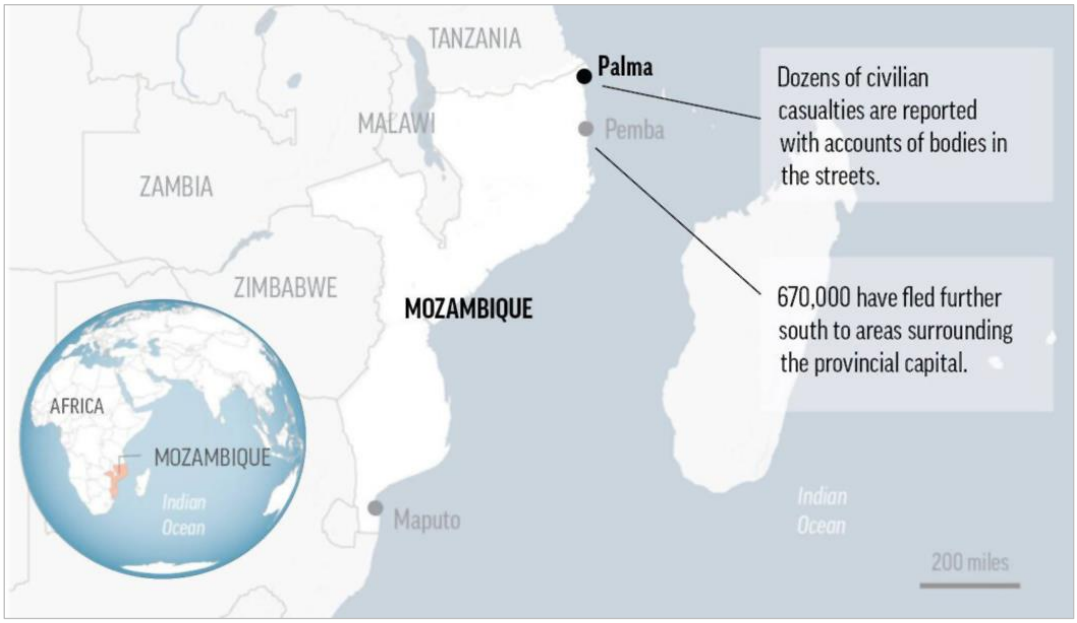
	Opponents say the hunt for oil and gas threatens vital waterways in Namibia and the Okavango Delta's arid savannas, home to the world's largest elephant population and vast numbers of endangered wildlife. The exploration licence area falls within the newly-proclaimed Kavango-Zambezi Transfrontier area, while the biodiversity-rich Okavango river basin is a crucial water source for over a million people. Namibia says the proposed exploration activities will not cause any negative impacts to the Okavango ecosystem as they are not connected to the proposed drilling locations. Botswana's government announced in February 2021 that the exploration licence does not cover the core and buffer zones for the Okavango Delta and the Tsodilo Hills Heritage Sites.
DEMOCRATIC REPUBLIC OF CONGO	Shema Power Lake Kivu (SPLK) is set to produce 15 megawatts of electricity by June this year, in its first phase of methane gas extraction from Lake Kivu. Overall, the plant seeks to add 56 megawatts to the national grid after investing $400 million in methane gas extraction. The Governments of the Democratic Republic of Congo and Rwanda have signed a Validation Act of the Contract in March 2020. Approximately 60 % of Rwandan households were connected to electricity by September 2020. However, projects like methane gas extraction and the newly-built power substation in Rubavu District, are expected to increase power generation in order to reach 100 per cent connectivity by the year 2024.
MADAGASCAR	Madagascar has 225 offshore exploration blocks, plus a number of onshore blocks. The small Indian Ocean Island has five basins, totalling 320,000 kilometres2 (123,550 miles). The most important of these onshore basins, Ambilobe, Majunga and Morondava, are located along the western coast. All three share a common geological history, with structures similar to those off Angola and Nigeria. The largest fields, Bemolanga and Tsimiroro, are in the Morondova basin – most of which remains unexplored. Recently, unconventional oil deposits in Madagascar have attracted investors' attention, where Madagascar has historically been seen as somewhat complicated. For starters, extraction is not easy given its location in the Mozambique Channels, thus requiring a great deal of technological investment. Infrastructure is a challenge, as Madagascar currently has no refineries. Another bone of contention for investors has been political instability with several attempted coups and political confusion left in their wake. The Tsimiroro field, south of the town of Morafenobe, has proven reserves of 1.7 billion barrels of heavy oil, buried some 100m to 200m beneath the mountainous region. Madagascar Oil has oil concessions totaling 30,000 square km in the region. However, unlike light crude oil, the hydro-carbon in Tsimiroro is hard to extract. Madagascar Oil is therefore employing new extraction technology that injects steam into the ground to soften the oil. While Tisimiroro holds around 1.7 billion barrels of Original-Oil-in-Place, with potential for light oil and natural gas, Bemolanga is an ultra-heavy field with potential resources of 16.6 billion barrels (about 9.8 billion barrels of recoverable reserves). Other oil and gas companies are still conducting seismic analyses before moving towards the drilling process. And while commercial exploitation of Madagascar's natural resources is still some years away, the prospects of oil being produced in this country is quickly gaining investor interest.

NAMIBIA	BW Kudu Limited, a wholly owned subsidiary of BW Energy Limited and the National Petroleum Corporation of Namibia (NAMCOR) have signed a Farm-In and Carry Agreement. The agreement increases BW Kudu's working interest in the Kudu license offshore Namibia from 56% to 95% in line with previously disclosed intentions. NAMCOR will retain the remaining 5% working interest (down from the previous 44%). The agreement gives NAMCOR the opportunity to acquire an additional 5% working interest post-first gas, while BW Kudu will pay USD 4 million at completion of the transaction and carry NAMCOR's share of development costs until first gas. Kudu gas is an important project for the energy sector and for Namibia. It has the potential to provide a valuable contribution to Namibia's energy mix and local value creation by monetizing stranded gas which is an untapped natural resource in Namibia. The **next step for the Kudu joint venture** will be to secure **long-term commercial gas sales agreements**, update the development plan to meet offtake needs and ensure robust financial project returns. The Kudu gas field is located about 130 km offshore the southern parts of Namibia. It contains an estimated 1.3 trillion cubic feet (TCF) of gas and was discovered in 1974. The new arrangement will enable gas sales arrangements and increases the likelihood of securing financing for the upstream Kudu development. The Kudu project may become the first ever oil and gas development offshore Namibia—an opportunity to reduce carbon emissions and strengthen energy independence for Namibia, which currently imports a major part of its electricity from coal fired power plants outside of the country. Developing Kudu will provide insights which can be used to unlock similar abundant stranded gas reserves available around the world. Adding cost-efficient gas to the energy mix of tomorrow is going to be vital to reach the world's environmental targets.
TANZANIA	The Songo Songo gas field is located on and offshore Songo Songo island, about 15km from the Tanzanian mainland and 200km south of the commercial capital, Dar es Salaam. The project serves two onshore and three offshore natural gas wells at the island, the gas from the wells being piped to a plant on the island. The discovery well, Songo Songo-1, was drilled in l974 by AGIP, now a subsidiary of Italian oil and gas multinational Eni. The main sponsor of the $320m project was AES Sirocco of the US; the other sponsor was PanAfrican Energy, formerly Ocelot International. Investment in the project came from AES, PanAfrican Energy, Tanzania Electric Supply Company Ltd (Tanesco), Tanzania Petroleum Development Corporation (TPDC), UK investor CDC Group plc, Tanzania Development Finance Co Ltd (TDFL), the European Investment Bank and the World Bank, these last two through the Tanzanian Government. The gas processing plant and pipelines were built and are owned by Songas Ltd, a local joint venture company formed by power company CDC Globeleq (itself formed by CDC Group), Tanesco, TPDC and TDFL. CDC Globeleq has the controlling interest in the project, and the gas plant and wells are operated on its behalf by PanAfrican Energy Tanzania Ltd, a local subsidiary of Orca Exploration Group Inc. Construction of the pipeline network was completed in May 2004. The first gas reached Dar es Salaam in July 2004, and the project started commercial operation in July 2004. The network transports natural gas to Dar es Salaam where it is used as the principal fuel for turbine generators at Songas Ubungo power plant in Dar es Salaam to generate about 190MW of electricity – or 45%

of the country's capacity – for the national grid. A proportion of the gas also supplies a local cement plant, Wazo Hill, as well as a number of other industries and power plants in Dar es Salaam.

4.3 Focus on: Mozambique

Figure 13: Area of insurgent attacks



Source: The Africa Report, 29 March 2021

Militant groups attacked Palma, on 24 March 2021, near where the $20bn liquefied natural gas (LNG) project is planned in northern Mozambique. This is the latest in a series of terror attacks aimed at the gas operations in Mozambique. It is reported that insurgents first attacked the police station on the coastal side of Palma, and then moved into the town and the business park, where they reportedly robbed Banco Internacional de Moçambique, S.A. (BIM) and Standard Bank. Disturbances were also reported near the Amarula Hotel on the northern side of the town.

Total suspended its operations in January following an insurgent attack and had just decided to restart operations prior to the Palma incident. In late April 2021, Total **declared Force Majeure on its Mozambique project** and expressed the hope that the Mozambican government, and its regional and international partners will work towards a sustainable security solution. The French company evacuated all its personnel from its Afungi base. The whole of the Cabo Delgardo province remains uneasy, with regular unrest and violence occurring.

An **Extraordinary SADC Double Troika Summit** was held in Mozambique on 8 April 2021, represented by **Mozambique:** H.E. President Filipe Jacinto Nyusi, Chairperson of SADC; **Botswana:** H.E. President Dr Mokgweetsi Eric Keabetswe Masisi, Chairperson of the Organ on Politics, Defence and Security Cooperation; **Malawi:** H.E. President Dr Lazarus McCarthy Chakwera, In-coming Chairperson of SADC; **South Africa:** H.E. President Matamela Cyril Ramaphosa, In-coming Chairperson of the Organ on Politics, Defence and Security

Cooperation; **Zimbabwe:** H.E. President Emmerson Dambudzo Mnangagwa, and Outgoing Chairperson of the Organ on Politics, Defence and Security Cooperation; and **United Republic of Tanzania:** H.E. Hussein Ali Mwinyi, President of the Revolutionary Government of Zanzibar, representing H.E. President Samia Suluhu Hassan, Outgoing Chairperson of SADC. Executive Secretary of SADC, H.E. Dr Stergomena Lawrence Tax also participated.

The Double Troika received a report from the Organ Troika on the security situation in Mozambique and noted with concern the acts of terrorism perpetrated in the districts of Cabo Delgado Province of the Republic of Mozambique; condemning the terrorist attacks in strongest terms. SADC has maintained an interest in finding a peaceful resolution in Mozambique; but there are complicated political relationships at play. Mozambique seems determined to keep ensure its sovereign control over the outcomes.

Mozambique's gas history

Mozambique has been producing gas since the onshore Pande and Temane fields were brought into production through the Sasol Rompco pipeline to South Africa in 2004. The discovery of major gas reserves in the offshore Rovuma Basin in the north of Mozambique has led to the recalibration of Mozambique as a major natural gas resources country and ranked first in the SADC region.

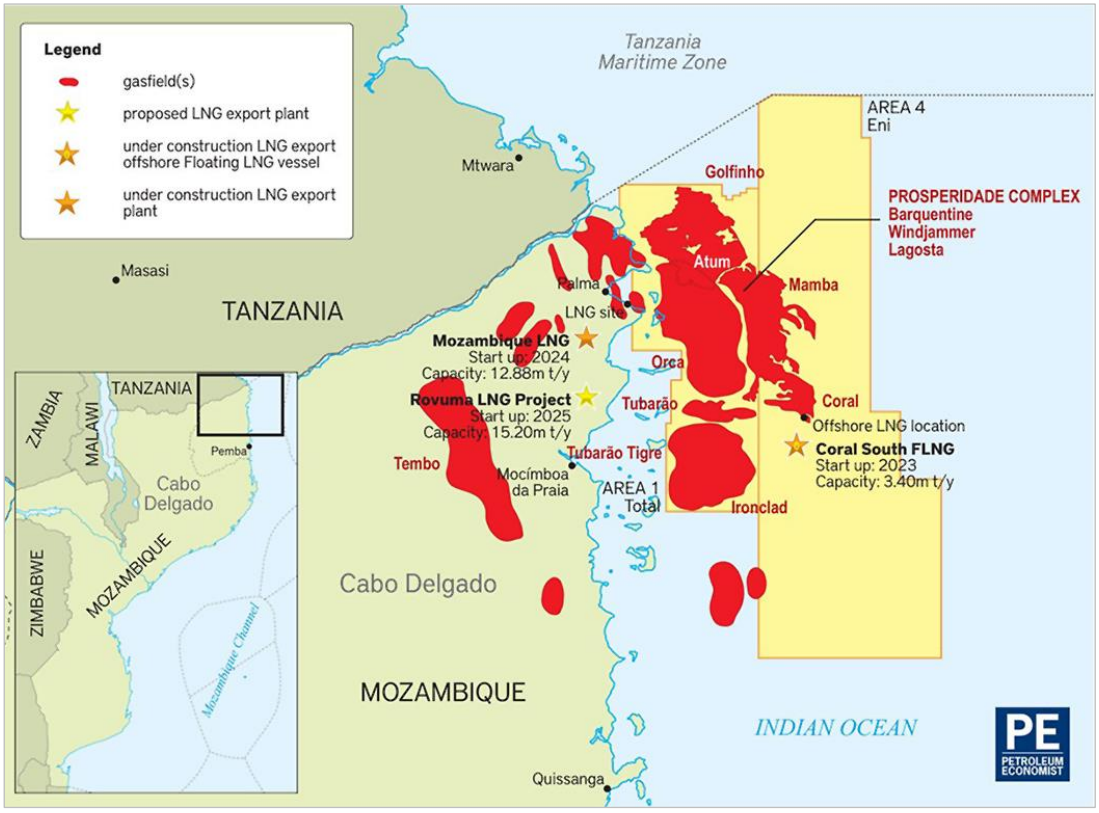
The Mozambique-Rovuma LNG Project started with the discovery of a vast quantity of natural gas off the coast of northern Mozambique in 2010, leading to a $20 billion Final Investment Decision in 2019. The project is reportedly still on track to deliver LNG in 2024, despite security threats in the form of Islamist insurgents.

Previously, on August 12th, 2020, Ahlu Sunnah Wal Jammah (ASWJ) militants captured the port of Mocimboa da Praia, according to a report from Moz24Horas. This was the third time militants had seized the port, situated 60 km south of the Afungi peninsula, and a key logistical piece for the development of Mozambique LNG. The seizure was indicative of a rising extremist insurgency in the north of the country, where the sophistication and resilience of ASWJ continues to stifle an ill-equipped and under-funded Mozambican military.[101]

Overcoming the insurgency around the Rovuma Basin operations will remain a critical issue to ensure that the development remains on track. Official assistance from SADC and/or member states will likely be required, as to date, South African mercenaries have been accused of human rights abuses in the province.

[101] https://www.gbreports.com/article/cooking-with-gas-in-mozambique

Figure 14: Mozambique oil and gas activity



Source: Petroleum Economics

Total's plans for the approximately 65 trillion cubic feet of recoverable natural gas include a two-train project with the ability to expand up to 43 million tonnes per annum (MTPA). Total's Mozambique LNG plant (Area 1) is one of two projects on the Afungi Peninsula. The other (Area 4) is ExxonMobil's Rovuma LNG project. Both are intended to involve $50bn of investment — the largest industrial investment in Africa.

The project is committed to collaborating with Mozambican communities and government officials to safely develop these resources in a manner that protects the environment, encourages additional foreign investment, develops local content (of up to $5 billion for the first two projects alone), and contributes to the long-term social and economic stability of the country.

The African Renaissance Pipeline (ARP) Project (see Chapter 5) is a project where a joint venture contract has already been signed for the construction of the $6 Billion pipeline that will transport gas from Mozambique to South Africa. The agreement was signed on April 22, 2016 between Mozambique state-owned oil and gas company **Empresa Nacional de Hidrocarbonetos**, a private-sector consortium made up of Mozambican **Profin Consulting Sociedade Anónima**, **South Africa's SacOil Holdings Ltd**., and Chinese international pipeline construction company **China Petroleum Pipeline Bureau**. The 2,600-km, large-diameter main pipeline will link Rovuma Basin gas fields in northern Mozambique to South Africa's industrial region of Gauteng. It will also deliver gas to towns along the pipeline route, stimulating industrial demand.

The Mozambique LNG Project will deliver a range of social and economic benefits to Mozambique.

- Develop competent construction and operation workforces,
- Develop subject matter experts that support those industries,
- Generate revenue that will contribute to the socio-economic development of the country.

In the short term, construction of the LNG facilities will provide opportunities for professional training, employment, and contracts for the supply of goods and services. The construction phase also manages environmental and social impacts and reduces risks.

Its geographic location positions the project well to meet Atlantic and Asia-Pacific market needs, as well as tap into the growing energy demands of the Middle East and Indian sub-continent.

Increasing security concerns, along with COVID-19, have raised questions over the timelines for such huge undertakings in one of Mozambique's least developed areas. Further delays to the LNG projects would mean they come online even deeper into the ongoing energy transition, meaning further regulatory hurdles.

Total has signed a security pact with the Mozambique government that will see state troops protect the project site. That the Mozambique government is more focused on defending LNG projects while a humanitarian crisis in northern Mozambique is getting worse may not go unnoticed for long by investors with ESG concerns. Total has stated that "each Mozambican military or police officer assigned to the protection of the facility receives Voluntary Principles on Security and Human Rights training."

LNG as a fuel is one option, particularly given a reorientation of export flows. Liquefied gas is an attractive option for long-distance heavy trucking, with discussions under way in South Africa. This will require new players, including local companies with strong links to communities, and with private equity-backing to bring these barrels of LNG to market. As the gas markets develop, companies will also need to consider how to provide local resources for local consumption.

Governments have a role to play in encouraging such upstream investments, but perhaps even more in the crucial midstream. Infrastructure projects are complicated and political support is crucial.

Pipelines and power grids could have a hand in transforming African resources into African gains. For now, power-ships and floating storage and regasification units (FSRUs), diesel generation and mini-grids clustered around mine sites or other major power off-takers will persist. In the longer term, better (cleaner, greener and more cost-effective) fuel choices should take priority. LNG as an intermediate fuel is such an option, where long-distance heavy trucking plays a part. This would be, for instance into the interior of South Africa from Mozambique or from the pipeline destinations in Secunda or Sasolburg. This is already under discussion in South Africa.

4.4 How close is SADC to going green?

Developing Africa's variety of resources will take access to large pools of capital. While there is scope for local investment, the larger proportion must be made up of stronger foreign-denominated currency investment. Given Africa's age demographic and potential for high economic growth and transformation, Africa is rising on the opportunity front.

Renewable energy is still the most under-penetrated market in the world. As battery and other storage technology improves, renewable energy's share of baseload is expected to grow substantially. In the meantime, opportunities exist for international developers to move in. According to the UN Industrial Development Organisation, understanding SADC's emerging renewable energy sub-sectors, and growth in market demand will help to define the region's overall potential and possible investment opportunities.

On 24 July 2015, SADC energy ministers approved the establishment of the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE). SACREEE will contribute to the development of thriving regional renewable energy and energy efficiency markets by addressing gaps related to policies and regulations, capacity building, technology co-operation and the promotion of investments.

The increase in renewable energy and energy efficiency initiatives in the SADC region has been driven in large part by electricity supply shortages in several key countries, but also by the changing economics of wind and solar energy and by the emergence of new policy concepts such as feed-in tariffs (FITs), net metering, auctioning of power supply to independent power producers (IPPs) and renewable energy certificates (RECs). In response, SADC member states are developing their own targets and policies to expedite the development of renewable energy and energy efficiency projects and to offset their dependence on fossil fuels.

SACREE Status Report, 2015

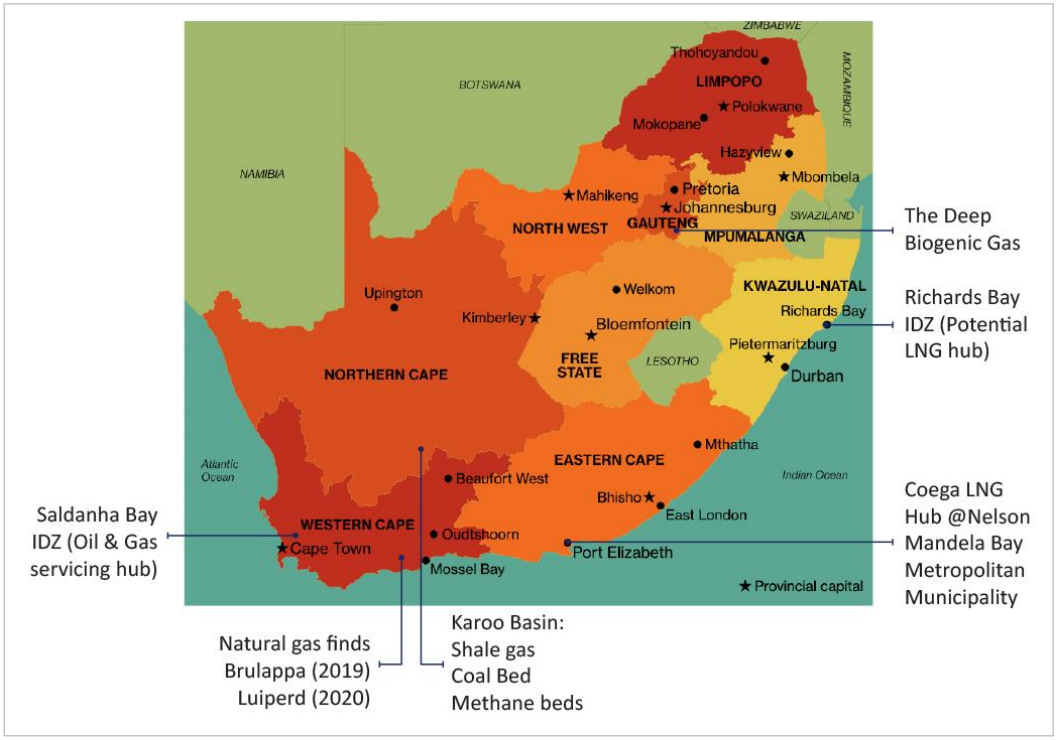
5. Chapter 5: Opportunities for Brazilian companies

The oil and gas sector requires significantly greater and longer-term capital investment given its capital-intensive nature and most of the large-scale equipment required being denominated in US dollars. Financial requirements are typically greater than what the South African capital market can accommodate, especially without hard currency investment partners. In addition, those South African investors who are able to afford the massive capital investments tend to invest outside of South Africa – where large reserves are already proven, and where they are more readily accessible with more manageable forex risk exposure.

It is clear that an abundance of natural resources is not enough, without a stable currency and without a coherent strategy that manages the factors that influences currency fluctuations. Policy and regulatory stability and certainty are important – even where socio-political priorities such as B-BEE are concerned. In addition, a business environment with an openness to engagement between government and investors, and fiscal responsibility overseeing sovereign debt and liquidity are important factors that investors in the oil and gas sector consider, where the risk-reward stakes are much higher than many other sectors.

5.1 Assessment of the opportunities in the oil and gas sector

Figure 15: Landscape of activity in South Africa



Source: https://southafrica-info.com/land/nine-provinces-south-africa/

Established presence of Sasol

Sasol is the main local company with an established presence in this sector. The company's largest operations are in South Africa in Secunda, Mpumalanga and Sasolburg in the Free State. Most recently, Sasol has identified renewable energy as a key lever for reducing its GHG emissions and moving it towards producing products in a more sustainable manner.

In Sasolburg, Sasol converted its operations from coal gasification in 2004, and now uses more efficient natural gas in its production processes.

"Secunda Synfuels Operations operates the world's only commercial coal-based synthetic fuels manufacturing facility, producing synthesis gas (syngas) through coal gasification and natural gas reforming. We use our proprietary technology to convert syngas into synthetic fuel components, pipeline gas and chemical feedstock for the downstream production of solvents, polymers, monomers and other chemicals."

Sasol Operations

Sasol owns the vast Secunda plant, which employs some 22,000 people turning coal into gasoline and petrochemicals. As a result, it is looking for renewable sources to complement its energy transition including solar and gas. Since 2004, a pipeline between Mozambique and South Africa began pumping gas to Sasol's Secunda operations. Sasol was behind the 865 km gas pipeline construction. Additionally, South Africa produces a small volume of natural gas offshore, which is mainly used to supply the Mossel Bay GTL plant.[102]

Currently, **Sasol is looking to accelerate its feedstock transition from coal to gas.** On February 19 2021, its board approved a $760-million investment for the Mozambique Production Sharing Agreement licence area, in southern Mozambique (Panda-Temane). "This will extend the plateau production from the existing licence areas and support continued gas supply to both Mozambican and South African markets." [103] Apart from its own gas exploration and development activities, **Sasol is also considering liquefied natural gas imports**.

South Africa's geographical advantage

The Western Cape is ideally placed to service growing demand in the oil and gas sectors with the three ports in the province – Cape Town, Saldanha Bay and Mossel Bay – playing a key role in this industry, and they are being expanded and upgraded to support the industry. With its links to West Africa, the Western Cape has attracted many international exploration and oil-refining organisations to its shores. PetroSA, the national oil company, has six oil-storage tanks in Saldanha Bay, each with a capacity of 1.19-million cubic metres. PetroSA's GTL refinery in Mossel Bay is South Africa's leading facility with a capacity of 36 000 barrels per day – equivalent to 45 000 barrels of crude oil per day. The Western Cape is also home to a resource of shale gas in the central Karoo.[104]

Cape Town and the Western Cape are ideally located to be a launch pad for the oil and gas sector in the rest of Africa. Firstly, the government has invested heavily in the development of the energy sector by creating incentives such as the 12I tax allowance to stimulate large capital projects. There is also the anticipated development of an off-shore supply base to offer support services, and the oil and gas industrial development zone (IDZ) in Saldanha Bay (SBIDZ).[105]

The IDZ in **Saldanha Bay** is geographically set on South Africa's south-west coast, creating a linkage point for both Sub-Saharan African and international markets. It is envisioned to be the centralised provider of bulk parts and services to the industry, and an oil, gas and marine repair services hub. Set up in 2013, the SBIDZ is the country's first dedicated development in the Oil and Gas Services and Marine Repair sector. It aims to support Upstream Exploration and Production developments in the West and East African regions, as well as the South African market in the near future.[106]

---

102 https://www.eia.gov/international/content/analysis/countries_long/South_Africa/south_africa.pdf

103 Engineering news, Sasol upscales renewables roll-out ambition to 900 MW, starts plotting big green-hydrogen role, 22 February 2021, https://www.engineeringnews.co.za/article/sasol-upscales-renewables-roll-out-ambition-to-900-mw-starts-plotting-big-green-hydrogen-role-2021-02-22/rep_id:4136 (Accessed 11 March 2021)

104 Invest SA. https://www.wesgro.co.za/invest/sector/oil-and-gas (Accessed 2 February 2021)

105 *Ibid.*

106 https://gifs.africa/wp-content/uploads/2020/05/Geography-Industrial-Development-Zones-2019.pdf

Apart from French company Total, operating in the Western Cape province, US oil company ExxonMobil and the Italian Eni S.p.A group also have stakes in the **Mossel Bay** area, east of Cape Town. The Western Cape, therefore, has companies with the capacity and capability to assist these offshore operations; therefore, **providing a landing pad for foreign sector players.**

Despite the Western Cape's prominence in the sector, the new Total finds could transform the Eastern Cape region's energy landscape too.

5.2 Investment opportunities in South Africa

Capital investment opportunities for exploration

According to InvestSA,[107] there are investment opportunities in terms of exploration. This is based on a government plan, Operation Phakisa of 2014, which sought to fast-track implementation of strategic projects.

For the oil and gas sector, the **value proposition for investors is the fact that the government wants to see 30 wells drilled in 10 years**. Government is aware that an enabling environment to do so is necessary. Perhaps this is why the policy and regulatory framework has been amended over time regarding the recent Upstream Petroleum Resources Development Bill and the Gas Amendment Bill, to ensure a win-win outcome for government, industry, and society. Already in the seventh year of Operation Phakisa's existence, there remains opportunities for offshore exploration. These targets from offshore explorations, envision creating 370 000 barrels of oil and gas per day (80% of oil and gas imports) and create 130,000 jobs and contribute US $2.2 billion to GDP, according to Operation Phakisa.

Capital investment towards pipeline infrastructure development

Operation Phakisa also planned to set up a phased gas pipeline network that emerged initially to exploit mooted offshore gas reserves, but now its priority is towards **imported LNG**. The fact that the county's gas network is small and is not reticulated also highlights the **need for investment in the form of pipelines to expand the reticulation network** for inland transportation of natural gas. For example, the proposed African Renaissance Pipeline (ARP) Project, that seeks to link Mozambique's LNG supply through a cross-border, terrestrial gas pipeline from Mozambique's Rovuma Basin to Springs in (Gauteng) South Africa is only envisioned after 10 years. This is due the pipeline crossing almost 3,000km pipeline across hostile territory, and also in order to attain a return on the investment. Transport by tanker (Floating Storage Regasification Unit down) to Matola, Richards Bay and Durban may be more attractive and simpler. Connecting the region is a much further out, long-term objective.

Investment agreement opportunities in support services

The development of support services offers opportunities to investors, according to Invest SA.[108] The country is known to be a preferred destination for repair, maintenance and upgrade of **drilling ships, semi-**

[107] InvestSA is a division of the South African Department of Trade, Industry, and Competition (the dtic). They support investors exploring opportunities in South Africa by helping with information, facilitation and aftercare http://www.investsa.gov.za/investment-opportunities/608-2/oil-and-gas/

[108] *Ibid.*

submersibles, and jack-up rigs for operations in African waters. Vessels come from as far away as South America to take advantage of the country's engineering skills, capacity and fast turn-around times which yield a highly competitive overall cost of work.[109]

With SBIDZ earmarked as an oil, gas and marine repair services hub, there are opportunities for investors to declare early interest in developing the area. A new, specialised oil and gas maintenance and repair centre is being implemented that will include new deep-water berth for rigs and drill ships, and a new construction, repair and maintenance berth. **Companies have opportunities to sign investment agreements** for development in SBIDZ, particularly for infrastructure and construction. There are currently eleven signed investors in the IDZ.[110] There are also **opportunities for foreign engineering companies or joint ventures** to partner with the South African government on this front.

Currently, both the Coega SEZ and the East London IDZ (both within Eastern Cape province) are also set up to **support and provide maritime services**.[111] Another possible opportunity is if government decides to name the Coega SEZ as the potential site for a 1 000 MW LNG plant. The value to the regional economy of the project is estimated at R25-billion. A 342 MW gas-fired power plant (Dedisa) has also started operating at Coega.[112]

In summary, **private capital is much needed in the sector**, especially regarding monetising the new gas finds. This will only create new opportunities for new technology and a gas industry to develop. Other service industries such as maintenance could also develop further and this could create new jobs and new skills in the sector.[113]

5.3 Trade of goods and services opportunities

Opportunities to supply LNG to South Africa

There is a **need for a new supply of gas in the country** to ensure the security of supply and to pivot away from Eskom's coal-based electricity, especially for industrial players. As South Africa's gas is imported from Mozambique, there is a further supply gap of natural gas that can be filled. Government is looking for imports and supply of LNG from around the globe and this is an opportunity for foreign players to supply to the South African market. As a result, the first LNG Hub has been established at Coega as of November 2019 – Coega SEZ is noted to be ready to welcome investors to its shores for gas-to-power opportunities and for converting natural gas as a fuel source and feedstock in various industry value chains.

The main SEZs in the country identified as potential for LNG terminals are Coega (as above) and Richards Bay, while in Mozambique the port at Matola is the identified LNG terminal. Each of these plays an important role in the energy ecosystem and will each develop in their own time. Government is yet to name which one of these terminals will be the potential site for a 1 000 MW LNG plant. However, according to the Coega

[109] *Ibid.*

[110] Saldanha Bay IDZ lands new investments (March 2020) https://www.globalafricanetwork.com/company-news/saldanha-bay-idz-lands-new-investments/ (Accessed 4 March 2021).

[111] Global Africa Network, January 21, 2021, https://www.globalafricanetwork.com/company-news/offshore-gas-finds-could-be-transform-the-eastern-cape-energy-landscape/ (Accessed 10 February 2021).

[112] *Ibid.*

[113] Interview with Mbuso Xaba from Central Energy Fund. Date 19 Feb 2021.

Development Corporation Project Development Manager, Sandisiwe Ncemane, the Coega SEZ is said to be the most advanced in terms of preparations for the LNG Hub due to its ideal location and proximity to the Dedisa Power Peaking Plant which is in operation within the SEZ. This leads to reduced costs of the gas to power project for investors quite significantly.[114]

> "The Coega SEZ has a world class infrastructure; it has prime and serviced land that is available to host key gas-to-power projects with spin-offs for other sectors. In addition, the approved Coega Infrastructure Master Plan is in place. It defines services corridor from the LNG Project site to Dedisa substation as well as good access via National Road (N2) and ancillary road network.
>
> The short-term outlook is to import liquefied natural gas (LNG) to trigger the Gas economy, which would stimulate the exploration and production of indigenous gas resources in the Eastern Cape."
>
> **Coega Development Corporation, op cit.**

As the new Total gas finds still need to be monetized, investment in infrastructure in this regard is in the medium term. **In the short term, LNG imports will serve as new sources of supply.**

Virtual pipelines can transport imported LNG locally

The big question being asked is if the need for gas is now, without the adequate infrastructure, how can gas be transported to benefit the South African market? This also relates to solving the chicken and egg scenarios where - you need the market to develop the gas fields; but then you also need the gas fields to develop the market. So small scale options may be the way to go i.e. bringing in the LNG gas suppliers and then transporting it to small distributed markets to grow the market, so as to bring in larger infrastructure later on.

Despite the small gas network in SA, there have been technology shifts in small scale delivery mechanisms which make **virtual pipelines viable**, allowing for downstream development. This implies transporting LNG via ship and offloading it on trucks and rail, which disseminate it to downstream facilities onshore. This allows one not to spend on high-capital investment for pipelines, in the short term. There is room to integrate pipelines with ships, rail and road to move gas to its various supply nodes, as shown below in Figure 16.[115] For example, Matola and Richards Bay, envisage using floating storage and regasification units, rather than onshore terminals.[116]

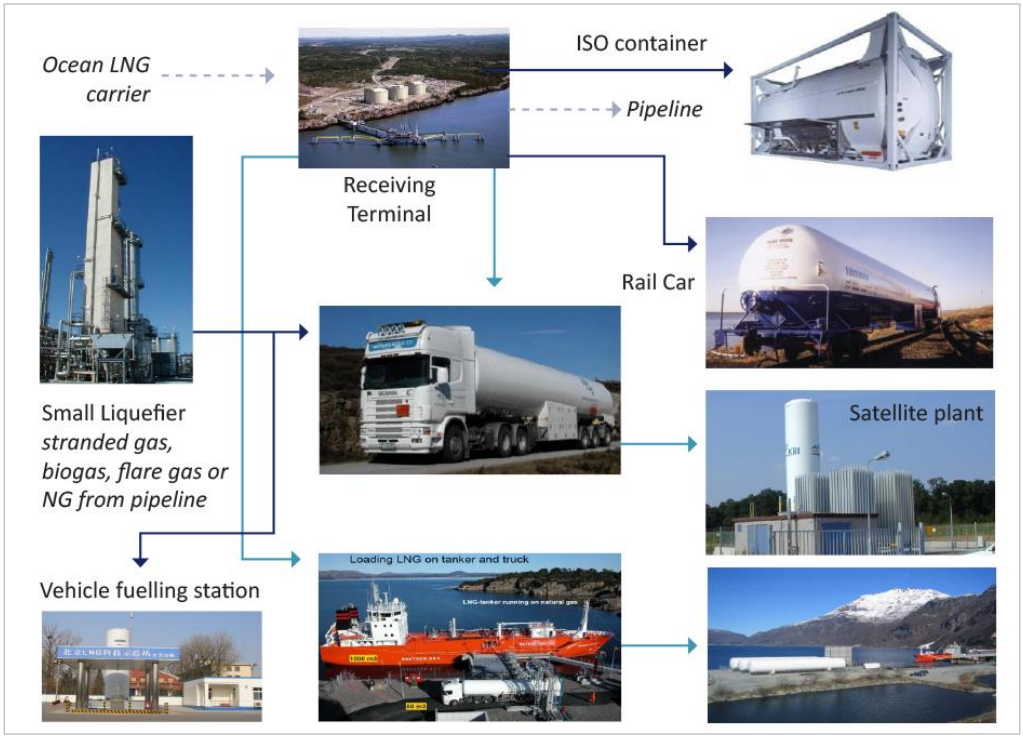
Figure 16: Concept of an extended LNG supply chain, including virtual pipelines[117]

[114] Coega Development Corporation, First LNG Hub to be Established at Coega – Coega SEZ Ready to Welcome Investors to its Shores for Gas Opportunities (13 Nov 2019) http://coega.co.za/NewsArticle.aspx?objID=105&id=5761 (Accessed 4 March 2021)

[115] Energy Indaba conference 2021.Gas forum discussion: *Developing a robust gas pipeline network for Southern Africa.*

[116] Engineering news (4 December 2019), Promoters of Maputo and Richards Bay LNG terminals insist projects can be complementary. https://www.engineeringnews.co.za/article/promoters-of-maputo-and-richards-bay-lng-terminals-insist-projects-can-be-complementary-2019-12-04/rep_id:4136 (Accessed 4 March 2021).

[117] Abdalla Altayeb Abdalla Managing Director 3ACryogenic FZE, United Arab Emirates (2015), Utilizing the liquid natural gas in small scale application in power generation, industrialization and as alternative Vehicle fuel. UNCTAD



Source: Abdalla Altayeb Abdalla (2015)

Karpowership, a Turkish-based company, is among various private companies seeking contracts to provide Eskom with "emergency electricity" (of up to 2000 mw). This is proposed to be generated from purpose-built, gas-to-electricity "power ships" in three South African harbours, including Richards Bay, Ngqura, Saldanha Bay, where they would be plugged into the existing Eskom grid to provide power on demand.

After allegations of non-compliance to an environmental impact assessment, it emerged that Karpowership and its local empowerment partners have been granted an exemption from the Department of Trade, Industry and Competition (DTIC) – around complying with a 40% local content stipulation designed to encourage the development of locally based manufacturers and suppliers.

It remains unclear to what extent, if any, the new local content exemption granted to Karpowership might potentially prejudice other companies also bidding for the same contract — but neither the DTIC nor the DMRE has responded. The local content issue is of extreme concern as it should be a level playing field for everybody. The company has issued a formal response denying that the exemptions favoured them. It was claimed that the DTIC granted exemptions to other bidders (14 bidders) in terms of the Risk Mitigation IPP Procurement Porgramme (RMIPPPP).

As part of the bidding requirements, the energy department had stipulated that: "Where the quantity of materials and/or products required cannot be wholly sourced from South African-based manufacturers and/or at the relevant Designated Local Content threshold at any particular time, Bidders should obtain written approval from the DTIC to supply the remaining portion at a lower threshold. Such requests for approval should be submitted and approval be obtained prior to the bid submission date."

The DTIC, in consultation with the energy department, would then grant approval on a case-by-case basis based on a number of factors that would include required volumes; available South African industry

manufacturing capacity at that time; delivery times; availability of input materials and components; technical considerations including operating conditions; construction materials, emergencies and security of supply. This process for exemption from local content would apply to all bidders.

On November 4th, DTIC issued a letter to Karpowership, in which it was acknowledged that South Africa lacks the infrastructure to manufacture such vessels. As such, exemption was granted, on the condition that engineering, maintenance, repair and overhaul services are done locally.

Despite these vessels being seen as an affordable, sustainable and clean energy option, it is suggested that, based on the amount of time these vessels are expected to operate, carbon dioxide equivalent emissions will be vast. They are also unlikely to provide direct jobs- 108 temporary construction jobs, of which 87 would be South African.

Daily Maverick

https://www.dailymaverick.co.za/article/2021-03-14-floating-gas-powerships-plan-gets-another-free-pass-from-south-african-government/amp/

Refinery closures imply more supply of fuels and LNG

As highlighted in the section about Challenges facing refineries, the South African plants owned by Glencore Plc and Petroliam Nasional Bhd (CHEVEREF) which make up about 43% of the nation's oil-refining capacity have been closed down, and are expected to stay shut until at least 2022. The closures will force South Africa to rely heavily on fuel imports.

All four of South Africa's oil refineries - with a total capacity of more than 500,000 barrels a day - have had accidents, such as fires, or are under review, with the industry already hit hard by the Covid pandemic. These oil refineries include: Sapref (joint venture of Royal Dutch Shell and BP, which also faces uncertainty); Natref (Sasol refinery); Enref (Engen –owned refinery) and Chevref (Astron Energy, a unit of Glencore).

South Africa's Engen is looking as far afield as Singapore and Malaysia for fuel oil as refinery shutdowns curb domestic availability and raise import demand. Engen has issued a tender seeking to buy 35,000t (226,000 bl) of very low-sulphur fuel oil (VLSFO) for loading from Singapore, Malaysia or the Mideast Gulf over 17-29 May. About 123,000t (26,000 b/d) of fuel oil is on course to arrive in South Africa next month, the most since April 2018, according to data from oil analytics firm Vortexa.

Engen typically seeks fuel oil from Europe and the Mideast Gulf but rarely buys from Malaysia and Singapore. It may have been prompted to look to Asia-Pacific because of tight supplies in Europe and more ample availability in the east, said traders, although this could not be confirmed with the company.

Engen does not produce 0.5pc sulphur LSFO and typically seeks supplies from the import market. But its latest tender comes as South African demand is rising because of prolonged shutdowns at Engen's 105,000 b/d Durban refinery (ENREF) and other domestic plants, market participants said.

Engen's Durban refinery has been shut since December 2020 because of a fire, with its operating permit revoked until it submits a comprehensive report on the cause of the incident and a set of preventative measures. Astron Energy's 110,000 b/d Cape Town refinery (CHEVREF) is expected to remain shut until sometime in 2022, after a fire in July 2020. And the BP-Shell SAPREF joint venture has extended a full shutdown at its 180,000 b/d Durban refinery to mid-June 2021. The Engen and SAPREF refineries supply all the local bunker fuel needs at the port of Durban.

Argus Media (2021)
https://www.argusmedia.com/en/news/2205088-south-african-refinery-shutdowns-boost-fuel-oil-demand

According to some experts interviewed in the course of this study, the closure of refineries is less linked to a green transition than to a variety of operational issues and accidents. It is understood that the negative impact of these closures could be curbed by upgrading and converting existing refineries to accommodate natural gas. Without pivoting to an alternative energy source such as gas this will mean **more importation of crude oil and refined petroleum products**, meaning greater contributions to the country's deficits. The policy framework needs to be reformed to enable a just transition towards cleaner fuels– this includes exhaustive consultation with industry, academics, and CSOs amongst others.

Currently, there is no agreement on who will foot the bill regarding repairs and upgrades to the refineries.[118]

Despite the issues going on at refineries, there is room for the upgrade of refineries towards 'greener' or cleaner fuels and according to this analysis, natural gas could be a feature. There is a willingness on the part of the oil and gas industry as well as the government to transition to cleaner sources of energy, boosting the interest in natural gas. Currently, most natural gas used in South Africa comes from Mozambique.[119] **To meet the demand for LNG in the country, and that which will taper off from Mozambique, the county is open to LNG from the globe**, noting that most of Mozambique's LNG will be earmarked for Asia.[120]

[118] Interview with Philip Ninela from DTIC. Date 23 Feb 2021.

[119] *Ibid.*

[120] Energy Indaba conference 2021.Gas forum discussion: *Repositioning the Southern Africa gas play for agility in a dynamic world.*

5.4 R&D collaboration potential

Supply machinery and equipment to South Africa

South Africa's technology (especially from Sasol) is considered world-class. Given South Africa's experience in the sector since Sasol's lead, oil and gas -related technology is available locally.[121] Some technology for gas extraction can be sourced abroad, particularly for the upstream sector, up until South Africa develops its own technology and equipment, as the industry progresses.[122] Such equipment includes stabilisers for undersea pipelines and those reflected in (section 2.3 - Origin of the machinery and equipment for deep-water exploration (National or Imported?). Foreign players will need to consult with local companies[123] to understand their plans and infrastructure and technology constrains to know where the opportunities lie, in this regard. Processing the gas, however, will not be an issue for South Africa as it has the technology to covert gas to liquid for transportation.

Engagement with R&D laboratories

To benefit from R&D potential, an R&D energy lab can be set-up, such as the one in Tanzania.[124] This would then allow for several workstreams to be created e.g., a finance workstream that brings in DFIs and private investors to the table. A skills development workstream would seek to boost human capacity and develop skills in this area like welding. Bringing both public and private sector together, would create a win-win situation.

Operation Phakisa includes this in its policy pointing that it aims to "exploit research opportunities presented by offshore oil and gas explorations that will unlock data ecosystems, marine resources, and ocean-related renewable energy."[125] The Council for Scientific and Industrial Research (CSIR) launched an *Offshore Oil and gas Exploration Lab* to determine the extent of offshore oil and gas reserves in the country. Among its 11 initiatives identified by the Lab, its first initiative was a *Strategic Environmental Assessment for a phased gas pipeline network* launched in 2017. The final report[126] has been published. These Lab reports are gazetted and sent out for public comments, allowing an **opportunity for investors to contribute too.**

Also, with Saldanha Bay IDZ earmarked as an oil, gas and marine repair services hub, foreign engineering partnerships would bring in new technology skills into the country, allowing for further **skills transfers**.

Brazil has a vibrant biofuels sector and there may be an opportunity for **collaboration on developing South Africa's biofuel sector**, including advancements towards jet fuel.

[121] Interview with David van der Spuy of Petroleum Agency South Africa. Date 18 Feb 2021.

[122] Interview with Mbuso Xaba from Central Energy Fund. Date 19 Feb 2021.

[123] Companies include but not limited to these: BP Southern Africa, Chevron SA, Engen Petroleum, PetroSA, Sasol Oil, Shell SA, Total SA. Additionally, iGas, Egoli gas, Transnet, CNG Holdings, Renergen, Industrial Gas Users Association of Southern Africa.

[124] Interview with Mervin Chetty from Transnet. Date 26 Feb 2021.

[125] Operation Phakisa (2014). https://www.operationphakisa.gov.za/operations/oel/oilGas/Pages/default.aspx

[126] https://gasnetwork.csir.co.za/final-sea-reports/ Contact CSIR: Gas SEA Project Manager: Rohaida Abed; Gas SEA Project Leader: Annick Walsdorff. Email: gasnetwork@csir.co.za Telephone: 031 242 23 18

5.5 Summary of key opportunities

It is important to note that these opportunities must synchronise with the global transition framework of energy, as timing is important. SA's need for gas is now. The government's intent as stated by the DTIC a few years ago is to take a three phased development approach: (i) imported global LNG (ii) imported regional LNG and (iii) tap into onshore and offshore reserves.[127] Prospective timelines have been incorporated in the opportunities below regarding where foreign players can come in (these are initial draft sentiments).

Table 6: Summary of key opportunities

Opportunity for Foreign players	Type	Stakeholders to engage with	Prospective timeline for when the opportunity is needed
Supply of LNG to the country *(This is dependent on the gas market, which is very difficult to juggle. May not be the ideal opportunity for Brazil)*	Trade of goods and services	• Coega Development Corporation (CDC)	Short term (within next 5 years)
Supply machinery and equipment in Upstream and Midstream sections e.g. providing deep-sea stabilisers for undersea pipelines	Trade of goods and services	• Oil and gas companies	Short to medium term
Companies can sign investment agreements to develop the Saldanha IDZ	Trade of goods and services / Capital investment and infrastructure builds	• Saldanha Bay IDZ	Short term (within next 5 years)
Opportunities for foreign engineering companies/teams to partner with South African government to service oil rigs	Services /R&D tech skills transfer	• Saldanha Bay IDZ	Short term (within next 5 years)

[127] Energy Indaba conference 2021.Gas forum discussion: *Developing a robust gas pipeline network for Southern Africa.*

Opportunity for Foreign players	Type	Stakeholders to engage with	Prospective timeline for when the opportunity is needed
Capital investment for infrastructure for inland pipelines to expand/establish a reticulated natural gas network. *(Brazilians would need to determine what these companies' plans are)*	Capital investment and infrastructure builds (downstream)	• iGas • Egoli gas • Transnet • CNG Holdings • SASOL Gas • Industrial Gas Users Association of Southern Africa	Medium to Long term (5-10 years)
Capital investment in infrastructure for gas extraction *(Brazilians would need to determine what these companies' plans are)*	Capital investment and infrastructure builds (Upstream and midstream)	• Total • Related IDZs • PetroSA	Medium to Long term (5-10 years)
Capital investment for exploration (drilling of 30 wells – to tap into gas reserves)	Capital investment and infrastructure builds (Upstream)	• Invest SA • Petroleum Agency South Africa (PASA)[128]	Medium to Long term (5-10+ years)
Capital investment for infrastructure for regional pipelines	Capital investment and infrastructure builds (downstream)	• Follow developments on SADC regional gas masterplan	Long term (10 -15 years)

[128] PASA has a data portal on their website where companies interested in investing can look at and assess the opportunities.

Opportunity for Foreign players	Type	Stakeholders to engage with	Prospective timeline for when the opportunity is needed
Partner with potential R&D Energy labs (yet-to be created) **Contribute to gazetted public comments of CSIR Lab Reports**	R&D opportunities	• CSIR	Short term (within next 5 years)
Collaboration on developing SA's biofuel sector	R&D opportunities	• CSIR	Short term (within next 5 years)
Selling of crude oil	Trade of goods and services	• Refineries in the country (highlighted in Figure 5)	Short term (within next 5 years)
Selling of refined oil	Trade of goods and services	• SAPIA • Oil wholesalers and retailers e.g. BP Southern Africa, Chevron SA, Engen Petroleum, PetroSA, Sasol Oil, Shell SA and Total SA	Short term (within next 5 years)

6. Chapter 6: Conclusion and recommendations

The consultants recommend that the Brazilian government and private sector partners enter consultations with the South Africa's Department of Mineral Resources and Energy on the abovementioned opportunities. This will allow Brazil to gauge close-up the extent of the opportunities available in the country, and to uncover the necessary stakeholders to begin direct engagement.

Additionally, approaching the various stakeholders mentioned in Section 5.5 (summary of key opportunities) of this report, will allow the Brazilian government and private sector partners, to assess the plans of the companies working within the sector; and form a clear strategy as to how they can participate and invest in the sector. There are several oil and gas events in the country and region such as the South Africa Oil, Gas and Energy Summit held in June 2021 that shed further insights and provide essential networking opportunities for external players.

As highlighted, there is a timing issue with global developments regarding gas as an energy source. Gas has an immediate opportunity within the next 5-20 years; and beyond that it gets hazy, due to global greener developments and policies. Policy windows for investors are also closing for developing countries, and developing countries may be caught in between and become subject to developed-countries' policies around renewal energy sources. Therefore, there is an immediate opportunity for natural gas in the South Africa market for the Brazilian government and companies.

With regard to biofuels, South Africa has not yet formulated a very clear strategy in terms of development and utilisation of the various sources. There is an opportunity for Brazil to share its experiences with South African stakeholders and to develop a strong bilateral engagement that would be mutually beneficial. There seems to be an openness to growing this sector and to working with trusted partners to develop options.

Finally, an ongoing bilateral engagement around R&D and scientific and technological exchange would be well-received – especially given frustrations and delays in off-shore developments. Scientific dialogues involving partners who have been through some of the technical issues currently experienced by the relevant South African government and institutions would likely provide the support required to make the best policy moves.

7. Internal Annex

7.1 Annex 1: List of key stakeholders consulted

The following list comprises people who the team has already interviewed in the first phase of the study. Their views are expressed within the document.

Organisation	Name	Designation
Petroleum Agency of SA	David van der Spuy	David van der Spuy: Acting General Manager: Petroleum Resources Management Division / Geologist
Central Energy Fund	Mbuso Xaba	CEF Alternative Energy Project Manager
National Department of Trade, Industry and Competition	Phillip Ninela	Deputy Director: Green Industries
Department of Mineral Resources and Energy	Vania Mahotas	Deputy Director: Petroleum Regulation
South African Petroleum Industry Association (SAPIA)	Kevin Baart	Head - Strategic Projects
Transnet	Mervin Chetty	General Manager Africa
DMRE	Stella Mamogale	Midstream Gas regulations
Petroleum Agency of South Africa	Tebogo Motloung	Manager: Licensing and Legal Compliance
Appload Africa (Mozambique)	Claire Hassoun	Director
EDSE Team	Nigel Gwynne- Evans	Leader (Oil and gas experience)