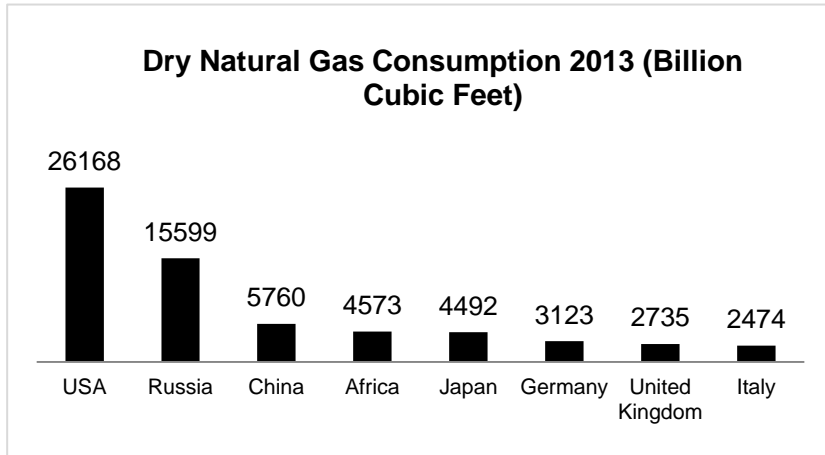




Insights into the Natural Gas Market in South Africa

Where Does Africa Rank Globally in terms of Natural Gas Consumption?



Source: EIA; Worldometers

The True Size of Africa

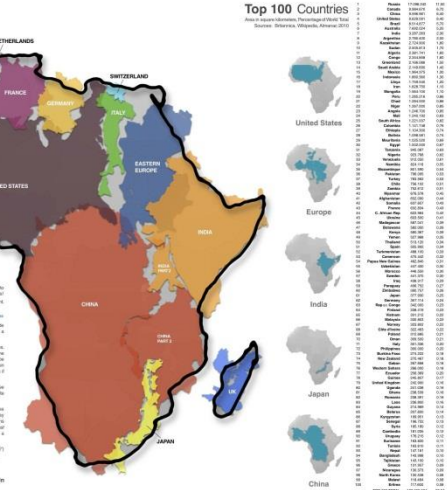
A small cartoon in the left margin reminds us that, in addition to the well known social issues of illiquidity and immaturity, there also should be such a concept as "overmapping", meaning, insignificant geographical knowledge.

A survey with random American schoolkids let them guess the population and land area of their country. Not exactly surprising, but still rather surprising, the majority (how "a billion" and "larger in the world") respectively. Even with random European college students, geographical estimates were often off by factors of 2-3. This is partly due to the high density nature of the predominantly used mapping projections (such as Mercator).

A particularly extreme example is the worldwide misperception of the true size of Africa. This might change when to embody the massive scale, which is larger than the USA, China, India, Japan and all of Europe - combined!

COUNTRY	AREA (x1000000)
USA	3.633
China	9.573
India	3.287
Brazil	8.514
Russia	17.095
France	633
Spain	506
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	324
Italy	302
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	144
Denmark	132
TOTAL	30.102
AFRICA	30.221
Just for Reference: The Surface of the MOON	37.690

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Source: Kai Krause <https://agenda.weforum.org/wp-content/uploads/2015/11/ccsr5od.jpg>

As shown in the graph above, in 2013 the African continent consumed 4,573 billion cubic feet of natural gas falling well behind the United States and Russia, but only slightly behind China. Japan and several European countries consumed just less than the entire African continent showing an opportunity to increase the reach of natural gas as a power source.

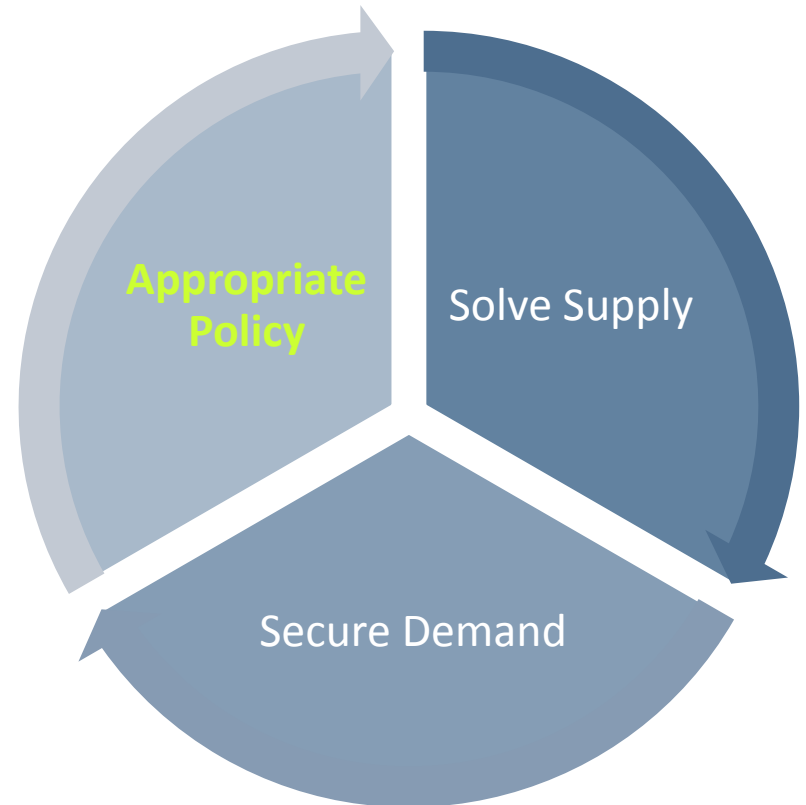
The image on the right was composed by Kai Krause and shows visually and to scale the true size of Africa relative to several other countries in the world. This representation communicates the opportunities that are available for Africa to harness native natural resources for the good of the continent, rather than selling African resources to other countries enabling their growth and prosperity.

Hurdles to the Development of the Gas Sector in South Africa

Despite the large opportunity for natural gas to improve its footprint in South Africa, given the government's commitment to diversifying the energy mix away from coal, there are still several hurdles in the way of this being achieved.

The three hurdles discussed in this report include:

- The lack of appropriate supporting policy in place
- The issue of securing a stable and reliable supply of natural gas
- The level of demand for natural gas must be established



Appropriate Policy

Current State of Affairs

There is currently policy in place to support the gas concern. However, it is still more than it should be in order to encourage investment into the sector.

Gas was featured in the **IRP 2010**. However, the South African Economy has not performed as predicted in the document and given the number of years since its release, it is less able to address the current context.

The Gas Utilisation Master Plan (GUMP) is currently being finalised by the Department of Energy and is supported by the IPP office.

Many have questioned why this document has not yet been released and that if it had been released several years ago, that the sector would be mature today.

Gas Utilisation Master Plan

The reason for the delay is the complexity of the landscape and the diverse nature of stakeholders. The needs of these very different participants in the sector must be considered and addressed by the policy, and getting their input and feedback takes time.

It is hoped that GUMP will provide guidance on the following:

- Framework for the investment in gas infrastructure
- The role of gas in the South African market
- The regulatory environment, government commitments and economic prediction.
- Demand, supply, market structure, industry organisation, environmental risks, financing and social impacts

Source: DOE; Parly Report SA

Appropriate Policy (continued)

The Role of the IRP 2010 Document in the Success of the REIPPP

Although relatively out of date for gas, the IRP 2010 document played a fundamental role in the success of the Renewable Energy IPP programme.

It is expected that the GUMP document will do for gas, what the IRP 2010 did for renewable energy, and more.

Noteworthy Achievements

- Over 90 projects were launched within a decade resulting in South Africa being one of the top renewable players in the world. It has created a new sector, resulting in innovation and collaboration between researcher, designers, developers and financiers.
- It stimulated the production of technology within the country resulting in job creation, improved skill sets and increasing export revenue.
- The programme has resulted in providing exposure to a wide range of tech types and a diversity in the energy mix of the country.
- The nature of solar and wind energy allows for divergence from economic hubs In favour of suitable weather conditions resulting in previously under developed areas to benefit from economic expansion.
- It has assisted South Africa in developing a global brand.

Appropriate Policy (continued)

Given the support of the IRP 2010 document, the REIPPP programme has achieved many successes since its inception, some of which are mentioned on this page:

6,376 MW
power
procured from
over 90 IPPs

92.1% of
government
target for RE

2 GW
connected to
the national
grid

RE share of
installed
capacity
grown from
0%-5% in five
years

SA is the
biggest wind
energy
producer in
Africa

In the top ten
globally for
with largest
installed utility
sized solar
PV capacity

Wind and
solar energy
has had a
R800 million
net benefit on
the economy

Reduction of
7 million tons
of CO₂

Country
brand
development

R19.2 billion
committed
towards
social
economic
development

23 000 job
year
opportunities
to date

R53.4 billion
in FDI and
financing to
date

Source: Engineering news

Appropriate Policy (continued)

What does this mean for gas?

The REIPPP programme has proven the case for having appropriate policy in place in order for the sector to develop quickly and successfully.

The opportunities for gas are even greater as:

It can be used to support base load power

It is more affordable than most fuel types on offer in South Africa other than coal

It does not depend on weather conditions for performance

It can be switched on and off with little associated effort and cost

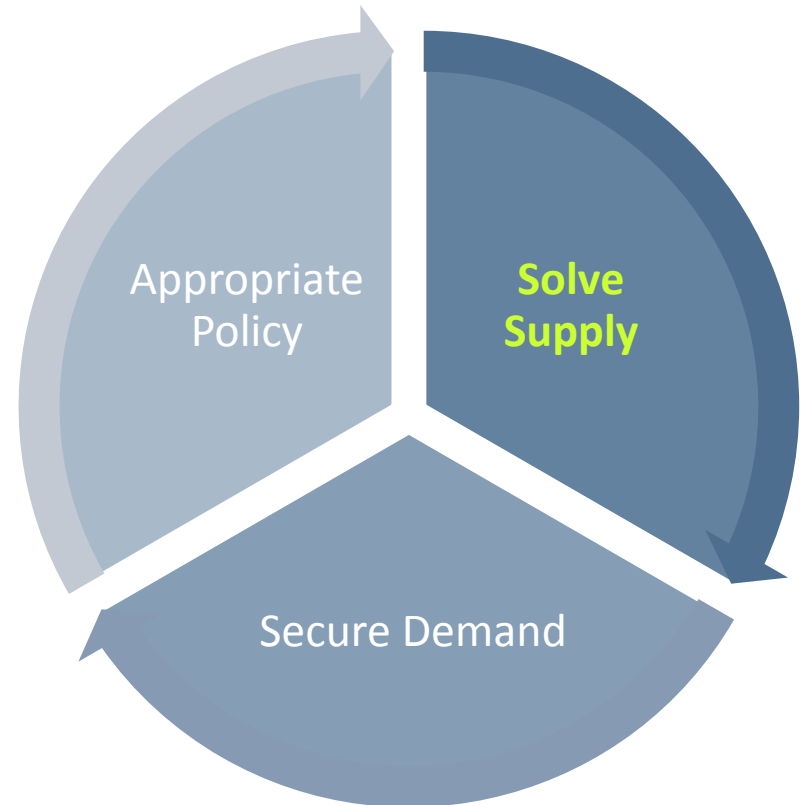
It is ideal for both primary and backup power

Hurdles to the Development of the Gas Sector in South Africa

The second hurdle to address is the question of where natural gas will be sourced. Typically natural gas is either:

- Harvested from local reserves
- Imported from other countries when no existing natural reserves are available

When imports are necessary the question of whether to buy from neighbouring countries or the international market must be addressed.



The Supply of Natural Gas:

Local shores

The first logical step in sourcing natural gas is to consider local reserves.

Unfortunately South Africa does not house meaningful conventional supplies and the existing supply is coming to an end and used primarily by PetroSA.

The country does have large shale gas reserves; however, these are still unproven and remain an estimate.

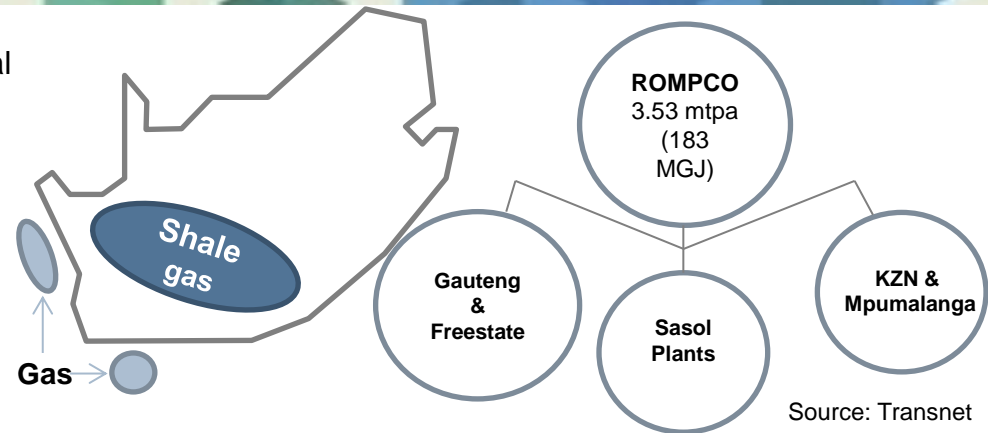
As shown in the graph South Africa has a higher demand for natural gas than what the country can produce resulting in the need for imports.

Sasol is the sole importer of natural gas. The gas is imported from Mozambique along the ROMPCO pipeline.

A total of 183 MGJ is brought into the country, of which:

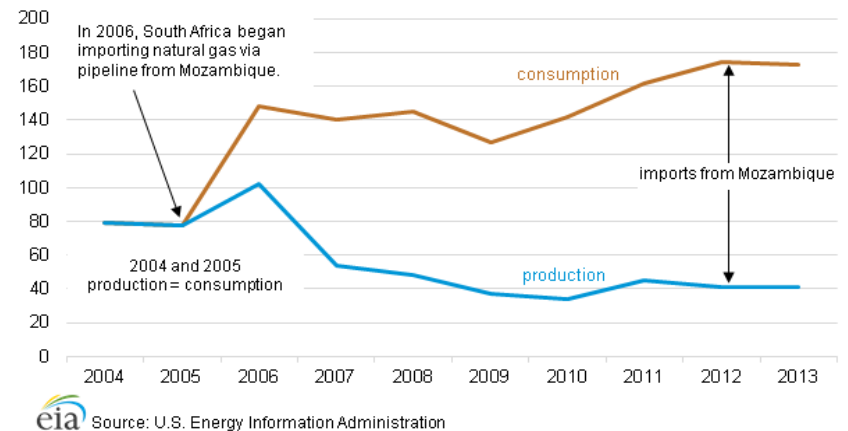
- 93 MGJ is distributed to the Gauteng and Freestate area
- 77 MGJ is used in Sasol internal operations
- 16 MGJ is distributed to the KZN and Mpumalanga area

Sasol is in the process of expanding its pipeline and as a result, these volumes are likely to increase.



Source: Transnet

Figure 5. South Africa's natural gas production and consumption
billion cubic feet



Source: Transnet Soc Ltd, LTPF 2015; AT Kearney ; EIA

The Supply of Natural Gas:

Africa

Total marketed production in Africa in 2014 was 212,341.7 million standard cubic metres.

Three of the large natural gas producing countries are within close proximity to South Africa, so sourcing from these countries would be ideal. However, the sale of natural gas is likely to adopt an economic business model rendering South Africa vulnerable to unfavourable and fluctuating exchange rates. This could result in these reserves not being available as an option.

Some of the reserves within these producing countries have already been contractually allocated to other countries, rendering them unavailable to South Africa.



The Supply of Natural Gas: Global

Total world marketed production is approximately 3,566,249.3 million standard cubic metres and the major suppliers are shown in the image above as being North America, Eastern Europe and Eurasia as well as Middle East.

Global prices for natural gas have dropped due to the increased volume of supply experienced. As a result, the price point has been favourable to South Africa.

As shown in the graph, natural gas is competitively priced in South Africa relative to other fuel types, beaten only by coal.

As a result in the short term South Africa is likely to source Liquid Natural Gas (LNG) from the global market.

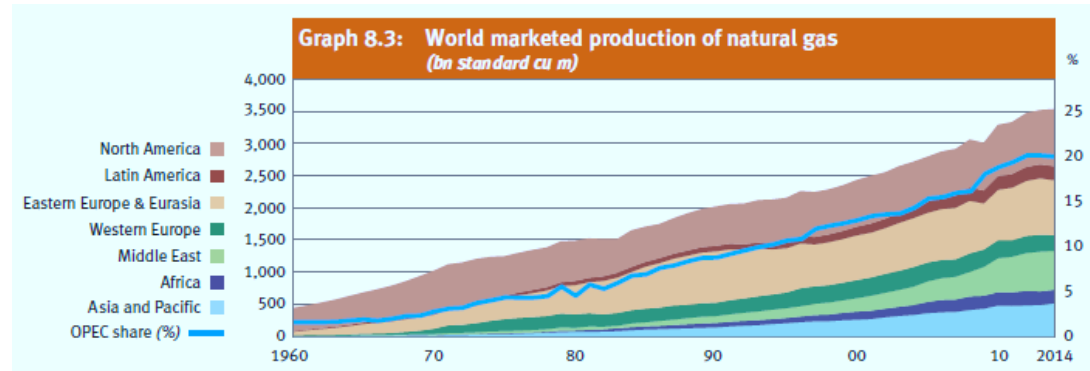


Image source: OPEC, 2015

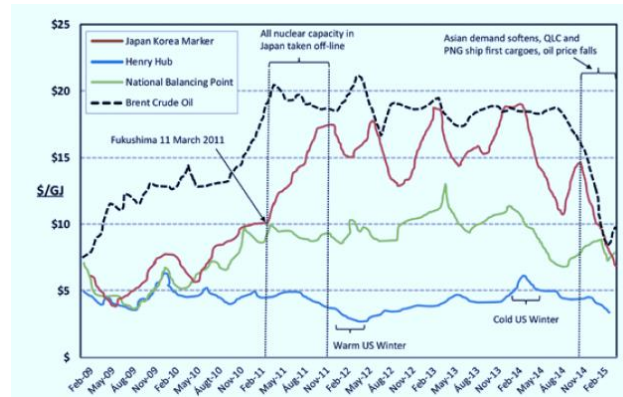
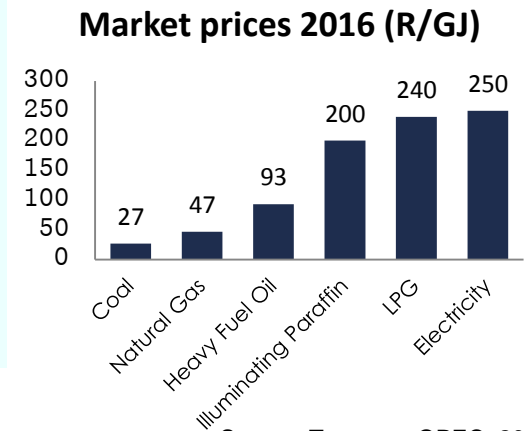


Image source: Transnet Soc. Ltd, 2015



Source: Transnet; OPEC, 2015

Obstacles to Establishing a Gas Sector in South Africa



Once a stable supply of natural gas has been secured, there are various other obstacles to landing the gas in South Africa. Some of these are:

- South Africa experiences an abundance of low-cost coal that will out price natural gas in virtually every context.
- If the nuclear projects planned by government come on line there will be far less scope for gas in the market.
- In order to secure a stable supply of gas, an anchor client must be proven. However, to secure an anchor client, proof of a stable supply of natural gas must be supplied.
- Converting existing operations to be powered by gas will entail high development and switching costs.
- There is limited existing gas pipeline infrastructure in the country.
- The country has no LNG import terminals.
- There is no regasification plant infrastructure in the country.
- The level of competition found in the existing market is extremely low.

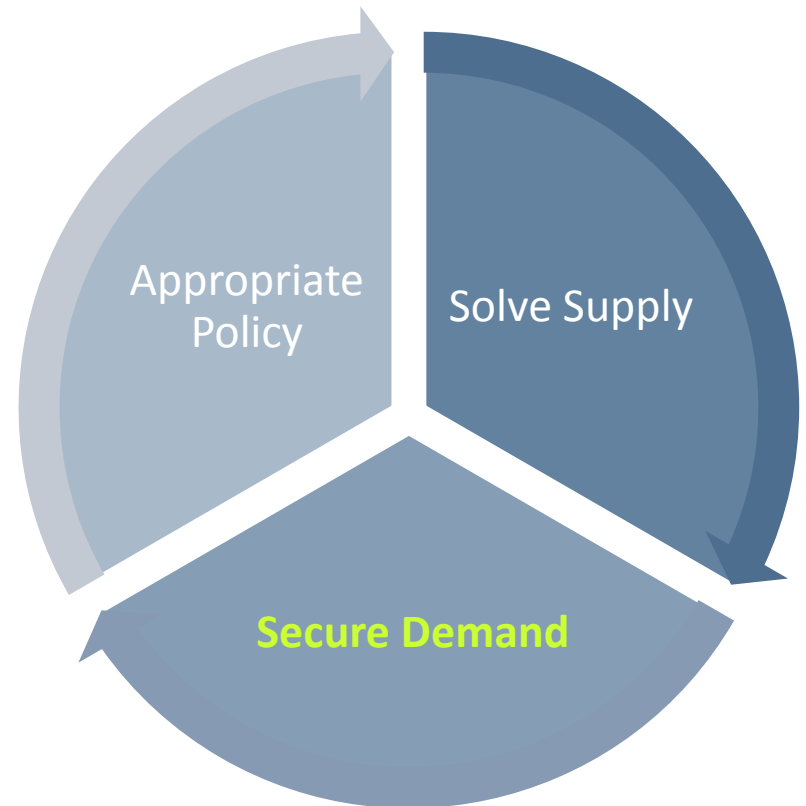
Demand

The third hurdle to address is the question of whether or not there is sufficient demand for natural gas in South Africa.

The uptake of natural gas in South Africa will entail investment in the relevant new infrastructure as well as converting existing operations to be powered by natural gas. If the gas is piped then a big portion of the large industrial energy consumers in the country are likely to convert their operations to facilitate gas. However, if the gas is not piped and a virtual pipeline is adopted, then the residential, commercial, and automotive sectors are most likely to be the major uptakers.

Competition within the Existing Market

Sasol is the only supplier in the market at present. The company is an established participant and its existing clients are unlikely to look to other sources of gas as security of supply is a major concern and the price point offered by Sasol's piped gas cannot easily be beaten.



Demand (continued)

Does South Africa Need More Power?

- Electricity demand is falling and is lower than it was 10 years ago.
- Electricity consumption and GDP are less correlated as the country is becoming more energy efficient as a result of increased electricity prices.
- The South African economy is changing with high intensive users such as smelters and mines disappearing in preference to the services sector such as call centres.
- The forecast presented in the IRP 2010 needs to be revised.
- The new coal power stations Medupi and Kusile are going to add 9.6 GW and Ingula will add 1.3 GW.
- Dedisa and Avon peaking plants will add 1 GW as ordered by the DOE.
- Contracted co-gen and coal IPPs will each add 1GW with more planned.
- Over 90 RE IPP projects adding 6,347 MW albeit intermittent and possibly complemented by gas power already allocated 3 GW to the Gas IPP programme.
- 2.5 GW has been negotiated from Inga 3
- The service sector is currently the greatest user of power in South Africa, a big change from the mines and industrial participants.

Source: Bdlive: Anton Eberhard UCT

Opportunities and Risks

Opportunities

- Infrastructure throughout the value chain is needed and associated markets that feed into that
- Availability of turbines at Eskom power plants can be powered by gas.
- Possible reticulation hubs along coastal areas

Risks

- Interplay with nuclear plants is a big risk. If government backs nuclear plants then the gas sector will suffer as a result
- Everyone is sitting back and waiting, no one is taking the first leap of faith in the vacuum of limited policy in place
- Industry is built on a coal backbone, hence it has the infrastructure for coal but not gas
- The market is not currently diversified from a stakeholder point of view making market entry complex
- Global LNG prices are linked to the oil price which brings uncertainty
- Purchasing gas on the global market exposes participants to exchange rate risk