

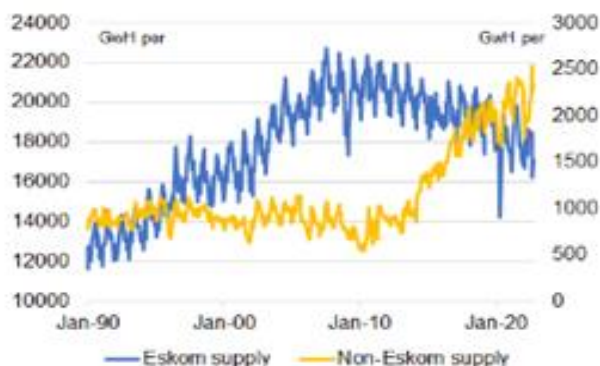
Loadshedding – who will benefit from the crisis?

A great business idea can best be described as lots of willing buyers and unsatisfied demand. These ideas are typically difficult to find, and a R40bn+ revenue pool of demand is a seductive opportunity. In addition, what makes this R40bn revenue pot attractive is above average margins, depending on who you sell your power too. The recent Bid Window 6 closed with solar power prices coming in at less than 50c/kwh with the Joburg City Power selling this power at R2.36/kwh on step 1 going up to R3.09/kwh on step 3, (Business paying R4.07kwh) that's an impressive margin, but the sun does set every day. Gas is the obvious answer to back up cheap solar power and I highlight a number of sources of gas below.

Eskom has capacity to produce 47 145MW with demand at 29 400MW (add another 2000MW for reserve margins) and production floating around the 25 000MW level. Eskom's revenue for 2022 was R246.5bn with EBITDA at R52.4bn, a healthy 21% margin if it wasn't for the massive overspend on capex and the debt. The coal companies privately tell us one of the biggest problems is the higher quality coal for Eskom is being stolen and trucked and railed out for export due to the massive pricing difference (c.R450/t to Eskom versus c.R3400/t FOB Richards Bay) . This leaves Eskom burning low quality coal and rock which is substituted in the trucks crossing the weighbridge. This low-quality coal and rock not only doesn't burn, but clogs up the boiler tubes which is why the number of breakdowns is so high.

No power source can compete with solar on both pricing and speed of implementation. We know from discussions with one listed company who have rolled out multiple solar projects (importantly without batteries) that the payback on a solar panels and inverters is three years. Thereafter the power comes at very little expense and becomes earnings enhancing, and possibly a profit center. This payback period will be accelerated if the Cape Town feed-in tariff is rollout across South Africa. More below on this issue.

Exhibit 6: Private sector power generation has been growing steadily off a low base ...



Source: STATS SA, Thomson Reuters RMB Morgan Stanley Research

Exhibit 7: ... and it should pick up more substantially in 2023 given the increase in NERSA registrations for power generation



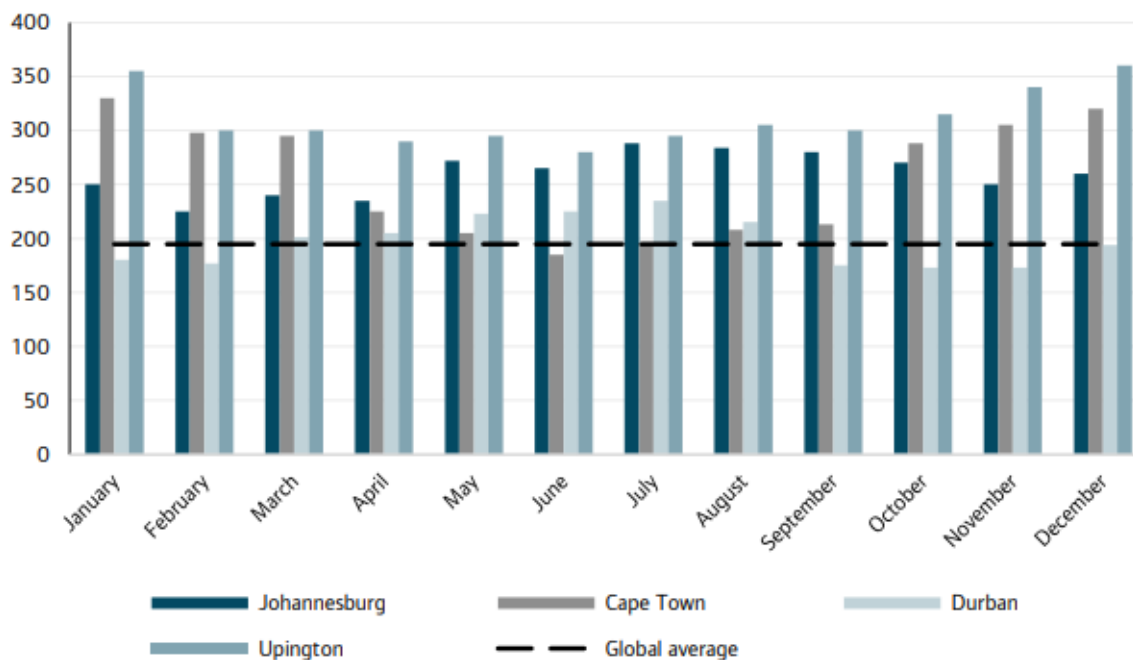
Source: NERSA, RMB Morgan Stanley Research

The best solar production sites are in the Northern Cape, but the national grid is at capacity moving from east to west. At the same time the grid on the eastern half of South Africa has lots of surplus capacity. But this hasn't stopped NERSA approving 398 projects amounting to 1659MW of large solar projects with 14 of these projects above 50MW for 2022. Many of these projects are mini grid systems where production and consumption are positioned close together. Importantly regulatory approval has been reduced significantly recently which makes tracking installed power that much harder.

The South African Photovoltaic Association (SAPVIA) highlights 2200MW have been signed up by Eskom as IPP's with the latest round (REIPPPP round 6 at 860MW) still needing to be built and connected in the next few months. Industrial projects are estimated to deliver over 9000MW in the next three years. Residential installations are difficult to gauge as they require no approvals and there is an army of installers undertaking these projects, SAPVIA estimate 1500MW to 2250MW are installed on residential roofs with recent "solar as a service" companies saying they are receiving 1700 to 2100 new applications per day with 75 to 100 installations per day.

The graph below from Standard Bank research shows the Northern Cape and Gauteng significantly ahead of global average sunlight with Cape Town and Durban suffering from more cloudy conditions. Fortunately, the coastal cities have access to offshore wind which I discuss further below.

Figure 23: Monthly hours of sunlight – Notable SA locations vs. global average



Source: www.climate-and-weather.com; www.currentresults.com, SBGS analysis

Most residential solar installations will have surplus power which is available to feed back into the grid. This method is called a "feed-in" and resolved the Vietnamese power crisis in almost 18 months. Vietnam offered a Feed-in tariff of c.R1.60/kwh and planned for 850mw, but the price was so good Vietnamese households instead delivered 16500mw, far surpassing governments targets. As of the 24th of January 2023, the South African government has allowed a feed in tariff which the city of Cape Town jumped at publishing the advert below. The feed-in tariff is R1.04/kwh which is fantastic for both parties considering the City of Cape Town can sell that power at R3.15/kwh to residential customers. How many businesses do you know who operate on 67% gross margins!

Several companies offer a rental system for solar installations. I would suggest investigating who owns the feed-in revenue stream if you are signing up for one of these services. Outright purchase using bank finance may be a better solution when feed-in income is added.



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CAPE TOWN TO PAY CASH FOR POWER DIRECTLY FROM BUSINESSES & RESIDENTS.

- ✓ Businesses can sell power by June, residents within 2023
- ✓ Feed-in tariff: 78,98c/kWh + 25c incentive per kWh
- ✓ No Net consumer requirement - sell as much as you can

BE PART OF THE ENERGY REVOLUTION
INSTALL A CITY-APPROVED GENERATION SYSTEM.

Another interesting opportunity utilized internationally on a larger scale is landfill gas to electricity. The newer legislation class B-liner landfill sites, which Interwaste was the first to use at their wrongly maligned Midrand site, are highly methane producing with Interwaste's Midrand site venting 11 tons per day of methane. This is the very successful business model of JSE listed Montauk. An opportunity exists to place power generation units at both the Midrand and Delamas Interwaste sites that utilize the B-liner technology where the gas is currently flared. South Africa has 860 landfill sites but the vast majority are not lined which retards the production of gas as much of the water leaches into the soil.

We have identified four companies that are best positioned to exploit the R40bn opportunity.



Reunert, a company we hold across portfolios, has several divisions involved in power components and services and is by far the best positioned to deliver immediate power solutions to companies not only seeking relief from loadshedding, but a cheaper source of power.

- African Cable and Zamefa manufacture copper cables used to interconnect large wind turbine farms and smaller solar cables used behind the solar panels. Look behind solar panels at the quantum of cables required to interconnect the panels.

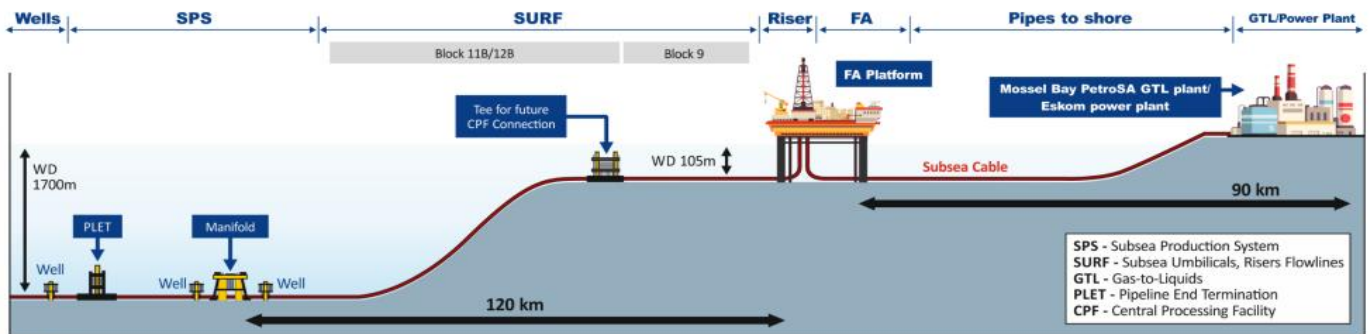
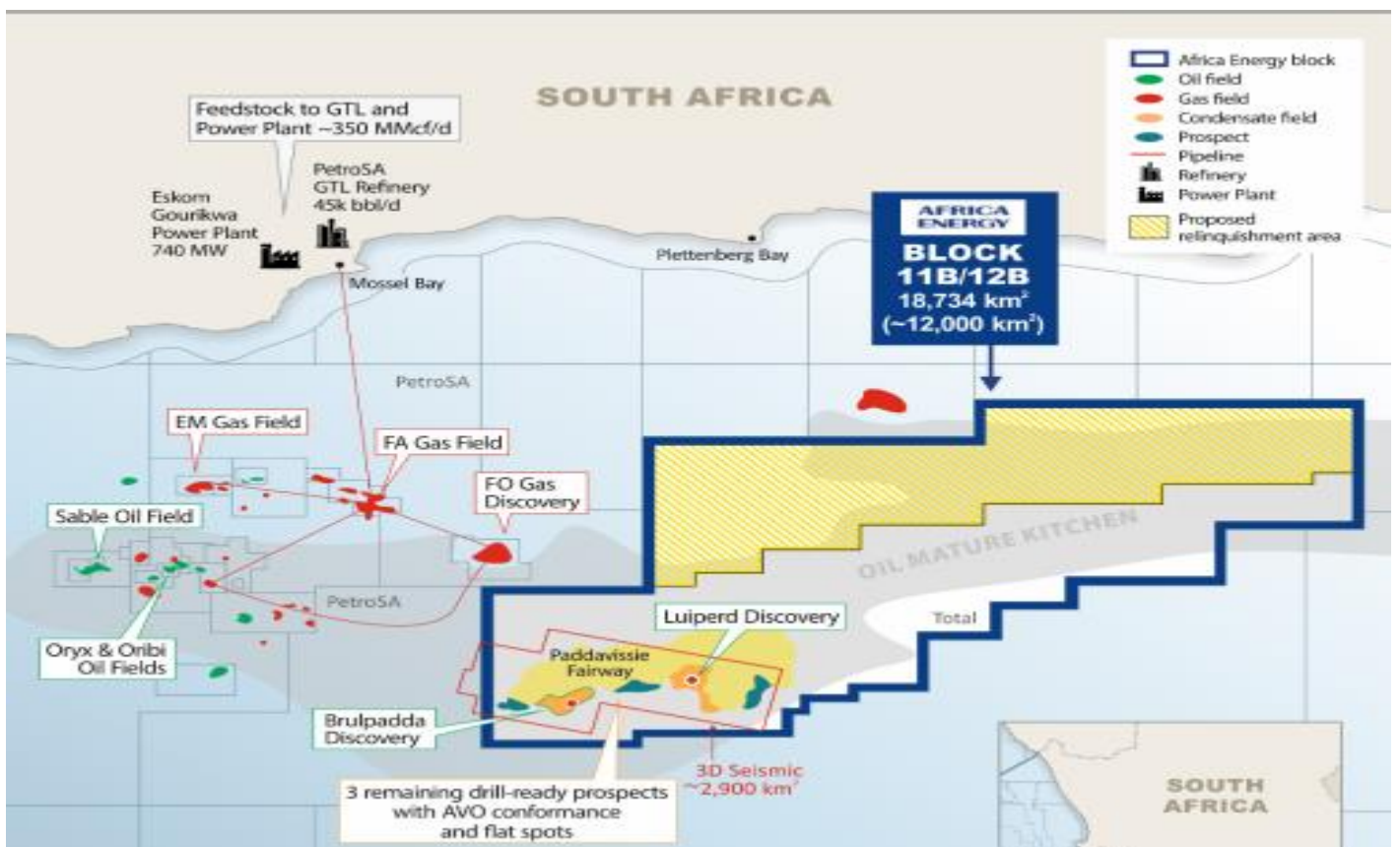
- CBI (Circuit Breaker Industries) manufacture circuit breakers used in your DB box. CBI manufacture 8000 of these circuit breakers per day of which the bulk are exported to the USA and Australia. CBI have recently launched circuit breakers with a blue tooth capability which allows intelligent software control of a company's power consumption by shaving the peaks and limiting loads during peak pricing periods.
- BlueNova manufacture and assemble lithium-ion battery packs up to 1mw. These very large batteries provide power during peak pricing and recharge during off peak pricing. In addition, they manage power spikes on machine startups (Industrial customers are not charged for consumption, but rather their highest peak demand).
- Terra Firma build and install solar power projects. Terra Firma has 19 teams installing 60mw with further teams outsourced as demand continues to increase.
- Lumika Renewables is a JV between Reunert and the AP Moller family (owners of the shipping company Maersk). Lumika will design, build and finance renewable power solutions with a medium-term target of 450mw.
- Apollo Energy is one of four power wheeling companies in South Africa who provide offtake agreements to private power generating companies using either solar, wind or hydroelectric. Wheeling is done by way of a "credit pass through system" with the industrial user invoiced by Eskom. The Eskom grid is only constrained when moving power from the Northern Cape (our best solar radiation) towards Gauteng. All other networks within the country have excess capacity and Eskom earn a fee from wheeling this power between private power generators and consumers.
- Nashua distribute, finance and invoice 45 000 businesses across South Africa for office equipment. They have now added solar packages and installations to the suite of services with 10 to 15 installations being done per day.



Hosken Consolidated Investments Limited

Another interesting company with several power projects is HGI. The company have a 10% ownership in the Karoshoek Concentrated Solar Plant but more important is the Block 11B/12B (Brulpadda and Luiperd discoveries) and the Venus 1 discovery in Namibia.

The Block 11B/12B is estimated at 5 TCF (Trillion Cubic Feet) of gas which makes it a very large find. The production license was submitted in September and much of the infrastructure already exists from the old PetroSA gas fields in the Mossel Bay area. Annoyingly the regulator wants 18 months to make a decision (surely they also get loadshed?) which hopefully with some public pressure could be speeded up. This will allow gas to flow to Eskom Gourikwa power plant at Mossel Bay and allow for 24hr power production against the current usage of peak periods using diesel. In addition, the gas will allow PetroSA to restart the diesel GTL plant which will remove some of the pressure off the diesel supply chain. Phase 2 will see a new pipe laid into Port Elizabeth to supply the Dedisa Peaking Station with gas. Natural gas is typically priced at 13 to 14% of the price of oil. Access to gas for Eskom would be a huge financial saving allowing for longer operations.

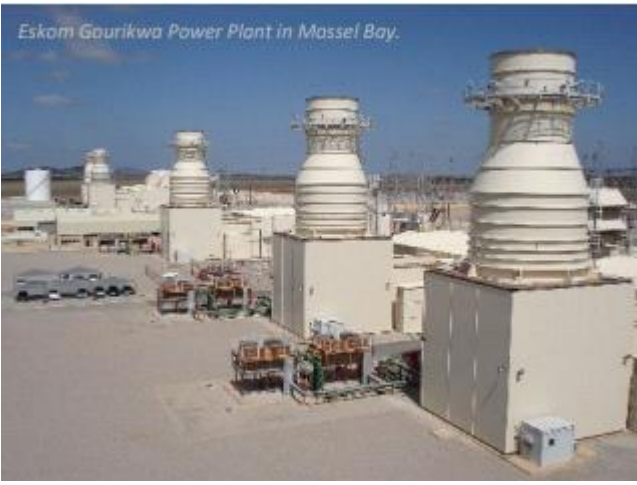


Africa Energy is a small component of HCI, by far the bigger asset is the 10% holding in the Venus-1 well with lead partners Total Energies and Qatar Petroleum. This field is estimated to hold between 4bn and 15bn barrels of oil and could be the largest offshore oil find ever, we will know the exact numbers by mid-2023. Why this field is relevant to our power solutions is the field has an estimated 5 to 10 TCF of natural gas. Total Energies has a no-flare policy on gas so the gas either needs to be injected back into the well (this could be a temporary solution), or piped to shore to be converted into LNG (it will take 5 years at least to build a large LNG plant), or piped to shore to generate power in a series of large gas turbines (a quick and profitable solution). This would turn Namibia into a large power exporter supplying the Southern Africa Power grid. Final Investment Decision (FID) is expected in 2024 with first oil in 2027.

Standard Bank estimate the capex on the two giant oil & gas fields in Namibia to be an estimated USD48bn with 11 wells drilled in 2023 from 3 oil rigs. HCI don't have the capital available to follow their rights and have their holding in Venus up for sale, we expect the sale to be concluded in 2024. This sale is expected to be in the range of R13bn which is not reflected in the current share price.

Eskoms 740mw plant which will be converted from diesel to Brulpadda gas. This will allow the plant to be run for longer periods at significantly lower costs, estimated at 14% of the cost of diesel.

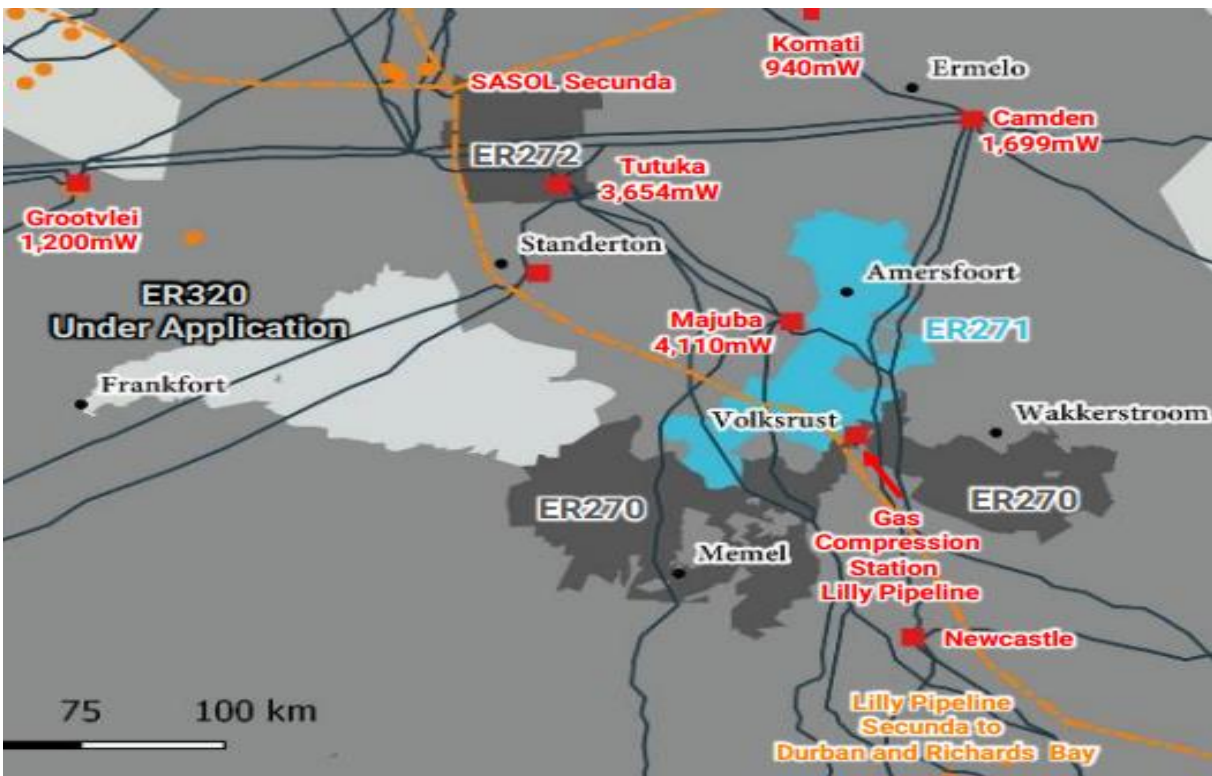
Eskom Gourikwa Power Plant in Mossel Bay.



The next possible beneficiary is ASX listed Kinetiko Energy. They have an estimated 4.9 TCF of gas in the Amersfoort, Volksrust area. Kinetiko have drilled 24 core wells in the ER271 block, each intersecting gas, they are moving the first five well cluster to production in early 2023. Importantly the gas fields are close to Sasol's Secunda complex, Majuba Power station, with several Eskom distribution lines running overhead as well as the Lilly Gas pipeline running through the property that can carry gas to Richards Bay and Durban.

Kinetiko Energy are installing a 1mw power plant at present as a trial and wheeling the power to a client across the Eskom network.





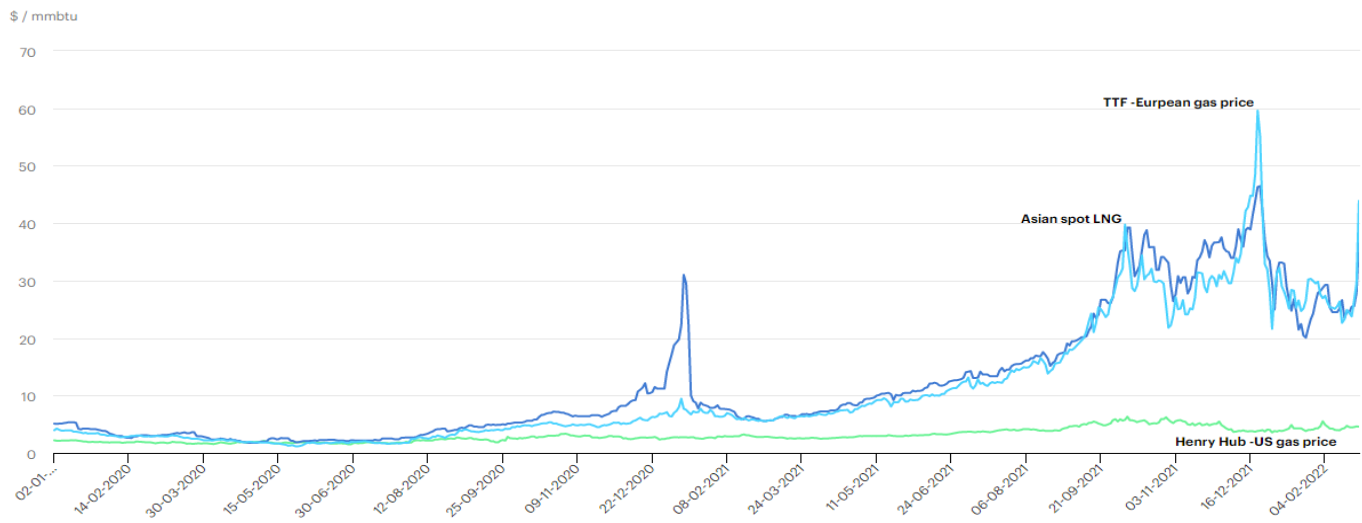
RENERGEN

Renergen have completed phase 1 of their Helium and LNG plant and will start construction of phase 2 in 2023. Helium is the primary output with a by-product of LNG available for industrial use in South Africa. Renergen currently supply Itatile and Consol Glass with LNG and have one major trucking company converting their diesel trucks to run on 30% cheaper LNG.



Renergen is planning on increasing LNG production from 894k Giga Joules to 9.8m GJ with the startup of phase two. Much of this LNG will likely end up in the diesel trucking industry with capacity available for power solutions. Renergen are in the early stages of planning a 350MW plant which will supply peaking power to back up solar capacity. This combination of solar during the day and gas at night can deliver electricity at a very competitive price of R1.30kwh.

Importantly they will have significant LNG capacity for other industrial customers. Reenergy have been able to achieve a very competitive price for the LNG at c.\$13.50 per btu against European import prices in the \$30's (but highly elevated due to the Ukrainian war), Japan at c.\$19/btu and the United States at c.\$3.30/btu

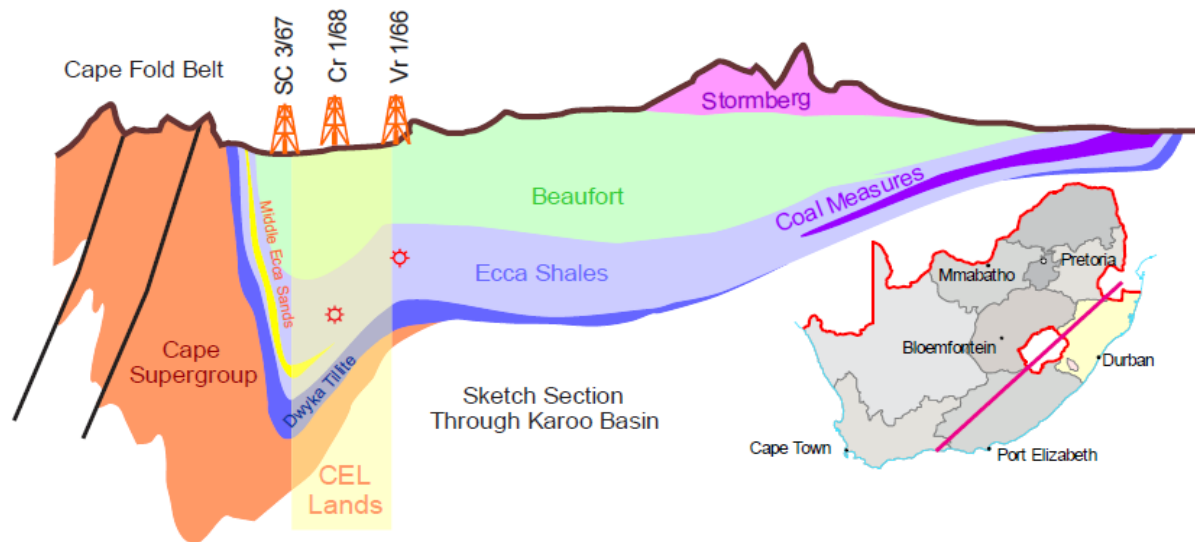


THE BANKS

Industrial scale solar projects cost c.R14m per MW with gas turbines at c.\$900 000 per MW (c.R15.3m). Standard Bank in a recent report believe the power market could result in R1 trillion Rand of addition borrowings representing 25% of system wide credit today. Banks in South Africa have for long battled with the lack of borrowing from companies who have very strong balance sheets and have largely de-gearred in a low growth economy. Taking a 3% to 4% interest margin on R1 Trillion from your higher quality borrowers is a dream come true for South African banks.

KAROO GAS

Another opportunity for power is the Karoo basin shale fields. The US Governments EIA estimated 390TCF of gas in the Karoo shale fields based on drilling done in 1968. With rapid technology changes in fracking technology several companies applied to explore the Karoo which sent Karoo landowners into panic (the resource is owned by the state and not by landowners as in the case of the US). Many allegations were thrown at companies and fracking as a method which highlighted the misunderstanding of the process. Fast forward a decade and various technical reports from universities and government research departments have been done which are designed to put peoples fear of fracking at ease (but won't unfortunately) and PASA is about to permit drilling in the Karoo again. Modern fracking uses nitrogen gas rather than water (with no chemicals as claimed) to access the shale beds which are 2500m below the surface with the water table at less than 100m. Many of the concerns are misplaced when you consider the success of fracking in the United States, the most litigious country on the earth. If one of the oil companies had polluted a US farmers land they would certainly sue.



- ▶ Fort Brown Upper and Middle Ecca shales are deep basin turbidites deposited in the foredeep of the rising Cape Fold Belt and are have a vertical thickness of 1,500 – 1,800 metres (5,000 – 6,000 ft)
- ▶ Basal Ecca Shales (Whitehill & Prince Albert formations) are high TOC marine and have vertical thickness of 110 – 150 metres (360 – 485 ft)

These latest research reports estimate 200TCF of gas with concerned farmers saying it's an unviable 13TCF. But keep in mind Mossgas was built on 1TCF of reserve and Sasol built their Mozambique operations on 3TCF. Either way the Karoo has lots of gas, its accessible, cheap and could power South Africa. But between nervous landowners and a government tied up in red tape of its own making it seems a distant possibility. A more determined government, looking for a quick solution, would access the gas.

KUDU GAS Field owned by BW Offshore, an Oslo listed company.

BW Offshore current development plan is to install a 420mw offshore jackup barge with transmission tie-in to the Namibian power grid. In addition gas would be piped to shore through a new 195km 12-inch subsea pipeline to Elizabeth Bay. This pipe could carry 130 MMcf/day to shore for power applications. Kudu is estimated to hold between 13TCF and 3TCF and sits on the continental shelf in shallower water compared to the giant Venus and Graff deposits in 3km water depths.

To cut through the jargon for a layman 1000mw of gas fired power requires 1 million tons per year of LNG which is equal to 150MMscf per day.

OFFSHORE WIND

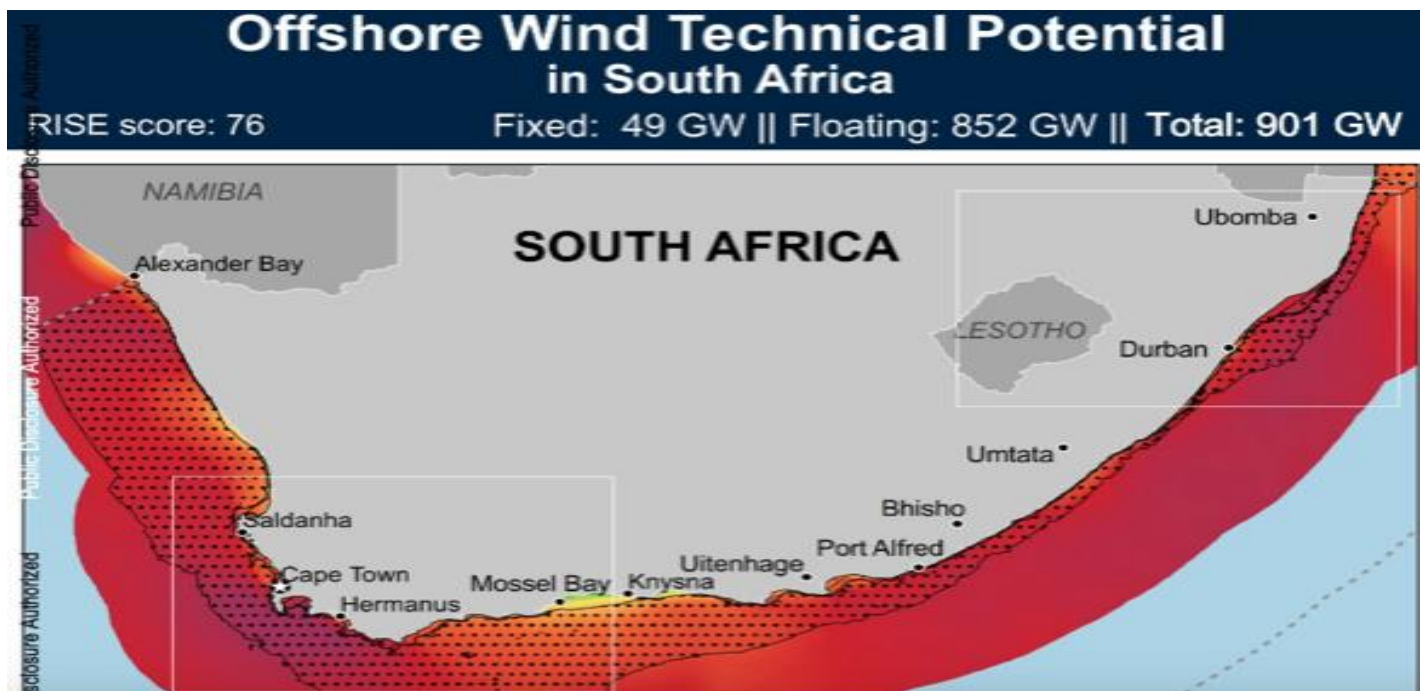
Offshore wind farms can provide South Africa with power to coastal regions where the resource is abundant. Four sites have been identified with the best wind.

Site 1 is located about 200 km off the eastern coast of Durban harbour, in KwaZulu-Natal; site 2 is located about 300 km south of Gqeberha, site 3 is located about 290 km south of Cape Town, and site 4 is located about 570 km northwest of Saldanha Bay.

The potential power output of all South African sites using a Siemens SWT-4.0-130 (4mw each) wind turbine is well above our current requirements. These turbines start generating power at 5m/s with our offshore winds well above 9m/s.

While site 2 is large, developing just 1% of the area still provides a potential 7500mw of energy, while site 1 covers a smaller area of 21 000 km², translating to 2000mw at 1% site development. The main challenge when creating offshore wind farms is the harsh environment. Large turbines have to be erected onto stable platforms, electricity has to be transmitted over large distances using undersea cables, which can lead to higher transmission losses, and installation and maintenance have to be conducted in harsher environments, compared to those associated with other energy technologies. However the advantage of developing offshore wind farms is that the wind speeds are higher than other energy technologies, which allows for an increase in capacity generation. Offshore wind turbines are relatively bigger than onshore wind turbines, as there is more space and wind in the ocean. In addition, the price is attractive at under 70c/kwh with capital costs of \$1.3m per megawatt.

This website [Global Wind Atlas](#) is a fun and interactive resource which shows ideal locations for onshore and offshore wind. For industrial users in places like Durban, where solar radiation is below average, you would expect larger power users to form consortiums to build, operate and own offshore power projects considering the significant pricing advantages. This could become a large opportunity for wheeling companies such as Reunerts Apollo Energy division.



KELVIN AND ROOIWATER POWER STATIONS

Kelvin Power Station in Kempton Park is on its third owner. The first owner ran the plant hard which ultimately led to the power station operating at 25% of design capacity. The second owners (two banks) allowed for significant maintenance which is why the third owner (PIC and private equity company Harith Partners) are now able to operate the plant at over 80% utilization. This story is interesting as it mimics the recent history at Eskom where generators were run hard with little maintenance and today we find Eskom output below 50% of available capacity. Kelvin exclusively supplies the City of Joburg with c.200mw at c.R1.13/kwh currently with the city consuming 3000mw. Kelvin is made up of two units of which only unit B is operational. Management have tried to refurbish unit A with new coal boiler technology only to be stopped by environmental groups opposed to coal, this has led management to plan a new 450mw gas power plant which requires 10pj of gas a day. But this plant is only likely to come into production in 2026 with the restraint being gas. This highlights the opportunity at Kinetiko, Karoo gas or possible LNG imports via Maputo or Richards Bay port.

The City of Tshwane owns the Rooiwal Power station with a design capacity of 300mw. Unfortunately, the power plant stands idle despite the lead political party in the Tshwane coalition trying to sell or lease the key asset. Clearly keeping your voters in the dark serves a purpose!

KEY TAKE AWAYS

- If you are relying on Eskom and politicians to fix the power problem, then you are the problem!
- Solar and Wind Power can be produced significantly cheaper than Eskom, but its intermittent and needs battery storage or gas backup.
- Gas is essential. Which management team best navigates the stupid environmental laws to deliver gas at scale? I believe this will be Kinetiko.
- Coastal regions will become more reliant on offshore wind in the longer term. This is likely to be done by pooling corporate power demand into long term power offtake agreements which allows for funding and construction of offshore power. Offshore wind power is plentiful and cheap.
- Electricity is privatizing fast. Don't underestimate the private sector in fixing the power deficit.
- Solar will start to ease Eskom's issues in the next 12 to 18 months and gas should become more widely available in the next 3 to 5 years.
- The most accessible electricity for municipalities will come from surplus feed-in from existing private solar installations. On a normal sunny day, most home solar installations have more than double the houses consumption.

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