

An aerial photograph of an industrial facility, likely a refinery or chemical plant. The image shows a complex network of large, cylindrical storage tanks and a dense system of pipes. In the foreground, there is a cluster of smaller, white, vertical tanks with flat tops, each equipped with a central access structure. To the left and in the background, larger tanks are visible, some with grey or white exteriors and others with reddish-brown roofs. A network of white and yellow pipes connects these tanks across the site. In the middle ground, there are several small, rectangular buildings, a yellow crane, and a white truck. The ground is a mix of dirt, gravel, and patches of grass. The overall scene depicts a large-scale industrial operation.

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# SOUTH AFRICA'S GAS-TO-POWER PROGRAM: WHERE IS THE GAS?

By Natalie Regoli and Brian Polley, Baker & McKenzie



After years of underinvestment and poor maintenance of its power plants while demand has grown, South Africa now struggles to supply enough electricity to its people and industries. Eighty-five per cent of South Africa's electricity comes from coal-fired power plants: infrastructure that is 30-35 years old and has become insufficient and unreliable. The economic consequences are real. "Regular load shedding by Eskom is hurting South Africa's economy to the tune of 0.5-1.8% of GDP per month, depending on the blackouts' severity," according to investment analysis firm Edison Investment Research. Almost all South Africans are in the dark some of the time, and 10 million of them are in the dark all the time.

Eskom has maintained its focus on coal as a solution to South Africa's power problems. In April 2007 it began construction on the coal-fired Medupi power plant. Medupi has six 800-megawatt (MW) units and, after years of delays due to labour unrest, it finally had one of its units become fully operational in August 2015. Its sister plant, the Kusile coal-fired power plant, is planned to have the same capacity once complete. But more

power is still needed. Brian Molefe, interim CEO of South Africa's public utility, aims to generate 3,000 MW of additional power before the end of 2015 in order to be able to perform maintenance and compensate for power failures in the national grid.

How can South Africa improve its power generation and distribution? The Integrated Resource Plan 2010-2030 (IRP) from March 2011 lays out a comprehensive plan for developing South Africa's energy resources, from fossil fuels to renewables and nuclear power. Under the IRP, South Africa has begun developing 4,000 MW of renewable energy projects and attracted US\$10 billion in foreign investment through four competitive bidding rounds in three years.

Building on the success of renewables, officials have now turned to gas-fired power generation as an additional power source. A request for proposal for the new gas-to-power program is expected to be issued by the third quarter of 2015.

Gas power plants require gas feedstock to operate, but there is currently no clear plan for getting that gas to future power plants in South Africa. The country has limited domestic production capacity and insufficient transportation infrastructure, and therefore currently imports 77% of its natural gas by pipeline from Mozambique.

As long as gas prices are low, South Africa may defer creating a domestic gas industry and instead continue to rely on imported

gas. That gas could be delivered by pipeline, including from Mozambique, or through various other methods such as compressed natural gas (CNG), or gas cooled into liquefied natural gas (LNG). "For the next two to 10 years, compressed natural-gas terminals can be located across the country, while potential locations for LNG import terminals include Saldanha Bay and Mossel Bay. Also, there are identified areas, in Namibia and Mozambique, from which piped gas could be imported," said Kishan Pillay, director of the Department of Trade and Industry, during the South African National Energy Association gas industry dialogue in February 2015.

Mr. Pillay believes that existing industries would substitute their current feedstock mixes for gas feedstocks, causing demand for gas to increase and, over time, establishing stable demand for gas in South Africa.

All these methods would require South Africa to invest in building new infrastructure. Delivering gas to power plants by pipeline would require new pipelines. Enabling vehicles to run on gas requires either CNG, and thus compression and refuelling stations as well as vehicles equipped to run on CNG, or LNG, with its refuelling stations and so-equipped vehicles.

LNG could be made either by liquefying imported pipeline gas with liquefaction facilities, or by importing LNG from abroad via LNG tankers. Turning LNG back into gas for power plants and for use as a fuel for heating and cooking requires onshore



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or floating regasification facilities, with the associated storage tanks, ports, jetties and pipelines. Power plants themselves require generating facilities and the associated transmission and distribution networks.

Supporters contend that the gas-to-power program, by demonstrating a commitment to 3,000 MW of power generation through gas, would offer a demand-side “anchor” to stimulate sufficient investment in the required import capacity. However, this program alone is likely too small to create a national gas industry when currently there is none at all.

Power barges could be a short-term fix. The West African nation of Ghana, itself experiencing an energy crisis, has acquired two marine vehicles equipped with on-board power plants capable of supplying a total of 450 MW of power. These power barges are scheduled to arrive in Ghana this September. If South Africa were to follow Ghana’s example in this respect, it would not be the first time it has turned to barges as a power

source. In 2006 Eskom rented a power supply barge when a problem arose at Koeberg, its nuclear power plant in the Western Cape. Whether or not South Africa decides to do so again, it should be noted that power barges are costly and do not increase the nation’s capacity to generate power sustainably.

Developing South Africa’s vast domestic shale gas resources also deserves attention. South Africa has 390 trillion cubic feet of technically recoverable shale gas reserves, which places it eighth in the world. Its gas reserves could power 20 GW of combined cycle gas turbines and provide more than half of the country’s current power generation for 20 years. There are certainly risks involved in shale exploration and production, some well-documented and others, including seismic and drinking water effects, less clear. South Africa has taken note of these risks.

A few sites in the prolific Karoo region, the heart of South Africa’s shale gas reserves, had exploration wells drilled between 1965 and 1975 by the state-owned upstream company

Soekor. Although Soekor discovered gas reserves in the Karoo, technology for deep exploration was not yet available and it wasn’t until 2008 that commercial operations began. After a few oil companies applied for shale exploration permits in the Karoo in 2010, South Africa imposed a moratorium in April 2011 to prevent harm to animals and water in the region. Shale drilling is still opposed by many. Although the government lifted the moratorium in July 2012, as of summer 2015 there is still no hydraulic fracturing, or “fracking,” in South Africa.

In June 2015, the government gazetted its Technical Regulations for Petroleum Exploration and Exploitation, which supplements existing regulation and specifically addresses technical and environmental conduct related to fracking. If companies are permitted to begin exploration, it will likely take about three years to determine if Karoo reserves are commercially viable before shifting to production. Before this happens, though, under the auspices of its new Strategic

Environmental Assessment (SEA) for Shale Gas Development Committee, the government will evaluate the economic and energy-security benefits of fracking in the Karoo. After two years, the SEA intends to provide its analysis and thus enable the relevant authorities in South Africa to draft a comprehensive policy governing shale gas development.

South Africa is exploring all options in its efforts to improve power supply reliability. It has coal, it continues developing its renewable program, and now it is exploring gas-to-power and has an eye on nuclear. Achieving a diversity of energy sources will serve South Africa well. If planned and implemented correctly, these efforts could have beneficial effects on the development of new local industries and ultimately increase economic prosperity for all South Africans.



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