Continental shift: 

Africa’s emerging gas-to-power revolution
How to tackle Africa’s power gap

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Foreword

It’s no secret that a lack of cheap, reliable electricity is hindering economic progress in sub-Saharan Africa. More than 600 million people in the region lack access to power – but if the deficit can be closed it would boost economic growth across the region by between 2 and 4 per cent a year.\(^1\)

It’s also evident that energy and infrastructure investors can see the potential. Their input is vital – the International Energy Agency (IEA) estimates that $450bn in private investment\(^2\) is needed to provide universal access to electricity by 2040.

It was against this backdrop that a range of stakeholders assembled in October 2015 at the offices of Freshfields in London, and again in November 2015 at the offices of Bowman Gilfillan in Johannesburg, to consider the future role of gas in the sub-Saharan power-generation market.

Leading players from the energy industry – including regulators, sponsors, bankers and consultants – discussed, among other things, how to overcome the obstacles to improving gas infrastructure and where the best investment opportunities may lie.

This report summarises the two debates, their themes and the issues that need to be addressed. We thank everyone for sharing their time and their thoughts.

The views set out in this document are our impressions of what was said; they are not the official position of any of the organisations represented.

We hope you find the report insightful, and would be delighted to discuss the issues in more detail.

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More than 600 million people in Africa lack access to power.

$450bn in private investment is needed to provide universal access to electricity by 2040.
## Round-table participants

### Attendees – London

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### Attendees – Johannesburg

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Africa’s gas-to-power market – key themes

1. There is a huge demand for infrastructure
A lack of gas supply infrastructure – alongside inadequate transmission and distribution networks, particularly in South Africa and Nigeria – constrain the implementation of effective gas-to-power policies. In South Africa – a country yet to exploit its onshore Karoo shale gas reserves or its potential offshore fields – the government target to increase the proportion of power that comes from gas will require a decision to be made between pipeline gas imports, principally from Mozambique (which requires building a new $6bn, 2,600km pipeline), or the quicker option of importing liquefied natural gas (LNG), either via floating or onshore regasification.

2. Private investment is key
The trend towards new power generation infrastructure project-financed by foreign debt, equity and official development aid is well established and growing. Domestic governments are unable to fund the investment required while local capital pools lack sufficient depth.

3. Governments must build their capacity
It is vital that African governments are able to design the legislation, regulation, power purchase agreements (PPAs) and contracts necessary to encourage infrastructure development and investment. For gas-to-power projects, pricing and the allocation of base and peak load require a sophisticated regulatory framework, not only for transmission and distribution infrastructure but also to ensure reliable supply and reasonably predictable returns to independent power producers (IPPs). Measures are also needed to mitigate the economic and political risks of investing in Africa.

4. Unbundling is not essential
Many governments prefer bundled projects that involve a single procurement contract. South Africa has the expertise for an unbundled gas/LNG supply and power generation project, but it, too, would initially prefer a single contract with one entity accountable for everything.

5. Country risks are manageable
Political risk has always been a key concern for investors, and export credit or multilateral agreements and/or long-term political risk insurance are needed to address those concerns together with appropriate government commitments that tie into the risk cover provided by the export credit agencies, the multilaterals and/or the insurance market.

The universal complaint from bankers, investors and project developers is of the scarcity of bankable projects – ie proposals with enough time and money already invested to establish that they are commercially viable. This points to a need for more and better project preparation.
Why access to power will drive development

Africa’s power deficit has been at the top of the regional agenda since the World Bank published its landmark report *Africa’s Power Infrastructure: Investment, integration, efficiency* in 2011.

It is a priority for the African Development Bank and the Africa Progress Panel chaired by Kofi Annan, and is a major concern for governments in sub-Saharan Africa where fewer than 300 million of the region’s 920 million inhabitants have access to mains electricity. According to the International Energy Agency, the region is home to 13 per cent of the world’s population yet consumes just 4 per cent of the world’s energy.

Figure 1: Number and share of people without access to electricity by country, 2012

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

According to EY only seven of 48 sub-Saharan African countries have electrification rates above 50 per cent, with the remainder averaging just 20 per cent. The combined power generating capacity of sub-Saharan Africa is around 80GW, roughly that of Spain. More than half is generated in South Africa with Nigeria next on the list at 5GW. Moreover, as much as 25 per cent of the region’s installed capacity is not operational at any given time owing to its age, lack of maintenance and transmission interruptions. Power is expensive by international standards, and the electricity supply is so unreliable that people often rely on diesel or heavy fuel oil generators or dry cell batteries. Industrial users have also sought their own solutions – since 2000, the region’s mining sector has spent about $15.3bn generating its own electricity and has installed around 1,590MW of generating capacity.

The combined power generating capacity of sub-Saharan Africa is around 80GW, roughly that of Spain, more than half of which is generated in South Africa.

Power Transactions and Trends, EY Q2 2015
Why access to power will drive development

How much generating capacity is needed now?

As a rule of thumb, emerging countries require 1,000MW per million people to meet demand. Using this metric Nigeria would need at least 170,000MW to supply its population of 170 million, yet at present the country’s grid generates just 4,800MW – and on some days less than half this amount. Kenya has around 2,294MW in total installed grid capacity, but for its current population and economy it should have 45,000MW. Rolake Akinkugbe, an analyst at Ecobank, estimates that Africa generates less than half of the 74,000MW peak demand requirement, and this shortfall in supply is likely to widen given current trends in population growth and urbanisation. The Africa Progress Report 2015 puts the economic cost of the power gap in Africa at between 2 and 4 per cent of GDP.

Future demand for power

Demand for power is rising fast. Between 2015 and 2050 more than half of global population growth is expected to be in Africa. The economies of sub-Saharan Africa will quadruple in size between now and 2040, according to forecasts from the US Energy Information Agency (EIA). Power supply is also set to grow over that period, but not enough to meet demand. PwC’s Africa Power and Utilities Sector Survey forecasts that installed capacity will rise from around 90GW in 2012 to 380GW in 2040. This would provide universal access to electricity in urban areas but leave 530 million rural dwellers without power. These estimates are in line with McKinsey research, which indicates that it takes an average of 25 years to get from 20 per cent electrification to close to 90 per cent. It is particularly hard – and expensive – to reach the final 10 per cent due to the remoteness of rural communities.

Nigeria generates a maximum of 4,800MW but would need at least 170,000MW to supply its population

More than half of global population growth is expected to be in Africa 2015–50

*Financial Times, 15 December 2015*
What role could gas play?

McKinsey predicts that – if every country in sub-Saharan Africa builds enough capacity to meet its domestic needs – gas generation will rise from under 10 per cent of capacity and supply to nearly 50 per cent by 2040 (see Figure 2). Were this scenario to play out, gas-fired capacity could be as high as 700 TWh\(^2\) and it would join coal as the dominant source of power in the region.
McKinsey claims sub-Saharan Africa is rich in potential for power generation. If every country exploited its proven and speculative reserves of coal and gas – and also tapped in to its technically exploitable hydro, geothermal and wind resources – the region could install an extra 1.2TW of power capacity (see Figure 3).


If every country in sub-Saharan Africa builds enough capacity to meet its domestic needs, gas generation will rise from under 10% of capacity and supply to nearly 50% by 2040

Brighter Africa: The growth potential of the sub-Saharan electricity sector, McKinsey 2015
Why access to power will drive development

What would it cost to tackle Africa’s power deficit?

Between 2000 and 2013 only a third of energy investment in sub-Saharan Africa was directed towards energy for domestic consumption. Power sector investment is currently estimated at $8bn a year, or 0.5 per cent of the region’s combined GDP.

Estimates vary as to how much investment is needed to electrify sub-Saharan Africa. According to McKinsey: ‘If every country builds what it needs, we estimate that the region would require about $490bn of capital for new generating capacity… and a further $345bn for transmission and distribution… between now and 2040’. The IEA’s *Africa Energy Outlook* 2014 estimates that $450bn of investment over the next 25 years would deliver universal access in urban areas and reduce outages by half. The *Africa Progress Report* 2015 suggests that $55bn is needed each year to ensure universal access to electricity by 2030. Whatever the actual figure, there is clearly a huge need for investment to meet the shortfall in supply.

In a recent article for the *Financial Times*, Emanuel Misghinna, the managing partner of Rematco (which is developing a 500MW gas-fired plant in Nigeria), commented that many people have resorted to using expensive generators to make good the deficiencies of the grid. Industry experts claim the upfront costs of importing diesel fuel into Nigeria nearly match the country’s entire annual budget.
Why access to power will drive development

Where will the investment come from?

According to 2014 survey data from the International Compliance Association, African governments invested $46.7bn in infrastructure in 2013, 37 per cent of which was spent on energy.16 Governments are traditionally the main suppliers of finance for Africa’s power sector, accounting for between 65 and 89 per cent of investment each year.17 In response to low interest rates they are increasingly turning to the capital markets to finance this investment, with total sub-Saharan sovereign debt almost doubling from 2012, reaching $25bn in 2014.18

Since the mid-1990s Africa’s power sector received about $600m a year in public assistance, with a similar amount from private investors.19 More recently, investment has flowed from emerging economies, most notably China, Brazil and India. Traditional sources of finance such as the World Bank, IMF, OECD, and development and commercial banks have been joined by sovereign wealth funds, European utilities, private equity firms, hedge funds, and even Google.20 Western private investors are usually willing to invest only alongside experienced official development finance institutions, which are more likely to be consulted if a project runs into trouble.

A number of new sources of funds dedicated specifically to power generation have also emerged in recent years.

1. The Sustainable Energy Fund for Africa (SEFA)

The fund, now standing at $68m, is mainly financed by the governments of Denmark, Italy and the US. Administered by the African Development Bank, it aims to support small- and mid-scale renewable energy and energy efficiency projects with project preparation and equity investment.

2. Green Africa Power (GAP)

GAP has received £98m from the UK’s Department for International Development and invests in green energy alongside commercial lenders and other investors.

3. Power Africa

Launched in 2013, this partnership between the US government and more than a hundred private companies and NGOs has committed over $20bn to supply up to 30,000MW of clean generating capacity and 60m new connections (including $1bn for off-grid energy) by 2020. Initially focused on just six countries – Ethiopia, Ghana, Kenya, Liberia, Nigeria and Tanzania – its scope was widened in 2015 to include all of sub-Saharan Africa. As of June 2014, Power Africa has helped finance projects expected to produce nearly 2,800MW of new generation capacity. In 2015 alone it expected to reach financial closure on transactions expected to generate more than 4,100MW of electricity, enough to power roughly 4m new connections.
Why access to power will drive development

4. China

China is by far the largest investor in African infrastructure. It provides a combination of development capital and commercial lending made available through the Chinese Export-Import Bank, which finances infrastructure projects built by Chinese firms. According to Freshfields’ research, China is currently involved in power projects across 25 countries in sub-Saharan Africa, with 11 in Kenya and six each in Nigeria, South Africa and Zimbabwe. China’s power investments are evenly spread across coal, hydro and wind projects although it has a presence in gas and oil-fired generation, as well as geothermal and solar. For every $5 invested by multilateral institutions and OECD donors, China now provides an extra $1, and towards the end of 2015 the country’s Exim bank pledged to invest $1tn in Africa over the coming decade.

African governments are turning to capital markets to finance investment – total sub-Saharan sovereign debt almost doubled from 2012–14, reaching $25bn

The role of project finance

Project finance is a popular long-term tool for financing capital-intensive projects such as IPPs, due to the inability of many domestic governments to fund the investment required and the lack of depth in domestic capital pools. Repayments are based upon the projected cash flows of the project rather than the balance sheets of its sponsors. Debt can come from a variety of sources including foreign debt, equity and official development aid. For instance, New York-based Blackstone is working with Nigerian conglomerate Dangote Industries to jointly invest up to $5bn in energy infrastructure projects across sub-Saharan Africa over the next five years, with a particular emphasis on power, transmission and pipeline projects. South Africa’s Standard Bank has also provided $170m in debt financing to help build a 118MW gas-fired power plant in Ressano Garcia, Mozambique. The transaction, funded via debt with a door-to-door tenor of 12 years, is the first project-financed IPP initiative to reach financial close in Mozambique.

Figure 4 provides a snapshot of the global nature of funders, builders and owners of sub-Saharan Africa power projects valued at over $50m dollars in 2014.
Why access to power will drive development

What projects are in development?

According to Freshfields’ research, 92 power and wind-energy projects were under development in sub-Saharan Africa in 2015, of which 42 were at tender stage, 14 at pre-approval stage and 25 in finance. Of the 92 projects, 26 were gas-fired projects, followed by 21 wind and 18 coal-fired.

The remaining projects were shared between hydro, oil, diesel and geothermal. There is finance available to build the infrastructure necessary to close Africa’s power deficit, but unlocking it will require sponsors and investors to demonstrate bankability.
How to tackle Africa’s power gap

Five ways to tackle Africa’s power gap

1. Upgrade transmission networks
Much of sub-Saharan Africa is characterised by ineffective transmission infrastructure and transmission losses of up to 25 per cent (the global average is just 10 per cent).21
Large sections of the region’s existing transmission infrastructure are old and have been poorly maintained. Any planned expansion of generating capacity needs to be matched by a significant upgrade of transmission and distribution infrastructure, which, according to McKinsey, requires investment of around $345bn over the next 25 years. There are other factors that also need to be addressed, from the prevailing low transmission fees to the extraordinarily high maintenance costs needed to secure existing capacity. The state of transmission infrastructure has implications for the size and number of power projects that can be viewed as bankable in any country or region.

Sub-Saharan Africa's transmission and distribution infrastructure needs urgent upgrading and expansion alongside any increases in gas-to-power generation and growth in renewables such as wind and solar.

2. Create a regional power programme
With many countries too small to gain economies of scale from power generation, a regional power and transmission programme could offer a solution. There are currently four power pools in sub-Saharan Africa, established to promote cross-border trade in electricity and incentivise capacity investment. Half the countries of the region have insufficient demand to support a typical utility-scale power plant. Theoretically, by pooling demand across multiple countries it is possible to create the conditions for utility-size projects. Despite the high hopes of their proponents, power trading is still limited and mostly takes place within the Southern African Power Pool, which links the power networks of all the countries between Tanzania and South Africa.

Poor infrastructure means sub-Saharan Africa has transmission losses of up to 25% against a global average of 10%
How to tackle
Africa’s power gap

3. Explore untapped energy reserves
In 2014 sub-Saharan Africa was home to 7 per cent of the world’s known oil reserves and 6 per cent of its gas. Almost 30 per cent of global oil and gas discoveries made since 2010 have been in the region, and it is highly likely that future exploration will yield additional resources in the under-explored east and south of the region. East Africa – where just 600 oil and gas wells have been drilled – remains the continent’s last exploration frontier. By contrast, there are more than 14,000 oil and gas wells in West Africa.

4. Focus on gas
According to the EIA, significant discoveries of natural gas in Mozambique, Tanzania, Angola, Ghana and Nigeria have increased Africa’s known reserves from 14,682bcm in 2011 to 17,106bcm in early 2015. As a result, Africa’s potential LNG capacity has been estimated at 25.6 per cent of world capacity, enough to support development of two new LNG liquefaction facilities over the coming decade. Another 28bcm of associated gas is flared every year by Africa’s oil producers, which if used for power would be enough to meet the region’s electricity needs for more than a decade. There is a strong case for gas-powered generation in sub-Saharan Africa given the size of the region’s natural gas reserves and their wide distribution.

In the short to medium term, the case for gas power over alternative fuels rests largely on its availability and versatility.

Nigeria enjoys extensive developed gas resources, while recent discoveries in Kenya, Ghana, Mozambique and Tanzania underpin a number of gas-power projects currently under development (four each in Kenya and Nigeria and three each in Namibia and Ghana) that will use a mix of domestically produced offshore gas and imported pipeline gas and LNG. In addition, two further projects in South Africa will use gas from Mozambique and two in Tanzania will use offshore gas supplies.

Gas power plants are cheaper and cleaner to operate than diesel, with fuel for a diesel-powered 100MW plant costing the same in one year as it would take to build an equivalent-sized gas power plant. They are also more versatile than renewable energy plants since they can provide base load, peak and stand-by power, features that are highly attractive to countries that rely largely on hydropower, which is vulnerable to droughts. It is therefore not surprising that of the 92 power plants currently under development in sub-Saharan Africa, 26 are gas fired. The remainder comprise wind, coal, hydro, oil, diesel and thermal.

Africa’s potential LNG capacity is estimated at 25.6% of world capacity.
How to tackle Africa’s power gap

In the medium term, technological advances are likely to increase the viability of shale gas in South Africa and Botswana. Current gas reserves, potential future discoveries in sub-Saharan Africa and availability of LNG underpin the case for an expansion in gas-to-power generation facilities.

Figure 5: Power generation potential from domestic gas reserves, gigawatts

How to tackle
Africa’s power gap

5. Reduce wasteful flaring
According to the IEA, one-sixth of sub-Saharan Africa’s proven natural gas reserves are associated with oil production.\(^4\) Oil reserves are concentrated in Nigeria, Angola and Sudan with smaller deposits in Gabon, Kenya, Democratic Republic of the Congo, Chad, Equatorial Guinea, Cameroon and Ivory Coast. However, these countries lack the domestic gas pipeline infrastructure needed to market their gas to domestic consumers, which leads to wasteful flaring.

Nigeria produces around two-thirds of sub-Saharan Africa’s natural gas but, according to the US Energy Information Agency, flares around 20 to 25 per cent of its gross production.\(^5\) The majority of natural gas production in Angola – Africa’s second-largest oil producer – comes from associated gas at oil fields and is flared or re-injected into wells to enhance oil recovery. A similar situation is found across the region. As one Johannesburg-based participant at the round table observed: ‘The Mossel Bay gas field in South Africa is an example of how to waste gas. It’s turned into liquids and for burning off rather than being used for power generation.’ Overall, according to the World Bank, the amount of gas flared in Africa each year is enough to power the whole continent.\(^6\) However, over the past five years flared volumes have dropped from 35bcm a year to 28bcm, with Nigeria accounting for much of the decline. Nevertheless, Nigeria still flares around 17bcm a year, slightly more than the country’s annual consumption.\(^7\)

If gas flared every year from Africa’s oil plants was used for power it could meet the region’s electricity needs for more than a decade

Nigeria flares
20–25% of its gross gas production

Oil and Natural Gas in sub-Saharan Africa, EIA 2013
What’s the best solution for gas imports?

The potential market for gas-to-power projects in South Africa alone would support around 5,000MW of imports. This would require new investment in gas infrastructure tailored to the origin and nature of those imports – whether of pipeline gas principally from Mozambique, Namibia and Angola, or imports of LNG. No decisions have yet been taken but the discussion centres on the choices between pipeline gas or LNG imports and onshore versus floating regasification barges moored in port. A similar situation applies across sub-Saharan Africa.

The case for pipelines

Mozambique is currently South Africa’s only gas supplier. A modest natural gas producer, it exports around 3bcm a year to South Africa from the Pande and Temane fields via an 865km-long pipeline. Most of the gas produced in Mozambique is for delivery to the Sasol 1 pipeline network, to IPPs and industry on both sides of the South African border with Mozambique. However, there is increasing demand on both sides of the border and as a result Sasol and its partners are investing in additional capacity along this route, which should be ready by 2017. South Africa could take around 28bcm out of a potential 3,400bcm from northern Mozambique’s gas fields. There are three options being considered to bring the gas or gas-fired power into the country.

1. Via a proposed $6bn, 2,600km-long pipeline linking the new gas fields with Mozambique’s existing infrastructure. The location of this north-south pipeline would need to be decided, although there was general agreement at the round table that it would lie distant from the Mozambique coast in order to build off-take branches to Malawi and Zimbabwe. The viability of the pipeline would be improved as part of a regional energy development plan for southern Africa, and it would need good, experienced players with large balance sheets to build it. This pipeline option would take years to come online.

2. By dedicating some of the liquefaction capacity being built onshore near Mozambique’s border with Tanzania. The gas would then be shipped down either to the regasification facility at Maputo (linking up with the existing gas pipeline to Johannesburg) or to future regasification projects in Richards Bay (north of Durban), Port Elizabeth (Coega) or even north of Cape Town (Saldanha).

3. Via a new gas-fired power station in Mozambique near the Tanzanian border that would transmit power to South Africa via new transmission lines.
How to tackle
Africa’s power gap

What role should LNG play?
Africa is a major supplier of LNG. Nigeria is the fourth-largest LNG exporter in the world, shipping some 25.3bcm in 2014.39 Angola has an estimated LNG capacity of 5.2MTPA once its Soyo export liquefaction terminal returns to service after repairs to resolve various technical faults are completed.40 Recent massive finds give Mozambique the potential to become a major LNG player both in the region and globally. Current proposals for LNG export facilities include the Mozambique LNG project led by Anadarko and one, or possibly two, floating liquefied natural gas (FLNG) vessels proposed by ENI.

Between 2015 and 2020 over 150bcm of new LNG supply will come online worldwide, raising the volume of global LNG trade by nearly half. The prospect of a surge in Australian supply and US exports from six LNG projects currently being built in Louisiana, Texas and Maryland raises the spectre of a supply glut.41 This, together with the development of highly efficient combined cycle gas turbine (CCGT) technology, makes LNG an attractive fuel for electricity generation. Moreover, a CCGT plant can be built in between two and three years, with a small initial investment compared to nuclear or coal-generation plants.

The main thing is government must have a clear strategic view in its energy policies, as it applies to a country’s energy mix.
How to tackle Africa’s power gap

Country focus: LNG in South Africa

South Africa could very soon reach its target of 4,626MW of gas power via imports of African and foreign LNG. However, large-scale use of LNG would, according to one round-table participant, require a change in South Africa’s legislation, which supports only small-scale use of LNG to generate power.

Some potential sites for LNG imports have already been discussed including Richards Bay, Ngqura (near Port Elizabeth) and Saldanha Bay. The government is due to make a decision on its chosen location or locations this year. However, all these options would necessitate improvements to South Africa’s grid capacity to overcome current and predicted future congestion.

There is a proposal to build a $1.2bn LNG import facility at Saldanha Bay to provide gas for the existing Eskom-operated Ankerlig and Gourikwa plants, as well as thousands of industrial users and homes stretching to Cape Town. In this case, the LNG facility will have to be bigger than is strictly necessary to support local power stations – both existing and proposed – and create a gas supply industry that can deliver sufficient energy to promote economic development in Cape Province.

The potential of the existing power plants in the Saldanha area is around 70m GJ and it is estimated that the re-gas facility will need to have at least 150m GJ minimum capacity to allow for future development in the local market for gas. Companies in the hinterland of the proposed port locations for FLNG would be interested in exploiting surplus gas for various industrial, power-generation and transport purposes. The availability of gas would itself encourage greater interest in gas use.

Onshore schemes are likely to be preferable to more complex floating re-gas facilities. However, the main issue is the price of producing electricity versus the availability of floating storage and regasification units (FSRUs). Re-gas projects (in a variety of sizes, to be distributed at locations across the power network) could be the best option to secure supply.

So is it better to build one large 2,500MW power plant (which is viewed, in some circles, as being the optimal size for a facility of this nature) or a number of smaller facilities? From the South African government’s point of view, multiple smaller plants are thought to be the preferred option as they spread investment geographically across the country, are simpler to build, less likely to run over budget – and easier to locate at pressure points on the distribution grid. However, these considerations will have to be weighed against the lower tariff which an optimally sized power plant is likely to be able to offer.

Instead of going ahead with four possible LNG power generation schemes simultaneously, it might be better to pursue a single LNG-fuelled power plant of between 800 and 1,100MW and see how things develop. The South African government’s poor experience on several projects, including the construction by Eskom of the much delayed 4,800MW Medupi and 4,800MW Kusile coal-fired plants, would
How to tackle Africa’s power gap

probably see it leave the decision to the private sector. In this scenario, the development is likely to be an onshore gas-power station in an industrial development zone next to a port, where an FRSU would be located to accept LNG from tankers.

However, Eskom has its own plans – perhaps to use an existing plant near the coast and transfer gas from a nearby port. Eskom is already converting Ankerlig from diesel to gas, and the work should be complete by 2018. All of these issues – the cost of gasification, transport and regasification, and the cost of gas transmission to South Africa – require further investigation.

The case for FSRUs

While South Africa’s gas-to-power plans would require a modest LNG import facility on the coast, the alternative of setting up and developing a gas industry to supply a market of local towns, industry, mining, manufacturing and transport will require a larger terminal. Where power supplies are tight as they are in South Africa – importing LNG via an FSRU allows power output to be quickly and substantially increased. FSRUs can be up and running within a year and can be leased either for a season or on a long-term basis for up to five years. With an average capacity of 6.1bcm a year compared with 9.3bcm a year for an onshore terminal, an FSRU offers a short-term solution to power supply deficit.

An FSRU, moored in a port, removes the need for a land-based facility and avoids many of the environmental, regulatory and social issues associated with building onshore. At an average of $300m they are also around half the price of an onshore regasification plant. FSRUs, connected to either floating power plants or onshore power stations, have been suggested as solutions to South Africa’s immediate power shortage problems. For instance, Ghana is planning to use two Turkish-owned floating electricity-generating vessels to produce over 450MW of power, which is expected to contribute about 22 per cent to the country’s electricity needs.

The case for onshore regasification

South Africa would benefit from its own regasification facility, not least because it would be able to shop around for the cheapest gas from the growing spot market. Any LNG re-gas development would be expected to serve existing power stations and future IPP plants. In addition, Cape Province would want gas from Saldanha’s imports to fuel Cape Town’s buses, homes and industry. Were any gas development to be approved at Richards Bay, the contract would need to allow access to any future Mozambique-to-South Africa gas pipeline.
What about importing electricity?
Upgrading and capacity increases to electricity transmission and grids were considered as a possible alternative to LNG imports and associated regasification and LNG-to-power developments. There are a number of locations where it would be relatively straightforward to add significant new capacity to the system. Another 250MW line upgrade could be added between South Africa and Mozambique. Richards Bay has around 3,000MW generating capacity already thanks to the existing aluminium smelter, so adding more IPPs should be feasible. At Saldanha, grid capacity is even better. In addition, all the Namibia links with South Africa go through Cape Province, where there is significant capacity available. Building at Saldanha would save Eskom by building a third grid line into Cape Province and improving the security of grid supply in the region.

South Africa is in a better situation than the rest of the continent. It can benefit from distributed generation from renewables, which reduce the distance of transmission to customers.
Dealing with country risks

There are many tales of African gas power plants with no supply, the authorities’ failure ‘to do the boring things like collect revenues’, and the corrosive effects of electricity subsidies.

Governments in sub-Saharan countries often do not have the necessary skills and experience to run an operational national power-market system and provide a business-friendly environment for gas-fired IPPs.

Why government capacity is key

Studies show that most African energy programmes involve a state agency. The quality and capacity of governments to design gas-to-power legislation, regulations, PPAs and contracts for IPP involvement is therefore of strategic importance to develop gas-to-power solutions. There are many examples of government or state agency failures, including Transnet’s petroleum products pipeline which was delivered late and twice over budget. At the Soyo LNG plant in Angola, the pipe reportedly runs through a minefield en route to the port.

The sub-Saharan African governments’ inability to deliver enough power plants of the scale needed to meet demand is well documented. Legislation to accommodate gas-power generation has been tardy and often the initial level set for the government’s ‘take’ is unrealistic.

Government indecision often brings uncertainty. In Mozambique the plan was to build a chain of coal power stations to export power. Today, it’s to build gas-power stations both to meet domestic demand and also to supply nearby countries.

A case in point is Tanzania’s long-delayed gas legislation (promulgated during 2015) and its provisions for royalty payments, which are deemed too high to attract investor interest.

Unrealistically large power plant targets are also common. Namibia for example had planned a 2,000MW gas plant only to see it undermined by massive ongoing investment by South Africa in solar, wind and potentially gas. Likewise there has been heavy investment in mega hydropower schemes despite droughts stretching from Ethiopia to South Africa.

On the one hand, state involvement in new power capacity projects was favoured for political reasons and energy security, but on the other there are risks for investors wherever state agencies are involved.

One possible model to follow is that of the existing gas pipeline between Mozambique and South Africa, which is 50 per cent government owned but built, operated and controlled by the private sector.
The importance of coherent policy

African governments seem unable to produce long-term energy policies – an essential pre-requisite to attracting investment. Integrating all the components of power generation, transmission and distribution; selecting from a range of technologies; reforming market structures and developing transparent tendering and procurement procedures are essential elements of a comprehensive and coherent energy policy.

How can investors recover their outlay?

The sub-Saharan electricity sector is hemorrhaging money. On average, 40 per cent of those connected to the electricity supply fail to pay their bills – including 20 per cent of the most affluent. Inefficient billing, meter failure, fraud and illegal connections account for between 20 and 30 per cent of utilities’ revenue losses. Up to 25 per cent of installed capacity is not operational at any one time. Physical leakage and theft accounts for a large proportion of distribution costs, and is estimated to lose utilities around $1.8bn a year. Generation, transmission and distribution networks badly need investment, including in South Africa where $15bn is required to upgrade the country’s transmission network by 2022 in order to cope with increased production. One way forward could be for all new connections to have smart meters, which can provide accurate billing and improve revenue collection via smartphones.

Around three-quarters of the population in sub-Saharan Africa have access to a GSM network.  

On average 40% of those connected to sub-Saharan electricity supplies fail to pay their bills

*Africa Power Special Report*, Newsbase, November 2014

South Africa’s transmission network needs

$15bn

by 2022 to cope with increased production

*Reuters*, Peroshni Govender, 4 October 2015
Dealing with country risks

Why tariffs must reflect costs

In the main, sub-Saharan Africa’s electricity sectors are state-owned and run. There are also some hybrid markets where the state-owned utility acts as a single buyer of electricity from IPPs, such as Eskom in South Africa. Most countries have some form of administered pricing designed to reflect average national income, but the average yearly wage in the region is just $470.51 Half of sub-Saharan countries use electricity tariffs that do not cover costs. As a case in point, when Nigeria’s government privatised some 15 state generation-and-distribution companies, it set tariffs too low and left distribution companies unable to pay power plants.

Prices must rise to finance additional capacity, a situation reflected in a recent PwC survey which found that the biggest barrier to investment in Africa is the inability to recover the cost of new generation via current electricity tariffs.52 This gap is a major stumbling block to new private sector investment in gas, and African governments must do their bit to bridge it. However, reviews of tariff structures are taking place. Nigeria raised electricity tariffs in 2015 by between 5 and 40 per cent, depending on the power provider and class of customer. Ghana’s multi-utilities regulator, the Public Utilities Regulatory Commission, has also announced plans to raise electricity charges by 52 per cent and announced a major tariff review in anticipation of new electricity generation projects. Ivory Coast has recently approved a 10 per cent increase in tariffs, while the Zambian president approved an increase in tariff in late 2015, only to have the increase partially reversed in early 2016 after sustained pressure from the mining industry. But these changes are often not implemented on the ground, and in Ghana public protests are causing delays.53 For other countries considering change, setting multi-year tariffs with automatic adjustment clauses could be the answer. Any delay in obtaining clarity on the effectiveness of proposed tariff increases translates into a delay in financing and hence implementation of projects.
Dealing with country risks

The biggest barrier to investment in Africa is the inability to recover the cost of new generation via current electricity tariffs.

*A New Africa Energy World, PwC 2015*
Dealing with country risks

The challenge of currency volatility

The US dollar currently dominates the long-term capital market for large energy infrastructure projects. It is much easier for IPPs to get export credit funding agreements in dollars than local currencies, although South Africa is able to use the rand in some circumstances. For South Africa’s gas-to-power programme, using dollars to pay for gas and repay loans will be a burden on the state. Although US LNG exports are currently cheap, where the costs will stand in five years is what really matters.

State utilities and IPPs that rely on foreign imports of gas and LNG are vulnerable to exchange rate and fuel price volatility unless they are hedged, contained by fixed price contracts or paid for with a mixture of domestic currency and dollars. Even South Africa cannot entertain significant currency fluctuations over coming months and years without raising customer bills. The South African Reserve Bank is looking at models to even out fluctuations in gas prices and currency rates to ensure stable tariffs for consumers.

It’s hard to see any South African gas project going over wholly to rand, but it would be possible to reduce the dollar exposure by pricing feedstock costs in dollars and the operational costs in rand.

Fluctuating gas prices could be damaging for South Africa’s economy and currency reserves. However, a fixed-price contract for gas and a fixed-price LNG import contract could solve the problem.

For future domestic supplies of shale gas and coal-seam gas in South Africa, it may be possible to fix the price for up to six to nine months ahead and pay in the local currency. For imported gas, the consumer, the government or the operator takes the risk of price fluctuations, although the operator at least has the ability to adjust its tariffs each quarter.
Dealing with country risks

Can Africa escape the ‘subsidy trap’?

According to the Africa Progress Panel’s *Africa Progress Report* 2015, government subsidies for kerosene and energy utilities in sub-Saharan Africa amounted to $21bn a year, which, if invested in efficient power generation, would make a significant contribution to the estimated $55bn investment needed each year to provide universal access to electricity across the region by 2030. Electricity subsidies have a corrosive effect on government finances and can harm the commercial viability of both new and existing electricity generation. They are however very difficult for politicians to reform given the potential fallout from increased consumer prices.

“

There are major problems in Africa’s power sector in that governments don’t know how to get out of the ‘subsidy trap’. Many are concerned whether governments have the capacity to deal with such schemes.

*Africa Progress Report, Africa Progress Panel 2015*
Dealing with country risks

Which countries are set up for gas-fired IPPs?

According to Freshfields’ research, as of October 2014 there were 77 gas-fired IPPs operating across sub-Saharan Africa – with Uganda (19), Kenya (11) and Zimbabwe (10) the leading countries. Just a dozen sub-Saharan countries have legislative frameworks that specifically encourage gas-fired IPPs. They include Uganda, Kenya, Senegal and Ivory Coast, while countries such as South Africa, Mozambique and Equatorial Guinea have prepared the requisite legislation in advance of seeking to attract investment for future gas-fired IPPs.

The absence of such legislation does not necessarily diminish developer and investor interest, since governments can pass it relatively quickly. In addition, many IPPs are designed to be dual fuel, such as AES Corporation’s 216MW facility at Kribi in Cameroon, which is able to switch its engines from gas to light fuel oil during maintenance of the local gas fields. Many IPPs above 40MW are dual fuel operations, which make them more attractive for countries relying on expensive fuel oil.

The need for market reform

As a rule, more liberalised energy markets are most attractive to private investors. But with the exception of Kenya and Nigeria, progress towards liberalisation in sub-Saharan Africa has proved long and slow. South Africa has yet to reform its dominant state utility Eskom. To promote competition in the southern African power market, participants in Johannesburg suggested Eskom be prevented from both managing and operating the grid. The new independent grid agency would then be able to buy energy from a variety of power producers on a non-discriminatory basis. Ghana, Ivory Coast and Ethiopia were identified as future investment opportunities due to their favourable legislative and institutional frameworks. Elsewhere, Malawi has announced a roadmap of reforms, including the sale of its state-owned power company, and has attracted interest from investors.
Dealing with country risks

Table 1: Snapshot of reform status in key markets

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Tackling vested interests

With some exceptions, there is a general lack of transparency around tenders for new projects in sub-Saharan Africa. The exclusion of stakeholder inputs and lack of independent regulators creates uncertainty and reduces investor confidence.

However, some countries stand out. Botswana, for example, is seen as an exemplar of good governance, with an established culture of accountability and transparency stemming from its tribal tradition of consultation, participation and consensus. Indeed, in recent versions of Transparency International's Corruption Perception Index it has been rated among the least corrupt African countries for the last 10 years.

Vested interests seeking to protect their position can sabotage even a good project. A government minister’s friend can, over a game of golf, change their point of view.
Dealing with country risks

Can politicians provide the leadership?

The Africa Progress Report 2015 states that energy policy requires governments to make tough choices. African leaders are encouraged to set out strategies for achieving universal access to energy and commit to financing half the $55bn a year needed to provide it. They must change the politics of power by transforming energy sector governance, commit to reform market structures and tackle entrenched political interests. ‘In many countries, power utilities are a nexus for political patronage and corruption’, it notes.

Where are the biggest investor risks?

There are many issues that weigh heavily on the bankability of African gas-power projects, from foreign exchange risk to fluctuating fuel prices, supply risk, high levels of end-user non-payment and provisions regarding base load and peak load. Political risk is also at the forefront of investors’ and sponsors’ thinking given the long-term nature of projects and their high cost. The degree of government control of security against civil unrest, terrorism and theft is increasingly important, especially in countries such as Nigeria which have a reputation for bribery and corruption. Governments themselves pose a risk if they interfere in the power sector, breach contracts or concessions, nationalise resources or fail to honour bank guarantees and letters of credit.

Freshfields’ proprietary data on country risk (developed in conjunction with its StrongerTogether partner law firms around the world and incorporating risks from anti-competitive market arrangements to corruption – which are particularly important for forthcoming gas IPP developers and investors) shows South Africa to be the lowest-risk country in sub-Saharan Africa. Namibia and Ghana are ranked as slightly higher risk, while most of the region is categorised as medium to high risk on the major indicators.
How to structure an African gas-power transaction

Craft a bankable PPA
According to guidance from the Overseas Private Investment Corporation (OPIC) – the US government’s development finance institution – a bankable PPA ‘from a creditworthy off-taker which is able to pay back debt from a clearly defined, adequate and predictable revenue stream’ is a pre-requisite for new IPP projects. In practice this requires a fixed and sustainable cost-reflective tariff and a form of guarantee (preferably sovereign) in the case of non-payment. Other safeguards cover the allocation of risk between the off-taker and the IPP as well as provisions for dispute resolution. In addition, a bankable PPA should also set out the grounds and terms for early termination.

Secure credit support and sovereign guarantees
The involvement of international financial institutions and the existence of export credit agreements (ECAs), development finance institutions (DFIs), sovereign guarantees and political risk insurance are also important pre-requisites for successful IPPs. It is difficult to raise finance for an IPP selling electricity to an indebted off-taker without some form of credit support given the virtual absence of end-user, cost-reflective tariffs. Ways must be found to overcome investors’ fears that they won’t be paid at a price that allows for full cost recovery and acceptable profits.

Every country in Africa, except South Africa, needs to have ECAs and/or long-term political risk insurance. South Africa is unlike the rest of the continent; it is less of a potential risk for investors and banks. As a result, banks are prepared to take on a portion or even to share in the equity.
How to structure an African gas-power transaction

Multilateral guarantees have enabled successful projects to be launched, including Tanzania’s 200MW Songas plant (supported by the World Bank and European Investment Bank) and Ghana’s 350MW Cenpower facility, which was funded by regional and global commercial banks with added ECA protection.

Where the off-taker is a state-owned utility, lenders will normally require a government guarantee to provide credit support for the payment obligations. Where the creditworthiness of the government is in doubt, commercial products to reduce the risk of non-payment are available. Partial risk guarantees can be bought from the World Bank, African Development Bank or other multilateral development banks, and sovereign guarantee insurance policies are available from OPIC.

In short-term liquidity situations, letters of credit alongside credit support from a development finance institution or export credit agency can be helpful. In addition, the EU’s Africa Infrastructure Trust Fund offers risk reduction and credit enhancement policies.

In some countries, progress will only happen if political leaders keep their focus. Uganda, for example, began its IPP-building programme with government guarantees that attracted significant interest. However, they have since been watered down, reducing both the number and size of projects. But in others the absence of sovereign guarantees has not inhibited development. In Kenya, projects have gone ahead thanks to the country’s good track record of creditworthiness, which has reduced the cost of political risk insurance and credit agreements for projects.

Ring-fencing and controlling electricity revenues

Project finance, which depends on guaranteed revenue streams from either contractual arrangements or assured tariffs from end-users, is available for gas-power projects in Africa. However, lenders want to know that projects are viable and will want to review whether the project risk allocation detailed in the PPA protects the project company. One way to ensure that IPPs will be repaid is by ring-fencing all of (or an appropriate proportion of) the revenues from power sales. For the Ivory Coast’s 300MW Azeto power plant, the International Finance Corporation appointed a private sector firm to collect fees from customers, which were put in an escrow account that ensured that debt service was met and investors received an equity return.

Insure against political risk

Local political risks, including energy nationalism, civil war and corruption were cited as major barriers to investment, but these conditions are prevalent across sub-Saharan Africa. Political risk insurance is available from a number of institutions including the Multilateral Investment Guarantee Agency (MIGA), which provides policies primarily to support equity investment and shareholder loans to power projects. National export credit agencies also provide political risk insurance to lenders or equity investors.
The case for gas-to-power in sub-Saharan Africa is strong given the size and distribution of natural resources, the availability of associated gas and imports of LNG. Speed is of the essence if sub-Saharan Africa is to cope with rising demand for power caused by rapid population growth and increasing urbanisation. Gas-to-power projects are faster to build than those fuelled by coal, nuclear or hydro. They are cleaner than coal and more reliable than wind, solar or hydropower. Gas and LNG can be both short- and medium-term solutions to the region’s power deficit and act as a bridging fuel to a low-carbon future.

Equally, gas power is an important source of energy security, particularly for countries that rely on hydro. Governments should therefore aim to provide a business-friendly legal and regulatory environment to attract reliable private investment and be able to fast-track proposals when they emerge.

A major barrier – possibly the major barrier – to large-scale generation and transmission projects is the availability of finance. However, the rise in the number and size of generation and transmission projects in sub-Saharan Africa has attracted bigger and more experienced sponsors and lenders to the market. Today, consortia of international commercial and investment banks work alongside local financial institutions, infrastructure funds and private equity firms to develop the next wave of power generation infrastructure. As more major players enter the market and the track record of successful projects grows, so future developments will be easier to get off the ground.