Development and Financing of Small Scale Gas to Liquid (GTL)

Issue 2018001

Nigeria

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Introduction

Large quantity of global natural gas reserve has not been used to the same extent as petroleum crude. Although it does have some drawbacks compared to other fuels, mainly issues dealing with its volume, it promises to be an increasingly important energy source in the years to come.

The demand for cleaner burning liquid and solid fuels has been increasing from the global issues of environmental concern. Gas-to-Liquid (GTL) is the technology that allows producers convert gas into liquid fuel, enabling it to be transported much more compactly, and hence more easily. GTL diesel, in particular, is ultra-clean, sulphur free with a very high cetane number of 75-80.

Nigeria had 201 trillion cubic feet (Tcf) of proven natural gas reserves in 2019, making Nigeria one of the largest natural gas reserve holders in the world and the largest in Africa but on the other hand Nigeria flared 7.83bcm of gas contributing about 5.2% of total gas flared globally in the same year, which, according to Nigeria National Petroleum Corporation (NNPC), costs the country billions of dollars in revenue.

In 2020, there was an increase in natural reserves from 201 trillion standard cubic feet (SCF) to 203.16 trillion SCF, representing a marginal increase of 0.57% in one year.

This paper identified some of the numerous opportunities and prospects of GTL technology for Nigeria with reference to the World's existing GTL plants.

GTL is the technology that allows producers convert gas into liquid fuel, enabling ease of its transportation in a much more compact form. GTL diesel, in particular, is ultra-clean, sulphur free with a very high cetane number of 75-80 (cetane number is a measure of fuel combustion quality) compared with typical refinery diesel range of 45-50.

Only 6% of the world's known gas fields are large enough to sustain GTL plants on the conventional scales, and the majority of potential undiscovered gas finds are thought to contain less than 1 trillion cubic feet (Tcf) of gas, an amount too small to make conventional GTL plants economic.

By taking advantage of new smaller technologies, such as microchannel reactors, to shrink the Fischer-Tropsch (FT) and steam methane reforming (SMR) hardware, GTL plants can be scaled down to provide a cost-effective way to take advantage of smaller gas resources. GTL plants, based on the use of microchannel FT reactors, can be operated on a distributed basis, with smaller plants located near gas resources and potential markets.

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The Case for Small Scale GTL Project in Nigeria

Nigeria's Natural Gas reserves has been on the incline from 2013 and is projected to continue to grow at a conservative rate of about 1.0%, the country's Department of Petroleum Resources (DPR) has reported. Overall, gas utilization in the country for 2019 shows the export market accounts for 41%, field/plant use accounts for 32%, domestic market is about 13.6% and flared gas is 11%.

Data obtained from the Nigerian Gas Flare Tracker, hosted by the National Oil Spill Detection and Response Agency, NOSDRA, showed that of the 425.9 billion SCF of gas flared between January and November, 2019, 22.6 million tonnes of carbon dioxide was emitted into the environment, while the volume of gas flared is capable of generating 42,600 megawatts of electricity.

Federal Government regulations in 2018 prohibit gas flaring and venting and impose the following fines:

- $2.00 (Two United States Dollars) per 28.317 standard cubic metres (one thousand standard cubic feet) of gas flared shall be charged as payment to the Federal Government for gas flaring by a Producer from any Oil Mining Lease area or Marginal Field that produces 10,000 barrels or more of oil per day.
- $0.05 (Fifty United States Cent) per 28.317 standard cubic metres (one thousand standard cubic feet) of gas flared shall be charged as payment to the Federal Government for gas flaring by a Producer from any Oil Mining Lease area or Marginal Field that produces less than 10,000 barrels of oil per day.

In 2009, the Nigerian government developed a Gas Master Plan that would promote new gas-fired power plants to help reduce gas flaring and provide much-needed electricity generation.

Although, liquefied natural gas (LNG) is one way of accomplishing the end to gas flaring, the need to constantly keep LNG at a very low temperature is a drawback, sometimes a serious one. This leads to the other area of GTL, chemically reacting methane with other compounds.

The Escravos GTL, the only GTL in Nigeria, cost US$10 billion and started up in summer 2014; its original cost started out at US$1.9 billion in 2005, rising to US$5.9 billion in 2009 but continued to escalate. It has an initial capacity of 34,000 barrels per day (5,400 m3/d) of synfuel. The plant uses the Fischer-Tropsch process technology and Chevron's ISOCRACKING technology. Large-scale GTL projects are complex and capital intensive making it unattractive to investors in the GTL market.

Movement toward mini-GTL technology—plants with capacities of 100 bpd–1,000 bpd is gaining acceptance. Mini-GTL plants can be used for isolated gas monetization and flare reduction. They are less complex than large-scale facilities, and some technology providers have modified their catalysts to maximize diesel production and avoid wax handling issues.

Small Scale GTL Explained

Since conventional FT reactors are designed to work on a large scale, traditional GTL plants are built to process substantial amounts of gas. These plants require large capital investment, and they are only economically viable for plants producing approximately 30 thousand barrels per day (Mbpd) or more of liquid fuel.

Small-scale GTL plants are containerized units comprised of a reformer for synthesis gas production, a Fischer Tropsch (FT) reactor for syncrude production, and, in some cases, an upgrading package, which is used to further refine the FT products into the desired transportable fuel. Since these containerized units already have about 70 percent of their construction complete before reaching the plant site, on-site construction costs are significantly reduced. In cases where capacity needs to be increased, additional units can be easily shipped via truck or ship and connected in parallel to the existing process. Depending on the technology, capacity can range anywhere from 100 barrels per day (bpd) to 15,000 bpd.

Prospects of Small-Scale GTL

There is, however, a hitch to the possibilities offered by GTL technology. The GTL process involves two main operations: conversion of natural gas into a syngas [a mixture of carbon monoxide (CO) and hydrogen (H2)] via steam methane reforming (SMR) or autothermal reforming (ATR), followed by Fischer-Tropsch (FT) synthesis. Since conventional FT reactors are designed to work on a large scale, traditional GTL plants are built to process substantial amounts of gas. This factor has been a disincentive to the investors in GTL projects.

The cost and capacity constraints explain why only five GTL plants are operating commercially today: the Bintulu plant in Malaysia, the Mossel Bay plant in South Africa, the Oryx and Pearl plants in Qatar and the Escravos GTL in Nigeria.

By taking advantage of new technologies, such as microchannel reactors, to shrink the FT and SMR hardware, GTL plants can be scaled down to provide a cost-effective way to take advantage of smaller gas resources. GTL plants based on the use of microchannel FT reactors can be operated on a distributed basis, with smaller plants located near gas resources and potential markets.

Smaller, modular GTL plants are suitable for use in remote locations. In contrast to conventional GTL plants, they are designed for the economical processing of smaller amounts of gas ranging from 100 million cubic meters (MMcm) to 1,500 MMcm, and they can produce 1,000 bpd–15,000 bpd of liquid fuels. Their modular structure makes microchannel reactor systems very flexible. The plants can be scaled to match the size of the resource, expanded as necessary, and potentially integrated with existing facilities on refinery sites.

Smaller-scale GTL operations also pose a lower risk to producers. Since the plants are smaller, construction costs are reduced; and, since the plants are modular, investment can be phased. The construction time is short, at 18–24 months.

Smaller-scale GTL plants open GTL to the broader market by reducing the entry price and significantly increasing the number of locations where GTL technology can be installed. This flexibility offers great potential for monetizing resources like stranded gas and associated gas in Nigeria.

Smaller-scale GTL processes also offer the potential to expand refinery capacity and to produce hydrocarbon-based feedstocks from gas. Additionally, they improve profitability by unlocking gas resources that would otherwise be wasted, thereby capturing value from the gas-to-oil spread, widening access to global markets and taking advantage of existing infrastructure.

Smaller-scale GTL plants offer advantages at all stages of production: upstream, midstream and downstream.

Upstream: Environmental Advantages.

On the upstream side, smaller-scale GTL plants offer an environmentally friendly alternative to the flaring of associated gas produced alongside oil. By providing an alternative to flaring,

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smaller-scale GTL plants can help solve the associated gas problem and unlock more oil production.

Midstream: Enabling economics.

Developing smaller-scale, distributed GTL plants to convert the gas to liquid products near the production site could reduce the cost of transporting gas to market and tip the economic balance in favor of what are presently considered to be marginal stranded gas and associated gas projects.

Smaller-scale GTL plants offer advantages for developing resources where pipelines do not exist or are already full or where political or commercial considerations make it difficult to export gas via an existing pipeline. It could also allow smaller producers greater access to global markets, or make it possible for them to produce transportation fuels for their local markets.

Downstream: Making the most of the resource

Downstream, smaller-scale GTL processes make it possible to convert refinery gas feedstock into products such as diesel, kerosene and naphtha, or even higher-value products such as specialty chemicals, waxes and lubricants. In addition, the technology gives industrial producers the flexibility to produce feedstocks from cheaper gas, rather than from more expensive oil. This improves margins and, in many cases, makes it possible to produce feedstocks containing virtually no sulfur.

Smaller-scale GTL plants can also serve as a relatively low-cost option for expanding or debottlenecking in refineries. In addition, refineries can use excess steam, water and power from the GTL plant for other operations, reducing the operating cost of the combined facility. Locating a smaller-scale GTL plant within a refinery can also reduce the cost of the GTL plant, because some of the necessary facilities are already present at the refinery site.

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Summary

Smaller-scale GTL technology opens the use of GTL to the broader market by reducing the entry price and significantly increasing the number of locations and sizes of reserves where GTL technology can be successfully implemented. Smaller-scale GTL processes are more practical than their larger-scale counterparts, and they are easier to finance, permit, supply and construct.

Challenges of Small-Scale GTL

Oil Price

Generally, changes in crude prices cause a direct change in GTL product prices, this makes GTL plants' profitability directly affected by change in crude oil price in the International Oil market. A declining oil price is a threat to GTL project profitability.

Infrastructures

Certain services and amenities has to be in place at the remote area of the project site. The areas must have a good road network, port facility, pipeline network, stable electricity and a good security system. Unavailability or dearth of all or any of these may discourage the investment into the small-scale GTL projects.

Feedstock prices

Escalating feedstock prices have a significant negative impact on calculated project economics. The OPEX of the GTL will surge and this will lower the operating margin.

Motivation for Small Scale GTL Project Development and Operation.

Favourable Industry Economics

Increases in crude oil prices have certainly helped GTL economics, but this may not be sufficient for the approval of large-scale projects, given the complex dynamics involved. A significant drop in project CAPEX, sustained low gas prices and further appreciation in crude prices are needed to turn the tide and attract investors into the industry.

In response, the industry has taken steps to reduce project CAPEX and improve the yield of high-value products.

Uninterrupted Access to Feedstock

Mini GTL will be required to explore varied options to ensure constant access to feedstock required to keep output at optimal levels. Operators will do well to look beyond heavy reliance on the government for feedstock.

Leveraging strategic partnerships with upstream oil and gas producers and setting up close to stranded gas zones are likely considerations to guarantee steady supply of feedstocks.

Small Scale GTL Economic Analysis

The overall economics or viability of a small-scale GTL depends on the interaction of four key elements:

- the adequate supply of feedstocks at a moderate rate;
- the complexity of the GTL plant and its configuration;
- the desired type and quality of products produced; and
- the price of crude oil in the international oil market.

Products and market

GTL products, which are either chemicals or liquid hydrocarbon, are highly valuable even more than crude oil. GTL products include Syncrude, diesel, gasoline, methanol, ethanol and formalin. The GTL products of interest are diesel, methanol and ammonia because these products are highly valuable and of high demand in the Nigerian market.

Nigeria imports large volume of **diesel** for transportation and power generation purposes.

Methanol is used as a chemical inhibitor to prevent the formation of hydrate in subsea pipelines. In Nigeria methanol demand by oil producing companies is high considering that there are several offshore producing fields such Bonga, Akpo, Agbami, etc. Another emerging use for methanol in Nigeria is domestic cooking.

Ammonia is the second largest chemical manufactured in the world and the primary constituent of urea fertilizer. Ammonia is also used as an ingredient in the production of resins, refrigerant, fibers, and pulp and paper. Natural gas is the major ingredient for ammonia production accounting for 70-90% of the production cost.

Project and Production Cost

The capital cost of a mini GTL technology is generally not high given that the quantity of metal required for fabrication and cost of fabrication is low.

The economic advantages or breakthrough in small scale GTL plants have occurred with advances in 4 areas:

- Commercial introduction of micro-channel F-T technology;
- Higher reactive cobalt catalysts;
- Mass production of F-T reactors;
- Modular construction of the plants.

The general cost categorisation of the small scale GTL project cost include:
Micro-GTL: Unattended operation units below <1 MMscfd and below <US$ 10million.
Mini-GTL: Small modular plants with some operators and a cost >US$ 10million.

Some components of the operating cost such as labour cost, supervision, etc. are negligible as the technologies are modular and skid mounted. For example, GasTechno and Greyrock both indicated that their technologies could be remotely operated. The gas feedstock is generally the largest operating cost for mini GTL technologies

The driven factor for the product cost is the quantity of the product produced per annum as well as the fixed capital cost of the mini GTL plant. The capital charges, local taxes and miscellaneous cost are all tied to the fixed capital cost.

Product value

The market price of the product is considered to be the value of that product. The higher the market price of the product, the more valuable and profitable would be the product provided the product cost is low compared to its market price.
Diesel is the most valuable product in terms of market price but methanol gives the highest gross margin because of higher annual production rate. Prospective investors in any of this mini GTL should be aware that the market price of the product could fluctuate depending on forces of demand and supply. Therefore, the parameter that should be carefully examined when thinking of investing in any of the technologies is the annual production rate of the technology.

Profitability (GasTechno Mini GTL Case Study)

GasTechno mini GTL is taken to illustrate the economics of a mini GTL plant.

The GasTechno Plant can be scaled down to 1 mmscfd and the mini GTL plant can be scaled down even further, to 200 metric standard cubic feet per day (mscfd). In this case, the final processing of the raw products has to be performed at the central processing facility.

Although the economics of the mini GTL is positive, the need for a central processing facility slightly decreases the internal rate of return (IRR), thereby reducing the earnings before interest, taxes, depreciation, and amortization (EBITDA). By scaling up the plant to 5 mmscfd, the economics can be significantly increased.

Though mini GTL can be an innovative technology to monetize the stranded gas, it will be economically profitable only when the available gas for input is more than 5 mmscfd.

Benefits of Building Small Scale GTL

The mini-GTL concept has existed for many years and is ideally placed to monetize stranded gas volumes, such as flared gas from a remote asset. While the industry has historically focused on large-scale GTL projects using F-T technology, new technologies associated with mini-GTL projects could prove to be both economically and technologically attractive.

The claims of reductions in CAPEX are partly the result of the development of a new generation of catalysts. These proprietary catalysts provide higher production of diesel, naphtha and gasoline, while reducing or totally eliminating wax production. With no GTL wax production, the post-production unit to separate, process and store wax products can be eliminated, thereby dramatically reducing CAPEX costs.

The elimination of wax production from the GTL process has the added advantage of reducing the overall complexity of the equipment, another factor that makes mini-GTL suitable for the monetization of flared gas in remote locations. In such areas, production of gasoline and diesel—products that can be used locally—is preferred over output of other products derived from conventional GTL projects.

It is believed that mini-GTL technology may provide some unique benefits, given its lower CAPEX, simpler operations, focused product slate and ability to meet investment criteria in the present price environment.

Small Scale GTL Technologies

Vendor	GTL Product	Technology
GasTechno, LLC	Methanol, ethanol and formalin	Mini-GTL
Greyrock	Diesel or Syncrude	DFP M-CLASS
Proton Ventures	Anhydrous Ammonia	NFUEL/N-Flex
BGTL	Syncrude	CompRex
CompactGTL	Synthetic crude and diesel	Fluor
Velocys	Diesel and jet fuel	FT reactors.
Rocky mountain	EGTL™	Diesel

Brickstone Research

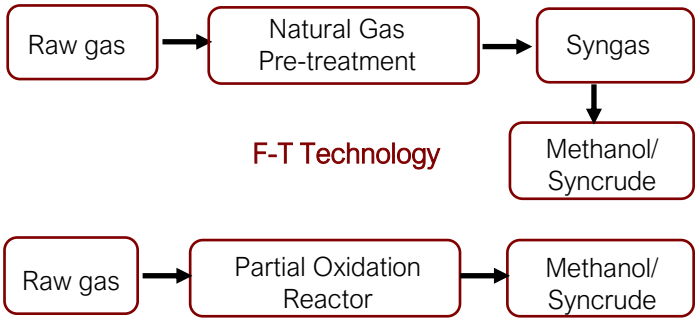
Project and Production Cost

There are several developers of GTL technologies in the world. Most technologies are at various stages of development and some are even ready for commercial development. The accelerated development in small and mini scale GTL technologies is due to the advocacy by the World Bank group. We discuss technologies by vendors in the GTL commercial development stage:

GasTechno, LLC

The GasTechno's Mini-GTL technology converts raw gas directly into methanol in a single step process that does not require catalyst. The patented technology uses partial oxidation reactor to achieve the single step direct conversion of the natural gas into liquid fuel. Apparently, this eliminates the traditional syngas production step.

Since catalysts are not required, the process is flexible on variations in gas composition. Elimination of the syngas production stage results in significant cost reduction and makes this technology quite attractive. The entire process plant comes in a 40ft shipping container, which makes it easy to deploy it to a wellsite. However, there is requirement for auxiliary units such as air separation unit, feed gas compressor unit, a power generating set and liquid products tank. The GasTechno Mini-GTL requires 500 Mscfd feed gas to produce 14.6 tpd of methanol.



Greyrock

Greyrock's Direct Fuel Production (DFP) M-Class system with a footprint of 65×45 ft can convert 500 Mscfd of associated gas to 50 bpd of clean oil or diesel.

The plant, which is developed specifically for flare gas monetization, can be operated remotely. The liquid fuel production process begins with feed gas treatment to remove impurities and contaminants followed by synthetic gas production using steam methane reforming (SMR) process. Finally, proprietary catalysts called GreyCat (which is a nonconventional Fischer-Tropsch catalyst) are used to convert the syngas directly into clean oil. The GreyCat eliminates the traditional Fischer-Tropsch reaction step that involves refining paraffin waxes into fuel.

Proton Ventures

The N-Flex technology is a wheel skid mounted plant that is movable and can convert 140 Mscfd of natural gas into 3 ton/day of anhydrous ammonia. The mini ammonia plant was developed by Proton Ventures of Netherlands and Ammonia Casale of Switzerland.

CompactGTL

CompactGTL has the only small-scale GTL technology that has been proven to work for the conversion of real associated gas into synthetic liquids at the point of production. The technology has powerful oil company endorsement by Petrobras who successfully operated CompactGTL's commercial demonstration plant for 3 years in Brazil.

CompactGTL has a unique patent protected and tested process utilising a 2 stage FT process which significantly increases catalyst life and reduces operating costs.

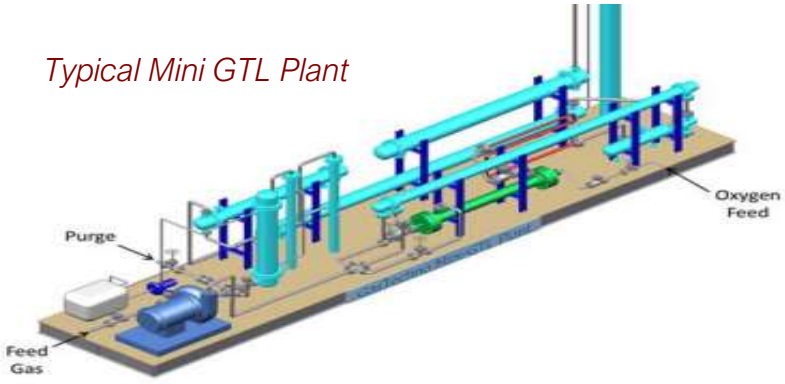
Combining real plant operating experience with design focus on performance in the field, and a secure world class supply chain, CompactGTL has established the capabilities and capacity to supply multiple projects worldwide.

BGTL

With enhanced heat and mass transfer, BgtL's compact reactors can be significantly smaller (up to 5-10x) than conventional tube and slurry reactors and other microreactors as well. These shop-fabricated and truck-shippable skids require minimal field assembly and installation onsite. Scale-up risk is reduced from use of standardized components and by combining multiple standardized modules.

Recent testing has proven the unparalleled efficiency of the compact technology, as its pilot GTL skid produced FT liquid fuels at over 70% conversion rate in a single pass with low methane selectivity and mostly syncrude and low wax output.

Typical Mini GTL Plant



Rocky Mountain

Rocky Mountain GTL Inc. designs, constructs, and operates, small scale modular Fischer-Tropsch gas to liquids (GTL) plants to convert natural gas and natural gas liquids into synthetic fuel. The EGTL™ convert natural gas, natural gas liquids (NGLs) and Liquid Petroleum Gas (LPGs) into synthetic fuel through the combination of Rocky Mountain GTL's feedstock flexible EGTL™ technology along with Greyrock Energy "Direct to Fuel" production catalyst.

Mini GTL Project Financing

The capital-intensive nature of this project and the strategic market ensuring its cash flow, makes it a project desirable for project financing. However, there are risks which the lenders may face in the project financing of this nascent technology.

In sourcing for funding for mini-GTL projects, the project sponsors have the choice of either going for conventional financing or resorting to project finance. The lenders, however, before agreeing to project finance a project, make sure that there is an isolated and assignable cash flow from which they can get their loans repaid.

Owing to the fact that mini-GTL projects involve mid to heavy capital costs, and because it has a market for its product, thereby having an isolated cash flow, it qualifies as a project suitable for project financing. Generally, for a project to attract project financing, the end product of the project has to be a strategic project which would attract cash flows readily as project financing is usually done on a limited recourse basis. Ideally, the project must also have the strong support of its sponsors who would show their commitment to the project through the equity provisions they make in regard to the project.

Also, the sponsors must have in place a well-structured contractual arrangement which would show how the risks in the project can be allocated to the parties to the project.

GTL products are usually traded off as commodities and usually it does not involve long term off take contracts. Also, mini-GTL being a nascent activity involves the use of technology that has just recently been put into commercial scale use. Because not many mini-GTL projects have been made commercial, this has brought to fore the issue of technological risk and also the commercial viability of the project. Also, because of the fact that GTL products premium pricing do not really have a historical precedent, the lenders would need to be convinced that the products will actually earn the premium expected.

It is important to note that since the GTL products will eventually be sold into a regulated market, because by its nature its market is determined by the oil prices. As has been stated above, with the present rise in oil prices and the forecast of further increases, GTL products stand a chance of having a large market. On the other hand, however, in the event that the prices of oil should reduce the market for GTL products will be affected. Against this backdrop the risks which lenders may be faced with while project financing mini-GTL projects are discussed as follows:

GTL Project Financing: Lenders Risks and Possible Mitigation Strategies.

The associated risks with mini GTL financing will be discussed as follows:

Market Risks

for projects to earn cash flows there has to be a ready market for the sale of the end products. GTL products are substitutes to oil products. There is however a risk that the GTL products will not have a market for it when produced. Also, GTL products traditionally do not have long term bilateral contracts like LNG contracts. All the combined factors expose the lender to market risk as there is little assurance that there would be a buyer for the end product. In order to mitigate this risk, the lenders will have to ensure that off take arrangements are made to guarantee that there would be a market for the GTL products so that the sponsors can be able to generate money enough to cover the operating expenses made and offset both the principal and the interest of the debt.

Price Risks

The fact that the economics of GTL products are tied to the oil price and consequently any drop in the price will affect the price of the GTL products and the cashflow of the project.

In order to mitigate this risk, the lenders will have to get the sponsors to make strategic assumptions of the product prices based on oil indexes in order to attract financing and guarantee payment in the event of reduction in the assumed GTL prices in the market.

Technological Risks

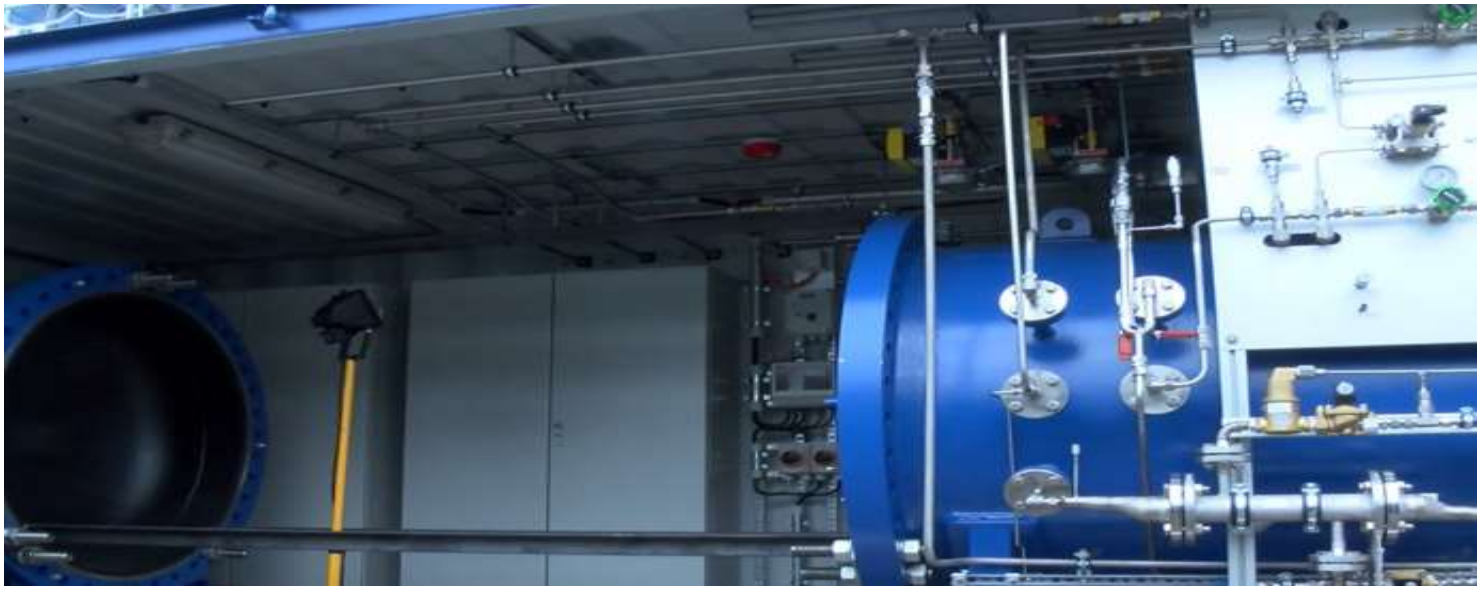
Mini GTL is a nascent technology and so far has not really achieved commercial viability and as a result the lenders may face technological risks in project financing of GTL projects. In order to mitigate this risk, the lenders may ensure that the contractors give a guarantee of the performance for the project. Also they would ensure that the sponsors counter guarantee the project performance to the point of completion.

Cash Flow Risk

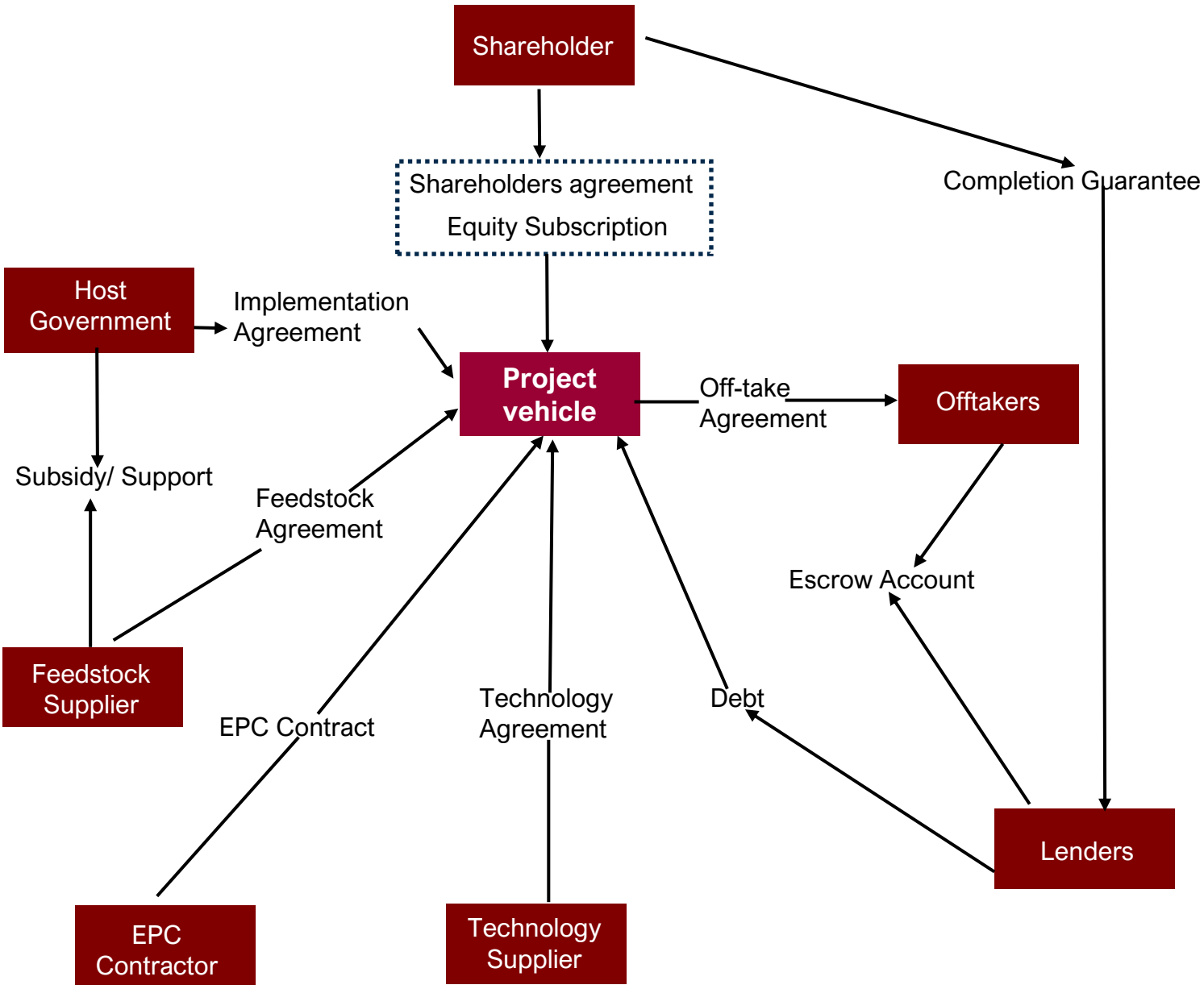
This is the risk that as a result of the lack of market or because the project was not completed as at when speculated, it would not generate the cash flow anticipated. The project lender can mitigate this risk through the long term off-take agreement with the off-taker to ensure a steady cash flow and a completion guarantee by the sponsors to the lenders to ensure that the project is completed as at when specified in order to yield cash flows.

Reserve Risk

There is a possibility that the amount of stranded or remote reserves predicted or estimated by the project company may not be enough to produce the estimated cash flow and as such not worthy of project financing. In order to mitigate this risk, the lender can conduct a survey to decipher the amount of gas in the stranded reserves and grant the loan based on this conservative lending assumption.



A Typical Contractual Matrix for a GTL Project



Lenders in Mini GTL Project Finance

Like sponsors, there is no limit to the number of lenders in a Mini GTL project finance transaction. The lenders are the debt financiers of the project – they finance the project by providing long-term loans – and they are prepared to accept the risk involved in the venture.

There are many types of lenders and there are a variety of debt finance products which can be applied in a project financing but the specific mix of products available to a project will depend on the sector, jurisdiction, project size, sponsor profile, transaction risk profile and credibility of the technology provider. The principal lenders for a typical Mini GTL project financing are:

1. Commercial banks

Commercial banks (especially international banks) represent a primary source of funds for project financings – they are the largest providers of debt capital in project finance. Lending to a project exposes banks to great risk, so the banks pay particular attention to the feasibility of the project, and the evaluation of the credit risk. The banks also offer financial advisory services in the project, and seek to have a high level of control over the management of the project because if the project fails, it may damage them heavily.

The syndicate is important not only for raising the large amounts of capital required, but also for de facto political insurance – a syndicate of banks might be chosen from as wide a range of countries as possible to discourage the host government from taking action to expropriate or otherwise interfere with the project and thus jeopardize its economic relations with those countries.

2. Export Credit Agencies (ECAs)

Essentially, an export credit agency (ECA) is owned (or franchised) by a government. An ECA is a public agency or entity that provides a loan guarantee or funding to projects for an amount that does not exceed the value of exports that the project will generate for the ECA's home country. Notable examples of ECAs are the Export-Import Bank (Ex-Im Bank) of the United States, the Export Credit Guarantee Department (ECGD) in the United Kingdom, and the Nigerian Export-Import Bank (NEXIM). Because infrastructure projects in developing countries often require imported equipment from the developed countries, the ECAs are routinely approached by sponsors and contractors to support these projects.

3. Multilateral agencies

Multilateral agencies are established by intergovernmental agreements and unlike ECAs are independent of the interests of any single country member or recipient government – they are designed to promote international and regional economic co-operation. They can provide direct lending, political insurance to other lenders and even equity participation. Because they are developmental in nature, they are predominantly emerging-markets-focused and will seek a strong socio-economic developmental rationale for a project to consider support.

Multilateral agencies are often present, through their loan and guarantee products, in project finance transactions located in developing countries – where a great deal of project finance takes place.

In addition, these institutions often play a facilitating role for projects by implementing programs to improve the regulatory frameworks for broader participation by foreign companies and the local private sector. In many cases, the multilateral agencies are able to provide financing on concessional terms. The additional benefit they bring to projects is to provide further assurance to lenders that the government and state-owned companies will not interfere detrimentally with the project.

Conclusion

No doubt, Nigeria's stranded gas holds great prospects for the future and the mini GTL, whose CAPEX is low, can be employed by investors and sponsors to develop the vast prospect.
The fuels produced through the mini GTL process are competitive in price with fuels produced from crude oil when crude is selling at $55/bbl, a figure that includes market-rate feedstock cost. Even with today's historically low price of oil, the mini GTL process can profitably produce high-quality gasoline.

By transforming Nigeria's vast domestic resources of natural gas into valuable transportation fuels, GTL can increase energy independence, stimulate the economy and reduce greenhouse gas emissions.

With mini GTL, it is possible to unlock the advantages of GTL with low-cost, high-efficiency plants that do not require multibillion-dollar capital investments. Project sponsors are open to project finance opportunities as the lenders can mitigate the risks that come with it and the bankability of the project.

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