



Figure 1 Kawa mountain, Region 8, Guyana

Guyana's Oil Boom: risks and opportunities in a new era for extractive industries

September 2019

Background: Guyana's natural resources industry

Guyana's mineral wealth consists mainly of gold, bauxite, manganese and diamonds. In 2017, extractive industries accounted for 21% of Guyana's GDP, 9% of government revenue and 4% of employment. Gold is by far the largest source of revenue, and producers are required by law to sell their output to the Guyana Gold Board or one of its licensed dealers. However, approximately 70% of gold production comes from artisanal and small miners, and the government estimates smuggling at about US\$1 billion.

Large-scale mining is concentrated in a few Russian, Chinese and Canadian producers. The main expansion under way appears to be a new manganese mine owned by the Bosai group, which has secured an exploration license over 46 thousand acres and is expecting to complete construction activities and initiate production by year-end.

That said, mining is about to be overtaken by oil in terms of its contribution to the economy. By 2025, the government revenue generated by offshore oil production may exceed that from mining by a factor of 30. Exxon is the lead shareholder (with a 45% stake) and the operator of the Stabroek block; Hess and CNOOC have stakes of 30% and 25% respectively. Oil production will start from the Liza-1 project is due to begin in the first quarter of 2020, to be followed by at least two other production hubs.



Figure 2 Guyana

Operator	Project	Start	Production target	Revenue (est)
Exxon	Liza phase 1	Early 2020	120kbpd	US\$2.4bn
Exxon	Liza phase 2	2022	205 kpd	US\$4.1bn
Exxon	Payara	2024	180kbpd	US\$3.6bn

Exxon is also the operator of the Canje and Kaieteur fields. Meanwhile, the operators looking to emulate Exxon's success include Repsol (Kanuku block), Tullow (Orinduk block), CGX (Demerara and Corentyne blocks) and Anadarko (Roraima block). Collectively, they have planned to drill several exploration wells this year and it is likely that some of them will be successful and lead to additional volumes. In the long term, it is also possible that natural gas reserves will be monetized in some form.

Oil exploration and production

To date, Exxon has deployed three drill ships in Guyana and is reportedly considering adding a fourth. Collectively, they have made 13 discoveries adding up to an estimated recoverable reserve of 5.5 billion barrels in the Stabroek block. This puts Guyana on track to exceed established producers like Mexico (7.2 billion) and Norway (7.7 billion) once future discoveries in Stabroek and neighboring blocks are taken into account.

So far, Exxon has approved two production hubs. Liza-1 is due to start production in late 2019 with a target rate of 120 thousand barrels per day (kbpd). Liza-2, with an expected production capacity of 220 kbpd was approved on May 3, 2019 and is due to come online in 2022. Exxon has flagged the potential for a further three production hubs by the middle of the next decade. Oil production from the Stabroek block alone may exceed 600 kbpd by 2026, putting Guyana ahead of OPEC member Ecuador.

Exxon will produce oil using floating production, storage and offloading (FPSO) vessels. An FPSO collects oil from several submarine wells, and it separates any water and gases for reinjection back into the oil field. Oil tankers connect to the FPSO to collect the oil for delivery into the export market. Thus, Guyanese oil should never reach the mainland.

The Petroleum Agreement of 2016

The objective of the government during the negotiation phase is to maximize revenue without discouraging investment. Governments can collect revenue from hydrocarbons using a range of instruments including:

- Royalties
- Income tax
- Resource rent tax
- Production sharing agreement
- Equity stake



Figure 3 Oil platform

The optimal mix depends in part of the government's risk appetite, i.e. its tolerance for volatility in the revenue stream. Countries with high income levels and diversified sources of income can afford higher levels of risk, which can be achieved via a resource rent tax and/or an equity stake. In Guyana's case, an aversion to risk is likely to have shaped the government's approach in the Petroleum Agreement.

Oil production volumes will be split into two different streams. *Cost Oil* is the share of production that will be

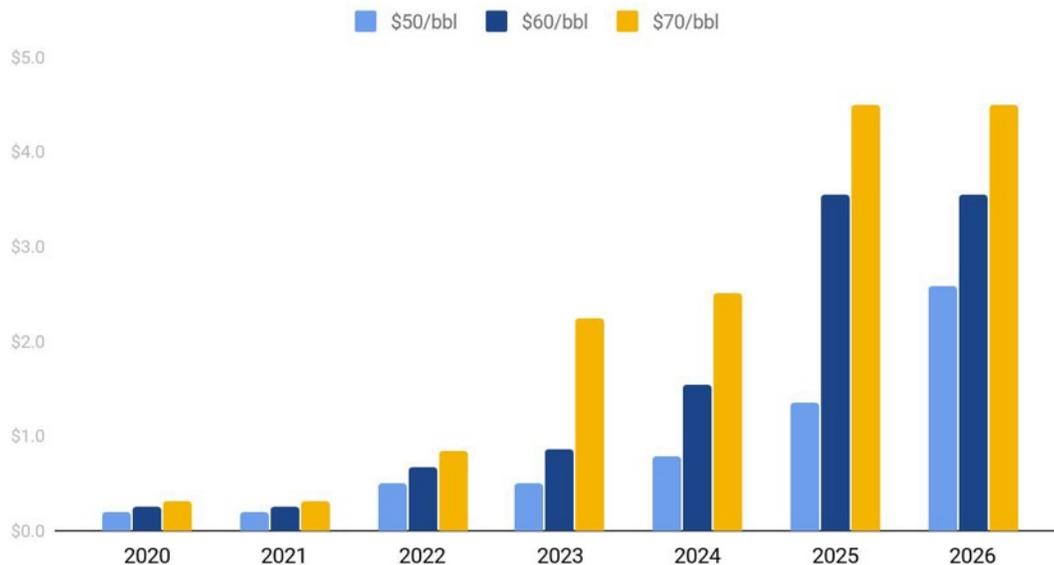
sold by Exxon in order to offset the costs incurred in the development and operation of the oil field, and *Profit Oil* is the remainder. The main source of government revenue will be its share of Profit Oil, which will increase rapidly over time as a) production volumes increase and b) the initial investment cost is reimbursed and Profit Oil grows relative to Cost Oil. In addition, the government will also earn a royalty on every barrel produced. The clauses and provisions that define these two revenue streams are:

- 11.2 Cost Oil is capped at 75% of monthly production net of losses and self-use.
- 11.3 Contract costs can be carried forward over until all costs have been recovered.
- 11.4 Profit Oil is shared between the Contractors and the Government on a 50:50 basis
- 15.1 The Contractor is exempt from income tax, VAT and other fees, with minor exemptions
- 15.6 The Contractor will pay a 2% Royalty to be paid in cash or in kind

Thus, the Guyanese government will receive 52% of the profit generated by Exxon and its partners. The definition of recoverable contract costs, and hence of Profit Oil, is included in Appendix C of the agreement. The agreement also includes a US\$300K commitment by the Contractors to fund environmental and social projects, to be selected jointly each year by the Minister and the Contractors, but this amount is negligible relative to the total revenue.

Government revenues will be a function of production volumes, operating cost and the global price of oil. Exxon has outlined its expected production rates for the next five years, and it has described Guyana as a low-cost project. The consultancy Wood Mackenzie has estimated the break-even price of the project at US\$46/bbl using a 15% rate of return, and Exxon has estimated a rate of return in excess of 10% under a US\$40/bbl price. Based on these data points, we estimate the operating cost of the project at US\$26/bbl. On that basis, we estimate the government take from the first three phases (Liza 1-2 and Payara) under different oil price scenarios:

Government take under different oil prices - US\$ billion



Exxon has indicated that the size of the oil reserve can support higher production rates, and other blocks have not been fully explored. The revenue estimates shown above are a baseline that is likely to be exceeded.

Stabroek is only one oil block among many in Guyana. In fact, the Petroleum Agreement with Exxon (June 2016) was preceded by similar contracts signed with CGX (February 2013) and Tullow (January 2016) for the Demerara and Orinduik blocks, respectively. The commercial terms in those two contracts are similar, albeit with slightly higher share of Profit Oil for the government relative to the Exxon contact.

Governance in Guyana's energy sector

Guyana ranks alongside most other countries in Latin America in terms of perception of corruption. However, it lags the rest of the region in several development indicators including GDP per capita (15th out of 20), adult literacy (18th) and life expectancy (20th). According to a global survey by the World Bank, Guyana ranks in the 38th percentile for control of corruption and the 41st percentile for government effectiveness.

A recent report by the EITI highlights some of the shortcomings of Guyanese institutions, noting for example that the reporting templates of several producers (including Exxon) were not signed by the authorized officer. More broadly, it showed that:

Government Agencies' records on exports were different from one another as well as from the companies' records... GGMC and GGB do not systematically crosscheck exports data GRA's records to identify the potential discrepancies.

In that context, in December 2018 the Inter-American Development Bank approved a US\$11.6 million loan. The conditions attached to the loan commit the Guyanese government to:

1. *creation of the Department of Energy (DE) within the Ministry of the Presidency to take over responsibilities related to the governance and development of Guyana's oil and gas sector.*
2. *approval by the DE of a draft roadmap to develop Guyana's oil and gas institutional framework.*
3. *design of a model contract for future Production Sharing Agreements (PSA) by the DE and presented to Guyana's Ministry of the Presidency.*
4. *a DE functions manual establishing its organizational structure, budget and staff allocation, approved by the Ministry of the Presidency.*
5. *a PSA set of protocols and mechanisms for contract management.*
6. *an oil and gas depletion policy designed by the DE and presented for approval to the Ministry of the Presidency.*

The Department of Energy (DOE) was created last year and its staff was made up of 15 employees as of March 2019. The DOE is actively recruiting to fill vacancies in several functional areas. In April 2019, the World Bank approved a US\$20 million loan to promote governance of Guyana's energy sector, although the conditions of the loan are not publicly available.

Experience in other countries

One year after the 2016 Petroleum Agreement, the International Monetary Fund issued a report titled "Guyana: A reform Agenda for Petroleum Taxation and Revenue Management". The report argues that the terms of the 2016 agreement "are relatively favorable to investors by international standards... Existing production sharing agreements appear to enjoy royalty rates well below of what is observed internationally."

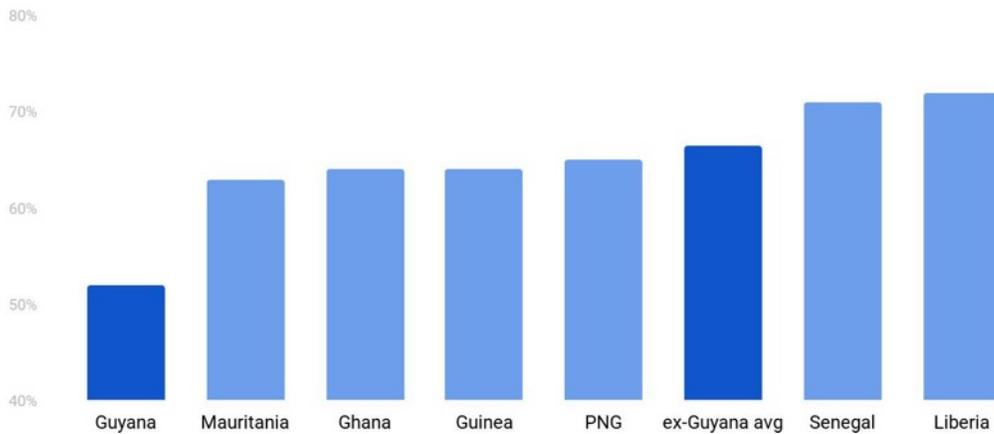
Copies of the IMF report are not publicly available, but media sources state that the recommendations made by the authors include:

- employ a more progressive tax regime so that the government receives a higher share of profits as projects earn more
- consider eliminating interest expenses from the project's costs to avoid "abusive use of debt"
- introduce tighter ring fences to avoid costs being shared around multiple fields
- bulk up its regulatory capability

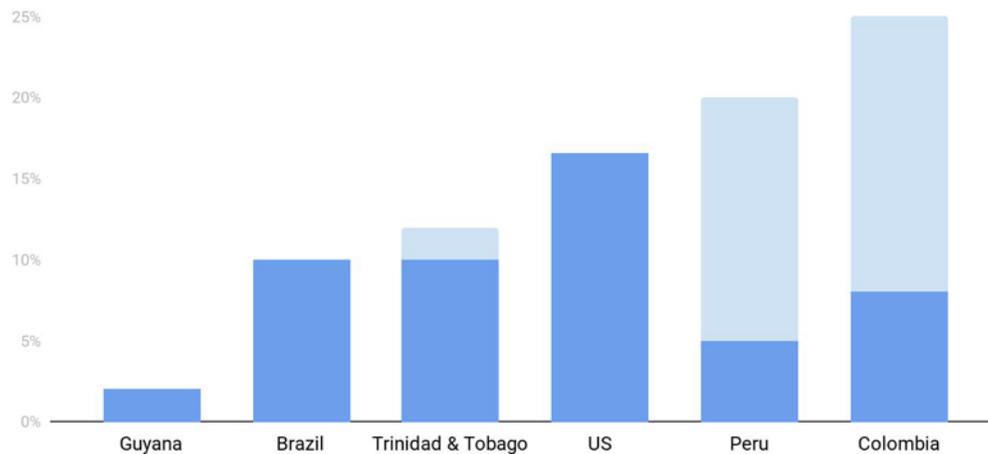
To be clear, a comparison of commercial terms between countries must take into account a wide range of factors. But the view that Guyana may have left money on the table seems justified when comparing the 2016 agreement to the expected government take in other countries with similar characteristics. Papua New Guinea is particularly relevant because Exxon is active there as a major hydrocarbon producer.

Government share of profits in the oil sector

Offshore production in high-risk emerging countries



Royalty rates by country



The ripple effect of hydrocarbon revenues

The Guyanese economy is set to experience an increase in capital investment and government spending on an unprecedented scale. The World Bank expects GDP growth to reach 34% in 2020, up from 4.6% in 2019.

But a booming energy sector can also starve other sectors of investment and labor. Countries where oil and gas drive economic growth can also suffer from an appreciating currency and/or rising inflation, a loss of competitiveness and an increase in unemployment. For example, the development of oil and gas fields in the North Sea in the 1960s and 70s sent hydrocarbon production in the Netherlands and Great Britain soar, but the Dutch guilder and the British pound appreciated significantly over that period, and by 1981 both countries were in recession.

For example, high inflation and/or a more expensive Guyanese dollar could drive labor costs higher, and this could result in tradable goods produced in the country -from agriculture to mining- being at risk from competition. And while the oil industry is not labor-intensive, demand for skilled workers is likely to grow significantly relative to the modest size of the country's labor pool.

Guyana's Sovereign Wealth Fund

The government has adopted a long-term development plan called Green State Development Strategy (GSDS) that aims to turn Guyana into “*a model of sustainable development and environmental security worldwide, demonstrating the transition to a decarbonised and resource efficient economy that values and integrates the multi-ethnicity of our country and enhances the quality of life for all Guyanese.*”

In August 2018, the Ministry of Finance published a green paper for a Natural Resources Fund (NRF). Guyana's sovereign wealth fund will channel revenues from the oil sector into the government's budget, and is meant to 1) support the implementation of the GSDS, 2) protect the Guyanese economy from the volatility of global oil markets and c) ensure that future generations continue to benefit once oil production runs out. The National Assembly approved the bill in January 2019, and the President added his signature the following month. The government received advice from the World Bank, among others.

The key features of the NRF are:

- A fiscal rule designed to limit withdrawals in order to 1) ensure the long-term growth of the fund and 2) mitigate the risk of increased revenue and expenditure for the broader economy.
- Parliament is responsible for approving the annual withdrawal amount
- The Ministry of Finance is responsible for the overall management of the fund, setting the limits under the fiscal rule, determining the withdrawal amount and preparing the annual report.
- A Sovereign Investment Committee (whose seven members are appointed by the government, the opposition and civil society) advises the Ministry of Finance on the investment mandate for the fund.
- The Bank of Guyana is the operational manager of the fund and publishes quarterly and annual accounts.
- The Private Manager is responsible for the investment portfolio.
- The Auditor General is responsible for auditing the accounts and reports of the fund.
- The fund will invest overseas, subject to the list of eligible assets and their respective ceilings.

The NRF has many elements in common with the sovereign wealth funds of countries that are often held as an example, such as Norway. That said, there are two areas for concern. First, the fiscal rule allows the government to front-load the spending of oil revenues in the early years of the fund, which is also the period where the institutions to manage the fund are at their weakest. More importantly, the overly generous terms and lack of transparency of the profit-sharing agreement raise questions about the ability of officials at the Ministry of Finance and Bank of Guyana to be competent stewards, independent from political pressure.

Oil spill risk

Exxon is planning to develop the Stabroek basin using a type of technology called Floating Production Storage and Offloading (FPSO). The Liza wells are approximately 200 km offshore, and each well delivers the oil into a nearby vessel where the oil is processed and transferred to an oil tanker. This voids the need for a submarine pipeline and the associated onshore facilities.

Offshore oil production is less of a major environmental risk than on-shore production because off shore oil spills are relatively uncommon. Large spills during transportation have declined over time even as global oil production has roughly doubled since 1970. In the past decade, the average number of spills over 700 tons by an oil tanker is less than two per year (for reference, the volume of an Olympic swimming pool is equivalent to 2,300 tonnes or 16 thousand barrels of oil). In a global fleet of approximately 7,400 oil tankers accounting for 100,000 voyages per year, the probability is low.

Spills at the production site are also rare. The United States enjoyed a 40-year period without major incidents at an offshore platform until the catastrophic BP spill of 2010. That accident can be attributed to poor regulatory oversight and poor coordination between the operator and contractor, rather than offshore technology per se. Although regulatory oversight in Guyana may be weak, the US\$65 billion cost to BP is likely to sharpen minds in the oil industry and reduce the risk of a repeat accident.

Could Guyana become a natural gas producer?

Natural gas is often a by-product of oil, and the operator must decide on the most rational use of this gas. The higher the gas volume, the greater the incentive to invest additional capital in the processing and transport of gas. Publicly available information does not make it possible to assess the potential of the Stabroek and neighboring blocks, but Guyana may become a gas exporter in the long run.

If the volume of gas is insufficient to justify investment in infrastructure to bring it to market (e.g. gas processing plant and associated pipelines), the producer can dispose of the gas by **burning it at the well** (a practice known as flaring). This practice is both wasteful and harmful to the environment. Many governments and companies (not including Guyana and Exxon) have committed to eliminating flaring by 2030.

Alternatively, the producer can **reinject the gas** back into the well. This practice (known as enhanced oil recovery) increases the pressure in the oil field, thus helping to increase the production rate of oil. This is the default solution as long as gas volumes are modest.

If the volume of gas is significant, the producer has several options to commercialize it:

- Natural gas can be **converted into liquefied natural gas** in a dedicated vessel (FLNG) located close to the well. For reference, the annual revenue generated by a single LNG terminal is in the order of US\$1.5 billion.
- It can be sent **onshore via a submarine pipeline**. The Guyanese economy is too small to consume a large volume of gas, and it is too far from large demand centers in Brazil and Colombia to justify the construction of a pipeline. Instead, gas produced offshore could be exported after conversion to LNG or fertilizer.

Finally, gas could be sent by pipeline to **Trinidad & Tobago**, where existing LNG terminals have spare capacity and could accommodate an additional gas source.

Summary and recommendations

- The discovery and exploitation of extensive oil reserves are likely to transform Guyana's economy and society in a myriad of ways, all of which cannot be predicted in advance.
- Exxon is the dominant non-state actor in Guyana, and its influence is difficult to overstate. Like any other oil major, the company will also try to demonstrate good corporate behavior at a time of increased scrutiny.
- Exxon's success in the Stabroek block is likely to result in higher exploration activity in neighboring areas. The number of oil producers active in Guyana is likely to grow in coming years.
- The oil sector is likely to crowd out other sectors of the Guyanese economy. Mining companies may experience higher production costs due to wage inflation and a stronger Guyanese dollar, and the loss of competitiveness may discourage future investment to expand existing mines and/or to build new ones. That said, informal gold miners will likely still pose a risk, given the numbers of people participating in the sector and the lack of viable alternative employment.
- The design of Guyana's sovereign wealth fund is sound, but its benefits to the Guyanese people depend on the largely untested capacity of institutions to live up to those expectations. Strengthening governance of the oil sector through strong institutions, and robust transparency and public participation are keys to achieving this.
- While the proceeds from the oil sector will accrue via the Natural Resources Fund directly into the general budget, civil society organizations in Guyana will need to ensure that the government lives up to the principles of transparency and good governance, and meets the objectives of the Green State Development Strategy.

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