

Guyana: On the brink of exploration success?

Executive summary

With exploration activity in Guyana starting to gain momentum once more, hopes are high that the country might finally be able to deliver some commercial success. Located in the northeast corner of South America, Guyana is a country long considered to hold good hydrocarbon potential. Furthermore, the country is very open to private investment and been very successful in marketing its acreage to an impressive array of companies over the years.

There are two potential hydrocarbon basins. The larger, and more prospective, basin is the Guyana Basin which extends far offshore from the country's coastal plain. The second basin is the Takutu Basin, which is much smaller and lies inland, on the border with Brazil. However, very little drilling has taken place over the years and the country remains very under-explored. The geology is undoubtedly high risk and in a recent setback, Repsol YPF suffered a disappointment earlier this year on the Surinamese side of the Guyana Basin, when its West Tapir prospect came in dry. That well targeted just one of several prospective offshore plays in the Guyana Basin and many other prospects remain to be tested.

Reflecting the risks, the Guyanese fiscal regime is very favourable and the country is still drawing the attention of major players in the form of Repsol YPF and ExxonMobil, as well as smaller companies such the Canadian trio of CGX Energy, Groundstar Resources and BrazAlta Resources. With the resolution of the long-running maritime border dispute between Guyana and Suriname in 2007, exploration drilling is set to commence once more over the next few years and, with some luck, a new exploration and production frontier in South America may be opened.

Subscribers to our Latin America (Atlantic) Service can now access our new Guyana Service, which consists of a Country Overview. Fiscal models covering both the Guyana and Takutu basins have been created in GEM, and PathFinder has been populated with the latest block & well data.

If at first you don't succeed...try again

With exploration activity in Guyana starting to gain momentum once more, hopes are high that the country might finally be able to deliver some commercial success. Located in the northeast corner of South America, Guyana is a country long considered to hold good hydrocarbon potential. Indeed, in 2001 the United States Geological Survey (USGS) estimated that the Guyana Basin held recoverable reserves potential of around 15 billion barrels. Although this figure is now considered to be overly optimistic, it still suggests that significant potential exists.

There are two potential hydrocarbon basins. The larger, and more prospective, basin is the Guyana Basin which extends far offshore from the country's coastal plain. The second basin is the Takutu Basin, which is much smaller and lies inland, on the border with Brazil. Some of the upstream sector's largest companies have looked at Guyana over the years, with the likes of Shell, Total and Conoco all involved in exploration activity. However, very little drilling has taken place over the years and the country remains very under-explored.

Reflecting the risks, the Guyanese fiscal regime is very favourable and the country is still drawing the attention of major players in the form of Repsol YPF and ExxonMobil, as well as smaller companies such as the Canadian trio of CGX Energy, Groundstar Resources and BrazAlta Resources. With the resolution of the long-running maritime border dispute between Guyana and Suriname in 2007, exploration drilling is set to commence once more in the next few years. However, with many geological uncertainties, the risks must be considered high.

The Guyana Basin

The Guyana Basin is a well developed half-graben, passive continental margin type sedimentary basin. The entire basin actually spans four countries with the majority lying in Guyana and Suriname with minor extensions into Venezuela and French Guiana. In Guyana, this basin covers the country's entire coastal region and extends offshore approximately one hundred and fifty kilometres.

Exploration history

The first well in Guyana was drilled on the onshore coastal section of the basin in 1916. Offshore exploration kicked off in the 1950s, and drilling activity peaked in the latter part of the 1960s, before tapering off in the mid-1970s. Several companies were involved, including Conoco, Comoro, Deminex, Oxoco, Tenneco and Shell. Nine wells were drilled over the period, but only a single well encountered hydrocarbons. Shell's Abary-1 well, drilled in 1975 in what is now Repsol YPF's Georgetown licence, found oil and gas shows, and flowed 37° API light oil. Through the latter part of the 1980s and into the 1990s, Mobil, Total, Guyana Exploration and BHP continued the exploration effort. In 1990, Total drilled the offshore Arapaima #1 well, although it proved to be uncommercial.

The most recent offshore activity occurred in mid-2000, when CGX Energy attempted to spud a well on its Eagle prospect. However, the rig was run off its location by Surinamese gunboats, which claimed that it was in Surinamese waters. This was part of a long-running dispute between the two countries over the maritime border. CGX was forced to move the rig and went on to drill its Horseshoe West prospect in the Corentyne block. The well failed to encounter commercial quantities of oil or gas due mainly to the absence of a shale seal. The company also drilled three onshore wells during 2005 on its Berbice Block, through its operating stake in the ON Energy JV, but all three were also dry holes.

No further drilling has taken place offshore Guyana since. In September 2007, the century old border dispute between Guyana and Suriname was finally settled by the United Nations International Tribunal of the Law of the Sea (ITLOS). Guyana was awarded 33,000 square kilometres, the majority of the acreage under dispute, with Suriname awarded the remaining 17,800 square kilometres. This allowed Repsol YPF to drill a well offshore Suriname earlier this year in Block 30. Unfortunately, its West Tapir prospect came in dry, yet another disappointing offshore result in the basin. However, the Guyana Basin remains hugely under-explored and hopes for exploration success remain high.

Hydrocarbon generation and potential traps

The main source kitchen is the Canje-Saramacca petroleum system, located offshore in deep waters close to the Guyana-Suriname border. The source rock is the Cenomanian to Turonian-aged Canje Formation. Hydrocarbons are believed to have migrated southwards from the source rock in an updip direction towards the onshore (where the Tambaredjo and Calcutta fields in Suriname are found). The main risk is whether or not adequate seals are present. This was identified as the problem with the unsuccessful Horseshoe West well in 2000, and may also be the reason for the disappointing onshore drilling results. However, several distinct areas have been identified as offering exploration potential:

- **Berbice Canyon:** This Tertiary feature makes a deep incision into the Canje source rock and continues further down into the Potoco carbonate sequence in places. Its close proximity to the Canje source rock in conjunction with contained gravity flow sands that are also evident makes it a highly prospective play.

- Tertiary Turbidite Fans: These turbidite fans are present along the basin's entire shelf margin, and were the target of Shell's Abary-1 well in 1975. The fans are the main targets in CGX Energy's Corentyne Licence.
- Demara High: This structural high is a Cretaceous feature that has faulted four-way closures. Major faulting and pinchout structures in Jurassic sediments, which lie beneath an early-Cretaceous angular unconformity some 100 kilometres offshore, is also another highly potential prospect.

The Takutu Basin

Located deep in Guyana's interior and straddling the border with Brazil, this intra-cratonic rift basin separates the country into two distinct geological provinces (northern and southern). The Guyanese section of this basin covers an area of approximately 10,000 square kilometres and is up to 6,000 metres deep in some places.

Exploration history

This basin is very under-explored with only five exploration wells drilled so far. All of the wells were drilled between 1981 and 1993 (three in Guyana, two in Brazil) and all targeted the Apoteri Formation within basalt structures in what is known as the Rupununi Trough. All were dry holes, with the exception of Home Oil's Karanambo-1 well drilled in 1982 which encountered oil shows.

Hydrocarbon generation and potential traps

The main risk in this basin appears to be uncertainty over reservoir quality, a problem confirmed by four out of the five wells drilled to date. The Manari Formation is the main source rock, and there are two distinct formations that have been identified as potentially providing good reservoirs:

- Apoteri Formation: The high quality of oil encountered by the Karanambo-1 well in this formation suggests good reservoir potential, although the flow could not be sustained due to poor reservoir quality. Trap and conduit potential is thought to be excellent here, due to the combined effect of possible interconnected fracture networks as well as vertical movement of fault blocks. Consequently, the mechanisms to facilitate the movement of petroleum is present. The last well that was drilled showed evidence of hydrocarbon residue. However, this residue appeared to be exposed to extremely high temperatures for a prolonged period.
- Takutu Formation: Potential for the trapping of hydrocarbons is high in this formation due to its low energy shale deposits towards the centre of the basin and high energy delta fan deposits at the basin margins. Additionally, pinchout traps, structural traps associated with salt movement, and growth faults, heighten the formation's trap potential.

The main players and their future plans

Table 1 lists the licences that are currently active in Guyana. Map 1 shows the location of these licences. It is the offshore areas of the Guyana Basin that are believed to hold the greatest potential and this is where most activity will be seen in the years ahead.

Table 1 – Exploration blocks in Guyana

Block Name	Basin	Onshore /Offshore	Participants	Area (km ²)	Award Year	Current Activity
Takutu PPL	Takutu	Onshore	BrazAlta Resources (55%)*, Groundstar Resources (45%)	9,800	2005	Exploration drilling set to commence in 2009
Berbice	Guyana	Onshore	ON Energy (100%)*	2,790	2003	Studies ongoing following disappointing drilling results in 2005
Corentyne Annex	Guyana	Offshore	CGX Energy (100%)*	4,047	2001	
Stabroek	Guyana	Offshore	ExxonMobil (100%)*	50,370	1999	2D seismic acquisition planned for 2009
Corentyne	Guyana	Offshore	CGX Energy (100%)*	8,837	1998	536 km ² 3D seismic survey underway
Pomeroon	Guyana	Offshore	CGX Energy (100%)*	11,331	1998	
Georgetown	Guyana	Offshore	Repsol YPF(45%)*, Tullow Oil (30%), CGX Energy (25%)	13,076	1997	1650 km ² 3D seismic survey underway
* denotes operator						

Of all the companies operating in the country, **CGX Energy** of Canada is most exposed. The company's entire portfolio is focused on Guyana, both the onshore and offshore Guyana Basin. Onshore, the company holds a majority stake in the Berbice Block, through the ON Energy joint venture (owned 62.5% by CGX Energy, 37.5% by local investors). However, exploration results on the block to date have been disappointing, with three dry holes drilled in 2005. The results are still being analysed before any further activity takes place. Moving offshore, it has a 100% stake in three offshore blocks, Corentyne, Corentyne Annex and Pomeroon, and is currently looking for partners. Initial activity will focus on the Corentyne Block, where 536 square kilometres of 3D seismic is currently being acquired. Following the processing of the data, the company hopes to farm-out some equity in the block. CGX also holds some equity in the offshore Georgetown Block (see below).

In terms of total acreage, **ExxonMobil** is the most heavily exposed company. It holds a 100% stake in the Stabroek Block, a huge licence (50,370 square kilometres) that extends across Guyana's entire deepwater maritime area, from the border with Venezuela to the northwest down to Suriname in the southeast. The company has held the block since 1999, but all exploration activities were on hold until a resolution to the Guyana-Suriname maritime border dispute could be found. Now that the issue has been resolved, the company is preparing to resume its exploration activity and has plans to carry out an extensive 2D seismic campaign possibly in Q1 2009.

The other large company in the country is **Repsol YPF**, which has a 45% stake in the offshore Georgetown Block located adjacent to Suriname. The company has recently farmed out a 30% stake to Tullow Oil and the remaining 25% is held by CGX Energy. This is the block where Shell's promising, although non-commercial, Abary-1 well was drilled in 1975. Operations have begun to acquire some 1,650 square kilometres of 3D seismic to help define drilling targets.

The final block in the country is Takutu, which effectively covers the whole of the Guyanese portion of the Takutu Basin. This block was awarded to Groundstar Resources in 2005. In 2008 BrazAlta Resources farmed in 55% on the licence and is now the block operator. Drilling is set to start in Q2 2009, when the Karanambo prospect is to be drilled once again (good oil shows were found at this location in 1982).

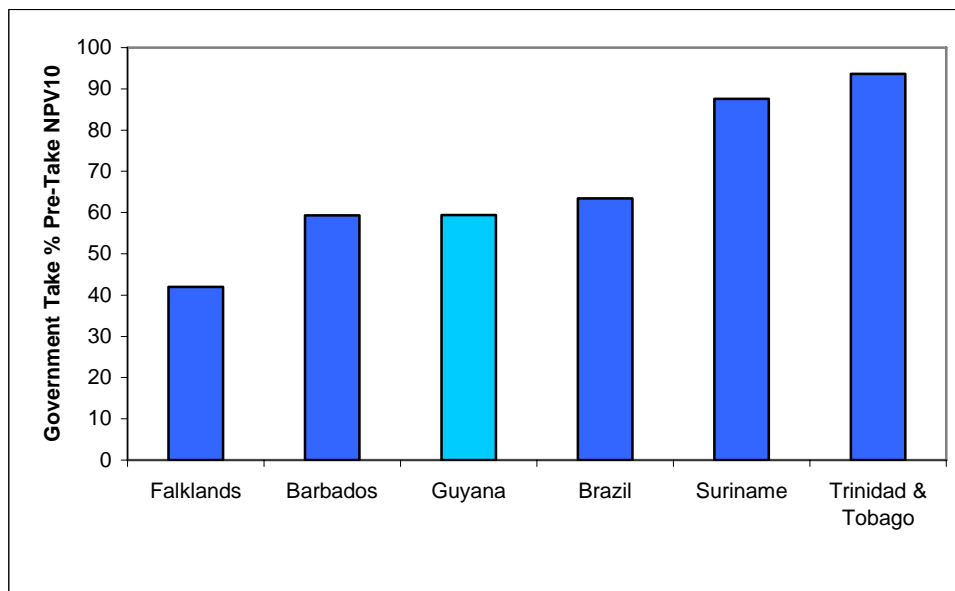
An attractive fiscal regime

Guyana operates under a relatively straightforward PSC system. The exact terms vary from licence to licence, but the following can be taken as a reasonable approximation:

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- **Cost recovery:** Following the start of commercial production, the contractor will be able to recover all capital and operating costs per month to a maximum of 75% per month during the first three years. After this period, contractors will be able to claim a maximum of 65% of recoverable capital and operating costs per month.
- **Profit oil:** The contractor's share of the remaining production (profit oil) during the first five years will be 50% of the first 40,000 barrels of oil produced per day and 47% of additional production. After this five year period, the contractor's share will be reduced to 45%.

Chart 1 – Government take comparison between the Atlantic margin countries of Latin America¹



¹ The fiscal terms of over 100 global fiscal regimes are compared in Wood Mackenzie's *Government Take* study, published in June 2007. For details, please go to www.woodmac.com/take.

It is worth noting that the 1% royalty and 45% income tax payments are paid by the government on behalf of the contractor. Contractors' obligations are waived as they are considered to be part of the state's share of profit oil. Another point of interest is that there is no mandatory state participation in any upstream activity.

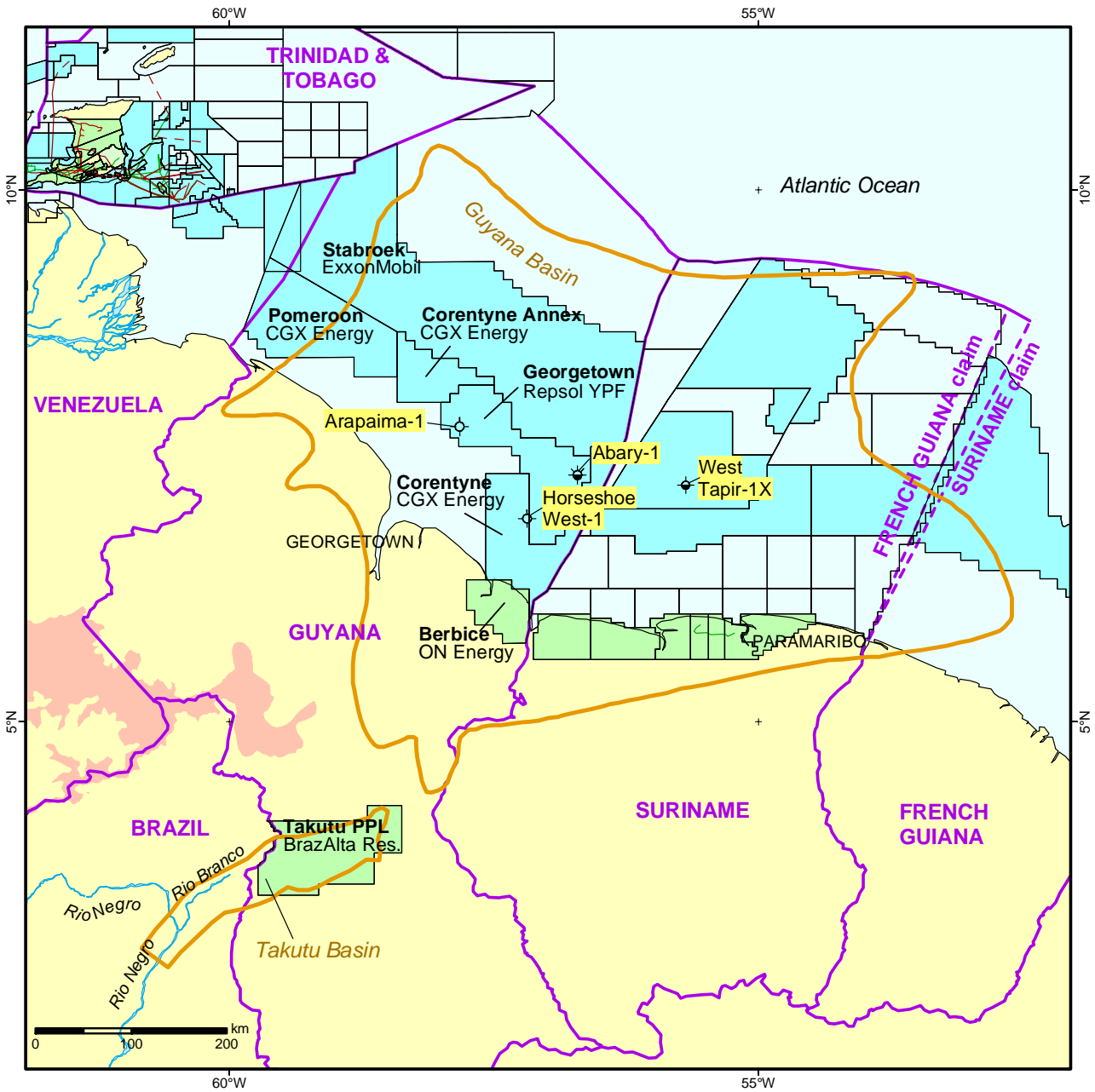
Chart 1 shows that Guyana's fiscal system compares well with other countries in the region, and in particular it offers notably more attractive terms than its immediate neighbour, Suriname. Interestingly, the terms are roughly similar to those offered by Barbados in its recent licensing round (see our July 2008 Insight '*Barbados: The opening of a new exploration frontier?*'), another country that has high hopes for its virgin exploration acreage.

Conclusion

The resolution of the long-running maritime border dispute between Guyana and Suriname has proven to be the catalyst for a resumption in exploration activity in the offshore Guyana Basin. In Guyana itself, all the companies with offshore positions have embarked on seismic acquisition campaigns with drilling soon to follow. Elsewhere, exploration efforts in the inland Takutu Basin are also set to resume with drilling planned for 2009.

The country has long been considered as holding good hydrocarbon potential, but the associated risks are high. No commercial discoveries have been made to date in Guyana, but the country's oil and gas fortunes might be about to change.

Map 1 – Exploration acreage in Guyana



Source: Wood Mackenzie PathFinder

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