Investor Briefing

July 2017

GREENPEACE

Amazon Reef

Investor risk from Total's and BP's plans

This briefing outlines Total's and BP's controversial plans to commence deep water exploration drilling in the Foz de Amazonas (the Mouth of the Amazon) - an area of exceptional ecological significance off the northern coast of Brazil. It highlights the risks the companies face as well as concerns regarding their assessment of the risk of and response to an oil spill. We suggest questions investors should ask the companies to understand whether the various risks are being adequately assessed, mitigated, and managed.

In May 2013 Total E&P do Brasil Ltd as operator (in a partnership with BP and Petrobras) won licenses for oil exploration at five blocks in the Mouth of the Amazon basin. A BP-Petrobras partnership and a Brazilian oil company Queiroz Galvão Exploração e Produção S/A took the other two respectively. Total has announced its intention to commence its exploration campaign in late August or early September 2017 at two of its blocks.[1] The company hopes to drill between seven and nine wells and has until August 2021 to carry out its entire exploration programme.[2]

The Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) is currently reviewing Environmental Impact Assessments, oil spill modelling, and related studies - the last step before issuing final approval to Total. IBAMA has recently rejected Total's latest oil spill modelling and a number of requests remain outstanding. On May 3, the Federal Prosecutor for the State of Amapá recommended the suspension of the environmental licensing process.[3]

Total has called the Mouth of the Amazon basin "*a difficult and challenging play.*"[4] Since the 1970's, there have been 95 attempts to discover oil[5] in the Mouth of the Amazon basin and none have been successful. Experts have highlighted that while the region has significant development opportunities, it also has "*significant operational hazards*".[6]

Given the presence of a newly photographed and not yet fully documented unique reef system in the Mouth of the Amazon basin, Total and BP's plans are attracting increasing scrutiny.

Major Risks for Investors

- High-profile, ecologically significant region
- Expert & regulator concern about oil spill modelling
- Federal Prosecutor recommending suspension of licensing process
- Growing pressure from civil society and local community groups
- Technically challenging project with estimated $85-$100 break-even price

Commercially exploitable resources

There are questions whether the Mouth of the Amazon basin holds commercially exploitable oil resources. BP has previously unsuccessfully invested in exploration drilling in the Mouth of the Amazon basin. In 2004 it announced that drilling in Block BM-FZA-1 in the Mouth of the Amazon had cost more than $60million due to the remote position of the blocks and swirling currents but had not been a commercial success.[7] It has been reported that the company found insignificant amounts of gas rather than oil.[8] According to Total, in a submission to Ibama, "*the probability of finding hydrocarbons in commercial quantities in the blocks is relatively low, considering the geological and geophysical studies being conducted at this time…*".[9]

While Total has claimed that this project has been evaluated within prices scenarios of $40-$60 bbl,[10] energy analyst Wood Mackenzie estimates break-even prices of $85-$100[11] Investors should ensure that Total as operator will be in a position to maintain the highest standards of health & safety and environmental protection if reducing the operating costs of an ultra-deepwater project.

Total acknowledged at its 2017 AGM that there was an average of 8 years between exploration and production for similar projects.[12] Accordingly, the profitability of the Mouth of the Amazon project will be determined by market conditions into the 2030s. Oil prices may be impacted by both already anticipated advances in transportation technology as well as government policies to address global climate change. Meeting the ambitions of the Paris Agreement will mean immediate and drastic action to limit emissions and prevent fossil fuel extraction. Accordingly, investors need to carefully scrutinise company claims regarding breakeven prices for and the compatibility with Paris Agreement of projects like the Mouth of the Amazon.

IBAMA criticises Total's hydrodynamic module…upon which the accuracy of oil dispersion modelling is highly dependent as "statistically incoherent" in places

Operational challenges

Industry geologists have long believed that Brazil's north-east deep-water sector — from the maritime border with French Guiana to the Amazon Estuary — may host a major oil play, mirroring the prolific West African Play across the Atlantic.[13] However, although the first drilling blocks were allocated in the basin in the 1960s, no oil has yet been found[14] and companies have faced challenges in exploring the basin due to the treacherous operating conditions. Since the 1970's, there have been 95 attempts to discover oil[15] in the Mouth of the Amazon basin and none were successful, with 27 wells abandoned due to mechanical accidents.[16] References to exploratory drilling by industry and industry press often refers to the challenging conditions. [17][18] Total itself has called the Amazon mouth basin "*a difficult and challenging play*.[19]

Academic experts have also highlighted that while the region has significant development opportunities, it also has "*significant operational hazards*" and that "*Chief among the hazards are intense and highly variable ocean currents capable of delaying, disrupting, or damaging oil and gas exploration and production efforts.*"[20]

Remote operated vehicles will likely be deployed in the event of a well blowout. Experts have pointed out that "*the ability to effectively operate robotic vehicles in a western boundary current regime such as the NBC* [North Brazil Current] *has yet to be demonstrated.*"[21]

Questions for Total and BP

- Given BP's previous unsuccessful experience in the Mouth of the Amazon basin, the area's recently confirmed ecological significance, and current market conditions, why do the companies consider this project a strategically sensible allocation of capital?
- Given Total's own acknowledgement of the challenging operational conditions and the company's 'downplaying' of the potential of a significant find, why has Total prioritised this exploration play over other portfolio options?
- Given Wood Mackenzie's estimate of a break even price of $85-$100, can Total explain why it is confident about significantly lower break-even prices? How specifically will the company reduce costs? How will the company ensure that cost reductions will not compromise health & safety standards and/or environmental protection?
- What is the anticipated internal rate of return for this project?

An area of ecological significance

A unique coral reef system

Confirmation of the discovery of a coral reef at the Amazon mouth was announced in April 2016 by an international team of 39 scientists from 10 universities led by the Federal University of Rio de Janeiro.[22] The team conducted three expeditions in 2010, 2012 and 2014 primarily to research Amazon plumes although they also wanted to examine claims made in a 1977 scientific paper about catching reef fish along the continental shelf.[23]

In January 2017, Greenpeace captured the first underwater images of the Amazon Reef. Brazilian scientists participating in the Greenpeace expedition also established that the area of the Amazon Reef is far larger than originally thought. It is now estimated to extend over fifty thousand km^2 and as far as the coast of French Guiana, with some reef structures at depths of 200 meters.[24] According to scientists, only five per cent of the Amazon Reef has been documented to date.[25]

The unique oceanographic conditions, metabolic features and species discovered provide evidence that the Amazon Reef constitutes an entirely new biome or major ecological community type (such as tropical rainforest, grassland or desert) with characteristics distinct from coral reefs found elsewhere.[26] Its discovery is being celebrated as one of the most important in marine biology in recent decades.

A unique ecosystem

- Coral reefs are not generally found at the mouths of great rivers such as the Amazon River.[27]
- Unlike shallow reefs like the Great Barrier Reef, the Amazon Reef is subjected to extreme conditions: low light or none for the deepest parts, strong currents, the sediment the Amazon River it carries into the Mouth of the Amazon basin. Accordingly, some of the corals at the Amazon Reef have unique characteristics, and do not use photosynthesis but rather chemosynthesis. Chemosynthesis is a process that produces organic matter and energy from carbon dioxide, water and other inorganic substances (like ammonia, iron, nitrite and sulphur) without the presence of light.
- The 2016 study recorded 60 species of sponges, 73 reef fish species (many of them carnivorous), as well as spiny lobsters, starfish and other reef life.[28]

This is something totally new and different from what is present in any other part of the globe

Fabiano Thompson,Federal University of Rio de Janeiro[29]

One of Total's planned wells is only 28km from the Amazon Reef. Total's oil spill modelling acknowledges that in a worst case scenario, an oil spill could impact the Amazon Reef .[3031] The scientists who confirmed the existence of the Amazon Reef have expressed concern about oil exploration in the region without more *"complete social-ecological assessment"* of the Amazon Reef.[32]

Despite claiming in correspondence with Greenpeace that its existence was well-known, according to experts, Total in fact made no reference to the Amazon Reef in its initial Environmental Impact Assessment (EIA) submitted in March 2015.[33] At the request of IBAMA, Total included the Amazon Reef in a revised version of its EIA. However experts commissioned by Greenpeace to review the relevant documents have confirmed that Total has still not cited the Amazon Reef in key studies including the Vulnerability Analysis which forms part of the company's spill response plan.[34] The experts have also questioned the adequacy of Total's assessment of the risks to the Amazon Reef stating in correspondence that *"the impacts of oil spills on Biogenic Reefs were not appropriately described and supported by the bibliography. Moreover, important statements were unreferenced. This limits the reader's ability to understand the environmental consequences of this potential impact."*[35]

In early May, the Federal Prosecutor of the State of Amapá intervened to recommended the suspension of environmental licensing. According to the Prosecutor's public statement, Total *"did not take into account the important ecosystem of the coral reef of the mouth of the Amazon River. Thus, exploration in an area close to [the reef system] corals, without adequate environmental impact study, can cause irreparable damage to this unique and little known biome."*[36] The Prosecutor has reserved the right to take legal action in the event of an unsatisfactory response from IBAMA.

The largest continuous mangrove forest in the world

The northern Brazil mangrove belt at the mouth of the Amazon river stretches along the coast of Brazil, French Guiana and Venezuela. Some of this lies within the Cape Orange national park, in the north of the Brazilian state of Amapá. Parts of the mangrove is designated to be 'of international importance' by Ramsar, the Intergovernmental Convention on Wetlands.[37]

As well as being biodiversity- rich ecosystems, mangroves play an important role in climate change adaptation and mitigation.[38] Mangroves are highly sensitive to pollutants, and take years to recover from any contamination, let alone an oil spill. An offshore spill or a leak from a support vessel accident, if it reached the coast, could, according to an expert commissioned by Greenpeace, cause significant damage to this unique and important ecosystem.[39] Oil spills in the region's mangrove areas could, according to Dr. Moirah P. M. de Menez have "*catastrophic dimensions*", since the estuaries extend up to 40 km inland and the water table of nearby communities and cities could be contaminated.[40]

Total's oil spill modelling does acknowledge that in a worst case scenario, oil from an offshore spill could reach the coastlines of other countries with mangroves including Venezuela.

Questions for Total and BP

- If Total was aware of its existence - as confirmed by the CEO[41] - why was the Amazon Reef not included in Total's initial EIA and only included in a revised version following a request from the regulator?
- What are the companies's responses to expert criticism that the companies have still not adequately addressed the potential impacts on the Amazon Reef in their EIAs and spill response plans?
- Have the companies used the EIA process to consider the full range of options, including a withdrawal from the project, or have the companies only been considering the extent to which the environmental and social impacts may be mitigated?
- In light of the views of the scientific community about the uniqueness of the Amazon Reef and the need for further study (published after the initial EIAs) together with increasing civil society, local community, and international media interest in the Amazon Reef, will the companies review the adequacy of their environmental impact and risk assessment procedures for this project?
- Has Total considered how this project might impact its ambition to be 'the responsible energy major'?[42]

Impact of a spill and response

Concerns have been expressed by academic experts commissioned by Greenpeace to review Total and BP documents and by IBAMA regarding the quality of Total's oil spill modelling.

In its most recent review, IBAMA *"... decided not to approve the model presented, considering that it does not adequately represent the environmental variability of the region,..."*[43] while noting that Total had still not complied with some of the regulator's previous requests *"considered essential for a better assessment of impacts and risks for a region with little knowledge, with strong ocean dynamics and great ecological and socioeconomic importance."*[44]

IBAMA criticises Total's hydrodynamic module which simulates factors such as currents, sea level, temperature and upon which the accuracy of oil dispersion modelling is highly dependent as *"statistically incoherent"*[45] in places stating that it *"no way represents the environmental variability of the region in question."*[46]

Despite this, Total in subsequent correspondence to IBAMA, has refused to provide revised oil spill dispersion modelling in the event of an offshore spill from the well.

Other deficiencies highlighted by IBAMA include:

- A tendency by the companies to group and treat in a generic way species with distinct habitat, behaviour and conservation status.[47]
- Underestimating the risk of a support vessel sinking, consequent leakage of oil/chemicals - and oil reaching coast of Amapá, with no infrastructure in place to respond.

Total's own modelling for a worst-case scenario (30 days uncontrolled well blow-out[48]) has a total susceptible area of over 2,300km, affecting other jurisdictions including Barbados, Saint Lucia, Grenada, Trinidad and Tobago and Venezuela. Total's modelling indicates a 62.1% probability that a spill would reach Trinidad and Tobago in a worse-case summer scenario.[49] However, according to experts, Total's spill response plans does not contain key information - either in text or map form - on the susceptible areas outside of Brazilian jurisdictional waters, such as defining the priority areas for protection, the response procedures to be followed and available resources.

According to experts neither BP nor Total consider the Amazon Reef in the Vulnerability Analysis within their spill response plans.[50]

In the event of an uncontrolled well blowout Total would have to deploy a capping stack. However, unlike in the offshore US Arctic, companies are not required to maintain a dedicated capping stack on-site. In correspondence with Greenpeace, Total stated that the company would make all provisions in the case of an accident, highlighting that a capping stack is available in Rio de Janeiro. This equipment is owned by Oil Spill Response Limited, an industry-funded cooperative, and is jointly held in case of emergency by a number of oil companies working across South America.[51] Since Total does not own the equipment, this could of course mean that it is being deployed elsewhere should an emergency occur in the Mouth of the Amazon basin. In addition, given the distance to the drilling site, a vessel carrying it would likely take at least 10 days to arrive.

Investors may wish to clarify the estimated time required to deploy a capping stack and, if required, the time required to drill a relief well and the spill response measures that can be taken in the intervening time.

Compliance with regulator requests

From a review of the regulatory process to date Total are not complying with all requests from IBAMA. This failure to comply is explicitly mentioned by the regulator as a reason for its rejection of the oil spill modelling. A major spill in such an ecologically sensitive region could have a severe financial and reputational impact on Total and BP. In light of the inadequacies identified by IBAMA and academic experts, it would be prudent for investors to push for Total and BP to comply fully with all of IBAMA's requests rather than seek any waiver.

Failure to comply: Examples of outstanding queries from IBAMA

- 3D seismic data from Total in order to assess the geological and geotechnical risks including the stability of the equipments to be placed on the ocean floor
- Inclusion of the Amazon Reef within Total's Vulnerability Analysis which forms part of the spill response plan.
- New studies on the migratory routes of coastal and migrating avifauna to include primary data.

Questions for Total and BP

- Will the companies confirm that they will deal with *all* of IBAMA's outstanding queries and criticisms of their oil spill modelling and that they will not seek any waivers from the Brazilian government?
- What assessments and response plans have been made by the companies for the cross-border impacts of a worst case scenario spill?
- In the event of an uncontrolled well blowout, will a capping stack be guaranteed to be available to be deployed? Given that it will take around 10 days to arrive on site what steps can be taken while the capping stack is awaited? What is the daily flow rate in a worst case scenario spill?
- How many days would it take to drill a relief well if one was required? What contingency plans have the companies made to contract a second drilling rig for a relief well?
- Have the companies modelled spill impact and response for scenarios where capping takes more than 30 days? If so, will the companies publish such modelling?
- IBAMA has identified the lack of spill response infrastructure particularly in the coast of Amapá in the context of a support vessel oil leak. How will the companies overcome this problem and ensure an adequate spill response in such a scenario? What logistical challenges including time to deploy responders?

Local communities

Total did not consider the coastal and Indigenous communities in their assessment of the impact of an offshore oil spill (as they do not believe oil from a spill will reach the coast of Brazil). Distinct ethnic groups in Amapá state include Indigenous communities, quilombola communities, extractivist communities and riverside communities.[52] Many of these communities engage in small-scale fishing for subsistence or income, rely on uncontaminated water, and live in regions directly influenced by the tides at the Amazon mouth.[53] An oil spill or any alteration of the water quality could be disastrous for them.

Intense scrutiny and opposition

Confirmation of the reef's discovery attracted significant media attention including a feature in National Geographic magazine[54] and celebrity social media coverage.[55] Civil society campaigning and media coverage is likely to intensify further.[56] A number of Brazilian groups have written to the Minister of Environment opposing oil industry activity in the Mouth of the Amazon.

Conclusion

The impact of a major spill on an area of ecological significance demands close scrutiny and detailed assessment, as it carries with it the potential for significant financial and reputational impacts. In this context, the nature and number of unaddressed requests from the Brazilian regulator raises concerns about the adequacy of the companies's spill risk assessment and response particularly as it relates to the Amazon reef.

In addition to raising economic and climate risk resilience questions, Total's and BP's plans are increasingly gaining critical attention from civil society.

Investors must question whether Total and BP are adequately assessing and addressing the full range of risks inherent in this controversial project and whether it presents an appropriate risk/return profile.

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