COUNTRY ECONOMIC MEMORANDUM

for São Tomé and Príncipe

Background Notes

Note #4 – Update on oil and gas exploration and production in São Tomé and Príncipe

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I. Introduction

1. **São Tomé and Príncipe is surrounded by oil-producing neighbors, but haven't found commercially viable oil in its territory so far.** São Tomé and Príncipe (STP) is surrounded by major oil producing countries including Nigeria, Equatorial Guinea, and Gabon, but there has not been any commercial oil or gas discoveries in the country's waters yet. STP is exploring for oil in two different zones under different jurisdiction: the Joint Development Zone (JDZ) with Nigeria, and the Exclusive Economic Zone (EEZ). There are talks as well for a joint exploration zone with Equatorial Guinea.

2. **The purpose of this note is to update the status of oil and gas exploration in STP and provide a probability and timeline for eventual discoveries and commercial production**. The answers to these questions are key to the country's long-term development prospects, as it would alter dramatically STP's development path.

3. São Tomé and Príncipe EEZ is a frontier area for oil and gas exploration, with low discovery probability, and in very early stage of prospection, thus no oil production should be considered in a baseline scenario. Newcomer companies with new ideas on geology and new technologies opened the door to a revival of exploration in the EEZ. However, STP EEZ is a 'frontier area' in terms of exploration, which means that its subsoil has not been drilled yet, not even for exploration or appraisal wells. Such areas have success rate below 15 percent. In the case of a discovery, at least five years will be necessary before commercial production begins. Thus, no oil or gas production scenario can be considered before drilling the exploration or appraisal wells, taking into account all the uncertainties.

II. There have been activities in both zones, but EEZ is the most active zone now

II.a. Joint Development Zone

4. **The Nigeria - STP Joint Development Zone is a small area of deep-water acreage in the Gulf of Guinea.** Both Nigeria and STP claimed the area, but in 2001 an agreement was reached between the two countries allowing the exploration of the area. The northern part of the JDZ lies in the Niger Delta Basin, which has significant discoveries on the Nigerian side. However, at the proximal edge of the delta (extending into the JDZ) most discoveries to date have been of gas, which is much harder to

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commercialize.

5. **The JDZ has its own governance arrangement and uses production sharing contracts.** There is a Joint Ministerial Committee, which has the overall political responsibility, and a Joint Development Authority (JDA), which regulates petroleum activities in the JDZ. The JDA is divided in 11 blocks. All licenses are under production sharing contracts (PSC)[1] with signature bonuses and exploration work commitments. Any future development would pay royalty.

6. **Exploration in the JDZ from 2009 to 2013 did not find commercially viable reserves.** The JDA has auctioned six oil blocks so far. Addax (subsequently acquired by Sinopec) conducted the JDZ's first major drilling campaign in 2009 and completed five exploration wells. The Lemba and Bomu gas fields, and the Kina oil and gas fields were discovered during the campaign, but oil prospects proved disappointing. The only other liquids discovery was the Obo field on Block 1, but further appraisal on Obo failed to yield additional volumes. Sinopec exited Blocks 2, 3, and 4 at the end of 2012. Of the major oil companies: ExxonMobil, Chevron, and Total have each taken turns in Block 1 of the JDZ but haven't succeeded. Block 1 lies adjacent to the Total-operated OML 130 field in the Nigerian sector, which contains the producing Akpo gas-condensate field. Total exited Block 1 in September 2013.

7. **Exploration in the JDZ is stalled.** The exploration activity in the JDZ is now limited, after eight disappointing wells. All the eight wells drilled in the JDZ encountered hydrocarbons, but none of them in commercial volumes. The main players, Sinopec and Total, exited in 2013. The total resources discovered to date in the JDZ are 270 mmboe, mostly of gas. There are no plans for further bid rounds in the JDZ.

II.b. Exclusive Economic Zone

8. **Over the last 10 years, STP has been developing a set of rules that aim to legally frame the petroleum sector in the EEZ while simultaneously making it more attractive.** The National Petroleum Agency (ANP) manages the license granting process on behalf of the government. ANP requests bid proposals for oil contracts through public advertisements placed in national and international media. The government may negotiate oil contracts directly with companies when these are considered matters of public interest, and if there is a lack of bid proposals that meet the criteria.

9. **There has been lukewarm interest in the EEZ.** The EEZ is formed by 19 blocks distributed in three zones. The Zone A blocks are in deep water and those of Zone B and C are in ultra-deep waters. The range of the depth varies between 2000 and 3000 meters. The first license round, in 2010, contained 7 blocks within EEZ zones A and B: Block 3 was attributed to Oranto, Blocks 4 and 11 to ERHC, Blocks 5 and 12 to Equator. After the first round, some blocks were negotiated directly with oil companies due to lack of interest or in restricted tenders. There were also changes in oil licenses ownership as companies sold their licenses to other operators.

10. **Since 2015, Kosmos has been taking an increasing interest in STP EEZ.** Between 2015 and 2018, Kosmos Energy acquired exploration rights in six Blocks in the EEZ, two of them together with BP. Kosmos

[1] The government share from a future development under the current model PSC contract is approximately 83 percent. Revenues are shared in the ratio of 60 percent for Nigeria and 40 percent for STP in line with the provisions of the treaty.

Energy is a pure-play[2] deep water oil and gas company, focused on frontier and emerging areas along the Atlantic margins. The company has been very successful in exploration in Ghana, Equatorial Guinea and more recently in Senegal and Mauritania. They recently entered into exclusive negotiations with Shell to take an interest in their acreage in STP. This strategic alliance would bring development capability. Kosmos Energy is currently reviewing the geological data and doesn't plan to drill their first well before 2020.

Table 1 - Kosmos Energy stake in STP EEZ

Date of Purchase	Block	Partners
October 2015	11	Kosmos Energy (85%), ANP (15%)
February 2016	6	Kosmos Energy (45%), Galp (45%), ANP (10%)
February 2016	5	Kosmos Energy (65%), Equator (20%), ANP (15%)
January 2018	10 and 13	Kosmos Energy (35%), BP (50%), ANP (15%)

Source: Kosmos, ANP, and press releases.

III. STP EEZ is a frontier area and in early stages of prospection

11. **STP EEZ is a 'frontier area' for oil and gas exploration with a probability of success of less than 15 percent.** A frontier area is characterized by little if any, seismic data, no drilling, generally far from markets and established infrastructure, and sometimes difficult-to-work-in environments. The success rate of exploration wells in frontier areas is low: between 0 and 15 percent[3], compared to success rates of 20 percent or more in areas already de-risked. Therefore, oil companies exploring frontier areas are looking for giant fields with a minimum of 500 to 1000 million barrels of oil equivalent.

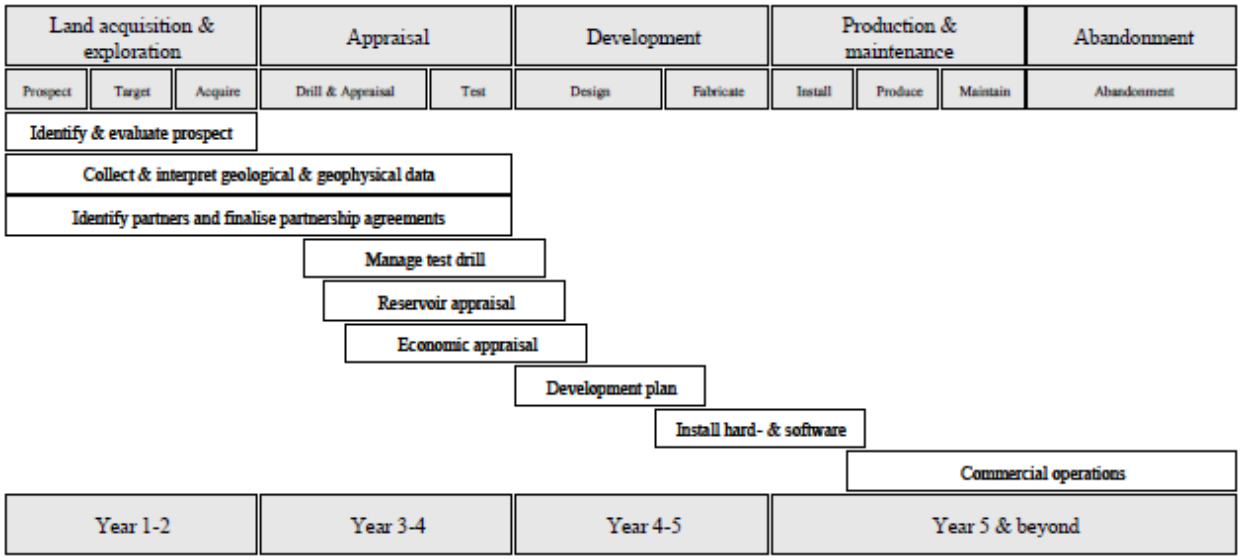
12. **It can take from five to more than ten years to start commercial production in an oil and gas project.** The lifecycle of an Exploration and Production (E&P) project has five stages: (i) land acquisition & exploration, (ii) appraisal; (iii) development; (iv) production and maintenance; and (v) abandonment. The first step – land acquisition - is to ensure that the right to explore the block has been secured. After that, exploration begins by conducting identification activities such as aerial and satellite photography, magnetic surveys, and seismic surveys (both two and three-dimensional). If the company judges that there are possible deposits in the block, it can do some exploratory drilling to obtain more data. In case of discovery, appraisal wells have to be drilled to get a good assessment of the reservoir's characteristics. The duration of the appraisal lasts from a few months to many years, depending upon their complexity. Then, comes the development cost estimate. It takes at least two years and five different steps (preliminary studies, conceptual studies, pre-project study, basic engineering, detailed engineering) to reach an assessment with a 10 percent margin of accuracy. In parallel commercial, financial, and profitability aspects have to be handled. At the end, a Field Development Plan is submitted to the authorities, for approval. A final investment decision is taken by the operators only when all the aspects have been evaluated and considered as acceptable: development concept, costs, commercial contracts, return on investment, risks, financing, and government approvals. If the deposit is judged commercially viable, only then the company will start drilling and investing for full-scale production. A minimum of five

[2] Pure play are companies devoted to one single line of business.

[3] The BP manager in STP believes success rate inn fields 10 and 13 are at 10 percent but it could increase to 25 percent after the seismic results.

years between a discovery well and the start-up of the commercial production is needed. It could be much more.

Figure 1 – Typical lifecycle of an E&P project



Source: Wolf, Christian O. H. "The Petroleum Sector Value Chain" World Bank, Washington D.C. 2009

13. **Oil and gas exploration is at early stage in STP and no commercial production should be expected before 2030, even if discoveries are made in 2022.** No well has been drilled in STP EEZ so far, which means that no company has passed the first stage of the E&P process. The current status of all oil fields is reported in Table *2*. Kosmos Energy and BP, which are the most advanced have been undertaking three-dimensional seismic surveys and baseline environmental assessments in STP EEZ. In addition, the company has no obligation to drill any well in STP, only to carry-out three-dimensional seismic surveys, and has four years, renewable for equal period, to explore each block. According to the company, the best-case scenario for the first exploration/ quantification well to be drilled is 2022. Thus, based on the lifecycle of E&P projects and on the most optimistic scenario, and oil production would only start in 2030.

Table 2 - Exploration status of oil blocks in STP EEZ

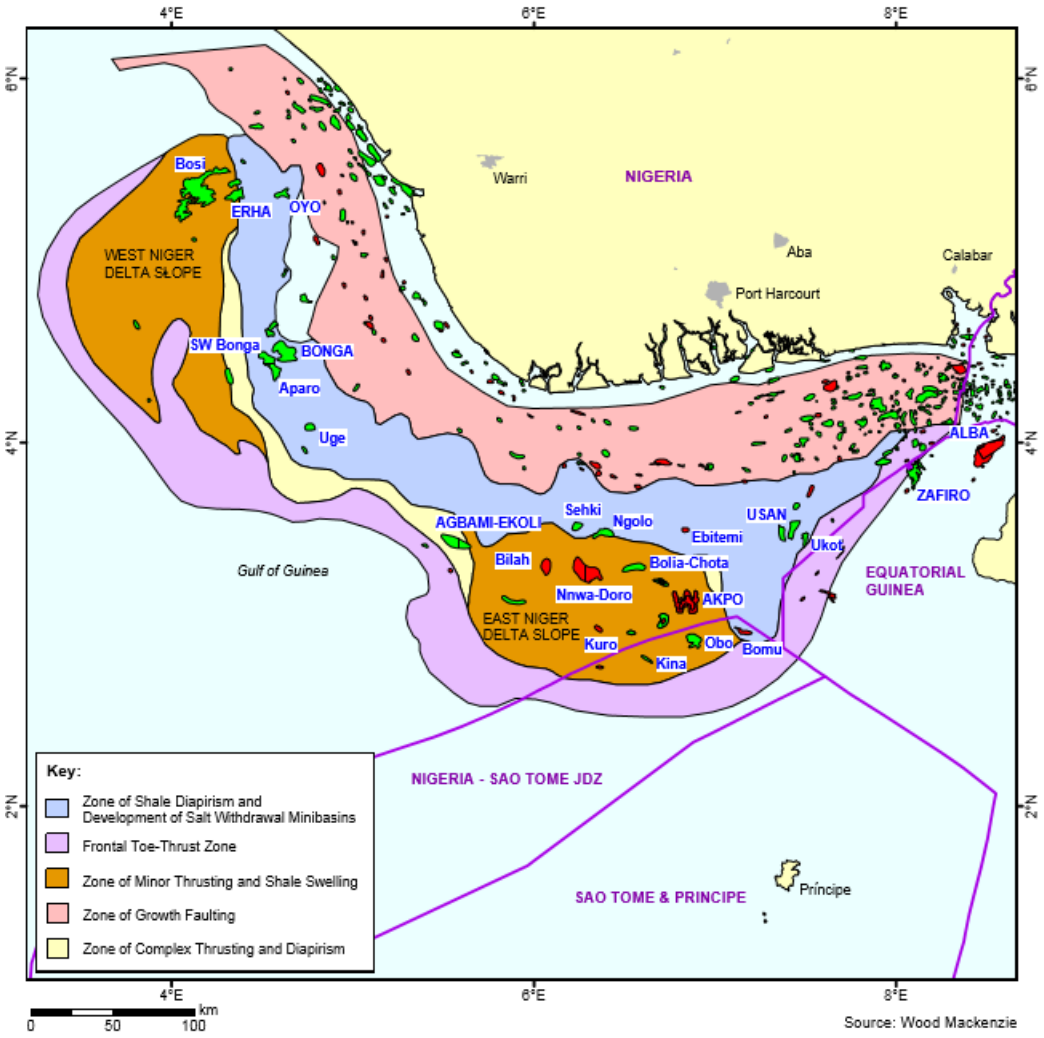
Block(s)	Companies	Status
1	Total and Sonangol	There is 2D seismic data. Contract is expected to be signed in early 2019.
2	Sonangol	There is 2D seismic data. Contract signed, but there has been no activity.
3	Oranto	Contract signed.
4	ERHC	Company had right of preference, but never signed contract.
5	Kosmos and Oando	In 2017, Kosmos carried out 16,000 km^2 of 3D seismic activity, whose data has been processed and interpreted. Kosmos has already identified possible sites for drilling the first appraisal wells.
6	Kosmos, Shell, and GALP	
11	Kosmos	
12	Oando, Kosmos, and	

	Galp	
10	Kosmos and BP	The environmental impact study has been concluded and 3D seismic activity will start in March 2019.
13	Kosmos and BP	The 3D seismic activity is scheduled to start in the end of 2019 or early 2020.
7 – 10 and 14 - 19	None	There have been no auctions neither exploratory activity.

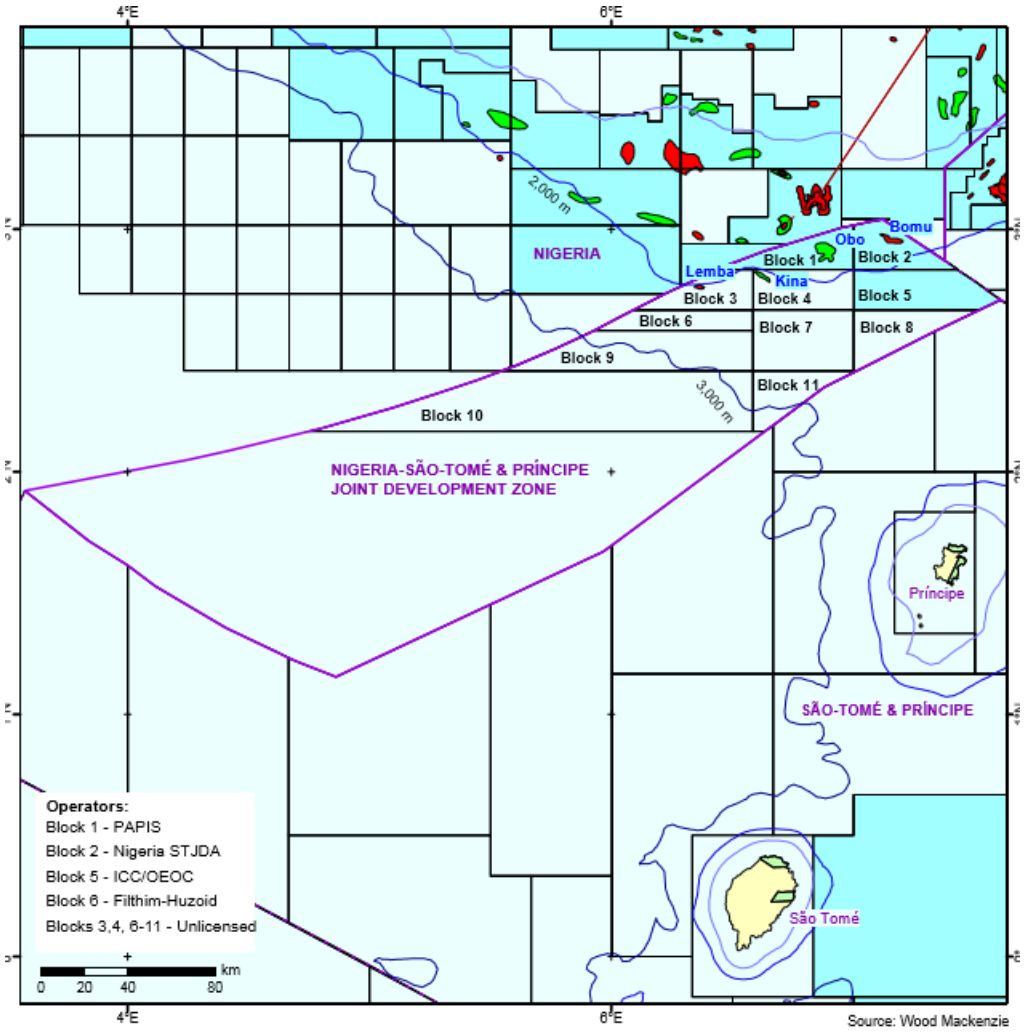
IV. Conclusion

14. **Given the long-time length involved in oil projects, the initial stage of the country and low success probability rate, oil production should not be included in any baseline scenario for STP.** Oil companies has been exploring oil in the EEZ of São Tomé and Príncipe and in the JDZ with Nigeria. Some oil and gas were found in the JDZ, but it was not commercially viable, which led to a halt in exploration. There is some exploration activity in the EEZ, but it is a very early stage since no well has been drilled. STP EEZ is considered a frontier area and thus success rates are very low. It would take at least five years, but likely more, from the drill of the first appraisal well to the beginning of commercial production.

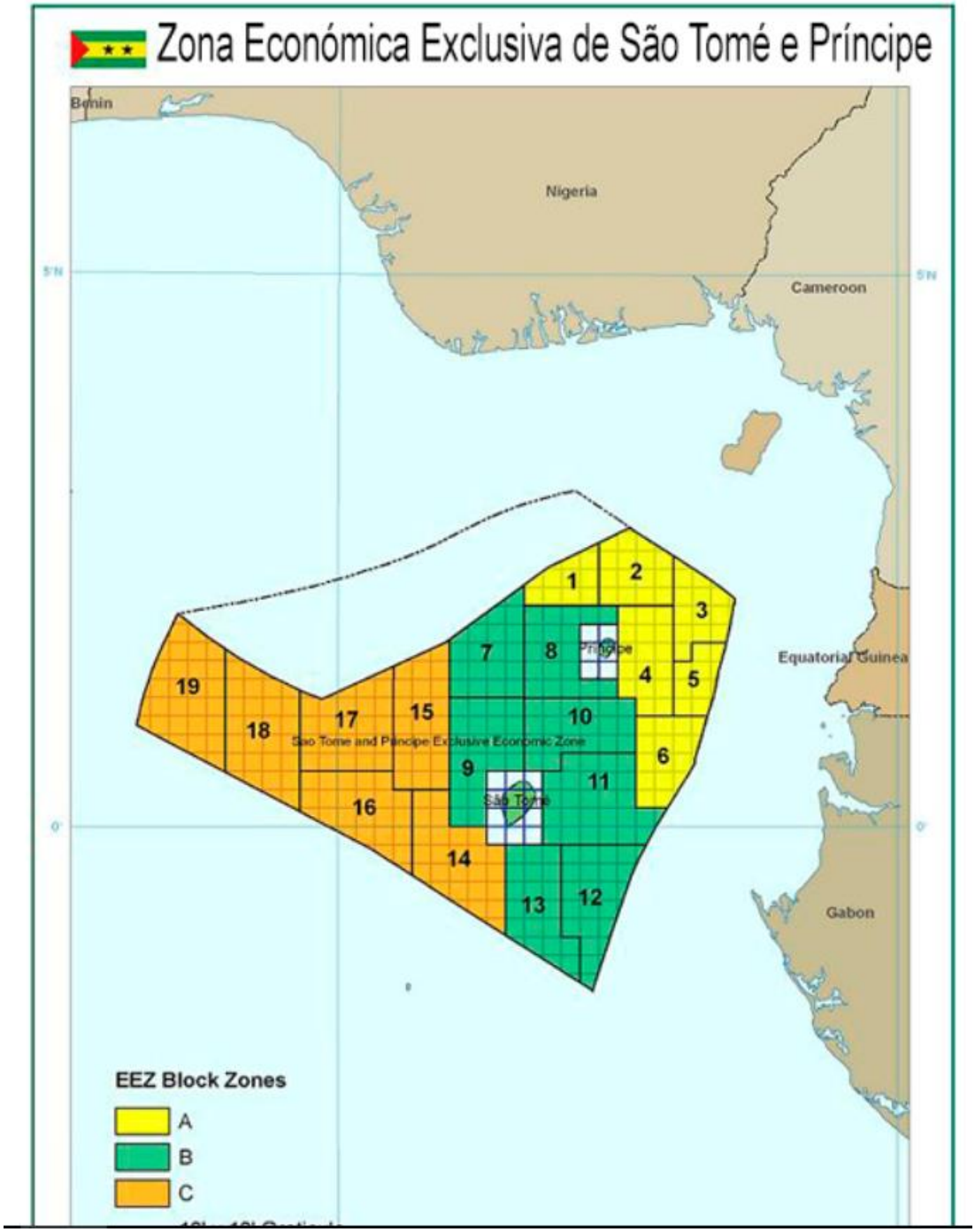
Annex 1 - Map of adjacent fields in Nigeria and Equatorial Guinea



Annex 2 - Map of the Joint Development Zone



Annex 3 - Map of the Exclusive Economic Zone



Annex 4 - Map of Kosmos Energy Blocks in the Exclusive Economic Zone