

# West Africa – shallow offshore oil and gas exploration options review



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## Table of contents

Objective of the report.....	2
Territory, covered by the report.....	2
Assessment factors.....	2
Short overview by country.....	2
Mauritania.....	2
Senegal.....	4
Gambia.....	5
Guinea-Bissau.....	6
Guinea.....	7
Sierra Leone.....	8
Liberia.....	8
Ivory Coast.....	9
Ghana.....	9
Togo.....	11
Benin.....	11
Cameroon.....	12
Equatorial Guinea.....	13
Gabon.....	14
Congo Brazzaville.....	15
São Tomé and Príncipe.....	16
Conclusions.....	17
References.....	18
Appendix.....	18

## Objective of the report

Main objective of the current report was assessment of publicly available data for West Africa shallow offshore oil and gas exploration and production and suggest most prominent options for future, more detailed assessment.

## Territory, covered by the report

Offshore of following countries were assessed: Mauritania, Senegal, Gambia, Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Cameroon, Equatorial Guinea, Gabon, Congo, Sao Tome and Principe. It have to be noted that Nigeria offshore was not assessed in this report.

## Assessment factors

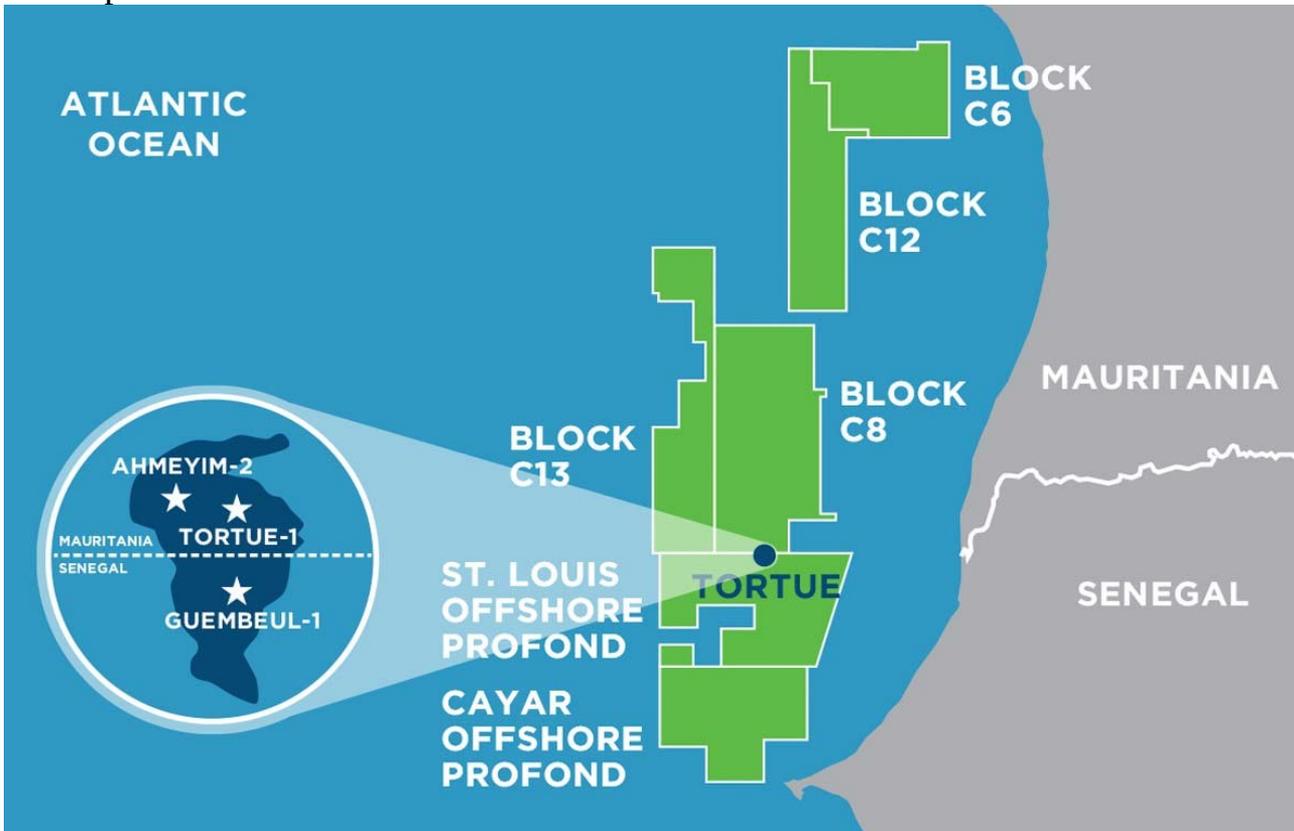
Overall, West Africa offshore territory is under explored, with exception of Nigeria offshore (not included in this report). Existing geophysical data (seismic, wells, e.t.c.), information on existing oil and gas fields and recent discoveries or absence of such discoveries, exploration history, presence of major and local oil and gas companies, other available geological and geophysical information (sedimentary basins, source rock presence, migration, traps availability e.t.c.) used in this assessment. Other important factors such as political risks, level of corruption, availability of infrastructure or current license rounds were not assessed, due to unavailability of such information for all countries (but for some countries this information also included). These factors have to be assessed in future reviews.

## Short overview by country

### Mauritania

Oil production started back in 2006 from Chinguetti (Miocene trenches) offshore oil field that was first discovered in 2001. Estimated initial reserves 123 mln. bbl of 28° API oil. Later three other fields were discovered Tevel (Miocene sandstone, 50 – 100 mln. Bbl), Banda (Paleocene trenches, ~45 bcm of gas) and Oualata (Miocene trenches, mixed gas/oil, initial reserves ~250 mln. bbl). Most recent discovery was large gas field located in offshore territory of two countries Mauritania and Senegal called [Greater Tortue Ahmeyim](#) field. It was discovered in 2015 by Kosmos Energy company in Upper Cretaceous structural-stratigraphic play. Reserves of this field estimated to be around 25 tcf of gas, makes it the largest gas discovery in deep offshore of West Africa. It is expected that this field wold start first production in 2021 via liquefied natural gas (LNG) facility. Both countries agreed joint work on this project. In 2016, BP acquire part of Kosmos Energy interest of C8 block and, at

present, C8 block, located in Mauritania offshore, is jointly owned by BP (62%), Kosmos Energy (28%) and Société Mauritanienne Des Hydrocarbures et de Patrimoine Minier (10%), while the Saint-Louis Profond block, located in Senegal offshore, is owned by BP (32.49%), Kosmos Energy (32.51%), Timis Corporation (25%) and Société des Pétroles du Sénégal (10%). Kosmos Energy is serving as the exploration operator for the gas field, while [BP](#) is acting as the operator for field development.



Greater Tortue field, Image taken from [Kosmos Energy](#) web site.

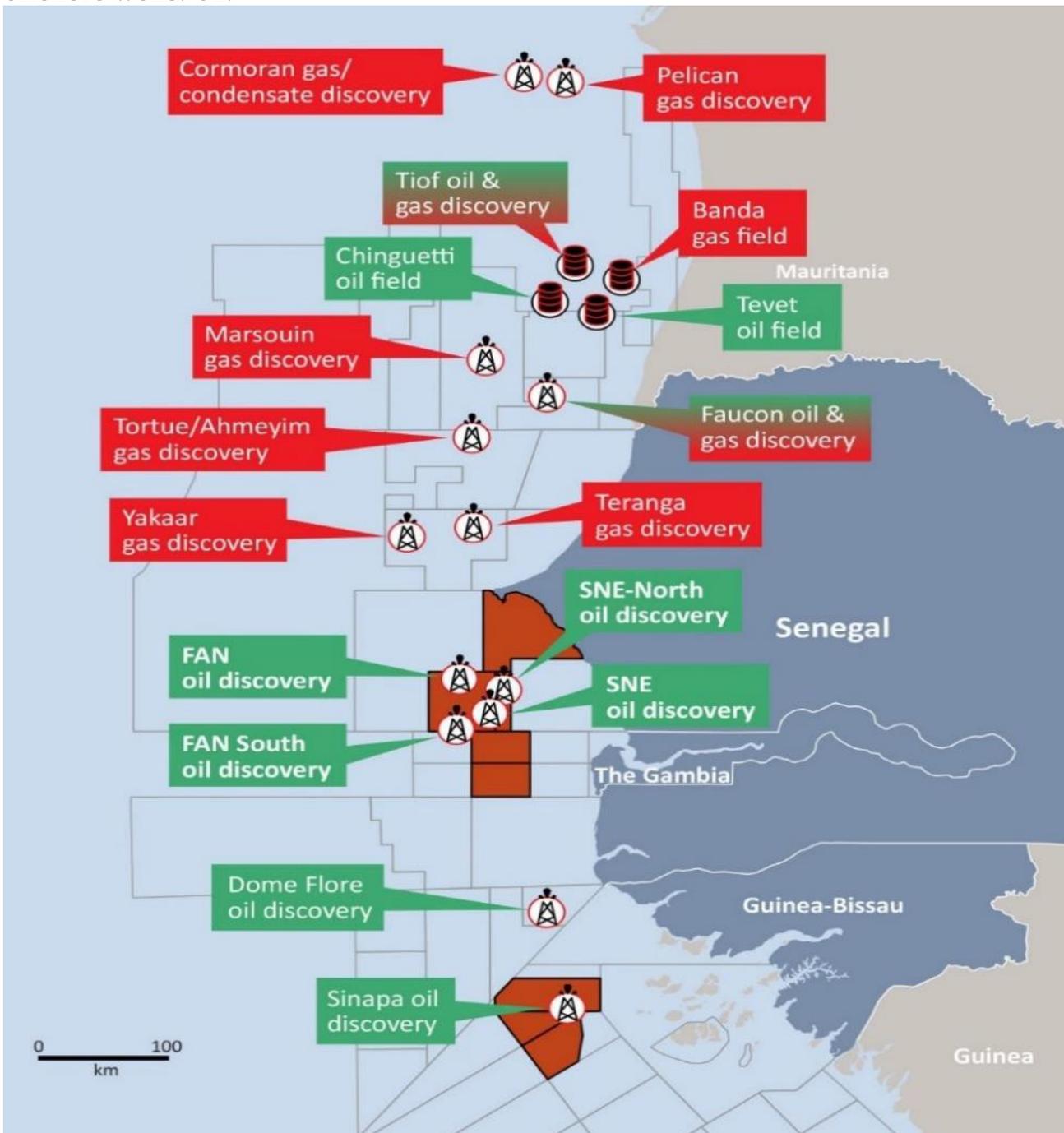
In presentation “General Framework of the E&P activities in Mauritania: Current status and perspectives”, presented in August 2018 by Moustapha Bechir, General Director of Hydrocarbons Mauritania stated that offshore area surface (shallow and deep offshore) is around 184 000 km<sup>2</sup>, total number of offshore blocks 32 (14 are under contract), 6 operators present, 84 694 km of 2D seismic and almost 85 000 km<sup>2</sup> of 3D seismic available in this area. Total number of wells drilled in offshore: 71, total number of discoveries: 9.

Major players in Mauritania offshore exploration market are: BP, ExxonMobil, Shell, Total, Tullow and Kosmos Energy.

Active license round (as of May 2019) – no, but direct discussions on blocks awarding process possible according to Article 18 of the Law 2011-044.

## Senegal

The Senegal sedimentary basin occupies the central part of the large North-Western African coastal basin called MSGBC (Mauritania – Senegal – Gambia – Bissau – Conakry). Total surface area of the basin: 230 000 km<sup>2</sup>. This basin is under explored in Senegal: total amount of seismic data (offshore and onshore) 60 900 km of 2D seismic and 27 150 km<sup>2</sup> of 3D seismic, total number of wells drilled: 173, number of offshore wells: 61.



MSGBC basin discoveries overview, courtesy of FAR Limited [References #13, page 13].

Main oil and gas offshore discoveries: Dome Flore & Gea (1967, ~1 bln. bbl heavy oil in Oligocene limestone), Sangomar Offshore Profond in 2014, 2017 (4 oil and gas discoveries in Cenomanian & Albian), Saint Louis offshore Profond in 2015, 2016, 2017 (3 great gas discoveries in the Cenomanian & Albian). Especially it is important to note huge gas discovery in 2015 of [Greater Tortue Ahmeyim](#) field (joint discovery located in C8 block Mauritania and Saint-Louis Profond block Senegal with reserves estimated to be around 25 tcf of gas) and SNE oil field discovery in 2014 by FAR Limited (largest oil offshore discovery in the in 2014, with initial 2C estimation of 330 mmbbls in 2014 and revised reserves 2C estimation of 641 mmbbls in August 2016 after drilling additional 4 wells). There are other deep offshore discoveries: FAN South: ~152 mmbbls of oil and SNE North: ~83 mmbbls of oil and ~378 bcf of gas, Teranga-1 (Cayar Offshore Profond block, resources in place around 5 tcf of gas), Yakaar-1 (Cayar Offshore Profond block, resources in place around 15 tcf of gas). There are also many other prospects and leads to be drilled in Senegal offshore.

Deep and ultra-deep Senegal offshore potential estimated by PETROSEN: ~40 tcf of gas and more than 500 mmbbls of oil.

Major players in Senegal offshore oil and gas exploration and production are: African Petroleum Corp., FAR Limited, Carin Energy, ConocoPhillips, Elenilto Senegal LLC, Oranto Petroleum Ltd., Kosmos Energy, BP.

Active license round (as of May 2019) – no.

## **Gambia**

The Gambia (officially the Republic of The Gambia) is the smallest country in mainland Africa and it's territory is surrounded by Senegal, except for its coastline on the Atlantic Ocean. Very little information available on this country oil and gas exploration activities. There are six offshore blocks available: blocks A1,A2,A4 and A5 are deep offshore blocks and A3,A6 are shallow offshore blocks.

Main interest to The Gambia offshore exploration in recent years related to the oil and gas discoveries by FAR Limited in adjustment to A1 and A2 blocks - Sangomir Deep block in Senegal deep offshore. SNE field and FAN discovery were quite big ones in 2014-2015. FAR Limited acquire 80% working interest and operatorship in these two blocks A2 and A5 in 2017. Later on, in 2018 FAR Limited signed farm-out agreement with PERONAS to assign 40% interest in each block to this company.

Based on FAR's estimation – potential of these two blocks covering area of ~2682 km<sup>2</sup> is around 900 mmbbls (unrisked, best estimate).

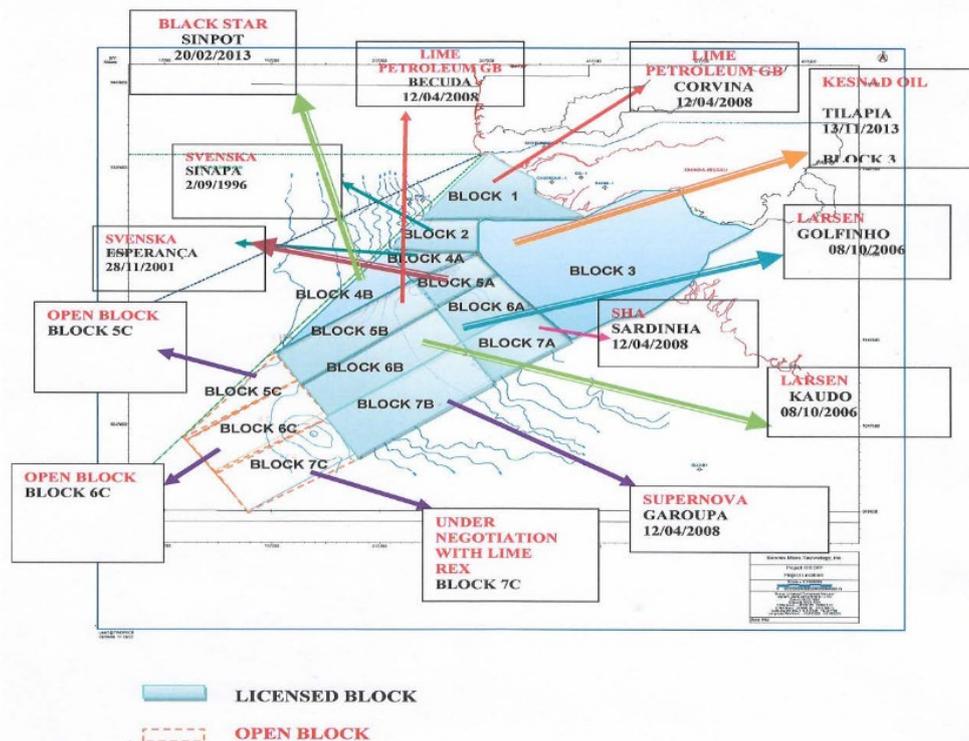
Two wells drilled in A2 block in 2018: Samo-1 and Jammah-1. Both wells confirmed presence of good reservoir rocks, but no sealing intervals. Hydrocarbons shows in these wells at multiple intervals. These wells were first wells drilled in Gambia offshore in 40 years. In May 2019, deep Gambia offshore block A1 was awarded to BP. Modern 3D seismic survey acquired covering area of 1504 km<sup>2</sup> in both blocks A2 and A5.

Major players in The Gambia offshore oil and gas exploration: FAR Limited, BP, Petronas.

Active license round (as of May 2019) – no.

## Guinea-Bissau

Guinea-Bissau oil and gas exploration started back min 1960 wen 4 wells were drilled by Exxon (dry) based on gravity and magnetic data. Second phase of exploration started in 1968 and continued until 1972 when Exxon drilled another 6 salt basin wells (had oil shows, PGO-3 recovered 8 bbls of 36° API oil). Third exploration phase (1973-1984) started with 2D seismic acquisition and drilling of GBO-1 well by Elf (1984, oil shows). Forth phase (1987-1990) was carried by Shell Pecten – three wells were drilled and all had oil/gas shows. Fifth phase (1997-98) era of 3D seismic started with attempt to acquire first 3D survey, but job was terminated due to force majeure. Six phase (2001 to the present time) – started with Premier Oil exploration of sub-salt overhangs. Sinapa-1 encountered significant crestal live oil shows in the Maastrichtian that confirmed the existence of the predicted working Petroleum System, but failed to reach the primary sub-salt closure in the Albian.



Most recent activities include: modern 3D long offset seismic acquisition, PSDM and AVO analysis, non-commercial discovery in Sinapa-2 well, seismic 2D and 3D acquisition in deep water blocks.

Major players in Guinea-Bissau offshore oil and gas exploration: Far Limited, ORYX Petroleum, Svenska Petroleum Exploration, Sphere Petroleum, Larsen, Petroguin, Bissau Exploration, Trace Atlantic Oil, Supernova Energy and few others.

Active license round (as of May 2019) – no.

## **Guinea**

Offshore Guinea consist of 22 blocks, total territory of around 80 000 km<sup>2</sup>. It is a large undeveloped basin.

Seismic data of various vintages available: CGG 2D survey of 2900 km acquired back in 1968, SOGUIP 2D seismic survey of 1630 km in 1974, Union Texas 2D survey in 1980-1981, PetroCanada survey of 1852 km in 1984, Western Geophysical performs 5100 km of 2D speculative seismic in deep waters in 1999, SCS (subsidiary of Hyperdynamics) realizes 17 800 km of 2D seismic, Petroleum Geoservices carried out a 3635 km<sup>2</sup> 3D seismic survey in 2010, Dolphin Geophysical performed 2D multi-client seismic survey of 4 593 km in 2011, PGS acquires MC3D multi-client survey of 7900 km<sup>2</sup> in a water depth from 90 to 4900 m. in 2018-2019 (currently in processing).

Three offshore wells were drilled: GU2-B1 was drilled in a 88 m. of water depth back in 1997 (dry well, total depth 3 353 m.), Sabu-1 was drilled in 760 m. of water depth in 2011 (oil shows in Upper Cretaceous section, total depth 3 610 m.), Fatala-1 well was drilled by Hyperdynamics in 2017 in a 2897 m. of water depth (dry well, total well depth 5 117 m. below sea level)

In October 2017, Total signed an agreement with National Office of Petroleum of Guinea (ONAP) for technical evaluation of deep and ultra-deep offshore areas of Guinea. Total size of that exploration area is around 55 000 km<sup>2</sup>.

Major players in Guinea offshore oil and gas exploration: Total, Hyperdynamics, Dana Petroleum.

Active license round (as of May 2019) – no.

## Sierra Leone

In 2018 Petroleum Directorate of Sierra Leone started [Forth License Round](#) for offshore license blocks. With support of Getech Group as technical data consultant and provider, data rooms were set in Freetown, London and Houston.

Over 29000 km of 2D seismic data, over 11000 km<sup>2</sup> of 3D seismic (covering mostly shallow and deep offshore areas, while ultra-deep areas covered only by 2D data). Also information from 8 wells drilled offshore Sierra Leone available for companies wishing to participate in oil and gas exploration activities.

Special [GIS portal](#) was created – providing overview of data, available for Sierra Leone offshore license round. According to Petroleum Directorate, companies interested in offshore exploration could define area of interest by combining adjacent rectangular blocks (size of each block is around 1360 km<sup>2</sup>).

Direct tender negotiations would be closed on 20<sup>th</sup> of September 2019, and deadline for Open Tenders set on 22<sup>nd</sup> of November 2019.

Active license round (as of May 2019) – yes.

## Liberia

The Liberia offshore basin consists of thirty concessionary blocks. 17 of these blocks are from the continental shelf to water depths of between 2500 to 4000 meters. 13 of the blocs are considered “ultra deep” with water depths of as much as 4500 meters.

Twelve of these blocks were previously awarded, four blocks (included in the last licensing round in 2014) have been previously awarded but now they are vacant acreage available for exploration.

Seismic data coverage include 2D TGS seismic surveys covering territory of almost all offshore blocks and five 3D surveys by TGS: Blocks 11 & 12; Blocks 13 & 14; Blocks 15,16 & 17; Blocks 8 & 9 and Sunfish 3D survey.

Total number of wells drilled in offshore licenses: 6, one in block LB-11, one in LB-12, one in block LB-15 and three in LB-09. Very little information available on results of these well. It was only mentioned that well Narnia-1 in block LB-9 was successful.

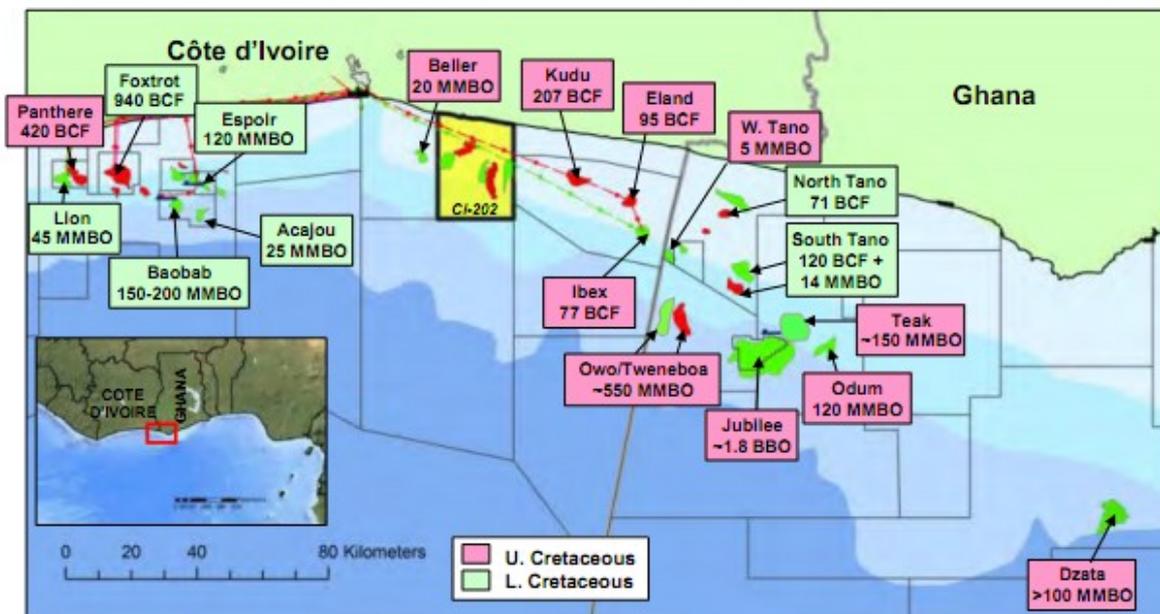
Major players in Liberia offshore oil and gas exploration: Repsol, Anadarko, Chevron, ExxonMobil and African Oil.

Active license round (as of May 2019) – no.

## Ivory Coast

Offshore oil was discovered in 1977 and production started three years later. Natural gas was initially discovered in 1980s and first development started in 2005. Proven oil reserves estimated at ~300 mmbbls and gas reserves of 1.5 tcf. Oil production was around 34000 bbl/day back in 2017.

There are 28 blocks in offshore of Ivory Coast, 24 of them already allocated to oil and gas companies.



Ivory Coast offshore oil and gas fields map

There are quite a number of discovered oil and gas fields in Ivory Coast offshore, oil fields: Baobab (shallow offshore, block CI-40, capacity ~52000 bbl/day), Espoir (block CI-26, capacity ~28000 bbl/day), Acajou (block CI-26, capacity ~3500 bbl/day), Lion (block C-11, capacity ~1230 bbl/day), gas fields: Panthere (block CI-11, ~420 bcf), Fox Trot (block CI-27, ~940 bcf), Kudu (~ 207 bcf), Eland (~95 bcf), Ibex (~77 bcf) – all three fields located in block CI-01 and quite a number of other fields.

Active license round (as of May 2019) – no.

Major players in Ivory Coast offshore oil and gas exploration and production: Petroci, Total, ExxonMobil, Anadarko, Tullow Oil.

## Ghana

Ghana got approximately 2 388 mil. bbl of oil proven resources located offshore and 149 mil. bbl in onshore licenses. In 2017 crude oil production was 57 mil. bbl.

Ghana's only oil refinery is the Tema Oil Refinery with capacity of 40 000 bbl/day, main oil storage company is the Bulk Oil Storage & Transportation Company. It got seven storage facilities, the largest one is the Accra facility with capacity of 1.3 mil. bbl.

Ghana has four sedimentary basins. These are the Cote d'Ivoire-Tano Basin (including Cape Three Points Sub-basin), the Saltpond Basin, the Accra/Keta Basin and the Inland Voltaian Basin. The offshore basins cover about 60,000 km<sup>2</sup> (0-3500m water depth) extending from the Cote d'Ivoire - Ghana maritime border in the west to the Ghana-Togo maritime border in the east.

The first offshore well was drilled in the Saltpond Basin in 1970. The success of that well led to increased interest, offshore Ghana. The Tano basin also recorded its first offshore exploratory success in 1970 with the Volta Tano well and subsequently the North Tano field. The first and only exploratory well in the Voltaian basin was drilled in 1974 by Shell Oil and gas production in the Saltpond Field started in 1978 and peaked at 4,500 bopd. The first deep water well, the South Dixcove -1X was drilled in 900m of water in 1978 by Phillips Petroleum, offshore Cape Three Points. Commercial production started in the late 70's in the offshore Saltpond area in the Central basin of Ghana. In December 2010 first oil was produced from the Jubilee field, which was discovered in 2007.

Discoveries in Ghana offshore (few examples): The Mahogany-1 well was discovered on 18th June 2007 in the West Cape Three Points (WCTP) license area of Ghana. The well was drilled with the Belford Dolphin drillship to a total depth of 3,683m in a water depth of 1320m. The Mahogany-1 well targeted the Santonian turbidite stratigraphic trap that opens a new play fairway in the Tano Basin. It encountered a gross hydrocarbon column of 270m with 85m net pay stack. In August 2007, Tullow Oil Plc using the Belford Dolphin drillship made a discovery upon drilling the Hyedua-1 well in the deep-water Tano license area offshore Ghana. It discovered significant light oil. The Ebony-1 well was spudded on 22nd October, 2008 and reached a total depth of 2,640m in a water depth of 86m using the West Ceres semi-submersible. The well lies in the Southwest part of shallow water Tano block. It encountered a pay of a four meters oil bearing interval at 2053m and a two meter high-pressure gas condensate interval at 2,570m. Odum-1 is the second exploratory well drilled in West Cape Three Points license area offshore Ghana. It was drilled to a total depth of 3,391m in a water depth of 955m under the operatorship of Kosmos Energy, using the Songa Saturn drillship. It encountered a gross oil column of 60m and a net pay of 22m of 29 degrees API oil. The Tweneboa-1 well, was drilled in March 2008, by Tullow Oil Plc, using the EirikRaude semi-submersible rig, in the Deep-water Tano block, depth of 1,148m. The well was drilled

to a total depth of 3,593m and encountered a 21m net pay. The well was optimally located to penetrate multiple targets, including the edge of an under-drilled major Turonian fan system.

Examples of offshore fields: Jubilee (Kosmos Energy, 2007) – oil producing field operated by Tullow [Turonian deep marine sandstone reservoir], Tweneboa, Enyenra & Ntomme (Tullow, 2009-2010) gas, condensate and oil field [Turonian deep marine sandstone reservoir], Pecan, Pecan North & Almond (Hess, 2012-2013) oil field [Turonian deep marine sandstone reservoir].

Active license round (as of May 2019) – yes ([Ghana 1<sup>st</sup> Oil and Gas Licensing Round](#)), 6 blocks on offer (1 – shallow offshore block, 3 – deep offshore blocks, 2 – ultra-deep offshore blocks).

Major players in Ghana offshore oil and gas exploration and production: Kosmos Energy, Ghana National Petroleum Corporation, Tullow Ghana Ltd., Anadarco, PetroSA, ENI Ghana Exploration and Production Ltd, Hess Exploration Ghana Ltd., Heritage, Sahara Energy, ERIN, AMNI International and few others.

## **Togo**

Offshore Togo covers an area of 6000 km<sup>2</sup> with water depth up to 4000 m. That territory split into two large blocks: Block A (shallow / deep offshore) and block B (deep and ultra-deep offshore). In total 8 wells drilled: 5 in shallow water and 3 in deep water. No discoveries – only oil shows. Best results were from Lome-1 well, initially tested 516 bbl/day of heavy oil (37° API).

Seismic data: sparse 2D seismic data and new (2011) 3D seismic data of about 3200 km<sup>2</sup> available. Seismic data available from PGS and TGS-Nopec companies.

At present two offshore blocks totally relinquished. Previously ENI and CBH exploring Togo's offshore blocks.

Active license round (as of May 2019) – no, but these two offshore blocks available for exploration.

## **Benin**

Benin is situated in a region known to harbor immense oil deposits particularly in offshore locations. The continent's largest oil producer, Nigeria, neighbors Benin. Oil was first discovered in Benin in the early 1980s in an offshore oil field.

Existing oil fields located in offshore territory: Seme Fields (Turonian fluvial/Deltaic sands, produced more than 21 mmbbls, remaining reserves estimated around ~20 mmbbls), Hihon oil field (Albian shallow marine, estimated unrisks reserves ~60.3 mmbbls), Fifa oil field (Albian shallow marine, estimated unrisks reserves ~32.5 mmbbls).

However oil production declined in the 21<sup>st</sup> century and in 2004 had ceased. There are plans to restart oil production activities, first of all related to offshore fields, but they delayed by the fact that plans to build first country refinery still only on paper.

Major players interested in Benin oil and gas exploration: Anadarko, Sapetro, Kosmos Energy, SIGNET, CBH, Oranto, Moncrief.

Active license round (as of May 2019) – no.

## Cameroon

Cameroon has two main types of sedimentary basins, which belong to three active African petroleum systems: Niger Delta, West African Salt Basins and Southern and Central Africa rifts. They include:

- the coastal sedimentary basins (Rio Del Rey and Douala/Kribi-Campo)
- the intracratonic basins (Logone Birni, Mamfe and Garoua).

The latter are still under-explored.

As of 31<sup>st</sup> of December 2017, remaining oil reserves were estimated at 210.62 mil. bbl and natural gas resources were estimated at 6.05 tcf. Crude oil production for the year 2017 stood at 27,726 mil. bbl, gas production – 13 886.97 mil. ft<sup>2</sup>. Based on preliminary results for year 2018, there was a major increase in gas production: 61 454.28 mmscf, 442.5% of 2017 production.

In 2017, 10 wells were drilled: two appraisal and eight development. In Sanga Sud block four wells got initial gas production rate of 40-60 mmscf/day, one well in Logbaba block also provide 40-60 mmscf/day, in Moabi block oil production rate for one new well was 1549 bbl/day, in Lipenja-Erong block – 1500 bbl/day, in Kita-Edem – 2760 bbl/day.

Three types of crude oil produced in Cameroon: Kole (30.70° API), Lokele (24.27° API) and Ebome (37.86° API).

Major players in Cameroon oil and gas exploration and production: SNH, Petronas, Perenco, Addax, Nobel Energy, Gaz do Cameroon, EurOil.

The first half of 2018 was marked by the official start of natural gas liquefaction operations on the Hilli Episeyo floating plant, which arrived Cameroon on November 20, 2017. The first shipment of liquefied natural gas (LNG) intended for export, loaded in two cargoes, took place on May 1 and 17.

New Tiko oil field was put on production on March 25, with an output of 1 500 barrels/day by Perenco Cameroon, operator of the Moabi Association.

In February 2019, PSC (Production Sharing Contract) was signed with Perenco company for hydrocarbons exploration on the Bomana offshore block (222.75 km<sup>2</sup>), located in Rio del Ray basin.

Active license round (as of May 2019) – yes. According to information on state oil company SNH (National Hydrocarbons Corporation) – [nine block were put on promotion](#) in the hydrocarbons rich Rio del Rey Basin (RDR) and in the highly prospective Douala/Kribi-Campo (DKC) Basin.

## Equatorial Guinea

Equatorial Guinea became member of OPEC since 2017. As of 31<sup>st</sup> of December 2017 country oil reserves stood at ~1.1 bln. bbl, gas reserves ~14 301 bcf [References #2, page 19]. Average 2017 year production: ~54 m. bbl of oil and ~337 bcf of gas.

Oil production came entirely from offshore fields, including the largest Zafiro oil field operated by ExxonMobil. Due to lack of the refinery capacity, Equatorial Guinea export all its crude oil. Historically all oil exports were to the USA, but after shale oil boom, import of Equatorial Guinea oil in USA stopped and now country tries to extend export of oil Asia (India, South Korea and China) and Europe (Spain).

Gas production came mostly from Alba and Zafiro fields. Equatorial Guinea is a net exporter of LNG via onshore LNG plant Punta Europa. Gas exported to Asian countries: Japan, China and Singapore. Also agreement signed with West Africa countries: Burkina Faso, Ghana and Togo for the LNG gas export. Overall gas export expected to increase starting from 2022, when Ophir's Fortuna FLNG project would be launched.

Active license round – yes ([EG Ronda 2019](#)), 26 blocks on offer (24 – exploration offshore blocks, 2 – appraisal/development offshore blocks). For exploration blocks bidding deadline set to the 27<sup>th</sup> of September 2019, for appraisal/development blocks

pre-qualification closes on 3<sup>rd</sup> of June 2019, bidding deadline set to the 27<sup>th</sup> of September 2019. Winners would be announced on the 27<sup>th</sup> of November 2019.

Major players in Equatorial Guinea offshore oil and gas exploration and production: Kosmos Energy, ExxonMobil, Noble Energy, Marathon Oil, Royalgate Energy, Atlas Petroleum Ltd., GEPetrol, Triton EQ G.

## Gabon

Gabon rejoined OPEC in 2016. As of 31<sup>st</sup> of December 2018 country has a total of 4922 mln bbl of proven oil reserves (87% or 4269 mln. bbl located offshore and 13% or 653 mln. bbl located onshore) [References #2, page 22]. Average yearly production in 2017 was: ~73.12 mln. bbl. Most of Gabon's crude production exported as there is almost no refining capacity in the country. Gabon's crude is still favorite above other West African countries due to its low sulfur.

Oil infrastructure in Gabon: the Port Gentil refinery, built in 1967, is the only significant downstream oil asset with capacity of 24 000 bbl/day, the only oil storage company, Sté Gabonaise d'Entreposage des Produits Pétroliers (SGEPP), with biggest storage facility located in Libreville (capacity of 151 000 bbl), oil export terminal Cap Lopez got capacity of 4 mln. bbl.

Active license round – yes ([12<sup>th</sup> Licensing Round Gabon Offshore](#)), 35 blocks on offer (12 – shallow offshore, 23 – deep and ultra-deep offshore). The round closes at the end of September 2019.

Seismic data – for the 12<sup>th</sup> Licensing Round Spectrum Geo has been appointed as Official Technical Partner to support the Direction Generale des Hydrocarbures (DGH) on the promotion of this license round and has acquired 17,000 sq. km of 3D broadband data over key acreage in addition to offering strategically-positioned regional 2D seismic coverage.

New [Fiscal Terms](#) were prepared and implemented for the year 2019 licensing round, offering more attractive conditions for companies, participating in oil and gas exploration in Gabon.

Major players in Gabon offshore oil and gas exploration and production: Total, ENI, Tullow Oil Plc., Ophir Gabon, Perenco Gabon, Sino Gabon Oil and Gas, BW Energy, Vaalco, Addax (Sinopec), Sasol, PetroEnergy, Maurel & Prom and others.

Recent discoveries: in August 2018, an oil discovery was announced by Panoro at the Ruche North East Marin-1 well, in March 2018 Petronas announced a discovery at it's ultra-deep exploration well in block F14.

## **Congo Brazzaville**

Congo became member of OPEC since June 2018. As of 31<sup>st</sup> of December 2018 country oil reserves stood at 496 847 000 bbl (1P) and 2 613 793 000 bbl (2P), gas reserves 200 bln. m<sup>3</sup>. Average daily production: ~350 000 barrels/day.

Deloitte, in “Africa Oil and Gas State of Play”, issued November 2018 estimated Congo-Brazzaville oil resource as much as 5.3 bn. bbl, with share of offshore resources increased from 87.5% in 2010 to 97.6% in 2017. Onshore oil resources estimated to be 70 million bbl, while offshore oil resource 5 259 million bbl. Oil production also increased from just over 100 million bbl in 2010 to almost 125 million bbl in 2017 (with more then 95% from offshore).

Oil production expected to increase in 2019-2020 when Moho Nord field (Total) and Nene Marine field (ENI) would start production. Potential gas production increase related to planned offshore gas development project (FLNG) by New Age company, but this project not expected until at least 2022.

Oil infrastructure consist on the only one refinery operated by CORAF (Société Nationale des Pétroles du Congo) with capacity of 21 000 bbl/day. There are two oil terminals located at the ports of Djeno and Pointe Noire. Offshore oil fields linked with export oil terminal at Django by subsea pipelines.

Active license round – yes ([Congo License Round Phase II 2018-2019](#)), 18 blocks on offer (8 – onshore, 5 – shallow offshore [depth below 500 m.], 5 – deep and ultra-deep offshore). Offers have to be submitted until 30<sup>th</sup> of June 2019, results would be announced in September 2019.

Results (announced at the 25<sup>th</sup> Africa Oil Week event in November 2018) of previous Congo License Round Phase I: block “Marine XXI” was awarded to [Kosmos](#), Block “Marine XXVII” was awarded to [Perenco](#) and block “Marine XX” was awarded to [Total](#).

Seismic data (Congo “MegaSurveyPlus” – multi-vintage depth migrated 3D dataset, covering offshore data on offer) available from [PGS](#).

Major players in Congo exploration market are: Total, ENI, SNPC, New Age, Chevron, CNOOC, Wing\_Wah, Gazprom, Philla\_SA.

Major players in Congo production market are: Total, ENI, SNPC, Perenco, Congorep, SOCO, Wing\_Wah, Pelfaco, AOGC, Petro Kouilou.

Overview of updated legal and fiscal terms could be found in this document: [“Improvements in new legal and fiscal framework of the upstream sector”](#).

## **São Tomé and Príncipe**

Democratic Republic of São Tomé and Príncipe – small country located in the Gulf of Guinea, off the west-central coast of Africa, 250 km from Gabon. Land area approximately 1001 km<sup>2</sup> (two islands: São Tomé and Príncipe), maritime area approximately 132 000 km<sup>2</sup>.

There are 19 offshore license blocks. All located in a deep and ultra-deep (above 4000 m.) offshore.

Total amount of seismic data: 12827 km of 2D data and 2900 km<sup>2</sup> of 3D data. Most data provided by PGS company. As of May 2019 no information available on offshore drilling activity. Two shallow wells drilled onshore, on the island of São Tomé, by Island Oil company. Well Ubabudo-1 was drilled to 1501 meters into Upper Cretaceous clastics and well Esperanca-1 was drilled to 859 meters into Tertiary basalt with minor Miocene carbonates). Both wells were dry.

Active license round – no (as of May 2019). Last open license round was held back in 2010 ([1<sup>st</sup> \(EEZ\) Licensing Round](#)). Block #3 was awarded to [Oranto Petroleum](#), blocks #4 and #11 to [ERHC](#), blocks 5 and 12 to [Equator Exploration](#). Also, in 2017 there was separate “EEZ Restricted Bidding” event covering offshore blocks 10 and 13.

Major players in São Tomé and Príncipe offshore oil and gas exploration are: Kosmos Energy, SONANGOL, ESTADO, ERCH Energy, Oranto Petroleum, GALP Energia and BP Exploration.

## **Conclusions**

Overall this review confirms the fact that West Africa offshore is quite promising but underexplored are for oil and gas prospecting with moderate to high risks. Some countries just start petroleum exploration offshore activities, others got already long history in offshore exploration and production. Bigger companies with sufficient resources looking for big prizes in deep and ultra-deep offshore blocks, but other smaller ones shoes that they also got good chances even in shallow offshore.

There would be long list of factors (positive and negative) that have to be taken into consideration while looking for good shallow offshore license to invest. I would

just express my view on this subject and would try to suggest top three countries that looks promising from my point of view for more detailed investigation of possible exploration targets in shallow offshore of West Africa:

1. Mauritania / Senegal offshore border, shallow area close to the Greater Tortue / Ahmeyim huge (around 15 tcf) gas field discovery by Kosmos Energy now developing in partnership with BP. Discovery that changed exploration landscape in that area and draw attention of many different companies, big and small to that Mauritania / Senegal offshore exploration.
2. Senegal / The Gambia offshore border, area close to the FAN and SNE (world's largest oil discovery in 2014) oil fields discoveries by FAR Limited company. A number of other smaller oil and gas discoveries in the area. Good place to start looking for similar discoveries, that not yet drilled.
3. Gabon shallow offshore might be of interest, especially taking into account existing license round for the year 2019, new fiscal terms for oil and gas exploration and quite a good history of already discovered oil and gas fields.

Have to note that for top two positions I was quite sure with the selection (taking into account that neither Nigeria nor Angola was in the list of countries that were evaluated). But third position was difficult to select. Few other countries might also compete with Gabon shallow offshore i.e. Equatorial Guinea or Ghana or Cameroon, but after additional review of available data, reports, maps e.t.c. publicly available, I trend to confirm that initial selection was right.

Special note on Democratic Republic of São Tomé and Príncipe – initially that country was not on the list of countries to review. Added at the last moment. Quite interesting, underexplored, risky – but main reason why it was not on the final suggestion list was water depth of all blocks on offer. There are no shallow offshore blocks on offer, they all are in deep and ultra-deep offshore with water depth above 2500 and up to 4500 m. With only small portion of license blocks very close to two islands where water depth is shallower. That's why it was not selected.

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## Appendix

Special appendix presentation, contained examples of license maps, seismic sections and other geophysical information from publicly available source would be available shortly after publication of current report on request.

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