The MSGBC Basin has all the Hallmarks of a Future Superbasin

Occasional short releases by First Exchange Corporation on the MSGBC Basin #9
January 2019

Superbasins are defined as '*established producers with at least 5 billion BOE produced and 5 BBOE remaining recoverable, two or more petroleum systems or source rocks, stacked reservoirs, existing infrastructure / field services, and access to markets*'
(taken from Sternbach, 2018, image 24 at:
http://www.searchanddiscovery.com/documents/2018/11167sternbach/ndx_sternbach.pdf

1) The volume requirement

The MSGBC Basin currently hosts a combined resource, mostly spread between the recent Cairn (1 BBO) and Kosmos (40 TCF) discoveries, of nearly 7.7 BBOE (**Figure 1**). In addition, there are some 2 BBO of heavy oil in the Dome Flore and Gea region of the AGC, plus in excess of 1 BBOE in the offshore Mauritanian discoveries (only Chinguetti was developed, the exact sum volume of the discoveries is unclear). Finally, there is the Fortesa resource in onshore northern Senegal and the Sinapa Field in Guinea-Bissau. The Fortesa finds are in production, as were Tullow's adjacent discoveries, and the FEED stage of activities was reached in the last quarter of 2018 for the development of Phase 1 of Cairn's SNE Field (230 MMBO) and BP's (formerly Kosmos operated) 15 TCF Greater Tortue Ahmeyim Field. In February 2018 an Inter-Government Cooperation Agreement was signed by the Mauritania and Senegal governments to facilitate cross-border activities.

Figure 1. Plays, fields/discoveries and the Middle to Lower Jurassic kitchen.

2) The source requirement

The accepted source is the oil-to-gas-prone, mid-Cretaceous succession which is regionally present. In addition, there is growing geochemical evidence for a regional oil-prone, Middle to Lower Jurassic source. The contributions of the Cretaceous and Jurassic sources to the discoveries remains to be determined. However, modelling by FEC indicates sufficient hydrocarbons have been generated in the MSGBC Basin to meet the full demands of a Superbasin. The Jurassic is mature where the mid-Cretaceous is immature. **It is the predicted widespread presence of mature, Jurassic sources that offers the strongest pointer to the eventual rise of the MSGBC Basin to Superbasin status.** Paleozoic sources remain possible in coastal and onshore Senegal southwards.

3) **The reservoir requirement**

The reservoirs for the Cairn and Kosmos discoveries, plus those in onshore Senegal and at Sinapa in Guinea-Bissau are all products of the Casamance Delta. These vary from shelf or delta top sands (SNE) by way of slope sands (Fortesa) to basin floor fans (Kosmos, plus Cairn's FAN discoveries). Work by FEC indicates that the Casamance Delta is large enough to host multiple further finds.

Chinguetti produced from Miocene channel sands within a salt cored closure. Mauritania's other post-2000 discoveries have either Miocene or younger Cretaceous clastic, deepwater deposited reservoirs, all associated with channel systems. Oligocene limestone caps formed above rising salt diapirs host the Dome Flore and Gea area heavy oils. Younger Cretaceous carbonates cap the Ras Al Baida (RAB) Nose at the northern end of Mauritania. There are flanking clastics (both are associated with convergent currents), but neither reservoir has yielded more than shows. The primary carbonate resource is the former shelf margin, Jurassic to Lower Cretaceous carbonate bank that runs the length of the MSGBC Basin. There have not been any commercial discoveries, though no recent well located on this trend has made it its primary objective (one was '*drill ready*' in 2015 in Mauritania and Tullow exhibit two reefs defined using their 2017 acquired 3-D). FEC has mapped significant developments of Lower Cretaceous aged carbonates positioned across the Guinea Marginal Plateau of Guinea-Bissau and Guinea. These carbonates are located south of the Casamance Delta and lie to the east of the southern termination in Africa of the carbonate bank at the Guinea Fracture Zone. Limited information exists on facies, though giant closures are evident, and the Jurassic source is modelled to be mature at depth. The trend continues northwards on the other side of the Atlantic in Suriname.

4) **The infrastructure and market requirement**

With the newness of these discoveries, these requirements have yet to be met, but the recent FEED agreements represent a first crucial on the pathway for the MSGBC Basin to become a Superbasin.

FEC anticipate the following additional geological developments will materialise within the MSGBC Basin:

1) Tie-ins of the other Kosmos gas discoveries to the Greater Tortue Ahmeyim development.
2) Studies to determine whether the previous oil and gas finds further north in Mauritania can be commercialized (LNG options were considered prior to the Kosmos discoveries). This process will be aided by drilling success in the recently awarded Exxon, Shell and Total deepwater blocks, plus the Kosmos acreage. These blocks wrap

around the western side of the earlier discoveries. (a separate short release, #10, is available from FEC on Mauritanian possibilities).

3) Expansion by Fortesa of gas and potentially oil production from their onshore Gadiaga core area.
4) Stage 2 and higher development phases at SNE and the commercialization of the FAN discoveries.
5) Further exploration in The Gambia and the AGC. (a separate short release, #8, is available from FEC on possibilities in The Gambia).
6) Further exploration of the younger Cretaceous progradation of the Casamance Delta.
7) Success from structural and stratigraphic plays in and around Sinapa.
8 Exploration of the carbonate plays identified by FEC in the Guinea Marginal Plateau.

Please contact FEC should further information be required relating to this occasional release or their reports on the MSGBC Basin. Their Contact details are:

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