



Experts in West Africa

**Gaffney,
Cline &
Associates**

Who is Gaffney, Cline & Associates?

Gaffney, Cline & Associates (GCA) is a global consultancy that has been offering technical, commercial, and strategic advice to the oil and gas sector for over 50 years. GCA's reputation demonstrates that the advice delivered, together with its industry insights, is of high-quality, impartial, technically based, and commercially astute. GCA is traditionally known for being one of the leading Oil & Gas Reserves Consultants within the industry providing Competent Persons Reports and Expert Witness representations; but in reality, GCA offers a much wider range of upstream, midstream and downstream technical and commercial consultancy services. These range from in-depth subsurface evaluations using seismic interpretation, the building of detailed static and dynamic reservoir models, through field development planning, field engineering, to gas monetisation, LNG/GTL, mergers and acquisitions, economics and project finance. GCA operates worldwide from three main offices located in London, Houston and Singapore.

West Africa

West Africa is a good example of a region where GCA has been active for many years and where its recent activity level has grown significantly. Over the past four years, GCA has carried out over 140 projects in the West African region for over 60 different clients; these include National Governments, National Oil Companies, International Oil Companies, plus an ever increasing number of indigenous independent companies. The projects cover a wide range of services that demonstrate the versatility, experience and skill base of GCA; these projects include Reserves audits, resources evaluations, reservoir studies, field development plans, due diligence and support for mergers and acquisitions, Competent Person's Reports (CPR) for stock market listings, gas monetisation options, field unitisations and Expert Witness representations; additional downstream projects include refinery, LNG, fertilizer, methanol and gas and power. The majority of these projects have been focused in countries with a long history of oil and gas development such as Nigeria, Gabon, Angola and Congo (see Figure 1). However, in recent years, there has been an increase in GCA's activity elsewhere in West Africa for a number of reasons such as:

- 1) One of the largest offshore oil discoveries in West Africa, in the past decade, in Ghana.
- 2) Increasing interest and exploration activities in the pre-salt play offshore Angola, Congo and Gabon.
- 3) A focus on local content and involvement in the energy sector such as in Nigeria, with the consequential increase in the number of indigenous independent marginal field operators.

The following examples (mostly anonymized and excluding contract values) provide a taste of the breadth of work, technical and commercial, that GCA has been engaged on in the region.

PSA Management Guidelines, West Africa:

At the request of a West African state oil company, GCA prepared management and organisational guidelines (200-page illustrated document) for the staff group regulating the performance of Operators within the framework of the country's Production Sharing Agreements (PSAs).

Play Concepts & Opportunities, West Africa:

A client commissioned a review of the oil plays and future exploration opportunities in four West African producing countries. GCA's report summarised source, reservoir, seal and trap types for all the coastal basins. Past and predicted future resource distribution by play type were documented and recommendations regarding open acreage, future relinquishments and under-explored leased acreage were included. The database for this work was strictly public domain information supplemented by GCA's long term experience in West Africa.

Assistance with Bid on acreage, offshore Ghana:

For an independent oil company, GCA attended a data room in Ghana, reviewed all available information, high-graded two potential offshore areas and recommended licence applications. Bid documentation was then prepared and bid submitted within a tight timeframe. The government's initial favourable reaction led to the purchase of technical data to reduce the risk profile.

Development Plans & Costs Assessment, Mauritania:

GCA assisted client with assessment of reliability of a gas source for the development of a major mining venture in Mauritania. The possibility of using gas from an offshore gas discovery led to the requirement for an independent review of the feasibility of this alternative. By reviewing the gas reservoir appraisal and modelling, GCA was able to confirm the validity of the development scenarios and costs. This enabled an accurate picture of the supply costs to the client as end user.

Geological Asset Evaluation, Republic of Guinea:

In order to provide advice and support to a client engaged in identifying and evaluating the hydrocarbon potential of available acreage in offshore Guinea, GCA performed a data review and analysis. The work considered the available seismic database,

regional mapping, well prognosis and the Environmental Impact Assessment for various drilling projects.

Block Prospectivity Asset Valuation, Liberia:

GCA reviewed seismic data associated with a Block in offshore Liberia for hydrocarbon indications to provide an independent opinion on the block prospectivity. This work compared the geophysical information to the regional geological setting and recommendations were made for the future appraisal of the play fairway.

Gas Power Supply Asset Valuation, Senegal:

GCA was asked to provide expert review of a study conducted to support an electricity power gas supply. Areas for further evaluation were proposed including dehydration and liquid separation requirements, production manifold and vessel sizing, consideration of later gas compression and other facilities concerns.

Review of Oil Field, Congo:

For an independent oil company, GCA reviewed the development potential of an onshore field. The study included an analysis of analogue fields, tight oil sand reservoirs, the applicability of horizontal wells and stimulation practices to the field. GCA also advised on a drilling plan to test the selected well completion and stimulation practices and produced an outline development plan.

Coastal Basin Study, Congo:

GCA conducted a thorough review of the onshore and offshore portions of the coastal basin of DRC on behalf of the government. This study involved detailed analysis of all producing and non-producing fields, regional geology, seismic, gravity and magnetic data, reservoir and production engineering, plus preliminary economics modelling. This report utilised large volumes of confidential data over existing licenses as well as over the open acreage.

Risk Analysis, Côte d'Ivoire:

GCA was instructed by an international agency to undertake a technical and economic audit of a gas field located offshore the Côte d'Ivoire. Key factors included within the study were an analysis of Reserves, production profiles, offshore structure costs, pipeline costs and power generation plant costs.

Due Diligence Methanol Plant, Equatorial Guinea:

For an investment corporation, GCA conducted an appraisal of a 2,500 metric ton/day capacity methanol plant project to be constructed and operated in Equatorial Guinea. The assessment determined the feasibility of the facilities' design to meet production objectives and the accuracy of the project costs and reasonableness of the contract terms as well as an assessment of the adequacy of the proposed transportation and storage/distributions. In addition, GCA reviewed the project's ability to meet requirements specified in its permits and licenses and whether it complied with World Bank environmental standards and local environmental regulations.

Production/Operating and Capital Cost Profiles, Congo and Gabon:

GCA was engaged by a Canadian oil company to carry out an assessment of the future production profiles, operating cost profiles and capital requirements of a number of fields. GCA was instructed to derive estimates for production and cost profiles for each of the fields to assist GCA's client in developing a valuation for these properties in order to consider the purchase of either part or all of the interests held by a major oil company as operator in one or more of these fields. In addition, GCA was instructed to collate geophysical, geological, engineering and operating information on these properties from the data made available by the operator and provide a summary report.

FPSO Tendering Process Review, West Africa:

For the operator of a major deepwater concession offshore West Africa, GCA reviewed the tendering process for the engineering, procurement, supply, construction and commissioning of a 2 million barrel storage capacity Floating, Production, Storage and Offloading Unit (FPSO) to determine whether the approved process was followed, such that a fair and transparent tender evaluation was completed and a most appropriate final recommendation made. All key documents associated with the tender were reviewed, including project procedures, instructions to tenderers, bid documents and bid evaluation documents.



Abandonment Planning, West Africa:

For a West African National Oil Company, GCA undertook a technical, financial and management audit of the Abandonment Plan and subsidiary documentation prepared by the operator of an offshore concession. The work included development of a template for the preparation of abandonment plans (for issuing to operators), construction of economic models to assess financial aspects of abandonment, and the secondment and training of NOC staff, within GCA, in the methodology of auditing.

Advice on LNG Project Planning, West Africa:

As part of ongoing assistance to a major African National Oil Company, GCA advised during all discussions with international partners on the planning of a new LNG project. GCA participated in numerous reviews to assess the various full-chain aspects of the project including: gas Reserves, liquefaction plant design/safety/development, and gas supply/LNG sale commercial issues.

Gas Supply Agreements for LNG, West Africa:

As part of ongoing assistance to a major African National Oil Company, GCA provided advice and assistance on gas supply agreements for a planned LNG project. GCA reviewed the status of the supply agreements and presented its initial views and opinions. Subsequently, consolidation was provided through a report which addressed the key issues around the proposed gas supply arrangements and provided thoughts and conclusions on the most appropriate way forward.

Offshore Pipeline FEED, West Africa:

GCA was requested to review the FEED basis of design for a gas pipeline network in West Africa. The pipeline network provided gas supplies to an onshore LNG liquefaction plant, using gas transported in the dense phase from contiguous deepwater fields. The review highlighted several inconsistencies in the design basis, including an inflexibility to satisfy client demand requirements; this resulted in the client negotiating modifications to design basis.

Assessment of new Ammonia Plant, West Africa:

GCA assisted in the appraisal of a potential new world-scale ammonia plant, proposed by a third party for location in the client's home country. The proposal was being considered by GCA's client as one of a number of options to monetise future natural gas resources. GCA offered analysis and opinion on future prospects for the global ammonia industry (supply/demand prospects, pricing, ammonia technologies, likely supply competitiveness of the proposed project), as well as commentary on project specifics (including suitability of the third party as a partner), so that the feasibility and attractiveness of the third party's proposals could be assessed.

Multi Field Reserve Audit, Cameroon:

GCA performed an independent technical and economic audit of the oil Reserves of approximately forty fields in Cameroon on behalf of an independent oil company which had recently acquired them. Most of the fields had been on production for twenty years or more, and the Reserves therein were estimated using decline curve analysis. For the one undeveloped field, seismic and petrophysical interpretations and static and dynamic reservoir models were audited.

Reserves Methodology, West Africa:

For a major African National Oil Company, GCA designed and compiled a "Reserve/Resource Methodology Document". This document has now been accepted as the official standard for all future Resources estimating and reporting activities to be undertaken by the NOC. It addresses SEC standards and also describes 'best practices' for using the SPE PRMS. The work was carried out through a series of workshops held in country with a select group of the NOC's staff, comprising the "Reserves Committee".

Engineering Due Diligence, West Africa:

For a major National Oil Company, GCA provided extended engineering due diligence and support during the client's discussions with several large oil major stakeholders in a large offshore pipeline network. Support was provided during the pre-FEED stage and the initial contract negotiations.

Unitisation Workshop, West Africa:

GCA moderated a workshop on unitisation issues on behalf of a West African government petroleum ministry. Particular attention was paid to the variations in the methodology employed dependent on the status of the field development. For example, unitisation methodologies and processes in the exploration phase and for green-brown field developments versus brown-brown field developments were discussed.

Gas Reserves Audit, Namibia:

On behalf of a utility company and partners, GCA undertook a comprehensive gas study in order to determine the proven gas Reserves for direct use in a project for a potential new gas-fired combined-cycle power station. The study included the costs and economics of the upstream development project and the non-power market for gas, both locally and in an adjacent country.

Gas Storage Feasibility, West Africa:

For a major West African National Oil Company, GCA reviewed and revised both static and dynamic models for two offshore fields to investigate their potential for gas storage. Potential gas storage volumes, injection and production rates were modelled and the impact on potential late-life oil production was also investigated.

African NOC Rightsholding Valuation, West Africa:

As preparation for an Initial Public Offering (IPO), GCA conducted an evaluation and valuation of a portfolio of offshore rightsholdings located in shallow and deepwater acreage offshore West Africa. The portfolio included producing properties, fields under development and exploration acreage, and the project included an element of technology transfer with the client's staff.

Independent Review, Equatorial Guinea:

GCA evaluated the gas discoveries and prospects of a Block in offshore Equatorial Guinea, West Africa for a UK listed company. The work entailed a review of existing interpretations of seismic, geological data and well logs, followed by independent re-interpretations where necessary in order to provide independent resource estimates at three levels of uncertainty based on probabilistic methodology. Recovery factors and potentially recoverable volumes were estimated based on analysis of well test data. A total of nine discoveries and twelve prospects were covered in the study. The report was subsequently made available in a data room.

Reserves and Resource Assessment, Pre-Salt Deep Water Angola:

GCA conducted an assessment of the oil, gas and inert hydrocarbon volumes of the new Pre-Salt discoveries in carbonate reservoirs offshore Angola. All aspects of the subsurface were reviewed, including 3D seismic imaging, depth conversion, lateral facies mapping, fluid contact uncertainty and fluid compositions. For the most mature of the discoveries, GCA assessed the preliminary field development plan and evaluated the range of recoverable volumes commensurate with the development.

Additional Information

For more information about GCA's integrated services, please contact your local GCA office.

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