

Gaffney
Cline

West Africa Expertise



About GaffneyCline

GaffneyCline is a global consultancy that has been offering technical, commercial, and strategic advice to the oil and gas sector since 1962. GaffneyCline's reputation demonstrates that its advice, along with its insight, is high-quality, impartial, technically based, and commercially astute. GaffneyCline is often referred to as one of the leading Reserves consultants within the industry, but in reality, GaffneyCline offers a full range of upstream, midstream and downstream technical and commercial consultancy services. These include seismic interpretation, static and dynamic reservoir modelling, field development planning, field engineering, gas monetisation, LNG/GTL, expert witness, mergers and acquisition, economics and project finance. GaffneyCline operates worldwide from three main offices in London, Houston and Singapore, and from regional offices located in Buenos Aires and Sydney.

West Africa

West Africa is a good example of a region where GaffneyCline has been active for many years and where its recent activity level has grown significantly. GaffneyCline has carried out over 300 projects in the West African region over the last 10 years and for diverse clients; these include National Governments, National Oil Companies, International Oil Companies, financial institutions, plus an ever increasing number of indigenous independent companies.

West Africa includes the continent's largest producers, mature petroleum basins, oil and gas fields under development, very significant basin opening discoveries, stranded gas discoveries, marginal oilfields and frontier basins: a hunting ground for every type of energy player.

The projects cover a wide range of services that demonstrate the versatility, experience and skill base of GaffneyCline; 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 following pages provide a taste of the breadth of work, technical and commercial, that GaffneyCline has been engaged on in the region. GaffneyCline's extensive Nigeria experience is expanded in a separate brochure.

Our Experience

Gas Reserves Audit, Angola

For ALNG and its shareholders, GaffneyCline has audited associated gas reserves, for delivery to the liquefaction plant at Soyo, annually since 2018.

Gas Conceptual Development & Utilisation, Angola

GaffneyCline undertook a conceptual development and gas utilization study for a group of gas reservoirs and prospects. GaffneyCline first reviewed the potential options for use of the gas, including power generation, chemical production and LNG. The subsurface data were reviewed and used to make estimates of the range of recoverable gas volumes and the number of wells required. Two end-point scenarios were retained to bracket the range of possibilities; a low case corresponding to the currently discovered reservoirs only, and a high case assuming that additional prospects would be successfully drilled. Conceptual phased development plans were proposed for both scenarios, out-lining options for platform or sub-sea developments, sizing, location and timing of processing facilities, etc. Preliminary economic estimates were made showing condensate yield to be a key parameter. Recommendations were made for future appraisal of the reservoirs, for future studies as more data become available, and on the need to firm up options for gas utilization.

Review of Offshore Block, Angola

For a non-operating partner, GaffneyCline conducted a review of the potential for redevelopment of shallow water block. The work involved public domain searches of production history and known data regarding the condition of equipment and the state of developments at the time of shut in, and then proposed a potential redevelopment scheme with initial costs and economics.

Probabilistic Production Profile Generation, Angola

GaffneyCline undertook an analysis of production, at concession or group of field level, to establish the production history, decline rates and forecasts. Facilities performance were analysed from historical production, in order to generate reliability and throughput data. All these data were used to populate a Monte Carlo Analysis that provided time-sequence estimates of probable production at block and country level, over a 20 year horizon.

Oil Reserves Audit, Angola

GaffneyCline has been auditing oil Reserves and Contingent Resources for the National Oil Company for some 20 years. As an integral part of the annual process, GaffneyCline works closely with the Reserves Committee and provides detailed training for the client staff. Each update is undertaken in accordance with SPE PRMS definitions.

Prospectivity Review, Onshore Angola

For a private local company that had been offered operatorship of an onshore licence, GaffneyCline reviewed all available data, in a data room in Angola, to provide an initial opinion on the prospectivity of the block. As well as reviewing seismic and well information to identify leads, GaffneyCline provided a work programme to cover the first three years' activities and the drilling of an initial exploration well.

Gas Market Feasibility Study, Cameroon

GaffneyCline provided Commercial, Technical and Strategic end to end gas value chain advisory services in the form of a gas market feasibility study to assess the use of natural gas in Cameroon, addressing:

- Gas supply forecast analysis (3 scenarios), and identification of costs of development and delivery to gas market to feed midstream and downstream gas demand, including power, mining, fertilizers, industrial use, and transportation.
- Gas demand forecast analysis (3 scenarios) and identification of the additional gas distribution infrastructure that will be necessary to be implemented to deliver gas to the end users.
- Appraisal of the feasibility and cost (economics) of the resource development and gas monetisation/downstream opportunities set out.
- Advising on gas market project bankability, including detailed technical review and analysis of the supply and demand side, pipeline supply and routings.
- Advice on the establishment of optimum regulatory, legislative, fiscal and pricing constructs that are most suitable to underpin successful and sustainable development.

Multi Field Reserve Audit, Cameroon

GaffneyCline 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.

Review of Oil Field, Congo

For an independent oil company, GaffneyCline 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. GaffneyCline also advised on a drilling plan to test the selected well completion and stimulation practices and produced an outline development plan.

Our Experience

Audit of Petroleum Resources, Congo

GaffneyCline performed an audit of Prospective and Contingent Resources for the operator of a moderately deep (100- 500m) offshore block, Congo. Prospective Resources consisted of a number of leads and the Contingent Resource lay in a partially developed oil field straddling a neighbouring block, where decisions awaited concerning potential development options and pathways to unitized redevelopment. It entailed scrutiny of seismic, well data, and static model to confirm in place volumes, from which GaffneyCline created a range of production profile projections. Development concepts were reviewed to create forward cash flow projections and an economic analysis of Contingent Resources, NPVs and sensitivities. Of particular importance to the project were understanding the contribution that analysis of seismic amplitudes made to defining reservoir extent and undeveloped field compartments, and examining the sensitivity of economic attractiveness to notional future renegotiation of fiscal terms. A full overview report was supplied to the client including a tabulation of Prospective and Contingent Resources and economic sensitivity analysis, prepared to PRMS guidelines.

Production/Operating and Capital Cost Profiles, Congo and Gabon

GaffneyCline 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. GaffneyCline was instructed to derive estimates for production and cost profiles for each of the fields to assist GaffneyCline'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, GaffneyCline 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.

Independent Assessment of the Gas Supply, Côte D'Ivoire

GaffneyCline was requested to provide an independent assessment and opinion as to the adequacy of gas volumes and supply availability to the Azito Power Plant, Abidjan, to meet the additional gas demand associated with the extension of the Concession Agreement of the project through to 2040. GaffneyCline also supported the client at meetings with IFC and other lenders. This was an update to previous assessments of the gas resources.

Risk Analysis, Côte d'Ivoire

GaffneyCline 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.

Entitlements Model Amendments and Support, Equatorial Guinea

GaffneyCline advised on and implemented changes to the client's Entitlement Model for Equatorial Guinea, which was an economic model worked on previously to detail PSC entitlement take for each party in the concession. GaffneyCline also helped consider, model and implement new gas marketing arrangements that have been matured by client and prepare model for more usage for business planning and gas plant product allocations.

FLNG Due Diligence, Equatorial Guinea

For a European operator, GaffneyCline reviewed a potential Floating LNG project offshore Equatorial Guinea for possible acquisition. The initial work covered the full spectrum of the development plans, and identified several technical issues surrounding delivery of the gas volumes. The second phase then involved a detailed assessment of the likelihood of water production exceeding the production plant capacity, issues around well integrity in the face of high gas volumes and reservoir compaction, and volumes available vs the drilling schedule.

Due Diligence Methanol Plant, Equatorial Guinea

For an investment corporation, GaffneyCline 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, GaffneyCline 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.

Independent Review, Equatorial Guinea

GaffneyCline 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.

Our Experience

Acquisition Due Diligence, Gabon

As a key part of a technical due diligence review of Shell's assets in Gabon, GaffneyCline attended Physical Data Room/Management briefing with further data reviewed in a Virtual Data Room. Work involved analysis of the volumetric uncertainty in newer fields, production performance and simulation outputs for both mature and newer fields. Analysis of capital and operating costs, scope for cost/staff reduction and options to simplify infrastructure and cost centres. Major issues regarding poor up-time of older facilities were addressed along with cost of remediation. Bid advise was provided in follow up visit to the client's office.

Contingent Resources for Offshore Gabon Cluster of Marginal Fields

For an independent operator, GaffneyCline undertook a detailed audit of numerous Petrel and Eclipse model cases for four small fields offshore Gabon. GaffneyCline provided a report on Contingent Resources and this report was added to the Client's website and also included in a data room to attract new investors.

Provision of a Baseline Production Profile, Gabon

GaffneyCline provided a baseline production forecast for a fairly mature oil field in Gabon, where one partner decided not to participate in some infill wells. The baseline forecast would be used to determine the incremental production attributable to the incremental wells. The field had been developed with horizontal wells to exploit the oil zone sandwiched between a significant gas cap and an active aquifer. The forecast was made by decline curve analysis, which was performed at field level and at well level taking account of trends in oil production rate, water cut and gas-oil ratio and limits on these quantities.

Audit of Gas Resources, Gabon

GaffneyCline performed an independent technical audit of the gas resources in certain with significant gas volumes operated by five different companies. The audit involved cross checks of the Operator's evaluations in all key discipline areas (i.e. geology, geophysics, petrophysics, reservoir and production engineering), plus an assessment of the gas development plans (where they existed). Conformance of the methodology used with international best practices was also assessed. Most of the fields audited had been developed as oil fields, since there had previously been little or no opportunity to commercialize the gas resources in the country in question. Consequently, the Operators had in most cases focused their efforts on the oil, and gas volumes had not always been evaluated with the same degree of rigor and accuracy as oil volumes; where necessary, GaffneyCline performed some independent analysis in order to estimate the gas resource volumes. The potential impact of a gas development on oil production was also considered.

GaffneyCline's Recent West African Projects



Due Diligence, Ghana

Assistance with Data Room, for Offshore Ghana development assets. For a Japanese client GaffneyCline provided technical support in virtual and physical data rooms for their Tokyo based M&A team. Specific interests included the specialized seismic facies driven Petrel modelling, deep water well and facilities costs, and their combined impact on FDP sensitivities and profiles.

Due Diligence, Ghana

On behalf of the lenders, GaffneyCline completed the due diligence for project finance on an offshore field development project in Ghana. Subsequently, GaffneyCline was engaged to monitor the project beyond financial close and through field development.

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, GaffneyCline 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.

Our Experience

Block Prospectivity Asset Valuation, Liberia

GaffneyCline 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.

Development of Strategic Vision for the Petroleum Sector, Mauritania

GaffneyCline was selected to provide support to MPME to prepare a new vision and roadmap to strengthen the government's capacity to carry out negotiations for a final investment decision and to lay the foundations for the contribution of the gas sector to the economy. Objectives include optimising oil & gas revenues, managing the long-term growth of gas demand and use, the transition to a low carbon energy economy and identifying diversification and partnership opportunities.

Development Plans & Costs Assessment, Mauritania

GaffneyCline 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, GaffneyCline 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.

Gas Reserves Audit, Namibia

On behalf of a utility company and partners, GaffneyCline 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 Advisory Services, Nigeria

GaffneyCline investigated potential gas suppliers for an Independent Power Plant in Nigeria. Scope included desktop study, meetings with potential suppliers and technical and commercial evaluation of short-listed suppliers assets and the operators' ability to develop the gas fields and bring the gas to market. Operators' project execution ability and experience was evaluated as well as their financial capability. The review took account of the domestic market in Nigeria, including relevant legislation. Key deliveries included a MOU which incorporated some key terms for future Gas Sales Agreement.

License Dispute, Sierra Leone

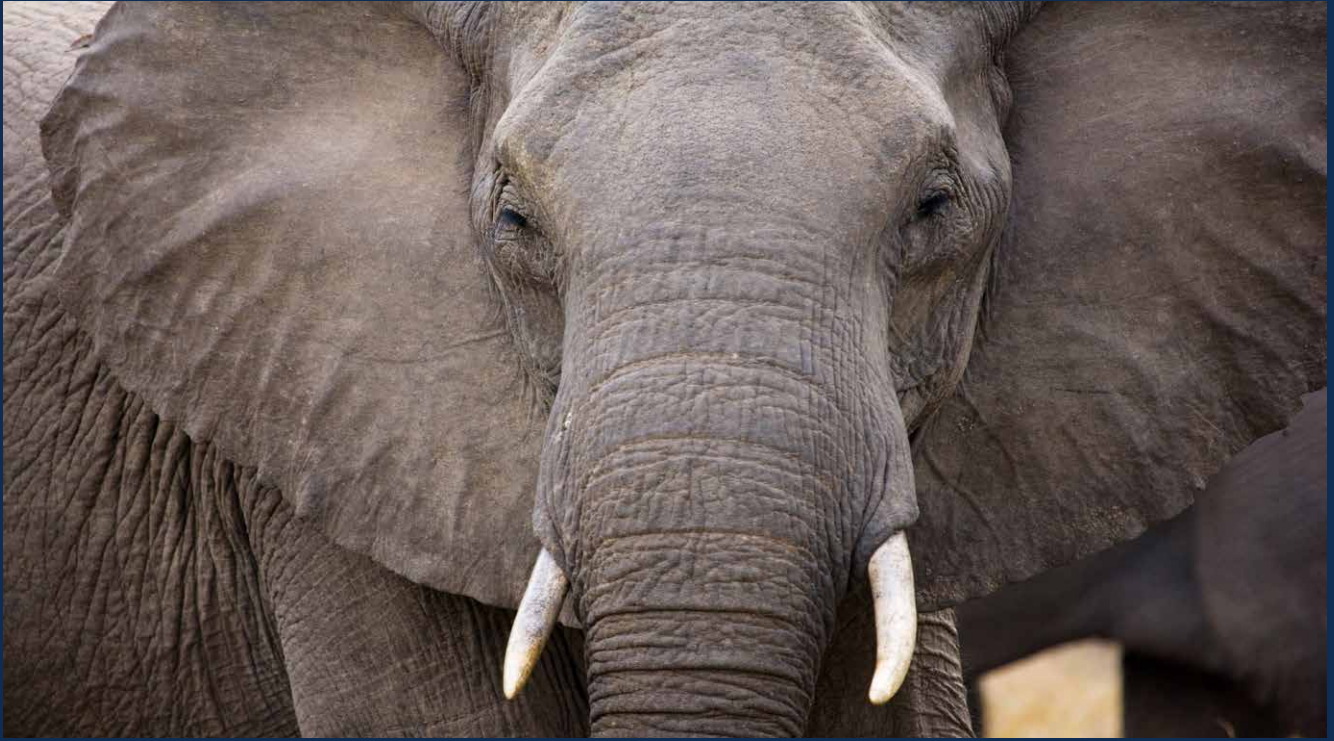
GaffneyCline was retained to act as Expert Witness in a dispute in Sierra Leone regarding activities in a contract area. A report of our findings from information provided by the client and from public domain information was submitted. The client elected to settle with the other party without going to arbitration (planned for the London Court of Arbitration). Key issues were the work obligations and reporting of progress to the government under the original deep water PSA. The Government served notice to the Operator of failure to perform work and issued notice to that effect, and then re-assigned part of the acreage to another party. Subsequently, a small oil/gas discovery was made on adjacent acreage leading to claims by the operator of breach of duty by the state. A 3D seismic survey was eventually recorded by the original operator, and subsequent to our report draft being completed, a settlement was reached, and a renewed license awarded with further exploration obligations.

Reserve Opinion for Oslo Stock Exchange

GaffneyCline prepared an independent reserve and resource report for a small independent oil company with assets in Norway and West Africa. The reserves and resources quoted in GaffneyCline's report were used in support of a corporate bond issue on the Oslo stock exchange. GaffneyCline evaluated reserves and resources in each of the company's assets according to the definitions and guidelines of the SPE PRMS. The company's assets included one large producing oilfield in West Africa, eight further oil and gas discoveries in West Africa and Norway, and numerous exploration Prospects. GaffneyCline reviewed technical information and development plans provided by the operators of the various assets, as well as the company's own views on its key assets (including the two exploration licenses in West Africa where it was the operator), and performed its own analysis to arrive at its reserves and resources estimates. GaffneyCline's work included geoscience and engineering analyses, cost estimation and economic analysis.

FPSO Tendering Process Review, West Africa

For the operator of a major deepwater concession offshore West Africa, GaffneyCline 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.



Our Experience

Abandonment Planning, West Africa

For a West African National Oil Company, GaffneyCline 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 GaffneyCline, in the methodology of auditing.

Advice on LNG Project Planning, West Africa

As part of ongoing assistance to a major African National Oil Company, GaffneyCline advised during all discussions with international partners on the planning of a new LNG project. GaffneyCline 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 Storage Feasibility, West Africa

For a major West African National Oil Company, GaffneyCline 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.

Engineering Due Diligence, West Africa

For a major National Oil Company, GaffneyCline 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.

Assessment of new Ammonia Plant, West Africa

GaffneyCline 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 GaffneyCline's client as one of a number of options to monetise future natural gas resources. GaffneyCline 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.

Offshore Pipeline FEED, West Africa

GaffneyCline 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.

Gas Supply Agreements for LNG, West Africa

As part of ongoing assistance to a major African National Oil Company, GaffneyCline provided advice and assistance on gas supply agreements for a planned LNG project. GaffneyCline 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.

Gaffney Cline

For more information about GaffneyCline's integrated services, please contact your regional GaffneyCline office.

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