



Experts in Egypt

**Gaffney,
Cline &
Associates**

Who is Gaffney, Cline & Associates?

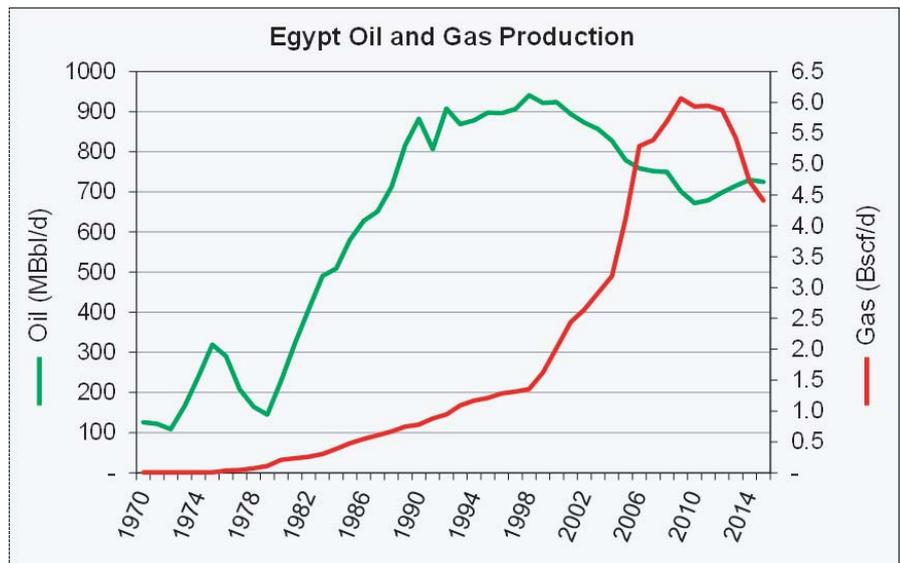
Gaffney, Cline & Associates (GCA) is a global consultancy that has been offering technical, commercial, and strategic advice to the oil and gas sector for over 50 years. GCA's reputation demonstrates that the advice delivered, together with its industry insights, is of high-quality, impartial, technically based, and commercially astute. GCA is traditionally known for being one of the leading Oil & Gas Reserves Consultants within the industry providing Competent Person's Reports and Expert Witness representations; but in reality, GCA offers a full 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, and supported by local offices located around the world.

Why Egypt?

Egypt is rich in oil and gas, with proved oil reserves of 3.5 BBbl and reported gas reserves of 65.2 TCF at end 2015 (BP Stats). Egypt benefits from a relatively low cost operating environment and a good geographical location to reach different markets. There is a wide range of assets in Egypt which GCA has and is continuing to work on; oil/gas, onshore/offshore as well as mature producing assets and exploration blocks. While oil production is in decline, new plays in Western Desert and IOR/EOR options exist.

Egyptian gas has attracted recent interest due to the 2015-16 major discoveries in the East Mediterranean and Nile Delta. Egypt's gas production steadily increased to 2009, when a number of factors, including regional instability resulted in the production starting to drop from 6.1 Bscf/d to below 4.5 Bscf/d in 2015. However, the discoveries being made and planned projects are set to reverse this decreasing trend and bring Egypt's gas production to an all-time high within the next 2-3 years.

GCA conducts 8-10+ projects a year on the Egyptian oil and gas sector for Egyptian and foreign investors and financial firms seeking flexible, lower cost opportunities. The rich diversity of source rocks and reservoirs and challenges of imaging them mean that Egyptian explorers have a huge range of options to locate new hydrocarbon accumulations. Examples include pay in the Carboniferous of W. Desert, Miocene and deep Oligocene pays offshore Nile Delta, all of which help to increase revenue and hence reduce cost/barrel trends. GCA has also reviewed East Mediterranean assets as potential suppliers of gas to the growing Egyptian energy market.



Why GCA in Egypt?

GCA has executed a large range of projects in Egypt that demonstrates its versatility, experience and skill base. Starting in the 1970s this Egyptian experience has grown and includes work for National Oil Companies, multi-nationals and independents. GCA's experience includes everything from upstream, midstream and downstream projects incorporating technical, commercial and legal disputes. This experience has provided GCA with strong knowledge of the challenges as well as the opportunities in Egypt, some of the key challenges are outlined below:

- Detailed study of well, subsea and pipeline costs and long term OPEX issues including water breakthrough in deep water gas wells.
- Interacting with and training of local JVs.
- Domestic demand to increase refined products, gas and power.
- Access to hard currency for repayment of \$ loans:
 - Some of the options in 2014-2015 included condensate cargos, goods and services invoiced in Egyptian Pounds, legitimate currency conversion and payments in exportable goods.
- Returns on \$ investment.
- Management of mature fields.

The following brief summaries provide descriptions of selected projects which GCA has carried out in Egypt in the past few years:

Reserves/Resources

Reserves for Gas Assets in Egypt & UAE: For an independent operator, GCA continues to conduct an annual audit of several onshore gas-producing assets in Egypt and an offshore gas development in the UAE. This is continually updated from previous years and entails a detailed examination of new reservoir mapping, new static and dynamic models, fluid composition models, an audit of production data, and creation of an integrated production forecast model. Of particular significance is integrating the results of new seismic mapping with reservoir performance data to understand compartmentalization of existing discoveries, and using seismic modelling to estimate the range of resources assigned to new discoveries and careful forward modelling of condensate ratios in producing fields. Results are reported in accordance with PRMS standards.

Annual Reserve Reporting, Egypt: As part of its ongoing relationship with an International Client since 2009, GCA undertakes annual audits of hydrocarbon reserves of pre-salt oil and gas fields offshore Gulf of Suez. The assets have complex geology and one of the fields produces from the oil rim under-lying the gas cap. GCA reviews reservoir models, production performance, facilities upgrades and scope for incremental drilling targets in wide range of different reservoir objectives. GCA's analysis report Oil, LPG and sales Gas reserves at the 1P, 2P & 3P levels with corresponding production and cost profiles based on the SPE PRMS guidelines.

Annual Reserve Reporting, Egypt: For its annual reporting requirement under Canadian NI51-101, GCA undertook an audit of Sea Dragon's Komombo concession in Upper Egypt. This concession contains the producing Al Baraka oil field. The results of GCA's audit are used by Sea Dragon in its reporting to the Canadian authorities.

Assisted Prospective and Contingent Resources

Evaluation: GCA guided the staff of an International client to evaluate their resources portfolio. A structured approach was used, including understanding of the databases to be used, the correct G&G methodologies and best practices to be followed, use of probabilistic and deterministic estimations and ultimately estimation of low-high volumes associated with each identified resource. The assets covered were multiple pre-salt Gulf of Suez blocks and a Mexican naturally fractured limestone block.

Competent Persons Reporting (CPR)

Competent Person's Report, Egypt: GCA prepared a Competent Person's Report for a long term International Client. This was the first time the client was obtaining a report covering the company's full Prospective resources, Contingent resources and Reserves portfolio, the report was required in preparation for a potential Initial Public Offering (IPO). The assets within the portfolio were complex pre-salt oil and gas assets. GCA also prepared a Competent Person's Report of a government oil company in preparation for an Initial Public Offering (IPO). The assets within the portfolio included two blocks in Egypt, one onshore and one offshore. GCA's analysis was based on the SPE PRMS guidelines.

Acquisition Due Diligence and Sale of Assets

Due Diligence, Mature Egypt Portfolio: For an independent operator, GCA undertook detailed due diligence based on a VDR and digital data sets for a range of mature Egyptian gas fields and one gas/oil field. GCA reviewed seismic, static models and rebuilt a compositional simulation model combined with OFM database to build late life production forecasts. A detailed review of OPEX and staffing levels was conducted, to consider the scope for reduction over the long term. A summary report was prepared and delivered with Excel forecasts. Finally, a follow up workshop was successful in delivering all the key messages.

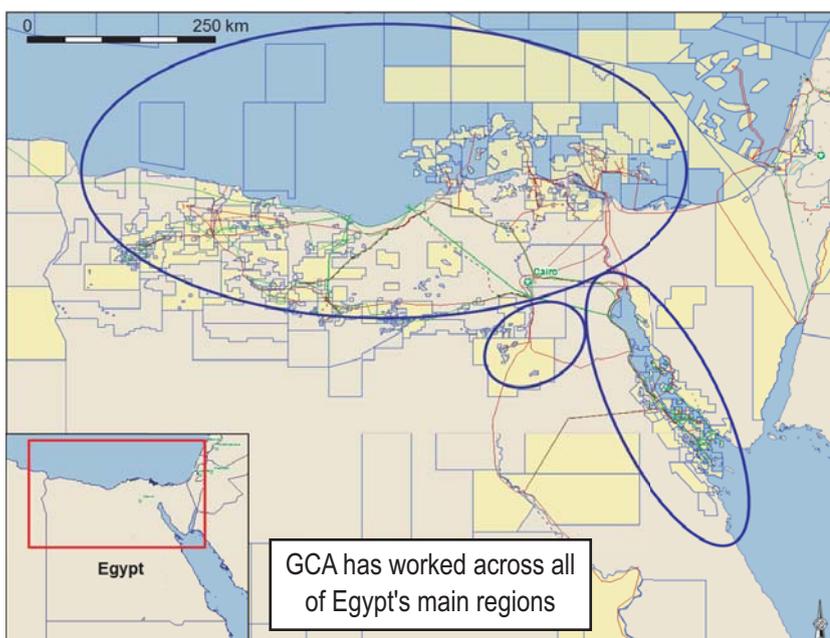
Evaluation and Support for Bid Round Offer - Offshore Gas Field, Egypt:

For a large Japanese company, GCA carried out an independent evaluation of an offshore gas asset, together with associated infrastructure. The evaluation was based on a local consultant's earlier review, together with further research using public domain data, with the aim of providing sufficient

understanding of the asset for the client's board to decide on involvement in a bid round. The work ultimately supported the client in its data room process and the subsequent bid round involvement. GCA also supported the client in its negotiations for forming a joint venture operating company to develop the field, which successfully led to the client being short listed.

Technical/Commercial Asset Evaluation:

For an international client, GCA attended online and physical data rooms and provided a technical and commercial evaluation of a package of Egyptian field assets for the client's consideration of an acquisition. These included mature offshore fields in the Gulf of Suez, new gas fields onshore Nile Delta and undeveloped deep water gas/condensate fields offshore Nile Delta.



Gas Reserves and LNG Facility, Nile Delta: GCA evaluated and valued the possible acquisition of Edison's 50% interest in the West Delta Deep Marine Concession. This concession contains several gas discoveries which supply gas to the domestic market as well as a major onshore LNG facility. GCA's work included an estimation of the gas reserves, an assessment of the exploration prospects/leads and a valuation of these elements. GCA also reviewed the LNG facility and its commercial arrangements.

Opportunity Assessment, Egypt: GCA undertook a detailed study for a multi field acquisition opportunity in the Western Desert. The assets comprised producing fields and exploration opportunities in the NW Gemsa, Alam El Shawish, West and East Gazalat areas.

Sale of Assets, Egypt: GCA was jointly engaged with a major merchant bank to provide assistance to EGPC with the sale of a package of state-owned oil and gas fields. Work included the preparation of an Information Memorandum with a site visit to the field complex, plus data collection in Cairo and Alexandria. The assets were subsequently sold at auction.

Technical Due Diligence for Corporate Acquisition: In January 2007, Dana Gas completed its acquisition of the TSX-listed Centurion for \$1,015,000,000. This was Dana Gas's first acquisition which provided a major entry in Egypt. The primary asset was the producing El Wastani gas field, onshore Nile Delta, Egypt. In connection with this transaction, GCA provided technical due diligence which included an appraisal of the producing assets and an in-depth evaluation of the exploration potential of the areas adjacent to the producing fields. GCA continues to provide post acquisition support to Dana Gas.

Peer Review/Assist

GCA carried out a number of Peer Reviews in Egypt, including review of drilling locations (infill and exploration), review of well results/post mortem, facilities reviews, FDPs and work programs reviews. GCA also provided assistance during a client's preparation for a potential gas field equity unitisation.

Additional Information

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

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Opportunity Screening

Gas Opportunity Screening, Egypt: GCA undertook a gas field acquisition screening task for an International client looking to acquire gas onshore or shallow offshore assets in Egypt. GCA presented a number of opportunities that became available in 2015-16 as well as possible future opportunities.

Gas Expert

Egyptian Gas Pricing Dispute: For an Egyptian independent petrochemical company, GCA undertook an independent study of the developing Egyptian gas markets and pricing issues.

Gas Supply/Demand Market Study: For an international oil company, and as part of a wider review of gas supply/demand in the Middle East, GCA undertook a review of the Egyptian gas market.

Training

Reserves Seminar: GCA prepared and presented a three-day seminar with focus on PRMS in Cairo to attendees from EGPC and a range of joint venture companies.

Prospective and Contingent Resources Training Course:

GCA held a Prospective and Contingent resources training course in Cairo for the staff of an International long term client.

PRMS, Reservoir Engineering & G&G: Trained the staff of an International long term client and their joint venture company.

GCA Projects: Of the 88 projects undertaken by GCA in Egypt over the last 10 years, the split per type of project is as follows:

Job Category	Number of Jobs
Reserves	42
Competent Persons Report	7
Acquisition Due Diligence/Asset Review	22
Expert Witness	1
U&R	1
Peer Review/Assist	8
Gas Expert	3
Reserve/Resource Training	2
Opportunity Screening	2

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