

Natural Gas Production and Processing - a Central African Perspective

From Wellhead to Market



Focus on: **The Manager** ☐ **The Specialist** ☒ **Spotlight Programme** ☐ **Hands-on Skills** ☒

Course Overview

This intensive 5-day training program, delivers a comprehensive understanding of natural gas systems with a strong focus on Central Africa's unique energy landscape. Designed for professionals working in upstream, midstream, and downstream sectors, the course bridges theory with real-world practice—highlighting how gas is produced, treated, processed, and monetized across Angola, Cameroon, Gabon, and the Republic of Congo.

With over 14 trillion cubic feet (Tcf) of proven gas reserves in the region—particularly offshore Angola and Cameroon—the ability to efficiently develop gas infrastructure is critical for economic growth and energy security. This course explores key technologies in gas separation, dehydration, sweetening, NGL recovery, and liquefaction, using flagship regional projects such as Soyo LNG (Angola), Kribi Gas-to-Power (Cameroon), and GTL feasibility studies in Gabon as central case studies.

Participants will gain hands-on insights into operational best practices, safety standards, environmental compliance, and economic optimization—equipping them to support current and future gas infrastructure development. Emphasis is placed on Liquefied Natural Gas (LNG), Gas-to-Liquids (GTL), and domestic utilization strategies under national initiatives like Angola's Gás Natural para Todos and Cameroon's Vision 2035.

By the end of the course, attendees will understand not only the technical aspects of gas processing but also the economic, regulatory, and logistical realities shaping the Central African gas industry.

Course Objectives		This Course is Ideal For:	
1	Understand Natural Gas Fundamentals	✓	Process, Production, and Petroleum Engineers
2	Analyze Gas Gathering & Separation Systems	✓	Field Operators and Supervisors (onshore/offshore)
3	Address Hydrate & Mercury Challenges	✓	Technical Staff involved in Gas Treatment & Facility Operations
4	Master Dehydration & Acid Gas Removal	✓	Entry-level Engineers transitioning into gas processing roles
5	Optimize NGL Recovery & Condensate Stabilization	✓	Government Regulators (ANPG Angola, ARMP Cameroon, AGE-Gabon)
6	Explore LNG & GTL Technologies	✓	Project Managers overseeing gas infrastructure development
7	Navigate Gas Markets & Economics	✓	Energy Investors and Policy Makers interested in gas monetization
8	Improve Troubleshooting & Efficiency		



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Course Content

Day	Theme	Coverage
1	Introduction to Natural Gas Processing in Central Africa	<ul style="list-style-type: none"> Overview of Central Africa's gas resources: Angola, Cameroon, Gabon, Congo-Brazzaville, DRC Physical properties of natural gas: API gravity, Wobbe index, calorific value Impurities: H₂S, CO₂, water, mercury, nitrogen – impact on pipelines and LNG Flaring crisis in offshore fields: Regulatory response (e.g., Angola's flare reduction targets) Gas production systems: Offshore (deepwater, FPSOs), swamp, onshore Heating value (BTU) and its importance in sales specifications Case Study: Soyo LNG Plant (Angola) <ul style="list-style-type: none"> History, capacity (5.2 MTPA), train configuration Feedstock sourcing from Block 14 and offshore platforms Role in global LNG markets and local industrial development
2	Gas-Liquid Separation & Field Processing Systems	<ul style="list-style-type: none"> Principles of gas-liquid separation Separator types: Horizontal, vertical, spherical – selection criteria Three-phase vs. two-phase separators in wet gas fields Instrumentation and control systems (SCADA, pressure transmitters, level switches) Field application: Separator operation in deepwater FPSOs and swamp fields Associated products: <ul style="list-style-type: none"> LPG (Liquefied Petroleum Gas): Domestic use and bottling plants NGL (Natural Gas Liquids): Ethane, propane, butane recovery GTL (Gas-to-Liquids): Concept and potential in Angola/Cameroon using Fischer-Tropsch Flow assurance and sand management in high-water-cut wells Case Study: Kribi Gas-to-Power Project (Cameroon) <ul style="list-style-type: none"> Use of associated gas from offshore fields to fuel 135 MW combined cycle plant Integration with SONARA refinery and national grid
3	Hydrate Prevention & Natural Gas Dehydration	<ul style="list-style-type: none"> Hydrate formation: Conditions, risks in subsea pipelines (e.g., Pazflor, Moho-Bilondo)

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		<ul style="list-style-type: none"> Prevention methods: Temperature control, inhibitors (MEG, methanol injection) MEG (Monoethylene Glycol) Systems: Regeneration units and reinjection loops Water dew point control and specification for pipelines/LNG TEG (Triethylene Glycol) Dehydration Units: <ul style="list-style-type: none"> Process flow, contactor columns, reboiler design Performance factors: Circulation rate, temperature, contamination Troubleshooting: Foaming, glycol loss, pump failures Alternative dehydration: Molecular sieves for cryogenic applications Environmental considerations: Spent glycol disposal and recycling Case Study: Pazflor FPSO (Angola, TotalEnergies) <ul style="list-style-type: none"> Subsea tiebacks requiring robust hydrate inhibition Compact TEG units integrated on floating platform
4	Acid Gas Removal & NGL Recovery 	<ul style="list-style-type: none"> Sweetening processes: <ul style="list-style-type: none"> Amine treating (MEA, DEA, MDEA): Selection and design Sulfinol® and other hybrid solvents Membrane separation and physical solvents (Selexol™, Rectisol™) H₂S and CO₂ removal targets for pipeline (<4 ppmv) and LNG feed Corrosion and foaming: Causes and mitigation (antifoams, filtration) Heat Stable Salts (HSS): Detection, removal, and solvent regeneration Cryogenic NGL Recovery: <ul style="list-style-type: none"> Turbo-expander systems (e.g., Joule-Thomson valves) Cold box design and fractionation trains Condensate stabilization for safe transport Case Study: Soyo LNG Trains 1–3 Expansion Feasibility <ul style="list-style-type: none"> Pre-treatment section: Amine unit, TEG, mercury removal bed Cryogenic expander-based liquefaction process Mercury removal to protect aluminum heat exchangers Environmental performance and community engagement
5	LNG, GTL & Gas Market Dynamics in Central Africa	<ul style="list-style-type: none"> LNG fundamentals: Liquefaction temperatures (-162°C), boil-off gas (BOG)

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- Liquefaction technologies: Cascade, AP-X, mixed refrigerant cycles
- LNG storage: Full containment tanks, membrane tanks
- Marine loading arms and Q-Max carriers
- GTL Technology Overview:
 - Fischer-Tropsch synthesis
 - Potential sites in Angola (Soio, Cabinda) and Gabon (Port-Gentil)
 - Comparison: LNG vs. GTL economics and scalability
- Gas value chain: Upstream → Processing → Transportation → End Users
- Gas pricing models: Oil-linked vs. hub-based; SPAs (Sales and Purchase Agreements)
- Regional market outlook:
- Future trends: FLNG (Floating LNG), small-scale LNG, hydrogen-ready infrastructure
- **Case Study:** Proposed GTL Projects in Gabon & Angola
 - Historical context, technical challenges, and financing models
 - Lessons learned from Sasol's experience in South Africa
- **Group discussion:** "Can Central Africa become a net gas exporter?"

Course Assessment

Certification

Participants will be assessed on:

- Participation in sessions
- Completion of exercises & case studies
- Performance in assessments

Upon successful completion of the course, participants will receive a certificate of achievement, recognised by industry professionals and employers

Course Instructor

With BSc and PhD degrees from the UK, and with over 30 years of refinery technology, operations, and management expertise for several famous-name oil companies, this speaker is now an internationally-famous chemical engineering consultant.

As a Chartered Chemist, a Member of the Royal Society of Chemistry and a Member of the American Institute of Chemical Engineers, he holds honorary appointments at a number of European universities and conducts cutting-edge research into vacuum distillation, gas recovery, absorption and pyrolysis.

