

Natural Gas Production and Processing – a West African Perspective

From Wellhead to Market



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

Course Overview

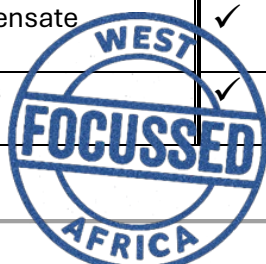
This 5-day course, provides a practical understanding of gas processing tailored to the region's needs. It covers gas field production, separation, treatment, and monetization through LNG and GTL technologies. Participants will learn about dehydration, sweetening, NGL recovery, and pipeline specifications, with a focus on operational efficiency and environmental compliance. Real-world case studies include Nigeria LNG (NLNG), Indorama Eleme, and Ghana's Jubilee Field. The course addresses challenges like flaring, hydrate formation, and gas utilization in OMLs and marginal fields. Ideal for engineers, operators, and regulators. It emphasizes local content, gas-to-power, and small-scale LNG potential. Attendees will gain skills in troubleshooting, process optimization, and economic evaluation, supporting West Africa's transition toward sustainable gas development and energy security.

With over 200 trillion cubic feet (Tcf) of proven gas reserves in Nigeria alone—and growing developments in Ghana, Côte d'Ivoire, and Senegal—the ability to efficiently process and export natural gas has never been more critical.

The course also examines domestic gas utilization strategies under initiatives like Nigeria's National Gas Expansion Program (NGEP) and Ghana's Atuabo Gas Plant.

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 West 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 (NUPRC, EPA Ghana, PETROCI)
6	Explore LNG & GTL Technologies	✓	Project Managers overseeing gas infrastructure development




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7	Navigate Gas Markets & Economics	✓	Energy Investors and Policy Makers interested in gas monetization
Course Content			
Day	Theme	Coverage	
1	Introduction to Natural Gas Processing in West Africa	 <ul style="list-style-type: none"> Overview of West Africa's gas resources: Nigeria, Ghana, Senegal, Mauritania, Côte d'Ivoire <ul style="list-style-type: none"> Nigeria LNG (NLNG) Bonny Island Plant & History, capacity (22 MTPA), train configuration Role in global LNG markets and local economic impact Physical properties of natural gas: API gravity, Wobbe index, calorific value and their importance in sales specifications Impurities: H₂S, CO₂, water, mercury, nitrogen – impact on pipelines and LNG production Feedstock sourcing from associated and non-associated gas Gas production systems: Onshore, swamp, offshore (deepwater) Case Study: Flaring crisis in the Niger Delta: Regulatory response (FGN Flare-Out Roadmap) 	
2	Introduction to gas conditioning objectives / Gas-Liquid Separation 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, control, and measurement of natural gas and gas liquids Field application: Separator operation in OMLs and marginal 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 Nigeria using Fischer-Tropsch Integration with PHRC and gas supply agreements 	

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		<ul style="list-style-type: none"> Flow assurance and sand management in high-water-cut wells Case Study: Indorama Eleme Petrochemicals (Port Harcourt)
3	Hydrate Problems / Dehydration of Natural Gas	<ul style="list-style-type: none"> Hydrate formation conditions/ Hydrate prevention and mitigation methods. <ul style="list-style-type: none"> Conditions, risks in subsea pipelines (e.g., Usan, Egina fields) Prevention methods: Temperature control, inhibitors (MEG, methanol injection) MEG (Monoethylene Glycol) Systems: Regeneration units and reinjection loops Water content estimation and dew point control and specification for pipelines/LNG Process description of the TEG (Triethylene Glycol) dehydration unit Performance factors: Circulation rate, temperature, contamination Troubleshooting: Foaming, glycol loss, pump failures Use of compact TEG units on FPSOs Alternative dehydration: Molecular sieves for cryogenic applications Environmental considerations: Spent glycol disposal and recycling Case Study: TEN Fields (Ghana) – Tullow Oil
4	Mercury, Acid Gas Removal & NGL Recovery	<ul style="list-style-type: none"> Mercury problem in natural gas, Mercury removal to protect aluminum heat exchangers Process description of the mercury removal units 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™) Physical processes / Alkaline Carbonate Salt Processes Hybrid Processes




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		<ul style="list-style-type: none"> • 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: • Turbo-expander systems (e.g., Joule-Thomson valves) • Condensate stabilization for safe transport • Environmental performance and community engagement • Case Study: NLNG Trains 1–6 and Train 7 (Expansion Project)
5	LNG Liquefaction / Gas markets and Gas economics 	<ul style="list-style-type: none"> • NG, GTL & Gas Market Dynamics in West Africa • Gas value chain • Gas markets, specs and prices • LNG fundamentals: Liquefaction temperatures (-162°C), boil-off gas (BOG) • Liquefaction technologies: Cascade, AP-X (used by NLNG), 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 Nigeria (Warri, Port Harcourt) • Comparison: LNG vs. GTL economics and scalability • Case Study: Shell's Proposed GTL Project in Nigeria
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

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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.

