

Nitrogen rejection

COSTAIN

Proven track record for full lifecycle delivery; from consultancy and advanced engineering design to complete programme delivery, using patented cryogenic processes.

Challenges

Increasing nitrogen levels in gas fields drive a need for efficient cryogenic nitrogen removal plants.

Natural gas is increasingly used for fuel and/or chemical production, where the nitrogen content is typically reduced to 5% for fuel use and 1% or less for use as chemical feedstock. This means that efficient cryogenic plants which deliver the appropriate feed gas nitrogen levels are essential to prevent major ramifications for chemical plant performance.

Cryogenic distillation, the only cost effective technology for nitrogen removal, operates at high pressure, offers high hydrocarbon recovery, low power requirements, and extracts a pure nitrogen vent.



“ Our innovative, patented cryogenic distillation processes are continuously developed and improved to maintain our position as an established expert in natural gas processing. ”

Grant Johnson Front End Solutions Manager



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Grant has over 20 years' experience in the delivery of projects in international gas processing and cryogenics.

Our approach

We deliver value and innovation across all phases of the project lifecycle; from conceptual studies, basic design packages and proprietary technology licensing agreements, to project delivery and ongoing technical support, globally.

Our units are cost effective, reliable, simple to operate, easy to maintain, and able to respond to challenges such as variable nitrogen content and presence of CO₂ in the feed gas. We can provide solutions across the entire gas processing chain, from the point where gas is received to product export.

With extensive track record in the supply of modular cryogenic process plants, we have supplied over one hundred large gas processing plants in modular form with cold boxes, preassembled units/racks, pre-dressed columns and packaged machinery.

We are experienced in optimising existing assets through brownfield modifications such as debottlenecking.

We recently provided exemplary front end solutions to one of the largest gas processing facilities in Abu Dhabi, offering engineering services and licensing on Costain's proprietary cryogenic technology for nitrogen rejection.

Our services

- Licensing of innovative and proprietary technologies, continuously developed via our cryogenic expertise.
- Patented optimised process designs based on pre-separation and double column processes for natural gas streams between 8-80mol% nitrogen.
- Recent patents include CO₂ tolerant nitrogen rejection units as well as simple, efficient nitrogen removal from liquefied natural gas to <1mol%.

Benefits:

- High energy efficiency
- Low compression power
- Very low hydrocarbon losses and low environmental impact
- Excellent turndown characteristics
- High rate of return.

Example project experience

PEMEX Mexico - Nitrogen rejection plant

Installation of 630 MMSCFD nitrogen rejection units, to enhance calorific value and maintain sales gas quality.

Solution

Technology supply, conceptual design, front end engineering design, detailed design, procurement and commissioning support.

Outcome

- Plant designed to handle a range of nitrogen concentrations following initial nitrogen breakthrough due to injection into the Cantarell oil field.
- World's largest nitrogen rejection plant, optimised to minimise lifecycle costs and hydrocarbon emissions.



ENI Pakistan - Cryogenic nitrogen rejection units

Installation of nitrogen rejection units at Bhit gas plant to maintain key gas supply for Karachi.

Solution

Conceptual studies, front end engineering design, detailed engineering design, procurement, commissioning and construction management support.

Outcome

- Delivered two cryogenic NRU systems against transport constraints and predicted decline in feed pressure, with successful execution in a challenging and remote desert location.
- 270 MMSCFD of natural gas treated to reduce nitrogen content from 20% to 7%.



BG Tunisia - NRU debottlenecking

Optimisation of sales gas capacity by identifying bottlenecks throughout the nitrogen rejection plant to support the Hannibal gas processing plant in supplying 40% of Tunisia's gas.

Solution

Conceptual studies, detailed engineering design, project management, procurement, construction and commissioning support.

Outcome

- 10% increase in sales gas capacity (up to 200 MMSCFD) achieved.
- Nitrogen content reduced from almost 20% to 6.5% through the NRU debottlenecking process.
- Plant downtime and onsite labour minimised using a modular approach to design and construction.



E.ON UK - Gas processing plant with nitrogen rejection

Installation of nitrogen rejection unit for a 200 MMSCFD gas processing plant to meet the UK's National Transmission System (NTS) requirements.

Solution

Front end design, detailed engineering design, project management, procurement, construction and commissioning services.

Outcome

- Nitrogen content in natural gas reduced to less than 5%.
- Innovative design giving an overall low power consumption.
- Significant cost savings realised through optimised compression system design.

