

NITROGEN REJECTION

Nitrogen is frequently found as an inert component of raw natural gas and removal is often required to improve fuel combustion and meet sales gas specifications. Cryogenic distillation is the only cost effective technology for nitrogen removal.

This method operates at high pressure, offers high hydrocarbon recovery with low power requirements and extracts a pure nitrogen vent.

Developed from over 40 years of extensive project experience, Costain's proprietary cryogenic distillation processes are continuously developed and improved, maintaining our position as an established expert in natural gas processing.



MAJOR FACILITIES WORLDWIDE, INCLUDING THE WORLD'S LARGEST NRU

EFFECTIVE DESIGN SOLUTIONS FOR CUSTOMER-SPECIFIC NEEDS

PROPRIETARY TECHNOLOGY FOR MAXIMUM PERFORMANCE, MINIMUM COST

COSTAIN'S CAPABILITY

Costain's engineering capability enables us to deliver value and innovation across all phases of the project lifecycle, from basic design packages and technology licensing agreements to project delivery and ongoing technical support. We are experienced in optimising existing assets by undertaking brownfield modifications such as debottlenecking.

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

A modular approach is often applied to project delivery, with proven benefits in minimising site construction, improving quality compliance and improving health and safety control.

PROPRIETARY TECHNOLOGY

Continuous development of our cryogenic expertise allows us to offer innovative, proprietary technologies, which are available for licensing.

Optimised process designs have been patented based on pre-separation and double column processes for natural gas streams with between 8mol% and 80mol% nitrogen. Other recent patents include CO₂ tolerant nitrogen rejection units as well as simple, efficient nitrogen removal from liquefied natural gas (LNG) to <1 mol%.

Costain's process technology provides

- high energy efficiency
- low environmental impact
- low compression power
- very low hydrocarbon losses
- excellent turndown characteristics
- high rate of return

RELEVANT EXPERIENCE

Pemex

Nitrogen Rejection Plant, Mexico



- Largest NRU in the world
- Plant handles a range of nitrogen concentrations following initial nitrogen breakthrough due to injection into the Cantarell oil field
- Processes up to 630 MMSCFD of natural gas

- ✓ TECHNOLOGY LICENCE
- ✓ FEED
- ✓ PROCUREMENT
- ✓ CONCEPTUAL STUDIES
- ✓ DESIGN
- ✓ COMMISSIONING SERVICES

ENI Pakistan

Cryogenic Nitrogen Rejection Units



- Bhit gas plant, key gas supply for Karachi
- Delivered two NRUs against transport constraints and a predicted decline in feed pressure
- Capacity 270 MMSCFD of natural gas, treated to reduce nitrogen content from 20% to 7%

- ✓ CONCEPTUAL STUDIES
- ✓ DESIGN
- ✓ PROCUREMENT
- ✓ FEED
- ✓ DETAILED ENGINEERING

E.ON UK

Gas Processing Plant + Nitrogen Rejection



- Design delivered a high degree of reliability and availability
- NRU for a gas processing plant to condition natural gas to meet the UK's National Transmission System (NTS) requirements
- Nitrogen content reduced to less than 5%

- ✓ FEED
- ✓ PROCUREMENT
- ✓ CONSTRUCTION
- ✓ DETAILED ENGINEERING
- ✓ PROJECT MANAGEMENT
- ✓ COMMISSIONING SERVICES

BG Tunisia

Nru Debottlenecking



- Hannibal gas processing plant supplies 40% of Tunisia's gas
- De-bottlenecked the NRU which was originally supplied by Costain to reduce nitrogen content from almost 20% to 6.5%
- Achieved a 10% increase in sales gas capacity to 200 MMSCFD

- ✓ CONCEPTUAL STUDIES
- ✓ PROCUREMENT
- ✓ COMMISSIONING SERVICES
- ✓ DETAILED ENGINEERING
- ✓ PROJECT MANAGEMENT