Brazed aluminum heat exchangers (BAHX) are at the heart of cryogenic NRU plants and fundamental to nitrogen removal and all the associated integrated processes of NGL and helium recovery and LPI and LNG production. Chart’s proven BAHX design and manufacturing experience and vertically integrated structure provide unequaled expertise in the application of BAHX systems and NRU processing requirements.

Principle BAHX features:
- Aluminum construction for maximum heat transfer performance and thermal conductivity
- Custom design for optimized thermal and hydraulic performance
- Multi-stream capability
- Reduced temperature approach
- Incorporated as packaged flange to flange cold box solutions

Chart’s principal BAHX engineering and manufacturing facility is in La Crosse, WI and the cold box manufacturing facility in New Iberia, LA has waterside access.
Brazed aluminum heat exchangers (BAHX) are at the heart of cryogenic NRU plants and fundamental to nitrogen removal and all the associated integrated processes of NGL and helium recovery and LPI and LNG production. Chart’s proven BAHX design and manufacturing experience and vertically integrated structure provide unequalled expertise in the application of BAHX systems and NRU processing requirements.

Principle BAHX features:
- Aluminum construction for maximum heat transfer performance and thermal conductivity
- Custom design for optimized thermal and hydraulic performance
- Multi-stream capability
- Reduced temperature approach
- Incorporated as packaged flange to flange cold box solutions

Chart’s principal BAHX engineering and manufacturing facility is in La Crosse, WI and the cold box manufacturing facility in New Iberia, LA has waterside access.
Cryogenic Nitrogen Rejection Units

Chart’s proprietary nitrogen rejection units (NRU) enable monetization of low btu gas reserves. Our technology solutions facilitate increased revenues through systems that integrate helium, cost effective production of nitrogen rejection with natural gas liquids (NGL) recovery and the potential production of liquid natural gas (LNG) and/or liquid nitrogen (LIN). Chart has over 40 years experience in cryogenic gas processing for plants in service from 15MM SCFD to the world’s largest integrated NRU with NGL extraction capability with a nameplate capacity of 900MM SCFD. Chart’s cryogenic NRU solution is applicable for nitrogen contents as small as 1% and greater than 70%.

- Flange to flange cryogenic NRU – complete cold box solutions for your project application
- Vertically integrated around Chart’s brazed aluminum heat exchanger (BAHX)
- Integrated process technology – maximized revenue opportunities via helium recovery, NGL extraction, LNG and/or LIN production

Why Chart?

- Extensive, proven and demonstrative worldwide NRU experience
- Vertically integrated design and manufacture of integral BAHX exchangers
- Process design, detailing and shop fabrication of flange-to-flange cold box solutions
- Gas monetization opportunities via integrated process design
- NRU solutions from 15MMSCFD to 900MMSCFD of feed gas
- Inlet nitrogen concentrations from 1% to 71% processed to monetize low btu gas

NLU LNG NGL He LIN

Demand for LNG is at a premium as it is clean burning and enjoys a substantial price advantage versus distillate fuels. Chart’s process technology reduces the nitrogen content in feed gas to < 1% to meet the most stringent LNG product specifications.

Helium is a scarce commodity and generates substantial revenues. With a Chart Integrated plant solution up to 99% helium recovery is feasible.

An integrated system provides significantly reduced energy consumption versus separate NGL recovery and NRU.

Chart’s integrated NRU/NGL plant solutions recover up to 95% of the ethane and virtually all of the propane and heavier hydrocarbons.

There is often local demand for liquid nitrogen.

Chart’s flexible BAHX design permits the production of refrigeration grade nitrogen.

NRU solutions from 15MMSCFD to >900MMSCFD of feed gas
Inlet nitrogen concentrations from 1% to 71% processed to monetize low btu gas

Two (or more) Column NRU
Where inlet nitrogen concentrations are < 40% and/or integrated helium recovery is required Chart’s patented and proven pre-fractionator NRU technology is the optimum processing solution. The resultant two column design features a pre-fractionator followed by a low pressure NRU fraxator and offers the following:
- Conditions very low nitrogen concentration inlet gases for efficient separation and minimized methane losses
- Recovery of a substantial fraction of methane at elevated pressure reduces recompression horsepower
- Permits higher concentrations of CO₂ and C₄+ hydrocarbons in the inlet feed
- Permits high recovery of crude helium

Nitrogen has no calorific value and its removal is often required to meet product specifications. Naturally occurring nitrogen is the most common cause of high nitrogen content in natural gas* and Chart’s NRU technology is the most economical cryogenic method for separating it. Of all the NRU technologies cryogenic plants have the highest methane recovery rate and are standard practice for plants >15MMSCFD. As the nameplate capacity increases so do the economies of scale.

*According to the Gas Research Institute (GRI), about 17% of the natural gas reserves in the United States cannot be used without nitrogen removal

Optimized design requiring less heat exchanger surface area
Optimized integration
The industry’s highest pressure residue gas return streams for minimized recompression
High purity sales gas
Minimized footprint

Chart NRU - Proven Experience

Represent approx. 25% of the world’s installed base
Represent approx. 50% of the world’s nameplate processing capacity
The world’s largest integrated NRU with NGL extraction

© RasGas Company Limited 2014
Cryogenic Nitrogen Rejection Units

Chart’s proprietary nitrogen rejection units (NRU) enable monetization of low btu gas reserves. Our technology solutions facilitate increased revenues through systems that integrate helium, cost effective production of nitrogen rejection with natural gas liquids (NGL) recovery and the potential production of liquid natural gas (LNG) and/or liquid nitrogen (LIN). Chart has over 40 years experience in cryogenic gas processing for plants in service from 15MM SCFD to the world’s largest integrated NRU with NGL extraction capability with a nameplate capacity of 900MM SCFD. Chart’s cryogenic NRU solution is applicable for nitrogen contents as small as 1% and greater than 70%.

- Flange to flange cryogenic NRU – complete cold box solutions for your project application
- Vertically integrated around Chart’s brazed aluminum heat exchanger (BAHX)
- Integrated process technology – maximized revenue opportunities via helium recovery, NGL extraction, LNG and/or LIN production

Demand for LNG is at a premium as it is clean burning and enjoys a substantial price advantage versus distillate fuels. Chart’s process technology reduces the nitrogen content in feed gas to < 1% to meet the most stringent LNG product specifications.

Helium is a scarce commodity and generates substantial revenues. With a Chart integrated plant solution up to 99% helium recovery is feasible.

Nitrogen has no calorific value and its removal is often required to meet product specifications. Naturally occurring nitrogen is the most common cause of high nitrogen content in natural gas* and Chart’s NRU technology is the most economical cryogenic method for separating it. Of all the NRU technologies cryogenic plants have the highest methane recovery rate and are standard practice for plants >15MMSCFD. As the nameplate capacity increases so do the economies of scale.

*According to the Gas Research Institute (GRI), about 17% of the natural gas reserves in the United States cannot be used without nitrogen removal

Why Chart?

- Extensive, proven and demonstrative worldwide NRU experience
- Vertically integrated design and manufacture of integral BAHX exchangers
- Process design, detailing and shop fabrication of flange-to-flange cold box solutions
- Gas monetization opportunities via integrated process design
- NRU solutions from 15MMSCFD to >900MMSCFD of feed gas
- Inlet nitrogen concentrations from 1% to 70% processed to monetize low btu gas

Single low pressure column NRU
- Generally applicable to an inlet nitrogen concentration <40%

Single high pressure column NRU
- Generally applicable to inlet flows <30 MMSCFD and without integrated helium recovery

Two (or more) Column NRU
Where inlet nitrogen concentrations are <40% and/or integrated helium recovery is required Chart’s patented and proven pre-fractionator NRU technology is the optimum processing solution. The resultant two column design features a pre-fractionator followed by a low pressure NRU fractionator and offers the following:
- Conditions very low nitrogen concentration inlet gases for efficient separation and minimized methane losses
- Recovery of a substantial fraction of methane at elevated pressure reduces recompression horsepower
- Permits higher concentrations of CO2 and C4+ hydrocarbons in the inlet feed
- Permits high recovery of crude helium

Chart NRU - Proven Experience

Represent approx. 25% of the world’s installed base
Represent approx. 50% of the world’s nameplate processing capacity
The world’s largest integrated NRU with NGL extraction

© RasGas Company Limited 2014
Cryogenic Nitrogen Rejection Units

Chart’s proprietary nitrogen rejection units (NRU) enable monetization of low btu gas reserves. Our technology solutions facilitate increased revenues through systems that integrate helium, cost effective production of nitrogen rejection with natural gas liquids (NGL) recovery and the potential production of liquid natural gas (LNG) and/or liquid nitrogen (LIN). Chart has over 40 years experience in cryogenic gas processing for plants in service from 15MM SCFD to the world's largest integrated NRU with NGL extraction capability with a nameplate capacity of 900MM SCFD. Chart’s cryogenic NRU solution is applicable for nitrogen contents as small as 1% and greater than 70%.

- Flange to flange cryogenic NRU – complete cold box solutions for your project application
- Vertically integrated around Chart’s brazed aluminum heat exchanger (BAHX)
- Integrated process technology – maximized revenue opportunities via helium recovery, NGL extraction, LMG and/or LIN production

**Why Chart?**

- Extensive, proven and demonstrative worldwide NRU experience
- Vertically integrated design and manufacture of integral BAHX exchangers
- Process design, detailing and shop fabrication of flange-to-flange cold box solutions
- Gas monetization opportunities via integrated process design
- NRU solutions from 15MMSCFD to 900MMSCFD of feed gas
- Inlet nitrogen concentrations from 1% to 71% processed to moniate low btu gas

**NLU LNGNGL**

Helium is a scarce commodity and generates substantial revenues.

- With a Chart integrated plant solution up to 89% helium recovery is feasible.

Demand for LNG is at a premium as it is clean burning and enjoys a substantial price advantage versus distillate fuels.

Chart's process technology reduces the nitrogen content in feed gas to < 1% to meet the most stringent LNG product specifications.

Helium is a scarce commodity and generates substantial revenues.

- With a Chart integrated plant solution up to 99% helium recovery is feasible.

There is local demand for liquid nitrogen.

- Chart’s flexible BAHX design permits the production of refrigeration grade nitrogen.

An integrated system provides significantly reduced energy consumption versus separate NGL recovery and NRU.

Chart’s integrated NRU/NGL plant solution recover up to 35% of the ethane and virtually all of the propane and heavier hydrocarbons.

Nitrogen has no calorific value and its removal is often required to meet product specifications. Naturally occurring nitrogen is the most common cause of high nitrogen content in natural gas* and Chart’s NRU technology is the most economical cryogenic method for separating it.

Of all the NRU technologies cryogenic plants have the highest methane recovery rate and are standard practice for plants >15MMSCFD. As the nameplate capacity increases so do the economies of scale.

*According to the Gas Research Institute (GRI), about 17% of the natural gas reserves in the United States cannot be used without nitrogen removal

**Chart NRU - Proven Experience**

Represent approx. 25% of the world’s installed base

Represent approx. 50% of the world’s nameplate processing capacity

The world’s largest integrated NRU with NGL extraction

© RasGas Company Limited 2014
Brazed aluminum heat exchangers (BAHX) are at the heart of cryogenic NRU plants and fundamental to nitrogen removal and all the associated integrated processes of NGL and helium recovery and LPI and LNG production. Chart’s proven BAHX design and manufacturing experience and vertically integrated structure provide unequaled expertise in the application of BAHX systems and NRU processing requirements.

Principle BAHX features:
- Aluminum construction for maximum heat transfer performance and thermal conductivity
- Custom design for optimized thermal and hydraulic performance
- Multi-stream capability
- Reduced temperature approach
- Incorporated as packaged flange to flange cold box solutions

Chart’s principal BAHX engineering and manufacturing facility is in La Crosse, WI and the cold box manufacturing facility in New Iberia, LA has waterside access.