CHART®

CRYOGENIC STORAGE

AND VAPORIZATION SYSTEMS

Innovation. Experience. Performance.®

About Chart

Our focus is cryogenics. Chart is a recognized global brand for the design and manufacture of highly engineered cryogenic equipment used from the beginning to the end in the liquid gas supply chain.

We express our brand promise through our tagline

Innovation. Experience. Performance.®

Innovation – We are passionate about what we do and dedicated to continuous, innovative development.

Experience – Customers rely on our knowledge because we are experts in our field.

Performance – We fulfill expectations. We respect our customers and are committed to meeting their needs.

Chart Vacuum Technology®

Providing the best insulation system to protect your valuable gases from harsh ambient conditions results in lower pressure rise and lower losses, yielding better gas utilization. Chart Vacuum Technology® is at the core of why Chart is recognized around the world as the premier supplier of cryogenic equipment.

Chart's production plants are fully audited and compliant with Quality System ISO 9001:2008 and Environmental System ISO 14001:2005

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Cryogenic Storage and Vaporization Systems

Application-focused cryogenic solutions designed to provide the highest levels of performance and lowest operating cost. Our complete liquid storage and regasification systems are delivered with the highest levels of quality, safety and engineering expertise.

Chart provides the complete mechanical and electrical installation including engineering, works, and approvals. Control & Emergency systems are designed in accordance with applicable standards to guarantee the highest level of reliability.

Projects are engineered, manufactured and managed in-house to ensure maximum quality and we pride ourselves on our expertise, responsiveness and customer support, which includes:

- Engineering & project management
- Prefabrication & documentation
- Inspection & testing
- Approval documentation
- Third Party Inspection of the tanks, vaporizers & kids
- Active participation in key project meetings (KoM, DRM, HAZOP)
- Site supervision
- Start - up and commissioning
- Handover of the final system
- After sales services

Chart guarantees on-time delivery, optimum performance and reliability.

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Engineered Systems – Definition

Custom engineered stationary bulk tanks are used to store liquefied gases - oxygen, nitrogen, argon, nitrous oxide, carbon dioxide, natural gas (LNG) and ethylene - with maximum efficiency.

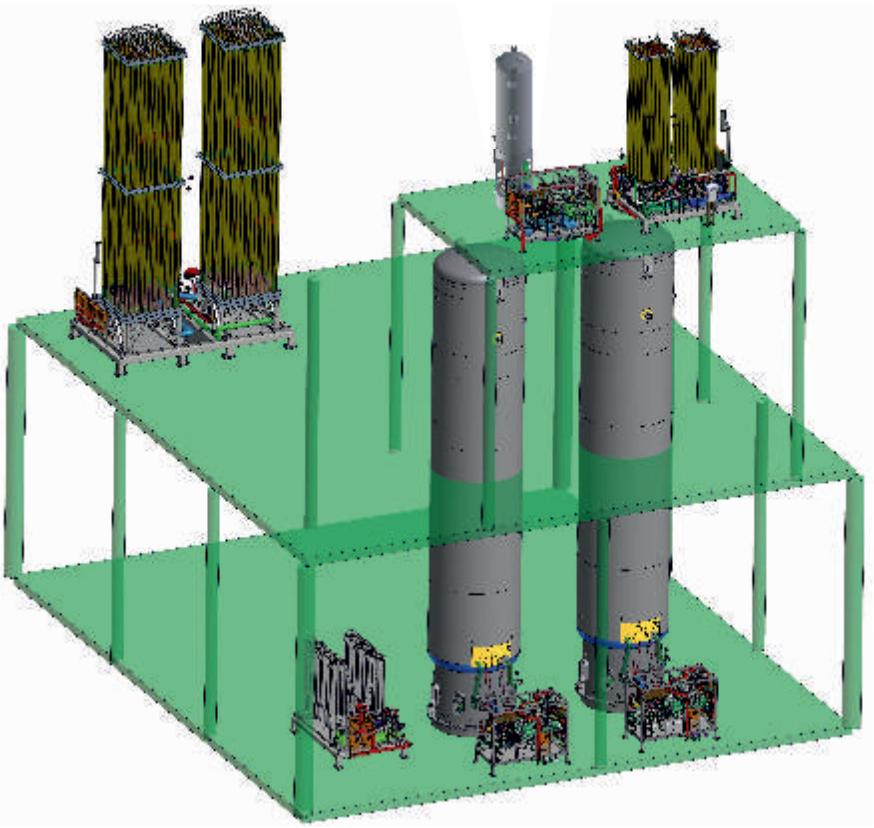
Air Gases and CO_2 Systems are tailored for individual customer storage capacity and flow gas withdraw demand requirements through modular design and standard components.

Typical applications include:

- Food and drink processing
- Breweries
- Hospitals
- Laboratories
- Universities
- Research facilities
- Aerospace projects
- Energy sources for industrial and residential consumption
- Peak shaving plants for use during high demand periods

LNG product portfolio includes onboard fueling systems for ships and vehicles, onshore and offshore bunkering terminals, ship to ship fueling systems, vehicle mobile and stationary fueling stations and a complete range of solutions for transporting LNG by road, sea and rail including ISO intermodal containers, trailers, swap bodies and the recently developed LNG rail car.

Chart brings more than 25 years experiences of delivering cryogenic system solutions.



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Engineered Systems – Components

Remote Fill Modules – provide ability to fill multiple bulk tanks in a given system if required.

Storage Vessels - vertical or horizontal vacuum (typically perlite) insulated cryogenic storage tanks with volume up to 1225m^3 each.

Vaporizers - ambient vaporizers are the aluminum star-fin " Thermax" type and do not need additional energy support. Vaporizers are custom optimized in accordance with the customer's specification for pressure flow and temperature zone. Electric or water bath versions are optional.

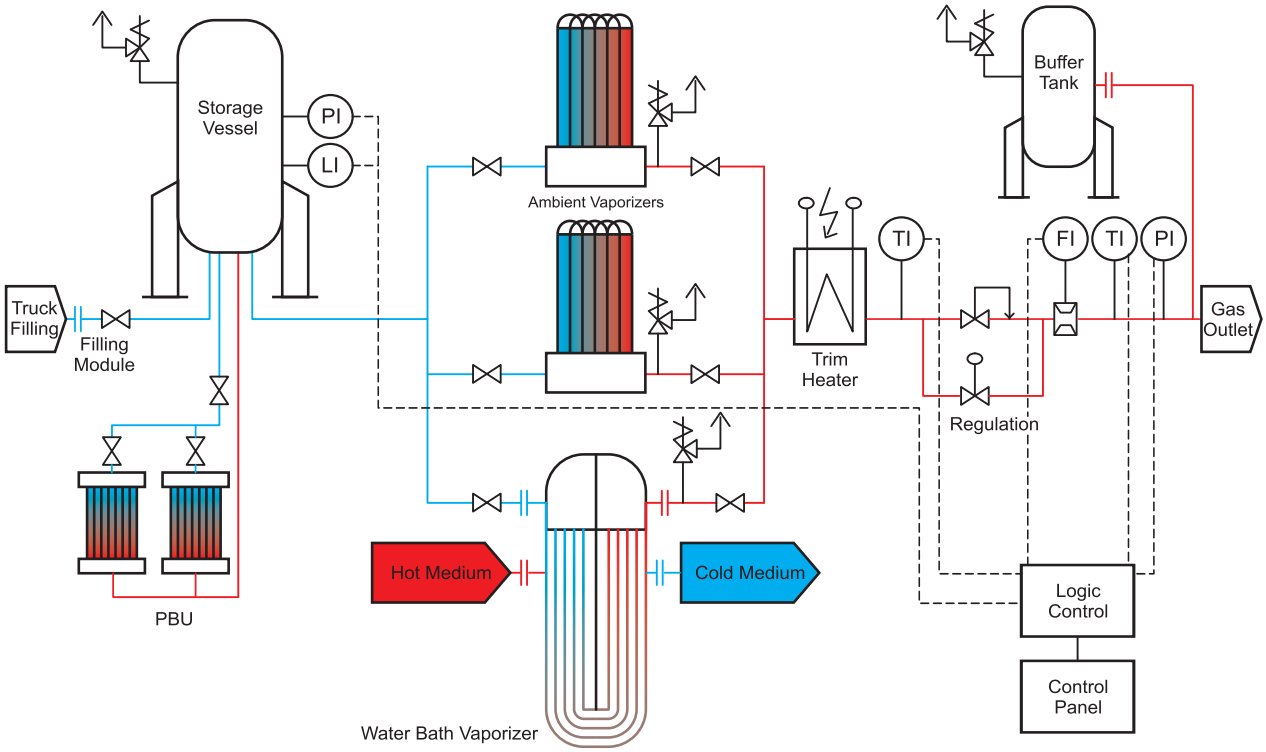
Piping & Components – filling lines can be vacuum or foam insulated. Vacuum Insulated Pipe consists of double walled stainless steel piping where the combination of super insulation and a high level of vacuum ensures maximum heat insulation.

Manifolds – provide required flow and pressure necessary for the application. Mechanical or automated, Single or Multiple versions are available.

Buffer Tanks - used as storage to cover peak loads or as back up for medium term shortages.

Logic Control (PLC) - the safety and control system operates and controls the tank(s) and associated equipment – valves, detectors, heat exchanger(s), station, etc.

Supervision, Start-up, Commissioning, and Training - Chart provides delivery of all cryogenic equipment and/or "Turnkey" installation. Civil work is offered as an option through approved subcontractors.



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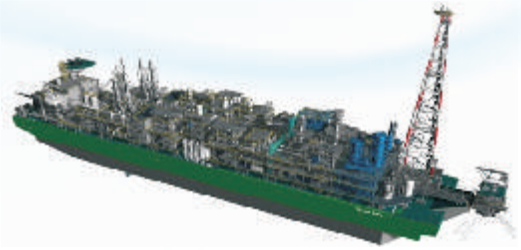
References

Floating LNG

Customer: Petronas

Scope: Design and manufacture of LIN storage, vaporization and distribution package

Project Highlights: The floating platform is used for mining and processing of natural gas from deposits from the sea bottom and a reliable nitrogen source is used for common consumption, conditional inerting in the liquefaction and storage of LNG for maintenance and an important safety provision.



LIN Injection Facility

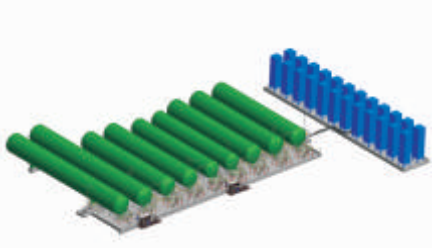
Customer: Apache North Sea Terminal - Scottish Area Gas Evacuation (SAGE)

Scope: Liquid Nitrogen Injection Facility

Project Highlights: The facility processes feed gas from the pipeline systems through pressure reduction, NGL removal and conditioning to meet National Grid requirements (namely CO_2 & H_2S content and Calorific value).

LNG Multifunctional Terminal

ÖRA LNG terminal has a total liquid capacity of 6,414 m^3 stored in bulk vacuum-insulated cryogenic tanks, including two HT1000 m^3, each with a storage volume of 1 000 000 liters of LNG and 24 large ambient Vaporizers to cover local natural gas demand. It serves as a supply point for trailer deliveries to Skangass/Shell customers in Sweden and Norway as well as to pipeline customers in the Fredrikstad region from its 5,000 Nm^3/h evaporation plant at the terminal. The terminal is supplied through jetty module from LNG carrier.



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LIN & LCO_2 Storage and Vaporization Package in Food Industry

Customer: MEG (Mitteldeutsche Erfrischungsgetränke)

Scope: N_2 and CO_2 are used as an auxiliary media in the vaporization process and as inert gas for protecting sensitive liquids and the carbonation of soft drinks.

Liquid CO_2 Storage for Breweries

Customer: Heineken, In Bev and other world class breweries all over the globe.

Scope: Vacuum insulated cryogenic storage tanks for carbon dioxide.

Project Highlights: In the production of quality beer carbon dioxide (CO_2) has a large influence on not only the beer's quality, but also the customer's acceptance of the product. CO_2 treatment, control, dosing and recovery are therefore of fundamental importance.

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Liquid CO_2 Dosing System

Customer: Various - Gas dosing systems for water desalination plants.

Scope: The pH value of desalinated sea water is kept neutral by adding dosed carbon dioxide. Chart delivers the complete system including dosers, storage tanks and atmospheric CO_2 vaporizers.

Project Highlights: Chart has established references for these projects in Algeria, Israel, Oman, Kingdom of Saudi Arabia and Latin America.

Nitrogen Storage and Vaporization Systems in LNG Terminals

Customer: Various Terminals – including Zeebrugge and Dunkerque.

Scope: Nitrogen storage and vaporization packages.

Project Highlights: Complete package comprising bulk tanks, ambient and/or electrical pressure building, product vaporizers, vaporizer skids, pressure control units and buffer tank for gaseous nitrogen.

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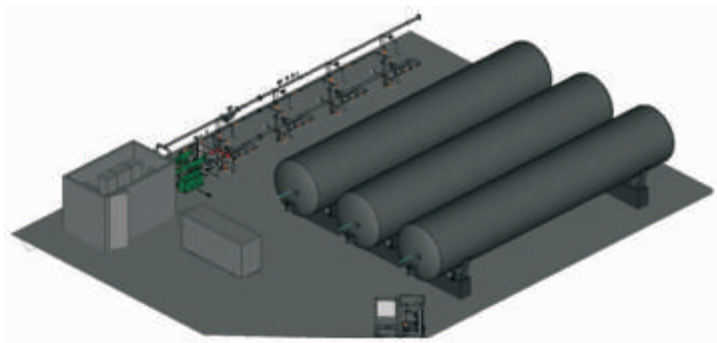
Liquid CO_2 Storage for Soft Drink Companies

Chart has delivered CO_2 Storage Systems to the world's leading soft drink companies including Coca Cola and PepsiCo.

Cryogenic Storage System for Research and Development Project with Birmingham University



University of Birmingham Institute for Forest Research (BIFoR) was established to study the impact of climate and environmental change on woodlands and the resilience of trees to pests and diseases. Chart supplied the CO_2 system for their Free-Air Carbon Dioxide Enrichment (FACE) programe that sees an area of forest being fed extra carbon dioxide (CO_2), over the course of at least a decade, to measure its effect on plant growth. The results will be used for improved forecasting about the effects of how tree growth will be affected by higher levels of CO_2 in the atmosphere.

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Hydrogen Storage

Chart delivered the liquid hydrogen storage tank at the Kourou Centre Spatial Guyanais (CSG) site in Guyana. Guyana Space Centre is a French and European spaceport.

Helium Storage for ITER Project

Chart is supplying two 400 m^3 capacity Quench Tanks for gaseous Helium as part of the prestigious international ITER project.

This project aims to build a fusion device to demonstrate the scientific and technical feasibility of fusion power. In order to function properly, the Tokamak (toroidal magnetic confinement chamber), requires huge refrigeration power for its magnets, where the fusion takes place, which is provided by the “Cryoplant”. Using electromagnetic fields, this sophisticated scientific instrument will make it possible to generate plasma to create the conditions necessary for the controlled fusion of atoms. This fusion process generates little waste and eliminates the risk of a nuclear meltdown or “runaway” reaction. The process generates the same type of energy as the sun, which eventually will be recovered in the form of electrical energy.

Chart's “LN_2 Plant and Auxiliary Systems” is a “tailored made” solution that forms part of the large cryoplant system with 3 cooling loops at 4 K, 50 K and 80 K).

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References

Europe's First LNG Rail Tank Car

The first-ever tank wagon for transporting LNG and Ethylene was launched to the market in May, 2015 during the 'transport logistic' trade fair in Munich. Chart Ferox, partnered with VTG to design the tank with operational authorization for the wagon issued by the German Federal Railway Authority. The basic parameters are: length over buffers 24,486 mm, distance between pivots 18,566 mm, volume 110,880 m^3, tare weight 45.7 t and payload 42 t.

LNG/LCNG Fueling Station for City Buses

Chart Ferox supplied LNG/LCNG fueling station in Warsaw, Poland mainly for fueling a fleet of 35 LNG powered public transportation buses.

The station was designed and delivered to Gazprom Germania and combines 120 m^3 of LNG storage capacity with three LNG dispensers provided by Chart's subsidiary Flow Instruments GmbH and two CNG dispensers.

Contact us

We collaborate closely with our customers and listen.

You ask, we deliver.

Tomas Hnízdil
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