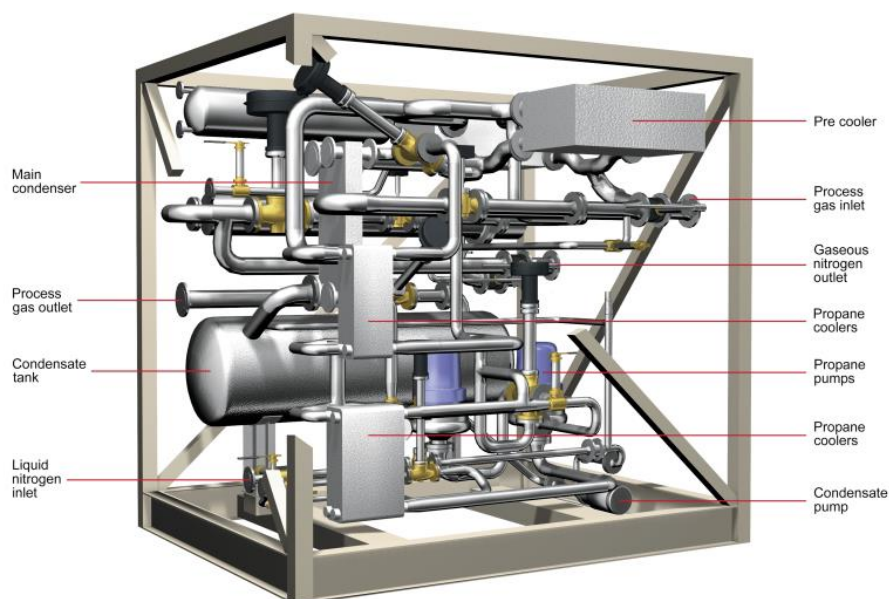


# CRYOGENIC GAS RECOVERY SYSTEM



CGR Arctic Marine has developed a compact and transportable multi-purpose recovery system for Volatile Organic Compounds (VOCs). Based on cryogenic condensation with liquid nitrogen, VOCs are recovered in a highly economical and environmentally friendly way, rather than disposed of through the use of flare or incineration. The application of an integrated heat transfer fluid makes this system truly unique, and its flexibility allows recovery of a wide variety of VOCs.

In addition to the high capacity and efficiency of the CGR unit, the system is also compact. All components are mounted in a standard 10 feet ISO container frame. That makes the CGR unit easy for transportation and consequently extremely flexible.

## APPLICATION AREAS OF CGR UNIT

The CGR unit is a multi purpose unit and can be used as a:

- Vapour recovery unit during gas freeing and purging operations of cargo containment systems
- Vapour recovery unit during gassing up and cooling down operations
- Reliquefaction/Cooling unit for liquefied gases
- General recovery unit in the chemical industry

## GET IN TOUCH WITH US

### CEO & NAVAL ARCHITECT

Andreas Norberg  
 ANDREAS@CGRMARINE.COM  
 +86 186 2171 8847

### PROJECT MANAGER

Daniel Wu  
 DANIEL@CGRMARINE.COM  
 +47 472 52 537

# From Black to Green, Simple and Clean, Pure Gas



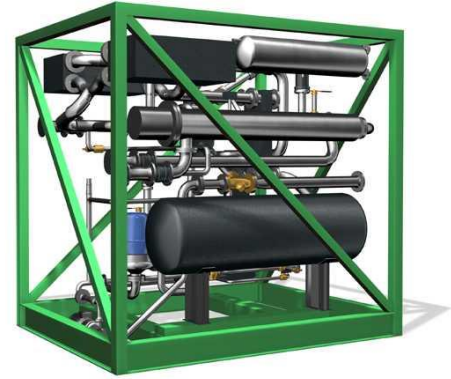
## THE TECHNOLOGY

CGR utilises liquid nitrogen as coolant. The nitrogen never mixes with the cargo vapour stream and leaves the unit as a pure gas. The vaporised nitrogen can be used for purging or blanketing of the cargo containment system or for in-plant operations. The cargo vapours to be recovered from the cargo containment system are simply replaced by nitrogen vapours generated during the liquefaction process in the CGR unit.

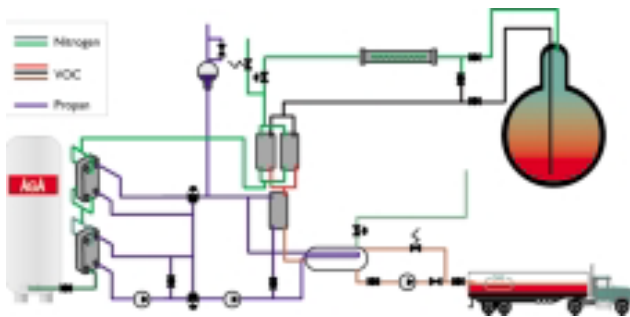
A direct heat exchange between the liquid nitrogen and the cargo vapours would result in operational problems in the CGR unit, due to solidification of most of the hydrocarbons at the extremely low temperatures. To avoid this problem, a heat transfer fluid is used as the intermediate between both the liquid nitrogen and cargo vapours. The temperature of the heat transfer fluid is adjusted as a function of the nature of the compound to be liquefied.

Liquid nitrogen is introduced to a nitrogen vaporiser where it is vaporised against the heat transfer fluid with the result of cooling down the latter.

In the cargo condenser, the VOCs are liquefied by heat exchange with the chilled heat transfer fluid. From the condenser, the liquefied VOC - incondensable mixture flows to the vapour / liquid separator. Incondensables, such as nitrogen vapours, are released from the top of the separator to the atmosphere. The condensate is pumped from the liquid collector of the separator to storage or to plant facilities. Complete condensation occurs in the condenser and an extremely efficient recovery of the product is achieved. A fully integrated control system makes this system easy to adjust for flow and concentration fluctuations. Few moving parts makes the compact and transportable GRS unit very reliable, provides low energy consumption and guarantees a low maintenance cost.



In operation since year  
**1999**



## CGR UNIT VALUE PROPOSITION

- Designed for efficient transport, hook-up and packing
- Enables time and energy efficient decontamination, purging, inerting, vapor recovery and gassing-up operations
- All residual product is re-liquefied, recovered and transferred directly to storage
- Satisfies all regulatory emission requirements and regulations

