

# Sustainable environment - new gas recovery technology

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## ABSTRACT

**G**as Recovery Systems (GRS) has developed a compact 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 environmental friendly way, rather than being disposed of through the use of flare or incineration. The result of a partnership between GRS and Chemgas Shipping, GRS Europe is now set to introduce the system within the European gas market. All operations are backed up with scientific reports from SINTEF Energy Research of Norway.

## Handling waste vapours

The disposal of vapours from tank spheres and tank containment systems are concerns of the petrochemical industry. Vapour emission control techniques of acceptable standards are not always easily available. A sound economical platform for recovery is also a challenge within the industry.

The amount of petrochemical gasses remaining in a tank storage system is considerable even though the liquid gas has been drained out. Consequently, such remnants have to be released to the atmosphere or incinerated, when the storage facilities need to be gas freed, which leads to a loss of valuable products and negative environmental effects.

## GRS applications

### GRS for tank spheres

The GRS unit is designed to exclude the emission of VOCs into the atmosphere. Liquid nitrogen is used in an effective and advanced heat exchange process with the VOCs, making a complete recovery simultaneous to a purging process, which is achievable at high velocities. Due to recovery at cryogenic temperatures, the emissions are reduced to an absolute minimum, while the recovered product is retained at its original specifications and can be gas freed for final use.

### GRS for ships and ocean going barges

A unit can also be successfully used in connection with the release of gas from oceangoing LPG carriers, as well as inland LPG river barges. By applying the technology after the liquid discharge, the remaining vapours can be efficiently purged and recovered to any required level of VOCs content in the nitrogen atmosphere. This process is beneficial to the transportation of the product, or prior to a maintenance period.

The recovered product can be utilised as a coolant after maintenance or be transported to a reception facility.

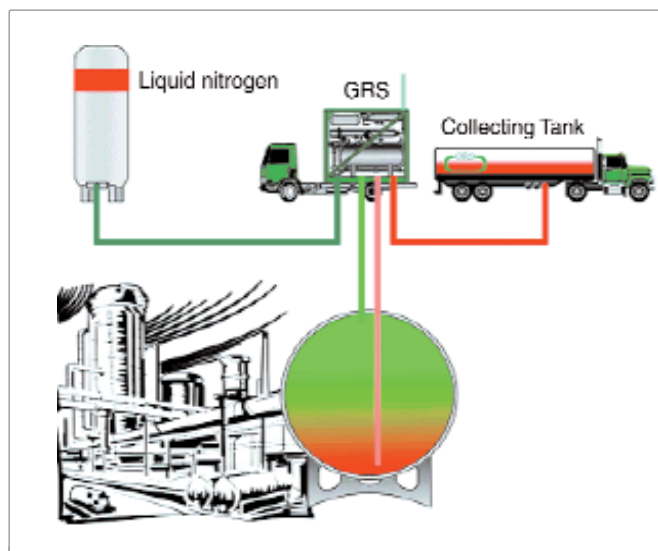


Figure 1. GRS connected to tank sphere, LIN tank and collecting tank.

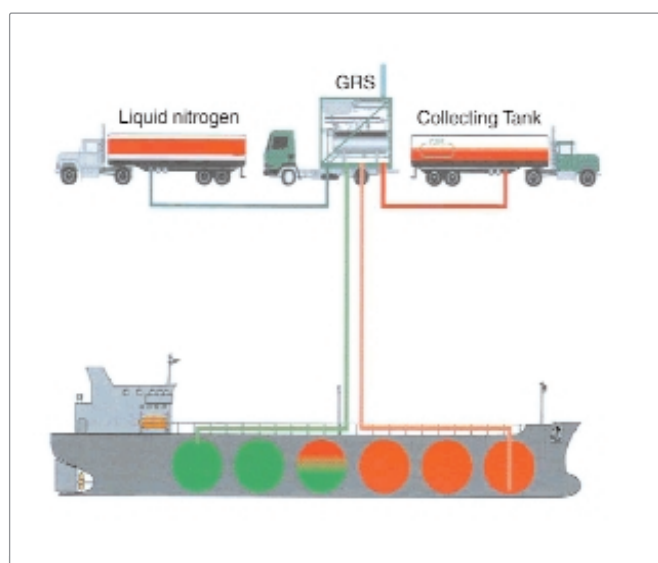


Figure 2. GRS connected to gas carrier, LIN tank and collecting tank.

## GRS Benefits

The recovered product has a commercial value and can be used in the production process of the client. Fast and efficient operations leads to an increase of the assets utilisation of tank spheres or gas carriers compared to present purging techniques.

GRS technology can recover almost all chemical gases, such as: Ammonia, Ethylene, Ethane, Propylene, Propane, Butadiene, Butane and VCM. In addition to the high capacity and efficiency of the GRS unit, the system is also compact. All components are mounted in a standard 10-foot ISO container frame. That makes the GRS unit easy for transportation and

consequently extremely flexible to operate at various locations.

Emissions are reduced to a theoretical minimum during operations. GRS is also free of secondary pollution in contrast to other techniques like flaring and incineration.

## Chemiepark Marl, Germany

In August 2002, GRS Europe recovered 20 tonnes of VCM vapours from a 2,000 cbm barge at Germany's Chemiepark Marl in Germany. The recovery operations took less than 24 hours from connection to disconnection. The environmental inspection service at the site could not measure any emission (less than 5 ppm), illustrating the low environmental impact of the complete operation. The barge itself was also left with less than 5ppm VCM in its tank containment system.



Figure 3. GRS connected to VCM 2,000 cbm barge.

### ABOUT THE AUTHORS



Sander van Rest is project manager for GRS Europe. He was posted by Royal Vopak to the Chemgas Shipping office to start up GRS Europe as an additional service for the European chemical industry. He is responsible for all marketing and sales activities within the European market. His work also includes the central coordination during preparations and actual operations at customer's sites. Currently he is involved in the development

to use the GRS technology for recovery of VOC's out of product pipelines in Germany.



Bård Norberg is General Manager for Gas Recovery Systems AS. He is the founder and part owner of GRS AS. He is VP special projects for I.M. Skaugen and has years of experience in the design, development of recovery technologies and gas carriers designs. He started developing the patented gas recovery technology 10 years ago together with SINTEF research center of Norway.

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