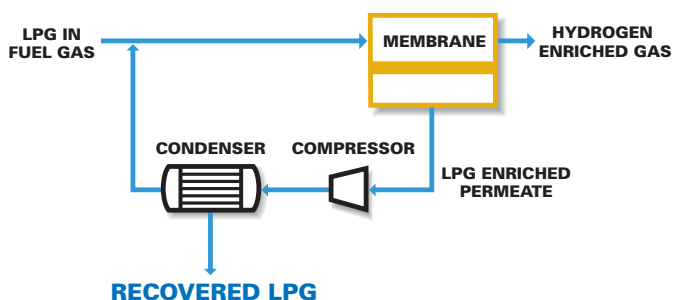


# LPG Recovery

- Recovers LPG from purge and vent streams
- Upgrades hydrogen purity without recompression
- Minimizes installation cost with skid-mounted construction
- Achieves short payback time of 1 year or less



*VaporSep unit for LPG recovery from refinery gases.*

## Problem

Recovery of heavy hydrocarbons (C<sub>3</sub>+) or Liquefied Petroleum Gas (LPG) from refinery purge and fuel gas streams is significantly more profitable than using these high-value components as fuel. LPG components are produced in many refinery operations such as reforming, isomerization, hydrocracking, hydrotreating, etc. Traditionally, absorption and cryogenic systems have been used for the recovery of LPG. These systems require numerous moving parts and/or external chemicals and have high capital and operating costs.

## VaporSep Solution

VaporSep offers a simple and compelling alternative for recovering LPG from refinery gases. In a typical VaporSep system, the feed gas enters the membrane and the LPG components preferentially permeate, producing an LPG enriched permeate stream. The permeate is compressed and LPG is recovered as a liquid in the condenser. The residue stream from the membrane, depleted in LPG and enriched in hydrogen and lighter hydrocarbon gases (methane, ethane), remains at pressure and can be sent directly to the fuel headers or for further hydrogen purification. In some cases, the hydrogen purity is high enough to allow direct recycle to other refinery processes.

*“VaporSep is a unique process that recovers valuable LPG and H<sub>2</sub> at pressure for reuse.”*

## VaporSep® Systems for

# LPG Recovery

### Benefits

- Recovers valuable LPG from refinery fuel gases
- Integrates into existing operations with minimal modification
- Simplifies installation and operation with compact skid-mounted construction
- Requires no external chemicals, contains few moving parts and operates as a stand-alone system
- Operates at moderate temperatures and pressures
- Increases hydrogen recovery and purity

### Application Example

Pressure Swing Adsorption (PSA) systems are often used to purify hydrogen from refinery streams. About 80-85% of the hydrogen is recovered at high purity in this system. The remaining hydrogen and LPG are rejected as a low pressure tail gas upon regeneration of the PSA bed. The tail gas is typically compressed into a fuel gas header, and the hydrogen and LPG components are reduced to fuel value. The VaporSep process separates and recovers these valuable components. In the VaporSep process, the tail gas is compressed to the feed pressure of the gas entering the PSA unit. The compressed gas is cooled and LPG is condensed. The gas leaving the condenser still contains significant amounts of LPG and enters the membrane. The LPG preferentially permeates the membrane and is recycled to the suction of the tail gas compressor. The residue stream from the membrane is enriched in hydrogen and other light ends. A fraction of this stream is sent to the fuel header to purge the methane and light ends, while the remaining fraction is recycled to the PSA for further hydrogen recovery. The VaporSep system not only achieves high LPG recovery, it also increases the total hydrogen recovery by 5 to 10%.



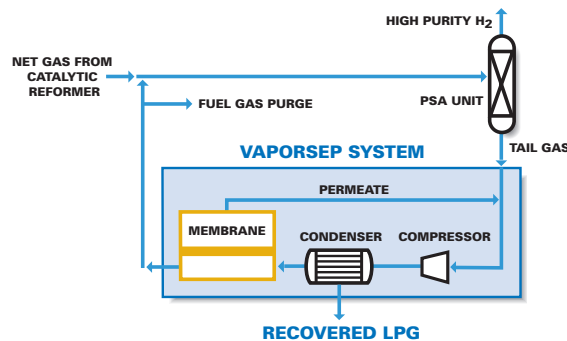
*VaporSep system for LPG recovery.*

### System Performance

- Feed flow rate: 3–15 MMSCFD
- Feed LPG content: 10–20 vol%
- LPG recovery: greater than 85%
- Typical payback time: 6–18 months
- Unit dimensions: 2 skids, each 8 ft (L) x 6 ft (W) x 6 ft (H)

### Application Areas

- Catalytic reformer net gas
- PSA tail gas
- Hydrotreater purge gas
- Hydrocracker purge gas
- Isomerization purge gas
- Coker off-gas
- FCC main column overhead gas
- Aromatics plant purge and vent gases
- Steam methane reformer feed gas
- H<sub>2</sub> membrane tail gas



*The VaporSep system for LPG and H<sub>2</sub> recovery from PSA tail gas.*

### Corporate Headquarters

Membrane Technology  
& Research, Inc.  
1360 Willow Road  
Menlo Park, CA  
94025-1516 USA  
Tel: 650.328.2228  
Fax: 650.328.6580  
Email: sales@mtrinc.com

### U.S. Gulf Coast Office

Houston, Texas USA  
Tel: 713.466.7608  
Fax: 713.466.9602

### European Office

Brussels, Belgium  
Tel/Fax: 32.2.633.6751

