

## CO<sub>2</sub> REMOVAL FROM SYNGAS

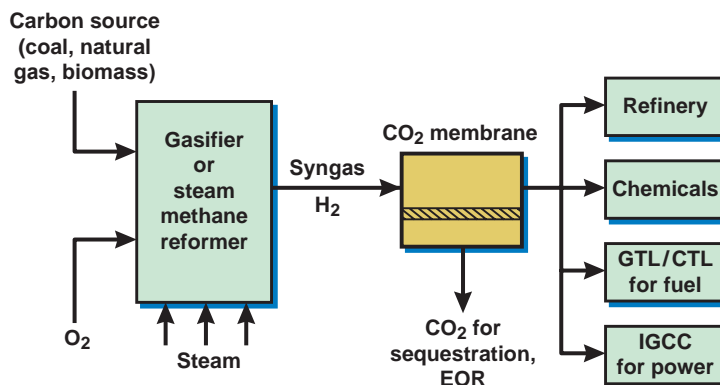
- **Polaris provides a simple technology for CO<sub>2</sub> removal from H<sub>2</sub>-containing streams**
- **Minimal installation cost with skid-mounted construction**
- **Achieves short payback time of 1 year or less**

*“Polaris is an important new innovation: for the first time, membranes can achieve practical separation of carbon dioxide from hydrogen.”*

### Problem

Syngas is produced via partial oxidation of a carbon source (coal, natural gas, or biomass) using oxygen (or air) and steam. Syngas produced from gasification or steam methane reforming (SMR) contains mostly hydrogen and carbon monoxide, desirable constituents that are used as feedstock in refineries, chemical processes and power generation. However, a significant amount of CO<sub>2</sub>, a greenhouse gas, is also produced as a by-product. Removal of CO<sub>2</sub> is desired due to downstream process requirements or to reduce CO<sub>2</sub> emissions. Until recently, membranes could not be used in these applications because previously available membranes cannot separate CO<sub>2</sub> from syngas.

### Polaris™ Solution



CO<sub>2</sub> Removal from Syngas using Polaris™

MTR's unique Polaris™ membrane is the first commercially available membrane that separates CO<sub>2</sub> from syngas. The Polaris™ membrane is much more permeable to CO<sub>2</sub> than to other syngas constituents and can be used to recover and purify CO<sub>2</sub> for sequestration, enhanced oil recovery (EOR), or for use in chemical and industrial applications. The resulting CO<sub>2</sub> enriched stream can be produced in gas or liquid form, depending on the final use for CO<sub>2</sub>.

## CO<sub>2</sub> REMOVAL FROM SYNGAS



Skid mounted CO<sub>2</sub> removal system

### Benefits

- Efficient CO<sub>2</sub> recycle or removal: membrane systems can typically separate 80% of feed CO<sub>2</sub>.
- Produces high purity CO<sub>2</sub>: up to 95+ vol%
- Simple reliable unit: easy installation with skid-mounted construction
- Easy to operate: requires no chemicals, no environmental hazards
- Minimal utility usage: cooling water, instrument air, instrument power, N<sub>2</sub> (for purging)
- Long membrane life: CO<sub>2</sub> membrane is made from very robust materials

### Application Areas

- Hydrogen plants
- Syngas production
- Methanol production
- GTL or CTL for liquid fuel production (Fisher Tropsch)
- Gasifiers feeding integrated gasification combined cycle (IGCC) and other power plants
- Pressure swing adsorption (PSA) feed/ tail gas

### System Description

- Feed pressure: up to 800 psi
- Feed: 1 to 200 MMscfd; 10 to 60 vol% CO<sub>2</sub>
- CO<sub>2</sub> recovery: greater than 50 to 80+%
- CO<sub>2</sub> purity: up to 95 vol%
- Modular construction

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