Cryocap™ H₂
A Carbon Capture technology for Hydrogen production units

Cryocap™ is an innovative and unique portfolio of CO₂ capture solutions developed by Air Liquide. Cryocap™ can be adapted to specific applications combining a variety of Air Liquide technologies to capture CO₂ from:
• Hydrogen production plants, Cryocap™ H₂
• Natural gas, Cryocap™ NG
• Power plant, Cryocap™ Oxy
• Steel plant, Cryocap™ Steel

In particular Cryocap™ H₂ is differentiating thanks to its combination of Cryogenic processes and membranes.

Cryocap™ installation in Port-Jérôme, Normandy, at the largest steam methane reforming hydrogen production unit operated by Air Liquide in France represents the first industrial scale deployment of the Cryocap™ H₂ technology. Key advantages are:

- SMR CO₂ capture 300-3000 tpd CO₂
- H₂ production or -4% NG consumption
- CO₂ recovery >95%
- CO₂ pressure up to +18%
- Footprint vs. large scale adsorption plants -75%
- CO₂ purity >99%
- Steam consumption vs. absorption solutions ~0
- CO₂ pressure >130 bar
Perfect fit for SMR retrofit

Cryocap™ H₂ is a unique patented combination of membranes and cryogenic separation resulting in minimal equipment and installation costs and best in class footprint. The simplicity of the scheme also provides a limited number of major equipment without the need of modifications on the main syngas line.

Cryocap™ H₂ has been designed and tested to have no impact on the SMR reliability. The modifications on the SMR are mostly limited to process control adaptations, and, if necessary, modifications to the burners.

The modularized design is easy and quick to construct and allows a reduction in installation costs and schedules. In addition, it can accommodate to existing dense plant layouts.

Advantageous performance and design

Cryocap™ H₂ has several differentiating advantages built-in its design:

- **Limited steam consumption** during operations
- Proprietary Membranes allows 95% CO₂ recovery
- In H₂ boost mode, H₂ production can be increased by 11% to 18% depending on the H₂ PSA recovery
- In iso-H₂ mode, CH₄ consumption is reduced by 4%
- Optional integrated CO₂ liquefaction
- Major maintenance every 6 years and unattended operations
- No toxic components or emissions

First reference running since 2015

Demonstrated at industrial scale in 2015 with the start-up of the Cryocap™ H₂ plant in Port Jérôme, France, the plant has proven its reliability as well as the following key features:

- **Integration** of the Cryocap™ H₂ to an existing SMR without impact on SMR operations
- **Reliable operation** of the compressor, cold box and membranes
- **Increase of H₂ production flow**
- **Centrifugal compression** scalable for large plants
- **Performance in transient cycles**
- Additional module for food grade liquid CO₂