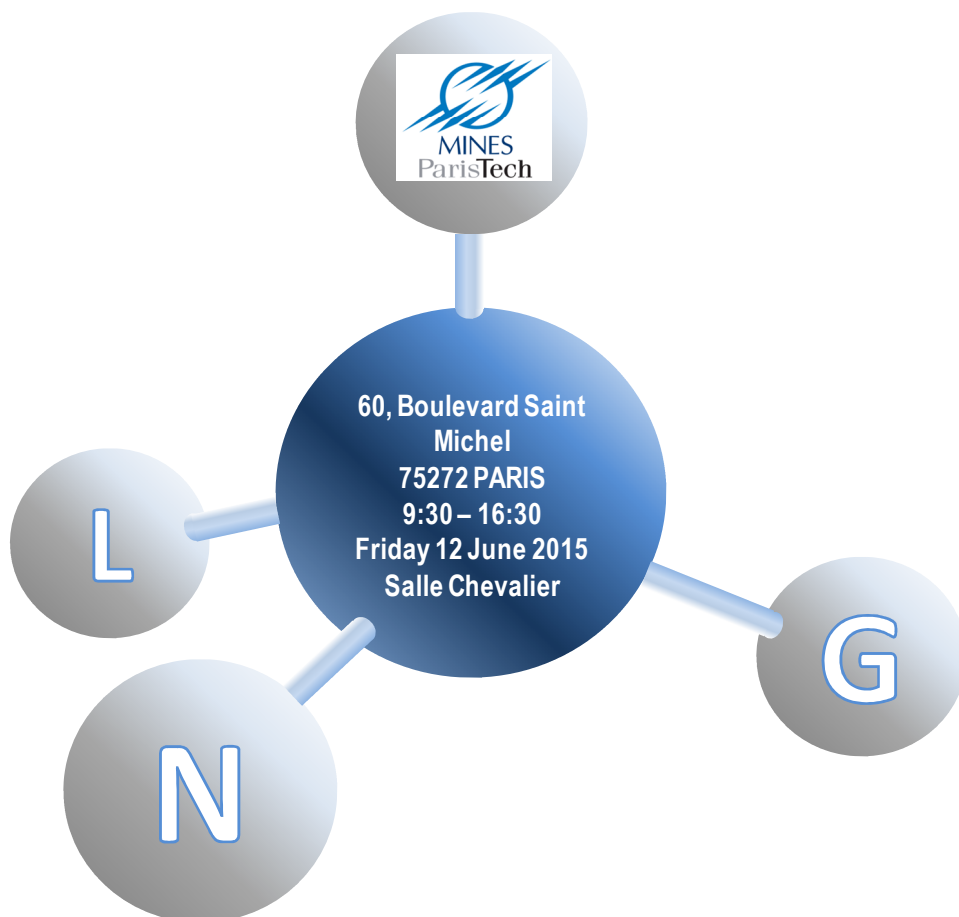




Seminar

Cryogenic processes for the purification of CO₂-rich natural gas and LNG production





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Cryogenic processes for the purification of CO₂-rich natural gas and LNG production

MINES ParisTech
60, Boulevard Saint Michel
75272 PARIS Cedex 06
10:00 – 15:30
Friday 12 June 2015
Salle Chevalier

Program:

Welcome breakfast: 10:00 – 10:30

Meeting introduction
10:30 – 10:40

Rodrigo Tinoco Rivera, CES-MINES ParisTech
Crystallization of Gases at Low Temperature and Novel Approach on Energy Recovery
10:45 – 11:30

Paul Terrien, Air Liquide
CRYOCAP NG - Combination of Cryogenics & Membranes for Gas Fields with High CO₂ Content
11:30 – 12:15

Lunch break (Buffet): 12:15 – 13:30

Stefania Moioli and Giorgia De Guido, Politecnico di Milano
The Dual-Pressure Low Temperature Process for Natural Gas Purification.
I. Techno-Economic Analysis of LNG Production Using Cryogenic vs. Conventional Techniques.
II. Dynamic Analysis
13:30 – 14:15

Scott Northrop, ExxonMobil
Sour Gas Treating Using Controlled Freeze Zone™ Technology: Demonstrated Commercial Readiness
14:15 – 15:00

Round table and conclusions
15:00 – 15:30

Visit to Musée de Minéralogie MINES ParisTech

Presentations

Paul Terrien, Air Liquide

CRYOCAP NG - Combination of Cryogenics & Membranes for Gas Fields with High CO₂ Content

Natural gas fields with high amount of CO₂ represent a sizeable share of the natural gas available and are under-exploited today. To successfully monetize these resources, producers need a cost-effective way of removing this excess CO₂. The standard go-to technology is chemical absorption in an amine solution. However, when CO₂ levels increase in the raw gas, this method becomes less and less economical. A number of other options are available including notably polymer membranes and cryogenics for bulk CO₂ removal. This presentation will show how those technologies can be selected and combined to tackle the challenge of high CO₂ fields, notably with the CRYOCAP technology, combination of cryogenics and membranes.

Stefania Moioli and Giorgia De Guido, Politecnico di Milano

The Dual-Pressure Low Temperature Process for Natural Gas Purification.
I. Techno-Economic Analysis of LNG Production Using Cryogenic vs. Conventional Techniques.
II. Dynamic Analysis

This work deals with an energy analysis of low temperature natural gas purification processes, in particular the dual pressure one, coupled with LNG production. Low-temperature natural gas purification processes can be usefully applied for the profitable exploitation of low-quality gas reserves. The low-temperature processes prove to perform better for LNG production in terms of the net equivalent methane requirement than traditional amine scrubbing and with lower CO₂ emissions. In addition, the dynamic analysis of the dual-pressure low temperature process is performed in order to prove the process robustness and to define a proper start-up procedure.

P. Scott Northrop, Ananda Krishna Nagavarapu and Jaime A. Valencia

ExxonMobil Upstream Research Company

Sour Gas Treating using Controlled Freeze Zone™ Technology: Demonstrated Commercial Readiness

CO₂ in natural gas freezes at cryogenic temperatures. Rather than trying to avoid this, CFZ™ solidifies CO₂ in a controlled fashion in the distillation tower. The resulting purified natural gas is sent to a pipeline or an LNG facility, while the impurities are removed as a high-pressure liquid stream that can be used for enhanced oil recovery or for acid gas injection (AGI). A 13.5 Mscfd CFZ™ Commercial Demonstration Plant (CDP) was built at our LaBarge Treating Facility, which processes one of the lowest hydrocarbon-content gases in the world. The CDP ran with blends of methane, CO₂, and H₂S, representing major global sour gas resources. Feed streams containing 8-71% CO₂ and 0-36% H₂S were successfully treated at pressures up to 625 PSIG. Integration of the CFZ bottoms with the Shute Creek AGI Facility was also demonstrated. Highlights of the experience at the CDP will be presented, including the influence of operational parameters like feed composition, flow rate, and operating pressure. Operational characteristics, stability and robustness of the process, and other lessons from more than a year of testing will be presented. The tolerance of the CFZ™ process to some moisture in the inlet gas will be demonstrated.

Rodrigo Rivera Tinoco

CES MINES ParisTech / Armines

Crystallization of gases at low temperature and novel approach on energy recovery

Recent work of the CES focuses on multifunction processes that lead to lower carbon dioxide emissions and more efficient systems. This presentation shows the particular attention that is being paid to crystallization of CO₂ in different kinds of fluids. Methane purification is one of the topics dealt with those benefits from novel approaches in CO₂ capture from exhaust gases in heavy industry. Expected scientific breakthroughs and industrial applications show major efficiency improvements in liquefaction and upgrading technologies.