

# Hydrate risk management tool

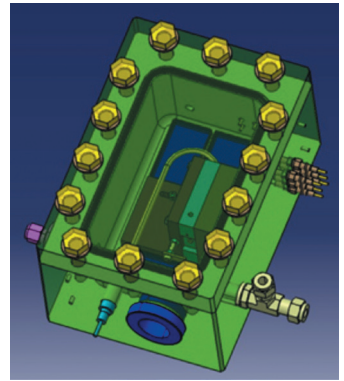
Reduce operational costs due to hydrate formation risk in gas storages and gas-dominated lines

## ATOLI sensor: a safety margin monitoring and real-time alert tool

- How to optimize the hydrate management and operating procedures in gas storages and gas-dominated flowlines?
- How to evaluate the water amount present in the gas responsible of hydrate formation in flowlines conditions (temperature, pressure)?
- How to know if the dew point temperature of a dehydrated gas is below  $-5^{\circ}\text{C}$ ?

### Main features

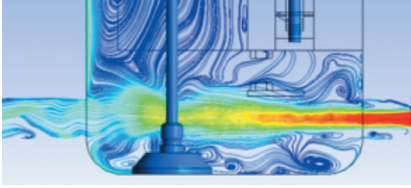
- Anticipates hydrate formation conditions under flow line pressure:
  - determines dew point and/or hydrate formation temperature under process conditions
  - measures on-line at process pressure (no depressurization, no sampling)
- No gas release in atmosphere
- Can be installed on main line or derivation



Prototype qualified  
200 ppm of water in gas

### Benefits

- Anticipates hydrate formation risks in real time
- Reduces operational costs by evaluating dew and/or hydrate point in flow lines:
  - optimizes quantity of injected THI with only what is necessary
  - limits liquid volumes that needs to be separated later on
  - decreases volumes of produced THI to be treated



CFD simulations

## Ongoing work

- Laboratory prototype validation with different water contents in gas (sl, sll hydrate formers- synthetic mixtures and network gas sampled from the Lyre loop)
- Prototype specifications improvement with qualification tests and simulations

## ATOLI Joint Industry Project objectives

- To qualify in flow conditions a real time alert and monitoring tool for hydrate formation in gas-dominated flow
- To take into account partner's operational constraints in specifications
- To manufacture a new ATEX compliant prototype
- To qualify the prototype at pilot scale in field conditions (IFPEN's Lyre flow loop)
- Alternatively to test the prototype directly on partner's site



The Lyre loop at IFPEN-Lyon

## Lyre flow loop conditions

- Real fluids (oil, natural gas)
- Pressure up to 90 bar
- Thermal regulation from 0 to 50°C
- Controlled water content
- 140 m length, 2"ID

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