Biomethane Standardisation for Grid Injection and for End Users

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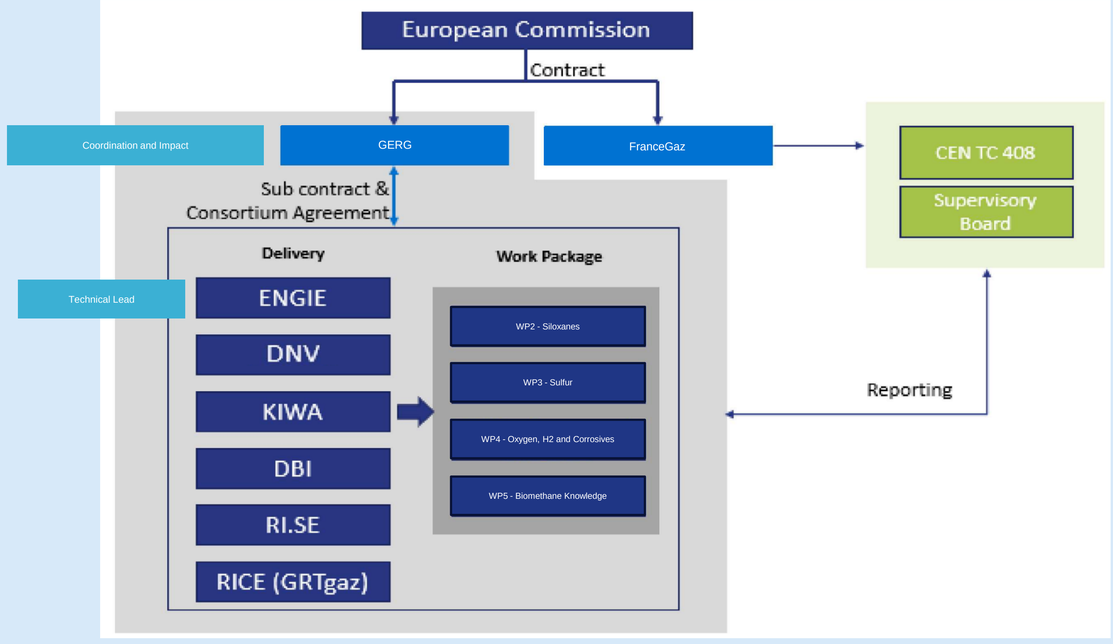
Overview and Objective

The overall objective of the project is to offer the conditions for a safe development and a competitive positioning of the biomethane chain on the market.

- Towards the removal of technical barriers to biomethane injection into the natural gas grids
- Two Year Project concluding end 2024
- Final Phase of a project supported by GERG (Phase 1) and by CEN (Phase 2a and 2b)
- **Phase 3 Revision of standards EN 16723 part 1 & 2**

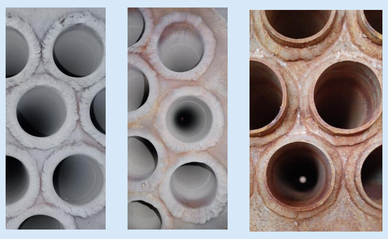


Methods and Discoveries

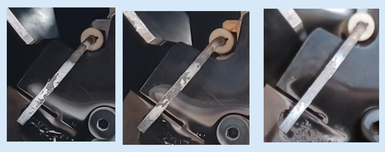
Impact of siloxanes on gas appliances

Industrial boiler case study

Smoketubes



Ionisation probe



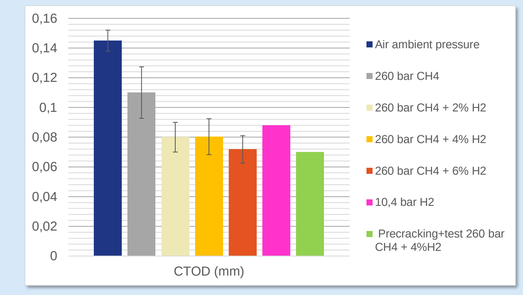
METHODOLOGY :

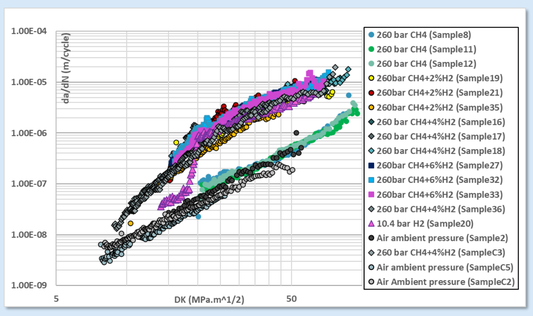
- Boiler operation in cycling mode (Pmax 450 kW / Pmin 90 kW) for 1 month.
- 4 siloxane concentrations tested.
- Constant monitoring of ionization probe signal, heat losses, pollutant emissions.
- Silica deposition observation after testing + cleaning.

RESULTS : silica deposition is observed for 2.5 and 5 mgSi/Nm³ with impact on burner efficiency. **1 mgSi/Nm³ did not lead to observable silica deposition**. No significant effect on performances was observed at that concentration

NEXT : providing recommendations of safe siloxane level to be used in this kind of appliances.

Impact of H_2 on CNG vehicle tanks





Fracture Crack Growth Rate of the 34CrNiMo6 sample in different H2 environments

METHODOLOGY :

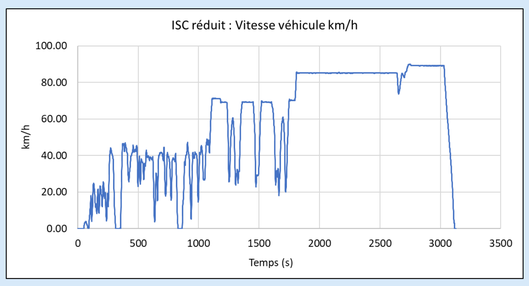
- Mechanical testing (toughness + crack propagation) on samples of Type I CNG tank steel material : 34CrNiMo6
- Tests in different H_2% in CH_4 matrix at 260 bar (2, 4 and 6 % H_2).

RESULTS : 34CrNiMo6 steel is suitable for CNG storage with up to 2% H_2 in the gas blend (as stated in UN R110 regulation). When adding H_2 from 0 to 2%, the impact on mechanical properties in indeed clearly observed. However, **an increase from 2% to 4% or 6% H_2 does not seems to impact strongly impact the material resistance.**

NEXT : propose an increase of the accepted H_2 percentage from 2 to 4% in the standards + additional tests on real size tanks.

Impact of sulfur on mobility

(impact on catalysts performance)



OBJECTIVES :

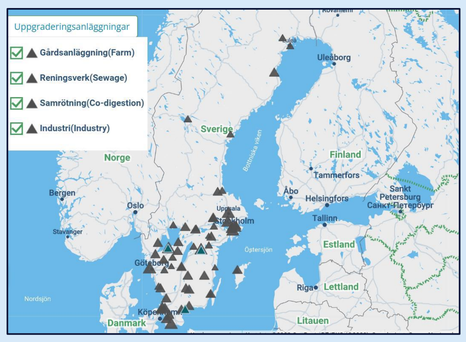
To determine the ability of a three-way catalyst to regenerate after being both thermally aged and poisoned by sulfur

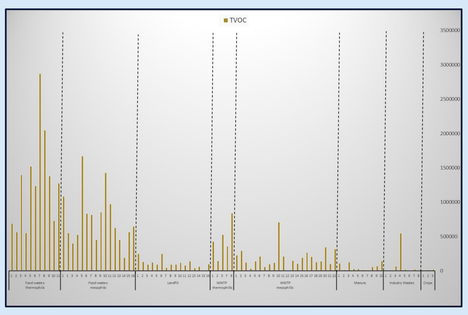
METHODOLOGY :

- Catalyst thermal ageing (without SO2)
  - One at 800°C during 400h
  - One at 800°C during 800h
  - SO2 poisoning (50 l/h)
  - One at 600°C during 400h
  - One at 600°C during 800h

NEXT : tests on test bench dedicated to accommodate a heavy-duty vehicle on which the different catalysts will be installed.

Biogas and biomethane knowledge





METHODOLOGY :

- 70 biogas and 50 biomethane samples
- Analytical method used : chromatography/mass spectrometry (GC-MS).
- For each sample, at least 60 components belonging to the Volatile Organic Compounds reported.
- For the biogas, the database contain information about the substrates (food, industrial, …) and process (thermophilic or mesophilic…).

RESULTS :

- Biogas composition is highly dependent on the feedstock used.
- Some VOCs can clearly be associated with a particular substrate: siloxanes in WWPT, 2-butanone in food wastes with thermophilic process, cyclic hydrocarbons in landfill samples.

Acknowledgement

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