

IEAGHG Risk Management Network Meeting: Site Visits in Lacq

June, 3rd 2020,
Afternoon

As part of the IEAGHG Risk management network meeting, Total offers, by reservation, a visit to various pilot sites. Limited to 60 places, visits will be organized at Lacq, the emblematic site of Total's research and development, 30 minutes' drive from Pau.

If you want to participate in these site visits, please choose one of the following two proposals:

1. Visit PERL
- OR
2. Visit PPL

To help you choose the themes that will be most relevant to you, below you will find additional information on each site.

1. PERL - Pole d'Etude et de Recherche de Lacq

A word about the PERL:

The PERL has developed an international renowned scientific expertise in 3 key areas of the Total Group: controlling the environmental footprint of its industrial activities; gas separation, including CO₂ capture; the physico-chemistry of interactions between hydrocarbons, water and solids.

With 130 people spread over three sites and six hectares, its activities cover themes of major importance for the Group, in line with the objectives of the Group's climate strategy on promoting gas as a transitional energy and reducing CO₂ emissions.

1.1 Visit PIC (Physical Chemistry of Complex Interfaces common laboratory between TOTAL and ESPCI/CNRS)

When trying to inject CO₂ in reservoirs or aquifers, to store it or to use it as an Enhanced Oil Recovery method, several issues can arise either from a flow assurance perspective (will the injection run smoothly without any stoppage due to formation of hydrates or others ?) or from a reservoir management perspective (will the injection be efficient ?). These questions born from physicochemical interactions at the microscopic level that will need to be integrated at a macroscopic level, and are studied within TOTAL, and our common laboratory with ESPCI / CNRS, using microfluidic studies and model porous media.

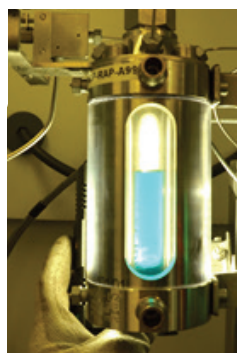
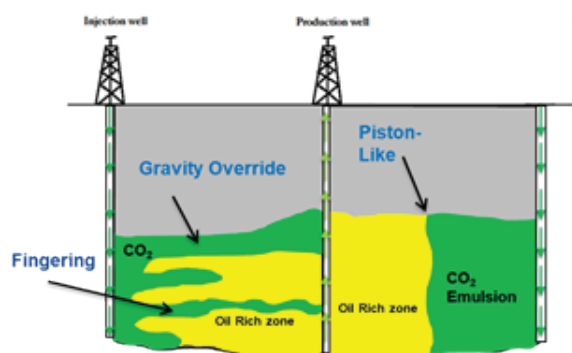


Figure 2
Mobility control
with CO₂ injection



Figure 1
Hydrate formation
in microfluidics



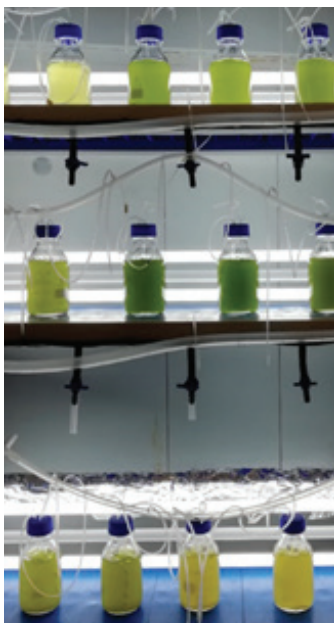
1.2 Visit PDU (Process Demonstration Unit) for CO2 capture – VeloxoTherm™ technology

Total and Svante are working within a Demonstration Collaboration Agreement (DCA) in the frame of the CCUS (Carbon Capture, Utilization and Storage) program promoted by TOTAL. The PDU is essentially an adsorption scaled-down CO2 capture plant based on the VeloxoTherm™ technology with a capture capacity of 0.1 tons of CO2 per day. This technology is based on a structured adsorbent that allows to optimize the contact between the gas and the solid and which is inserted into a Rotary Adsorption Machine or RAM. Designed to provide operational flexibility to enable process cycle development and optimization of the VeloxoTherm™ technology to maximize system performance, the PDU is critical for understanding the interaction between the structured adsorbent and process cycle and can demonstrate unambiguous performance metrics such as recovery, product purity, regeneration energy, and productivity of the integrated system.

RAM: Rotary Adsorption Machine

1.3 Visit at Microalgae Platform (pilot and laboratory installations)

After COP21 in Paris, the world committed to limit the increase in global average temperature to below 2°C by 2100 compared to pre-industrial levels. In order to minimize its environmental footprint, the Carbon Capture, Utilization and Storage (CCUS) program promoted by TOTAL is a solution to mitigate climate change together with energy efficiency and renewable energy production (i.e. biodiesel and biogas). Within this research program, the “CO2 bioconversion” project the “CO2 bioconversion” project focuses on the utilization of microalgae to convert CO2 for producing valuable added molecules and/or biomass-to-energy. The specific objectives of the project at TOTAL-PERL (Lacq) are the development of optimized technologies for microalgae culture in salty effluents and harvesting, at both laboratory and pilot scale. The final aim is to minimize the energy consumption and the costs of the cultivation and harvesting step, maximize the CO2 capture and obtain the optimal biomass concentration to produce biogas or biofuels.



Installations related to microalgae studies at PERL 2018

2. PPL - Plateforme Pilote de Lacq

A word about the PPL:

The Lacq Pilot Platform (PPL) covers almost 5.5 hectares within the Induslacq industrial platform, classified SEVESO 3, which adjoins the PERL laboratories. Its vocation: to host large-scale research infrastructures, with high stakes for the Group and to work jointly with the PERL laboratories.



Velocity measurement of groundwater flow at ADYCHATS with innovative velocity probes

2.1 ADYCHATS – Aquifer DYNAMIC CHARACTERIZATION Tools System

The ADYCHATS R&D platform based on the industrial area of Lacq aims at developing innovative, in-situ, realtime, remote and cost-effective solutions for groundwater monitoring in O&G and CO₂ storage activities. Located on two main places of the 5.5-ha Pilot Platform of Lacq area (PPL of PERL R&D Center), 20 monitoring wells and direct-push probes have been deployed to better understand the dynamic of groundwater through an heterogeneous shallow aquifer. Innovative velocity probes have been tested as well as microsensors, portative analytical equipment and fiber optic. Geophysical acquisitions have been performed and numerical model is updated to better constraint the global mass flux of dissolved species.

2.2 Gas detection

Gas leaks are a major issue for Oil & Gas companies, either for environment or safety purposes. Remote sensing technologies can be applied for a wide range of gas leak flowrates and in three main cases: major leaks in crisis management; medium size leaks in safety monitoring; small leaks in environmental monitoring. In 2018, TOTAL built TADI (Total Anomaly Detection Initiatives) testing platform in Lacq to assess innovative tools in the remote identification, visualization, detection and quantification of gas leaks with applications relating to safety and environmental protection. TADI is an open-air test site measuring 2,000 m² for qualifying systems designed for gas leaks remote observation including airplane, drones, robots and artificial intelligence processing. Equipped with surface facilities (pipelines, columns, recovered wellheads, etc.), this test area can reproduce around 30 scenarios of controlled emissions from 0.1 to 300 g/s of gas (methane, carbon dioxide carbon, nitrogen, and other interferent gasses such as ethane...) in an industrial environment. TADI is an important bridge between laboratory development and industrial pilots by providing the opportunity to evaluate gas leaks detection systems in a repeatable series of tests at mock facilities where the emission locations and flowrates can be controlled and metered. The aim is to catalyze remote sensing developments in optical (hyperspectral, multispectral infrared camera, Light Detection And Ranging (Lidar),...) and in acoustic systems in open innovation mode, by having all the players on the same controlled tests (research and development, service providers, industrialists).



Picture of TADI in Lacq, France

2.3 Visit ARGOS project – robotic for field operations

The Robotic Development Platform based on Lacq aims at evaluating in situ innovative, safe and cost-effective solutions for remote operation of unmanned installation and hazardous areas. The ARGOS project develops a track of robots performing inspection, production operations or even maintenance activities. Those robots can be used in explosive atmosphere.

The platform located in PPL is used to increase the maturity of the robotic technology by testing new functionalities of robotics before having them deployed on other plants in operation when reliability reach an acceptable level. The platform includes some industrial equipment's and a structure with three levels like an oil and gas production plant.



Inspection robot in stairs



Robot opening a valve