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Social aspects of Total's Lacq CO2 capture, transport and storage pilot project

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Abstract: This text describes the social aspects of Total's CO_2 integrated capture, transport and storage pilot project in southwestern France, from the initial press conference February 8th, 2007 to the formal opening in January 2010. The economic and social context was favorable. The company conducted a significant outreach campaign. It was followed by an effective involvement of stakeholders, if not of the general public, through a formal continuous deliberation process led by the public authorities.

Keywords: pilot project; outreach; communication; France, case study

1. Introduction

This case study describes the social aspects of Total's CO_2 capture, transport and storage (CCS) research pilot project in Lacq inaugurated in 2010. Apart from enhanced oil recovery projects or projects where the captured CO_2 is a fatal byproduct of another industrial process, this is one of the first integrated CCS projects in the world at this scale. During the two years of the experiment, about 50,000 metric tons of CO_2 per year will be captured from a steam production unit retrofitted with oxycombustion in collaboration with Air Liquide. The captured gas is compressed and transported for about 30km reusing an existing natural gas pipeline. The gas is then injected through a reworked existing well into the depleted natural gas field of Rousse 1 rock formation 4,500 meters underground. Injected CO2 quantities are low compared to initial natural gas quantities: The reservoir pressure, currently 30 bars, should be increased to 70 bars post injection, which remains well below the initial pressure of 480 bars.

The project is conducted at Total's Lacq plant, in southwestern France. It includes a comprehensive monitoring network. And in addition to the research based on science and engineering, it contributed to advances on the legal and social aspects of CCS in France and in Europe. The social aspect's significance arise from the relatively high stakes: a large population lives close to the storage area, and this is the first integrated CCS project in France. After describing the context, this text will tell the project's story in two parts: before and after the official permit request. The final section summarizes the lessons learned and concludes. Additional online material includes an interactive version of the timeline and a map[1].

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1 Additional electronic material is located at http://minh.haduong.com/Lacq_CCS_Pilot/.

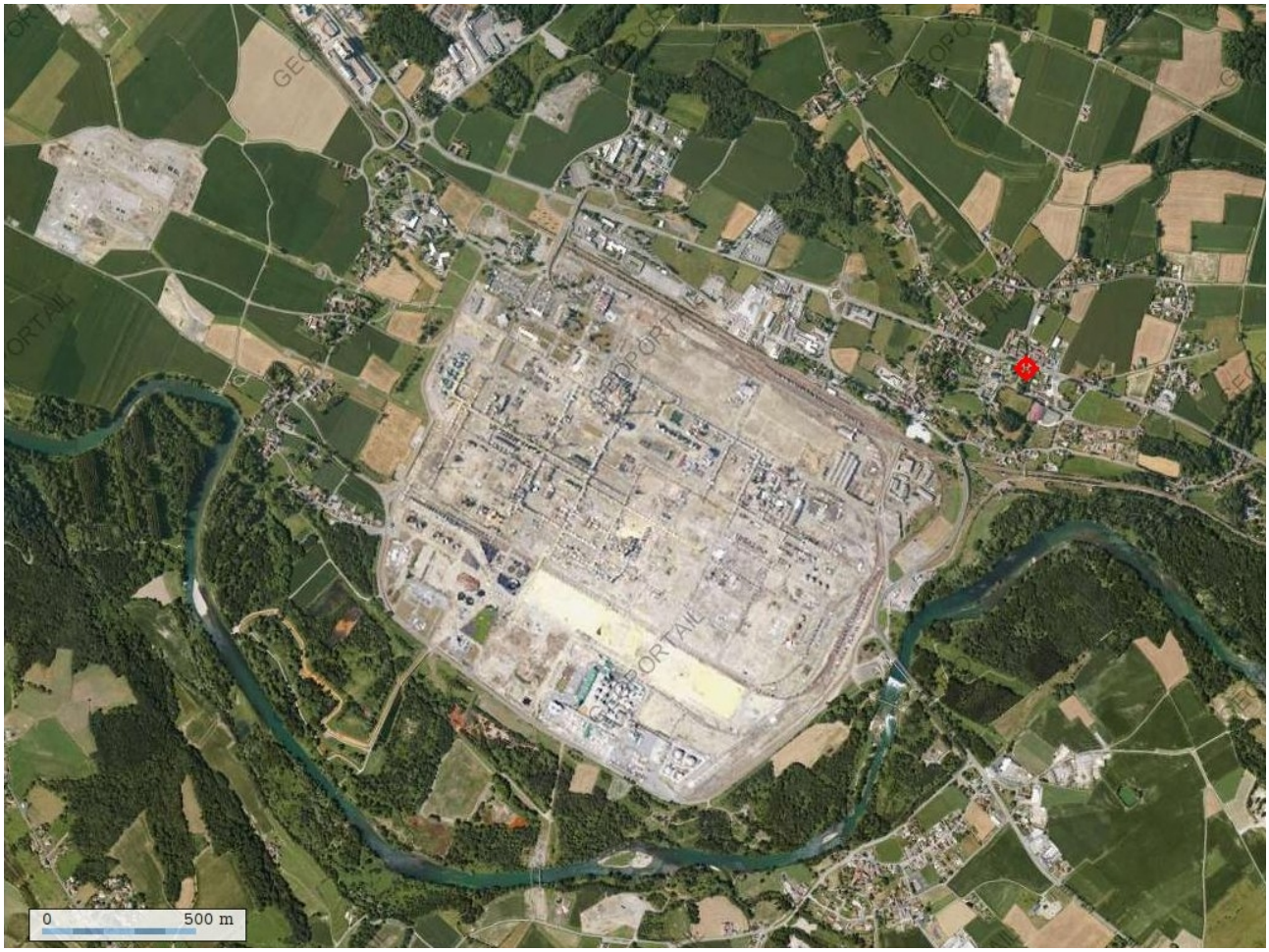


Illustration 1: Aerial view of the Lacq natural gas processing plant. Empty lots show the decline in industrial activity. Industrial risk and harmful effects do not prevent people from living close to the site (red dot). Image (c) Geoportail.

2. Historical context

Total's integrated CCS pilot project takes place in a valley along the *Gave de Pau* river, in the *Béarn* cultural area, in the Pyrénées Atlantiques (64) department of France.

The Lacq natural gas field was discovered accidentally at -3 550 m while digging for oil in 1951. It has been an important national asset for France, providing up to one third of the domestic natural gas consumption. Production peaked in 1982 at 33 million m³/day. But the flow has declined to under 10 million m³/day by 2009, and the end of the field's economic life is announced for 2013. As Illustration 1 shows, there are now many empty lots in Lacq's processing plant. After 50 years of natural gas bonanza, economic development plans for the valley are being reinvented. Several specialty chemicals production facilities, a bioethanol plant, a carbon fiber plant and a combined cycle power plant have been attracted. In this context where the economic future of the area is at stake, Total's announcement of the carbon capture and storage project had a clear value to the community. The project fits with the firm's broader strategy to manage responsibly the plant shutdown, not only by supporting local small and medium enterprises through its subsidiary 'Total DDR' but also by directly investing in training and R&D activities on the platform.

Lacq's natural gas is very dangerous, because it contains 16% H_2S and 10% CO_2. The gas is so corrosive that when the plant opened in 1957, special steels had to be developed [1]. Yet the processing plant's safety record shows no fatal accident outside it, even though some inhabitants



Illustration 2: Aerial view of the Rousse 1 CO_2 injection site in 2009, busy with equipments revising the well before injection (arrow). Surrounding landscape is hills covered with low density residential lots, wineyards, fields and patches of wood. In the background the cities of Jurançon and Pau are at approximately 5 km. Image (c) Total, used with permission.

live very close as Illustration 1 shows. The risk is not only present near the plant. The gas field extends dozens of kilometers beyond Lacq, reaching under the city of Pau. Consequently there is a wide network of collection pipelines in the area. These may have a low impact for newly installed inhabitants. But local citizens can have a memory or direct knowledge of the visual, air and noise pollutions that come from living in a valley rich in heavy industries [2]. Local institutions have experience with managing dangerous gases and pipelines risks.

According to [3], since the beginning of oil and gas production in the area, various liquid streams have been re-injected in the geologic structures. Some of these liquids came from the underground fields themselves, some came from the processing plant. Injection of liquid waste from other chemical plants in the industrial park is presently authorized in the geologic formation known as "Crétacé 4000". Injection rate were maximal in 1978-1979 at about 1 000 m^3/day, at a cost around 10 €/t. This is an economic opportunity, as some chemical waste streams would require up to 600 €/t to process otherwise. According to [4] that opportunity is a significant asset for the region, as only 2% of the disposal capacity has been used up in 40 years. Following a recommendation by the French national commission on public debates (CNDP), in 2001-2002 a concertation took place on whether to renew the Cretacé 4000 permit [5],[6]. Even if all this was not tied to the CCS project technically, legally or administratively, it contributed to the local political culture of concertation about industrial risk and geological injection.

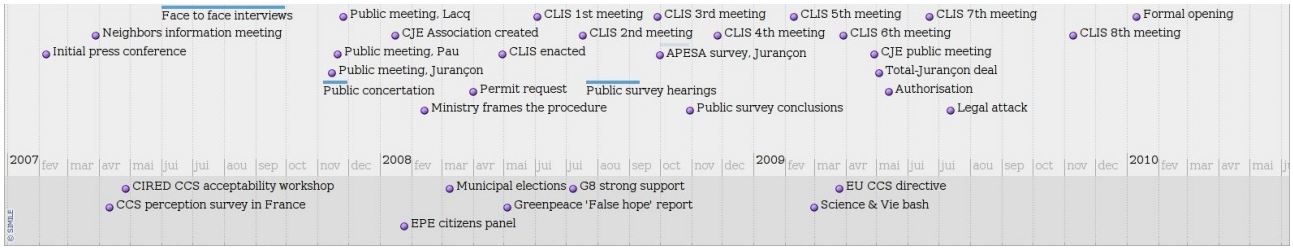


Illustration 3: Timeline of the Lacq pilot CCS project's social aspects. Events in the top part of the timeline are directly related to the project, while events in the lower part relate to the broader context of CCS in France. An deeper interactive timeline is at http://minh.haduong.com/Lacq_CCS_Pilot/timeline/.

3. Announcement, social characterization and concertation (2007)

Illustration 3 shows the project's timeline, starting from the February 8th, 2007 first press release [7]. The project initially aimed to inject up to 150 000 t CO_2 starting at the end of 2008. The cost of almost 60 million euros is supported privately by Total. A scientific committee advises the project and allows to maximize the research spillovers to the academic world. All leading geological research institutions in France: Institut Français du Pétrole (IFP); Bureau de Recherches Géologiques et Minières (BRGM); Institut National de l'Environnement Industriel et des Risques (INERIS); University of Pau Pays de l'Adour (UPPA); Institut de Physique du Globe de Paris (IPGP) as well as TNO are scientifically collaborating.

Total's outreach activities, comprehensively reported on their website [8] were voluntary and started well in advance of the administrative process. C&S Conseils, a specialized communication consulting company from Paris, helped to study the social context, define the methods, conduct the concertation and write the associated materials. The initial announcement was closely followed in March 2007 by a public information meeting at Jurançon. This was held with neighbors of the Rousse future injection site. Globally, there was no negative feelings at this meeting. The discussions were rather questions about the possible consequences, noise or visual impacts, zoning change and financial compensations for the city.

A social characterization study to organize the concertation was performed next. Between June and September 2007, C&S Conseils conducted about forty interviews with local and regional actors: elected representatives including all the mayors of the cities crossed by the pipeline, administrations, associations, businesses; and with the members of the project's scientific follow-up committee. The study led to the concertation itself, that included:

- Commitment to a "Chartee la concertation" [9] in which the company states the transparency guidelines according to which it promises to conduct the concertation. A guiding principle was that « All participants to public dialog do not take part in the final decision but all participants in the decision making take part in the public dialogue .»
- Publication of a 52 pages brochure [10] and its 8-pages synthesis [11]. The documents is organized around four topics: climate change; the CCS technology: the goals and characteristics of the pilot project; and the impacts and conditions of implementation.
- A section of about 10 pages on climate change, CCS and the project on Total.com web (*5*), and an exhibit on the project displayed at meeting places and at the Pau airport.
- Oral presentations and Questions/Answers sessions at three public meetings organized in the town-halls of Jurançon, Pau and Mourenx. A total audience of about 300 participants attended the meetings, each about two and a half hours. Talks by Total representatives were complemented and discussed by national experts from outside the project.

Meeting summaries were published on Total's website (*5*). Discussions with the public about local effects were related to security, land value, image risks for other activities like wine growing and visual impact on the site. Discussions on regional effects centered on economic attractivity, industrial development, jobs and fiscality. General discussions on CSC examined its costs, scale, additional energy needs, regulation, public subsidies, long term responsibility and risk control.

According to (*6*), the outcome of the concertation was first a clarification the agreements and disagreements. All participants agreed that climate change is an urgent issue, that increasing energy conservation, efficiency and renewables is more important than CCS, that a governance open to civil society is a goal to reach, that the project contributes to the economic renewal of the area, and that security and mastering the risks is an absolute priority. There was two points of dissent: the potential of CCS against climate change, and the regulation under the Mining code, as opposed to Environmental laws, especially regarding the legal status of CO_2 (waste or not).

There was several substantive outcomes of the concertation. An information day on climate change and its mitigation was decided, held on October 2, 2008 in Pau's historical congress center [12]. It was agreed to continue the dialogue by setting up a local commission on information and follow-uppp (Commission Locale d'Information et de Suivi, CLIS). Total promised they "will help local projects related to climate change mitigation (provided they are supported by the city)", and that discussions on taxes could be opened. Finally, after the concertation the project's neighbors formed an association: Coteaux du Jurançon Environment (CJE), officially registered on January 16th, 2008.

4. Formal dialogue and authorization (2008 to mid 2009)

The Préfecture des Pyrénées-Atlantiques, representing locally the French State, was in charge of examining the permit request. This was the first CCS project to be processed in France. The central ministry send a framing note to the Prefect (circulaire MEDDAAT du 14 février) early 2008. In addition to the existing national regulations on mining, waste, industry and transportation, the draft of the EU Directive on CCS was closely considered, even if it was not legally in place yet. Total filed the formal authorization request (Demande D'Autorisation d'Exploiter) with the Prefecture des Pyrénées Atlantiques in April, 2008.

During the spring of 2008, Total continued the communication and dialog meetings with mayors and neighbors, including a workshop with the Jurançon municipal council in July 2008, and an open site visit complemented with an information letter to neighbors in December 2008.

Formal discussions on the project were conducted mostly at the CLIS ad-hoc commission. It was officially enacted on April 30th, 2008 by the Préfecture des Pyrénées Atlantiques. In the absence of CCS law, the CLIS was created using the legal model of commissions established to follow-up landfills and the Crétacé 4000 CLIS. It includes the various components of the social body: 4 State representatives; 9 locally elected officials; 2 delegates from workers' unions; 4 from associations; 5 experts and 4 Total employees. The CLIS was established to discuss the authorization request and will sit at least for all the project's life. It met 8 times between June 2008 and December 2009.

The CLIS hears formal reports on the project from Total and experts like the BRGM. Its website [13], hosted in Préfecture's official website, provides access to the discussions reports and a significant range of supporting material. The CLIS visited the installations twice. At the first visit, it discussed on site with neighbors, ultimately making a press release about the project, but did not conduct a formal public meeting at the storage site. The CLIS also asked for and heard a report on the history of accidents with natural gas in the area, reviewed the monitoring plan, security exercises, a local perception survey. It reviewed and improved the authorization document draft.

Associations opposing the project, CJE and SEPANSO Béarn (a federation affiliated to France

Nature Environment), participated actively in CLIS meetings. At the outset, CJE was initially motivated to learn and understand. Its approximately 120 members are from diverse socio-professionnal background, and includes both rural people established in Jurançon from a long time and newly arrived inhabitants. Moderate members are ready to discuss with Total. At the end of the summer 2008, the association was not ready to organize big demonstrations, but could mobilize reliably a more radical fraction in total opposition to the project.

- CJE's advisor H. Pépin summarized the objections in a column published in a leading national newspaper [14]. Total was generally depicted as a big bad corporation that cannot be trusted to develop CCS acceptably, viewing its concertation efforts as mostly marketing and communication. The risk analysis was criticized for not considering massive release scenarios, and the security exercise for not directly involving neighbors.
- Opponents to the project questioned the independence of the BRGM, involved both in the project and in reviewing Total's permit request. CJE argued that the project could have been reviewed by an inter-disciplinary panel including foreign experts. BRGM replies with four arguments. First, BRGM is legitimate to examine the permit request because it is the public reference establishment for geosciences. Providing technical expertise to the administration is one of the core missions for which it has been created by the government. Second, the assessment was made only for the aspects in which the BRGM was competent, the expertise was conducted by a newly created unit of 13 specialists of security and impacts of CO_2 storage [15]. Third, this unit's personnel was not implicated in site selection and characterisation studies, and BRGM's researches currently led in partnership with Total at the Rousse site are disjunct from the injection permit request. Finally, it would have been difficult to find CCS experts, that were never involved in a joint research project with Total.
- Disagreements about the share of CCS in climate policies persisted. Opponents stated for example that IEA CCS scenarios are over-optimistic. SEPANSO raised these issues. They were not accepted as relevant by the CLIS, as they pertains to a national debate on policy choices between energy efficiency, renewables and cleaner fossil fuels.
- The opposition requested more technical reports release. Total argued commercial reasons to keep some documents non-public, but invited the experts to consult them on their premises. The CLIS president noted that the legal recourse against the permit may hinder transparency.

An administrative public enquiry was held from July 21st to September 22nd, 2008 in 4 cities. Participation was very weak in Lacq, weak in towns along the pipeline, 90% of the comments were received in Jurançon. CJE criticized this administrative public enquiry on the grounds that it was conducted during the summer vacations, and the final advice was positive while 56 out of the 60 recorded comments were negative [16]. The surveyors indeed assessed that the replies by the project-holder to the objections raised by the citizens were satisfying. The survey is not a vote, and 60 self-selected voices, that is less than 1% of the population, are not representative.

A final technical problem had to be examined before injection: signals from the three seismic sensors at the bottom of the well were lost, probably because a broken optical fiber. Total proposed to replace the sensors, but since that would take 9 months, to start the injection in the meantime. Without the sensors at the bottom of the well, the seismic monitoring network would comprise only the 7 sub-surface sensors, buried 200 meters. The permit specified that it was the operator's responsibility to determine the necessary number of sensors. Total's case that the incomplete network would be enough to monitor the site integrity was reviewed positively by two independant experts teams, so the Prefect did not cancel the autorization.

Municipal elections were held in March 2008.The project was not a stake of the campaign debates, as it was a politically risky topic with little to gain. The newly elected mayor in Jurançon initially

took a stance against the project, backed by an unanimous vote of the municipal council. The building permit for works needed at the injection site was not granted. Eventually, the mayor learned more about the project and its safety for the populations and became favorable to it. He negociated a partnership agreement with Total, signed in April 2009, saying that Total gives 1.5 million euros for projects in environmental protection, the development of energy efficiency and renewables as well as social, education, culture and sports. There are no injection taxes.

The capture, transport and storage project was permitted on May 13th, 2009, 27 months after the initial press conference. On January 11th, 2010, Valérie Letard, State secretary in charge of green technologies and climate negociations, with Christophe de Margerie, Total CEO, inaugurated the carbon capture and storage research pilot.

5. Discussion, lessons learned and conclusions

In this case, Total demonstrated a strong will to engage a concertation, allocating significant resources early on: hiring a consulting firm and allocating senior engineers time to answer the questions. The concertation covered the whole territory from Lacq, where acceptability was likely from the start, to Jurançon where things were more delicate. The social conditions were very favorable to the project. For two generations, the operator has been the first economic and therefore political power in the area, and has consistently demonstrated that it could control higher risks. The project answered local needs for economic development directly and indirectly, in the long run context of the gas field depletion. Research on CCS is supported nationally and internationally by scientists and States. All these reasons contribute to explain why the permit was obtained.

Still there are lessons to be learned. Total's position would have been stronger if its permit request had been expertised by a different team, and if it had more specific long-term plans. Because concertation meetings were held before elections, the local officials could only take a non-commited stance. Using a parisian consulting firm to moderate the discussion, and employing hostesses to hand out the information packages was not appreciated by the people of Jurançon. Total, following the advice of the president of the national commission on public debates, did not mass-mail the community with information on the project. Consequently, citizens came to the meetings to receive information, not to defend a stance in a debate. Another reason why the public participation in the discussion was low is that smaller formats might have been more interactive.

This case exposes the difficulty of modern governance. A balance between concertation, information and representativity has to be found for each issue, depending on local ethics and customs as well science and technology. As concluded in [17] this balance can only be found pragmatically. Technology policy is progressive and interactive, it needs projects to go forward. The project contributed to the regulation framework itself. The CLIS worked well, but the formal public survey came late in the procedure and did not interest much the citizens. The local media did not relay much the information about the public survey, not contributing to a meaningfull participation of the public. Even on a technically very constrained project, there was something to negotiate. Risk management studies were revised, and landscape integration in the environment was improved. Landscaping is the sensory interface with the community, and must be adapted locally anyway.

It might have been presumed that since geological storage is a highly technical subject, there was some rationality in technocratic decision making, where executive powers are delegated to elected representatives and State's engineers. Most citizens know little to no geoscience, and would sensibly err on the side of too much precaution when asked about an R&D project, since research means that there is a knowledge gap somewhere. In this case, the argument needs discussion, since some neighbors retired from Total were perfectly knowledgeable about the Rousse reservoir. We observed that the citizens tied with Total, retired or still active, exercised self-restraint in the public debates.

The case also highlights the issue of independance. As for many new technologies or drug assessments, CCS experts generally have an interest in the development of CCS. And local people in the administration, the industry and even the environmental associations mostly belong to the same social network. We believe that far from being a problem, strong communication links on the human side is an asset for governance. Beyond sharing knowledge, a key to the successful co-construction of a social innovation is the widening and deepening of the social network behind it. In this case, giving information empowered the local community to act. Having concerned citizens ask pointed questions to the experts balances power. The fact that the concertation led the neighbors to create an association of opponents probably improved the quality of the CLIS debates.

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