The struggle for a legitimate expertise on the shale gas controversy in France and Quebec

Introduction

Shale gas started to be of interest in the early 2000s, mainly in the United States, due to technical innovation and the increasing price of gas and oil. The exploitation of these bedrock hydrocarbons\(^1\) requires the combined techniques of hydraulic fracturing (fracking) and horizontal drillings. France and Quebec are thought to possess extensive resources (US Department of Energy, 2013) that companies have wanted to explore and extract since the late 2000s. The eventuality of such exploitation created a controversy on the environmental and social impacts of this industry. In fact, while in the USA and western Canada, shale gas and shale oil are considered an economic opportunity, in France and Quebec, they were constructed as an environmental threat.

State of the art

Chateauraynaud (2011), Chateauraynaud and Debaz (2012), Terral (2012) have described the flash mobilization in France in spring 2011, while Chateauraynaud and Zittoun (2014) explained how the ban on hydraulic fracturing emerged in the French parliament from the lack of resistance of the industry. In Quebec, Batellier and Sauvé (2011) showed the main stakes of the initial controversy. In the 2014 strategic environmental assessment (SEA), three sociological studies showed the lack of social acceptability in a multidimensional frame (Fortin and Fournis, 2013), the negative public opinion towards the gas industry (Montpetit and Lachapelle, 2013) and the across the associative spectrum dimension of the Quebecker mobilization (Bherer et al., 2013). Those studies focused on a short timeline to describe the mobilization. My goal in this paper is to extend the description of the controversy over time to understand how its frame

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\(^1\) Bedrock hydrocarbons regroup shale gas, shale oil, coalbed methane and tar sands, they are considered as unconventional hydrocarbons because they are not in localized reservoirs and need particular techniques to extract them from the impermeable sedimentary rock which contains hydrocarbon generated from buried, pressurized and heated marine algae.
evolves with the institutional instruments mandated to assess the risks and opportunities of shale gas exploitation and how the controversy spillovers on unconventional hydrocarbons.

**Shale gas policymaking and research question**

In France, the controversy started with social mobilization in early 2011 (gathering inhabitants in local committees, ENGO, local elected officials and Representatives) which claimed for a cancelation of the unconventional hydrocarbons licenses. The controversy is quickly framed as a technical issue the Parliament wished to overcome with a ban on hydraulic fracturing in 2011. Most of Representatives supported the ban in order to study the impacts. In fact, experimentation is still allowed and various institutional bodies took stances for exploration and research in 2012 and 2013. However none of the companies invested in experimentation as they do not know if they would be able to exploit the resource afterward. Furthermore, any government openly supported neither experimentation nor exploration since the 2011 ban because it would reactivate social mobilization. Despite the efforts of pro-exploration experts, the shale gas industry is still locked out of the French policies.

In Quebec, shale gas is first framed as an economic opportunity by the Liberal Government who supported the industry with tax reduction and a friendly legal frame. Liberals were then pressured to mandate public hearings (*Bureau d’Audiences Publiques sur l’Environnement* or BAPE: Bureau of public hearings on the Environment) on the “sustainable development of the shale gas industry” in 2010 after growing protests from local committees and ENGO. The controversy is then framed on social license to operate. The committee concluded to the lack of knowledge and refused to advice for a legal frame. Instead, it asked for the creation of a strategic environmental assessment (SEA) which worked from May 2011 to January 2014. Based on new scientific evidences, new public hearings occurred in 2014 with a wider scope on the opportunity of the shale gas industry. This second BAPE advised the Government not to strive towards this industry because of social unacceptance, economic unprofitability and environmental risks. Nonetheless, the government framed the use of hydraulic fracturing to allow it in low density areas (where shale oil is) whereas it is quite difficult to implement it in the lowlands of the Saint Lawrence where the shale gas is. So, the shale gas industry is discarded because of its unprofitability and unacceptability but hydraulic fracturing is still allowed.

We faced two apparently opposed institutional processes giving a same outcome. French representatives first took a harsh stance when they banned hydraulic fracturing pressured by social mobilization but without neither much consultation nor scientific state of the art. Then some of them tried to reopen the controversy with technical assessments of alternative techniques (following a framing on technological issue). In Quebec, public hearings were at the heart of the institutional process (following a framing on social acceptability) but the Liberal Government framed narrowly the debate over the economic opportunity. The SEA then included
some of the opponents' concerns and widened the scope of expertise. It concluded to a weak economic profitability and the threat the industry lies on CO2 emissions. The second public hearings finally discredited the industry as no social acceptance is met. In both countries, the final decision is to prohibit shale gas extraction (through a technical ban in France and social refutability in Quebec).

I thus seek to answer the following question: what are the impacts of the choice of expertise legitimate to assess the shale gas industry in the political forum? I will demonstrate that: 1- Governments tend to choose \textit{a priori} who is the expert of the controversy; 2- \textit{An a priori} choice of experts narrows down the frame of the controversy but participates to build distrust between stakeholders and to allow alternative narratives – and the controversy - to continue.

\textit{Theoretical approach}

The focus of this paper is to tackle the question of the limitation of public participation to sociotechnical controversies. Following the question asked by Collins and Evans (2002; 2007) on public participation to scientific controversies, I analyze the controversy over shale gas and hydraulic fracturing to see if one can adequately restrain public participation when a controversy is both technical (and scientific) and socio-environmental. If the Edinburg authors stated for the possibility of separating the technical controversy from its political parts, I conclude at the opposite that scientific work is inseparable from the political stakes. Collins and Evans underline the role of “those who know what they are talking about” (Collins, Evans, 2007: 113) in order to avoid technological populism. In that direction, Collins and Evans categorized different kinds of experts.

\textbf{Typology of experts (Collins, Evans, 2002 ; 2007) :}

Experience-based experts: no specific skill, their expertise goes from beer-mat knowledge to technical connoisseurs; they are supposed to debate in the political forum.

Interactional experts: skills in translation between expertise because they master the experts’ language.

Referred experts: experts from scientific domain who know how to discriminate contributory knowledge.

Contributory experts: core expertise, key actors of the scientific controversies, their reflexivity allows them to understand the limits and stakes of their own expertise.

This typology helps us to grasp how experts are discriminated given their scientific domain or the type of knowledge they produced. However, I follow Wynne (2003) and Jasanoff (2003) when they stressed the importance of power relationships between the choice of experts and the political outcomes. The main issue is then more about the framing of the controversy that about the limitation of who is expert enough to assess the controversy. My study outlines the limitation to consider who is an expert in a controversy \textit{a priori} whereas the experts are an outcome of the controversy and only recognizable \textit{a posteriori}. I focus on the attempts of redefinition of the controversy through instruments of public action (Lascoumes, Le Galès, 2004: 2

\footnote{The political forum is defined here as the institutionalized spaces where public, parliamentary and administrative debates occurred.}
13): “An instrument of public policy constitutes a device both technical and social organizing specific social relationships between the public power and the recipients according to the representations and meanings it is holding.” Those instruments legitimize some expertise and rejected others. They frame public participation to describe public preoccupation as an opinion which is opposed to scientific facts.

**Methodology**

I draw a parallel between the institutional instruments for managing expertise by the administrations in France and Quebec. I mostly analyze the instruments ruled by a committee who published a report; the legal instruments only backed the analysis as policy transcription of the assessment. Those constitute the political forum I analyze.

**Instruments of public action:**

**Quebec:**
- Report 307 du BAPE (BAPE, 2014)
- Strategic environmental assessment (EES, 2014)
- Reform of the subsurface mineral right (Loi 70, 2013)
- Reform of the water protection regulation (RPEP³, 2014)

**France:**
- Legislative committee on the bill no 3301: report Havard-Chanteguet (HC, 2011)
- Jacob Act prohibiting the use of hydraulic fracturing (Loi 835, 2011)
- Information mission of the Office parlementaire d’évaluation des choix scientifiques et technologiques [Parliamentary bureau of scientific and technological choices assessment] (OPECST, 2013)

Two analyses are conduced: a qualitative one underlines the discourses and narratives of the reports, and a quantitative one focuses on the 1100 interviews and 1385 bibliographical sources of the report. I categorize the interviews and the references given the status of the sources: administration, industry, association, science, law or media. This study is also based on 24 semi-directive interviews recorded in 2012 and 2013 in France and 16 interviews recorded in 2013 in Quebec, on communication documents from the stakeholders involved and more than 2000 press articles in six newspapers (2009 to 2012). I selected a sample of representative stakeholders for each category based on their discourse, modes of action, and presence in the debate. I sought to understand their influence on public decision by isolating their arguments and looking for them in the media and the official documentation.

This paper will first describe the engaged stakeholders, their discourses and the expertise which purports their legitimacy. Then, we will see that both governments tried to split the controversy into small parts to

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³ Règlement sur les prélèvements d’eau et leur protection: Water intakes and protection regulation.
reduce uncertainty. Analyzing the different kinds of experts engaged will enable us to show the arbitrary choice of the legitimacy given by the instruments of public action to specific experts. Finally, the paper will claim that the choice of expertise is a political work.

Three kinds of stakeholders and their discourse

Before analyzing the transformation of the controversy, we must describe the competing interpretations of shale gas. All the stakeholders base their discourse on expertise, but they differ on the identity of the expert (professional, “contributory” or “experience-based”) and his weight in the public forum.

<table>
<thead>
<tr>
<th>Major facts</th>
<th>Quebec</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008: Shale gas is produced in Bécancour</td>
<td>2010: Licenses for shale gas are granted</td>
<td></td>
</tr>
<tr>
<td>2009: AQLPA asks for a moratorium</td>
<td>2011: Protests arisen / local governments support the opposition / Jacob Act prohibits hydraulic fracturing / Cancelation of the controversial licenses</td>
<td></td>
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<tr>
<td>2010: The first BAPE is mandated / creation of multiple local citizens’ committees</td>
<td></td>
<td>2012: Election of the F. Hollande and the Parti Socialiste</td>
</tr>
<tr>
<td>2011: Publication of the BAPE report / start of the SEA / multiplication of protests</td>
<td></td>
<td>2013: Second report on the mineral right reform / Publication of various pro industry reports</td>
</tr>
<tr>
<td>2012: Maple Spring and electoral defeat of the Liberals</td>
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<tr>
<td>2013: Mineral right reform by the Parti Québécois (Marois Government)</td>
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<tr>
<td>2014: Election of the Liberal Couillard Government / Publication of the SEA report and the second BAPE report / reform of the Water protection regulation</td>
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Shale gas industry and its supporters

The first shale gas licenses were issued between 2006 and 2008 in Quebec when the State-own company Hydro-Quebec sold them to private companies. 460 licenses, or claims, strewed the province for unconventional gas between Montreal and Quebec on the southern shore of the Saint-Laurence River (the most populated and agricultural area of the province). Exploration drills confirmed the gas potential in 2008 when the price of gas was at its highest of 13US$/MBTU. In France, three licenses were issued in 2010 aiming specifically shale gas on the south-east. Others licenses were previously issued in the Paris basin for shale oil between 2008 and 2009, and in the north-east for coalbed methane. 64 licenses aimed gas and oil in 2011 (the French law does not discriminate conventional and unconventional hydrocarbons). Both countries are ruled under a subsurface mineral right which only gave to the central State the ownership of mineral and hydrocarbons resources and the ability to issue licenses.

Shale gas companies, like Total and Schuepbach Energy in France, or Talisman and Junex in Quebec, communicated mainly through their professional associations: Union française des industries pétrolières (UFIP) and Association des pétrolières et gazières du Québec (APGQ). Their experts are mostly geologists and

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4 Millions of British thermal unit, unit for measuring gas.
engineers defending their know-how of risk management. Each company has its own strategy, but they tend to agree on the regular characteristic of the shale gas extraction (shale gas is just methane as conventional gas is). Their discourse translates shale gas industry as an economic resource and as a technical area better understood by professionals and experts from the inside. Hydraulic fracturing is defined as a mastered technique used since decades in the industry (the stress on the mastering of the technique is stronger in France). Shale gas is considered as regular methane which is seen as a bridging-fuel participating to energy transition (argument encountered mostly in Quebec). They problematize shale industry on how to reproduce the American (and western Canadian) shale’s boom. In Quebec, the coalition pro-shale gas is much stronger and organized than the one in France. Exploration drills confirmed the presence of gas in 2008 so the next phase is about intensive exploration and developing the first exploitation wells. In France, there were mere exploration drills in the Paris basin but without any significant findings.

Proponents of the industry challenge the opposition to shale gas as a lack of knowledge or an ideological bias. The first argumentative tests failed so the industry had to reorient its strategy insisting on the rejection of its opponents outside the scientific rationality (France) or on the potential identity shaping behind the industry (Quebec). In Quebec, companies can’t drill since the first public hearings in 2010 and, in France, exploration is stopped since 2011. Since the Jacob Act of 2011 in France, a Manichean opposition is growing between obscurantism and knowledge improvement. This is not companies that struggle to allow exploration but specialized research centers and a handful of officials. They support scientific researches as a way to demonstrate the soundness of this new activity. “Beyond this bushfire, what appeared a pity to us, and unusual compared to other processes, was to deprive ourselves from the possibility of examination of a potential resource, to check if there is a resource.” In fact, in France, the pro industry coalition only engaged in a promotion campaign after the ban passed, so it is more about preserving its ability to explore for both conventional and unconventional hydrocarbons than about defending hydraulic fracturing.

In Quebec, companies are reorienting their strategy towards shale oil and conventional oil which are more profitable and situated in less inhabited areas. The price of gas has dropped to 4US$ in 2009, then to its lower level at 2US$ in 2012 and seemed to stay around 3,5US$ since 2012. The APGQ also tried to reframe shale gas as structuring industry and a national resource capable of modeling the country as hydroelectricity did in 1960s, but this new frame broadcasted by the former Prime Minister L. Bouchard (as the APGQ spokesperson) did not worked. The industry’s frame of shale gas is blocked by the moratorium on exploitation in both our cases but while in France there is a political decision prohibiting hydraulic fracturing, in Quebec, there is no such decision and hydraulic fracturing is even framed to be allowed in low density areas (where shale oil is) in 2014 through a reform of the water protection regulation.

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5 Interview with general secretary of the Union française des industries pétrolières, April 2012.
The State institutions

The relevant State institutions acting on shale gas are the Government, the Parliament, the Environment and Industry ministries, and research centers. Whereas in Quebec, the Liberal Government of J. Charest is an early bird supporter of shale industry, in France, the UMP Government of F. Fillon and President N. Sarkozy did not purport the industry more than a few days when it came under critics. The Quebec Government waited a full year between the whistleblowers’ call for a moratorium in 2009 and the mandate given to the BAPE in 2010. The French Government decided a moratorium days after the first major protest, then it mandated an administrative mission to assess the industry (the CGIET-CGEDD mission) and asked the companies to wait for the mission’s report before to start exploring for shale gas or oil.

The Ministry of Natural Resources (MNR) is the lead ministry in Quebec because it issued the licenses; the Minister Normandeau strongly supported the industry as “an opportunity not to be missed”. The Environment Ministry controlled the industry but without any particular regulation on the hydraulic fracturing technique until 2011 (obligation to demand an authorization) and 2014 (water protection regulation). The Environment Ministry issued the licenses in France but in a joint General Directorate with the Ministry of Industry. The Environment Minister opposed rapidly the industry whereas its colleague from Industry tried to support it, even after the ban passed. No regulation applies to hydraulic fracturing except for the ban.

French Representatives opposed quickly the industry; they signed bills to prohibit hydraulic fracturing only days after the Government mandated the administrative mission, speeding up the regulatory process. They then passed the UMP Jacob’s bill in June 2011 which prohibits hydraulic fracturing but allows experimentation, bypassing both a parliamentary informative mission and the administrative mission mandated earlier. The Parti Socialiste Government elected in 2012 did not change the law and assured the opponents no further exploration would occur in the next five years. However, Representatives from both major parties became louder on the importance of a full implementation of the Jacob Act which calls for the creation of an assessment committee to manage experimentation. The OPECST mission (composed of Representatives specialized on technological and scientific assessment) worked in that direction in 2013 when it evaluates the alternative techniques to hydraulic fracturing, urging the Government to explore and assess potential resources. However, all the attempts to reopen the debate in France failed. In Quebec, the Parti Quebecois opposed the industry only after social mobilization set the agenda on its threats. Representatives signed bills to implement a moratorium but they had no majority to pass them in 2010-2011. The Liberals were defeated in 2012, but the elected Parti Quebecois (PQ) failed to pass a moratorium before its own defeat in 2014. PQ only succeeded in reforming the subsurface mineral rights in 2013 to reduce the free mining legal frame. Supporter of the moratorium over shale gas, the PQ Government
nonetheless purported the contested shale oil exploration on a remote island of the Gulf of Saint-Lawrence. Hence, national political support against hydraulic fracturing and shale gas is stronger in France than in Quebec.

A vast majority of Representatives turned to scientific knowledge in order to reduce uncertainty. Representatives rely on administrative instruments to legitimate a viable stance. The French Government asked for the expertise of research centers – *Institut national de l’environnement et des risques industriels* (INERIS)\(^6\) and *Bureau des recherches géologiques et minières* (BRGM)\(^7\) - and internal engineering expertise - *Conseil Général de l’Industrie, de l’Energie et des Technologies* (CGIET)\(^8\) and *Conseil Général de l’Environnement et du Développement Durable* (CGEDD)\(^9\) - which concluded the necessity of further studies because of the gap between theoretical hydraulic fracturing based on American experiences and the reality of French underground. These experts defend their own interests when asking for more impact studies to be performed by their institution. They do not support directly any exploitation but they wish to be able to explore the subsurface to acknowledge the potential resource. Their discourse translates the shale gas as a national resource which should be managed long term and on a wider scale. Even if this discourse gained more media and public attention after the ban passed, no experimentation occurred in France, and only coalbed methane is explored concerning unconventional gas. Those experts represent an active part of the pro-exploration activated in the aftermath of the ban.

In Quebec, the expertise of the MNR was supportive of the industry since the beginning of exploration in 2006. Civil servants followed a subsurface mineral right based on the free mining principle. Most of the data used to assess the industrial activity is produced by the gas companies. However, the Government was forced to mandate a strategic environmental assessment of the shale gas industry between 2011 and 2014. The scientific exercise widened the scope of the inquiry, mandating academic scientists to assess various aspects of the controversy, including researches on sociological construction of the controversy, calculation of profitability, seismic risk, water and air pollution to cite a few of the 70 studies produced. Contrary to France, the expertise mobilized tended to confirm the claims of opponents related to the risks of this industry.

*Social mobilization and the opponents to the shale gas industry*

Social mobilization first started in Quebec in 2009-2010. Whistleblowers ignited the controversy in 2009. They constructed shale gas industry as a threat for the environment (water pollution linked to hydraulic fracturing, GHG emissions) and public health, they denounced the inadequacy of the legal frame and the lack

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\(^6\) National institute for the environment and industrial risks

\(^7\) Bureau of mining and geological surveys

\(^8\) General Council of Industry, Energy and Technologies

\(^9\) General Council of Environment and Sustainable Development
of consultation. Associations such as the *Association Quebecoise de Lutte contre la Pollution Atmospherique* (AQLPA) and local committees broadcasted their discourse in the public forum through public meetings and conferences, the media forum through the critical articles published in newspapers, and the political forum through a strong opposition from the municipal elected officials (a hundred a municipalities passed bylaws to prohibit hydraulic fracturing). They pressured for a moratorium to assess the risks and the opportunity of the industry within an orientation towards energy transition, they also support a reform of the mineral right. In fact, the consensus in Quebec is about the inadequacy of the governance which is the main storyline and about uncertainty.

In France, the same kind of grassroots movement ignited in December 2010. The opposition is first supported by Green Representatives on all political levels (municipal, regional, national, European). European Representative and former agriculture unionist, J. Bové, came to be the major public figure of the opposition and a vast social mobilization grew in the areas concerned with gas exploration. 180 local committees were created in the first months of 2011, organizing public meetings and broadcasting the documentary *Gasland*. They gained support from most of the municipalities – which signed municipal bylaws to prohibit hydraulic fracturing – General Councils – stressing the inadequacy of the industry with an economic development based on tourism and agriculture – and Regional Councils – asking for cancelation of the licenses. All of them stressed the opacity of an administrative procedure which did not foresee the necessity of an inquiry before the issuance of exploration licenses. National associations such as Friends of the Earth brought logistic support to the movement and insert the local concerns in the context of energy transition. The main storyline in France is about the technological risk in the use of fracking. Contrary to Quebec, opponents claimed for a ban and the cancelation of the licenses, not for impact studies.

Administrative and industrial experts are accused of bias by the opponents to the shale gas industry, who claim for independent expertise: “We understood the information the government had access to, was totally insufficient. I asked to the ministries: where did the information come from? And they told me: we have them from the company.”¹⁰ The shale gas opponents have succeeded to impose an emergency warning into the public forum. They have opposed the industry’s translation – shale gas is only natural gas – and generated a public issue over shale gas – shale gas exploitation could be dangerous and governance over mining extraction is inadequate. To do so, they mobilized experts such as engineers, geologists and hydrogeologists, often retired from the industry or research centers. They are contributory experts as they are skilled and experienced directly in the main scientific domain concerning the controversy, but they are outsiders of the official core-set of experts. The professional experts from companies and the administration rejected academic experts as they are supposed to lack practical experience of drillings. For example, a

¹⁰ Interview of a member of the alternative scientific commission against shale gas in Quebec, 2012 (our own translation)
critical geologist from Université du Québec à Montreal became a public figure of the opposition but he was clearly rejected by the proponents outside the core-set of experts.

Many referred experts participate to the controversy as they are able to understand the stakes of knowledge production even if they do not master the geological language deemed to be the core expertise of the controversy. They are referred experts as they understand the geological frame of the controversy, but they are also contributory experts in their own discipline. In Québec, a scientific committee was created around more than 170 university and college professors and researchers, bringing together all kinds of specialists: biologists, economists, jurists, etc. Those experts in their respected fields played the role of knowledge brokers and interactional experts as they explained the various aspects of shale gas exploitation during conferences and public meetings. They rarely engaged in official research programs but developed knowledge on the subject\textsuperscript{11}, even creating tools for the opponents such as the \textit{reglement} Saint Bonaventure, a municipal bylaw written by R. Langelier, doctor of Law, which prevents the gas companies to inject chemicals into the ground. Those experts are engaged professionals showing a second assessment of the industrial technical data and widening the scope of inquiry (their expertise became contributory as the controversy opens toward a global assessment of the industry’s impacts). This alternative assessment is present in the media and the activist’s forum but it has difficulties to enter the administrative and the dominant scientific forums. Same kind of scientific committees were created in France but as the ban passed, they became less visible in the controversy.

Moreover, a full range of experience-based experts is called upon with their local discrimination. Potholers warned about the specificities of the southern France subsurface made of cavities and faults allowing chemicals spills in the ground water and weakening the cementation of the wells. Farmers stressed the danger of water consumption and rejection linked to hydraulic fracturing whereas a fish reintroduction program is ongoing on a small creek near the Richelieu River in Quebec. They also highlighted previous experience with gas companies in the Quebec Lotbiniere region and the issue of gas pipelines. Their expertise is not really legitimate in the scientific forum, and is dismissed as an opinion which should be expressed outside the technical debate.

Their discourse translates the shale gas industry as a threat for the environment, their way of life, their values and identity, and as an issue that should be discussed on a wider scale. Their discourse is more diverse, more global but rooted in the local, and accessible to the general public. Expertise from the social mobilization tries to maintain a sociotechnical definition of the controversy against the attempt of monopolization by the technical experts. Social mobilization binds local preoccupation with political change

\textsuperscript{11} In France, A. Picot, a toxicologist, provided knowledge about the public hazards related to fracking. S. Pistre, a hydrogeologist, broadcasted knowledge about the risk for underground water and the specificity of the karstic underground of the South-East for safe cementation of the wells.
and systemic questioning. Ultimately shale gas opponents support energy transition and new governance of natural resources (a soft energy path). Their discourse is strengthened after numerous argumentative tests and gained consistency; it is both local and global. For the opponents, the protection of local lands enables a global defense of the environment:

“It started with the protection of the land, local, really local. Here, Causses-Mejean, it’s 33km². At first, it was not protecting the Lozère, it was to preserve Causses-Mejean. But ideas evolved, when you did some research, you realized the scope of the issue, from where comes the motto “neither here nor somewhere else”. (...) The claim spreads to the protection of the global environment, and towards energy transition. It is an evolution.”

Over time, opponents enlarged their claims to denounce the whole unconventional hydrocarbons industry as inadequate with the goals of energy transition. They nevertheless had difficulties to broadcast this global opposition. In France, the ban deprived them of their key storyline over the threat related to hydraulic fracturing. In Quebec, the opposition to shale oil had hard time to gather public support because the shale oil deposit are situated in uninhabited areas and this industry is supported by all the political parties.

The controversy through the instruments of public action

I selected ten institutional management instruments of the controversy. I now analyze them as instruments of public action (Lascoumes, Le Galès, 2004: 13). I analyze a legislative act, the Jacob Act (2011), and two reforms of the Quebec mineral right (2013) and of the Quebec water protection regulation (2014); three parliamentary committees (Havard-Chanteguet report, 2011; Gonnot-Martin report, 2011; OPECST report, 2013), an administrative committee (CGIET-CGEDD, 2012), two public hearings (BAPE, 2011; BAPE, 2014) and a strategic environmental assessment (EES, 2014). I discriminate them following three categorizations: the frame of the mandate (narrow or wide), the degree of public consultation (selective or open) and the kind of final assessment (technical or global). The Jacob Act and the reforms are only discussed as supports of the institutional frame emerging from the analysis of the other fora. This analysis showed which kind of experts and expertise are called upon by the central State to assess the shale gas industry and its related risks.

Control the frame, manage the outcomes

Committees in charge of the shale gas issue are all oriented by the question asked. Governments mandating them frame a specific question, as Fischer (2010: 127) explains: “The process of framing is the basis for not only identifying the problem, but also for defining it. In this sense, the processes of framing predetermine the direction and nature of the technical analysis that might follow.” In 2010, the mandate of the first BAPE is about “sustainable development of the shale gas industry”. The legitimacy of shale gas industry is not

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12 Interview with a member of the collective Causses-Méjean, April 2012.
questioned by this narrow frame which only aimed to develop shale gas the best possible way. The first decision in France in February 2011 is to mandate the CGIET-CGEDD about potential resources and impacts assessment (extend to alternative techniques in August 2011). This is also a narrow frame which only questioned the technical feasibility of the industry. The informative mission (Gonnot-Martin, 2011) benefited for a more open frame on “shale gas” and tended to assess the pros and cons. The legislative mission (Havard-Chanteguet, 2011) worked on the Jacob bill from a wide angle of prohibiting shale oil and shale gas exploration and canceling the licenses but it reframed the bill on a smaller scope only on hydraulic fracturing prohibition. Nevertheless, I categorize those last two as a wide frame.

The SEA benefited for a relative wide scope of inquiry as 70 studies were mandated in various scientific domains including some aspects set on the agenda by the opponents and validated through the public hearings. However opponents criticized the orientation of those studies and denounced the biased committee appointed by the Liberals which included two experts for the industry, three other representatives of economic interests, three civil servants and one sociologist. No seat was given to any association or representative of the local committees. The controversy on the committee’s composition stopped when the Parti Quebecois came to govern and placed the SEA under the management of the BAPE. The following second public hearings in 2014 benefited from the same open frame on the opportunity of shale gas industry in the Saint Lawrence lowlands. On the contrary, the latest report in France framed the controversy only on the alternative techniques and its conclusion is a manifesto for exploration and experimentation (OPECST, 2013). Hence, we see that the framing tends to be more open to various concerns in Quebec whereas it confines the controversy to a technical area in France. It echoed the general political framing on social acceptability in Quebec and on technological issue in France.

**Political (un)use of public consultation**

Each committee organized hearings to assess the diversity of opinion, the scientific knowledge, the companies’ strategies and techniques, etc. I discarded here hearings from the SEA because they were organized to assess the work plan of the committee, 350 peoples participated to the hearings but mostly to criticize the composition of the committee. No data on the status of the participants is available and the influence of those hearings on the political process is weak (calls for application for the studies were sent before the synthesis of the hearings was published).

The selectivity or the openness of the hearings is related to the participation’s strategy followed by both the Government and the people participating. In France, with cantonal elections running in September and general elections less than a year on the road, Representatives wished for a quick ending of the social mobilization. There was no time for a long public hearings process and even the CGIET-CGEDD mission did not have the time to finish its assessment before Representatives launched a legislative process to ban
hydraulic fracturing. When participation from ENGO was demanded, it was for the assessment committee planned in the Jacob Act to frame experimentation, and none of the local committee nor the national associations was willing to participate: “the policy of the local committees is: we do not participate to institutional forums. To participate is to support. This assessment committee is only consultative, it is not negotiation. In fact, it is just to obtain the approval of local committees.” On the other side, Quebeckers were willing to participate to public hearings. They did in large numbers. They occupied the BAPE hearings as well as the informative sessions organized by the Oil and Gas Association of Quebec in fall 2010. They asked questions to the public contacts of the ministries and the companies during both BAPE hearings. They mobilized during the hearings of the SEA. They participated to mirror committees of the SEA. Some of the opponents were even candidate to be on the SEA committee. They utilized every space of institutional participation to assert their arguments.

Table 1: Consultation given the identity of the source

<table>
<thead>
<tr>
<th>Identity of the individual heard</th>
<th>BAPE</th>
<th>BAPE2</th>
<th>CGIET/CGEDD</th>
<th>Gonnot-Martin</th>
<th>Havard-Chanteguet</th>
<th>OPECST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central administration</td>
<td>47</td>
<td>64</td>
<td>11</td>
<td>17</td>
<td>3</td>
<td>10</td>
<td>152</td>
</tr>
<tr>
<td>Foreign administration</td>
<td>39</td>
<td>3</td>
<td>29</td>
<td>19</td>
<td>5</td>
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<td>Local administration</td>
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<tr>
<td>Municipality</td>
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<td>23</td>
<td>16</td>
<td>6</td>
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<td>Local committee</td>
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<td>5</td>
<td></td>
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<td>37</td>
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<td>75</td>
<td>5</td>
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<td>177</td>
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<tr>
<td>ENGO</td>
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<td>28</td>
<td>20</td>
<td>8</td>
<td>3</td>
<td>91</td>
<td></td>
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<td>Other</td>
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<td><strong>Total</strong></td>
<td><strong>393</strong></td>
<td><strong>293</strong></td>
<td><strong>179</strong></td>
<td><strong>126</strong></td>
<td><strong>25</strong></td>
<td><strong>93</strong></td>
<td><strong>1110</strong></td>
</tr>
</tbody>
</table>

Reports from the different committees gave a contrasted picture of the use of the hearings. The four French hearings were selective whereas they were opened in Quebec. French Representatives chose which actors and stakeholders they wished to heard (it is a way to deprive opponents of the legitimacy to participate to public decision about shale gas). We can see it leads to representativeness bias. In fact, the Havard-Chanteguet committee heard quasi exclusively only representatives from gas companies (17 on 25), no citizen, no local committee, no ENGO were heard. The report therefore emphasizes the technical aspects of the controversy, following the description given by the companies. The authors then modified the text of the bill towards a less extreme feature. The Gonnot-Martin mission is more balanced but half of the hearings are from companies and their supporters. They nevertheless engaged a thorough assessment in traveling to

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13 Interview with a member of Collectif Causses-Mejean, April 2012
Quebec, Washington and Pennsylvania to meet with actors of the industry, the administration and even ENGO opposed to shale gas such as the AQLPA. They did not hear many scientists as only 6 of them were auditioned on 126 hearings. The CGIET-CGEDD committee engaged quite the same hearings process but members of the committee preferred to travel to Poland to meet with European actors of the shale gas industry. They supported a more scientific assessment in auditioning more scientists. Finally, the OPECST mission aimed a technical assessment as the Representatives met with technicians of the industry through research centers specialized in the gas industry and risks management, professional associations and companies. They did not underlined concerns from the public as they chose to promote the industry in their report. Academic researchers interviewed both by me and the OPECST complained of the biased translation of their contribution: Bataille and Lenoir (the authors of the OPECST report) eluded peer-reviewed studies brought to their attention; they did not translate specific concerns over profitability or water pollution.

The public hearings organized by the BAPE give a different picture. The first BAPE shows a strong participation of companies and its supporters, but also a strong participation of local committees, individuals and ENGO. All the stakeholders have been heard by the BAPE committee. However, the report gathered most of the individual and associative participation to the sole chapter 5 entitled “concerns and opinion of the participants”. They possessed “opinion” while companies and administration have knowledge. Concerns from the opponents are partially addressed in other chapters but mainly through the expertise of the Ministry of Natural Resources and the data of the gas companies. The second BAPE shows a drastic drop of participation from the companies which can be explained by the low price of gas and the unprofitable status of Utica shale exploitation in 2014. The overall participation in these second public hearings is lower (293 participants in 2014 versus 393 in 2010). Shale gas is not a central issue in 2014 whereas it was in 2010 and most of the concerned people thought the danger of a full-scale exploitation was not as great in 2014 as it was in 2010. The only actors who participated more in 2014 than in 2010 are the central administration actors. It can be explain by the diversity of ministries heard in 2014 in comparison to the relative narrow administrative frame of 2010 (most of the administrative actors were from the Ministry of Natural Resources or the Environment). Analyzing public participation, we see that there were more open in Quebec than in France, and that the diversity of opinion is greater in the Quebec reports than in France.

The controversy through its institutional references

All the instruments support their conclusions by referring to bibliographical sources. Analyzing those references, I can underline which kinds of sources are the most recurring. The references bear ideological bias of the type of assessment that is made. First we note a clear difference between the French reports and the Quebecker’s: while the reports from Quebec give an exhaustive list of references, the reports from Paris do not produced a state of the art on the issue. The Havard-Chanteguet report refers mostly to
administration and law documentation to support their conclusions on the content of the bill debated at the National Assembly. The Gonnot-Martin report takes the same stance to assess the situation of shale gas in France (resources, techniques used and potential impacts) instead of engaging a state of the art on the risks and opportunities of the industry. More interesting are the CGIET-CGEDD mission and the OPECST mission who are supposed to engage such a state of the art on the industry for the first one and the alternative techniques to hydraulic fracturing for the second one. The CGIET-CGEDD authors based their conclusions on an administrative literature (mostly foreign administration such as the Environmental Protection Agency or the US Department of Energy) and elements of general science produced by research centers (such as the Oxford Institute for Energy Studies) or universities (e.g.: MIT). They rarely cite peer-reviewed articles whereas they refer to companies’ documentation. The OPECST authors opt for the same kind of documentation but they refer to a bigger pool of scientific literature. They also cite numerous documents from gas companies.

In Quebec, the reports are supported by a thorough state of the art. They tend to cite most of the existing literature on shale gas and hydraulic fracturing. We can observe differences between the reports. The first BAPE’s sources came mostly from the administration (the MNR produced many references on the type of subsurface found in the Saint Lawrence lowlands, etc.) and the companies (referring to the potential resources, the techniques used to exploit shale gas, etc.). Individual documents cited are the memoirs sent to the BAPE from the people willing to participate to the public hearings. They explain the content of the speeches made during the hearings and they are mainly cited in the chapter 5 on “opinion and concerns from the participants”. With the documents from associations, they represent most of the sources insisting on the risks of the industry and the lack of adequate legal frame. The BAPE also reported numerous peer-reviewed articles and scientific reports. The SEA then summarizes the content of 69 specific studies mandated by the Government on various aspects of the controversy. It is clearly a scientific instrument because it lies on those scientific studies as well as on general science and peer-reviewed articles. Companies and associative references are nearly missing. Finally, the second BAPE shows a drop of the companies’ references as well as the associations’ ones. It orients its references towards scientific evidences.

Table 2: References of the reports given their type.

<table>
<thead>
<tr>
<th>Authors of the sources</th>
<th>BAPE</th>
<th>BAPE2</th>
<th>EES</th>
<th>CGIET-CGEDD</th>
<th>GM</th>
<th>HC</th>
<th>OPECST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration and Parliament</td>
<td>126</td>
<td>135</td>
<td>44</td>
<td>36</td>
<td>17</td>
<td>12</td>
<td>26</td>
<td>396</td>
</tr>
<tr>
<td>Peer-reviewed articles</td>
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<td>31</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>9</td>
<td>115</td>
</tr>
<tr>
<td>General science</td>
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<td>23</td>
<td>8</td>
<td>5</td>
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<td>93</td>
</tr>
<tr>
<td>Companies and associates</td>
<td>69</td>
<td>23</td>
<td>5</td>
<td>10</td>
<td>6</td>
<td>2</td>
<td>20</td>
<td>133</td>
</tr>
<tr>
<td>Specific studies</td>
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<td></td>
<td></td>
<td>1</td>
<td>138</td>
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</tbody>
</table>
The analysis of the references gives us a picture of the type of assessment which is being made in those reports. The identity of the sources and the number from each category orient the understanding of the controversy for the audience of the report. The reports referring mainly to administrative and corporate sources tend to support a technical understanding of the controversy while the diversity of references opens the controversy to various concerns and is more critical about the industry’s opportunity.

**Unbalanced references and selection of the narratives**

The orientation of the assessment through the type of references is even more visible when we look exclusively to the scientific sources. We can see on the table 3 how most of the reports cite first and foremost scientific studies from geosciences, engineering and economy. Those disciplines respond to the main questions asked by the mandate or by the frame of the reports which are typically the potential amount of resources, the type of techniques used and the profitability of the industry for the national economy. The French instruments quasi exclusively referred to scientific evidences supporting the potential resources (geosciences), the well-mastered techniques (engineering) and the profitability of the industry (economy). Those disciplines tend to support the industry because they do not emphasize its risks as geoscientists and engineers interviewed or cited worked in/with the industry. When they stress some risks they also show they are not “insuperable”\(^{14}\). They only criticize the technical implementation of the industry.

I differentiated hydrogeology from geosciences because hydrogeology tends to oppose geology precisely on the risk caused by hydraulic fracturing on the subsurface water flows and ground water. The scientific-based reports from the CGIET-CGEDD and the OPECST are therefore biased because they did not engage a full state of the art. The latter is clearly biased because it ignores specific studies contradicting the goals of the report: the authors cited for example a controversial study on the fugitive methane leaks which minors the risks of greenhouse gases emission, while ignoring other ones which concluded on a great amount of leaks. They also referred to consulting firms to assess the profitability, job creation and tax recollection, while academic economists opposed those optimistic findings.

In Quebec, scientific evidences are more diverse from the start but they became even diverse after the SEA. The first BAPE called upon different scientific disciplines to assess the sustainable development of the shale gas industry but most of the opponents criticized the narrow frame of evaluation. When the SEA is

\(^{14}\) Interview with a geologist from IFPEN, August 2012
mandated, the same opponents criticized the orientation of the studies and the composition of the committee of the SEA.

«I asked who studies water pollution risks? It’s Marianne Molgat. Who studies wells’ deterioration risks? Marianne Molgat. Every crucial stakes were studied by the industry representative. They were 11 in the SEA committee and they trusted to the only person with a bit of expertise who was from a company and who could concentrate the work and exclude specific questions opposed to her interests.»

However, the SEA shows a widening of the controversy’s scope. Even if all the concerns of the opponents were not studied, many questions were asked and a diversity of scientists from universities as well as research centers and ministries worked on various aspects of the controversy. The technical aspects are studied in prospecting the number of wells needed to exploit a certain level of gas and the assessment of the impacts. Studies, on the seismic risks, on the amount of water needed for hydraulic fracturing, on costs-benefits analysis of the industry, assessed the technical feasibility. Contrary to the OPECST mission working at the same time, the SEA underlines the controversial studies on methane leaks and points this concern as a major issue because if methane leaks are as important as in the Cornell’s studies, the potential qualification of shale gas as bridging fuel is no more demonstrable. Furthermore, the governance of the industry is assess with studies on the role of the Agricultural committee (which allows or forbids nonagricultural use of agricultural lands), the necessity of further communication between the Ministry of Natural Resources and the one of the Environment. And very specific to the Quebec case, sociological and political studies have been mandated to assess the social acceptance and the public opinion and to draw the portrait of the social movement. This quite full assessment is then used as a scientific base for the second BAPE. This exercise shows a growing importance of sociological, political and legal references to assess the controversy.

Table 3: Main scientific references by disciplines.

<table>
<thead>
<tr>
<th>Scientific disciplines</th>
<th>BAPE</th>
<th>BAPE2</th>
<th>EES</th>
<th>CGIET-CGEDD</th>
<th>GM</th>
<th>HC</th>
<th>OPECST</th>
<th>Total</th>
</tr>
</thead>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>10</td>
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<tr>
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<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

15 Interview with a geologist from UQAM, July 2014
17 Some references are excluded due to their interdisciplinary status. I also excluded disciplines which have iteration lower than 5 documents.
I argue that the composition of the references as well as the one of the hearings oriented the final conclusions of the reports because we can observe a different assessment given the type of references cited in each report. The Havard-Chanteguet (HC) report participated to the modification of the bill from Representative Jacob. While the first draft of the bill would prohibit shale gas industry and cancel all the licenses, the HC version only prohibits hydraulic fracturing and cancels the licenses if the companies cannot demonstrate they won’t use it. The bill started from a relative wide scope to end to a narrow technical one. The Gonnot-Martin (GM) report is inconclusive because one of the authors is a clear proponent of the industry (Gonnot) while the other one opposes the industry (Martin — he will become the Minister of the Environment in the socialist Government in 2012). Both risks and opportunities are described in the report but most of the questions remained unanswered. The authors avoided for example the main issue of energy transition. They only try to assess the specific case of shale gas industry and focus on the threat of hydraulic fracturing (insisting on the psychological effect of the documentary Gasland on public opinion). They hope to overcome further problems by reforming the subsurface mineral right, so the issue seems not to be why exploiting shale gas but how to exploit it with public support.

The two French scientific assessments opt for a clear technical frame (their mandate is clear about that). The CGIET-CGEDD draws the portrait of the industry, what are the resources, how to extract them, what can be the risks, what is the legal frame for companies. The authors (State engineers for most of them) concluded on the uncertainty of the risks, they advised the Government to wait and experiment new innovations for cleaner exploitation. The OPECST tried to produce a state of the art on the alternative techniques to hydraulic fracturing. From the debates in the annex of the report we can understand the authors wished to “change the law.” They concluded on the necessity to exploit unconventional hydrocarbons which do not require hydraulic fracturing such as coalbed methane, they underline the mastering of the technique from

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18 The references tally to the sum of the categories “general science”, “peer-reviewed articles”, “specific studies”, “institutional bodies” and some “individuals”.

19 OPECST, 2013 : 213
the companies, they urge the Government to implement the assessment committee foreseen in the Jacob Act, they insist on the economic impacts\(^\text{20}\) of the exploitation for French importation.

In Quebec, the first BAPE is not clear in its conclusions. The authors highlight the uncertainty context which precludes them from doing any recommendation. However, the report contains first and foremost a technical portrait of the industry: geological environment of integration, techniques of the industry, risks for water (water consumption is targeted as a main issue) and air, inconveniences for the local inhabitants, legal frame, etc. The frame on sustainable development of the industry limits a full assessment of the industry. It is not the case with the SEA and the following BAPE which both concluded on the inopportune of developing the shale gas industry. The SEA underlines a major risk of an increase in GHG emissions with such industrial development, while it minors risks of seismic activity and water consumption. More interesting, the SEA shows there is no economic profitability in developing shale gas in Quebec because of relative low price of gas, inadequate legal frame (low royalties are expected from the actual frame), low local jobs creation and inadequate energy mix (Quebec produces electricity with hydropower, gas would only be consumed by aluminum industry). It also demonstrates there is no social acceptability and public opinion is durably against such industry. The second BAPE draws the same conclusions and recommends the Government not to develop the industry for the next 25 years.

**Legislative support**

We have yet to analyze the influence of the legal action taken in this controversy. The Jacob Act brought a quick legislative solution to the French controversy in banning hydraulic fracturing. However, we already saw the evolution from the first draft to the parliamentary committee. The bill then comes and goes between the National Assembly and the Senate which amended it. The final version of the bill prohibits hydraulic fracturing but foresees the creation of an assessment committee to experiment on hydraulic fracturing and study the possibility of using alternative techniques, the annual revision of the prohibition given the conclusions of the committee, and the cancelation of the license only if the company does not demonstrate they won’t use hydraulic fracturing (as a result, only three licenses on 64 are canceled in September 2011, the other companies promised not to use the forbidden technique). Nevertheless the Act stroke a blow to the hydrocarbons industry as no new license for all hydrocarbons has been delivered since 2011. In fact, articles about experimentation and exploration are not implemented to the great displeasure of the pro exploration coalition.

\(^\text{20}\) A later report from the National Assembly (Barbier, 2014) minors the economic impacts of the French shale industry, the Barbier report shows shale gas exploitation would only benefits to energy-intensive industries and could only reduce the increasing gap between US gas price and European gas price.
In 2011, a reform of the *code minier* (subsurface mineral right) is initiated, both central to the future of shale gas and voluntarily kept in the dark and cut from any ties with this issue. This reform is supposed to manage the claim of transparent governance and local participation to the license deliverance process. The election of the *Parti Socialiste* in 2012 did not stop the reform which is still ongoing. This reform contains two threats for the anti-shale gas movement: profit-sharing of the royalties with the local representatives and the possibility of scientific experimentation outside the regulatory frame of permit deliverance. Legal instruments concur to strengthen the technical frame allowing some ways of exploitation.

There is no specific bill on shale gas today in Quebec. The *loi 37* on a five-year moratorium has not been voted before the downfall of the *Parti Québécois* (PQ) in April 2014 (however, Quebec is under a *de facto* moratorium since 2010). A reform of the *loi sur les mines* (subsurface mineral right) has been promulgated. It has been a long parliamentary fight between the liberals and the PQ since 2011, the latter succeeded to pass a reform in December 2013 (*loi 70*). Contrary to France, shale gas opponents participated in the debate because of their alliance with the proponents of a reform of mining precedence and a quite benevolent PQ. The reform allows municipalities to exclude specific areas from mining activity (but with a final veto from the Ministry of Natural Resources). However, the comeback of the Liberals might erase the gains and favors the industry: they voted a reform on the water legislation which allows companies to drill closer to municipal water wells (an activist municipal bylaw has been prohibiting such drilling since 2011). This water protection regulation frames the use of hydraulic fracturing to allow it in low density areas where the shale oil is and to restrict it in high density areas where the shale gas is. As a result, it did not reactivate social mobilization but allowed the shale oil industry to go along.

**Discussion: legitimacy of expertise, framing of the controversy and public policies**

We now faced two distinct political and social processes that engaged very different ties with experts and expertise. In fact, the question of limitation of public participation to the scientific forum can be addressed given two different sub questions. The first one is about the subversion of the borders between the scientific forum and the political one; the second one is about the utility of such borders.

In France, the institutional process is rooted in a narrow frame related to technical assessment of hydraulic fracturing and shale gas industry. The committees which studies the controversy heard mainly the proponents of the industry and they mostly referred to geosciences and engineering to assess the opportunity of the industry. They applied the point of view of Collins and Evans in separating the technical assessment from the social and political debates. On the one hand, most of the reports we analyzed stated for an *a priori* choice of experts legitimate to tackle the issue. On the other hand, the policy implemented – the ban – responded to the social and political concerns voiced in the public, media and political forums. This split between a technical assessment and a political debate shows a major contradiction: the technical
assessment concluded to the opportunity of the industry whereas the political debate led to the prohibition of the core technique used to exploit shale hydrocarbons.

The contradiction can however be explain by the flash decision-making which gave birth to the ban. In prohibiting so quickly hydraulic fracturing, and thus the shale gas industry, policy actors did not engaged in a thorough assessment. So the following institutional committees were “colonized” by pro-exploration actors who wished to equalize the debate after their non-resistance to the flash mobilization of early 2011. In that sense, the committees analyzed here are only tools used to reopen the debate which did not occur before the ban. The a priori choice of geosciences and engineering experts is thus logical for proponents who tried to assert their storylines about the well-mastered technique, the economic profitability and the amount of resources needed for energy consumption. So the institutional legitimacy given to those experts is the outcome of the influence from proponents of the unconventional hydrocarbons industry who failed to assert their claims during the early controversy won by opponents.

However, the split between the scientific forum and the political debate is quite blurry because most of the reports came from representatives who cannot claimed the “neutrality” of scientists. The separation between a technical assessment and a political – emotional – debate is instrumented by proponents. This is a major breach of the stance defended by Collins and Evans. Stating for such borders between science and politics opens the door for subversion of the borders because they are the results of a boundary work and not scripted in marble. Moreover this led to public distrust regarding central institutions. This situation echoes Jasanoff (1990) when she said that political factors weaken the power of science and allow alternate versions to continue. In fact, following the ban and the publication of the pro-shale gas reports, there is no controversy in France anymore but a conflict between two sides. They discussed no more but expressed their views in parallel forums in front of yet-convinced audience. Some forums could have bring together those two sides – for example the committee foreseen in the Jacob bill – but given the pro-shale gas stances of the majority of the institutional committees, opponents refused to participate to any State committee after the ban passed. Finally, opponents succeeded in obtaining a ban on hydraulic fracturing but only through a political pressure. The ban is not the outcome of a thorough assessment but the reflection of a balance of power between grassroots activists and a fistful of geologists, engineers and representatives. The later were not reactive enough in 2011 and they now tried to use their strong ties with the Ministry of Industry and research centers to reopen the debate. The first ones stand on the victory and defend the ban. By calling upon specific experts to assess the issue afterward, the institutional committees only participated to build distrust between opponents and the central State. The impact of the legitimate expertise is thus to weaken the power of scientific expertise in public policy.
This is the exact opposite dynamic that occurred in Quebec. The early controversy is institutionally locked in by the proponents of the industry thanks to their alliance with the Charest Government. The first assessment is narrow and concerned most exclusively geosciences, engineering and economy, echoing the discourse of the proponents. All the work of opponents is about opening the controversy to wider aspects of the industry. Through the first BAPE (political forum), they succeeded in the recognition of the uncertainty related to the industry and the necessity of an impacts study. Through the SEA (scientific forum), they obtained the scientific validation of some of their claims, but, more precisely to our questioning here, they widened the scope of the inquiry by calling upon a diversity of experts from research centers and universities. The Quebec controversy is not only about geosciences but also about sociology, political science, law, territorial development, economy, biology, etc. The assessment is more interdisciplinary and underlines the dissensus while silencing the studies from other scientific disciplines than geosciences in the case of France only participated to build a false conclusion of a consensual assessment of the opportunity of the industry. Hence, the controversy produced its own legitimate experts because this is through the social mobilization that some areas of expertise became relevant and legitimized by the central institutions. The second BAPE finally validated those scientific findings and advise the government in favor for the opponents. In that case, the split between scientific assessment and political debate is not contradictory but it is more a coproduction of knowledge and social order (Jasanoff, 2004). The split is more material than in the French case, but there is a certain fluidity between the arenas. However, the borders between those forums are clearly the product of a boundary work the same way they are in France. We saw that the Charest Government tried to manipulate the composition of the SEA committee, so there are political factors orienting the scientific work. Moreover, in the end, the scientific assessment is reframed by decision makers who applied partially its findings to the shale gas industry (unprofitability and unacceptability) but subverted the findings on hydraulic fracturing in allowing it despite the advice of both the SEA and the BAPE. In that case, separating the scientific and political forums is a way a dissimulating the framing processes occurring inside the controversy (shale gas industry is an issue of social acceptability) and outside (compared to shale oil).

In Quebec, the a priori choice of experts is overcome inside the institutional process. The BAPE played a key role in expanding the areas of concerns in 2011. In stating that uncertainty was too high to allow any recommendation, it opened the debate to other types of expertise. The conclusion of the institutional instruments, even if it went in favor for opponents, is quite balanced. It led to maintain a relative level of trust of both opponents and proponents regarding the central institutions. Even if opponents did not trust the Liberal government to address their claims, they nevertheless trusted the BAPE to be “neutral” and independent. They did not obtain the same outcome the French opponents did – there is no ban or legal moratorium in Quebec – but the industry is impeded to go along because of the social unacceptability and
the economic unprofitability. This has a blowback though because hydraulic fracturing has been framed through a water protection regulation in 2014. It is thus allowed under certain conditions. The legitimacy given to the expertise of the SEA is not deemed transferable to the shale oil controversy, and another SEA is ongoing to assess it. This other controversy benefited from less popular support than the shale gas controversy, and it will be interesting to look at its conclusion to see if they are similar.

The legitimacy given to specific experts and expertise is therefore political before being scientific. The choice of geosciences narrows down the frame but exclude many concerns out of the debate. Moreover, this is not only a scientific discipline which is discriminate but it is some individuals given their credentials (even Collins and Evans would disagree on that choice). In geology and engineering, I observe boundary works to maintain academic geologists outside the controversy. A large number of geologists from companies refuted the expertise of academic geologists because they lack experience of drilling. Besides only a handful of academic geologists entered the controversy and most of them were retired. They said active geologists cannot take stance against the industry if they want to obtain students grants and future research programs. The same industry’s geologists also refuted any expertise from the social mobilization as the CEO of Questerre Energy declared “people think they can understand shale gas industry after 10 minutes on the Internet.” When retired geologists and engineers participate to the social mobilization, their expertise is considered out of date or not relevant. Allowing first and foremost the core-set experts from the contested industry to be the main experts in the controversy bears an ideological bias because it narrows down the possibility of a critical assessment and it does not participate to trust building between stakeholders. Hence, the limitation of public participation to scientific controversy and the separation between a political and a scientific forum that it implied can be a major issue as it generated a blind spot on the framing processes. This does not imply that the general public should participate to the actual scientific work but that it should be allow participating to the orientation of the scientific work (Carolan, 2006). So, the stance defended by Collins and Evans seems too risky to be efficient. The threat of “technological populism” appears to be less of an issue compared to the risk of subversion of scientific findings that a border between science and politics beard. The focus of analysts thus should be on the framing processes orienting both the political solution and the scientific work and not about tracing a border between scientists and the rest of the world. This border is contextual and contingent. It is the product of a boundary work and its reification participates to reinforce the domination of some actors on others.

Conclusion

The shale gas controversy offers an example of a sociotechnical controversy. The comparison of the institutional management of the controversy in France and Quebec shows a diversity of instruments of

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public action. While the controversy is frame on its technical aspects in France (prohibition of hydraulic fracturing), the sociotechnical aspects are more visible in Quebec (social refutability of the industry finally stops the exploration). In both cases, shale gas industry is impeded to go along but the choice of legitimate experts prior to the controversy limits a global assessment and participates to the distrust. The full global assessment of the controversy appears to be only possible if one lets open the door of expertise. The experts legitimate to participate are produced by the controversy: public health experts, local development experts, sociologists, hydrogeologists, etc. are legitimate because they all possess a part of expertise necessary to a wide understanding of the shale gas industry and its impacts. Expertise is thus constructed in the action and do not constitute an a priori skill. The impact of the choice of experts legitimate by the institutions does not foresee the outcomes of the political decision but it undermines or maintains the level of trust in the institutions. Choosing experts ex ante participates to reify a border between science and society which is mostly contingent and it silences framing processes that are the core political stakes of a controversy.

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