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# Shale tales: Politics of knowledge and promises in Europe's shale gas discourses

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ABSTRACT

Straddling the late 2000s and the early 2010s, and following the dawn of the 'shale gas revolution' in North America, European governments have considered the possibility to repeat such an endeavor. However, the great disparity of energy mixes and histories across the continent has caused diverse responses to these plans. In this paper, we focus on three countries whose governments made markedly different choices with respect to the development of shale gas and to the application of its related extractive technology, hydraulic fracturing: France, Germany, and Poland. We analyze the discursive strategies employed by advocates of this resource/technology to turn them into a legitimate and desirable option for national energy supply. For our investigation, we mobilize a combination of theoretical frameworks and concepts originating from discourse analysis (the Sociology of Knowledge Approach to Discourse), and science & technology studies (the regime of technoscientific promises). In doing so, we focus on the press and the grey literature. Our tripartite analysis reveals that the reception of shale gas was significantly shaped by the ways in which proponents built horizons of expectations, and inflected them by adapting them to different national contexts: that was ultimately a matter of discursively structured politics of knowledge.

## 1. Introduction

The year 2011 was particularly significant for the history of natural gas. The reason for this were not individual gas discoveries, but rather the official sanctioning of the role of gas for the 'future of humankind.' In that year, two reports were published: one authored by the International Energy Agency (IEA), the other by the US Energy Information Administration (EIA). The former formulated arguments and scenarios for the ushering in of a global 'golden age of gas' (IEA, 2011a), in which unconventional gas was expected to play a fundamental part. The latter provided geological studies of technically recoverable shale gas resources in 14 areas outside the United States (EIA, 2011). While in the EIA data, individual European states were dwarfed in terms of resources by countries such as China, the United States or Argentina (EIA, 2011: 4), among the eleven European countries surveyed, two stood out as significantly endowed: Poland (5.3 trillion cubic meters, Tcm) and France (5.1 Tcm).[1]

Seven years into the publication of the two reports, the US has succeeded in becoming the world's largest oil and gas producer (IEA, 2017a: 15) and one of the world's largest exporters, precisely thanks to shale gas and oil.[2] On the contrary, the forecast of a golden age of gas has not materialized in the European countries, not even in Poland or France. The attempt to replicate the US achievement at the European scale—a wish more than one European government had originally expressed—has heretofore failed. Several factors have produced this outcome. These were related to difficulties in applying US extraction technology to Europe's geology; the complexity of national and supranational regulatory systems; the decline in the oil price from mid-2014; and the public image of both shale gas and its extraction technology, hydraulic fracturing (also known as *fracking*), with the attendant promises that contributed to generating that image. This paper focuses on the latter item.

With the aim of taking into account the complexity of European social actors' positions towards shale gas/fracking, we concentrate on three European countries, the governments of which followed decision-making paths that not only markedly differed from each other, but are

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[1] As a term of comparison, the third-largest surveyed European country, Norway, was estimated at 2.3 Tcm (EIA, 2011).

[2] Amanda Kay, "Top 10 Oil-producing Countries," *Investing News* website, 19 June 2018. https://goo.gl/ia9mPJ (accessed 12 September 2018).

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also representative of the most common decisions made by other European countries involved in the shale gas controversy.[3] These are France, whose government implemented a moratorium, and then a ban on shale gas exploration through fracking at an early stage; Germany, whose administration initially advocated exploration but at a later phase enacted a nationwide moratorium; and Poland, whose government firmly supported exploration. Regarding the remaining European countries involved in shale gas, parallels can be drawn between France and Bulgaria, in that the latter's government also approved an early open-ended ban on fracking in 2012. On the contrary, the strategy followed by British authorities resembles more closely the activism pursued by the Polish government. Other European countries followed a more articulated course, with extended periods of political ambiguity and oscillation on the matter: apart from Germany, this was the case in the Netherlands and in Ireland, whose governments implemented late moratoria and bans, but also in Romania, in the opposite direction.

The exemplary character of our cases, together with the specific language abilities of the authors of this paper, made it a consequential choice to focus on France, Germany, and Poland, as opposed to other, more widely studied countries. This tripartite comparison will allow us to analyze, on the one hand, the socio-political grounds over which the promise of shale gas has been built, and on the other hand, the discursive practices of power and knowledge employed by its promoters to try and make it performative. In the following, we briefly describe the overall situation in the three countries. The period chosen for our analysis is from 2010 to 2013, since a preliminary exploration showed this was the period in which shale gas and fracking received the highest public attention.

### 1.1. France

In 2016, France largely produced its electricity via nationally generated nuclear energy (73% of the total generated power), corresponding to 44% of the total primary energy supply (TPES). Renewable energy sources (RES) accounted for 10% of the TPES and (mostly imported) fossil fuels for 49% (MTES, 2016; IEA, 2017b). Thanks to its unique power mix and to its RES system developing at a sustained pace, France can claim to be a country on a steady way towards energy transition.[4] A further increase in RES is part of the energy transition program, advocated by the latest French administrations.[5] An extended national debate on how to achieve this aim (the Great Debate on Energy Transition) was launched in 2012, and continued until 2013.

According to the 2011 EIA report, France possesses the second largest shale gas reserves after Poland, at 5.1 Tcm.[6] On the one hand, the EIA estimates—and the prospect of achieving higher energy autonomy from traditional gas suppliers—contributed to stir up expectations in the industrial environment.[7] On the other hand, these expectations were moderated by skepticism, which derived not only from the early nature of the estimates, but also from doubt regarding the technical feasibility of the extraction project. Furthermore, even before the publication of the EIA report, proponents of shale gas in France had to face a mass mobilization against their extraction plans (cf. Section 4.1.1, this article, and French paper, this issue). The mobilization started in late 2010 and ultimately led to a stop in shale gas exploration in April 2011. In July, the 'Jacob Law' was passed, which prohibited shale gas exploration through fracking; at the same time, a commission was instituted to evaluate alternative extraction technologies. Significantly, in the debate on the energy transition in 2012–13, shale gas was not mentioned among the resources to be possibly exploited in the future.

The case of France in the shale gas debate is interesting for several reasons: while more than 99% of the fossil fuels are imported,[8] such import dependency is made less significant by the fact that most of the fossil fuels are not used for electricity production (only 6%) (IEA, 2017b). Moreover, no nationwide studies were conducted to confirm the EIA estimates for technically recoverable shale gas.[9] The strong and almost instant citizen opposition to the technology for shale gas extraction was unexpected for the national authorities insofar as mining and hydrocarbon exploitation, regulated by the Mining Code of 1956, had never before been the object of popular opposition (Baudrin et al., 2014: 2). Finally, French authorities believed that with the knowledge available, the risks of fracking could be mastered, and therefore, there would be no reason to excessively worry about extractive activities (Chailleux, 2015: 21).

### 1.2. Germany

The main objective of the current German energy policy is to foster an energy transition (*Energiewende*) that gradually replaces fossil fuels and nuclear energy by RES. According to the Federal Ministry of Education and Research, RES should reach 80% of the country's gross electricity consumption by 2050.[10] As a result of this policy, RES have been gaining importance in the country's energy portfolio since the early 2000s, reaching a 14% share of the country's TPES in 2016.[11] However, fossil fuels still cover 80% of the total domestic energy needs, with mineral oil and natural gas making up the largest share. While the primary energy consumption of mineral oil has remained virtually unchanged since 1990, an increase in the consumption of natural gas can be observed for the same period (AGEB, 2017). Against this background, natural gas is used primarily to generate heat and electricity (BGR, 2017; AGEB, 2017).

However, domestic production only accounts for a small amount of the required oil and gas, so the largest part has to be imported.[12] Reasons for this are country's overall energy demand, which has been increasing over the last years, and the ongoing depletion of domestic oil and gas reservoirs (BGR, 2017). Consequently, when early estimates of shale gas in Germany became known, the Federal Institute for Geosciences and Natural Resources (*Bundesanstalt für Geowissenschaften und Rohstoffe*, BGR), as the country's central geoscientific advisory body, framed shale gas as an opportunity to increase domestic resources, and thus as a possibility to ensure the reliability of energy supply (BGR, 2012). The EIA report attributed 226 billion cubic meters (Bcm) of technically recoverable shale gas resources (EIA, 2011: VII-35) to Germany: however, according to current estimates by the BGR (2016), this figure has been adjusted upwards, and Germany is currently supposed to hold the fourth-largest amount of technically recoverable resources in Europe, ranging from 320 to 2030 Bcm.

The debate on shale gas exploration and extraction started in late 2010, when both advocates and critics discussed the technology regarding the country's projected energy transition. However, the plan of resorting to shale gas through fracking stirred a nationwide anti-

[3] We refer to accomplished and ongoing studies conducted by the authors.

[4] IEA website, 2017. France – Energy System Overview. https://goo.gl/PCJUxo (accessed 12 September 2018).

[5] Cf. the "Plan Climat," introduced on 6 July 2017. French government website. https://goo.gl/N7Pxuq (accessed 12 September 2018).

[6] These figures were not greatly affected by the 2013 revision by EIA, which downgraded the technically recoverable resources to 4.1 Tcm (EIA, 2013: 6).

[7] In the case of France these are, by order of importance: Norway, the Netherlands, Algeria, and Russia.

[8] IEA website, 2016. France: Balances for 2015. https://goo.gl/ookHx2 (accessed 12 September 2018) and related graphs at the bottom of that webpage.

[9] IASS Fact Sheet 1/2015, 2015. Shale Gas and Fracking in Europe. https://goo.gl/Lv2LEj (accessed 12 September 2018)

[10] Federal Ministry of Education and Research, undated. German Energy Transition. https://goo.gl/tN84bq (accessed 12 September 2018).

[11] IEA website, 2017. Germany – Energy System Overview. https://goo.gl/yvtT5F (accessed 12 September 2018).

[12] In the case of Germany most of the imported gas comes from, by order of importance, Russia, Norway, and the Netherlands (BGR, 2017).

fracking mobilization, based on the claim that this technology might entail uncontrollable risks, especially for natural water resources, human health, and the local surroundings of drilling sites.[13] After some years of debating, in June 2016, the German Parliament passed a bill that allowed fracking for conventional oil and gas resources under strict environmental conditions, but prohibited its use for the extraction of unconventional fuels.[14]

### 1.3. Poland

Poland's heavy reliance on coal makes it rather unique in the overview of EU's energy mixes. Regarding electricity generation, in an early phase of the Polish 'shale rush' in 2009, coal amounted to 90% of the share (IEA, 2011b: 63), and natural gas to only two percent.[15] About two thirds of the gas Poland consumed back then were imported, and 90% came from the Russian giant, Gazprom (ibid., 63, 115). In addition, the Polish coal mining industry has been facing hardship as the coal price has declined continuously between 2011 and 2015. This situation, together with the repeated solicitation from the European Commission to switch to sources emitting fewer greenhouse gases, has urged successive administrations to start planning the diversification of Poland's energy sources.[16]

Given the checkered history of the Polish-Russian relationships, the issue of energy dependence is particularly sensitive, and it certainly was not assuaged by the repeated gas disputes between Russia and Ukraine in the last decade, which on more than one occasion resulted in a direct threat to the energy supply security of Central and Eastern European countries. Furthermore, of all European countries supplied by Gazprom, Poland paid among the highest prices for its gas in 2013 (over $ 500/$m^3$, compared with less than $ 400/$m^3$ paid by Germany).[17] The main argument underlying the government's advocacy of shale gas was precisely greater energy autonomy from Russia (Wagner, 2014: 274).

The case of Poland can be regarded as the counterpart to the French case. Ever since the very first signs of the potentialities of the Polish subsoil were revealed in the late 2000s, the national administration supported exploration by adhering to a political and narrative agenda centered on the promises of national energy autonomy from Russia, and of the creation of jobs and wealth for the population. By simplifying the license-attribution procedure and by according enterprises favorable fiscal conditions, the government succeeded in attracting widespread international interest in Poland's shale gas resources (see also [Poland paper], this issue). Unlike the French and German cases, and considering the Polish population's wide acceptance of shale gas operations, the trials of strength for the industry did not come from mass protest, but from the difficult geological conditions, prolonged legislative regulations, and the decline in oil and gas prices on the world market (Author 1, 2018). Faced with these difficulties, companies began to quit the business from 2013.[18]

From these three country summaries, profound differences appear with respect to shale gas policies, which we will explore more extensively in our empirical section. Over the next paragraphs, we focus on the advocacy strategies pursued by proponents of shale gas in the three countries. The reason why we restricted our research to this specific subset of actors is grounded in the prominent role of the promoters in the establishment of a public discursive agenda, and will be clarified further below. We examine a subset of those discursive strategies in the light of theoretical notions developed in the sociology of discourse and in the sociology of expectations. In particular, we investigate questions related to the production of technoscientific knowledge through an analysis of the politics of knowledge that shale gas advocates employed to further their visions. Knowledge plays an important role for the political negotiations, strategies, and social mobilizations described below (cf. Section 4), since all these processes are based on specific tools for prognosis (e.g., those concerning the expected shale gas potential or the expected energy demand), which presuppose knowledge of a number of variables and parameters. In other words: we regard the processes mentioned as strategies to establish knowledge claims within the context of conflictual situations.

In the next section, we first provide a review of the existing scholarly studies on shale gas/fracking in social sciences; we then outline the theoretical framework for our analysis and the way we operationalize it. After describing the methods of our study, we examine the three national cases by first focusing on the public controversy, and then on the formulation of the technical and economic promises represented by shale gas/fracking. We finally discuss our findings and provide some conclusions.

## 2. Theoretical background

### 2.1. Current state of research

Over the last decade, and concurring with the 'shale gas revolution' in the US, shale gas and fracking have been the preferred research subjects for numerous publications from several academic disciplines, ranging from petroleum geology to economics (Kinneman, 2011; Barth, 2013), environmental and health studies (Osborn et al., 2011; Howarth, 2014), policy studies (Weible et al., 2016), law (Reins, 2017), and social sciences (e.g., Steger and Milicevic, 2014; Willow, 2016; Whitton et al., 2018). Regarding the latter, after an early period with most studies focusing on the US, works on European countries have multiplied. These have often centered on discourses, mainly in the media (Cotton et al., 2014; Jaspal et al., 2014; Mercado et al., 2014; Metze, 2014; Goldthau and Sovacool, 2016; Rasch and Köhne, 2016; Lis and Stankiewicz, 2017). With few exceptions (Upham et al., 2015; Goldthau and Sovacool, 2016; Lis, 2017; some chapters in Whitton et al., 2018), these works have focused on individual EU countries. This has generally increased the risks of neglecting historical cross-country differences and of overgeneralizing the applicability of country-specific analysis results. In addition, the focus in a considerable number of cases has been on discourses and arguments produced by opponents of shale gas (but see Baudrin et al., 2014).

Moreover, most studies have heretofore focused on *established* framings of fracking and shale gas, without providing much insight on their genesis. By focusing on France, Germany, and Poland, we aim to investigate how shale gas developments and hydraulic fracturing were turned into a legitimate, credible, and realizable—although ultimately unrealized—possibility. We argue this was achieved through the formulation of country-specific horizons of expectations and through their integration within regimes of technoscientific promises (Joly, 2010,

[13] This nationwide anti-fracking mobilization is visible in the establishment of numerous citizens' initiatives and interest groups that have joined under the name of 'Gegen Gasbohren' (*Against gas drilling*). http://www.gegen-gasbohren.de/ (accessed 12 September 2018).

[14] Cf. The Federal Government (*Bundesregierung*) website. https://goo.gl/vqMZqk (accessed 29 June 2018). The German regulation is singularly ambiguous in this respect, as explained in 4.2.1.

[15] In 2016, the share of coal was 80%; gas amounted to 5%. IEA website, Poland - Energy System Overview. https://goo.gl/xjULPK (accessed 12 September 2018).

[16] Although Poland has seen a large growth rate of renewable energy for its overall energy supply since the early 1990s, it still needs to diversify its energy mix significantly to meet EU regulations. In 2005, one year after joining the EU, the share of renewable energy in TPES was around 5 percent, and rose up to 10 percent in 2015 (IEA, 201: 96).

[17] Sergey Ispolatov, "Больше всех в Европе «Газпрому» платят македонцы и поляки," *Izvestia*, 1 February 2013 (https://iz.ru/news/544100, accessed 12 September 2018).

[18] *Occupy Chevron* blog. http://occupychevron.tumblr.com/ (accessed 12 September 2018).

2015). The main theoretical contribution of this paper is to show how the notion of regime of technoscientific promises (TSP) can be integrated within a sociology of knowledge that takes into account the role of discursive and institutional practices, as well as of politics of knowledge and power. In doing so, we draw on a hybrid theoretical background that brings together perspectives from the Sociology of Knowledge Approach to Discourse (SKAD) (Author 5, 2011b, 2013) and science & technology studies (STS). Such a framework will enable us to respond to questions regarding the role of knowledge production and utilization, as well as the discursive practices followed by the producers of that knowledge, in the formulation of expectations on technoscientific matters.

### 2.2. The Sociology of Knowledge Approach to Discourse (SKAD)

The Sociology of Knowledge Approach to Discourse (SKAD) (Author 5, 2011a, 2011b, 2013; Author 5 et al., 2018) has been established in German sociology since the late 1990s. SKAD defines discourse as "a statement practice or a totality of statement-events definable according to various criteria, which is investigated with regard to institutionally stabilized common structural patterns, practices, rules, and resources of meaning creation" (Author 5, 2013: 72). It is emphasized that discourse is concrete and material, observable and describable, not an abstract idea or free-floating line of arguments. This means that discourse appears as speech, text, discussion, visual image, use of symbols, which have to be performed by actors following social instructions and patterns of communication and discursive meaning-making.

Discourses are a real social practice that can be analyzed through social actors' communicative actions, the structural patterns they draw upon, and the resources they use in this process. Building on the interpretive paradigm in sociology and Foucauldian analysis of the power/knowledge-nexus, SKAD is interested in social relations of knowledge and knowing ('structures') and the politics of knowledge and knowing ('processes'), as well as in the work they do in current societies, e.g. the interplay between actors, statements and heterogeneous forms of knowledge production and circulation in social processes of problematization. It therefore establishes a research agenda and designs a methodology for analyzing the discursive construction of reality, which cannot be fully addressed here (see Author 5, 2011a, 2011b).

Knowledge in the sense of SKAD refers to socially constructed symbolic systems that are produced in, and through discourses. SKAD regards discourses as performative sets of statement practices that constitute the 'reality' of a phenomenon. This includes both the institutional and content-related dimensions of discourses and actors' practices of producing and distributing knowledge, for instance in the form of speech, text, images, etc. (Author 5, 2013). Hence, SKAD's focus lies on investigating the discursive construction of knowledge on the level of institutions, organizations, and (collective) social actors.

For the purpose of this article, we focus on the role of social actors in constructing shale gas-related horizons of expectations.[19] From the perspective of SKAD, this implies the symbolic ordering of the situations at hand by involved and committed actors, the resources drawn upon for contributing to discourse, the measures proposed, but also the ways of legitimating, generating and deconstructing 'facts,' norms and values. Such legitimating, generating and deconstructing modes, as we will show, bridge SKAD with the concept of regime of technoscientific promises. For instance, when representatives from the oil and gas industry formulate knowledge claims about shale gas, they resort to tools such as risk assessments, geological estimates, or future scenarios. References to these documents can also be found, quoted verbatim or reprocessed, in the press. Thus, we regard technical and scientific reports (i.e., the 'grey literature') and statements within the media as central discursive practices to produce a particular image of a technology.

Moreover, when actors produce specific visions concerning shale gas/fracking, they do this based on established or emerging speaker positions. These determine who may speak in a discourse and under what conditions something may legitimately be said. Against this background, we assume that shale gas advocates refer to pre-existing discourses and to a specific set of arguments as discursive strategies to enforce and legitimate their knowledge claims against others (Author 5, 2011a). Adding to the SKAD framework, the specific question about the construction of horizons of expectation needs further theoretical and conceptual clarification. For this, we refer to Pierre-Benoit Joly's (2010, 2015) concept of regimes of technoscientific promises (TSP), which we suggest can be integrated within the scope of SKAD and provide beneficial theoretical insight.

### 2.3. The regime of technoscientific promises

In the last decade, several studies (Stankiewicz, 2009; Gross, 2010; Wagner, 2014) have interrogated concepts of risk, uncertainty, and (non-)knowledge in scientific activities, as well as their role in creating strategies for argumentation. Notably Aleksandra Wagner (2014), by referring to scenario building, estimates of reserves and prices, has acknowledged the future orientation of discourses formulated by shale gas experts. Future orientation is at the basis of regimes of TSP. This framework, inspired by works in the sociology of expectations (Van Lente, 2000; Borup et al., 2006), discourses play a central role.[20] That is because the most obvious form in which TSPs materialize is in discourses, where they are 'spoken out loud.' Hence, the primary function of language is to serve as a means to construct promises and the related expectations based on what is known or not known. In other words, once constructed, TSPs have to be included in discursive practices. To achieve that result, 'expectation work' is necessary (Bakker et al., 2011). 'Brokers of futures', as we can call actors involved in such knowledge production work—whether they are managers, lobbyists, scientists and engineers, or consultants—will have to enroll policy-makers and funding institutions. In addition, they will have to convince the public of the meaningfulness and feasibility of a TSP: for example, by providing citizens with meaningful *storylines* (Hajer, 1995) capable of establishing the legitimacy of specific speaker positions.

In the case of shale gas, as we will see, these storylines may refer to economic achievements, job creation, controlled risk of extraction processes, improved national supply security. Brokers of futures will also need to set quantifiable horizons of expectations that are functional for their discursive strategies—these are the technical and scientific reports we mentioned earlier. In these reports, horizons of expectations are usually expressed in the form of forecasts on results to be achieved by a certain time. Once formulated, a promise can only become successfully established, if: (a) it is linked to a given, typically urgent problem (production of legitimacy for actions to be taken); (b) it achieves credibility; and (c) its proponents manage to mobilize the needed material and immaterial resources (Joly, 2015). It *may* then be accepted as a truth and become part of an established 'reality.' Because of their performativity in directing people's beliefs and actions, promises can therefore be thought of as instruments of power within Foucauldian 'games of truth.' One of the tasks of brokers of futures is to channel flows of performativity towards their preferred avenue. While we limit our analysis to the early stage of promise formulation as based

[19] As our research is at an early stage, we cannot give a full SKAD basis to our empirical analysis here. We will therefore focus on an early comparative analysis of promises in the fracking arenas.

[20] However, one need to notice that Author 5's and Joly's meaning of 'discourse' differ: while Joly separates the discursive aspects of a TSP from its material aspects (Joly, 2010: 209), in SKAD discourses are already understood as both symbolic *and* material processes (Author 5, 2013).

on our empirical findings, one could go further to investigate the conditions under which a promise could fail or, on the contrary, be ultimately implemented through concrete measures.

## 3. Materials and methods

The empirical material for this paper has been collected through two main channels: from the national and regional press and from the grey literature the press articles referred to. The press materials date from 2010 to 2013, as the shale gas promises were formulated in those years and the debates on shale gas and fracking began and peaked in the countries under investigation. With the help of international research databases Nexis® and Factiva®,[21] we conducted a keyword search by using the terms 'hydraulic fracturing,' 'fracking' for the technology, and 'shale gas' and 'unconventional gas' for the resource in the respective languages. Our aim was to cover a wide range of societal and political views by gathering articles from different national and regional newspapers. We only selected articles that focused on fracking or shale gas development in each of the three countries (e.g., German articles dealing with fracking in Germany).

While we analyzed the press to identify influential speakers, speaker positions and discursive strategies within the daily debate, the grey literature served a different aim. It represented a reservoir of raw, technical argumentative materials on which promoters built their technoscientific promises, no matter whether they presented readers with geological estimates by scientific institutions, opinions and studies on fracking by corporate engineers, or cost-benefit analyses of shale gas by lobbying institutions and persons. Grey literature we consulted varied from country to country with respect to authorship. That is not surprising, considering the different evaluation procedures and institutional ecology pertinent to the three countries under study. Such literature mainly included technical reports produced by national think tanks and associations, national and international geological institutions, as well as by technical committees set up in national parliaments.

## 4. Case studies

### 4.1. France

#### 4.1.1. Public debate and political regulation

In October 2010, the French magazine *Charlie Hebdo* made it publicly known that in March the Minister of Ecology had allocated 64 shale gas exploration permits in the Paris basin and in southeastern France without previously informing or consulting residents and local authorities (Chailleux, 2015: 161). That had been possible because the process to obtain an exploration license for unconventional hydrocarbons was the same as for conventional ones, involving three different ministries and the regional government. Hence, the authorization was "divided, fragmented, and partly invisible" (Chateauraynaud and Zittoun, 2014: 9). Moreover, the exploration licenses did not refer to fracking: therefore, policymakers possibly did not feel 'responsible' for giving their go-ahead (ibid.).[22]

Hydraulic fracturing was not new in France, as the technology had already been employed to extract conventional gas in the Paris basin. Its planned use in southeastern France however, a region with more problematic geology, caused great ecological and safety concerns. Following the disclosure, and the subsequent self-organization of a number of regional and local citizen collectives, uncertainty about the risks and the impact of the proposed operations informed the discourse about fracking, with civil protests at the regional level starting in December 2010 in the Larzac area, situated between the departments of Aveyron and Hérault, whereas the first national mobilization was organized in February 2011 in Valence (Terral, 2012: 189). As a logical consequence, media reports first focused on Larzac, which was also an area characterized by a longstanding protest history and an established protest infrastructure, as well as the stronghold of one of France's leading 'green' political activists, José Bové. As we will see in the next paragraphs, and contrarily to the German case, it was precisely this long-term acquaintance with political activism in the region that helped the French mobilization spread rapidly. The French mobilization has been investigated from several perspectives.[23] It was understood as a movement "[o]n behalf of environmental protection" (Terral, 2012) for soil, water, and the underground. The movement spread quickly via local networks and regional media [see also French paper, this issue].

After an early phase of political disorientation, politicians from the major French parties quickly took sides with the protestors, seizing the precious opportunity to win over voters for the upcoming departmental (in 2011) and presidential (in 2012) elections. In the wake of the approval of the Jacob Law (see 1.1), shale gas proponents argued its implementation had been rushed, and accused anti-shale activists to have based their stance on 'emotions' and 'fear,' rather than on 'sound scientific evidence.'[24] From their side, the shale gas opponents considered the Jacob Law a door left ajar to the shale gas industry, so its passing could not end the local protests. In this period, both anti-shale gas collectives and pro-fracking actors established their knowledge bases on shale gas and fracking, which would function as argumentative reservoirs for their discursive strategies. While shale gas opponents mostly used websites,[25] social media, and protests as their communication channels, pro-fracking actors (such as Total's CEO, Christophe de Margerie, and the former Deputy Minister of Industry, Christian Estrosi, from the center-right UMP) shared their opinions in the national media.[26]

Shale gas opponents mostly focused on ecological and decision-making issues both at the local and global scales, including shale gas within broader narratives of energy transition and the future of the planet. Shale gas proponents addressed this resource mainly through economic-oriented narratives, such as benefits that would accrue to the nation's balance of payments; France's improved position as an economic power within Europe thanks to its possible energy exports; the betterment of the country's national technological standing; and the creation of jobs.

#### 4.1.2. Constructing the promise: "the revitalization of the French gas industry"

Since the shale gas controversy began in 2010, by the time the EIA estimates of 2011 were published the discursive grounds for the formulation of a 'national' shale gas promise had already been weakened.

[21] Nexis® and Factiva® are international research databases that make public documents such as press articles accessible.

[22] Fracking would have been mentioned in the *exploitation* licenses, had these materialized, but was not supposed to appear in exploration licenses.

[23] Besides Terral (2012), see also: Francis Chateauraynaud and Josquin Debaz, "L'affaire des gaz de schiste. Anatomie d'une mobilisation fulgurante." *Socio-informatique et argumentation* blog. https://goo.gl/dSnnpH (accessed 12 September 2018).

[24] A book authored by Philippe Charlez et Pascal Baylocq (2014) in the wake of the mobilization is exemplary in showing the technically-oriented and a-sociological mindset at the basis of the evaluation of protesters' claims. See also: Ludovic Dupin, "Gaz de schiste : 'On ne peut pas bâtir une civilisation sur la peur', selon Bernard Tardieu," *L'Usine Nouvelle*, 11 February 2015. https://goo.gl/NHY53e (accessed 12 September 2018).

[25] E.g., Collectif 07 Stop au gaz de schiste website, "Gaz de schiste et hydrocarbures non-conventionnels : une aberration économique, sanitaire et environnementale." https://goo.gl/6hLzTj (accessed 12 September 2018).

[26] Marie-Béatrice Baudet, Denis Cosnard and Pierre Le Hir, "Christophe de Margerie : 'Le changement climatique, c'est sérieux'," *Le Monde Planète*, 11 January 2013. https://goo.gl/YSvcdY (accessed 12 September 2018); AFP, "Gaz de schiste: Estrosi veut une enquête," *Le Figaro*, 14 September 2012. https://goo.gl/mmnGyY (accessed 12 September 2018).

Shale gas was not even included in the energy transition or climate protection program launched in 2012.[27] Therefore, rather than starting as a consequence of promise-building, the discourse on fracking began by focusing on environmental risks and negative impacts. However, at a later stage, shale gas proponents started building a promise to revitalize the French gas industry through this new resource. A fundamental process in this strategy was the accumulation of reports and prognoses.

Due to the clash of controversial opinions and lack of adequate geological and technical knowledge on these two issues, the Jacob Law planned for the institution of a commission that would investigate and evaluate exploration and exploitation techniques for liquid and gaseous hydrocarbons. Shortly after, the government also announced it would install additional research panels to explore alternatives to fracking. The first study to be commissioned was the National Assembly's 2011 report by deputies François-Michel Gonnot (UMP, center-right) and Philippe Martin (PS, center-left) on shale gas and oil (Gonnot and Martin, 2011). In 2012, an additional report was released, collaboratively produced by the General Council of Economy, Industry, Energy, and Technology, and the General Council of Environment and Sustainable Development (CGIET-CGEDD, 2012). Especially this second reportwas perceived as favorable to exploring shale gas. In 2013, the Parliamentary Office for Scientific and Technological Assessment (Lenoir and Bataille, 2013) also conducted a feasibility study, which specifically investigated alternatives to hydraulic fracturing. The reports mainly gathered expert opinions from the industry, the sciences, and politics; set up timelines for future measures; and looked at the situation of shale gas exploration in foreign countries. Apart from the 2011 report by Gonnot and Martin, which required two different conclusions stemming from the divergence of its authors' opinions vis-à-vis fracking, they all concluded in favor of research on shale gas in France.

With the reports published, policymakers would no longer ignore the economic potential of shale gas for France. The reports' pro-research stance, together with the impact of the US shale gas boom on global fuel prices and on US economy, and 'technological activism' on the part of French manufacturers like Interel, engaging with alternative technologies to hydraulic fracturing, constituted the pillars on which oil and gas companies such as Total and GDF Suez, but also technological providers such as Schlumberger, Vallourec, and Technip, constructed their promise. The aim of this 'pro-exploration coalition' (Chailleux, 2016: 286) was to frame extraction technology as controllable, and economic benefits as crucial for the French economy. To support this purpose Total, for example, invested in shale gas exploration and exploitation in other countries, and reported these efforts in press releases (Baudrin et al., 2014: 13).

Aside from the reports, one notable event was the publication of a study by the consulting firm SIA Conseil in 2012.[28] One of the firm's customers was GDF Suez, the French energy company that partnered with the US-American Schuepbach LLC for two exploration permits in southern France.[29] The study concluded that shale gas would create 100,000 new jobs in France. SIA Conseil had also created a website named 'Gas in Focus,'[30] for which it collaborated with GRTgaz, a company associated with GDF Suez.[31] A second noteworthy example is the publication of dossiers defending the industry's standpoint towards shale gas; first in 2012 (Baudrin et al., 2014: 14),[32] and then in 2013.[33] Their aim was to change the inertia of the French government in the shale gas question by delivering solid economic arguments for the exploration of shale gas. These documents formulated the promise of a revitalization of the French gas industry, focusing on an economic upswing with shale gas 'made in France' and emphasizing the technological prowess of France as a manufacturing location.[34] Other aspects were the reinforcement of the competitiveness compared to other countries in the EU and, here too, the prospect of numerous jobs in the revived gas industry in France. Even in the media, the promise was discussed and framed to come across as a duty to explore shale gas in France: In 2012 for example, *Le Figaro* asked: "Should France exploit its shale gas reserves?"[35]; and *La Tribune* exhorted to do exactly that: "Shale gas: let's explore our reserves!"[36] In the construction and communication of this promise, ecological concerns were silenced by taking for granted that the technology would be controllable.

In addition to round tables, exchange forums, and conferences designed for economic actors and scientific experts,[37] individual voices from the extractive industry and politicians spoke in favor of shale gas. They emphasized the economic benefits of shale gas exploration, like the CEO of GDF Suez, Gérard Mestrallet, who argued that focusing on renewables would harm the competitiveness of France.[38] Among the politicians, a debate began between the Minister of Environment, Delphine Batho, and the Minister of Productive Recovery, Arnaud Montebourg, both from PS. While Batho reconfirmed the ban of hydraulic fracturing, Montebourg's staff was in touch with the Association of Drillers and Oil Professionals, an organization that had been lobbying against the Jacob Law since 2011. In his 2012 campaign, then-President Nicolas Sarkozy of the UMP also shifted his position regarding fracking: overturning his party's initial oppositional stance, he argued that fracking would be admitted for exploration and exploitation when using technologies that respect the environment.[39]

Overall, while environmental concerns were discussed in the media, the doubts they generated were never entirely dissipated or confirmed due to the lack of thorough exploratory activity on French soil.[40] At the

[27] Service d'information du Gouvernement, 2017. La transition énergétique pour la croissance verte. https://goo.gl/532spB (accessed 12 September2018).

[28] SIA Partners Energies & Environnement, 2012. Gaz de schiste : le débat n'est pas enterré. https://goo.gl/mY5t8R (accessed 7 July 2018); SIA Partners Energies & Environnement, 2012. Les Gaz Non Conventionnels : un potentiel d'emplois évalué à 100 000 en France d'ici 2020. https://goo.gl/5H3VEi (accessed 7 July 2018).

[29] Sylvain Lapoix, "Les emplois au pifomètre du gaz de schiste," *OWNI.fr*, 8 October 2012, https://goo.gl/USJGz5 (accessed 7 July 2018).

[30] GRTgaz and SIA Partners, 2013. Gas in Focus: L'Observatoire du gaz de GRTgaz et Sia Partners. https://goo.gl/Buxd9G (accessed 12 September2018).

[31] Astrid Gouzik, "100 000 emplois pourraient être créés grâce au gaz de schiste," *L'Usine Nouvelle. L'Usine de l'Energie*, 14 September 2012, https://goo.gl/AJMXWn (accessed 12 September 2018).

[32] L'Usine de l'Energie, 2012. "Gaz de schiste, le point de vue de l'industrie," *L'Usine Nouvelle*. https://goo.gl/6geamd (accessed 12 September2018).

[33] Derek Perrotte, "Patronat et syndicats pour la recherche sur le gaz de schiste," *Les Echos*, 29 May 2013, https://goo.gl/3nDcJd (accessed 6 July 2018); Céline Boff, "Les syndicats tous unis pour défendre les gaz de schiste", *20minutes.fr*, 29 May 2013, https://goo.gl/P3vRSt (accessed 12 September 2018).

[34] Jean-Michel Bezat, "L'industrie pétrolière défend les vertus d'une production 'made in France'," *Le Monde*, 1 February 2012. https://goo.gl/EFBf58 (accessed 12 September 2018).

[35] Académie des Technologies, "La France doit-elle exploiter ses réserves de gaz de schiste?," *Le Figaro*, 18 February 2012, https://goo.gl/R25ecQ (accessed 12 September 2018).

[36] Michel Rousseau, "Gaz de schiste : explorons nos réserves !," *La Tribune*, 14 September 2012, https://goo.gl/CjMReM (accessed 12 September 2018).

[37] E.g., RTL, 2012. Conférence environnementale : mais au fait, c'est quoi le gaz de schiste? https://goo.gl/Qc4gDH (accessed 6 July 2018); Institut de France, Académie des sciences, 2013. Conférence débat : "Les Gaz de Schiste". https://goo.gl/fNdefz (accessed 12 September 2018) and the videos from the conference: https://goo.gl/YAnPmi (accessed 12 September 2018).

[38] Jean-Michel Bezat, "Gérard Mestrallet : 'Privilégier les énergies renouvelables pénaliserait notre compétitivité.'," *Le Monde*, 6 February 202, https://goo.gl/F771yr (accessed 12 September 2018).

[39] Marie-Béatrice Baudet et al., "Ecologie : radicalisme de Mélenchon, paradoxes de Hollande et Sarkozy," *Le Monde*, 7 April 2012, https://goo.gl/7sZf1H (accessed 12 September 2018).

[40] Académie des Technologies, "Peut-on extraire cette ressource proprement?," *Le Figaro*, 8 February 2012. https://goo.gl/JyNCPi (accessed 12

same time, macroeconomic conditions related to stable and low oil and gas prices made it economically doubtful to invest in innovative extraction technologies when foreign oil and gas were available. This also slowed down the search for an eco-friendly alternative to fracking. The change of government in mid-2017, which brought the proactive ecologist Nicolas Hulot to the leadership of the Ministry of Ecological and Solidary Transition, seemed to sound the death knell for fracking in the country. In theory, all actors that could potentially be involved in shale gas exploration and exploitation are still active in the French energy sector. In practice, however, the continued validity of the Jacob Law, and the promulgation of the Hulot Law in late 2017, planning to end hydrocarbon production on French soil by 2040, will likely oblige the pro-shale coalition to keep a low profile, and that notwithstanding Hulot's resignation in September 2018.[41] In conclusion, political strategies and electoral events, rather than risk expertise, seemed to be the main drivers for stopping shale gas exploration in France.

### 4.2. Germany

#### 4.2.1. Public debate and political regulation

In Germany, the controversy on fracking emerged in late 2010, when it became known that companies such as ExxonMobil, Wintershall, BNK Petroleum, and 3Legs Resources were planning to drill several wells to explore for shale gas reservoirs, especially in Lower Saxony and North Rhine-Westphalia.[42] In a short time, numerous citizen initiatives were formed, which stressed the many uncertainties surrounding fracking, and argued that this fundamentally new (for the local context and geological target)[43] method of extraction should be banned before serious damage occurred. In addition, members of the Social Democratic Party of Germany (SPD) called for a postponement of drilling in the sense of a moratorium, arguing the technology would need further research and evaluation before it could be applied regularly.[44] The main perceived risks associated with the technology were the contamination of groundwater through the injection of chemicals, earthquakes caused by drillings, and the damage to the landscape (Schirrmeister, 2014). Moreover, the technology was discussed with reference to the energy transition. In this context, for example, the German Advisory Council on the Environment (*Sachverständigenrat für Umweltfragen*, SRU) emphasized that shale gas extraction at a commercial scale could not make a decisive contribution to the government's energy transition policy of promoting RES (SRU, 2013: 21p.).

At the end of 2011, these criticisms and widespread episodes of social resistance prompted the regional government of North Rhine-Westphalia to refrain from issuing additional exploration permits, to exclude major risks. Since then, no more drilling permissions involving fracking have been issued in Germany (Zittel, 2016: 114). However, the pace of the mobilization was slower than in the French case: besides the mentioned significant record of political activism in the French Larzac, an additional factor was the argumentative power of shale gas as a possible replacement for coal, which applied to the German case but not the French one, as we will show. Moreover, until 2016 Germany has had no regulatory framework specifically addressing fracking.

In June 2016, after five years of discussion, the Government passed a bill that imposed strict regulations on the use of fracking, but did not entirely ban the technology (Tosun and Lang, 2016). Even though the bill prohibits shale gas production in the near future, fracking for tight gas and tight oil (which, like shale gas and oil, are usually classified as unconventional resources), as well as for geothermal energy production, is still allowed if nature and water protection areas are not targeted. Moreover, pursuing European regulations, any future use of fracking will require an obligatory Environmental Impact Assessment, a practice that was previously only mandatory for drillings with gas production rates exceeding 500,000 cubic meters per day. Finally, in total four test drillings can be conducted for scientific purposes. This regulatory framework came into force in February 2017 and is to be evaluated in 2021 (a more detailed discussion of this framework can be found in Fleming, 2017).

#### 4.2.2. Constructing the promise: "Fracking as a (possible) bridge to RES"

Despite the mainly negative public opinion about shale gas and fracking, the public debate was also triggered by the promise of shale gas serving as a bridge energy for the planned transition to RES. Hence, one of the discursive strategies adopted by advocates consisted in emphasizing the ecological quality of natural gas, claiming that this energy source would have a more favorable carbon footprint than other fossil fuels like brown coal, of which Germany is EU's largest consumer.[45] "[...] [A]mong the fossil energy sources natural gas is by far the cleanest. [...] For [gas-powered] power plants, $CO_2$ emissions per kW/h are lower than for coal-powered ones. They are a half. Replacing heating oil, petrol or diesel with natural gas will save a quarter of greenhouse gas emissions."[46] Against the background of climate change, shale gas was regarded as a particularly environmentally friendly energy source that would also offer a possibility to compensate for the expected decline in domestic conventional gas reserves in the near future (BGR, 2012).

This promise was connected to two arguments as a discursive strategy to gain credibility. The first argument concerned the need for shale gas production. Here, representatives from the oil and gas industry,[47] as well as geoscience institutions—the Federal Institute for Geosciences and Natural Resources (BGR), and the German Research Center for Geosciences—stressed that RES in the current state of technology could not fully cover the country's electricity needs. In particular, geological institutions firmly established their speaker positions by leveraging on their reputation, which legitimized their opinions in the public eye. Together with oil and gas representatives, they claimed that a bridging fuel was necessary to compensate the low energy production rates from RES.[48] The second element of the proponents' discursive strategy referred to the safety of shale gas production. In this context, representatives from the industry, such as ExxonMobil, were the main speakers: they pointed to the many years of experience in the application of the technology. Their argument was that fracking had

*(footnote continued)*
September 2018).

[41] Sénat, 2017. Projet de loi mettant fin à la recherche ainsi qu'à l'exploitation des hydrocarbures conventionnels et non conventionnels et portant diverses dispositions relatives à l'énergie et à l'environnement – scrutins, https://goo.gl/131sV5 (accessed 12 September 2018); Secrétariat général du gouvernement, 2018. LOI n° 2017-1839 du 30 décembre 2017 mettant fin à la recherche ainsi qu'à l'exploitation des hydrocarbures et portant diverses dispositions relatives à l'énergie et à l'environnement (1), https://goo.gl/S1LXGK (accessed 12 September 2018).

[42] Cf. Christian Tenbrock, "Ran an das Gas; Sitzt Deutschland auf einem Rohstoff-Schatz? ExxonMobil bohrt, Umwetschützer protestieren," *Die Zeit*, 03 March 2011. https://goo.gl/Qv9y5w (accessed 12 September 2018).

[43] Even though the fracking technology itself had been applied for many years, it was considered new in that its use for shale gas exploration is accompanied by an increased number of wells and a significantly increased use of water (SRU, 2013).

[44] Deutscher Bundestag, 2011 Drucksache 17/7612. Leitlinien für Transparenz und Umweltverträglichkeit bei der Förderung von unkonventionellem Erdgas. https://goo.gl/ZFkcGi (accessed 12 September 2018).

[45] Euracoal website - Euracoal Statistics - Coal and lignite production and imports in Europe. https://goo.gl/Wj3aR8 (accessed 12 September 2018).

[46] Dirk Asendorpf, "Der Brennstoff im Gestein, "*Die Zeit* 34/2010. https://goo.gl/4ipuoL (accessed 12 September 2018). The quote is an own translation from German.

[47] In addition to oil and gas companies there are representatives from business-related associations such as the Trade Association for the Extraction of Crude Oil and Natural Gas (*Wirtschaftsverband Erdöl und Erdgasgewinnung e.V.*, own translation).

[48] Asendorpf, "Der Brennstoff im Gestein."

been used on many occasions since the early 1960s, without causing any environmental damage in about 50 years of application.[49] In consequence, one could assume the technology was well-known, and potential risks manageable. This reference to practical knowledge was also used to refute the frequently expressed criticisms that fracking would cause risks for health and the environment, and to create an image of technical reliability and security.

The promise that the production of shale gas could make an important contribution by supporting the energy transition and guaranteeing energy supply was also confirmed by geological estimates concerning Germany's shale gas potential. In a report from 2012, the BGR (2012: 30) came to the conclusion that the technically recoverable quantities of shale gas (which were expected to be between 0.7 and 2.3 Tcm) clearly exceeded the conventional reserves still available (estimated at 0.146 Tcm). However, as the technology was still at an experimental state, the BGR stressed that the actual amount of technically recoverably shale gas reserves was not yet known and could only be assessed through further research. In addition, a research consortium commissioned by ExxonMobil for a risk study on fracking pointed out that shale gas production could benefit the local economy. In particular, this was because local communities would benefit from tax revenues companies would have to pay for their exploration activities (Ewen et al., 2012: 26). In this context, Philipp Rösler, the then Minister of Economics and a member of the business-oriented Free Democartic Party, pointed out to the opportunities of technology to create new jobs.[50]

Especially ExxonMobil sought to make this promise credible through a shrewd communication strategy. Positioning itself not as an omniscient authority, but as a reliable partner who responded to the concerns of critics and residents, the company launched an expert panel on fracking (*InfoDialog Fracking*), which began in April 2011 and ended one year later with the publication of a report. Led by experts from industry and science, it also involved representatives of the public. In this way, different stakeholders from local citizens to representatives of social interest groups could bring their own perspectives and questions, and also comment on the questions asked and the methodology used. The Hydrofracking Risk Assessment (*Risikostudie Fracking*) (Ewen et al., 2012), published as the result of this dialogue, is commonly regarded as the first assessment of the ecological and toxicological risks potentially associated with the technology (Zittel, 2016). The study concluded that there was no factual justification for a general ban on fracking technology. However, due to potential risks of the technology, it recommended further research on risk evaluation and careful testing through exploratory drilling (Ewen et al., 2012: 57).

To summarize: when the controversy on hydraulic fracturing in Germany took off between 2010 and 2013, the promise that shale gas and fracking would contribute to that targeted energy transition was a major driver of the discussion, and led to an intense social debate on the ecological quality of this technology. Climate change served as a global reference point, and it was argued it should be addressed through technical solutions (natural gas as a climate-friendly energy carrier). In addition to this reference to technical handling, ecological quality was linked to balances and calculations ($CO_2$ balance) and to the concept of efficiency (reducing greenhouse gas emissions).

This promise was formulated by a variety of actors—representatives from the oil and gas industry (notably ExxonMobil), governmental authorities and geoscience institutions (the BGR and the Research Center for Geosciences)—using a set of arguments that can be regarded as discursive strategies to create an image of an environmentally sound and equally safe technology. Moreover, the promise was based on resource estimates that suggested further shale gas exploration activities were necessary and would be profitable. In addition, strategies of expert communication were applied to gain credibility. Finally, by formulating and presenting this promise in this way, expectations were created that made shale gas appear to be an important pillar of the transformative energy policy envisaged in Germany. Nevertheless, at a later stage risk evaluation data presented by core scientific expert groups, and widely reported in mass media, has contributed to slow down and finally stop shale gas exploration so far.

### 4.3. Poland

#### 4.3.1. Public debate and political regulation

Over the last few years, Poland has been a prominent actor in the European shale gas narratives, partly because early estimates, as mentioned in the introduction to this paper, assigned it the largest shale gas resources in Europe. The interest Poland sparked crucially depended on the significance of the investments deployed in the country by international companies to date.[51] The historical contingency was extremely favorable to the legitimization of alternative fuels when early estimates of shale gas recoverable resources were made public in 2009.[52] These ranged from an initial 1.4 Tcm provided by the consultancy Wood McKenzie in 2009, to the EIA's 5.3 Tcm in 2011.[53] In 2012, these estimates by foreign institutes competed with those, much less optimistic, from the Polish Geological Institute (PGI): whose namely, 346–768 Bcm (PGI, 2012: 5). While these conflicting knowledge claims were discussed in scientific arenas (cf. McGlade et al., 2013; Kiersnowski and Dyrka, 2013), even the reserves from the PGI scenario were supposed to provide Poland with enough energy for 35–65 years at the rate of consumption of the time. Nevertheless, it was mainly the early estimates that were taken as the reference in political discussions and the media. Poland was no new to fracking. While early tests employing this technique had been performed in the 1960s in conventional reservoirs, the first test wells for non-conventional resources were drilled in the northern region of Pomerania in 2010. In the administration circles, it was hoped that subsequent tests would ensure Poland's energy autonomy, while also increasing state revenues.

Recent sociological studies have revealed that 'economic opportunity' and 'national security' were the most common interpretative frameworks in the Polish media discourse on shale gas until mid-2013, with the latter predominating (Lis and Stankiewicz, 2017). Opinion polls conducted in Poland (Stasik and Stankiewicz, 2014) showed that citizens considered themselves relatively well informed about the process of shale gas production, and that they tended to see shale gas projects positively. A survey carried out by the Public Opinion Research Centre in September 2011 indicated that 73% of Polish respondents were in favor of shale gas exploration.[54] Agata Stasik and Piotr Stankiewicz (2014) showed this share had risen to slightly less than 80% in 2014, and pointed out that these results were partly due to a positive attitude towards shale gas production found in media reports.

Hydraulic fracturing was first addressed there in January 2010. The leading Polish dailies *Gazeta Wyborcza*, *Rzeczpospolita*, and *Dziennik Gazeta Prawna* highlighted the potential of shale gas reserves that could satisfy the Polish energy demand for the next 100–200 years. Until 2012, the publication rate on shale gas-related topics grew

[49] ExxonMobil website – Fracking in Deutschland. https://goo.gl/yau4wg (accessed 12 September 2018).

[50] Claudia Ehrenstein, "Fracking ist auch für Deutschland eine Großchance," *Welt Online*, 14 February 2013. https://goo.gl/xTCpDJ (accessed 12 September 2018).

[51] Among others, internationally known companies such as ExxonMobile, Chevron, 3Legs Resources and

[52] Other estimates in 2009 were conducted by Advanced Resources Int (3 Tcm) and Rystad Energy (1 Tcm).

[53] EIA delegated the task of estimating to the private consultancy firm, Advanced Resources International (ARI).

[54] "Sondaż: Polacy chcą gazu z łupków," *Polska Newsweek*, 27 September 2011.

significantly, and scenarios evoking a Polish gas revolution, a gas *eldorado*, a 'new Norway' or 'the next Qatar' were aired in public arenas (Wagner, 2014). After a 'euphoric phase' during 2010–2012, when shale gas was considered a valuable, geopolitically beneficial resource providing a prosperous future, the rate of articles significantly dropped in 2013. In the face of increasing geological, legislative, and economic difficulties, and results below expectations, exploratory activities increasingly slowed down from 2013, and most foreign companies started withdrawing from the shale gas business concomitantly. Consequently, articles in 2013 focused more frequently on possible improvements of extracting technologies,[55] on missing legislative and administrative regulation,[56] and evaluated economic advantages of shale gas extraction, while at the same time commenting that fewer efforts were made by politicians and companies to overcome difficulties and to create new incentives for foreign companies.[57] Nevertheless, it is significant to mention that even in this later, more problematic phase of shale gas testing, the information acquired through foreign expertise and Polish companies' own drilling experiences were seen as useful in the event of a future revival of the interest in shale gas and for a better understanding of geological conditions and environmental impacts.[58]

*4.3.2. Constructing the promise: "Fracking as the key to energy security"*

Shale gas exploration has been accompanied by many hopes and expectations of an economic upturn in Poland. Already in 2005, the Ministry of Environment forwarded a map of planned hydrocarbon exploration and production concession areas in Poland to the European Commission (INSPRO, 2013: 25), which was published in the Official Journal of the European Union in 2006.[59] In 2010 Prime Minister Donald Tusk announced that the revenues obtained from shale gas production would be used to create a pension fund and to protect the environment.[60] This discursive strategy of promoting economic growth and social welfare presented a prosperous outlook for Polish citizens, and was buttressed by resource estimates and media-generated narratives such as the Polish gas *eldorado*. Furthermore, the former Minister of the Treasury, Mikołaj Budzanowski, fostered the government's shale gas program by announcing in 2011 that the government's objective was to launch shale gas production by 2014.[61] To achieve this, the Treasury had prepared a plan to maximize drilling by the state-controlled company, PGNiG, and Polish share company, PKN Orlen.[62]

Moreover, the following elements were used by national policymakers and consultants alike to further contribute to making shale gas exploration and the application of fracking credible: the growing importance of natural gas in Europe and the EU's climate and energy plan (formulated in 2007, this also including the so-called 'three 20 targets'); geopolitical considerations regarding the achievement of greater energy autonomy from Gazprom and, more generally, from Russia; Poland's long history in the extraction of fossil fuels (especially coal) together with the weakness of its environmental movement after 1989, and the reliance on American technological prestige in the oil and gas industry.[63] As in the previous two cases, think tanks played a critical role as legitimized speakers as well, by supporting the government's proactive agenda through a number of publications. Prestigious Polish think tanks such as the Kosciuszko Institute (Albrycht, 2011; Albrycht et al., 2011, 2012) and the Sobieski Institute (Zawisza, 2012) fostered a view of likely beneficial outcomes from the extraction of shale gas through their analyses.

While politically problematizing energy infrastructures such as the Nord Stream gas pipeline, carrying gas from Russia to Germany, and the resulting disadvantages for Poland, the exploration of shale gas was propagandized as an 'autonomy boost' on the national level.[64] Moreover, with the commercial production of unconventional gas, the Polish government hoped to diversify the country's energy mix while respecting European climate regulations. In the programs of the two main parties—the liberal conservative Civic Platform (PO), and the nationalist Law and Justice (PiS)—shale gas production was construed as an opportunity for creating new jobs and for developing national extractive economy. This interpretation enjoyed support regardless of political opinions (Potarzycka, 2012: 94). Shale gas production did not only become one of the main topics of the parliamentary election campaign in 2011, but it was also a crucial issue in the wake of elections, when Prime Minister Tusk (from PO) spoke directly about shale gas as "our dreams of wealth flowing from the land," which he would like to change into "a hard, precise reality" (Potarzycka, 2012: 95-96).[65]

As Agata Potarzycka points out, to understand the reasons for the popularity of extracting shale gas in Poland, it is necessary to consider the particular image of the United States in the eyes of the Polish society as a discursively shaped vision of a "better world" (ibid., 92). The profits from shale gas were promised to be sufficient to build a "land of happiness" in Poland, not only for the pension fund mentioned in the party program, but also to support the development of municipalities and environmental protection (ibid., 95). In addition, as mentioned earlier, the historical tensions characterizing Polish-Russian relations favored the promise of shale gas production as a possible vehicle to become less dependent on Russia. These knowledge policies made the exploration and exploitation of shale gas politically more credible.

However, making this promise credible turned out to be harder than

[55] Tomasz Furman, "Firmy potrzebują nowych technologii łupkowych," *Rzeczpospolita*, 04 January 2013; Andrzej Kublik, "Zaczął się konkurs na dofinansowanie polskich technologii łupków," *Gazeta Wyborcza*, 25 September 2012.

[56] Tomasz Barańczyk, "Gaz łupkowy rozsądnie uregulowany," *Rzeczpospolita*, 06 March 2013; Michał Duszczyk, "Pomoże w wierceniach i pierwszy zarobi na łupkach," *Dziennik Gazeta Prawna*, 07 March 2013.

[57] Karolina Baca "Gaz łupkowy w naszym kraju dopiero od 2018 roku?," *Rzeczpospolita*, 10 April 2013; Karolina Baca-Pogorzelska, "Gaz łupkowy jest bezpieczny," *Rzeczpospolita*, 11 April 2013; Michał Duszczyk, "Gaz łupkowy: Uruchomienie wydobycia gazu z łupków ożywi rynek," *Dziennik Gazeta Prawna*, 29 April 2013; Andrzej Kublik, "Przedwczesne wieści o śmierci łupków w Polsce," *Gazeta Wyborcza*, 10 May 2013.

[58] cf. Foltyn, C., 2017. Politiken des (Nicht-)Wissens am Beispiel der Schiefergasförderung in Polen. Eine wissenssoziologische Diskursanalyse. Master thesis, Fachbereich Verhaltens- und Sozialwissenschaften Institut für Soziologie. Friedrich-Schiller-University Jena. Unpublished.

[59] Official Journal of the European Union, Communication from the Government of the Republic of Poland concerning Directive 94/22/EC of the European Parliament and of the Council of 30 May 1994 on the conditions for granting and using authorisations for the prospection, exploration and production of hydrocarbons and the competent authorities specified pursuant to Article 10 of Directive 94/22/EC (2006/C 98/07), C 98/22, 26 April 2006. https://goo.gl/U8YKzn (accessed 12 September 2018).

[60] Maryna Kruk, "Polish Shale Gas Flares," *The Wall Street Journal*, 19 September 2011.

[61] The Ministry of the Treasury, the Ministry of the Environment and the Ministry of Foreign Affairs were most involved in the implementation of the government's shale gas program (Rutkowski, 2013: 4).

[62] Mikołaj Budzanowski interviewed in: Grzegorz Osiecki, "Polska 2014: gaz, gaz i jeszcze raz gaz," *Dziennik Gazeta Prawna*, 2 November 2011 (accessed 12 September 2018).

[63] According to the reconstruction of Christopher Rootes (1997: 335), while an independent and pluralistic environmental movement emerged in Poland in the 1980s, "It was not an active participant in the new, post-communist political institutions."

[64] As Johnson et al. (2013: 396) point out, energy security in Poland plays a special role, also in the sense of geopolitical vulnerability: "Energy police discourse in Poland exhibits a high degree of 'securitization,' meaning that the topic of energy is often framed in terms of national security and an existential threat (...)."

[65] Original quotes by Donald Tusk can be found here: "Exposé Tuska - pełny tekst," Wprost.pl website. https://goo.gl/27pAxL (accessed 12 September 2018).

the government expected. In the country's southeast, disagreement manifested between local populations in the area of Żurawlów (in the region of Lublin) and the American company, Chevron (Author 1 et al., 2018). The latter's replies when confronted with citizens' concerns about fracking and shale gas developments, together with the company's patronizing attitude and its negative record in safeguarding the environment, ultimately destroyed the company's credibility and the shale gas promise altogether—in an environment where locals admitted they would not have rejected shale gas operations a priori (Author 1 et al., 2018).[66] Additional protests also occurred in the norther region of Pomerania.

After the first drilling tests and unsatisfactory results, brokers of a prosperous future in Poland advocated more exploration activities and legal facilitation for the investing companies. Especially in 2013, a discursive strategy centering on the need for 'more drillings' or 'as many drillings as in the USA' was predominant, although the comparison of such different states was questionable. Nevertheless, the success in America served as a reference model. Concerning legal facilitation, from March 2014 on, the Polish government adopted changes in the Geological and Mining Law and on the Special Hydrocarbon Tax to amend the process of shale gas exploration and to attract foreign entrepreneurs to further invest in Poland.[67] Furthermore, a state institution called NOKE (the National Operator of the Energy Fossils), based on a European model in Norway, was not established after the oil and gas industry–represented by the Polish Exploration and Production Industry Organization (OPPPW)–and think tanks such as the Kosciuszko Institute had raised strong criticism against it.

Ultimately, considerations regarding the difficulty in applying American fracking techniques to Polish geology, together with a drop in the prices of gas from 2013 and oil from mid-2014, and lengthiness in devising and passing the new legislative measures, was fatal to the country's fledgling shale gas industry. However, drilling activities to date have not been considered unsuccessful investments, but a 'valuable experience.' In other words, the knowledge inventory collected by Polish companies and geological institutions is now more complete, or less deficient, than in countries with no or only a few drillings, such as France or Germany. On this basis, Polish geoscientists and administrators still consider themselves as forerunners in the European context, and are trying to improve the legal and economic environment for new investments.[68]

Fracking as an exploitation technique is still considered as adaptable to Polish geological conditions. Therefore, drilling companies are continuing exchanges with American technological experts. Especially PGNiG intends to continue its long-term investment policy in the exploration and production sector, though no longer specifically targeting shale gas. The company's aim is to employ fracking to explore for new hydrocarbon resources and maintain current levels of gas and oil production.[69] While, in the current state, shale gas drilling activities are dormant, the Polish 'American Dream' seems still to represent a possible future for politicians and the general public. However, so far the mentioned deceptive results with respect to gas extraction, together with the disappointment of investors and administrative obstacles seem to be the dominant elements in the unfulfillment of Polish shale gas high hopes.

## 5. Conclusions

By drawing on a hybrid theoretical framework joining SKAD and the regime of TSP in this paper, we have conducted an analysis of the formulation and legitimization of the shale gas/fracking promise in three EU countries. We have focused on discursive practices and strategies, as well as on politics of knowledge, to explore the social construction of technological future visions. Our study, conducted at the level of institutions, organizations, and (collective) social actors, and through an examination of both the grey literature and the press, has identified and discussed cross-national commonalities and differences in the modes of discursive promise building (Table 1).

While we could find common discursive strategies in the promotion of fracking in our three cases, such as the stress on economic benefits deriving from shale gas, shale gas as an intermediate ecological solution, or as a tool to improve energy security, each of these elements was inflected according to context-specific, pre-existing discourses. In other words: building up on some common arguments, the framing of promises in each country was shaped by or adapted to established national discursive arenas, contexts and structuration.[70] In France, shale gas exploration through fracking was initially problematized as an ecologically critical topic, characterized by a lack of public transparency. This provoked a vast anti-fracking mobilization, and the early alignment of the main political parties on a rejection stance in the name of the precautionary principle and/or political opportunism. Partial legitimization of fracking could only occur when the protest calmed down in the wake of the Jacob Law. The reorganization of the pro-shale coalition, bolstered by official technical reports by influential 'speakers,' revived the focus on the benefits that French economy and its oil and gas industry could draw from development and research in fracking and from the extraction of national gas. However, this late reawakening was again contained by the anti-fossil-fuel political course taken by the new government, in particular by its Minister of Ecology. This outcome was also favored by France's specific energy context, in which low greenhouse-gas-emitting electricity sources were already largely majoritarian with respect to fossil fuels: consequently, it became hard to frame shale gas as a bridge fuel.

In contrast, shale gas and fracking could initially be legitimized in Germany by means of an ecological argument that suited the German context well, since the targeted energy transition is not yet completed, and oil and gas still take a fair share of the energy mix. Shale gas was therefore presented as a bridge energy from solid fossil fuels to RES, and fracking as the technology to access the bridge. However, when placed against the background of the *Energiewende*, this argument could only have a certain leverage in combination with the promise to limit risks inherent to the extraction process. That was mainly achieved by industrial and academic experts, not only by producing official estimates and reports, but also by including stakeholders in dialogic procedures. Ultimately however, the argumentative interplay between advocates and opponents led to an idiosyncratic moratorium that bans shale gas exploration while authorizing, for example, the extraction of tight gas.

In Poland, finally, fracking was legitimized through the promises of energy autonomy from foreign sources, job creation, the use of environmental best practices, and no less importantly by the technology's successful application in the United States. The geopolitical argument was paramount, given the country's considerable dependency on Russian gas, and its related political significance. Legitimization was obtained both at the political and the societal level. Various estimates produced by authoritative geological institutions, as well as the significant involvement of the country's major political think tanks, and

[66] Author 1's interview with Barbara Siegienczuk, leader of the Occupy Chevron Movement. Grabowiec, Poland, 27 November 2017.

[67] Thus far, the Minister of Environment had to grant three separate permissions for prospecting, exploring for, and exploiting hydrocarbons. After introducing the Amending Bill, these three permissions were joined into one.

[68] According to the latest Supreme Audit Office report (NIK, 2017), the challenges at present are: to enforce better legal and administrative regulations; to recruit sufficient qualified personnel; and to create incentives for foreign companies so that shale gas exploration can be successfully restarted.

[69] "PGNiG porzuca gaz łupkowy, ale nie szczelinowanie hydrauliczne," *Biznes Alert*, 17 October 2016. https://goo.gl/SzcYtj (accessed 12 September 2018).

[70] See Author 5, 2014, for a general argument on cultural shaping of discourses.

**Table 1**
Summary of the main empirical elements of the three case studies.

| | France | Germany | Poland |
|---|---|---|---|
| **Dominant resource in power mix**[a] | nuclear (73%) | coal (43%) | coal (80%) |
| **Gas within TPES (gas in the power mix)**[b] | 16% (6%) | 23% (13%) | 15% (5%) |
| **Promises** | - technological: support of French oil and gas service industry<br>- geopolitical: increased autonomy from foreign sources<br>- strategic: compensation of declining domestic conventional gas production<br>- economic: improved balance of payments, job creation | - environmental: bridge energy to support transition<br>- safety: fracking as standard technology<br>- strategic: compensation for the declining conventional reservoirs<br>- economic: job creation, tax revenues for local communities | - geopolitical: increased autonomy from Russia<br>- environmental: reducing GHG emissions<br>- strategic: decreasing dependency on inefficient coal sector<br>- economic: revenues from possible exports; job creation; pensions fund |
| **Promise-shaping texts** | - EIA (2011)<br>- Gonnot and Martin (2011)<br>- CGIET-CGEDD (2012)<br>- Lenoir and Bataille (2013) | - EIA (2011)<br>- Ewen et al. (2012)<br>- BGR (2012) | - consultancy studies (e.g. Wood McKenzie (2009))<br>- EIA (2011)<br>- PGI (2012)<br>- think tanks' reports |
| **Supporters of shale gas/fracking** | oil and gas companies and service providers; consultancy cabinets working in R&D; a few policymakers in both the center-left government coalition, and the center-right opposition | national geological institutions; oil and gas companies; a few policy makers from the Free Democratic Party (FDP) | oil and gas companies; national geological institutions; consultancy cabinets; conservative and liberal-conservative think tanks; the large majority of the parliament; the public opinion |
| **Promise outcome** | promise contested and deactivated by alternative discurses; 2011 ban still holding | promise contested and ban implemented in 2016 | promise accepted but eroded (material failure) |

[a] Data (from 2016) from IEA website, 2017. France – Energy System Overview; Germany – Energy System Overview; Poland – Energy System Overview.
[b] Ibid.

both the media's and the parliament's quasi-unanimous support of shale gas, contributed to the promise's credibility (except in a few, localized cases). To date, Poland is the European country in which fracking has most largely been employed, although exploration activities are currently greatly reduced compared to the early 2010s.

In all three cases, the shale gas controversy was performative—promises mattered in terms of shaping reality and displaying power effects. They resulted in various legislative acts; in the reconfigurations of actors' positions, discursive strategies, and practices; and in the activation of processes of expert knowledge production. Promise-making itself can be considered a particular practice in politics of knowledge. As we have shown, establishing promises needs situated adaptations to established institutional and discursive contexts. Such an argument holds true for the processing of promises too. Here a different set of politics of knowledge comes into play: in France, knowledge politics focused on the transparency of decision-making and on local vs. national interests and power. In Germany, risk expertise–that is, risk vs. safety issues—became the dominant battling ground over shale gas exploration. In Poland, problems in the application of fracking to local geology, as well as the deceptive results obtained in early wells and administrative uncertainty led to the investors' general disappointment. In this case, the promise was not countered by questions of power or risk, but by the production of evidence-based knowledge during the process of implementation.

Therefore, the three cases present evidence about the close relation between two states of politics of knowledge: promise-making and the fulfillment of promises. Contrary to a view that might assume rather similar processes related to the generation of high hopes and to the subsequent, fast disillusionment with fracking in France, Germany and Poland, our comparative case study shows the complexity of 'shale tales' in these three countries. In all three cases, the controversy on shale gas is currently temporarily shut down, but as shown by Callon et al. (2011) in the case of nuclear waste in France, that does not mean it will remain closed forever. Changing economic, technological, political, and social conditions may at some point in the future lead to its reopening, to new discourse structures in novel configurations of actors, and ultimately to different outcomes.

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