

Energy technology, politics, and interpretative frames: shale gas fracking in Eastern Europe

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Energy technology, politics, and interpretative frames: Insights from shale gas fracking in Eastern Europe

1. Introduction

Shale gas has changed the energy industry. The primary technical driver behind the 'shale gas revolution' is a leap in technical innovation: hydraulic fracturing, or “fracking” for short coupled with horizontal drilling (Sovacool 2014c). This advancement in technology allows exploiting reserves trapped in deep-rock formations. Today, shale gas – both the largest source and a popular term for unconventional hydrocarbons – represents some 45 percent of total US gas output (EIA 2014).

Clearly, fracking technology is contested. It offers material benefits to the countries using the technology, in the shape of economic welfare, tax dollar income or security gains in an energy world that has turned more volatile. However, environmental harm may be caused by chemicals entailed in fracking fluids, methane migrating onto the surface, and the processing, storage or transport of contaminated flowback water (Gordalla, Ewers, and Frimmel 2013; Howarth, Santoro, and Ingraffea 2011; Myers 2012; Vengosh et al. 2014). For societies deciding whether to invest in the technology, fracking in essence amounts to a cost–benefit calculation (Jackson et al. 2014).

Besides the purely empirical dimension, there are important contextual factors that matter. Complex dynamics between societal groups, the characteristics of incumbent socio–technical systems and the consequent societal response all exert profound and complex influence over technological innovation, diffusion, and acceptance (Bijker and Law 1992; Coutard 1999; Hughes 1983; Hughes 1986; Misa 2003; Summerton 1994). In short, it is the context and framing that gives empirics their meaning.

Fracking has become subject to scholarly investigation from a range of disciplines. Most research from the energy studies field continues to emphasize technical and economic concerns, ignoring more surreptitious yet salient social, political, and cultural elements (Sovacool 2014a; Sovacool 2014b). A rapidly growing literature beyond the energy studies community particularly looks at public attitudes, social contestation and public discourse surrounding fracking (Boudet et al. 2014; Brasier et al. 2011; Brown et al. 2013; Cotton, Rattle, and Van Alstine 2014; Evensen, Clarke, and Stedman 2014; Hudgins and Poole 2014). However, these works so far remain centered on the US and Western Europe (particularly the UK).

Based on extensive field research and a set of 66 semi–structured interviews, it explores the 'interpretive flexibility' of fracking in Bulgaria, Poland, and Romania. These countries, as Central Eastern Europe (CEE) more generally, face the choice of embracing shale gas as a potential revolutionizing domestic source of energy (Goldthau 2013). This makes them an interesting case for studying how policy narratives and discourses coalesce around a novel technology, and the interpretative frame assign to it in these countries.–

With this, the article contributes to three distinct strands of literature. First, it speaks to an ongoing academic debate on the politics and social construction of technology (Bijker 1992; Hughes 1987; Pinch and Bijker 1984). Second, it adds to the work done on socially contested technologies, such as

nanotechnology, biotech or even geoengineering (Corner et al. 2013; Falkner and Jaspers 2012; Levidow 1998). Third, it feeds into analyses on the power of frames and narratives in the public discourse and in policymaking (Bomberg 2015; Feindt and Oels 2005; Lachapelle, Montpetit, and Gauvin 2014; Lorenzoni, Nicholson-Cole, and Whitmarsh 2007). Each of these three themes—construction, contestation, and framing—have relevance to political scientists and scholars.

The next section delves into case selection, the theoretical concept and the empirical strategy. Sections following that discuss individual case studies, offer some comparative analysis, and present findings and conclusions for analysts and practitioners.

2. Case selection, theoretical concept, and empirical strategy

Central Eastern Europe is highly energy import dependent, with some countries sourcing up to 100 percent of consumed natural gas from Russia's Gazprom. Poland imports around 60 percent of its consumed gas and Bulgaria 96 percent. Romania constitutes an outlier with a 15 percent dependence rate (Eurogas 2014). Yet, Romania's conventional production is set to decline significantly this side of 2020 (KPMG 2012), which will likely increase the country's currently low import ratio. Moreover, coal plays an important role in domestic electricity production in all countries. Therefore, EU decarbonization policies will force them to replace coal by less polluting sources, with gas resuming the role of a 'bridge fuel'.

Importantly, all countries share a common history as planned economies, which implies similar regulatory legacies and a strong state bias. In addition, they are subject to identical EU environmental regulation. At the same time, it is left to nation states to choose the energy mix and the sources of supply, and the EU has not enacted any regulation on hydraulic fracturing. Finally, the energy sector resumes an important role in all three countries. This is not only due to the sector's size in total GDP – some 20 percent in the case of Poland for instance (EMIS 2014) – but also due to its function as an engine of economic growth.

Against this backdrop, the prospects of domestic gas reserves gained traction in Eastern European policy debates (Goldthau 2012). According to estimates, Poland's 148 trillion cubic feet (Tcf) or 4.191 billion cubic meters (bcm) of technically recoverable shale gas reserves could roughly meet 250 years of current consumption. Bulgaria and Romania together hold 37 Tcf (1.047 bcm) or around 70 years of cumulative consumption (EIA/ARI 2013). The optionality of fracking would therefore benefit countries that all come with similar a high import dependence on Russia and face decarbonization imperatives stemming from EU climate policies. In fact, governments in all three countries have publicly supported shale gas exploration, regardless of their party orientation. This makes shale gas in Central Eastern Europe an ideal case for studying the interpretative meaning assigned to a novel (energy) technology – fracking.

A key insight (Bijker 1997; Hughes 1987; Klein and Kleinman 2002; Pinch and Bijker 1984) is that the evolutionary pathway of a novel technology is not only a function of its technical qualities and characteristics, but equally so of its perception within society. In this context, interpretative frames are of great importance as they assign meaning to managers and corporate actors as well as regulators, investors, and even end-users (Sovacool and Brown 2015).

Frames are nothing new to the field of global environmental politics (Hayes and Knox-Hayes 2014; Wahlström, Wennerhag, and Rootes 2013). The specific concept of interpretive frames used in this article comes formally from a stream of thought known as the “social construction of technology,” or SCOT. SCOT holds that technology emerges in society as a “seamless web” (Hughes 1986) or what Latour called a “sociotechnical imbroglio” (1999). SCOT emphasizes the mutually constitutive nature of technology,

which is usually described as a technical “artifact,” and society (Bijker 1993; Misa 1988). Within this framework, four important elements have been developed: relevant social group, interpretive flexibility, closure and stabilization, and technological frame.

Relevant social group denotes the institutions and organizations that share the same set of meanings attached to a particular technology (Bijker 1992; Bijker 1997; Bijker 1995; Pinch and Bijker 1984). Social groups that constitute parts of the “environment” for technology play a critical role in shaping and defining the problems that arise during the development of an artifact; social groups thus give meaning to technology, and define the problems facing that technology (Pinch 1996).

Interpretive flexibility suggests that differing interpretations of technological artifacts are available. That is, different social groups see particular technologies in different ways. These technologies, then, become “heterogeneous” because their meaning, rather than being fixed, is interpreted and negotiated by those social groups connected to it (Pinch and Bijker 1984; Sovacool 2011).

Closure and stabilization occur in technology when a consensus emerges that problems arising in design and development have been alleviated. Closure has come to mean “the process by which facts or artifacts in a provisional state characterized by controversy are molded into a stable state characterized by consensus” (Misa 1992), 110). The concepts of closure and stabilization highlight that different interpretations of technology can lead to conflict and controversy, and the refinement of that technology will inevitably continue until such differences are resolved.

These three concepts culminate in the one we employ in this study, that of a technological or *interpretive frame*. An interpretive frame attempts to capture the interactions that occur between, rather than in or above, the actors. It comprises “all elements that influence the interactions within relevant social groups and lead to the attribution of meanings to technical artifacts – and thus to constituting technology” (Bijker 1997), 123); (Law 1991). In a nutshell, a shared frame “defines a relevant social group and constitutes [its] members' common interpretation of an artifact” (Klein and Kleinman 2002), 31).

Frames can exist in three configurations. In some instances, no frame may be present. Here, success in adopting a novel technology depends on the formation of a constituency. In others, one frame may be present because a dominant group is able to insist upon its adoption. A third configuration relates to when multiple frames are contested, and criteria external to such frames are needed to resolve differences. Shale gas exhibits the third type, as it is a relatively mature technology (with more than 20 years of operating experience) and yet faces contestation from (mostly environmental) opponents.

To identify specific frames connected to shale gas in Eastern Europe, we relied primarily on original data drawn from 66 semi-structured interviews in Bulgaria, Poland and Romania, conducted between 2012 and 2014. Most interviews were conducted in Poland (27) and Bulgaria (30), whereas the remaining 9 interviews occurred in Romania (see table 2 in the annex). The cases of Poland and Bulgaria – countries representing opposite ends of the shale gas policy spectrum – serve to identify diverging national level frames for shale gas. The case of Romania, by contrast, explores to what extent dominant frames in Poland and Bulgaria feature in a country representing the middle ground, points to similarities and maps deviations. This justifies a lower number of data points on Romania and at the same time allows triangulating narrative patterns.

Interviews covered all relevant policy levels (national, regional, local) and actor groups (government, public and private companies, regulators, civil society). Prior to conducting *sur place* interviews, broader

patterns characterizing each country's shale gas debate were identified through an assessment of media coverage and desktop research. Interview questions were then specifically designed to explore in more detail the dominant perceptions about shale gas and fracking, to consolidate them in the shape of specific frames, and to unveil the importance assigned to each frame. Interview proceedings were kept open to ensure additional comments were adequately captured through introspective dialogue.

Our dataset comes with three caveats. First, due to the sensitivity of the subject, a number of actor groups could not be included in the sample, for instance state owned companies in Bulgaria. In addition, several interviews had to be held anonymously. Throughout the article, names are therefore omitted and interviewees are identified by their function and institutional background. Second, the sample is not fully representative regarding the spectrum of relevant societal groups and institutions. This caveat pertains primarily to civil society, which remains slightly under-represented. To the extent possible, this problem was addressed through triangulation with other data sources. Third, as debates on fracking are still ongoing, interpretative frames remain in flux. Data, therefore, capture the meaning given to fracking as a novel technology for the period between 2012 and 2014. The outlier here is Bulgaria, a country where 'closure' could be observed via a 2012 ban of shale gas, backed by a broad set of societal groups.

We proceed to identify dominant frames within each country. This was done in an inductive way by coding and then grouping key terms as used by interviewees to describe attitudes or expectations toward framing. Then, we compare variation in frames across countries, and assess their relative dominance. The aim is to uncover whether dominant frames are similar or divergent across countries, and which sets of actors and institutions endorse these frames.

3. Poland: 'economic opportunity', 'national security' and 'environmental boon'

Poland has for long been viewed as the shale gas front runner in CEE. The country has been the target of major international energy companies, including ExxonMobil, Shell, ENI and Chevron, as well as companies specializing in shale gas, such as Talisman, Marathon, Cuadrilla and Lane Energy. Yet, the prospects of unconventional gas have become bleaker after most larger companies have turned their back on Poland after disappointing test drillings (FT 2014b; Reuters 2013).

The data on Poland reveal three dominant interpretative frames for shale gas. The first, the '*economic opportunity*' frame, embraces shale gas as a source of welfare. It is the positive effects on job creation, state revenues on national and subnational levels, and the competitiveness of the manufacturing industry, that constitute the core of this frame. The 'economic opportunity' narrative essentially mirrors statements made by Radoslaw Sikorski, Poland's former Foreign Minister, to the effect that shale gas could make the country 'a second Norway' (Kenarov 2012). The frame was found most dominant among business, the oil and gas sector and the state administration, but it was also supported by a broader cross-section of societal actors.

In the words of a director level representative of the Polish Confederation of Private Employers (PKPP Lewiatan), shale gas "can be an important driver for the Polish economy [because it] can produce cheaper gas for other economic sectors [such as] the chemical industry". In the same vein, a former advisor to the Polish Foreign Minister stressed lower energy costs and a "knock-on effect on energy consuming industry". Adding to this statement, a member of the Economic Policy Department of the Polish Foreign Ministry pointed specifically to the economic benefits for local communities, for whom "shale gas [is] a

tremendous opportunity to speed up their development." Further, an interviewee representing the Office of the Minister of the Treasury – the body overseeing state owned companies – stressed that "[w]e will do our best to help investors, because our companies will benefit as well". An Advisor to the Minister of the Environment, the ministry in charge of environmental oversight, seconded this by revealing that "[...] we will try to regulate [shale] in a way that will boost the level of investments and security of investments".

For representatives of the extractive industry, "[s]hale gas can be an impulse and driver for the economy", according to a manager at United Oilfield Services, a private Polish energy service company, particularly against the backdrop of Polish gas prices generally perceived as being among the highest in Europe. Because of the potential of the Polish shale reserves, a former advisor to the Polish Foreign Minister alleged, "[s]ome of the [major international oil and gas companies] are viewing Poland as a base for their European oil and gas business." But also representatives of state owned companies point to the opportunities coming with shale gas – possibly a function of the Polish government insisting on making them part of private industry–led gas exploration. As the chief economist of Polish national energy company Orlen insisted, "[i]t is not the case that the government pushes us into this. [...] We go in because we believe in it and put money on our bet that we will find gas". Benefits as perceived by state owned companies include foreign direct investment, gains in skills and expertise and technology transfer.

The second dominant interpretative frame surrounding Polish shale centers on *national security*. This frame connects to Poland's historical trauma of being geographically located between major European powers. As coined by the manager at United Oilfield Services, "energy is a foreign policy tool for Russia [and] shale gas opens up the possibility of being more secure from Russia's monopolistic position". Other representatives of the Polish business community seconded this statement. Public officials remarked that "shale gas [is] part of [Poland's] diversification policy" (representative of the Office of the Minister of the Treasury). Interviews with members of scientific community also revealed the perception that shale gas "would be a milestone to be independent from Russia" (professor of Polish Institute of Soil Science).

Though not supporting shale gas as a key means to end Gazprom's dominance on the Polish market, the Chairman of Poland's Green Party admits that "[c]itizens see the opportunity to be independent [...] from Russia". Even for Polish environmental NGOs, "sovereignty is important", as alleged by a representative of Cleantech Poland, a consultancy firm. That said, environmental NGOs remained among the more cautious observers, hinting that the business community may only utilize the security narrative for fostering the shale gas cause. As a representative of Climate Coalition argued, "[w]e should not expect too much in the way of shale gas development in Poland. As a threat or a success story". Still, the 'national security' frame is embraced by the bulk of actor sets represented in the interview sample.

The third dominant frame pertaining to Polish shale gas relates to the environment. This frame is more contested. To some, fracking technology represents an '*environmental bane*' in Poland, as in other European countries. The prospects of drillings using horizontal hydraulic fracturing have indeed raised protests among local population. A prominent case in point is the village of Zurawlow, whose inhabitants have successfully mobilized against drilling activities planned by Chevron (The Guardian 2015). Scepticism has grown mainly over groundwater safety issues and risks posed to local habitat. Environmental NGOs have vocally made the negative side effects of shale gas exploration and production a topic in public debates, which led to attempts of the Polish government to legally curb the ability of NGOs to get involved in shale gas matters (Natural Gas Europe 2013).

However, despite the presence of this negative frame, the dominant narrative is one of '*environmental boon*'. This frame is supported by members of the business community, parts of state administration and,

surprisingly, even the environmental community. As representatives of the employers' association, oil and gas companies and the business community stressed during the interviews, Poland may face economic pressure related to the European carbon trading scheme and rising carbon prices – a function of the country's power supply relying primarily on coal. Shale was therefore generally supported as a means to decarbonize Poland's energy system. More interestingly, however, it was also the environmental community that cautiously embraced unconventional gas as an opportunity to reduce the country's emissions. As a representative of Climate Coalition, a Polish environmental NGO, summarized: "[w]e believe [a] local use of shale gas [using] best available technologies could be a transition fuel that could complement the use of renewables [...]". Even the Green Party does not wholly stand against shale gas. As its chairman indicated, his party was divided in two groups, with one opposing shale but the other trying to demonstrate that alternatives may neutralize the need to explore it at first place. In sum, "[w]ithin environmental organizations, there is a pragmatic understanding" (consultancy firm Cleantech Poland).

4. Bulgaria: 'economic sellout', 'authoritarianism' and 'environmental bane'

Much as did Poland's political elite, Bulgaria's leadership sought to frame shale gas as a matter of *national security* and *economic opportunity*. The national security argument comes following a January 2009 dispute between Ukraine and Russia, during which a week-long gas cutoff left the country out in the cold. It was this experience which motivated statements by a former member of parliament and chairman of the Energy Independence Movement to the effect that "[s]hale gas is not only an industry, it's geopolitics". Moreover, rising energy prices have repeatedly led to protest in Bulgaria, reputedly the EU's poorest country, and even forced governments to leave office (The Economist 2013). It has been alleged by Bulgarian authorities that domestic sources of gas would ameliorate the situation and reduce exposure against price hikes induced by the prevalent oil indexation (Reuters 2010). Further, as the former Deputy Minister of Economy, Energy and Tourism highlighted in the interview, the country's envisaged "reindustrialization process [requires] cheap gas", which would also "enter state budgets in the form of concession fees and royalties [and] fix our trade balance".

This national security and economic opportunity narrative resonated among some of the interviewees. And yet, it did not prove strong enough to be supported by key actors: Bulgaria, by contrast to Poland, enacted a ban on fracking in January 2012, which effectively stalled further exploration activities in unconventional gas in the country (LaBelle and Goldthau 2014). Chevron, the only foreign company active in shale gas in Bulgaria, has left.

Three negative interpretative frames were identified as dominant in Bulgaria.

The first, the '*economic sellout*' frame, labels shale gas as an attempt to exploit domestic resources for private gains. This frame was most dominant among left and 'green' parties and the local level public administration, but it was also supported by a broader cross-section of societal actors, ranging from business associations to academia.

In this frame, foreign companies are portrayed as the cause of unsustainable economic activity rather than as engines of growth and sources of investment. As the co-chairman of the Bulgarian Green Party coined it, "foreign companies [...] do not create jobs for the local population [except for] guards, cleaning ladies and drivers". A leading activist of the Fracking Free Bulgaria Initiative further stressed that "*investor*

is a dirty word in Bulgaria because for them it's easy to bribe officials and sign contracts with virtually no obligations".

The negative attitude toward foreign investors particularly in the extractive sector coincides with the widespread perception that "when things start to collapse, companies just give up, but environmental problems remain" (Member of "За Земята – Friends of the Earth Bulgaria"). As the Chairman of the Parliamentary Committee on Economic Policy, Energy and Tourism explained, "people [...] have seen in the past how [investors] caused damages and disappeared after that". What is more, municipalities do not perceive economic benefits arising from drilling activities. To the contrary, the mayor of the town of Toshevo stated, "[w]e don't have any gains for these 10 years [the lifetime of the lease], only a symbolic rent for the municipal lands". Concession fees for natural resources are considered low by international standards, which has caused particular controversy in the case of the Bulgarian gold mining sector (Kenarov 2011). Whilst observers, notably from academia, stressed the opportunities that would be missed, the general perception that resonated also among the scientific community was that "[t]here are no gains for the local population, only damages and problems" (retired hydrology professor and anti-shale gas scientist).

Importantly, it is also the risk that fracking related pollution may deprive parts of the Bulgarian society of their economic base which forms part of the 'sellout' frame. For instance, the region of Dobrudzha, typically referred to as the 'bread basket of Bulgaria', had been earmarked for exploratory fracking drilling. Overall, Bulgaria's agricultural sector adds some 10 percent of GDP and account for 19 percent of total employment (European Commission 2015), which compares to roughly 3 percent for the EU as a whole.

A final element of the 'economic sellout' frame consists in the prevailing distrust in the government. The Chairman of the Parliamentary Committee on Economic Policy, Energy and Tourism hinted that "it looked like the government had an agreement with Chevron without [a proper] assessment of risks". According to the Chairman of the Bulgarian Federation of the Industrial Energy Consumers (BFIEC), the prevalent idea was that "the money will not go to people, but to the state". This brings the shale gas industry close to allegations of state capture, which needs to be seen in the context of high level corruption plaguing the country's energy sector (CSD 2014).

The second frame made shale gas a case for promoting '*energy authoritarianism*'. Overall, the '*energy authoritarianism*' frame was shared by similar actors as the 'economic sellout' frame, but also found supporters among proponents of shale gas. This frame highlighted the problematic way public interests were handled by the government and the energy industry, notably Chevron as the prime company active in unconventional gas. As numerous observers noted, information levels on shale gas among the public were generally low, and the former Deputy Minister of Economy, Energy and Tourism confirmed that "[t]he public lacked sufficient information and the government [...] and the business did not fill this gap on time".

Yet, interviews also revealed the perception that information on the fracking technology was strategically withheld, with an element of "secrecy" (member of Bulgarian Greens) characterizing governmental activities relating to planned drilling activities. Information campaigns were pursued "in a purely lobbyist fashion" (ibidem) and "[t]hings were presented as if everything is going to be alright" (member of За Земята – Friends of the Earth Bulgaria). As a result, people started to source information from the internet, with *Gasland*, the American documentary on shale gas, being cited as a key source. Moreover, dialogue between the government and citizens and other key constituencies was described as poor or

lacking. As observers noted, the communication between the private sector and civil society was top-down and channeled through the state administration. Even proponents of shale gas admitted that "Chevron [...] did not provide at that time any publicly available technological or other arguments regarding shale gas exploration" (former Advisor to the Bulgarian Minister of Economy and Energy and former Bulgarian Ambassador-at-Large for Energy & Climate Change).

In fact, municipalities and the local population typically learned about planned drilling activities only via official announcements. As one local mayor revealed, "[w]e don't have any communication with competent authorities, we only got a letter from the ministry when [Chevron] was granted a permit for exploration [...]". This top-down and non-participatory approach on part of the government was perceived as "endangering democracy and the environment" (leader of the anti-shale gas movement and co-chairman of Bulgarian Greens).

The third frame pertains, like in Poland, to shale gas being an '*environmental bane*'. As pointedly noted by two senior scientists of the Bulgarian Academy of Sciences' Geological Institute, "the population was frightened and waited for some kind of apocalypses provoked by shale gas and fracking", which was induced by "information that came from environmentalists' organizations – contamination of waters and soil with chemicals, radiation, earthquakes, and destructions". It was well-educated (co-chairman of Bulgarian Greens) and "predominantly young people who take Bulgarian environment and nature to heart" (former Advisor of the Bulgarian Minister of Economy and Energy), who drove the process. Interviews also revealed clear rifts within the scientific community, with some researchers siding with environmentalists and some not. Scientists critical toward fracking were even alleged to form part of "epistemic communities [...] naturally leaning in favor of conventional technologies", rather than novel and unconventional ones (member of the Board of Directors and head of the exploration unit of Oil and Gas Exploration and Production plc).

The 'environmental bane' frame gained particular traction in the context of potential damage done to groundwater safety, and specifically an aquifer in the Dobrudzha region. While officially dismissed as "senseless theories" (former Deputy Minister of Economy, Energy and Tourism), protesters managed to establish a link to agriculture and food safety. Environmental groups constituting the core proponents of this frame were also joined by the National Association of Grain Producers and farmers (Dobrich protest leader). Media, finally, tended to highlight environmental risks, too, which prompted comments from the energy business community to the effect that "[t]he media was not objective in covering the debate" (representative of Oil and Gas Exploration and Production plc.).

In this context it is important to mention the alleged Russia-led anti-fracking campaign in the country aimed at preventing competition in the shape of domestic energy sources (FT 2014a; FT 2014c). As our data suggest, environmental protests were locally rooted not part of a concerted effort. Moreover, interviewees on municipal levels reveal a strong suspicion against any outside intervention, be it on part of the national level government, foreign companies, or arguably also Moscow-sponsored agents.

Overall, a broad coalition of left leaning political parties (notably the Greens and the Socialist Party), local municipalities and scientists but also industry associations and conservative parts of the society such as farmers supported this third frame pertaining to the Bulgarian shale gas debate. –

5. Romania: 'economic opportunity', 'environmental bane' and frame segregation

As Romania covers most of its gas consumption through domestic production, shale gas does not play a vital role in energy security. Romania thus offers an excellent opportunity to test perceptions and frames of shale gas in a country that has more latitude in choosing to adopt it.

In many respects, the Romanian frames feature elements of both Poland and Bulgaria. On the one hand, the country's shale gas prospects have attracted the interest of international energy corporations such as Chevron (US), Sterling Resources (Canada), TransAtlantic Petroleum (Canada) or Hungary's MOL, which all acquired E&P licenses. Domestic state owned gas producer Romgaz has also expressed interest in joining shale gas exploration. A temporary moratorium on shale gas exploration in 2012 never went into effect, leaving the country open to the fracking technology. On the other hand, growing social opposition against fracking may have been a decisive factor in making foreign companies let go on Romanian shale gas assets (Mihalache 2015). Officially citing disappointing test drillings and a bearish international business environment, Chevron has announced it will leave Romania, whereas Sterling Resources sold their assets to Carlyle, the investor group.

As our interviews show, all frames identified for Poland and Bulgaria also exist in Romania, albeit with three important qualifiers: the 'environmental boon' frame does not feature prominently; none of the frames is dominant among all actor groups; and frames seem much more attached to specific actor sets, with little overlap between them.

The '*economic opportunity*' frame, which was strongly pushed by the Socialist Ponta government despite rallying against shale gas whilst in opposition, mainly resonated among representatives of the state administration and independent observers. Cases in point are statements to the effect that there is "a favorable case [to make] for shale gas exploration, due to the benefits it can bring to the national economy and energy security" (Romanian Ambassador-at-Large for Energy Security and Counselor to the Prime Minister). Shale gas would also improve the oligopolistic Romanian gas market structure, as "[n]ew competitors [...] would bring shale gas to the market [which] would make competition look totally different" (energy analysts at Expert Forum, a Bucharest-based think-tank). Moreover, counties with potential for shale gas extraction typically are in the poorer parts of the country, and "badly [...] need better infrastructure – water, roads, scholarships for kids etc. (Director of the National Agency for Environmental Protection (ANPM), Ministry of Environment, Waters and Forests). Shale gas development therefore promises to enhance "the quality of life in the involved local communities, by creating jobs and raising local budget revenues" (Ambassador-at-Large for Energy Security).

Actors embracing the '*economic opportunity*' narrative partially overlap with those framing shale in terms of '*national security*'. Particularly representatives of state institutions and the ruling party backed this frame. The general argument was that in light of falling domestic production, "shale gas [...] is a potential substitute and alternative to conventional hydrocarbons (Member of Parliament, Industry and Services Commission). Shale gas "would be a contribution to our energy balance" (Director of ANPM), and may "strengthen Romania's energy security [...], which is particularly important in the current regional geopolitical context" (Ambassador-at-Large for Energy Security). In short, given "Romania's energy security, we simply cannot ignore the potential contribution of natural gas from shale deposits" (President of the Romanian Agency for Mineral Resources, ANRM).

The two first frames starkly contrast the narratives of '*economic sellout*' and '*environmental bane*', which are shared by two other actor sets – environmental organizations and think tanks. According to the President of Terra Mileniul III Foundation, an environmental NGO, shale gas exploration and production "will [only] relocate oil workers from other parts of the country to the production site, while the more specialized employees will likely come from abroad [and] there are not many permanent positions in this industry". Seconding this, and echoing arguments also made in the Bulgarian context, analysts at Expert Forum stress that "since the kind of job openings for the industry are mainly for the high skilled workers [there are no] opportunities for the locals – other than few low skills jobs". In addition, the royalty system was criticized as generating insignificant financial revenue.

The perception of losing out economically coincides with fears of potential harm done to agricultural land and habitat. Though some observers argued that "[b]ringing more gas to the energy mix would [thus] replacing coal [...] would bring down emissions in Romania" (analyst at Expert Forum) and stressed Romania's long standing history and sophisticated expertise in the oil and gas industry and its ability to implement proper environmental oversight (Member of Parliament, Industry and Services Commission), environmental risks dominate. What is more, whilst the environmental risk narrative was most dominant on the national level discourse, the economic sellout frame resonated strongest on the local level. As a consequence, "these two kinds of protest are augmenting each other" (analyst at Expert Forum).

The latter two frames extend into the '*authoritarianism*' frame. It is mainly embraced by protest groups, NGOs and think tanks. This narrative on the one hand centers on institutional capacity and quality. In the words of an analyst at ExpertForum, "[...] the fickle institutions probably [are] one of the most important obstacles against public acceptance of fracking. The public does not trust institutions that today want to put a moratorium on fracking and tomorrow turn into enthusiastic supporters of it." Moreover, as various experts repeated, accessible scientific information in Romanian language was scarce, and the quality of information remained low. As a Counselor to the Energy Minister for Energy and Member of the Management Council of Transgaz mourned, "[d]iscussions in the media are mainly emotional, with little reference to science-based assessments of the costs and risks that shale gas operation can bring to Romania." *Gasland*, the US documentary, was again cited as a key source of information, which by some observers was deemed as "scientifically unfounded" (President of ANRM) or even "hostile [and] fuelled by often radical and anarchistic movements" (Ambassador-at-Large for Energy Security).

This antagonism connects in part to Romania's experience with an open-pit gold mining project at Roșia Montană in Alba county (Transylvania), a contested project for the use of the poisonous cyanidation mining technique and allegations of corruption surrounding the permitting process (The Guardian 2013). In this context, scientific studies have allegedly been commissioned by vested interests. As a result, a deep divide can be identified between two "epistemic communities" (Director of Energy Policy Group, a Bucharest based think tank): scientists and the business community on the one hand, and the shale gas critics on the other. As the President of Terra Mileniul III alleged, "[...] scientists and academics that often promote shale gas [...] are happy to get a small research contract financed by the oil companies". Coupled with "weak and indecisive [...] authorities" [...] there is only the NGOs and the civil society left to counterbalance this".

In this respect, shale gas was also perceived as an issue of citizen participation. As the Director of ANPM admits, "[u]nfortunately, we started off on the wrong foot, due to inadequate communication". A Member of the Management Council of Transgaz, Romania's state-owned operator of the national gas transmission system, went further by stressing that "[t]he fact that currently there is no participation of local communities to the prospective revenues makes them justifiably frustrated". Analysts at Expert

Forum pointed to the heavy security apparatus deployed to protect shale gas exploration that raised "serious concerns about human rights infringement". In all, whilst the key actors embracing the 'authoritarianism' narrative are found among NGOs, civil society and think tanks, this frame also resonates among certain representatives of state institutions.

6. Conclusion

The research conducted here of three Eastern European countries—Poland, Bulgaria, and Romania—suggests that the same technology can be given diverging meanings. This has at least four implications for political scientists, security analysts, and international relations scholars.

First, as Table 1 summates, shale gas fracking can be perceived, positively, as a way of accelerating economic development, serving national interests and increasing regional security, and encouraging less carbon intensive forms of energy supply. However, other relevant social groups envisioned shale gas as an environmental bane due to its impacts on water and ecosystems, as a mechanism of transferring national wealth and assets out of the country, and as reinforcing patterns of authoritative decision-making or further marginalizing the poor and vulnerable. Thus, it is a mistake to view energy systems as apolitical or uniformly interpreted.

Table 1 here

Second, the fact that five of our frames—all but 'environmental boon'—occur within relevant social groups across two countries or more implies a commonality of interpretation. That is, despite differing cultures, time periods, energy markets, modes of industrial cooperation, and national identity, there seem to be more universal frames that resonate with social groups at a deeper level. Energy systems such as shale gas can therefore intersect positively with notions of economic growth and national security, or negatively with issues of social injustice and concerns over environmental degradation. Interpretive frames can become aligned across cultures and contexts.

Third, there clearly exists cross-country exchange among groups subscribing to a given frame. Moreover, media or films such as *'Gasland'* foster the transnational dissemination or solidification of certain frames. At the same time, different sets of institutions tend to gather behind or share frames. So it is not necessarily one frame per institution but one frame that's shared by various sets of institutions. Sometimes one institution also buys into several frames at the same time (e.g. jobs and national security). The fact that many types of actors (such as business associations or public administrators) can populate multiple frames at once may imply that they have learned about this universal appeal of some frames, and may switch between them depending on their audience. Moreover, it suggests that while frames can 'travel' across borders, such 'cross-border frame export' from one country to another is not necessarily a linear process.

Finally, our study reveals that energy systems such as shale gas possess an interpretive flexibility but so far lack closure and stabilization, given that various social stakeholders continue to attach different, and at times conflicting, meanings to them. Shale gas, in other words, is poly-semiotic – it will provoke a heterogeneous mix of varying reactions based on both the type of relevant social group and the nature of the particular frame. The interpretive flexibility of shale gas therefore reminds us that energy projects not only mark the physical landscape and contribute to the production and distribution of natural gas or other energy sources. They can also transfer what were once customary public resources into private hands,

concentrate political power, become intertwined in national discourses of revitalization and strength, and validate distinct approaches to economic and social development.

These findings bear important implications for other fields of social inquiry, including security studies — a field mostly concerned with the geopolitical implications of shale gas. As this study reveals, new energy technologies such as shale gas interact in mutually reinforcing ways with social, cultural, political, and economic forces. It is therefore the interpretative meaning attached to them which determines whether a novel technology blends into a given energy system in a seamless way or not, and whether they 'succeed' or 'fail'.

In other words, enhancing security by way of deploying new yet risky energy technologies such as shale gas fracking is not simply a function of resource endowments and technological progress. Instead, it is the result of dynamic stakeholder interaction and the related discursive processes that result. It is these dynamics, not hardnosed security imperatives by themselves, which will eventually determine whether shale gas will go global — or not. Also, and more troubling, assessments of shale gas that ignore these (sometimes hidden) social dimensions threaten to naturalize them as part of the normal environment and depoliticize them as acceptable risks.

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