

## **SHALE GAS IN EUROPE: MUCH ADO ABOUT LITTLE?**



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# SHALE GAS IN EUROPE: MUCH ADO ABOUT LITTLE?

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# INTRODUCTION

Shale gas is an unconventional form of gas<sup>1</sup> because its extraction is more difficult or less economical than that of conventional natural gas. It has become an important item of energy policy during the last years since new processes have allowed its extraction. In the medium term, shale gas should foster a reinforcement of the gas part in the world's energy mix. In 2011, the IEA released an influential report entitled "Are we entering a golden age of gas?" This report suggests that shale gas could help substantially boost global gas use.<sup>2</sup> It also warns at the same time that this success could bring into question the international goal of limiting the long-term increase in the global temperature to 2° C above pre-industrial levels.

In the world economy, the impact of shale gas is increasing rapidly (especially in the USA, albeit apparently not as significantly as expected<sup>3</sup>). In the EU, its perspectives remain uncertain, for many reasons. Estimates are not reliable. Shale gas exploitation remains a controversial issue due to geology, lack of infrastructure and also fears for the environment and public health. The EU institutions seem to have a favorable attitude towards shale gas development while the Member States' attitude seems to vary from enthusiasm to hesitation or opposition. Public opinion on the issue appears quite divided everywhere.

This brief paper will examine various estimations of potential resources in the EU (§ 1), the potential costs and benefits (§ 2), the initiatives taken by the EU institutions (§ 3) and the national authorities (§ 4), and finally the emerging EU framework (§ 5). The conclusion is, rather surprisingly, that whatever happens on this front, this will not modify the present structural challenges of the EU in the domains of climate and energy.<sup>4</sup>

Tania Zgajewski<sup>5</sup>

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<sup>1</sup> Unconventional gas is the collective term used to describe "tight gas", "shale gas" and/or "coal bed methane".

<sup>2</sup> Thereafter, the IEA's medium-term gas market report released in July 2013 confirmed it.

<sup>3</sup> See T. Spencer, O. Sartor, Mathilde Mathieu, Unconventional wisdom: an economic analysis of US shale gas and implications for the EU, IDRI, Policy Brief, No 05/14 February 2014 (<http://www.iddri.org/Publications/Collections/Syntheses/PB0514.pdf>). See also a paper made by the Energy Modeling Forum (Stanford University) entitled "Changing the game?: emissions and market implications of new natural gas supplies", EMF Report 26, Volume I, September 2013, Stanford University (<http://emf.stanford.edu>).

<sup>4</sup> The relevant documents used in this paper stop on 11 March 2014.

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## § 1. VARIOUS EUROPEAN RESERVES' ESTIMATES

In the EU, sizeable quantities of shale gas (though generally smaller than in the United States) have been reported in several countries (Poland, Germany, France, Austria, the Netherlands, Sweden, Denmark, Hungary, Romania, UK, Ireland, Portugal, Spain, Italy) and exploration activity is occurring in several of them.

More precisely, according to a 2011 study by the US Energy Information Administration, the largest estimated reserves of shale gas in Europe are in Poland with 187 trillion cubic feet (5.3 trillion cubic meters) which equates to 29% of the European total but less than 3% of global shale gas reserves. This estimate has been reviewed in 2013 and lowered by the US Energy Information Administration to 148 trillion cubic feet.<sup>6</sup> In its own study published in 2012<sup>7</sup>, and well below the US estimate, Poland has pegged its recoverable shale gas reserves at 346-768 billion cubic meters. Poland is expected to publish a new study on the country's shale gas reserves in 2014. France has also estimated resources of 180 trillion cubic feet (5.0 trillion cubic meters) lowered also in 2013 by the US Energy Information Administration to 137 trillion cubic feet.<sup>8</sup> For these two countries, shale gas is or could be a fantastic opportunity when one knows that Poland's energy system importantly relies on fossil fuel (particularly coal which is a big source of GHG emissions) while France's energy system importantly relies on nuclear energy which, after the Fukushima accident in Japan in 2011 and the issue of nuclear waste, raises in a way or another the question of its long-term future. In Spain, the size of the opportunity seems important too and amounts, depending on the source, between 2.05 trillion cubic meters<sup>9</sup> (80% of these would be found in the shale rock) to about 50 trillion cubic feet<sup>10</sup> trapped in shale rock. Germany and the United-Kingdom have also significant shale gas reserves but here too figures are uncertain.

These few examples show the difficulties to estimate the volume of shale gas reserves. The latter in addition must be technically and economically recoverable. It is thus very difficult to know the shale gas production potential for Europe. Numbers are cited but they are so far guesses.

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<sup>6</sup> Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States, EIA, June 2013 (<http://www.eia.gov/analysis/studies/worldshalegas/>).

<sup>7</sup> The study was made by Poland's geological institute.

<sup>8</sup> Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States, EIA, June 2013 (<http://www.eia.gov/analysis/studies/worldshalegas/>).

<sup>9</sup> Estimates by the Spanish Association of Companies in Investigation, Exploration & Production of Hydrocarbons and Underground Storage.

<sup>10</sup> Estimates by the nation's Council of Mining Engineers.



## § 2. OPPORTUNITIES AND THREATS FOR THE EUROPEAN UNION

### 2.1. Opportunities

#### 2.1.1. *Easier decarbonisation*

The EU is committed to reduce its GHG emissions to at least 80% below 1990 level by 2050. In December 2011, the EU issued its energy roadmap for 2050<sup>11</sup>. The latter presents various routes towards decarbonisation of the EU energy systems, combining 4 main options: energy efficiency, renewable energy, nuclear and carbon capture and storage (hereafter “CCS”).

Within this framework, the key role of gas as a transitional source of energy is also confirmed. Gas could become a low-carbon technology if CCS becomes, commercially available on a large-scale basis.<sup>12</sup>

But will shale gas reduce GHG emissions as the EU seems to believe? This is not sure. A Cornell University study<sup>13</sup> concludes that shale gas is not a viable “bridge” to a low-carbon future. According to this study, methane<sup>14</sup> produced from shale gas has a large or even larger “greenhouse gas footprint “ than coal (a fossil fuel that we have no intention to stop the use<sup>15</sup>). Industry and some academics have branded those findings as exaggerated, but the debate has been marked by a limitation of the publicly available data.<sup>16</sup> According to the Scottish Widows Investment Partnership’s report, the climate impact of shale gas could be partially minimized if companies use a tech-

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<sup>11</sup> Commission communication entitled “A roadmap for moving to a competitive low carbon economy in 2050” – COM(2011) 112.

<sup>12</sup> It should be noted that the EU is currently lagging behind in the development of CCS compared to other parts of the worlds (USA and Asia). For that reason, the EU should launch a set of proposals to address the slow development and funding problems of CCS. See the Commission’s consultative communication on the future of carbon capture and storage in Europe – COM (2013) 180, in particular pp. 16-19. The responses to this consultation should feed the European Commission’s work on the 2030 Energy and Climate Framework. See also the 2012 report entitled “ European Carbon and Capture Storage Demonstration Project Network – Situation report 2012” (<http://cdn.globalccsinstitute.com/sites/default/files/publications/115876/network-situation-report-2012.pdf>) as well as the 2013 paper prepared by S. Tindale, Centre for European Reform, entitled “Europe should regulate to promote carbon capture and storage” ([http://www.cer.org.uk/sites/default/files/publications/attachments/pdf/2013/pb\\_sct\\_ccs\\_30oct13-8032.pdf](http://www.cer.org.uk/sites/default/files/publications/attachments/pdf/2013/pb_sct_ccs_30oct13-8032.pdf)).

<sup>13</sup> R. W. Howarth, R. Santoro, A. Ingraffea, Methane and the greenhouse-gas footprint of natural gas from shale formations, *Journal Climatic change Letters*, DOI 10.1007/s10584-011-0061-5 (2011).

<sup>14</sup> Methane is a greenhouse gas that remains in the atmosphere for approximately 9-15 years and is over 20 times more effective in trapping heat in the atmosphere than carbon dioxide (CO2).

<sup>15</sup> See IEA’s latest medium-term coal market report issued in 2013 which projects coal growth to continue, a resilient trend during the last decade. According to this report, coal demand will grow at an average rate of 2.3% per year through 2018.

<sup>16</sup> See for instance two articles published shortly after the Cornell University Study which addressed the same question but arrived at lower leakage rates and impacts. The first one: Mohane Jiang et al, “Life cycle greenhouse emissions of Marcellus shale gas”, Carnegie Mellon University, *Environmental Research Letters* 6, n° 3 (2011). The second one is an official comment submitted by another Cornell professor: Lawrence M. Cathles III, “A commentary on “The greenhouse gas footprint of natural gas in shale formations by R.W. Howarth, R. Santoro, and Anthony Ingraffea”, *Climatic Change* 113, n° 2 (2012): 525-535.

nology known as “green completion” (also called “reduced emission completion”) to capture the methane that comes up with hydraulic fracturing flowback.<sup>17</sup> But the vast majority of shale gas companies do not use this technology because it costs money.

It is worth noting that methane emissions have meanwhile received increased attention in the US with the following result. Since 2013, the US gas industry is required to use the “green completion” technology, with a transitory period to ensure that green completion equipment is broadly available.<sup>18</sup> During this transition period that ends 1 January 2015, the gas industry has the option to flare instead. This new obligation has been criticized by industry and environmentalists alike.<sup>19</sup>

### 2.1.2. *Reduced external dependency*

The EU becomes more dependent<sup>20</sup> from the outside world regarding its primary energy supply.<sup>21</sup> The EU is also the world largest energy importer. As such, the EU is likely to be more vulnerable to supply risks as a result. This is particularly true considering that developing Asian countries and the Middle East now account for most of the growth in global energy demand. And it was made particularly blatant by the Russia-Ukraine gas dispute in 2009. That year, Russia cut off gas shipments via Ukraine for nearly two weeks amid a price and payment dispute, and more than 15 European countries scrambled to find alternative sources of energy. The current Russian-Ukrainian conflict stemming from, on the one hand, the Ukrainian ex-President’s rejection of a single economic deal with the European Union regarding an association agreement and, on the other hand, the fact that Russian forces took control of Ukraine’s Crimea region, once again highlights the EU vulnerability.<sup>22</sup>

<sup>17</sup> <http://www.theguardian.com/environment/2012/may/29/shale-gas-coal-climate-investor?fb=optOut> and <http://dontfrackwithny.com/golden-age-of-fracked-gas-may-mean-dark-ages-for-climate/>. It should be noted that Scottish Widows Investment Partnership is one of the biggest shareholder in BP, as well as other major oil and gas companies. A recent study by David T. Allen et al. entitled “Measurements of methane emissions at natural gas production sites in the United States”, University of Texas at Austin, September 2013 confirms that almost all the escaping methane could be captured by state of the art equipment. The study relied on data from 9 major companies. It can be found on the following website: <http://www.pnas.org/content/110/44/17768.full.pdf+html?with-ds=yes> and the abstract of the study can be found on <http://www.utexas.edu/news/2013/09/16/understanding-methane-emissions/>. This study has already been criticized (<http://www.prnewswire.com/news-releases/experts-fracking-methane-leakage-study-financed-by-gas-industry-with-partner-edf-is-deeply-flawed-224092801.html>).

<sup>18</sup> <http://www.epa.gov/airquality/oilandgas/actions.html>

<sup>19</sup> For more information on green completion, see <http://watchlist.vermontlaw.edu/fracking-and-%E2%80%99%E2%80%99-still-incomplete/>; [https://www.rigzone.com/news/article.asp?a\\_id=117050](https://www.rigzone.com/news/article.asp?a_id=117050); and <http://www.epa.gov/airquality/oilandgas/pdfs/20120417changes.pdf>.

<sup>20</sup> Gross inland energy consumption in the EU27 reached a level of 1700 million tonnes of oil equivalent in 2011. This represents a decrease of 6% compared to 2008 because of the economic slowdown. Energy dependence rate was 54% in the EU27, nearly stable to 2008. These figures have been issued by Eurostat (STAT/13/23 dated 13.02.2013).

<sup>21</sup> According to EU Commissioner for energy, G. Oettinger, the EU gas production could decrease by 31% between now and 2030 and the result is that the EU’s dependence on gas imports could increase from 63% in 2010 to 73% in 2030. See Speech/13/642 of 17.07.2013 in the framework of “A transatlantic Energy Revolution: Europe’s Energy Diversification and US Unconventional Oil and Gas”.

<sup>22</sup> See an Article published on 8 March 2013 in Euractiv (<http://www.euractiv.com/central-europe/gas-remains-russia-key-card-euro-news-533930>).

Within the EU, domestic gas production is falling and there is increasing reliance on imports from outside the EU. The demand for gas within the EU is continuing to rise, particularly as the preferred transitional fuel for power generation. But will shale gas production in the EU have a major influence to reverse the declining European gas production and the rising import dependency? Here too, nothing is sure. A report requested by the European Parliament's Committee on Environment, Public Health and Food Safety (ENVI) published in June 2011<sup>23</sup> concludes that even an aggressive development of shale gas production in Europe would have a marginal influence. However, the report does not exclude that shale gas might play a significant role at regional level (overall, in Poland which have large shale gas reserves). A very recent report<sup>24</sup> from IDDRI confirms that analysis.

### **2.1.3. *Reduced gas prices***

More gas in market economies could mean cheaper gas. However, shale gas prices in Europe are expected to be higher than in the US due to a number of differences. Firstly, European geology is less favorable. Most of the European fields are deeper underground than in the US and shale gas would be harder to extract. Secondly, the US has a huge and very experienced land-based drilling industry, and competition drives down costs. That is not the case in Europe. Thirdly, the US has many existing pipelines, enabling drilling companies to get the gas to market, whereas Europe has no such comparable network. Fourthly, Europe will likely impose tighter regulation on the industry than the US, where arguably a wild-west mentality is still evident to some extent<sup>25</sup>. Fifthly, the current construction and drilling costs of a shale gas well are also significantly cheaper in the United States than in other developed countries.<sup>26</sup> The IEA's Energy Outlook 2013 shares this analysis. According to the IEA, Japanese and European gas and electricity are expected to be twice as high as in the US by 2035.

<sup>23</sup> See for precise figures, the document requested by the European Parliament's Committee on Environment, Public Health and Food safety entitled "Impacts of shale gas and shale oil extraction on the environment and on human health", Directorate General for Internal Policies – Policy Department A: Economic and Scientific Policy-, PE 464.425, June 2011, pp. 74-76.

<sup>24</sup> See T. Spencer, O. Sartor, Mathilde Mathieu, Unconventional wisdom: an economic analysis of US shale gas and implications for the EU, IDRI, Policy Brief, No 05/14 February 2014, p. 4. (<http://www.iddri.org/Publications/Collections/Syntheses/PB0514.pdf>).

<sup>25</sup> See The Economist, 26 November 2011. See also "A Slow Costly Road to Nowhere: Shale Gas Development in Europe" ([http://www.bund.net/fileadmin/bundnet/pdfs/klima\\_und\\_energie/130614\\_bund\\_klima\\_energie\\_wirtschaftlichkeit\\_fracking\\_foee.pdf](http://www.bund.net/fileadmin/bundnet/pdfs/klima_und_energie/130614_bund_klima_energie_wirtschaftlichkeit_fracking_foee.pdf)). See also D. Buchan, Can shale gas transform Europe's energy landscape, Centre for European Reform, July 2013. Even senior EU official, Robin Miese, Director of strategy at the European Commission's DG Environment, poured in June 2013 cold water on claims that a shale gas boom in Europe would result in low gas prices. According to this senior EU official, the possible benefits of European shale gas production would more likely come in the form of diversification of the EU's energy mix, and in more energy security, or in the potential to renegotiate with the main gas suppliers, but "the effect on prices is not necessarily going to be major".

<sup>26</sup> D. Hastings Dunn and M. J.L. McClelland, Shale gas and the revival of American power: debunking decline?, International Affairs, Vol. 89, Issue 6, 2013, p. 1423. See Pavol Szalai, Révolution du gaz de schiste: peut-elle traverser l'Atlantique?, Question d'Europe, n° 293, Fondation Robert Schuman, 4 novembre 2013, p. 5.

Yet, some analyses<sup>27</sup> consider that the developments of shale gas projects in Europe could at least contribute to lowering its gas prices and ensuring this way its intensive industrial sectors keep their competitive levels, notably vis-à-vis their US counterparts. Linking shale gas with lower gas prices and EU industry competitiveness appears rather simplistic. There are other elements to be taken into account. In addition, these benefits of shale gas production in Europe will depend on it being at least as cheap as gas imported. It will not be easy to do that. Indeed, at the moment, half of the gas (mostly Russian) that Europe consumes is sold on long-term contracts indexed to the oil price, which remains high. This expensive gas is losing market share not only to imports of liquefied natural gas (LNG) but also to coal (especially from the US, where coal has been pushed out of the domestic market into Europe by the shale-induced drop in the US gas price). In addition, in the EU markets where renewables account for a high share of total energy generation (like Germany or Spain), the average utilization of gas-fired plants has dropped to a very low level.<sup>28</sup> All these elements if persistent should put downward pressure on gas prices.

Finally, experts also agree that even modest amounts of shale gas will not be produced in Europe unless supported from public subsidies.<sup>29</sup>

So will shale gas produced in Europe be profitable from an economic point of view? It will depend mainly on the adjustment of several factors: (1) the evolution of demand; (2) the price of imported gas; and (3) the future development of LNG exports to the EU.

## 2.2. Threats

Gas drilling and hydraulic fracturing are not risk free and they have raised public attention on a number of concerns. The main ones are related to:

- the depth and construction of numerous wells, the area of surface land affected and heavy truck traffic;

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<sup>27</sup> See for instance, a November 2013 report to the International Association of oil and gas producers (OGP) entitled "Macroeconomic effects of European shale gas production" to be found on the following website: ([http://www.poyry.co.uk/sites/poyry.co.uk/files/public\\_report\\_ogp\\_\\_v5\\_0.pdf](http://www.poyry.co.uk/sites/poyry.co.uk/files/public_report_ogp__v5_0.pdf)). According to this report, a thriving European shale gas industry could help limit energy bills rises by the middle of the century. See also a May 2013 A.T. Kearney study on shale gas production in Europeç [http://www.atkearney.com.tr/news-media/news-releases/news-release/-/asset\\_publisher/000IL7Jc67KL/content/new-a-t-%C2%A0kearney-study-on-shale-gas-production-in-europe](http://www.atkearney.com.tr/news-media/news-releases/news-release/-/asset_publisher/000IL7Jc67KL/content/new-a-t-%C2%A0kearney-study-on-shale-gas-production-in-europe)). According to this study, expectations are that the price of gas will fall by up to six percent. If the regulatory, environmental, technological and economic circumstances can be optimized, production volumes will potentially be even greater.

<sup>28</sup> See D. Buchan, Can Shale gas transform Europe's energy landscape, Centre for European Reform, July 2013, p. 5.

<sup>29</sup> Friends of the Earth Europe, Extractive industries: blessing or curse? – A slow costly road to nowhere: shale gas development in Europe, May 2013, p. 3 ([https://www.global2000.at/sites/global/files/Fact\\_Sheet\\_-\\_Myths\\_of\\_the\\_European\\_Shale\\_Gas\\_Market\\_Final\\_0.pdf](https://www.global2000.at/sites/global/files/Fact_Sheet_-_Myths_of_the_European_Shale_Gas_Market_Final_0.pdf)).

- mistakes or accidents in the drilling process (like casing failures or poor cement jobs or spills on the surface of fracturing fluids) which can provoke soil and/or water pollution;
- methane gas leakage from shale gas drilling and hydraulic fracturing which can damage the air quality but also contaminate groundwater and drinking water;
- air emissions of volatile organic compounds, oxides of nitrogen and particulate matter, as well as noise, from pumps and compressors needed to render the produced gas up to the surface;
- the non-disclosure to the public (trade secrets) of the cocktail of chemicals used during the fracking process when one knows this cocktail includes toxic, allergenic, mutagenic and carcinogenic substances. This cocktail of chemicals can also provoke soil and/or groundwater pollution in case of leakage and there is here clearly a public health challenge;<sup>30</sup>
- the rise of seismic activities linked to the practice of hydraulic fracturing and the associated wastewater disposal;<sup>31</sup>
- the vast quantities of potable water needed for fracking creating, on the one hand, pressure particularly in regions suffering from water scarcity and reduce drinking water supply and, on the other hand, a risk of dramatic rise of water price (like it is happening in the US in certain states where the shale gas industry is in competition with the agricultural industry to buy water),<sup>32, 33</sup>
- the radioactivity which comes from the rocks in depth;
- the potential damages to the tourist industry.

<sup>30</sup> For instance, a February 2013 study by Lisa M. McKenzie et al. (NIH) entitled “Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado” cautiously suggests that the density and proximity of natural gas wells within 10 mile-radius of maternal residence would slightly increase – about 30% – the risk of heart defects of the newborn child. The Abstract of the study can be found on the following website: <http://ehp.niehs.nih.gov/wp-content/uploads/122/1/ehp.1306722.pdf>.

<sup>31</sup> The latest evidence comes in the form of an article in the 26 March 2013 issue of “Geology”, a publication of the Geological Society of America. Entitled “Potentially induced earthquakes in Oklahoma, USA: Links between wastewater injection and the 2011 Mw. 5.7 earthquake sequence”, this study was coauthored by University of Oklahoma Geophysics Professor Katie Keranen; U.S. Geological Survey geophysicist Dr. Elizabeth Cochran; Columbia University’s Lamont-Doherty Earth Observatory’s seismologist Dr. Heather Savage and Dr. Geoffrey Abers. The study concluded that there is a strong likelihood that the largest recorded earthquake in Oklahoma history (November 2011) was triggered by wastewater injection that follows fracking. The study also shows that it can take decades for an injection well to spark an earthquake. Some state-government experts remain skeptical towards the study’s findings while the hydrocarbon industry ignore them. Yet, a previous American report published in June 2012 by the National Academy of Science (USA) and entitled “Induced seismicity potential in energy technologies” also found that the energy industry may be increasing the risk of earthquakes by injecting wastewater underground.

<sup>32</sup> It should be noted that in its World Energy Outlook 2012, the IEA concludes that fresh water use is becoming an increasingly crucial issue for energy production around the world. It projects that the amount of fresh water consumed for world energy production is on track to double within the next 25 years. According to the IEA however, the future impact of fracking should be “relatively” small compared to the one of biofuel production and coal-fired electricity which will drive the largest shares of water consumption. Not everyone agrees with these projections.

<sup>33</sup> See also an article published on 5 February 2014 in the newspaper, The Guardian, entitled “Fracking is depleting water supplies in America’s driest areas”.

The US is the only country where horizontal drilling and hydraulic fracturing have been applied increasingly at large scale since many decades. Based on information from the US experience, EU civil society groups<sup>34</sup> warn that these techniques have already had negative impacts on the environment and human health. They also argue that shale gas development will keep the EU dependent on fossil fuels for a longer time and will slow down the large-scale deployment of clean energy renewables and energy savings. They call on Member States to suspend ongoing activities, to abrogate permits and to place a ban on any new projects. They also urge the EU institutions not to promote further the development of shale gas.

It should be noted that hydraulic fracturing is now controversially discussed in the USA.<sup>35</sup> People are becoming aware of it as drilling sites move to more densely populated areas.

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<sup>34</sup> See for instance, the position of Friends of the Earth Europe in two papers respectively entitled “Shale Gas: Unconventional and Unwanted” and “Shale Gas: Debunking Economic Myths” (<http://www.foeeurope.org/shale-gas>) or the June 2013 WWF position on shale gas in the EU – Keep Pandora’s box firmly shut ([http://awsassets.panda.org/downloads/wwf\\_shale\\_gas\\_position.pdf](http://awsassets.panda.org/downloads/wwf_shale_gas_position.pdf)).

<sup>35</sup> See among others an October 2013 report entitled “Fracking by the numbers – Key impacts of dirty drilling at the state and national level”, prepared by E. Ridlington and J. Rumpel, Environment America, Research and Policy Centre ([http://www.environmentamerica.org/sites/environment/files/reports/EA\\_Fracking-Numbers\\_scrn.pdf](http://www.environmentamerica.org/sites/environment/files/reports/EA_Fracking-Numbers_scrn.pdf)).



## § 3. THE VARIOUS INITIATIVES OF THE EU INSTITUTIONS

Various concerns exist and it is thus important to determine whether the European legislation is sufficient to allow potential investments, ensure the safety of the environment and protect the health of its citizens during the extraction of shale gas.

### 3.1. The Commission

To get a better view on whether the current EU regulatory framework sufficiently covers the risks associated with shale gas activities, the Commission has ordered several studies.

According to the results of a legal study<sup>36</sup>, the existing EU regulation framework is adequate for shale gas activities as they currently stand (stage of early exploration). The study enumerates examples.<sup>37</sup> For instance, authorization for exploration and production is covered by the Hydrocarbon directive<sup>38</sup>; water protection by the water framework directive<sup>39</sup>, the groundwater directive<sup>40</sup> and the mining waste directive<sup>41</sup>; operators' liability for damages by the environmental liability directive<sup>42</sup>; the use of chemicals by the REACH regulation<sup>43</sup> administered by ECHA; the availability on the market and use of biocidal products by the biocidal products regulation<sup>44</sup>. Public access to environmental information as well as the requirement for an environmental impact assessment are covered by general legislation (the legislation implementing the Aarhus Convention<sup>45</sup> and the codified environmental impact assess-

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<sup>36</sup> Final Report on Unconventional Gas in Europe, 8 November 2011, prepared by law firm Philippe & Partners.

<sup>37</sup> See p. 101 of the 2011 report for the full list.

<sup>38</sup> Directive 94/22/EC on conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons (OJ 1994, L 164/3).

<sup>39</sup> Directive 2000/60/EC establishing a framework for Community action in the field of water policy (OJ 2000, L 327/1).

<sup>40</sup> Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (OJ 2006, L 372/19).

<sup>41</sup> Directive 2006/21/EC on the management of waste from extractive industries and amending Directive 2004/35/EC (OJ 2006, L 102/15).

<sup>42</sup> Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (OJ 2004, L 143/56).

<sup>43</sup> Regulation (EC) No 1907/2006 concerning the registration, evaluation, authorization and restriction of chemicals (REACH), establishing a European chemicals agency, amending Directive 1999/45/EC and repealing Council regulation (EEC) No 793/93 and Commission regulation (EC) No 1488/94 as well as Council directive 76/769/EEC and Commission directives 91/155/EEC, 93/67/EEC and 2000/21/EC (OJ 2006, L 396/1).

<sup>44</sup> Regulation (EU) No 528/2012 concerning the making available on the market and the use of biocidal products (OJ 2012, L 167/1).

<sup>45</sup> The numerous legislative texts implementing the Aarhus Convention can be found on the following website: <http://ec.europa.eu/environment/aarhus/legislation.htm>. See also the last Commission's report on the implementation of the Aarhus Convention – COM (2011) 208.

ment directive<sup>46</sup>). The study recognizes however that the EU legislative framework might be reviewed as shale gas projects develop into a larger scale operation. It also confirms that most of the directives have been implemented into national law of the countries which were scrutinized. In the rare case of non-implementation, other national regulations exist governing the concerned activity or transposition is imminent.

The Commission seems to agree with the study's results. EU Energy Commissioner, Günther Oettinger, for example, expressed a very positive attitude towards shale gas. Speaking at an energy conference in Brussels on 17 July 2012, he argued that since the US used shale gas to reduce its dependence on cheap imports from Qatar and Nigeria, they now pay roughly 30% of the European gas price. He added "*we are not really active in looking at which risks and options we would have with shale gas*". His objective here was that access to shale gas could help EU energy prices come down and this would be favorable for the EU industrial production (which fell from 22% in 2000 to 18% in 2010). With the launching on 27 March 2013 of the Green Paper setting out Europe's energy and climate aims for 2030<sup>47</sup>, Oettinger reiterated his favourable position on shale gas. This green paper explicitly underlines "*.. a need to enable the future exploitation of indigenous oil and gas resources, both conventional and unconventional in an environmentally safe manner, ...*".<sup>48</sup> Overall, Oettinger's positive attitude towards shale gas does not seem to meet an unfavourable tone from other commissioners.

Six other studies already published have offered more information to the Commission. The first one<sup>49</sup> shows that extracting shale gas generally imposes a larger environmental footprint than conventional gas development. Risks of surface and ground water contamination, water resource depletion, air and noise emissions, land take, disturbance to biodiversity and impacts related to traffic are deemed to be high in the case of cumulative projects. The second one<sup>50</sup> shows that shale gas produced in the EU causes more GHG emissions than conventional natural gas produced in the EU, but – if well managed – less than imported gas from outside the EU (Russia and Algeria). Conversely, if not well managed, shale gas produced in the EU could cause more GHG emissions than imported gas outside the EU. The third one<sup>51</sup> shows that

<sup>46</sup> Codified directive 2011/92/EU (OJ 28 January 2012, L 26/1). Amendments to this directive have been tabled by the Commission in its communication COM (2012) 628. The revision aims at establishing a framework that allows projects to be developed under the "best possible" environmental conditions. These amendments are awaiting European Parliament's first reading to be held on 12.03.2014.

<sup>47</sup> Green paper: A 2030 framework for climate and energy policies – COM(2013) 169.

<sup>48</sup> COM (2013) 169, p. 11.

<sup>49</sup> A DG ENVI study on the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe. This study was undertaken by AEA Technology plc, under the reference AEA/ED57281/Issue Number 17 of 10.08.2012.

<sup>50</sup> A DG CLIMA study on the climate impact of potential shale gas production in the EU. This study was undertaken by AEA Technology plc, under the reference AEA/ED57412/Issue 2 of 30 July 2012.

<sup>51</sup> A JRC study on the potential impact of unconventional gas, in particular shale gas, on EU energy markets published under the reference JRC 70481 – EUR 25305 EN, 2012.

shale gas developments in the US have led to greater LNG supplies becoming available at global level<sup>52</sup>, indirectly influencing EU gas prices. It also suggests that under a best case scenario, taking into account environmental considerations, future shale gas production in Europe would not make Europe self-sufficient in natural gas. It would offset the decline in the European production of conventional natural gas and would help this way the EU maintain its import dependence at a level around 60% of its total energy needs. In a way or another through a different approach though, these published studies confirm the Cornell Study and the 2011 ENVI study. The fourth one<sup>53</sup>, prepared by JRC, aims at assessing whether the use of certain substances for hydraulic fracturing of shale gas reservoirs has been registered under REACH. The main outcome of the assessment is that neither hydraulic fracturing nor shale gas was explicitly mentioned in the investigated dossiers. Hydraulic fracturing of shale gas reservoirs was not identified as a specific use for any of the substances and a dedicated Exposure Scenario was not developed by any registrant.<sup>54</sup> The fifth one<sup>55</sup>, also prepared by JRC, provides an overview of shale gas development in the USA and describes the implications of findings for the prospects for shale gas development in the EU by 2020-2030. Particular emphasis is given to environmental and social aspects of market-scale extraction of shale gas. The sixth one<sup>56</sup> prepared by Milieu's Ltd's Belgium Office and ordered by DG Environment of the European Commission offers more details on the regulatory provisions governing key aspects of unconventional gas extraction in selected EU countries.

Building on the above studies, the Commission included in its 2013 Work Programme<sup>57</sup> an "environmental, climate and Energy Assessment Framework to enable safe and secure unconventional Hydrocarbon extraction" as new initiative (subject to an impact Assessment).<sup>58</sup> To prepare the impact assessment, the Commission launched an on-line stakeholders' consultation on unconventional fossil fuels such as shale gas at the end of 2012. The results of the consultation and their analysis are contained in an October 2013 report<sup>59</sup> elaborated by DG Environment.

<sup>52</sup> To know more about LNG market, see the International Gas Union's world LNG report 2011, June 2012 (<http://www.igu.org/igu-publications/LNG%20Report%202011.pdf>) and The Economist's special report entitled "LNG a liquid market", 14 July 2012.

<sup>53</sup> Assessment of the use of substances in hydraulic fracturing of shale gas reservoirs under Reach published under reference JRC 83512 – EUR 26069 EN, September 2013.

<sup>54</sup> It should be noted that the oil and gas industries consider that REACH is not the mechanism to address public disclosure concerns regarding the chemical constituents of hydraulic fracturing fluid and has launched its own web-based European chemical disclosure platform for hydraulic fracturing fluids from shale gas extraction: NGS Hydraulic Fracturing Fluid and Additive Component Transparency Service.

<sup>55</sup> Shale gas for Europe – Main environmental and social considerations – A literature review published under reference JRC 74271 – EUR 25498 EN, 2012.

<sup>56</sup> <http://ec.europa.eu/environment/integration/energy/pdf/Final%20Report%2024072013.pdf>.

<sup>57</sup> Commission communication entitled "Commission work programme 2013" – COM (2012) 629, Vol. 1/2, complemented by an Annex – COM (2012) 629, Vol. 2/2.

<sup>58</sup> A roadmap accompanied this initiative ([http://ec.europa.eu/governance/impact/planned\\_ia/docs/2013\\_env\\_004\\_unconventional\\_hydrocarbon\\_extraction\\_en.pdf](http://ec.europa.eu/governance/impact/planned_ia/docs/2013_env_004_unconventional_hydrocarbon_extraction_en.pdf)).

<sup>59</sup> Analysis and presentation of the results of the public consultation "Unconventional fossil fuels (e.g. shale gas) in Europe", 3 October 2013, ([http://ec.europa.eu/environment/integration/energy/pdf/Shale%20gas%20consultation\\_report.pdf](http://ec.europa.eu/environment/integration/energy/pdf/Shale%20gas%20consultation_report.pdf)).

According to this report, opinions on unconventional fossil fuels diverge but responses clearly showed a call for EU action. A large majority of respondents however agree on a strong need for information, the lack of public acceptance and the lack of a clear legal framework. The impact assessment<sup>60</sup> was released by the Commission on 22 January 2014 (see point 5.1)

To conclude, the European Commission appears in general positive towards the exploitation of shale gas in the EU. The various studies appear more on the cautious side, and so do the results of the public consultation.

### **3.2. The European Parliament**

Reports on different aspects of shale gas were issued in 2012 by two Committees of the European Parliament: the ITRE (Industry, Research and Energy Committee)<sup>61</sup> and the ENVI (Environment, Public Health and Food safety Committee)<sup>62</sup>. One can say that both reports are favorable to shale gas development and even call for its development. The ITRE report is generally unambiguous while the ENVI report has been perceived quite hypocrite.

Both reports confirm that the risks are well-understood and can be effectively managed with existing technology and best practices.

Neither report calls for new regulation. But both reports take the stance that further screening is needed of both European and national law to assess their adequacy. There is one exception however. The ENVI report urges the Commission to bring forward legislative proposals to make the use of completion combustion devices mandatory for all shale gas wells in the EU. Both reports also call for a “Best Available Techniques Reference” document for hydraulic fracturing. Disclosure of chemicals used in fracturing fluid is a key issue for both reports too, with the ITRE urging full disclosure while ENVI calling for disclosure on a mandatory basis. Concerns over the potential of shale gas development to damage water supplies through leakage from wells can be addressed in the case of ITRE through the adoption of best practices in well development and construction and through the adoption of water provision plans for ENVI based on local hydrology. These two reports also want to ensure participation of citizens and consider that the polluter-pays principle should be applied.

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<sup>60</sup> SWD(2014) 16.

<sup>61</sup> Report on industrial, energy and other aspects of shale gas and oil – Doc. 2011/2309(INI) dated 25.09.2012.

<sup>62</sup> Report on the environmental impacts of shale gas and shale oil extraction activities – Doc. 2011/2308(INI) dated 25.09.2012.

Still in 2012, the European Parliament adopted two non-committal resolutions<sup>63</sup> on shale gas drilling and hydraulic fracturing which call Member States to be cautious in going further with unconventional fossil fuels and to implement all existing regulations effectively. In both resolutions, the European Parliament does not reject the method of extraction (hydraulic fracturing).

On 9 October 2013, following a vote to amend a European Commission proposal to revise the Environmental Impact Assessment (EIA) Directive, the European Parliament proposed that shale gas exploration and extraction projects involving hydraulic fracturing be added to the list of projects for which an environmental impact assessment must be undertaken before planning permission (or equivalent in Member States).<sup>64</sup> According to the European Parliament, this proposal could help mitigate the absence of rejection of the hydraulic fracturing method.<sup>65</sup> But almost two months later, however, the European Parliament accepted to drop its proposal (see point 5.2.).

### 3.3. The European Council

In February 2011, EU leaders concluded that there is a need to assess Europe's potential for *sustainable* extraction and use of unconventional fossil fuel resources, including shale gas. At their Brussels Summit on 22 May 2013, they added that EU energy policy must shift towards diversifying supply, with natural shale gas likely to be part of the mix. In addition, at that occasion, UK Prime Minister David Cameron brought strong support for European exploitation of shale gas, even telling journalists: *"No regulation must get in the way."* Emphasis on competitiveness and high energy prices was also on the agenda, as well as the Green Paper on a 2030 framework for climate and energy policies.

This said, the written conclusions<sup>66</sup> of the European Council of 22 May 2013 remain cautious. They do not explicitly mention shale gas. They shyly indicate that: *"It remains crucial to further intensify the diversification of Europe's energy supply and develop indigenous energy resources to ensure security of supply, reduce the EU's external energy dependency and stimulate growth."* And to that end, notably, *"the Commission intends to assess a more systematic recourse to on-shore and off-shore*

<sup>63</sup> European Parliament resolution of 21 November 2012 on the environmental impacts of shale gas and shale oil extraction activities (2011/2308(INI)) and European Parliament resolution of 21 November 2012 industrial, energy and other aspects of shale gas and oil (2011/2309(INI)).

<sup>64</sup> See notably the previous ENVI report dated 22 July 2013 (A7-0277/2013), Amendment 31, p. 21 (<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2013-0277+0+DOC+PDF+V0//EN>).

<sup>65</sup> See European Parliament press release – Plenary Session – 9 October 2013.

<sup>66</sup> European Council Conclusions of 22 May 2013 (doc. EUCO 75/1/13 REV 1; CO EUR 7; CONCL 5 of 23 May 2013). Full text of the amendments proposed by the European Parliament can be found on the following website: <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P7-TA-2013-413>

*indigenous sources of energy with a view to their safe, sustainable and cost-effective exploitation while respecting Member States' choices of energy mix; ...". They also call for "the phasing out of environmentally or economically harmful subsidies, including for fossil fuels;". Such a call coming from Europe's political leaders in the European Council is noteworthy.*

## § 4. THE VARIOUS APPROACHES OF THE MEMBER STATES TO DEVELOPING SHALE GAS RESOURCES

Article 194 (2) TFUE states that Member States have sovereign rights regarding the choice of energy mix. Issuing licenses and other approvals for the exploration and exploitation of hydrocarbon resources is also a Member State prerogative. So all EU Member States can decide whether they want or not to exploit shale gas as domestic energy source, as long as they respect fully the obligations of the existing legal framework.

On that basis, Member States' attitude regarding shale gas varies a lot.<sup>67</sup>

Poland looks at shale gas in a very enthusiastic manner for three main reasons. First, it deems that shale gas emits, referring to the US experience, 50% less GHG emissions than other fossil fuels. Second, it sees shale gas as an opportunity for being less dependent from external gas sources, i.e. Russia. Third, it takes less time to explore and exploit shale gas than to build a nuclear power plant. About 110 shale gas exploration concessions have been granted and up to now more than 45 wells have been drilled with mixed results. Even if the results from some exploration wells have been disappointing and has led to the exit of important players<sup>68</sup>, the rate of drilling is set to increase the next years. Donald Tusk, Poland's Prime Minister, has even projected that commercial production of shale gas will take place late 2014/early 2015.

Nevertheless, an energy market report from Business Monitor International published in December 2013<sup>69</sup> has deemed this schedule too optimistic. According to the report, commercial production of shale gas in Poland will not occur before 2019. Among the reasons invoked, a draft law whose adoption has been repeatedly delayed. The changes which should be brought by this new law are related to: (1) the role of the government in the supervision of the sector (creation of a 100% state-owned operator, NOKE, to take stakes in future extraction concessions and a Hydrocarbon Generation Fund which will make long-term investments; (2) exploration concessions; and (3) procedures aiming at simplifying the assessment of the environmental impact of the exploration and production of shale gas. Also among the

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<sup>67</sup> See for more on the subject, L. Parmigiani, Dynamics and drivers of shale gas development in three European countries: can a European policy be imagined?, *Actuelles de l'IFRI*, Novembre 2013. See also S. Cornot-Gandolphe, *Gaz de schiste en Pologne, au Royaume-Uni, et au Danemark: vers un modèle européen?*, note de l'IFRI, Janvier 2014.

<sup>68</sup> For instance, US company ExxonMobil stopped all its exploratory tests because "no demonstrated sustained commercial hydrocarbon flow rates" were observed. More recently, Talisman Energy and Marathon Oil followed the same path after "unsuccessful attempts to find commercial levels of hydrocarbons". Other companies such as Poland's PGNiG and US giant ConocoPhillips have decided to abandon some regions because of difficult geological conditions.

<sup>69</sup> Poland Oil & Gas Report Q1 2014, 20 December 2013, pp. 135, ([http://www.fastmr.com/prod/759124\\_poland\\_oil\\_gas\\_report\\_q1\\_2014.aspx?afid=302](http://www.fastmr.com/prod/759124_poland_oil_gas_report_q1_2014.aspx?afid=302)).

reasons invoked, a fiscal reform applicable to the production of unconventional hydrocarbons.

Pushed by the rising tensions in Ukraine, progress has been made to accelerate shale gas activities in Poland however. In March 2013, the Polish government adopted a new draft legislation more attractive for investors. Tax on shale gas extraction will not be imposed until 2020 and after 2020 tax will not exceed 40% of profit arising from extraction. Plans to create a state-owned operator are given up. License procedures will be simplified and accelerated.<sup>70</sup> Put on fast track, the legislation could take effect this year.

France, privileged by its choice for nuclear power, was the first country to ban the use of hydraulic fracking with the “Jacob Law” adopted in July 2011<sup>71</sup>. Article 2 of this law foresaw however the creation of a “National Commission of Orientation” to evaluate the environmental issues involved in shale gas. This Commission was set up by a 2012 Decree<sup>72</sup> but the government has up to now refused to appoint 12 of 22 members whom it is supposed to appoint, so preventing its effective implementation. Since then, several reports in favour of shale gas were published and tried to rekindle discussions but without meeting success.<sup>73</sup> On 11 October 2013, the French Constitutional Council rejected an appeal from Schuepbach Energy to strike down the “Jacob Law” prohibiting fracking for shale gas. In its decision<sup>74</sup>, the French Constitutional Council indicated that the Jacob Law “conforms to the Constitution” and is not “disproportionate”. Schuepbach Energy had won two permits, later cancelled, to explore for shale gas in France. It is now seeking compensation from the French government for a sum reported by French media to be € 1bn. So in France shale gas remains a sensitive file and this file is far from being settled.

UK supports shale gas eagerly for several reasons. UK has given gas a significant role to play in its energy mix (35%). However, due to a decline of its conventional gas

<sup>70</sup> <http://adoptanegotiator.org/2014/03/11/the-120-days-of-the-polish-cop-presidency/> and <http://www.gpwinfostrefa.pl/GPWIS2/en/index/news/info/578202,poland-gives-up-on-creating-noke-national-mineables-operator--introduces-single-e&e-permit---cir.>

<sup>71</sup> Loi n° 2011-835 du 13 July 2011.

<sup>72</sup> Décret n° 2012-385 du 21 mars 2012 relatif à la Commission nationale d'orientation, de suivi et d'évaluation des techniques d'exploration et d'exploitation des hydrocarbures liquides et gazeux.

<sup>73</sup> See notably a February 2012 expert study published in March 2012 by the French government entitled « Shale hydrocarbons in France » clearly in favour of exploration and which recommended a focus on the Paris Basin ([http://www.developpement-durable.gouv.fr/IMG/pdf/007612-01\\_et\\_007612-03\\_rapports.pdf](http://www.developpement-durable.gouv.fr/IMG/pdf/007612-01_et_007612-03_rapports.pdf)). See also the November 2012 Gallois report ordered by the government which proposed 22 measures to rebuild competitiveness in France. The fifth one was on shale gas. ([http://www.gouvernement.fr/sites/default/files/fichiers\\_joints/rapport\\_de\\_louis\\_gallois\\_sur\\_la\\_competitivite\\_0.pdf](http://www.gouvernement.fr/sites/default/files/fichiers_joints/rapport_de_louis_gallois_sur_la_competitivite_0.pdf)). Finally, see the June 2013 report requested by the Economic Affairs Committee of the French Senate entitled “Les techniques alternatives à la fracturation hydraulique pour l'exploration et l'exploitation des hydrocarbures non conventionnels, rapport n° 640 (2012-2013) de MM. Jean-Claude Lenoir, sénateur et Christian Bataille, député, fait au nom de l'Office parlementaire d'évaluation des choix scientifiques et technologiques, déposé le 5 juin 2013 (<http://www.senat.fr/rap/r12-640/r12-640.html>).

<sup>74</sup> Decision No 2013-346 QPC dated 11 October 2013 (<http://www.conseil-constitutionnel.fr/conseil-constitutionnel/francais/les-decisions/acces-par-date/decisions-depuis-1959/2013/2013-346-qpc/decision-n-2013-346-qpc-du-11-octobre-2013.138283.html>).



production, the country faces an increasing dependency towards gas imports<sup>75</sup>, affecting its trade balance. Shale gas is thus seen there as an opportunity to reduce dependence upon imported gas and improve its trade balance. It is also seen as a means to maintain a traditional gas industry on its territory.<sup>76</sup> In the UK, concerns were raised following seismic activity near Cuadrilla's drilling site in Blackpool in April/May 2011. The UK halted exploratory fracking in May 2012 but in December of the same year, the government authorized the resumption of the exploratory hydraulic fracturing activities. Its view is that the risks are worth taking, though an analysis from Bloomberg New Energy Finance<sup>77</sup> suggests that the development of shale gas resource in the UK is unlikely to lead to a significant reduction in UK natural gas prices.<sup>78</sup> The House of Commons (Energy and Climate Change Committee) in its seventh report of session 2012-2013 is more cautious and concludes that substantial uncertainty remain about the impact shale gas will have on gas prices.<sup>79</sup>

In July 2013, the UK government announced generous tax breaks to stimulate shale gas industry and at the beginning of 2014 incentives to local communities to encourage them to accept drilling in their area. In addition, to reassure the local communities affected by fracking and which continue to protest strongly against shale gas exploration, Public Health England issued end of October 2013 a report<sup>80</sup> as a "draft for comment" for one month which reviews the literature on the potential public health impacts of exposures to chemical and radioactive pollutants as a result of shale gas extraction. According to this report, fracking for shale gas is safe as long as operations are properly regulated and properly run. Most of the problems in the US according to the report resulted from failures of the regulators and companies to observe good practices. The report also finds that the contamination of groundwater was "likely to be caused by leakage through the vertical borehole" used for fracking. As a result, well integrity was identified as the key concern. However, the report was unable to say whether current government regulations and the operations of the UK's only company to have fracked for shale gas met the criteria of being "properly regulated and properly run" and whether potential problems with well integrity had been addressed. Finally, the report examines some of the chemicals used at fracking sites in the US but has not examined the effects of the main two chemicals (oxirane and antimony trioxide) that Cuadrilla wants to use in the UK.<sup>81</sup>

<sup>75</sup> Imports mainly come from Norway and the Netherlands via pipelines and from Qatar (LNG).

<sup>76</sup> See S. Cornot-Gandolphe, *op. cit.*, p.7.

<sup>77</sup> <http://about.bnef.com/press-releases/uk-shale-gas-no-get-out-of-jail-free-card/>.

<sup>78</sup> The same opinion is shared by P. Stevens, "Shale gas in the United Kingdom", Chatham House, Energy, Environment and Resources 2013/02, December 2013, p. 5 (<http://www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/131213shalegas.pdf>).

<sup>79</sup> See the Seventh report of Session 2012-2013 of the House of Commons (Energy and Climate Change Committee) entitled « The Impact of Shale Gas on Energy Markets », Vol. 1, 23 April 2013.

<sup>80</sup> [http://www.hpa.org.uk/webc/HPAwebFile/HPAweb\\_C/1317140158707](http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317140158707).

<sup>81</sup> In the UK, companies wishing to inject fluid containing pollutants into the ground may need a permit from the Environment Agency. Permits are issued on a site-by-site basis, considering the proximity of the groundwater. In the case of Cuadrilla, the UK Environment Agency banned antimony trioxide but granted permission to oxirane despite concerns over its safety.

Germany has reservations about shale gas development. Shortly after the disaster of Fukushima in 2011, Germany initiated an energy transition process (Energiewende). All nuclear power plants will be shut down until 2022 and natural gas is regarded by the country as an important transition energy source which could replace part of the energy from nuclear power plants. But the decline of Germany's natural gas production has obliged Germany to rely mainly on imported pipelines gas (originating mainly from Russia, Norway, the Netherlands). So, like in the UK, domestic shale gas production is seen as an opportunity to lower this dependency. It is also seen as an alternative source of stable and cleaner energy to complement intermittent renewables. In December 2012, the German Parliament during its second consideration on shale gas rejected calls for a ban on hydraulic fracturing. In late February 2013 the German government issued draft legislation allowing the development of shale and the use of hydraulic fracturing under environmental safeguards but, due to strong political opposition, postponed its adoption until after the Federal elections on 22 September 2013. In the wake of these elections however the new coalition between the CDU and the SPD agreed to keep a moratorium in place on hydraulic fracturing until environmental concerns are resolved.

In Spain, the competence of exploration and development of shale gas is shared between the autonomous communities and the central government depending whether the permit crosses one or several regions. The central government has repeatedly voiced its support for shale gas exploration. During an intervention in the Senate in February 2013, the Minister of Industry, Energy and Tourism stated that the government will pursue opportunities involving hydraulic fracturing as long as they comply with environmental regulation and in March 2013 the Spanish parliament adopted a bill facilitating the use of the controversial method. In April 2013, despite the lousy economic shape of the country, the autonomous community of Cantabria passed a law to ban the use of hydraulic fracturing in the region where Spain's richest shale gas deposits lie. However Spain's central government announced in January 2014 it will file a legal challenge in the country's Constitutional Court against this fracking ban. With Spain importing more than 70% of its natural gas needs, Cantabria seems too rich to be ignored.

Elsewhere in the EU, the approaches vary too. Here are a few examples. The Netherlands and Luxembourg have suspended drilling for shale gas. Bulgaria banned in 2012 shale oil and gas exploration through hydraulic fracturing following political and public pressure. The Bulgarian government has stated that it will review its stand once shale gas is being substantively discussed at EU level. On the other hand, the Romanian authorities have reversed their decision of April 2012 to ban shale gas exploration and have granted Chevron on 31 January 2013 the certificate it needed to start exploring for shale gas in the eastern part of the country. But in this country, protests against fracking are ongoing. The Czech Republic introduced a moratorium on shale gas exploration. Shale gas exploration in the latter country is banned until

at least mid-2014 in view to allow the government to propose new legislation covering unconventional hydrocarbon developments. Finally, Italy does not want to develop shale gas. Instead, this country intends to strengthen its national infrastructure for gas storage and gasification in view of the large quantities of gas that are going to be imported into the Continent of Europe in the future.



## § 5. THE EMERGING EU FRAMEWORK

### 5.1. The 2014 shale gas recommendation

This debate on shale gas is taking place while the EU is seeking a new energy and climate policy. It is thus connected to broader discussions related to the future EU energy/climate framework for 2030. Here, the European Commission had a choice to make between three options to minimize the risks stemming from shale gas activities: (1) offering “soft guidance” to the industry; (2) bringing amendments to existing legislation; or (3) elaborating a standalone instrument such as a new directive applicable across the EU.

On 22 January 2014, the European Commission presented its proposals and revealed it had chosen option 1 with the issuance of a recommendation<sup>82</sup>, accompanied by a communication<sup>83</sup> and an impact assessment<sup>84</sup>. Two reasons have most probably justified the choice of a recommendation. On the one hand, the pressure of big pro-shale Member States (such as Poland and the UK) and the oil and gas industry. On the other hand, the lack of experience in the area albeit a lot of studies have already been ordered by the European Commission. A third reason could also be added. A too precise text on operating standards would have had few chances to be adopted by Member States because they are so much divided on the issue.

In this recommendation, it has been recognized that the current EU’s environmental legislation was developed before the emergence of shale gas activities in Europe and that certain aspects involving these activities are not comprehensively addressed.<sup>85</sup> Consequently, the recommendation defines a series of common and minimum principles and invites Member States to take them into account when applying or adapting their regulations related to hydraulic fracturing. These principles covers a certain number of issues such as (1) strategic environmental impact assessment prior granting licenses in order to prevent, manage and mitigate cumulative impacts as well as prevent possible conflicts with other uses of natural resources; (2) underground risk assessment; (3) well integrity; (4) baseline reporting to provide a reference for subsequent monitoring; (5) capture of methane emissions (but no obligation for using “green completion like in the US”) as well as limitation of venting (release of gases into the atmosphere) and minimization of flaring (controlled burning of gases); (6) public disclosure of chemicals and volumes of water used in

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<sup>82</sup> Commission Recommendation 2014/70/EU of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing (OJ 2014, L 39/72).

<sup>83</sup> Communication from the Commission on the exploration and production of hydrocarbons (such as shale gas) using high volume hydraulic fracturing in the EU – COM(2014) 23 final. This communication outlines the potential new opportunities and challenges stemming from shale gas extraction in Europe.

<sup>84</sup> SWD(2014) 15 final. The impact assessment examines the socio-economic and environmental impacts of various policy options.

<sup>85</sup> See Recital (8) of recommendation 2014/70/EU.

each well; and (7) application of best available techniques (BAT). They are expected to be made effective by EU Member States by 28 July 2014.

The recommendation also includes a review clause to assess the effectiveness of this approach. Depending on the results of the assessment, the Commission will decide whether it is necessary to update the recommendation or to table legislative proposals with legally-binding provisions. This could be seen as a smart tactical approach to transfer the burden of this controversial topic to the next Commission.

## **5.2. The revision of the Environmental Impact Assessment Directive (EIA Directive)**

Directive 2011/92/EU<sup>86</sup> contains a legal requirement to carry out an environmental impact assessment (EIA) of public or private projects likely to have significant effects on the environment, prior to their authorization. The EIA is also a tool to assess the environmental costs and benefits of specific projects with the aim of ensuring their sustainability.

In 2012, the European Commission submitted a proposal to amend this Directive.<sup>87</sup> This proposal is part of the initiatives aiming to implement the Roadmap to a resource-efficient Europe<sup>88</sup>. It also subscribes to the Europe 2020 Strategy<sup>89</sup>. In that context, in October 2013 as mentioned above, the European Parliament proposed that all shale gas exploration and extraction projects involving hydraulic fracturing be added to the list of projects for which an environmental impact assessment must be undertaken before planning permission (or equivalent in Member States). This proposal was justified by the fact that under the current EIA Directive an environmental impact assessment is mandatory for projects falling within its Annex I.14, i.e. extraction of natural gas where the amount of gas extracted exceeds 500 000 cubic meters per day. However, many shale gas projects yield less and hence are not subject to a mandatory impact assessment requirement. Instead, they are subject to a screening procedure which takes place either on a case-by-case basis or through thresholds or criteria decided by the Member State concerned.

In December 2013, a compromised agreement was reached, after a fourth round of negotiations between the European Parliament, the Commission and the COREPER (representing the 28 Member States). As a result, the European Parliament accepted to drop its proposal to mandate environmental impact assessments for all shale gas

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<sup>86</sup> Directive 2011/92/EU (OJ L 26, 28.1.2012, p.1) codifies Directive 85/337/EEC and its three subsequent amendments (Directives 97/11/EC, 2003/35/EC and 2009/31/EC).

<sup>87</sup> COM (2012) 628 final.

<sup>88</sup> COM (2011) 571.

<sup>89</sup> COM (2010) 2020.

projects.<sup>90</sup> This was formally approved by the European Parliament at its 10-13 March 2014 plenary session. The Council of the European Union is expected to give its endorsement over the coming weeks.

It is worth mentioning that the recommendation issued by the European Commission reintroduces the requirement to submit shale gas projects to an environmental impact assessment by inviting Member States to take *“the necessary measures to ensure that an environmental impact assessment is carried out on the basis of the requirements of Directive 2011/92/EU”*. The terms *“on the basis of the requirements of Directive 2011/92/EU”* are ambiguous however. The EIA directive requires a mandatory environmental impact assessment for shale gas projects that extract at least 500 000 cubic metres each day. Hence, are shale gas projects below 500 000 cubic metres – which are the majority – covered?

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<sup>90</sup> <http://www.europarl.europa.eu/news/en/news-room/content/20140210IPR35522/html/Committee-MEPs-back-beefed-up-environmental-impact-assessment-directive>.





## CONCLUSION

The exploration and exploitation of shale gas as a new energy source has recently emerged in the European debate. The EU institutions have worked a lot, and produced quite little until now. Some Member States have given out licenses for the exploration of such resources on their territory. Exploration wells have sometimes been drilled and some hydraulic fracturing has already been carried out or will be in the near future. Commercial production could start in 2015-2017 in the most advanced Member States.

This new energy source has triggered high expectations. To measure its potentialities, one must take many parameters into consideration: additional growth, climate change and the transition to a sustainable energy system; security of supply; environment and human health aspects; competitiveness of enterprises; jobs' creation. After many readings, these expectations appear clearly to have been raised too high.

### ◆ **Shale gas could potentially bring benefits, although limited**

In general, new energy resources are always welcome (except when they aggravate climate warming). They can increase revenues, reduce prices, develop easily competitiveness. However, in the present circumstances, the net benefits appear quite limited. Firstly, Europe has less proven shale gas reserves. Secondly, geology places it deeper in the ground, and it is more difficult and more expensive to reach. The exploitation is thus technically and economically less advantageous than in the United States. Thirdly, population density is generally higher in Europe, and thus the potential collateral damages more threatening. This could generate greater regulatory protection, and thus more costs. Fourthly, in some areas, important additional investments in infrastructure will be needed. Moreover, the competitiveness of European shale gas will also depend on developments outside the EU (such as, for instance, the possible rise of US exports of LNG). Revealingly, after asking for authorizations, different operators have already retired from the Polish market. This must be seen as a sign that, even with reserves and a favorable approach from the national authorities, exploitation will certainly not be easy.

In the best case, the economic net benefits brought by shale gas will remain limited. Even in the United States, where a lot of factors were more favorable, they are not impressive. *"The long-term effect on the US economy as a whole is small, in order of a one-off rise in GDP of 0.84%. These are "one-off" effects because they do not increase the annual growth rate of GDP. They are actually quite small in terms of long run growth in the level of GDP. The short-term effects on GDP are slightly larger, but are not lasting. These include a one-off boost from a decline in gas prices for residential consumers (estimated at 0.4% of GDP), a similar boost from increased investment*

*and employment in the oil and gas sector of around the same magnitude. These latter effects have nevertheless been short term and are non-replicable effects in economies at full employment.<sup>91</sup>*

◆ **Currently shale gas still raises fundamental questions regarding environment and health**

These weak benefits could be weakened yet by the existing uncertainties surrounding the externalities of environmental damage that may be associated with shale gas operations. This should be accounted for in the “cost” which obviously influences gas prices. In addition, without financial support, shale gas is unlikely to be cheap enough to squeeze coal out in power generation as it has been done in the US.

A pivotal question in that regard is whether shale gas in the EU can be extracted presently under safe conditions, in particular in a context of greater population density than in the US and in a context of absence of sufficient available data about the level of methane emissions which represents a potentially significant addition to greenhouse gas emissions?

Another pivotal question is related to the absence of debate at EU level concerning water. There is more and more an interdependence between water resources and energy needs. Water is needed notably for hydropower, to cool power plants, to produce transportation biofuels and now to develop shale gas industry. This situation entails a growing impact on water availability for other activities and for drinking water as well as raises water quality risks. All this happens in a context of climate change which exacerbates the problem. It would be a mistake to take water resources for granted.

◆ **Whatever will happen with shale gas, the structural challenges remain the same**

Finally, even in the best case of shale gas development, all present challenges will remain. In that perspective, it must be remembered that shale gas does not constitute a renewable energy. It is a fossil fuel. It does not help the climate by reducing greenhouse gases if used without widespread cost effective CCS technology or with other fossil fuels (such as coal).

Additionally, if shale gas has helped the US to cut its GHG emissions, it is because coal that would have been burnt in the US has simply been shipped elsewhere for burning, leading to more GHG emissions there (including Europe). This brings back

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<sup>91</sup> T. Spencer, O. Sartor, Mathilde Mathieu, Unconventional wisdom: an economic analysis of US shale gas and implications for the EU, IDRI, Policy Brief, No 05/14 February 2014, p. 20.

into question shale gas' role as a viable transition fuel. It only really works if the coal to gas switch happens at a global scale and CCS become widespread (or coal mines actually start to close).

Furthermore, even in the best case, shale gas will not free the EU from its external dependency. It will have a short and limited influence on the domestic gas supply. It will thus only compensate during a brief period the continuing decrease of natural gas production in Europe. Finally, its competitiveness benefits will be far from those of the United States.

So the final conclusion concerning the perspectives of shale gas exploitation in Europe could be: (1°) both the economic and the sustainability aspects still require more analysis, (2°) even in the best case, the benefits will be substantially more limited than in the United States, where they are already modest, (3°) this exploitation anyway will not happen quickly, and (4°) it is of the essence to keep on concentrating on the real solutions for the long term future. The real challenges and solutions of the EU energy strategy are elsewhere.

