

**DAVID GRODZKI**

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Poland's Shale.  
Europe's Small Kuwait or Dry Land?

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*Editor and typesetting:*

Andrea Tevelyné Kulcsár

*Editorial office:*

H-1016 Budapest, Bérc utca 13-15.

Tel.: +36 1 279-5700

Fax: +36 1 279-5701

E-mail: [titkarsag@hii.hu](mailto:titkarsag@hii.hu)

[www.kulugyiintezet.hu](http://www.kulugyiintezet.hu)

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*Shale gas is not a new discovery. First wells to extract it have been drilled as early as 1821 in Fredonia, NY,<sup>1</sup> however, commercial extraction of shale gas began only in the 1970s in the United States. Diminishing domestic reserves and falling production necessitated the exploitation of alternative sources of natural gas, most prominently gas trapped in shale rock formations. Since the turn of the century, shale gas has been the fastest growing contributor to total primary energy in the US.<sup>2</sup> In the last ten years, the US has been able to reduce its natural gas imports significantly, covering around 90 per cent of total domestic gas consumption from domestic production.<sup>3</sup> The shale gas success story has inspired countries around the world to try and emulate the developments in the United States.*

## POLAND'S SHALE GAS

The most eager and prominent country among the shale gas enthusiasts across the Atlantic is Poland. Hopes in the EU member state are great that shale gas will allow the country to free itself from the clutches of Russian “energy imperialism”.<sup>4</sup> Following the initial publication of the first Energy Information Administration (EIA) report on 48 shale gas basins around the world in April 2011, Poland’s reserves were estimated to hold as much as 187 trillion cubic feet (tcf) of technically recoverable shale gas, the largest in Europe. Proved natural gas reserves in Poland are considered much smaller, estimated at around 5.8tcf.<sup>5</sup> The EIA report triggered a new “gold rush” in Europe, with energy majors and smaller companies rushing in to secure the most prospective concessions in Poland’s Baltic Basin.

The Polish government has so far granted 111 rights to drill test wells to domestic and international companies, including majors like Chevron, Exxon Mobil, ENI or ConocoPhillips. However, the most prospective blocks have been awarded to smaller players like 3Legs Resource, BNK Petroleum or San Leon Energy.<sup>6</sup> Poland’s natural gas monopoly PGNiG was awarded 15 concessions<sup>7</sup> while PKN Orlen was granted six. Interestingly, oil refinery group Lotos was excluded from holding any concessions in

1 “New York’s Natural Gas History – A Long Story, but Not the Final Chapter”. *New York State Department Environmental Conservation*, [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/nyserda2.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/nyserda2.pdf). Last accessed: 10 September 2012.

2 Maria van den Hoeven: “World Energy Outlook 2011: Are We Entering a Golden Age of Gas?”. *International Energy Agency (IEA) Special Report*, [http://www.iea.org/newsroomandevents/speeches/igu\\_croatia.pdf](http://www.iea.org/newsroomandevents/speeches/igu_croatia.pdf), 29 September 2011.

3 Natural Gas Supply <http://www.naturalgas.org/business/supply.asp>

4 Michael J. Economides – Nate Evans: “Gazprom’s Energy Imperialism”. *Energy Tribune*, <http://www.energytribune.com/1258/gazproms-energy-imperialism>, 7 August 2008.

5 “World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States”. *US Energy Information Administration*, <http://www.eia.gov/analysis/studies/worldshalegas/pdf/fullreport.pdf>, 5 April 2011.

6 “ExxonMobil Leaves Poland Guessing”. *Natural Gas Europe*, <http://www.naturalgaseurope.com/exxonmobil-leaves-poland-shale-gas>, 20 June 2012.

7 “Five Polish Firms to Accelerate Shale Development”. *Natural Gas Europe*, <http://www.naturalgaseurope.com/pgnig-enea-kghm-pge-tauron-shale-gas-deal>, 4 July 2012.

Poland and currently only owns concessions in the Baltic Sea region – mostly Lithuania.<sup>8</sup> A further few dozen requests to drill wells are currently awaiting approval – which could bring the total of wells drilled till 2021 to as many as 300. Currently 122 test wells have to be drilled under contract till then. Progress has been rapid. So far 23 test wells have been drilled, and a further six wells are currently under work. Results, however, have been mixed. Whereas US major Exxon Mobil has decided to abandon its Polish test sides after two unsuccessful test drills (a story that mirrors its exit from Hungary<sup>9</sup>), smaller players, such as 3Legs Resource and San Leon Energy have been more successful. 3Legs Resource's test drillings at Lebien LE-2H, the first well to deliver sustained shale gas production, and Warblino LE-1H were successful enough to convince the company to spud a fifth well in October at Strzeszewo LE-1. Together with ConocoPhillips, 3Legs Resource might move those wells into production by 2014. Very recently BNK Petroleum announced that it was seeking permission to drill a horizontal well at Gapowo B-1 after the company found substantially higher than expected volumes at gas at a depth of 4300 metres. With total gas readings 20 times higher than in its previously most successful test side, Lebork S-1 well, Gapowo B-1 might prove the necessary “gold vein” necessary to rekindle the interest of many wary majors.<sup>10</sup> San Leon Energy, too, has so far mostly reported positive results from various test drill sites, including very encouraging results from its Siciny-2, which might include gas shows as large as 193 billion cubic feet (bcf) in zone one, and another 97bcf in zone two of its prospective five zones concession.<sup>11</sup> Only a few weeks later the company announced a third successful test drill, this time at its Szymkowo-1 well in the Baltic Basin.<sup>12</sup>

### THE GOVERNMENT'S ROLE IN THE FACE OF POLAND'S ENERGY NEEDS

However, even though most companies remain determined to explore and exploit shale gas, many problems loom on the horizon that might cause considerable headaches in Warsaw. Some of the issues will need to be addressed by the government directly, others will require a stronger commitment from local politicians in cooperation with representatives of the natural gas extraction industry. Among the most pressing issues is the currently pending presentation of a draft bill concerning the future taxation of shale gas businesses. The bill was scheduled to be revealed to the public in

8 “Lotos Seeks Partner for Shale Gas Projects in Poland”. *WarsawVoice.pl*, <http://www.warsawvoice.pl/WVpage/pages/article.php/21383/news>, 2 July 2012.

9 “ExxonMobils Quits Hungarian Shale Test”. *Upstream*, <http://www.upstreamonline.com/live/article195304.ece>, 8 October 2009.

10 “Poland: BNK Charts Major Gas Shows at Gapowo Well”. *Natural Gas Europe*, <http://www.naturalgaseurope.com/poland-bnk-major-gas-shows>, 7 August 2012.

11 “San Leon ‘More Than Encouraged’ on Siciny-2 Results”. *Natural Gas Europe*, <http://www.naturalgaseurope.com/poland-bnk-major-gas-shows>, 26 June 2012.

12 “Talisman, San Leon Hits Shale Gas at Szymkowo-1 Well”. *Natural Gas Europe*, <http://www.naturalgaseurope.com/talismans-san-leon-szymkowo1-well-hits-shale-gas>, 17 July 2012.

mid June, but its publication was called off after the sudden announcement by US major ExxonMobil that it was pulling out of Poland. The government has since then been working on redrafting the bill, with recent leaks suggesting that the government is currently eyeing a double-40 per cent solution: Poland would control around 40 per cent of each shale gas producing site and will charge a 40 per cent tax on the explored gas.<sup>13</sup> Exploration and production of shale gas requires a stable regulatory framework that will allow companies to assess future costs and benefits – an issue that is currently in limbo given the delay in the publication of the new shale gas bill. The government's major task therefore will be not only to produce a bill as soon as possible, but it will have to ensure that incentives are abundant to attract foreign investments in the nascent shale gas industry.

Given Poland's complicated and often painful historical relations with Russia, one could reasonably expect very strong support from across the political spectrum for the development of shale gas. However, even though Prime Minister Donald Tusk has repeatedly stated that the Polish government is determined to promote the creation of a shale gas industry in the country, going as far as calling it the beginning of a new epoch for energy in Poland,<sup>14</sup> few tangible steps have so far been taken by the governing coalition of Civic Platform (*Platforma Obywatelska*, PO) and Peasant Party (*Polskie Stronnictwo Ludowe*, literally Polish People's Party, PSL). An agreement between Poland and Canada was negotiated that will see both countries strengthen cooperation in the field of energy policies, including renewables, nuclear power and, maybe most importantly, shale gas development.<sup>15</sup> The exchange of experts and know-how with the US and Canada, as well as the establishment of cooperation with institutions more experienced with the development of fossil fuel industries has been strengthened and intensified since the beginning of 2011. However, so far the government has failed to incorporate shale gas into any meaningful energy policy for the country. Shale gas (and other unconventional gas sources) are not mentioned in the energy strategy till 2030 – entitled Energy Policy of Poland until 2030<sup>16</sup> – but since April 2011 shale gas has been repeatedly mentioned alongside LNG (liquefied natural gas) as a means of ensuring Poland's energy security and potentially a source of massive revenues for the country.

Following the exit of Exxon, the government quickly undertook measures to alleviate the negative impact such news would have. Given that the “free market” approach had so far failed to deliver any sustained gas flows – and most certainly owing to political pressure – Poland's major industrial companies decided to join forces to ensure shale gas extraction will reach commercial quantities within the next three years. KGHM (*Kombinat Górniczo-Hutniczy Miedzi*), Europe's leading copper mining company, teamed up with former gas monopoly PGNiG (*Polskie Górnictwo Naftowe i Gazownictwo*, literally Polish Petroleum and Gas Mining) and the country's three largest utilities PGE (*Polska Grupa*

13 “Poland to Take 40 pct of Shale Gas Concessions-Paper”. *Reuters*, <http://www.reuters.com/article/2012/07/10/poland-shalegas-taxation-idUSL6E8IA15220120710>, 10 July 2012.

14 “Shale Gas will Create ‘New Epoch for Polish Energy Sector’”. *LOT*, <http://www.thenews.pl/1/12/Artykul/99561,Shale-gas-will-create-new-epoch-for-Polish-energy-sector>, 16 May 2012.

15 “Canada and Poland Set to Expand Energy Relationship”. *CBCnews*, <http://www.cbc.ca/news/politics/story/2012/05/14/pol-cp-poland-visit-tusk-harper.html>, 14 May 2012.

16 “Energy Policy of Poland until 2030”. *Ministerstwo Gospodarki*, [http://www.mg.gov.pl/files/upload/8134/Polityka%20Energetyczna%20ost\\_en.pdf](http://www.mg.gov.pl/files/upload/8134/Polityka%20Energetyczna%20ost_en.pdf), 10 November 2009.

*Energetyczna*, Polish Energy Group), Tauron and Enea and will invest approximately 1.7bn złoty (\$515m) to develop PGNiG's Wejherowo concession in northern Poland.<sup>17</sup> The group will drill test wells at Kochanowo, Częstkowo and Tępcz. The Tusk government is convinced that domestically produced gas from shale gas formations will allow energy intensive industries, such as metallurgy or chemistry, to benefit from cheaper energy, thus raising the competitiveness of those industries.<sup>18</sup> The prospect of being able to use shale gas from the test drilling sites to produce energy that would power its operations might have convinced KGHM, while PGNiG could well have been forced by sustained high prices for natural gas, and a lack of room for manoeuvre in negotiations with Gazprom, to begin shale gas explorations in Poland. Whether the group will be successful will depend on many factors, however, despite the solid financial situation, caution is warranted as none of the involved companies has any real experience in shale gas exploration. Their cooperation is nonetheless a strong signal, proving the country's determination to develop its shale gas reserves. Many questions are still unanswered, for example whether the cooperation will extend to joint development and production of potential shale gas plays, or if other PGNiG concessions will be tested in a similar setup. Initial optimism over positive test results at the Lubucino-1 test site, also on the PGNiG-held Wejherowo concession, was followed by flow tests suggesting significant amounts of shale gas.<sup>19</sup>

Poland needs a new and reliable energy source that will allow it to slowly replace coal as its primary energy source. Currently more than 90% of its electricity is generated by burning dirty coal, which also accounts for 56% of its total primary energy supply (TPES). Natural gas, which is less polluting and has lower emission levels, accounts for only 2% in electricity generation and 13% of TPES.<sup>20</sup> The move towards cleaner and more environmentally friendly energy production is not an entirely voluntary one as Poland is forced to adhere to the EU's 2020 goal of cutting its greenhouse gas emissions by 20 per cent. This can only be done through a general reduction of coal-burning – and switching to natural gas currently seems to be the best option the government has as nuclear power is not yet part of its energy portfolio and renewables still have to prove their reliability. However, increased natural gas imports from Russia are not an option for Poland as the country struggles to free itself from its dependence on Moscow and its natural gas export monopoly Gazprom. Instead increased imports from Germany (though often this is revamped Russian gas) as well as future LNG supplies are considered appropriate solutions before domestic shale gas will cover demand and allow the country to export production surpluses to neighbouring countries.

Whether this strategy will succeed is currently unclear. An estimated 100 test drills will have to be undertaken before a first reliable assessment of Poland's shale gas reserves

17 "Poland's Shale: Enter the State". *Beyondbricks*, <http://blogs.ft.com/beyond-brics/2012/07/04/polands-shale-enter-the-state/#axzz1zqyB9cqA>, 4 July 2012.

18 "Five Polish Firms to Accelerate Shale Development". *Natural Gas Europe*, <http://www.naturalgaseurope.com/pgnig-enea-kgm-pge-tauron-shale-gas-deal>, 4 July 2012.

19 "PGNiG: Fracturing in Lubocino". *Natural Gas Europe*, <http://www.naturalgaseurope.com/pgnig-shale-gas-fracturing-in-lubocino>, 11 July 2012.

20 "Poland's Energy Security Strategy". *Journal of Energy Security*, [http://www.ensec.org/index.php?option=com\\_content&view=article&id=279:assessing-polands-energy-security-strategy&catid=114:content0211&Itemid=374](http://www.ensec.org/index.php?option=com_content&view=article&id=279:assessing-polands-energy-security-strategy&catid=114:content0211&Itemid=374), 15 March 2011.



can be produced. It will then be possible to determine if the figures published by the Polish Geological Institute (346 billion–768 billion cubic meters, though potentially as high as 1.9 trillion cubic meters) or the earlier 5.3 trillion cubic meters estimate of the EIA is closer to the Polish reality. Even the lower estimates are good news for Poland – making it the third largest recoverable natural gas reserves in Europe behind Norway and the Netherlands.<sup>21</sup>

## POTENTIAL OBSTACLES TO THE DEVELOPMENT OF A SHALE GAS INDUSTRY IN POLAND

**A**t least six issues need to be considered that might potentially derail the development of Poland's shale gas industry – they concern environmental factors, the country's geology and porosity of its shales, its population density, as well as economic questions.

- Environmental issues concern in particular questions relating to the application of water during and after the 'fracking' (hydraulic fracturing) process. In order to release the trapped gas, a combination of water, chemicals and proppants, such as grains of sand or ceramic, is injected under high pressure into boreholes causing the gas containing rock to crack. While the fluid continues to flow into the newly created fissures, proppants will ensure the gap will remain open, allowing natural gas to flow into the borehole. Critics claim that 'fracking' can lead to the contamination of groundwater aquifers, resulting in health hazards for the population. However, data on US shale gas operations is inconclusive, offering proponents as well as those opposed to hydraulic fracturing enough ammunition to believe they are right. Whereas a report by the US Environmental Protection Agency (EPA) suggested that in some cases 'fracking' had indeed led to groundwater contamination, both through the usage of chemicals and through the seeping of methane released during the 'fracking' process into the groundwater,<sup>22</sup> a study by the University of Texas found no proof that 'fracking' leads to potential contamination of aquifers.<sup>23</sup> Groundwater contamination cannot be entirely excluded as a risk associated with the practise of cracking gas containing rock formations, however, most of those malpractices seem to be caused not per se by 'fracking' but by failure to follow best practise procedures, and issues such as inadequate cementing of casing into wellbores or on-site surface spills. An MIT report on shale gas extraction found that in more than half of the 43 publicly reported cases groundwater was contaminated,

21 "Lower Poland Shale Gas Reserves Estimated". *UPI*, [http://www.upi.com/Business\\_News/Energy-Resources/2012/03/23/Lower-Poland-shale-gas-reserves-estimated/UPI-90051332498600/](http://www.upi.com/Business_News/Energy-Resources/2012/03/23/Lower-Poland-shale-gas-reserves-estimated/UPI-90051332498600/), 23 March 2012.

22 "Investigation of Ground Water Contamination near Pavillion, Wyoming". *EPA*, [http://www.epa.gov/region8/superfund/wy/pavillion/EPA\\_ReportOnPavillion\\_Dec-8-2011.pdf](http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf), 8 December 2011.

23 "Fact-Based Regulation for Environmental Protection in Shale Gas Development". *Energy Institute, The University of Texas at Austin*, [http://energy.utexas.edu/images/ei\\_shale\\_gas\\_regulation120215.pdf](http://energy.utexas.edu/images/ei_shale_gas_regulation120215.pdf), 15 February 2012.



Figure 1. European Shale Gas Basins (Source: *The Economist*)

but failed to find a direct correlation between hydraulic fracturing and aquifer contamination as such.<sup>24</sup>

- Groundwater contamination is not the only concern of environmentalists and opponents of shale gas exploration. Concerns over the heavy use of water during the cracking of shale gas rocks causes another problem. The water quantities needed might cause conflict between local farming communities and exploration companies. In areas which are relatively poor in water, pipelines will be necessary to ensure ‘fracking’ can be undertaken. This will in turn cause higher costs and might diminish the motivation of companies to explore prospective zones.
- Another issue relating to hydraulic fracturing is the notion that ‘fracking’ can cause tremors. Incidents of minor tremors around Blackpool, England, and Ohio, USA,

24 “Appendix 2E: Overview and Analysis of Publicly Reported Incidents Related to Gas Well Drilling”. *MITEI*, [http://web.mit.edu/mitel/research/studies/documents/natural-gas-2011/NaturalGas\\_Appendix2E.pdf](http://web.mit.edu/mitel/research/studies/documents/natural-gas-2011/NaturalGas_Appendix2E.pdf), 6 September 2011.



were found to be caused indirectly by hydraulic fracturing. However, whereas the tremors outside Blackpool reached magnitude 2.3 and 1.5 last year and caused public uproar, leading to demonstrations and the halting of 'fracking' operations around Blackpool,<sup>25</sup> tremors have become a more common incident in the US where the "remarkable" increase in earthquakes since 2001 can almost certainly be linked to the production of oil and gas from shale rock formations.<sup>26</sup> Despite concerns over man-made earthquakes, operations in the US and the UK continue and recent findings suggest that the economic benefits superbly outweigh the risks associated with tremors, spills and groundwater contamination. The study by a group of experts from Yale University found that the economic benefits for the US alone amount to more than \$100bn annually that the country saves due to reduced natural gas imports.<sup>27</sup> Even though the figure would most certainly be a lot smaller, Poland's government might consider reduced natural gas imports and potential exports of shale gas more important than environmental protection.

- US shale gas reserves are generally closer to the surface and contained in highly porous rock. Poland's shale gas reserves, however, seem to be generally located deeper in the ground, requiring more investment, more time and most importantly an adjustment of the drilling techniques used to extract gas. Exxon Mobil had stated that the company was officially pulling out of Poland because of unsatisfactory results from two early test drillings. However, it seems clear that Poland's underground is harder to drill and crack than similar formations in the United States, leaving companies with the additional task of finding means to ensure they will be able to free the trapped gas.<sup>28</sup> Different geological features will most certainly lead to delays in the spudding of new wells and higher costs. However, following the initial disappointment that similarities in the geological structures do not necessarily bear similar natural gas flows, the industry might finally be able to assess gas showings more objectively.
- Shale gas is a very controversial issue in the EU and member states are deeply divided on how to interpret the role shale gas might potentially play in their energy mixes. Whereas the UK and Poland have embraced the chances offered by exploitation and production from shale gas, France and Bulgaria have banned the use of 'fracking' in shale gas exploration, thus effectively bringing the development of shale gas in their countries to a halt. Poles seem to welcome the opportunities arising from developing shale gas – such as reducing dependence on Russia, cheaper natural gas, as well as potential natural gas export revenues and an upgraded role of Poland among the V4 and in Central Eastern Europe in general. However, despite enthusiasm over the benefits shale gas might bring, issues such

25 "Fracking 'Probable' Cause of Lancashire Quakes". *The Guardian*, <http://www.guardian.co.uk/environment/2011/nov/02/fracking-cause-lancashire-quakes>, 2 November 2011.

26 "Fracking Causes Earthquakes, Studies Confirm". *CBCnews*, <http://www.cbc.ca/news/technology/story/2012/04/17/environment-fracking-earthquake-studies.html>, 17 April 2012.

27 Robert M. Ames *et al.*: "The Arithmetic of Shale Gas". *Social Science Research Network*, <http://ssrn.com/abstract=2085027>, 15 June 2012.

28 "Shale Boom in Europe Fades as Polish Wells Come up Empty". *Bloomberg Businessweek*, <http://www.businessweek.com/news/2012-03-26/shale-boom-in-europe-fades-as-polish-wells-come-up-empty-energy>, 26 March 2012.

as NIMBYism should not be excluded. Poland's president, Bronisław Komorowski, though not speaking out against the development of shale gas, considers the production towers necessary for drilling the wells "an eyesore", and economics minister and vice-prime minister Waldemar Pawlak has been hitting the brakes, too, urging caution and calling shale gas "a media phenomenon".<sup>29</sup> Many Poles, unlike citizens in the US, will not necessarily benefit from natural gas reservoirs found under their property, as Polish legislation states that underground minerals and resources are the sole property of the Polish state. This will greatly reduce incentives for property owners to give companies a thumbs-up to get operations started and could greatly delay the exploration of potential shale gas sites.

- Poland, and many other European countries with potentially huge shale gas reserves, is much more densely populated than the United States. Whereas the majority of shale gas wells in the US have been drilled in sparsely populated regions, such as the states of Oklahoma, Texas, Alabama or Michigan, with population density between 21.3 and 67.1 people/km<sup>2</sup>, (the US average is 34.01 people/km<sup>2</sup>), many of the wells in Poland would be drilled in the vicinity of little villages and towns, whereas some might be sited close to major cities like Warsaw, Gdańsk, or Lublin. Most prospective shale gas reserves have been estimated to be in the Baltic Sea Basin, other prospective areas include the Lublin and Podlaskie Voivodeships. Combined with concerns about its environmental effect and the different geological features of Poland's underground, NIMBYism and local protests are likely to cause delays in the development of Poland's shale gas industry. It will require increased efforts by exploration companies like 3Legs Resource or San Leon to ensure that fears and concerns are addressed, fiction separated from facts and the local population informed about the processes involved in the extraction of shale gas. However, not only the industrial players, but also politicians will have to play their role to ensure the public continues to support the exploration and production of gas from shale wells.
- Even though less than 40 wells have been drilled, early indications allow the assumption that the costs of drilling a well in Poland, due to greater depths as well as different geology, will be significantly higher. Currently Poland's Geological Institute estimates that a single well costs between \$10–15 million. Given that many of the locations are currently lacking infrastructure, such as pipelines connecting them to Poland's network, storage facilities, and in some cases access to enough water, which would require expensive pipelines or trucks to ensure sufficient amounts of water, the costs incurred when drilling a well might only be the tip of the iceberg. All this means that developing shale gas on a commercial scale will be significantly more expensive than in the United States. It might also make exports, especially compared to US exports, less competitive, however, Poland's geographical location might partly make up for this disadvantage as its natural gas exports would be immediately available to neighbouring countries, such as the Baltic States, the Czech Republic, or even Germany, reducing the need for countries to invest into expensive LNG terminals.

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29 "Shale Gas Could Ensure Poland's Independence from Russia". *DW*, <http://www.dw.de/dw/article/0,,6237551,00.html>, 17 November 2010.

## LACK OF A EUROPEAN POSITION ON 'FRACKING' AND SHALE GAS

Two other issues need to be addressed. Even though the government is pushing forward with the development of shale gas, including the creation of a bill on unconventional sources of gas and oil (see above), another legalistic obstacle might cause considerable problems for Warsaw. Europe's leadership is strongly divided with regards to the development of shale gas, with Poland and the UK as frontrunners, whereas Germany and Sweden occupy a middle position of wait-and-see, and France and Bulgaria have introduced moratoria on the development of unconventional gas sources as long as the environmental effects of hydraulic fracturing have not been judged safe and without risk for groundwater aquifers.

France was the first country in the EU to categorically ban 'fracking' over concerns that the injected chemicals would not be fully recovered and could have lasting effects on the environment and ultimately human health,<sup>30</sup> but maintained that should technological improvements ensure the safety of aquifers, this decision might eventually be reversed. Indeed, recent developments in Paris suggest that the country might allow the extraction of shale gas if other means but 'fracking' are employed.<sup>31</sup> Bulgaria, one of the most dependent countries in the EU on natural gas supplies from Russia, and another shale-gas hopeful, has surprisingly followed France in its decision to ban the use of 'fracking'. Despite early enthusiasm of Bulgaria's estimated 300bnm of shale gas and the awarding of an exploration concession to Chevron Corp. in June 2011, nation-wide protests and the French ban on shale gas exploration employing 'fracking', resulted in the parliamentary decision to halt any ongoing exploration and put a moratorium in place.<sup>32</sup> Even though Poland and even the United States were trying to assure Bulgaria of the benefits of shale gas exploration and emphasised that any environmental risks could be limited if best practise mechanisms were implemented, the government remains firmly committed to the moratorium.<sup>33</sup>

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30 "French Ban on Shale Gas Drilling Passes Lower House". *Reuters*, <http://www.reuters.com/article/2011/05/11/us-france-gas-shale-idUSTRE74A6RG20110511>, 5 November 2011.

31 "French PM: Shale Gas Future Not Settled". *UPI*, [http://www.upi.com/Business\\_News/Energy-Resources/2012/08/27/French-PM-Shale-gas-future-not-settled/UPI-90771346063400/?spt=hs&or=er](http://www.upi.com/Business_News/Energy-Resources/2012/08/27/French-PM-Shale-gas-future-not-settled/UPI-90771346063400/?spt=hs&or=er), 27 August 2012.

32 "Bulgaria Bans Shale Gas Drilling with 'Fracking' Method". *BBC*, <http://www.bbc.co.uk/news/world-europe-16626580>, 19 January 2012.

33 "US Tells Bulgaria Shale Gas Is Safe". *EurActiv.com*, <http://www.euractiv.com/energy/us-tells-bulgaria-shale-gas-safe-news-510616>, 7 February 2012.

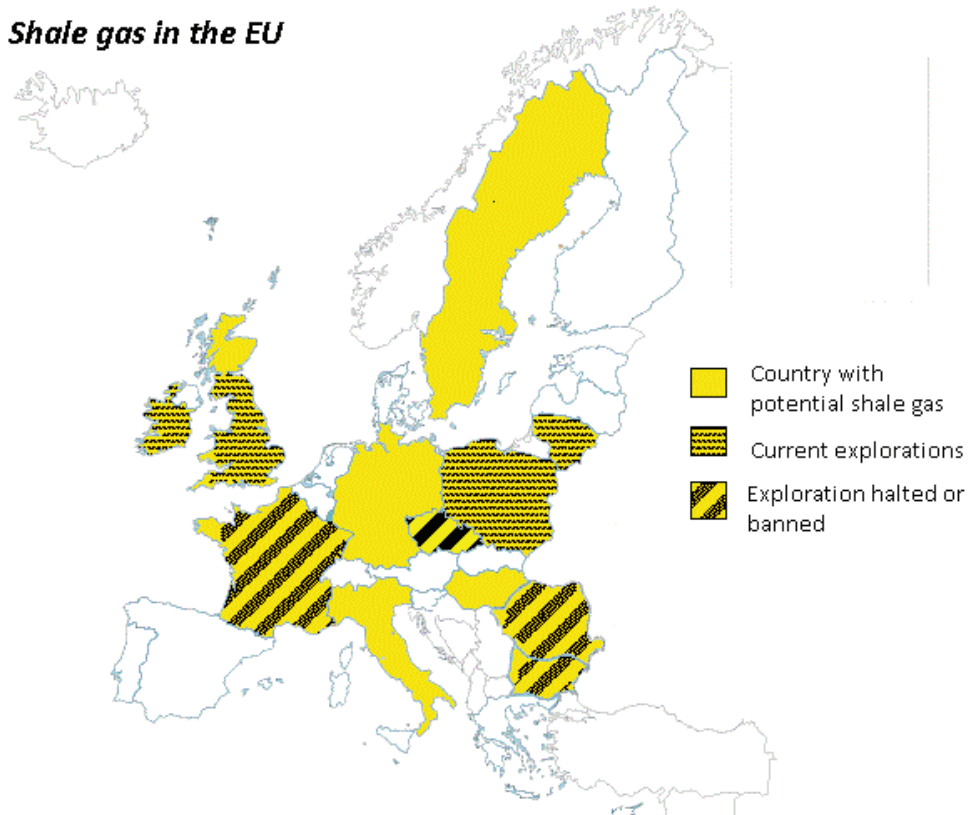


Figure 2. EU Member States with Potential Shale Gas Reservoirs and Current Status

The lack of a common position on shale gas in Europe is causing considerable headaches in Warsaw. Whereas Paris, Sofia and to a smaller degree the governments in Sweden and Germany are in favour of tighter regulation to ensure environmental protection, Poland on the other hand fears that tighter regulations on the extraction of conventional and especially unconventional natural gas could harm its chances to develop a prospering shale gas industry. Even though a study conducted by Philippe & Partners for the European Commission concluded that there was no need for further legislation given the current scale of shale gas exploration,<sup>34</sup> adjustments and new legislation in the future can be expected as explorations in Poland, and potentially Romania and Lithuania, will continue. New legislation, however, might significantly increase exploration and production costs –especially if further measures to protect the environment, above and below the ground, have to be implemented. Significantly increased production costs would then be passed on to the customer, which might turn to the cheaper pipeline gas from Russia. It is therefore not surprising that fears of Russian attempts to influence policymakers in Brussels and across Europe have surfaced in Poland. Should Poland succeed in developing its shale gas reserves, other countries in the region might be encouraged to follow in its footsteps, including Ukraine.

34 “Final Report on Unconventional Gas in Europe. In the Framework of the Multiple Framework Service Contract for Legal Assistance TREN/R1/350-2008 lot 1”. *European Commission*, [http://ec.europa.eu/energy/studies/doc/2012\\_unconventional\\_gas\\_in\\_europe.pdf](http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf), 8 November 2011.

Stronger energy security due to domestic natural gas production, however, would greatly reduce Russia's leverage over the countries in the region. Russia's grip on Ukraine, the most important transit country for Russian gas heading west, has become increasingly weaker, despite the election of the pro-Russian Viktor Yanukovich in early 2010. Disputes over transit fees (an important source of revenue for Ukraine) on natural gas and oil, as well as Ukraine's refusal to recognise the independence of the Georgian break-away republics Abkhazia and South Ossetia (both were formally recognised by Russia after the Russia–Georgia war in August 2008)<sup>35</sup> and its continued bid to join the EU highlight the rift between Kiev and Moscow. The establishment of laws allowing for production-sharing agreements (PSA) in the natural gas and oil sector – previously unsuccessfully attempted by the Yushchenko government – and rising prices for natural gas imports from Russia, have led to greater efforts to attract foreign investors and energy majors to search for new natural gas reserves – conventional and unconventional – on Ukrainian soil. Chevron, Royal Dutch Shell and ENI have rushed to secure concessions, and many smaller players have joined them since.<sup>36</sup>

It might be too early to predict the overall impact of such moves by the Ukrainian and Polish government, but shale gas could, if developed on a commercial scale in both countries, certainly become a game changer in energy relations between both countries and Russia – a scenario that, though falling short of making those countries potentially independent from Russian natural gas supplies, will cause serious concerns in Moscow.

The other issue at hand is the development of an energy system relying to some extent on renewable energy sources (RES), such as wind, hydro or solar power. Poland has committed itself to the EU's 2020 goals (20 per cent reduction in greenhouse gas [GHG] emissions, 20 per cent electricity generated from renewables and 20 per cent increase in energy efficiency). As its economy is very dependent on the burning of dirty domestic coal (over 90% of electricity production is from coal), a transition to cleaner energy sources will be required to meet its emission reduction targets. Part of the government's strategy to reduce emissions lies in developing the country's nuclear energy sector, however, the first nuclear reactor is not scheduled to become operational before 2020.<sup>37</sup>

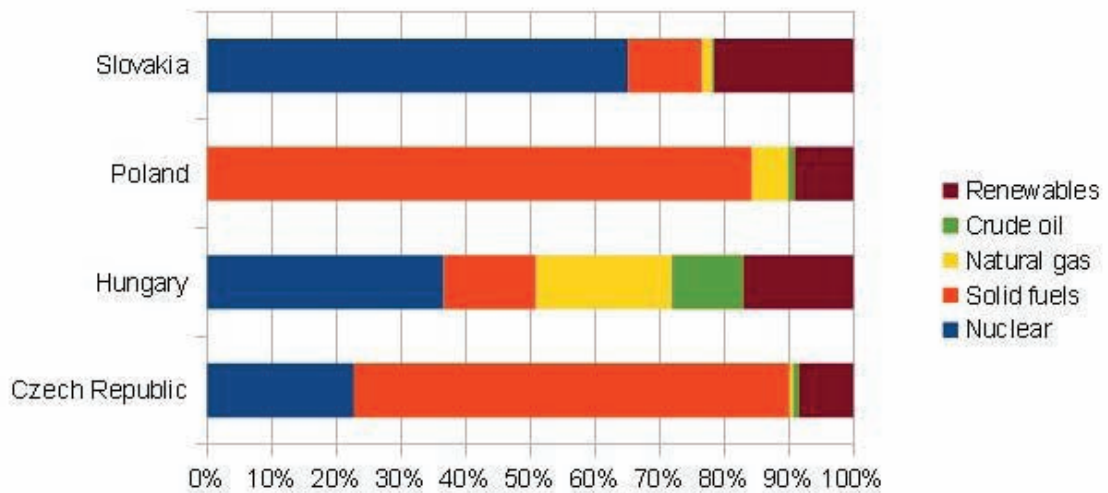
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35 "Ukraine's President Says will Not Recognize Abkhazia, S. Ossetia". *RIANovost*, <http://en.rian.ru/world/20100604/159304616.html>, 4 June 2010.

36 "Europe's Drive for Shale Gas Lacks Some Vital Parts". *Financial Times*, <http://www.ft.com/intl/cms/s/0/4328de68-a42a-11e1-84b1-00144feabdc0.html#axzz24vIS5oIJ>, 3 June 2012.

37 "'Poland's Nuclear Power will Be Safe,' Says Minister". *LOT*, <http://thenews.pl/1/12/Artykul/93020,Polands-nuclear-power-will-be-safe-says-minister>, 12 March 2012.





### Share of total energy production, 2009

Figure 3. Energy Mix of the V4 Countries in 2009 (Source: Eurostat)

Other efforts include the development of coal-fired power plants equipped with carbon capture and storage (CCS) technology – given its huge coal reserves a pragmatic move. Unfortunately CCS still has to prove its reliability and economic viability and concerns over major price hikes after the installation of CCS technology on existing coal power plants might prevent an industry-wide roll-out before 2020. This means that renewable energy sources like wind and hydro-power, but also biomass and even solar power will have to play a stronger role in Poland's energy mix. Given the very nature of renewables – infinite but not always available, be it due to lack of wind, cloudy skies, drought – back-up capacity will have to be established. Even though currently lobbyists from both sectors, shale gas and RES, are battling to ensure political support for one of them, in fact both could be complementary to each other in the mid-and long-term. Both industries remain in their infancy, however the development of RES capacity is strongly supported by the EU, whereas shale gas (as seen above) remains a controversial issue. It would, nonetheless, constitute a smart move for Poland to push ahead with the development of its own shale gas industry to both ensure the functioning of the stability of its energy sector (including the energy contributed from RES) and reduce its dependence on Russian natural gas imports.



## POTENTIAL IMPACT ON THE V4 AND OTHER COUNTRIES IN POLAND'S NEIGHBOURHOOD

The success of Poland's efforts to develop its domestic shale gas industry will affect the whole Central Eastern European region, and could revive or intensify efforts in other countries in the region, such as Hungary, which was deemed to have promising shale gas reserves, or Romania, which continues to balance its options. Lithuania is already encouraging foreign companies, among others Poland's Lotos Group, to search for shale gas.<sup>38</sup> Hungary, which was targeted early on by Exxon Mobil, uses almost as much natural gas as its much stronger populated V4 partner Poland and will seek ways to diversify away from Russia. The Makó Trough in southern Hungary is considered to hold up to 600bcm of natural gas, more than 60 times the annual consumption of Hungarians. However, Exxon Mobil abandoned operations at the Makó side after disappointing test results, blaming geological difficulties and uneconomically high extraction costs for its withdrawal from the project.<sup>39</sup> MOL, Hungary's major energy company, however, does not share Exxon's pessimism regarding shale gas in Hungary and pushes for a breakthrough in shale gas production by 2015 – the same year E.ON's supply contract with Gazprom for gas supplies to Hungary expires.<sup>40</sup> Other companies, such as Austria's OMV and smaller players like Falcon Oil&Gas, Ascent Resources, Delquadra and Aspect/HHE have increased efforts to find and extract shale gas after a period of slow decline following Exxon's exit.<sup>41</sup> Despite this development, it remains very unlikely that shale gas will cover Hungary's total natural gas consumption after 2015, but it could reduce the amount of natural gas imports significantly, thus allowing the country greater flexibility in its decision-making, especially when it comes to questions that might run counter to Russia's wishes. Hungary's current balancing act between its support for Nabucco and its rival, the Russian South Stream pipeline, might offer a useful example here, as the government fears that a final decision might eventually leave the country in the cold, should either Nabucco not be build, or South Stream be build but by-pass Hungary or the Russian's choice for a natural gas hub favour Romania over Hungary. However, a renewed interest in domestic shale gas deposits is in particular necessary as Hungary's conventional natural gas reserves might expire as soon as 2013,<sup>42</sup> two years before shale gas might come into production.

38 "Poland's Lotos to Look for Shale Gas in Lithuania". *Reuters*, <http://www.reuters.com/article/2012/01/23/lithuania-shale-idUSL5E8CN36T20120123>, 23 January 2012.

39 "ExxonMobils Quits Hungarian Shale Test". *Upstream*, <http://www.upstreamonline.com/live/article195304.ece>, 8 October 2009.

40 "Hungary Wants to Diversify away from Russian Gas". *The Wall Street Journal*, <http://blogs.wsj.com/emergingEurope/2011/09/23/hungary-wants-to-diversify-away-from-russian-gas/>, 23 September 2011.

41 "Breaking the Silence: Unconventionals in Hungary". *Natural Gas Europe*, <http://www.naturalgaseurope.com/unconventional-gas-in-hungary-6121>, 10 May 2012.

42 "Estimation Based on Data Provided by the Energy Information Administration". *EIA*, <http://www.eia.gov/countries/country-data.cfm?fips=HU&trk=m#ng>, 16 October 2012.

Shale gas development might become a high priority also in other countries, such as Bulgaria or Ukraine, but could similarly serve as an additional safety net for countries without currently projected shale gas reserves, such as Bosnia-Herzegovina or Macedonia. Those countries rely completely on imports of natural gas from Russia. The Czech Republic, Slovakia and Slovenia, as well as the Baltic States, Estonia and Latvia, similarly rely to a large extent on natural gas imports – mostly from Russia. All of them should, therefore, embrace the possibilities that shale gas development in CEE offers, even if their own reserves might turn out to be small in comparison to Poland's. All governments are aware of the dangers of relying solely or strongly on Russian supplies, and even though LNG might offer an alternative import solution for the Baltic States, support for shale gas might turn out to be a cheaper and faster solution as interconnection between markets already exists or is currently being developed.

However, the government in Prague is currently mulling its support for shale gas exploration, and might even introduce a temporary ban on all operations using 'fracking' until new regulation is introduced to ensure environmental protection during 'fracking' operations.<sup>43</sup> The ban which might last between 18 and 24 months might come into effect by mid-October already. How much shale gas the Czech Republic holds is unknown, and current estimates do indeed not foresee much shale gas in the country.<sup>44</sup> However, technological advances might eventually lead to significant discoveries in the future. Slovakia holds no shale gas reserves and thus remains neutral about the issue of shale gas exploration – somewhat surprising given that the country is highly dependent on Russian gas imports.<sup>45</sup> The government in Bratislava continues to remain relatively unconcerned about supply disruptions and remains instead committed to further promoting the use of renewable energy sources such as biogas and hydro-power.<sup>46</sup> Both countries could greatly benefit and further diversify their natural gas imports should Poland succeed in developing its shale gas reserves. However, explicit support for an accelerated introduction of Polish shale gas to the markets is unlikely given concerns over Russian "retaliation" should Prague or Bratislava publicly embrace shale gas.

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43 "Czech Republic Plans Shale Gas Moratorium". *Natural Gas Europe*, <http://www.naturalgaseurope.com/czech-republic-plans-shale-gas-moratorium>, 3 September 2012.

44 "Czech Republic". *Energy Delta Institute*, <http://www.energydelta.org/mainmenu/energy-knowledge/interactive-world-gas-map/europe/czech-republic>. Last accessed: 10 September 2012.

45 "Slovakia". *Energy Delta Institute*, <http://www.energydelta.org/mainmenu/energy-knowledge/country-gas-profiles/country-gas-profile-slovakia>. Last accessed: 10 September 2012.

46 Peter Ševce – Andrej Nosko: "The Evolution of Energy Security in the Slovak Republic". *Journal of Energy Security*, [http://www.ensec.org/index.php?option=com\\_content&view=article&id=262:the-evolution-of-energy-security-in-the-slovak-republic&catid=110:energysecuritycontent&Itemid=366](http://www.ensec.org/index.php?option=com_content&view=article&id=262:the-evolution-of-energy-security-in-the-slovak-republic&catid=110:energysecuritycontent&Itemid=366), 29 September 2010.

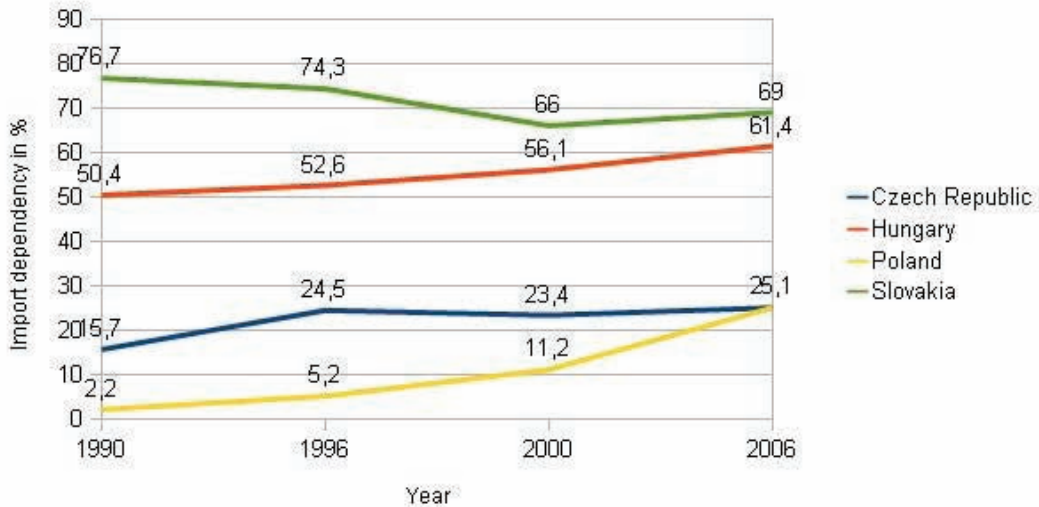


Figure 4. Import Dependency of Primary Energy Sources (Based on Eurostat Data)

As mentioned earlier, Poland's success or failure in developing its shale gas reserves will have an impact far beyond its borders. As a pioneer in shale gas development in the EU and Europe, Poland faces the risks of giving in to extreme position between enthusiasm and desperation, losing its head over good as well as bad news. After having been hyped as a European unconventional gas El-Dorado by analysts and the media, initially disappointing results from drill sites and reduced estimation figures quickly lead to labelling Poland's shale gas hopes illusionary and unrealistic. The truth is somewhere in between, and the government will have to ensure exploration and later exploitation is performed steadily, even in periods of slightly disappointing news. As the first country in Europe to perform a wide-scale attempt at exploring and developing shale gas sites, Poland faces many unforeseen and unexpected issues, all of which will require determination, patience and considerable leadership to overcome. The expected hardships, however, should be worthwhile for the government, given the potential benefits shale gas will have on natural gas imports and the state's budget. Should Poland succeed, other countries in the region will try to emulate the Polish experience, just as Poland is trying to follow the lead of the US. Should Poland, however, fail to embrace shale gas and the development come to a halt, other countries in the region will feel their reluctance to support shale gas development was right. Unfortunately it will also mean that, as natural gas consumption in the region is expected to rise, especially as dirtier fuels are being replaced, dependence on external, primarily Russian, gas suppliers will increase and worsen the already precarious security of supply of most countries in CEE.

## CONCLUSION

The initial question Poland's government has been facing since the beginning of the shale gas boom has been about Poland's potential role on the natural gas market in Europe. Would unconventional natural gas source allow the country to join the ranks of Russia, Norway, and the Netherlands, or would reservoirs turn out to be small and relatively insignificant compared to the major players in Europe? A definite answer is not yet possible, however, after a period of disappointment following the update of shale gas estimates – in particular the reduction by around 90 per cent – a new, more pragmatic approach to shale gas seems to be taking place in the country. Even if shale gas reserves are not going to be enough to rival Russia, they are considered big enough to allow the country to greatly reduce its dependence on Russian gas imports. This is maybe the most important motivation behind the government's support for the development of a shale gas industry, despite widespread concerns about environmental damage associated with the 'fracking' technology used to crack open gas containing rock formations. Shale gas could allow the country to shed its dependence on Russia and if consequently and successfully pursued, a Polish shale gas policy might encourage its neighbours to invest increasingly into the development of their domestic resources, thus further reducing Moscow's leverage over the Central Eastern European countries. However, despite this positive outlook, a number of issues still remain to be tackled and the sooner the Polish government addressed them, the more beneficial it should be for the development of shale gas in the country. The most important one is the publication of (at least a draft version of) the energy bill that will regulate the extractive industries. On a European level, Poland will have to seek either support for the development of shale gas, which will, however, be difficult given the EU's preference for the development of renewable energy sources, or attempt to debilitate any regulation that would excessively hamper the extraction of shale gas on grounds of environmental protection.

In the next two, maybe three years it will be important to determine the future of shale gas in Europe. Poland and the UK will continue to support their nascent domestic shale gas industries and should natural gas produced from shale allow those countries to reduce external dependencies, create new jobs and reduce pressure on governmental budgets, others will surely follow suit, in particular in Central Eastern Europe. Poland could then well become the CEE region's Kuwait, and an important player on the European gas market.

Study concluded by 10 September 2012