

Dynamics and drivers of shale gas development in three European countries: can a European policy be imagined?

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The European Commission introduced in its Work Programme 2013 an action¹ regarding “Environmental climate and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction”. After having assessed the existing legislative framework appropriateness regarding climate and environmental impacts of shale gas development in Europe,² and having noted some improvements that could be proposed when using the hydraulic fracturing technique,³ the debate is now shifting to address the issue of the good governance level. To what extent a European initiative could be more effective or comprehensive than national legislation? In particular, it remains unclear whether a common EU policy that goes beyond environmental and climate measures can be built to regulate the industrial exploitation of shale

¹ European Commission, Annex to the *Communication from the Commission to the European Parliament, the Council, the European and Social Committee and the Committee of the Regions, Commission Work Programme 2013*, 23 October 2012, Brussels

² Philippe & Partners, *Final Report On Unconventional Gas In Europe*, Brussels, 8 November 2011; AEA, *Climate impact of potential shale gas production in the EU*, Didcot; AEA, *Potential Risks for the Environment and Human Health Arising from Hydrocarbons Operations Involving Hydraulic Fracturing*, Didcot, 10 August 2010.

³ “In 2011, the Commission has carried out an initial technical and legal assessment of the EU environmental regulatory framework applying to shale gas practices. It concluded that **the existing EU environmental legislation applies to shale gas projects from planning and until cessation**. It found, however, that more information was necessary to determine whether or not the level of environment and human health protection provided by the applicable EU regulatory framework is appropriate.... An initial Commission assessment of hydraulic fracturing practices in the context of shale gas developments has identified a number of environmental areas at potential risk from these practices, most notably water contamination and consumption, impacts to air quality, and land-take and habitat fragmentation.” European Commission, *Annex to the Communication from the Commission to the European Parliament, the Council, the European Social Committee and the Committee of the Regions, Commission Work Programme 2013*, op. cit. p.2.

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gas in Europe.

Basis of the Commission proposal

Following the Commission justification on the necessity of the application of the subsidiary principle, a European initiative should be pushed forward for the following reasons:

- To bring clarity that would reassure the populations and foster public acceptance.
- To set common standards to avoid 'unlevel playing fields which would undermine the functioning of the internal market especially for SMEs'.
- Cope with possible trans boundary effects of water and air pollution.
- Avoid unnecessary costs that would derive if Member States acted alone.

In the words of the Commission:

"The lack of full clarity as regards the appropriateness of applicable regulatory frameworks, coupled with diverging requirements in individual Member States can erode public acceptance, prevent optimal knowledge-based risk response strategies and affect operators' level playing field. As Member States are beginning to introduce specific measures in their national legislation to deal with shale gas projects, their approaches may differ. A patchwork of national policies could create difficulties for businesses operating cross-border, and distortions in competition within the EU."

In this matter, the US experience does not provide many lessons. The American success derived first from the initiative of small oil and gas companies that could operate in a well-developed market (a functioning gas market), which allowed easily trading and selling of produced gas to consumers. However, each American state has its own laws and regulations and only few pieces of legislation remain at the federal level. The European case shows quite the opposite, with mostly international oil and gas companies operating in shale gas and where the environmental framework is largely set by European laws.

However, before talking about a common European shale gas policy, it is necessary to look at the status of projects and initiatives at the national level. It appears that only three states have begun the process of developing shale gas resources at large scale, Denmark, Poland and the United Kingdom. Indeed, other countries with significant resources have banned exploration or hydraulic fracturing technique (France, Bulgaria), suspended the activity (Germany, Switzerland, Netherlands, Austria, Czech Republic), or have just begun to consider operations (Romania, Spain). Therefore, an analysis of the characteristics of shale gas development in these three countries can actually give a picture of the on-going process of developing large-scale shale gas in Europe and assess whether a common European framework would be more suitable than the current national legislations.

Indeed, the political, cultural and energy contexts (energy mix, national energy policies), form an important frame that cannot be ignored in the implementation of industrial projects such as the exploration and exploitation of oil and gas deposits. Adapting to this context is fundamental for the acceptance and understanding of the affected civil society to be comprehensive. Despite similarities in the overall approach undertaken by governments and companies, there are substantial differences that, in spite of a European policy on shale gas, push, on the opposite, towards national approaches adapted to local requirements.

The comparison allows us to show that if some general trends in terms of communication process, evolution of the tax system and government structures emerge, their practical implementation differs from country to country and sometimes even among exploration permits within the same country (I). The creation of a common European policy on shale gas would not streamline these differences as they depend upon a specific context that cannot be replaced by a common framework. The right level of governance has to be chosen in each step of the development process and for each specific framework. Is the Member State or the European Commission the most appropriate decision making level for the environmental standards? Should the European Commission intervene in the communication processes? Should there be a common framework for landowners' remuneration? To what extent a common European legislation on environmental issues regarding fracking could foster competition in a national based development? (II).

Figure 1. Shale gas activity in Europe 2013



Source: The Economist, DG Energy, IEA.

1. From resources estimations to the development on an industrial scale: similar approaches, different measures

Denmark, Poland and the United Kingdom are those countries that, among the potential shale gas countries in Europe, have actually started large-scale development of their resources. In particular, Denmark is believed to hold 906 billion cubic meters (Bcm) of technically recoverable shale gas resources,⁴ Poland around 346-768⁵ bcm, and UK shale gas potential is estimated to be 736 Bcm (table 1.1).⁶ To develop this potential, governments and companies have deployed different tools and adapted their legislations. In fact, unconventional resources require sophisticated techniques and safety measures increasing the investments necessary to explore and produce them. Furthermore, water and land use are much larger in comparison to conventional resources, with potential consequences on the landscape or on water pollution that have to be taken into account. Private and public actors in Denmark, Poland and the UK have shown attention to these issues and taken specific measures.

Table 1.1 Estimated resources in Denmark, Poland and the UK

Estimated resources	Gas (Bcm)		Oil (tons)	
	High	Low	High	Low
Denmark	906	NA	NA	NA
Poland	768	346	268	215
UK	18007	736	NA	NA

Sources: US Energy Information Administration, PGI

⁴ U.S. Energy Information Administration, *Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States*, U.S. Department of Energy, Washington DC, June 2013, p. 1-7.

⁵ <http://www.pgi.gov.pl>. For shale oil, figures are estimated to be up to 535 million tonnes, with the most likely range being 215 to 268 million tonnes. USGS: 8.2 million tonnes and 7.1 million tonnes.

⁶ EIA/ARI, *World Shale Gas and Shale Oil Resource Assessment*, June 2013, XI-2, converted from original figure of 26 trillion cubic feet.

⁷ “Potentially recoverable resources of 1,800-13,000 Bcm by assuming similar recovery factors to the US, of 8-20%”, Patsy Richards, Mike Fell, Louise Smith, Matthew Keep, *Shale gas and fracking*, House of Commons, 10 September 2013, p. 4.

Evolutions in the legal framework of Member States

Among the measures that have been taken by the actors of the shale gas project in Denmark, Poland and the UK, two should to be mentioned that reflect similar developments: the evolution of the tax system and the communication efforts. Furthermore, Poland has proposed a modification of its licensing procedures in order to comply with the current European legislation⁸ and has modified the requirements for Environmental Impact Assessment.

First of all, **the tax system** has been improved or modified for two main reasons: better manage the wealth that might be derived by future production (as in the Danish and Polish case) or attract the investments required by shale gas development (as sought by the UK government).

Notably, in 2005 under the liberal and conservative government of Anders Fogh Rasmussen, *Denmark* has created a new fund, the Danish North Sea Fund (Nordsøfonden). It was not until July 2012, however, that Nordsøfonden has been granted the right to participate to up to 20% in all licences contracted since 2005, be they conventional or unconventional. Nordsøfonden has to administer the profits coming from these participations, similarly to the Norwegian wealth fund. It is with this entity that Total jointly develops the two shale gas exploration permits granted in 2010.

Poland has copied this model in a law proposal in March 2013. In this draft law, a new entity, the National Operator of Energy Minerals, called “NOKE” in Polish, would allow the State to participate as a capital shareholder in each license or concession. NOKE will have no more than 5% of profits and no more than 5% of the costs incurred by the project. In addition, a new fiscal law has been proposed⁹ to differentiate royalties and fees for conventional and unconventional hydrocarbon exploration. These amendments raise nevertheless the global tax burden. The approximate level of government revenues from CIT, cash-flow tax, revenue tax, exploitation fee and real estate tax will amount to around 40% of gross incomes from hydrocarbon mining activities. This represents a two-fold increase in the fiscal pressure in Poland, where, due to historical reasons,¹⁰ the tax burden was very low. The new regime would therefore rebalance the situation towards a greater benefit for the federal level (where profits from NOKE will partially finance the Generational Fund),¹¹ with the new incomes coming from royalties to be redistributed to the local and province levels too.

⁸ Hydrocarbons Licensing Directive (94/22/EC).

⁹ The text is still under consultation and it has to be approved by the Council of Minister before passing through the Parliamentary procedure. It can therefore still be modified during the process, but some key aspects can already be outlined.

¹⁰ Being the state the principal owner of the national company, the post-communist fiscal framework was not structured for taking profits from oil and gas production. It already benefitted from the stakes in PGNiG. For example, royalties did not exist before 2011.

¹¹ The Generational Fund will be operational from 2019. It will invest in projects to enhance economic activity in Poland, R&D, education; pension system; protection of human health and life.

On the contrary, in the *UK*, a public consultation has been issued that should bring to a more favourable fiscal framework for unconventional gas and oil E&P: “Harnessing the potential of the UK’s natural resources: a fiscal regime for shale gas”.¹² Prime Minister David Cameron insisted¹³ on the importance of taking advantage of the added value that the shale gas industrial project could have in terms of jobs, royalties and lower energy prices. In order to do so, the chancellor George Osborne underlined, however, that some “help” is needed. To get the unconventional development started, a new and advantageous tax regime is therefore envisaged, lowering the burden from 62% to 30%. The tax regime might be applied from next year, as it is stated that “where appropriate, legislation will be brought forward in Finance Bill 2014”.¹⁴

Improvements in communication and transparency, either by governments or companies, are the second important part of the process. The need for more explanations on the techniques applied, the consequences of land and water use, the way revenues and royalties will be shared or spent, the repercussions over land value and agricultural business, all represent some of the concerns of the populations impacted by shale development. To answer these requests, many solutions have been sought for.

The *UK* government has set up a new Office of Unconventional Gas and Oil (OUGO) that gathers all the available information, best practices, advices and pieces of legislations about the unconventional E&P. Although its website redirects towards other companies or associations pages in a sort of matrioshka path, information is being made available. In *Poland*, a new ad hoc website has been created by the Ministry of the Environment, though only available in Polish.

Companies have increased their communication efforts by sharing and organizing several *ad hoc* meeting with local communities, setting-up specific webpages with a step-by-step description of the entire shale gas development process. Additionally, best practice processes have been systematically introduced such as the **ground-zero assessment**. Before the first operation on site, the company proceeds with a “ground zero” assessment of the environmental conditions of the permit. This means that an early impact assessment is made in order to be able to compare the social and environmental conditions before and after shale gas development activities. This is a practice that was not applied in wells in the United States, where it is now very difficult to assess the real impact on air emissions and water pollution of shale gas activities (compared to conventional ones). In *Denmark*, Total has applied this best practice in the two permits it is exploring.

¹² The consultation was open between 19 July 2013 and 13 September 2013; its conclusions are therefore not available at the time of the publication of the present study.

¹³ Hannah Kuchler, *David Cameron urges support for shale gas fracking in the UK*, www.ft.com, August 12 2013 9:36 am.

¹⁴ <https://www.gov.uk/government/consultations/harnessing-the-potential-of-the-uks-natural-resources-a-fiscal-regime-for-shale-gas>.

Finally, *Poland* has specifically proposed a modification in its Mineral law, while the UK and Danish systems remain unchanged. Polish proposal derives mainly from the need to comply with the European legislation in Exploration and production licensing. At the same time the government introduced changes to create a better framework for unconventional oil and gas activities, by requiring EIA only at development stage, when a decision is issued on the mine operation plan or over the investment. The exact location of the prospecting and drilling is therefore decided and the environmental impact assessment will be required for the surface object of the drilling. In addition to these provisions, the government has required that all the documentation about concession and works should be made public, including fracking liquid composition.

These few examples show that similar approaches do not hide key differences in implementation. Environmental standards being set mainly by the European level, the Danish, UK and Polish cases reveal that core evolutions have taken place at the fiscal level. However, it is not only in practical implementation that differences appear. Even at a national strategic level, motivations behind the shale gas plan vary largely from country to country. In fact, the main drivers that are pushing these countries towards industrial shale gas development derive from the national energy contexts and goals. Unconventional oil and gas development is therefore part of a bigger national strategy and not only an isolated industrial activity.

Driving the shale gas development: an answer to national energy strategies

Specific national drivers are behind the voluntary measures pushed forward by the Danish, Polish and UK governments to develop their shale resources. The energy current and future scenarios can largely explain the choices made by the successive national governments, sometimes even in apparent contradiction with ambitious renewable and climate targets, as the Danish case shows.

For the UK, it is a matter of security of supply in a future energy mix that depicts a high gas scenario. In fact, based on its great resources, the UK has built up an energy and electricity mix largely reliant on hydrocarbons, including oil, coal and gas. However, engaged in the climate fight, the UK has set a national target for emissions reduction of 80% by 2050, and has a 15% renewable energy in final consumption target by 2020. To meet these targets, conversion from coal to gas should be assured, coal still representing 32% of electric power generation in 2011. Furthermore, over the next decade a number of power stations are planned to close, including 12GW of coal/oil (because of the Industrial Emission Directive)¹⁵ and 7.5GW of nuclear stations arrive at the end of their asset lives.¹⁶ More than 20GW of new generation will be therefore required by 2020, with variable renewable generation needing back-up capacity. “UK net gas imports are set to rise from 45 per cent of demand in 2011 to 76 per cent by 2030,”¹⁷ with costs expected to increase

¹⁵ Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)

¹⁶ <http://www.nationalgrid.com/uk/Electricity/MajorProjects/EnergyChallenge.htm>

¹⁷ Ibid.

from £5.9 billion to around £16 billion (in 2012 prices)¹⁸. To cope with these numbers, it is therefore of utmost strategic importance for the government to improve the conditions (regulatory and fiscal) to attract investments in domestic unconventional gas exploration.¹⁹

Ambitious climate goals for 2050 and an expensive transition to achieve them are the key drivers for Denmark shale gas industrial development. In fact, despite the apparent contradiction of the ambitious 2020 targets approved with an astonishing cross-party majority by the current Social-Liberal government in 2012 (which include 50% of electricity consumption coming from wind and 35% of the energy coming from renewables),²⁰ shale gas and conventional oil and gas exploration will be pursued. In fact the eventual shale gas production **profits will be used as a rent to finance the ambitious policy measures toward a zero-carbon energy mix by 2050.**

Finally, **Poland has chosen the shale gas path as a clear way to diversify its gas supplies**, where imports depend 100% on Russian gas. Poland relies heavily on fossil fuels for its energy consumption, with coal largely used for electricity production (90% of produced electricity in 2012) while gas is mostly consumed for heating and in industrial processes. As domestic coal production is diminishing and subsidies are being phased out, it is expected that²¹ in the medium-long run, gas is going to take a greater importance by replacing coal in electricity production as a transition to a more sustainable energy sector. As 54%²² of the gas consumed in Poland comes from Russia (while domestic production accounts for 26% of consumption mainly through state-owned company PGNiG),²³ ensuring gas supply becomes a national security issue. The national energy strategy is under review²⁴ and it aims at calculating the cost/benefit analysis of all the energy options opened to Poland: this means not only gas, but also renewables and nuclear. Shale gas might therefore contribute to diversifying supplies, as it is the construction of an LNG plant.²⁵

¹⁸ HM Treasury, *Harnessing the potential of the UK's natural resources: a fiscal regime for shale gas*, 19 July 2013, Public consultation document, accessed 3 October 2013.

¹⁹ It has to be noted that coal-bed methane is included in the unconventional resources the government intends to produce.

²⁰ *Enerpresse, Le Danemark vote pour une politique ambitieuse*, N° 10542, 28 March 2012.

²¹ S. Cornot-Gandolphe, *The European Coal Market: Will Coal Survive the EC's Energy and Climate Policies?* (Paris: Institut français des relations internationales, 2012).

²² 58% for *the Supply Safety of Gas Fuels Annual Report 2012* by Ministry of Economy. It has to be noted that 100% of Russian supplies come from Gazprom, since Gazprom has the monopoly on Russian pipeline gas exports.

²³ BP Statistical Review of World Energy 2013. The State has 79% stakes in PGNiG is 79% while the rest is on the stock market.

²⁴ As of June 2013.

²⁵ The LNG plant in Świnoujście (owned by the gas transmission operator Gaz System) replaces the pipeline project between Norway and Scandinavian countries, Skanled, that was suspended in 2009. Poland hoped to create a link to the pipeline in order to access Norwegian gas directly. Investors put the project aside because of increasing commercial risks.

Table 1.2 Comparative governance analyses

Governance analysis	Political Driver	Key actor	Main Administrative level	State participation as stakeholder
Denmark	Financing the transition	Government	Local	Yes, 20%
Poland	Diversification of supplies	Industry	Central	Yes, 5% (proposal)
UK	Security of supply	Industry and Government	Central and local	No

2. National policies or European framework: a false dilemma?

Although many confrontations have taken place about the use of the hydraulic fracturing technique and the way to improve environmental protection laws,²⁶ few *Member States* have actually started shale gas exploration with different stages in the development. While Poland has announced positive flow tests and can count on over 100 exploration permits, Denmark and the UK have only 2-3 permits issued and few companies involved in the shale activity (table 2.1).²⁷

Arguing for a European shale gas policy might be a false debate for many reasons.

Table 2.1 Comparison of shale gas development

Shale gas development	Number of permits	Number of companies in shale gas production
Denmark	2	1
Poland	106	>40
UK	>3*	3-4

* There is no distinction between conventional and unconventional exploration permits in the UK.

²⁶Action 41 introduces a legislative/non legislative action on ‘*Environmental climate and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction*’, in European Commission, Annex to the Communication from the Commission to the European Parliament, the Council, the European and Social Committee and the Committee of the Regions, *Commission Work Programme 2013*, Brussels, 23 October 2012,

²⁷GDF Suez has recently entered the shale gas development in the UK by acquiring 25 % shares in 13 licences located in the Cheshire and the East Midlands (Bowland play) from Dart Energy via its company GDF Suez E&P UK. Source: *Enerpresse*, N°10935, Jeudi 24 October 2013.

A European framework already exists

The regulatory framework in Europe has already a good level of harmonisation. The European Commission assessed the common rules regarding environmental standards, water and soil use, listing the pieces of legislation can be applicable to the shale gas extraction and production (table 2.2). Creating a new regulation or directive that specifically tackles environmental issues deriving from the extraction of shale gas would add complexity to the already intricate jungle of European legislation. Some have argued that an environmental impact assessment (EIA) for hydraulic fracturing should be mandatory²⁸ at the first stages of exploration. A vote at the European Parliament on October 9 put forward modifications to the EIA Directive of 1985 that take into account hydraulic fracturing specificities but only requiring an EIA when well tests are actually performed and not at an earlier stage. In Poland, the new requirements for EIA are in line with this position.

Table 2.2 European legislations applicable to the shale gas development

List of applicable directives
Environmental Impact Assessment Directive (2011/92/EU) Water Framework Directive (2000/60/EC)
Mining Waste Directive (2006/21/EC)
Directives on Emissions from Non-Road Mobile Machinery (Directive 97/68/EC as amended)
IPPC Directive (2008/1/EC)
IED (2010/75/EC)
The Outdoor Machinery Noise Directive 2000/14/EC
Air Quality Directive (2008/50/EC)
Environmental Liability Directive (2004/35/EC)
Seveso II Directive (96/82/EC)
The Strategic Environmental Assessment Directive (2001/42/EC)
Hydrocarbons Authorization Directive (94/22/EC)
Noise Directive (2002/49/EC)
REACH Regulation (1907/2006)
Biocidal Products Directive (98/8/EC)
Habitats Directive (92/43/EEC)

Hydraulic fracturing: one law to rule them all?

Currently, hydraulic fracturing is the only technique that effectively allows for the release of trapped shale gas and oil. However, does this justify a policy aimed at regulating only one technique? A new targeted legislation would create tailored-made regulation for a technique that can evolve.

In addition, development stages²⁹ in each European Member State vary significantly.

²⁸ Dave Keating, "MEPs demand shale gas impact assessments", *European Voice*, 10 October 2013.

²⁹ In general, the key steps of the shale gas development process are: the conception of the project, the static exploration data collection (with a vertical test well), the dynamic exploration data collection phase (with

While in *Poland*, at the end of August 2013, Lane Energy has already announced that a flow test at their well in Pomerania has released 8,500 cubic meters of gas per day³⁰, Cuadrilla has confirmed the potential of the Bowland play in the UK.³¹ However in *Denmark*, shale gas exploration is just at an initial stage. If new requirements for EIA or other steps of the development projects are approved, how to reconcile the permits already granted with those that are going to be tendered without incurring in distortions for companies? And how to reduce the administrative burdens for Governments?

There is no “one-size-fits-all” solution

Furthermore, the comparison shows clearly that there is no unique model, but that best practices and information sharing can help improve safety and environmental standards or give tools on the regulatory and fiscal frameworks. In the UK the private sector is dealing with development and investments, while in Poland and Denmark state-owned entities are playing an important role as shareholders (table 1.2).

In addition, the eventual production will probably remain ‘national’. This issue raises the question of whether the produced gas will remain ‘trapped’ in each national system or if the evolution of the infrastructures and market structure will allow companies to sell and trade on a more regional scale. Produced gas will probably be destined to the national market, excluding a Europe-wide impact. In fact, only the UK can count on a liquid and open market, with well-developed transport infrastructure, while Denmark and Poland have few interconnection points and a small transport system. However, while Denmark wishes to export and count on the revenues from its exporting activities, Poland and the UK will need the fuel for their energy system, as already mentioned.

Go Local

Local communities in Member States can request further studies or specific actions to the companies operating on shale gas permits with hydraulic fracturing techniques on their territory.

It is the case in *Denmark*, where in Fredreriskhavn, the local City Council voted for a full Environmental Impact Assessment to be completed before the exploration well is drilled. This is a further requirement that is not foreseen under the Danish hydrocarbon law but reflects the environmental concerns of this zone of the country which is not accustomed to hydrocarbons exploitation. Nordjylland territory is mostly rural with the economy based on agriculture and tourism. Furthermore, drinking water is extremely important in Denmark and operations are strictly controlled on this issue.

fracking technique applied to allow gas release from the rock), a small-scale development to test the economical conditions of exploitation (flows and rates) and finally the development stage, where a production well is completed and run.

³⁰ ‘Good results in shale gas boreholes in Pomorze region’, 28 August 2013, http://www.mos.gov.pl/artykul/123_newsroom/21223_good_results_in_shale_gas_boreholes_in_pomorze_region.html. Lane Energy has used both hydraulic fracturing and horizontal well techniques.

³¹ ‘Balcombe Drilling Yield's Hydrocarbons for Cuadrilla’, www.naturalgaseurope.com, 24 September 2013.

Another good example of local initiative is in the UK, where the United Kingdom Onshore Operators Group (UKOOG) has created a Charter³² that lists the main commitments the industry will take. Some of them address engagement with the public at any administration level and at each phase of operations, “beginning in advance of any operations and in advance of any application for planning permission”.³³ In addition, UKOOG proposed remuneration “packages” for counties hosting shale gas, adding that ‘Operators will publish evidence each year of how these commitments have been met’.³⁴ :

- ‘At exploration stage, £100,000 in community benefits will be provided per well-site where fracking takes place
- 1% of revenues at production stage will be paid out to communities.’³⁵

In Polish Pomerania, the most promising region in terms of estimated resources, pragmatic concerns rose with the fears of price depreciation of homes located on the Baltic Sea or farming land. Being an area of agriculture and tourism (sustainable “agro-tourism” is very common and it is part of EU-funded structural and agricultural programmes), the development of industrial activity might discourage touristic attractiveness of the landscape, causing further decrease of revenues. A clear regulation on the responsibility and compensation for these damages has therefore been claimed as well as an emergency procedure in case of environmental contamination.³⁶

Targeted measures can thus be implemented only at a more local level, where permits are issued.

Despite the existence of international or national best practices, it is not possible to establish or apply a standardized procedure to all the countries or even to the single permits. It would be even more ambitious to create a single European process. Local demands vary largely depending on the socio-economical, political or cultural context. Rural populations requirements differ from urban areas needs and the existence of an oil and gas exploration culture strengthen public acceptance.

Conclusion

Efforts to create and foster a pan-European policy on shale gas are in contrast with national situations and dynamics. The drivers that brought Poland, Denmark and UK governments to gear up shale gas development from myth to industrial projects are shaped on their national current and future energy mix. The way each country has implemented specific measures is even more different as it reflects their historical, legal, political context.

³² UKOOG, *Community Engagement Charter Oil and Gas from Unconventional Reservoirs*.

³³ Op. cit. p.2.

³⁴ Policy Providing regulation and licensing of energy industries and infrastructure Organisations: Department of Energy & Climate Change.

³⁵ Op. cit. p.3.

³⁶ M. Zielinski, ‘Pomorze: Seeds of Polish Shale Gas Counter Revolution’, naturalgaseurope.com, 26 November 2012.

The case studies reveal as well that no race-to-the-bottom in terms of environmental standards or requirements has happened. On the contrary, local needs have put pressure on governments and companies that have improved their practices and legislations.

Besides the well-known right for Member States to choose their energy mix included in the Lisbon treaty, the above analysis shows that is quite impossible to draw similar approaches among national experiences and therefore, a European policy that goes beyond environmental issues seems hardly justifiable. National and local governance levels are on the contrary better placed to answer civil society or technical needs.

Finally, it is important to underline that fostering shale gas development is not necessarily in contrast with ambitious climate goals. Denmark example reveals that hydrocarbon exploitation can be a source of income to fuel a smooth transition towards a low or zero carbon economy. Danish pragmatism shows that ideological opposition to hydraulic fracturing should be avoided in particular when all the necessary measures are taken in order to ensure the most advanced environmental standards.

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Abbreviations and Acronyms

BP	British Petroleum
DEA	Danish Energy Agency
DECC	Department of Energy and Climate Change (UK)
DUC	Danish Underground Consortium
E&P	Exploration and Production
GW	Giga-Watt
IEA	International Energy Agency
IOC	International Oil Company
LNG	Liquefied Natural Gas
MTOE	Million Tons of Oil Equivalent
RES	Renewable Energy Source
TSO	Transmission System Operator
TWH	Tera-Watt hour
UKOOG	United Kingdom Onshore Operators Group
US EIA	United States Energy Information Administration
USGS	United States Geological Survey