AVOSETTA MEETING, HELSINKI, 31 May – 1 June, 2013

Environmental risks of hydraulic fracturing of shale gas

(A preliminary draft)

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Research aim: Comparison of environmental risks of hydraulic fracturing of shale gas and appropriateness of regulatory framework in the United States of America and European Union[1]

"Hydraulic fracturing is the process by which fracturing fluids – a mixture consisting primarily of water, sand and a small percentage of chemical substances (generally between 0.5% and 2%) are injected under high pressure into a geological formation that contains hydrocarbons so as to break the rock and to connect the pores that trap the hydrocarbons. As the injection pressure exceeds the rock strength, the process results in the opening or enlargement of fractures. Injected sand prevents these fractures from closing after the pumping pressure is released, thereby enabling natural gas and oil to flow from the geological formation into the well."[2]

One of the greatest concerns is that fracturing could pollute underground water sources. Methane contamination of drinking water in some cases is so severe that some faucets can be lit on fire.

Many state regulators and officials in the United States conclude that there have been no cases of groundwater contamination caused by hydraulic fracturing.[3] However, fracturing i.e. injection of water and chemicals underground is only one of the many stages in the well development process. The accidents of groundwater pollution and explosion of homes, although there were not proven to be caused by chemicals used in fracturing, were reported to be the result of ineffective well casing or cementing jobs, operator negligence or use of pits to store wastes.[4]

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[1] Many thanks to Professor Hannah Wiseman for providing me with all the necessary materials, studies and inputs regarding the drilling and fracturing of gas wells in the United States.

[2] http://ec.europa.eu/environment/integration/energy/uff_context_en.htm.

[3] For various examples of testimonies and responses of state officials and regulators to allegations of groundwater pollution see: Wiseman, Hannah Jacobs, Risk and Response in Fracturing Policy (March 6, 2012). University of Colorado Law Review, 2013, Forthcoming; FSU College of Law, Public Law Research Paper No. 594. Available at SSRN: http://ssrn.com/abstract=2017104, p. 111-112.

[4] Letter from Scott R. Kell, Deputy Chief, Div. of Mineral Res. Mgmt. (Ohio), to Mike Paque, Exec. Dir., Ground Water Prot. Council (May 27, 2009); Letter from Joseph J. Lee, Jr., Chief, Source Prot. Section, Div. of Water Use Planning, Penn. Dep't of Envtl. Prot., to Michael Paque, Exec. Dir., Ground Water Prot. Council (June 1, 2009), http://www.dec.ny.gov/docs/materials_minerals_pdf/ogsgeisapp2.pdf (via Wiseman, *supra* note 3).

Recently, one investigation of groundwater contamination in a relatively shallow gas wells near Pavillion, Wyoming linked hydraulic fracturing to contamination in groundwater.[5] The data obtained through Environmental Protection Agency's groundwater investigation will be considered in Wyoming's further investigation. The State intends to conclude its investigation and release a final report by September 30, 2014.[6]

The examples of violations of environmental laws at hydraulically fractured well sites in the United States show that other stages of the well development process also deserve special attention e.g. chemicals may spill when transported to well sites; more and new types of wastes must be stored and disposed of; methane may contaminate underground water sources during the drilling process preceding fracturing.[7]

Overview of the current status of the regulatory framework at the EU level

Interest in assessing potential for development of shale gas was expressed in European Council's Conclusions from 4 February 2011: "In order to further enhance its security of supply, Europe's potential for sustainable extraction and use of conventional and unconventional (shale gas and oil shale) fossil fuel resources should be assessed."[8]

In June 2011 a study on the possible impacts of hydraulic fracturing on the environment and on human health requested by the European Parliament's Committee on Environment, Public Health and Food safety was published.[9] This study recommended development of a new EU directive regulating this area.

In November 2011 a report commissioned by the European Commission's Directorate-General for Energy concluded that existing EU legislation already covers shale gas exploration and extraction.[10] This study looked at the situation in Sweden, Poland, France and Germany and did not find any significant gaps in the current legislative framework either at EU or national level.

[5] Environmental Protection Agency, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming, 2011, http://www2.epa.gov/sites/production/files/documents/EPA_ReportOnPavillion_Dec-8-2011.pdf.

[6] Environmental Protection Agency, Press Release from June 20, 2013, http://www2.epa.gov/region8/pavillion.

[7] Wiseman, Hannah Jacobs, *supra* note 3.

[8] European Council, 4 February 2011, Conclusions, point 7. http://register.consilium.europa.eu/pdf/en/11/st00/st00002-re01.en11.pdf.

[9] Group of authors, Impacts of shale gas and shale oil extraction on the environment and on human health, http://www.europarl.europa.eu/document/activities/cont/201107/20110715ATT24183/20110715ATT24183EN.pdf.

[10] Philippe and Partners, Final Report on Unconventional Gas in Europe, 8 November 2011, http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf.

On 15 December 2011, the European Commission adopted the Communication "Energy Roadmap 2050" in which it identified shale gas and other unconventional gas sources as potential important new sources of supply in or around Europe.[11]

In September 2012, three new studies were carried out for the European Commission.[12] The studies investigate: (1) the potential effects of unconventional fossil fuels on energy markets,[13] (2) the potential climate impact of shale gas production,[14] and (3) the potential risks shale gas developments and associated hydraulic fracturing may present to human health and the environment.[15]

"The study on climate impacts 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, be it via pipeline or by LNG due to the impacts on emissions from long-distance gas transport. The study on environmental impacts 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. A considerable number of questions relating to legislation and regulation have been identified, implying the need for an appropriate framework to enable a sustainable shale gas extraction in Europe."[16]

In its statement on the use of hydraulic fracturing in the European Union (date: 19/11/2012), EU Commissioner for Environment Janez Potočnik submitted: "In the meantime, we have initiated work to propose before the end of 2013 an adequate risk management framework for unconventional fossil fuels, in particular shale gas developments in Europe. We are currently assessing what form such framework should take. See http://ec.europa.eu/atwork/pdf/forthcoming_cwp_initiatives_2013_en.pdf (item n°41)[17].

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[11] Communication from the Commission to the Euroepan parliament, The Council, The European Economic and Social Committee and the Committee oft he Regions „Energy Roadmap 2050", COM/2011/0885 final.

[12] The views in these studies have not been adopted or in any way approved by the European Commission and should not be relied upon as a statement of the European Commission's views.

[13] European Commission, Joint Research Centre, Institute for Energy and Transport, Unconventional Gas: Potential Energy Market Impacts in the European Union, http://ec.europa.eu/dgs/jrc/downloads/jrc_report_2012_09_unconventional_gas.pdf.

[14] AEA Technology plc, Climate impact of potential shale gas production in the EU, Final Report, http://ec.europa.eu/clima/policies/eccp/docs/120815_final_report_en.pdf.

[15] AEA Technology plc, Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe, http://ec.europa.eu/environment/integration/energy/pdf/fracking%20study.pdf.

[16] Midday Express of 2012-09-07, News from the European Commission's Midday Briefing, http://europa.eu/rapid/midday-express-07-09-2012.htm?locale=en.

[17] The mentioned item no. 41 reads as follows: „Description of scope of objectives: Against the background of existing EU legislation the initiative will examine options to ensure that opportunities to diversify energy supplies and improve competitiveness, including by production of unconventional gas, can be taken up. The framework would target a level playing field across the EU, clarity and predictability for both market operators

Regarding requests that the Commission intervenes in order to stop shale gas activities, the Commission is not endowed with such competence. Nor can it decide on an EU-wide moratorium."[18] [19]

On 21 November 2012 European Parliament adopted two non-legislative resolutions regarding shale gas and oil: Resolution on the environmental impacts of shale gas and shale oil extraction activities (2011/2308(INI))[20] and Resolution on industrial, energy and other aspects of shale gas and oil (2011/2309(INI))[21].

In its resolution on the environmental impacts the Parliament made many recommendations regarding the enhancement of the regulatory framework. The Commission was, *inter alia*, called on to:

- consider including operations related to hydraulic fracturing in Annex III of the Environmental Liability Directive,
- bring forward proposals to ensure that the provisions of the Environmental Impact Assessment Directive 2011/92/EU adequately cover the specificities of shale gas, shale oil, and coal bed methane exploration and extraction,
- issue guidance on the establishment of both the baseline water monitoring data necessary for an environmental impact assessment of shale gas exploration and extraction and the criteria to be used for assessing the impacts of hydraulic fracturing on groundwater reservoirs in different geological formations, including potential leakage and cumulative impacts,
- bring forward legislative proposals: i) to make the use of completion combustion devices ("green completions") mandatory for all shale gas wells in the EU, ii) to limit flaring to cases where there are concerns about safety, and iii) to completely forbid venting of all shale gas wells, in an effort to reduce the fugitive methane emissions and volatile organic compounds linked to shale gas.

The resolution on industrial, energy and other aspects of shale gas and oil emphasized primarily the benefits and opportunities of shale gas development.

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and citizens including for exploration projects, full consideration of greenhouse gas emissions and management of climate and environmental risks in line with public expectations."

[18] http://ec.europa.eu/commission_2010-2014/potocnik/media/pdf/statement_19_11_2012.pdf.

[19] Some EU Member States have banned hydraulic fracturing (for more information see e.g. Ruven Fleming, Shale Gas – a Comparison of European Moratoria (2013) 22 European Energy and Environmental Law Review, Issue 1, pp. 12–32).

[20] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2012-0443+0+DOC+XML+V0//EN&language=EN.

[21] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2012-0444+0+DOC+XML+V0//EN&language=EN.

In July 2013 the European Parliament's Environment Committee voted in favor of an amendment to the Directive 2011/92/EU of the assessment of the effects of certain public and private projects on the environment that would require a mandatory environmental impact assessment to apply to all unconventional fossil fuels projects. In accordance with the precautionary principle, it is proposed that non-conventional hydrocarbons be included in Annex I, so that the relevant projects are systematically made subject to EIA, regardless of the amount extracted.

As already mentioned, European Commission included in its Work Programme for 2013 the development of an "Environmental, Climate and Energy Assessment Framework to Enable Safe and Secure Unconventional Hydrocarbon Extraction".[22] This initiative aims at delivering a framework to manage risks, address regulatory shortcomings and provide legal clarity to market operators and citizens across the EU. An on-line stakeholders' consultation has been launched at the end of 2012 and was closed on 23 March 2013.[23] The Commission organized an open stakeholder meeting on 7 June 2013 in Brussels.[24] The European Commission is scheduled to publish its proposals for a risk-management framework for unconventional hydrocarbon activities by the end of 2013.

[22] http://ec.europa.eu/atwork/pdf/cwp2013_annex_en.pdf.

[23] http://ec.europa.eu/environment/consultations/uff_en.htm.

[24] http://ec.europa.eu/environment/integration/energy/uff_event_7june2013_en.htm. Presentation of the results of the public consultation: http://ec.europa.eu/environment/integration/energy/pdf/Presentation_07062013.pdf.