

Ad-hoc Technical Working Group on Environmental aspects of unconventional fossil fuels, in particular shale gas

First Meeting on 27 January 2012, Brussels

Final Summary Report

[15/02/2012]

At the meeting of the Environmental Policy and Review Group of 17 November 2011 it was agreed to set-up a Technical Working Group (WG) on Environmental Aspects of Unconventional Fossil Fuels, in particular Shale Gas. The first meeting of the Technical WG took place on 27 January 2012 in Brussels.¹

In this meeting, representatives from 20 EU Member States², from the EEA³ and from services of the European Commission (ENV, ENER) were present.

All meeting documents and presentations are available to registered users of the WG at:
<https://circabc.europa.eu/w/browse/6ff72d22-f149-401e-adeb-8297c7f86152>.

1. Welcome and Introduction

The Commission (Robin MIÈGE, *Director ENV F - Strategy*) welcomed all participants and recalled the context of the meeting. It summarised ongoing work in the EU Institutions and activities within the Commission. The Commission further explained the role of the Technical Working Group being part of the Commission's endeavour to lift uncertainties about environmental impacts and risks of unconventional gas extraction in a joint effort with Member States. It then clarified that the current focus of the Working Group is in particular on shale gas *practices*⁴ due to their relative novelty, the limited EU experience in this area and the opportunity of potential rapid and promising developments in several parts of Europe. Finally, the objectives for this first meeting were presented which were, in particular:

- To underline the need to swiftly identify and cover eventual knowledge gaps in relation to environmental and human health issues;
- To launch a timely discussion with Member States, establishing the WG as a platform for information exchange on environmental aspects of, and best practices as regards these projects;
- To share views with Member States on potential key issues and priorities;
- To jointly contribute to the Commission's efforts to assess the need for a harmonised risk management framework for these projects.

¹ The Working Group was set up in the Register of Commission expert groups, at: <http://ec.europa.eu/transparency/regexpert/detailGroup.cfm?groupID=2646>

² CZ, FI, HU, MT, LU, SE and SI did not attend

³ NO

⁴ Defined as the integrated use of high-volume hydraulic fracturing and horizontal drilling practices.

- a. Adoption of the Agenda
The agenda was adopted without modifications.

2. Overview of environmental aspects related to shale gas practices

- a. Potential environmental impacts and risks
Making reference to three established reports documenting environmental challenges of shale gas practices in the US,⁵ the Commission (ENV F.1) made a technical presentation on shale gas.

The presentation recalled the impressive growth in unconventional shale gas production in the US since 2000. It described the integrated use of high-volume hydraulic fracturing and horizontal drilling, explaining how this technological innovation enabled the commercial break-through of shale gas production in the US by 2002-2003. It clarified that in the EU this technological innovation would represent, most likely, a novel practice, notwithstanding other experiences with hydraulic fracturing,⁶ or with horizontal drilling of wells in the EU, as these appear to differ in scale, frequency and complexity from the general shale gas practices. The discussion of technological aspects then pointed to a number of possible environmental challenges and uncertainties with regard to water, land use, chemicals use and air pollution in the context of unconventional gas and in particular shale gas exploration and production practices.

The Commission concluded that, in its view, there is a need to further assess net incremental impacts and risks of unconventional gas extraction and in particular shale gas practices in order to determine whether the EU environmental acquis provides a sufficient level of protection to the environment and to humans. The Commission invited Member States to address these issues jointly in the frame of the Technical WG, and in a timely and open fashion, starting from the most relevant US experiences and their relevance in the European context.

- b. Discussion and input from the Technical WG
Most participants expressed interest in sharing information and best environmental practices. Main technical points referred to:
 - (i) the possibility / appropriateness of placing constraints in Europe on the list of chemicals to be used by operators in hydraulic fracturing processes, and requiring operators to demonstrate technically why particular chemicals are to be used, in order to avoid a 'trial and error' approach;

⁵ Final Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (US EPA, Nov. 2011); 2011 Supplemental Generic Environmental Impact Statement On The Oil, Gas and solution Mining Regulatory Program; Well Permit Issuance for Horizontal Drilling And High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs; Secretary of Energy Advisory Board. (New York State Department of Environmental Conservation: 2011); Shale Gas Subcommittee 90-Day Report. (US Department of Energy, Nov. 2011 and Aug. 2011).

⁶ Most notable EU experiences with hydraulic fracturing seem to relate to off-shore operations in the North Sea, and to on-shore operations mainly in tight gas reservoirs such as in Germany. These experiences appear to be mostly related to hydraulic fracturing in vertical wells.

- (ii) the need to further consider zoning measures and to apply a good site selection process to avoid a number of risks, including of groundwater contamination as a result of hydraulic fracturing operations in the proximity of aquifers;
- (iii) considerations about legal requirements for 'underground' mitigation measures (i.e. in relation to the absence of such measures under the EIA-Directive (2011/92/UE)); and
- (iv) the possibility of further improving current exploration and extraction practices to reduce their environmental footprint.
- (v) other technical aspects provided by Member States with some initial experience concerning shale gas exploration.

Some remarks pointed at the need to acknowledge differences between the US and EU contexts for shale gas, at the economic and energy independence benefits shale gas could represent for Europe, at the need to look at environmental aspects of all unconventional fossil fuels, and at the current EU experience with onshore hydraulic fracturing (e.g. in Lower Saxony). The Commission took note of these remarks; it reminded participants that the main focus of the Technical WG is on environmental aspects of unconventional gas extraction and in particular on shale gas practices. The Commission took note of the environmental issues raised by several participants in relation to chemicals, risks to aquifers and aspects concerning the management of flowback water. It informed that best practices will be discussed in future meetings and clarified that it was not aware of offshore projects that would make use of high-volume hydraulic fracturing in horizontal wells in the EU/EEA to date. The Commission clarified that flowback water from shale gas practices would fall under the scope of the Mining Waste Directive (2006/21/EC). It took note of the interest expressed by some participants to invite hydraulic fracturing experts at a future meeting.

Participants took note of the presentation and welcomed the additional information provided by the Commission. The Commission was invited to further focus on, and possibly come forward with best environmental practices. This will be addressed in future meetings of this Technical WG.

3. Roundtable on relevant activities in Member States

a. General context

The Commission recalled that a set of specific questions (outlined below) had been sent to participants ahead of the meeting in view of informing the discussion. It invited the Technical WG to address those questions:

Questions to Member States:

- State of the play on shale gas projects: where relevant, number and size of concessions, drilling/fracturing activities, developments in the next 5-10 years;
- Ongoing/planned studies on environmental aspects related to such projects: scope, timetable, main conclusions (if available);
- Considerations over key environmental impacts or risks;

b. Roundtable and discussions

Seven Member States (DE, DK, FR, LT, PL, UK, IE) prepared specific presentations, all other members contributed orally.

The discussion highlighted a number of aspects warranting further consideration, in particular:

- the importance of good (above-ground and underground) controls, and of well integrity requirements;
- requirements for baseline measurements and monitoring of e.g. water, air and seismicity, as precondition to be able to detect and assess potential impacts and to determine eventual causality relations;
- considerations about zoning of operations and about minimum safe distance requirements to aquifers, sensitive areas and other underground activities (such as CO₂ storage);
- considerations about induced seismicity;
- considerations about toxicity of chemical additives;
- potential challenges related to surface-management of flowback water, including considerations regarding the appropriateness of treating flowback water in municipal wastewater treatment plants;
- considerations about transboundary risks/impacts, such as related to aquifers;
- considerations about the need for further amendments of the EIA-Directive (2011/92/UE), in the light of potentially significant areal concessions for exploration and/or production of shale gas (up to thousands of km²) as well as public participation issues.

Public acceptance issues were identified as a further key challenge, notably due to possible differences between real environmental impacts and public perception. Some participants indicated that their Member State had experience to date with complex hydrocarbon extraction projects, which may include experience with hydraulic fracturing (mostly of vertical wells) and horizontal drilling; however, most other participants acknowledged that reliable and robust experience with the combined use of high-volume hydraulic fracturing and horizontal drilling practices, as used in shale gas projects, are missing to date in the EU. To address identified challenges, several Member States are carrying out / have completed technical studies. The Commission invited them to share these studies with all members via CIRCABC.

Member States have different levels of involvement, but are all faced with a number of uncertainties and common questions with regard to the development of unconventional gas and in particular shale gas projects. High-volume hydraulic fracturing in horizontal wells, as would be used for shale gas projects in the current state of technology development, is largely a novel practice in the EU.

4. Applicable EU environmental acquis

a. The Commission's legal interpretation

The European Commission recalled that a legal note had been provided to all Ambassadors of EU Member States in Brussels in advance of the meeting, as well as to the European Parliament. The note was also made available to participants of the Technical WG via CIRCABC. That note is clarifying the Commission's position in regard to the applicability of main pieces of EU environmental legislation to shale gas practices. The Commission (ENV A.1) explained the legal requirements applying to shale gas practices under the EIA-Directive (2011/92/UE), the Water Framework Directive (2000/60/EC), the Mining Waste Directive (2006/21/EC), and indicated other relevant EU environmental frameworks applying to such practices.⁷ According to the first return on experience from existing projects, the Commission concluded that practices required by shale gas projects are covered by the current EU environmental legislation from planning until cessation, albeit it is not possible to conclude definitively at this stage whether the current EU legal framework ensures an appropriate level of protection, given limitations in experience and knowledge with such practices in the EU.

b. Discussion and input from the Technical WG

The Technical WG raised several points for clarifications, notably as regards the applicability to shale gas practices of the EIA-Directive (2011/92/UE), of the Industrial Emissions Directive (2010/75/EU) in relation to the presence of multiple generators on a fairly confined area, and of the exemption clause under Article 11(3)(j) of the Water Framework Directive (2000/60/EC).

With regard to the EIA-Directive (2011/92/UE), the Commission explained that in the light of the precautionary and prevention principles, shale gas exploration and extraction projects are subject to an Environmental Impact Assessment (EIA) in line with requirements under Annex I and II of the Directive if it cannot be excluded, on the basis of objective information, that the project will have significant environmental effects; in case of doubts over the magnitude/significance of effects, an EIA must be carried out. At the same time, cumulative effects will play an important role. In this respect, projects have not to be assessed only on the basis of their own merits, but also in relation to other similar projects and interactions with other activities such as concerning water abstraction. In the light of the large shale gas plays to be prospected, the use of the Strategic Environmental Assessment (SEA) Directive (2001/42/EC) is indicated.

With regard to the Water Framework Directive (2000/60/EC) and the Mining Waste Directive (2006/21/EC), the Commission considered that the exception clause under Article 11(3)(j) of the Water Framework Directive (2000/60/EC) does not apply to practices involving the combined use of high-volume hydraulic fracturing and horizontal drilling for the following reasons:

- (i) A significant proportion of the initial fracturing fluid simply remains underground in the geological formation: only 25% to 70-75% of the injected fracturing fluid,

⁷ E.g. Regulation 1907/2006/EC on the registration, evaluation and authorisation of chemicals (REACH), Directive 98/8/EC, on the placing of biocidal products on the market; Directive 92/43/EC, on the conservation of natural habitats and of wild fauna and flora, Directive 96/82/EC, on the prevention and control of major accident hazards involving dangerous substances (Seveso II), Directive 2004/35/EC, on environmental liability with regard to the prevention and remedying of environmental damage.

mixed with produced water, rises back to the surface after injection, where it can be collected as "flowback water".

- (ii) The flowback water resulting from such processes does not qualify as "*water containing substances resulting from the operations*" as:
 - (a) employed fracturing fluids are designed primarily to encourage oil and gas to flow from the geologic formations to the well head, and
 - (b) the flowback water contains the initial fracturing fluid that was "prepared" for the fracturing process itself, plus substances liberated by the fracturing process itself and which were originally present in the geological formation.

In neither case does the flowback water only contain substances resulting from the extraction process itself – that is, only substances that were originally present in the geological formation and which have been removed from the formation by the respective practice.

- (iii) The exception clause under Article 11(3)(j) of Directive 2000/60/EC represents a derogation from a general prohibition and it is therefore to be interpreted in a restrictive manner. Applying the above exemption in the case of flowback water from the above novel practices would be in contradiction with the objectives of the Directive (ensuring the good status of the waters) and with the negotiation history of the Directive.
- (iv) Accordingly, used fracturing fluid is to be considered as extractive waste and flowback water must be treated according to the requirements of Directive 2006/21/EC. The classification of substances as hazardous does not play a role in this respect. A closed-loop use of flowback water however may avoid the classification as waste.

With regard to the IPPC Directive (2008/1/EC) and the Industrial Emissions Directive (2010/75/EU), the Commission stressed that they do not cover the exploration or extraction itself of shale gas. The Commission specified that those Directives would only be applicable to shale gas exploration and exploitation if a combustion plant of at least 50 MW or another activity (e.g. gas refinery) listed in Annex I of the IPPC Directive or of the Industrial Emissions Directive (i) would be directly associated to shale gas exploration and exploitation, (ii) would have a technical connection with shale gas exploration and exploitation and (iii) would be operated *in situ*. In this framework, the Commission added that it was not yet in a position, based upon the information currently available, to conclude whether those conditions are met in respect of shale gas exploration and extraction projects.

By virtue of the application of the Mining Waste Directive (2006/21/EC) to fracturing fluid left underground in geological formations or treated in surface, BAT (and related BREFs) should be applied to shale gas practices under this Directive. Thus far however, BREFs under the Mining Waste Directive (2006/21/EC) do not cover shale gas practices specifically, but only mining waste management aspects.

Participants welcomed the presentation and took note of the additional information provided by the Commission. The Commission, in close cooperation with the Member States, will come forward with a BAT / BREF for the above shale gas practices, and to further discuss best practices in the frame of the Technical WG. Participants were invited to submit further technical/legal questions in writing.

5. AOB

None

6. Conclusions and next steps

The Commission (Robin MIÈGE, *Director ENV F - Strategy*) presented the draft conclusions and next steps for the process. It highlighted that several relevant studies will be completed before summer 2012. In this context, it invited the participants of the Technical WG to actively exchange information on this topic, to notify the Commission (Mihai TOMESCU, email: mihai.tomescu@ec.europa.eu and Florence LIMET, email: florence.limet@ec.europa.eu) of relevant reports and shale gas related developments that could meaningfully inform the Technical WG and that could be shared via CIRCABC, and to notify as well the Commission of any further questions/issues they may have on this topic. The next meeting of the Technical WG was tentatively scheduled for late June or early September 2012. Confirmation of meeting dates will take place at least six weeks in advance.

In conclusion, the Technical Working Group:

- o acknowledged the complexity of shale gas practices and the lack of fully reliable and robust EU experiences with such practices to date,*
- o recognised that a number of technical environmental aspects require further consideration,*
- o welcomed the launch of an early discussion process to lift potential uncertainties as regards the deployment of unconventional gas and in particular shale gas practices,*
- o took note of the Commission's intentions as regards the organisation of the information exchange and discussion process with Member States, including in regard to best environmental practices as a key input to swiftly address potential challenges in this area, notably in the preparation of BAT/BREF documents.*
- o agreed to contribute actively to this process through this Technical Working Group.*