



European Union Network for the Implementation
and Enforcement of Environmental Law

Best practice in regulating onshore oil and gas operations (including shale gas)

Final report: March 2016



Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Brussels, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 7th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at: www.impel.eu



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Executive summary <p>This project aimed to help onshore oil and gas regulators in their work, by sharing experiences, learning from one another and establishing best practice. Participants have established the basis for a valuable ongoing dialogue, through identification of key technical and regulatory issues relating to managing environmental risks from this important industry. The findings of this project will support further work to drive improvements in the environmental performance of the industry and regulatory practice.</p>	
Disclaimer <p>This report is the result of a project within the IMPEL network. The content does not necessarily represent the view of the national administrations or the European Commission.</p>	



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1 INTRODUCTION

Aims

This project aimed to help environmental regulators of the onshore oil and gas industry to learn from each other, by sharing information on approaches, technologies and regulatory experience. It aims to identify good practice in the industry across the different regulatory regimes and any gaps in the regulatory process, and to share experiences of implementation, compliance, enforcement and monitoring in relation to different aspects of the industry, such as extractive waste, flaring of waste gases, protection of groundwater and minimising water usage.

There is intense public scrutiny of regulators, and participants welcomed the space afforded by a project within the IMPEL network to exchange views and experiences. Understanding how to apply the regulatory framework consistently and effectively will help to respond to technical and legal challenges with clarity and consistency, and identify if there are improvements to be made.

Another reason for the project was that the oil and gas industry, and especially their service providers, work internationally and have a good understanding of differences in regulatory approaches. It is therefore of great benefit for regulators to discuss approaches and the best available techniques.

Actions and recommendations

There are a number of improvements the project has identified to how regulators could work, and collaborate with each other. These include sharing experience and information through the project forum to form the basis of this report. The European Commission has stated its willingness to understand the need for guidance, especially if proposed improvements could be clearly linked to relevant legal or technical guidance. The key potential routes for those improvements include:

- regulatory practice such as permit conditions, inspection methodologies, and monitoring regimes;
- ways of working within and across regulator organisations;
- sharing technical information and data;
- research initiatives into environmental risks and techniques for their management; and
- European Commission guidance.



The project in 2015 has been an initiation stage. It has helped participants to identify the scope, objectives and benefits. Further tasks in future projects will develop regulators' understanding and could suggest solutions to the identified issues. This network of onshore oil and gas regulators is the most immediate, and one of the largest benefits from this project, and participants are determined to maintain a regular dialogue into 2016 and beyond.



2 THE IMPEL PROJECT

Participants

The project benefited from participation by a substantial number of countries:

- Austria – Federal Ministry of Science, Research and Economy
- Denmark – Energy Agency
- France – Ministry of Ecology, Sustainable Development and Energy
- Germany – Lower Saxony, Schleswig-Holstein, Hamburg and Bremen Office of Extractive, Energy and Geology (Germany was unable to attend the workshops and site visits, but responded to the project questionnaire)
- Hungary – Office of Extractive and Geology
- Netherlands – State Supervision of Mines, Ministry of Economic Affairs
- Poland – Chief Inspectorate for Environmental Protection
- Romania – National Environmental Guard
- Turkey – Ministry of Environment and Urbanisation
- England – Environment Agency
- Scotland – Scottish Environment Protection Agency
- Northern Ireland – Northern Ireland Environment Agency

The European Commission (DG Environment) participated in the two workshops and the final telephone conference as an observer. The project was managed by the Environment Agency, England. Note that, as Northern Ireland and Scotland are devolved administrations within the United Kingdom, they participated in their own right.

Structure and method

The project developed and circulated a questionnaire to participants in spring 2015. Following receipt and collation of responses, participants attended an initial, one-day workshop in London in June 2015.

This first workshop was intentionally introductory. It succeeded in establishing excellent working relationships between participants. The Commission also updated participants about its recent work in relation to onshore oil and gas.



The London workshop focussed on the following issues:

- The EU's legal framework for regulating onshore oil and gas
- Regulation of extractive waste
- Protection of groundwater
- Regulation of flaring and the Industrial Emissions Directive

The following day, participants travelled from London to the Perenco conventional onshore oil field at Wytch Farm, in Dorset. This is Western Europe's largest such operation. It is located in an area that is renowned and protected for its sites of special scientific interest, areas of outstanding natural beauty and nature reserves. The operator drills horizontally from a number of well pads, allowing wells to reach out over 10km, including beneath coastal waters. The operations are regulated under environmental permits granted by the Environment Agency.

The project team reconvened for a second workshop in Gdańsk, Poland, in late September 2015, at the invitation of the Polish Chief Inspectorate for Environmental Protection. The Commission was once more welcomed as an observer.

This workshop began with a series of presentations by both the head and regional offices of the Inspectorate for Environmental Protection, and from the Gdańsk District Extractive Office. They provided participants with an overview of Polish regulatory authorities and their experience of regulating onshore oil and gas and, more particularly, shale gas operations in Poland.

Discussions then focussed on following up the work begun in London, focussing on:

- issues arising from different regulatory structures and practices in member countries;
- the current EU regulatory framework;
- the industry's track record of compliance with environmental permits;
- how public concerns are expressed, and how regulators respond; and
- how this project could continue to support regulators and other work being undertaken (including that of the Commission).



The workshop was followed by a visit to the Wysin-3 site, approximately 50km south-west of Gdańsk, where PGNiG SA was carrying out exploratory drilling, prior to conducting high-volume hydraulic fracturing of shale deposits. Wysin-3 will be a well with a total length of 5,350m, of which 1,200m will be drilled horizontally to the point at which HVHF will take place. PGNiG aims to establish the potential for production of oil and gas from shale deposits in Pommerania, northern Poland.

The workshops were successful in building relationships between participants and allowing extensive discussions on a variety of subjects to take place. In the process, participants identified a series of key issues.

The project team then intended to discuss and approve a draft of this report at a third workshop in Brussels in late November 2015. Following the tragic events in Paris and the subsequent security alerts in Brussels at precisely that time, the workshop had to be cancelled. The project team and the Commission therefore discussed the draft report by telephone conference instead, and revised drafts were circulated by email for final comment by participants and the Commission, before submission to IMPEL.

The EU's policy and regulatory framework

The EU's policy landscape has developed significantly in recent years.

Policy

The EU's development of policy and legislation relating to onshore oil and gas was until recently set mainly in the context of the Single Market and environmental protection. A more free-standing and mandatory EU energy policy is a relatively recent concept, and only since the 2007 Treaty of Lisbon has there been a legal basis for solidarity in the area of energy supply. The need to reduce greenhouse gas emissions significantly and the desire to reduce the EU's reliance on imported energy have been important factors.

The Commission adopted a Communication on a European Energy Security Strategy¹ in May 2014, calling on Member States to take into account decarbonisation priorities when considering use of hydrocarbons. The Commission placed emphasis, where hydrocarbon resources are developed, on compliance with energy and environmental legislation, and proposed developing a general

¹ COM(2014) 330 final of 28 May 2014



hydrocarbons Best Available Techniques (BAT) reference document (commonly referred to as a “Bref”), covering conventional and unconventional hydrocarbons, and both off- and onshore activities.

Work on a BAT Guidance Document on upstream hydrocarbon exploration and production (referred to in this report as the “Hydrocarbons BAT Guidance”) began with a first technical working group (TWG) meeting in Brussels in mid-October 2015. The guidance will have no legally-binding effect. The TWG has attracted participation from a large number of EU Member States (as well as interested non-EU countries, such as Norway), industry representatives, non-governmental organisations and trade unions.

In addition, a review of the existing Bref for the management of waste from the extractive industries (referred to in this report as the Extractive Waste Bref) is in process. This document, originally developed under the auspices of Directive 96/61/EC concerning integrated pollution prevention and control, and subsequently adopted in 2009 after the entry into force of the Directive on the management of wastes from the extractive industries² (referred to in this report as the Extractive Waste Directive), will include a specific chapter on management of wastes from energy industries. The review began in late 2013 and had an initial TWG in May 2014. Information-gathering questionnaires were sent out in 2015, and the information received from these is now being processed.

The Commission has explained that the Hydrocarbons BAT Guidance will not address issues covered by the Extractive Waste Bref, so both documents will have relevance for regulation (by which this report means permitting, compliance and enforcement) of onshore oil and gas exploration and production.

In recent years, interest has grown significantly in Europe in the potential of unconventional fossil fuels, such as shale oil and gas. Public concerns about proposals to develop these resources have generated considerable political debate. The European Commission established a TWG of Member States on the environmental aspects of unconventional fossil fuels with a view to promoting transparency and the exchange of information between regulators. The TWG informed the

² Directive 2006/21/EC.



Commission in the process leading to the adoption, in early 2014, of a Recommendation for minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing³, with an accompanying Communication⁴. The Commission flagged its intention to monitor Member States' application of the Recommendation. It would also review its effectiveness 18 months after its publication. Building on the results of this review, it would decide whether any further action is necessary. Such action might include *“updating the Recommendation’s provisions”*, or *“decide whether it is necessary to put forward legislative proposals”*.

In tandem with this non-binding initiative on unconventional hydrocarbons, the Commission also took a number of other steps:

- The Commission established a European Science and Technology Network on Unconventional Hydrocarbon Extraction⁵, *“in order to continue increasing the knowledge on unconventional hydrocarbon extraction technologies and practices as well as to further reduce potential health and environmental impacts and risks”*. The Network is managed by the Joint Research Centre in close co-operation with a steering group chaired by DGs Environment and Energy, and brings together representatives of industry, research, academia and civil society. The Network collects, analyses and reviews results from exploration projects, and assesses the development of technologies used in unconventional gas and oil projects.
- The EU’s Horizon 2020 research and innovation programme is funding a number of technical research projects.
- In both its Communications, on a European Energy Security Strategy, and on the use of high-volume hydraulic fracturing in the EU, the Commission placed emphasis on the importance of using BAT. It stated that: *“[i]n order to draw up BAT reference documents, the Commission will organise an exchange of information between Member States, the industries concerned and non-governmental organisations promoting environmental protection”*⁶.

Regulatory framework

The project team agreed that the EU legislation most relevant to regulating the environmental impacts of the onshore oil and gas industry is as follows:

³ Recommendation 2014/70/EU of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing.

⁴ COM(2014) 23 final/2 of 22 January 2014.

⁵ See <https://ec.europa.eu/jrc/en/event/conference/launch-event-european-science-and-technology-network-unconventional-hydrocarbon-extraction> for further information.



- Licensing of onshore oil and gas activities: *Directive 94/22/EC on the conditions for granting and using authorisations for the prospection, exploration and production of hydrocarbons*

This Directive provides a set of common EU rules to ensure fair competition in the granting by national governments of licences for oil and gas activities in their territories. It also allows Member States to impose conditions and requirements on the basis of public health and protection of the environment.

- Assessment of significant environmental impacts at strategic and project level: *Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the Strategic Environmental Assessment Directive) and Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the Environmental Impact Assessment Directive).*

Some onshore oil and gas activities may be subject to the requirements of these Directives. The Strategic Environmental Assessment Directive requires an assessment of plans and programmes, in particular in the areas of energy, industry, waste management, water management, transport and land use. The Environmental Impact Assessment Directive requires an environmental impact assessment to be conducted for projects involving the extraction of petroleum and natural gas for commercial purposes, if the amount extracted exceeds certain thresholds, and a screening for deep drilling projects and surface installations for extracting oil and gas. In addition, Recommendation 2014/70/EU invites member states to carry out a strategic environmental impact assessment before granting licences that may require the use of high-volume hydraulic fracturing, and an environmental impact assessment before high-volume hydraulic fracturing activities are carried out. Reasonable alternatives to the proposed plan, programme or project must also be considered. The public and environmental authorities must be consulted, and their comments taken into consideration before the plan, programme or project is finalised. Only once assessment has been completed can public authorities give permission to proceed.

⁶ *Ibid.*



- Nature conservation: *Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and Directive 2009/147/EC on the conservation of wild birds (the Birds Directive).*

In some cases onshore oil and gas activities may also be subject to EU nature conservation policy, which is built around the Natura 2000 network of protected sites and the system of species protection. If a foreseen project may affect a Natura 2000 site in a significant manner, a prior appropriate assessment must be carried out under the Habitats Directive.

- Preventing/minimising pollution caused by emissions from installations: *Directive 2010/75/EU on industrial emissions (the Industrial Emissions Directive).*

Chapter I of the Industrial Emissions Directive applies to activities listed in Annex I to the Directive. It is potentially relevant to onshore oil and gas extraction, for example in the following areas: disposal of waste in waste incineration plant (for example, flaring of waste gases); underground storage of hazardous waste; and certain types of treatment of wastes. The Directive aims to prevent or, where that is not practicable, minimise emissions to all environmental media from specified activities. It does this by requiring Member States to permit those activities and to include conditions in permits that ensure that BAT are employed and/or that mandatory emission limits are complied with. If the activity could cause significant harm to the environment or human health, competent authorities must refuse permit applications.

- Protection of surface waters and groundwater: *Directive 2000/60/EC establishing a framework for the Community action in the field of water policy (the Water Framework Directive) and Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (the Groundwater Daughter Directive).*

These Directives are relevant for onshore oil and gas principally in relation to surface spills, abstraction and discharges to surface waters and soil, and impacts of sub-surface activities on groundwater. The Water Framework Directive establishes a legal framework to protect and restore clean water across Europe, and to ensure its long-term sustainable use. Protection of groundwater is addressed in more detail in the Groundwater Daughter Directive. The



Framework Directive allows for some pollution of surface waters, subject to general minimum standards and measures to mitigate any pollution. The Daughter Directive proceeds on the basis that no pollution of any groundwater should be allowed, with an absolute prohibition on direct discharges to groundwater, and a requirement to monitor groundwater bodies so as to detect changes in chemical composition caused by indirect discharges, and to reverse any upward pollution trends caused by human activities.

- Management of wastes: *Directive 2008/98/EC on waste (the Waste Framework Directive) and Directive 2006/21/EC on the management of wastes from the extractive industries*

While management of “extractive wastes” is directly relevant to onshore oil and gas activities, they may also produce other wastes. These Directives collectively require Member States to manage wastes from onshore oil and gas activities without endangering human health or harming the environment. The Extractive Waste Directive provides a comprehensive framework for the safe management of extractive wastes, and is accompanied by the Extractive Waste Bref that is currently under review. Where the Extractive Waste Directive does not apply to wastes produced by onshore oil and gas activities, they are likely to be covered by the Waste Framework Directive.

- Liability for environmental damage: *Directive 2004/35/EC on environmental liability (the Environmental Liability Directive).*

This Directive covers a number of activities that can be associated with onshore oil and gas activities, including water abstraction, waste management, emissions into the environment and use, storage, release into the environment and on-site transport of dangerous substances. Environmental risks from onshore oil and gas activities are not limited to the operational phase, and this Directive is particularly relevant to the longer-term (that is, up to 30 years after the event causing the damage has occurred) protection of the environment. The Directive enshrines the “polluter pays” principle and, by requiring environmental damage to be remedied, aims to encourage operators to prevent such damage from occurring from activities falling within the scope of the Directive.



- Public participation: *Directive 2003/35/EC in respect of the drawing up of certain plans and programmes relating to the environment and... with regard to public participation and access to justice (the Public Participation Directive) and Directive 2003/4/EC on public access to environmental information.*

Regulators have a vital role to play in addressing public concerns about onshore oil and gas. The EU is a signatory to the Aarhus Convention, to which it has given the most direct legal effect in amendments to the Environmental Impact Assessment and Industrial Emissions Directives. Public access to information, participation in decision-making and access to justice are seen as fundamental to good decision-making by regulatory authorities and public acceptance of those decisions.

- Regulation of naturally occurring radioactive material (NORM): *Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation (the Basic Safety Standards Directive).*

Produced waters and flowback fluids from wells frequently contain elevated levels of naturally-occurring radioactive materials (usually referred to as NORM). The Basic Safety Standards Directive sets out standards for radiation protection for workers and the general public.

- Prevention and management of major accident hazards: *Directive 2012/18/EU on the control of major accident hazards involving dangerous substances (the Seveso III Directive).*

The latest incarnation of the EU's legislation on major accidents involving dangerous substances aims to prevent such accidents and, where they occur, to limit their consequences for both human health and the environment. Where it applies, the Directive requires operators to have policies to prevent major accidents and, in the case of "upper-tier establishments", to produce a safety report and internal emergency plans.

- Management of chemicals: *Regulation (EC) No 1907/2006 concerning the registration, evaluation authorisation and restriction of chemicals (the REACH Regulation).*



The onshore oil and gas industry uses a range of chemicals that are potentially damaging to the environment, for example in drilling muds and fracturing fluids. The REACH regime aims to ensure that the environment is protected, while still allowing the free circulation of substances within the Single Market. It does this by making industry responsible for assessing and managing the risks posed by chemicals, and for providing appropriate safety information to users.

- Environmental aspects of unconventional fossil fuels: *Commission Recommendation of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing.*

The Recommendation aims to complement existing EU legislation and to bring clarity and predictability to public authorities, operators and the public. It invites Member States to follow minimum principles when applying or adapting their legislation applicable to the use of high-volume hydraulic fracturing.



3 SUBSTANTIVE ISSUES

Statutory framework

Participants identified the EU legislation outlined in the earlier section of this report as particularly relevant to regulation of the onshore oil and gas industry.

Key environmental risks

Participants agreed that the principal environmental risks from onshore oil and gas activities are:

- Contamination of groundwater by:
 - inadequate well design or well failure;
 - spills of chemicals or returned fluids at the surface; and/or
 - mobilisation of solutes and/or methane by high-volume hydraulic fracturing;
- Contamination of surface water and/or soil by above-ground spills, and/or leaks from storage tanks;
- Adverse impacts on water resources through abstraction for high-volume hydraulic fracturing;
- Pollution of the air by:
 - fugitive emissions of methane;
 - venting from on-site tanks/equipment; and/or
 - flaring;
- Pollution caused by the inadequate management of wastes, including:
 - waste waters;
 - drilling muds and cuttings;
 - gases; and or
 - naturally occurring radioactive material (NORM);
- Induced seismicity: both from conventional and unconventional onshore oil and gas activities.

While participants identified substantial areas of common understanding, they also agreed on the need to develop these further, and to promote best practice across member countries. In some areas, clarification and/or guidance could be helpful (see further below). Such discussions could contribute towards creating a level playing-field, building trust with the public, and supporting the evolution of policy and legislation.



CONCLUSION 1: Participants consider that:

- a) they have discussed and explored the existing *acquis communautaire* that applies to the known environmental risks relevant to the regulation of onshore oil and gas activities; and
- b) there should be an ongoing dialogue between participants and the Commission about our practical experience from implementing and applying the *acquis*, to establish best practice and to improve practical implementation across member countries.

Participants agreed to distinguish between technical issues on the one hand, which might best be addressed through the technical guidance process such as Bref development, and interpretative or legal issues on the other, which might be better dealt with by clarification or guidance from the Commission.

In addition, participants in Gdańsk mandated the project manager to submit proposals for a follow-up project to the IMPEL Air and Industry Expert Team meeting in Bucharest a couple of days later. Participants expressed a strong desire to maintain the dialogue, and encouraged the Commission to help facilitate this.

CONCLUSION 2: As well as a further IMPEL project, participants wish actively to continue the dialogue, wherever possible by face-to-face meetings and site visits. Participants will exchange views on how best to facilitate this. The project manager will investigate developing the use of BaseCamp as a means of exchanging information and views.

Initial discussion of environmental regulatory issues

Extractive waste



The project established that participants have a shared understanding of the principal terms and concepts in the Extractive Waste Directive, including distinguishing between, on the one hand, the activity of managing extractive wastes and, on the other, the existence of an extractive “waste facility”. While almost all onshore oil and gas activities involve the management of extractive wastes, for a “waste facility” to exist extractive waste has to be accumulated or deposited for specified periods (with the exception of “Category A” waste facilities, and facilities for waste characterised as hazardous, for which there is no time period). Nearly all participants always require operators to obtain a permit for both the management of extractive wastes and an extractive “waste facility” (where the latter exists). Where extractive wastes are immediately taken off-site for treatment and/or disposal elsewhere, participants agreed that there is no “waste facility” at the site (although extractive wastes are clearly being managed, and the wastes remain “extractive” wastes, so there will be an extractive “waste facility” elsewhere).

However, participants’ interpretations of the application of the definition of “extractive waste” to specific substances do differ substantially. The table below summarises questionnaire responses:

Substance	Extractive waste? (percentage of participants saying yes)
Drilling muds	60
Drill cuttings	60
Waste cement	25
Flowback fluid mixed with formation minerals and salt	40
Produced and formation waters	33
Proppants such as sand removed from flowback fluid	40
Waste gas for flaring	17
Waste oil	33
Waste suspension and spacer fluids	40
Discarded condensates	33
Testing or well stimulation fluids	40
Waste gases, including fugitive emissions	17

Participants generally do not regard substances that are re-used in the process as “extractive waste” at the point at which they are used: this can include produced waters and other materials, such as



drilling muds and fluids. (There are conditions to be fulfilled for a production residue not to be considered a waste.) Drilling cuttings, and drilling muds that are not re-used are generally considered to be extractive wastes. But interpretations in relation to most other substances, including proppants, waste cement and waste gases, diverge. In some cases, participants explained that their view depends upon the specific circumstances and, in fact, differences in interpretation are minimal. However, for several substances there were clearly conflicting interpretations. Moreover, the figures above do not reveal the fact that no two member countries' classifications of which substances are "extractive wastes" matched entirely. Participants agreed that clarification might be needed.

CONCLUSION 3: Participants agreed to develop areas of common understanding, as well as further investigating the basis for differences in interpretation. Where appropriate, participants agreed to seek clarification from the Commission. This issue is important for ensuring consistency in determining the scope of permits and the relevant legislation to apply. It is also relevant to the scoping of the Commission's Hydrocarbons BAT Guidance and Extractive Waste Bref.

Groundwater

Participants strongly agreed that protection of groundwater is the priority environmental issue for regulating onshore oil and gas; and the critical factor in protecting groundwater, including in relation to high-volume hydraulic fracturing, is well design and integrity.

As with other issues, participants shared a common technical approach on many subjects. However, discussions highlighted potential differences in approach between member countries on the following issues (note that participants agreed that this list should not be seen as comprehensive):

- locational issues, such as a prohibition on drilling in protected areas;
- technical requirements for safe horizontal and vertical separation of activities and vulnerable aquifers, particularly in the context of high-volume hydraulic fracturing;
- disclosure of chemicals, especially where claims for commercial confidentiality arise, for example in the use of proprietary blends of chemicals;



- appropriate requirements for baseline, operational and post-operational monitoring of groundwater, in relation to which participants agreed that a one-size-fits-all approach to groundwater monitoring is inappropriate (see further below);
- regulation of decommissioning to ensure longer-term protection of groundwater; and
- liability under the Environmental Liability Directive (as explained above).

As these issues cover all stages of onshore oil and gas activities and a range of technical issues, in some member countries more than one regulator is likely to be involved. Participants agreed that access to information and expertise on these issues, at all relevant stages of the regulatory cycle, is critical for effective regulation.

CONCLUSION 4: Participants agreed:

- a) clarification of the technical issues prioritised by participants will promote regulatory clarity and consistency among member countries;**
- b) regulators will benefit from a comparison of how they ensure they have access to sufficient and accurate data and expertise throughout the regulatory cycle.**

Flaring

Participants agreed that, in accordance with the hierarchy of waste management options, gases should not normally be flared. During the production phase flaring will in any case be the exception, either during an emergency or routine maintenance. Operators will not otherwise wish to burn what is, after all, their product. However, during exploration participants recognised that flaring might be essential, especially where the infrastructure necessary to avoid it is unavailable.

In at least one member country, waste gases that are flared are considered to be both extractive and hazardous waste. Where the plant flaring them has a capacity of greater than 10 tonnes per day, they are therefore regulated in that country as Industrial Emissions Directive installations (an activity listed in section 5.2(b) of Annex I as disposal of waste in incineration plants for hazardous waste with a capacity exceeding 10 tonnes per day). Smaller plant are subject to Extractive Waste Directive



requirements. However, other participants take different approaches: some do not consider gases to be a waste material that would be subject to these Directives at all.

Irrespective of which Directive applies, there was broad agreement as to what would normally constitute BAT for flaring, but also a recognition that this would be both a site-specific decision and one that could be affected by the phase of the activity. Participants recognise that factors such as safety and practical concerns may influence the choice of technique, especially during exploration, where gas flow and/or pressure may fluctuate. Some participants refer to the BREF for the oil refining sector in making determinations.

CONCLUSION 5: Participants agreed that clarification of the following would be desirable:

- a) the applicability of the Extractive Waste and Industrial Emissions Directives to flaring;
and
- b) what constitutes BAT for flaring, in different contexts and at different stages of activities.

Compliance and environmental track record of the industry, and implications for regulatory approach

Participants were invited to share experience of regulating the onshore oil and gas industry, and its track record in terms of compliance with permit conditions and impacts on the environment. This is a relevant consideration in determining what approach to regulating the industry is most appropriate.

Participants considered that the industry has a largely good record of permit compliance, with few incidents causing significant environmental harm. However, they also recognised that phenomena such as the seismic events associated with both conventional and unconventional activities in recent years in some member countries have had an impact on public opinion.



Participants discussed whether risk-based regulatory approaches such as standardised permit conditions, or less intensive inspection regimes (for example, less frequent inspections) are feasible, and what could be learned from their experiences to date. They concluded that a more risk-based approach would be both practicable and desirable, depending upon appropriate criteria being in place but, in order for that to be publicly acceptable (in terms of reassuring the public that risks are still being adequately managed), best practice for transparency and public engagement needs to be developed (see next section).

CONCLUSION 6: Participants agreed that they wished to discuss risk-based approaches to regulation further, with a view to determining what tools might be appropriate to use in which situations and how these could balance with the public interest.

Building the public's trust in regulation and regulators

Participants discussed the impact of public mistrust of regulation and regulators, most particularly in relation to emerging industries where we are dealing with a level of uncertainty.

There was unanimous agreement that transparency, and demonstrating effectiveness of regulation are both critical in gaining the public's trust. The routes for achieving this could include how regulators work together within a member country to apply the full regulatory framework, and managing transparency and engagement so that the public can achieve confidence.

CONCLUSION 7: Participants agreed:

- a) to identify best practice in helping regulators to work together within member countries; and
- b) to compare experiences and best practice in managing dialogue with the public, including by way of example establishing tripartite discussion fora, including regulators, industry and the public.



5 KEY REGULATORY ISSUES FOR FURTHER DISCUSSION

The workshops enabled participants to consider a range of complex issues and they welcome the opportunity for further discussion and sharing of experience for practical regulation, either in a future IMPEL project or by less formal means. The main topics are outlined below.

Waste minimisation and management

- a. Definition of “extractive waste” as applied to substances (such as used drilling muds and flowback fluids).
- b. The status under the Extractive Waste Directive and the Waste Framework Directive of process fluids that are treated off-site.
- c. Environmental permits for waste management on-site.
- d. Re-use of drilling muds for other drilling with similar characteristics.
- e. Defining gas that is not used as “waste”, in relation to fugitive emissions and waste management plans.
- f. Definition of Naturally Occurring Radioactive Materials and best practice in their management when levels are relatively low.
- g. Definition, management and monitoring of underground extractive waste facilities.
- h. Best practice for storage of extractive wastes.

Chemicals

- i. Assessment of the compound mixture of chemicals used in muds and fracturing, not just as single ingredients.
- j. Potential for a pre-approved list of chemicals to be used in onshore oil and gas, as is the case offshore.
- k. Regulation under REACH: maximum concentrations, below which a substance is deemed to be non-hazardous to the aquatic environment.
- l. Disclosure of chemicals information.

Groundwater protection

- m. The application of the regulatory framework to reinjection, both for production purposes and separately for disposal in other formations.



- n. Requirements for sub-surface monitoring.

Seismicity

- o. How induced seismicity happens and how this should be regulated.
- p. Best practice in informing local residents and businesses of plans to carry out high-volume hydraulic fracturing and likely seismic effects.

Industrial Emissions Directive

- q. Application of the IED, and particularly section 1.2 of Annex I (refining).
- r. BAT for flaring of waste gases.

Regulatory process

- s. Procedure for closure and decommissioning of wells and related activity.
- t. Structure of regulatory authorities and overlapping competences relating to environmental protection.
- u. Risk-based approaches to permitting, inspection and enforcement for the onshore oil and gas industry.
- v. Managing transparency and the dialogue with the public.
- w. Consistency of approach to pre-operational, operational and post-closure monitoring.

CONCLUSION 8: Participants agreed that this list properly captures the issues.



6 CONCLUSIONS

Participants agree that this project has been of enormous value.

First of all, the relationships that have been established are likely to be of lasting value in an ongoing dialogue between regulators on important regulatory issues, driving the environmental performance of the industry and improving regulatory methods.

Second, the project is a starting-point for regulators to contribute to the resolution of some important technical and regulatory issues.

It was reassuring that there was vastly more agreement than differences between regulators.

Regulators are, however, aware of uncertainties and differences in interpretation or practice between member countries. As much as establishing best practice, tackling those issues may be where the project can add most value. Regulators are commonly told “country X does things differently”, and this undermines efforts to build trust with the public and operators. Regulators with fewer resources would especially welcome the opportunity to develop a common European understanding which would support them in their work, building on the approaches of regulators with greater experience.

Participants therefore agree very strongly that the dialogue should be taken forward, with regular exchanges to consider the issues identified above in more detail and develop a greater common understanding. A relatively informal dialogue between regulators can play a significant role in informing policy-makers and legislators, as well as building regulatory capacity across Europe.