Case Id: ff6257dc-2b6e-4888-ae52-636f7ab9d352

## Questionnaire on the application of Commission

Recommendation 2014/70/EU on minimum principles for the exploration

and

production of hydrocarbons (such as shale gas) using high-volume

hydraulic

fracturing

Fields marked with \* are mandatory.

Respondents are invited to read the *introductory note* on the right side of the screen before responding to this questionnaire.

Please indicate in capital letters on

behalf of which Member State you are responding:\*

DENMARK

Recital

10, Points 1.1, 16.1 and 16.4. Did you grant or do you plan to grant authorisations for the exploration or production of hydrocarbons that may require the use of high-volume hydraulic fracturing (in onshore and/or offshore operations) ?\*

Yes

- Possibly
- € No

lf you

replied "Yes", please provide further information on authorisations granted or to be granted and distinguish between onshore and offshore operations, where relevant:\*

Onshore: Two Licences for exploration and production of Hydrocarbons, w here the exploration target is shale gas, were granted in 2010.

Offshore: An assessment has been initiated to decide if and in that cas e how the recommendation should be implemented / handled offshore.

This questionnaire will be answered concerning onshore activities where there will be used high-volume hydraulic fracturing and where there cur rently is limited experience with exploration and not yet established p roduction from such exploration/production-targets in Europe. Potential answers concerning offshore activities will await the above mentioned a ssessment.

### 3. Strategic planning and environmental impact assessment

Point 3.1 Is a strategic environmental

assessment on the basis of the requirements of Directive 2001/42/EC carried out before granting licenses for exploration and/or production of hydrocarbons which may lead to the use of high-volume hydraulic fracturing?\*

- Yes
- Partially
- No

#### Further

information/comments:

```
The two licences were granted after an Open Door Procedure. The Open Do
or procedure was introduced in 1997 for the non-licenced area east of
6° 15' eastern longitude, i.e. all onshore areas as well as the offshor
e area except the westernmost part of the North Sea. This plan was intr
oduced before the Strategic Environmental Assessment - SEA Directive we
nt into force in 2001 and therefore an SEA was not carried out for this
area.
```

## Point 3.2

#### Are there rules on restrictions of activities

	Yes	Partially	No
in protected areas?	0	۲	0
in flood-prone areas?	0	۲	0
in seismic-prone areas?	0	۲	0
in residential areas?	0	۲	0
in water protection areas?	0	۲	0
in other areas?	0	۲	0

#### Further

comments/information

Answered partially as restrictions can (and possibly will) be applied c onsequently of the approval/permit from authorities. When approving act ivities e.g. wells or seismic surveys a concrete assessment of the acti vities impact on the area will be conducted in accordance with the EIA Directive 2011/92/EU, the Habitats Directive 92/43/EEC and the Direct ive 2009/147/EC on the conservation of wild birds.

#### Point

3.2 Are minimimum depth limitations between the area to be fractured and groundwater established?\*

- Yes
- Partially
- No

#### Further

comments/information

```
It will depend on a concrete assessment based on the geology, area, kin d of activity etc.
```

#### Points 1 and 3.3 Is an environmental impact

assessment carried out on the basis of the requirements of Directive 2011/92/EU prior to carrying out exploration and production of hydrocarbons using high-volume hydraulic fracturing?\*

- Yes
- Partially
- No

#### Further

comments/information

```
An EIA was conducted for the exploration well that is planned to be car
ried out in one of the two licences where the exploration target is sha
le gas. A baseline is included in the EIA.
```

#### Point 3.4

Does the public concerned have early and effective opportunities to participate in the strategic environmental assessment and the environmental impact assessment processes?\*

- Yes
- Partially
- No

# Further comments/information

Cf. the answer in 3.1, an SEA was not conducted. The public was consult ed in the EIA procedure in line with the requirements of Directive 201 1/92/EU. The EIA procedure under the EIA Directive does not involve man datory scoping, but the EIA procedure concerning the Danish Planning Ac t before 2014 did, since there had to be undertaken a call for suggesti ons and proposals (scoping) in connection with the municipal plan suppl ement. Therefore the public was involved at an earlier stage with regar d to the planned exploration well where the exploration target is shale gas than in the general consultation on the EIA report.

## 4. Exploration and production permits

## Point 4. Are the conditions and

procedures for obtaining permits in accordance with applicable Union legislation fully coordinated if

	Yes	Partially	No
more than one competent authority is responsible for the permit (s) needed?	6	0	0
more than one operator is involved?	0	6	0
more than one permit is needed for a specific project phase?	C	0	0
more than one permit is needed under national or Union legislation?	6	0	0

## Further information/comments:

Answered partially because:

Currently there is only one operator involved in the two licences grant ed onshore where there is a possibility that high-volume hydraulic frac turing may be used and where there currently is limited experience with exploration and where production from such exploration/production-targe ts has not yet been established in Europe.

If in the future further licences will be granted that involves more th

an one operator, conditions and procedures for obtaining permits in acc ordance with applicable Union legislation will be fully coordinated.

### 5. Selection of the exploration and production site

#### Point 5.1. Are necessary measures

in place to ensure that the geological formation of a site is suitable for the exploration or production of hydrocarbons using high-volume hydraulic

- fracturing?\*
  - Yes
  - Partially
  - No

#### Further

comments/information:

Point 5.1 is ensured through the approval/permit system in place.

#### Point

5.1 Are measures in place to ensure that operators carry out a characterisation and risk assessment of the following areas:

	Yes	Partially	No
any potential site and surrounding surface area?	۲	0	0
underground area?	۲	0	0

#### Further

#### comments/information

Point 5.1 is ensured through the approval/permit system in place.

#### Point 5.2

Are sufficient data collected regarding the site and surrounding surface and underground area to identify all potential exposure pathways and to assess the risk of leakage or migration of drilling fluids, hydraulic fracturing fluids, naturally occurring material, hydrocarbons and gases from the well or target formation as well as the risk of induced seismicity?\*

- Yes
- Partially
- No

comments/information

```
Point 5.2 is ensured through the approval/permit system in place and is a part of the EIA-process.
```

## Point

5.3 As far as the risk assessment is concerned,

	Yes	Partially	No
is it based on best available techniques ? (Note: best available techniques are to be understood as best techniques that are available at local, national and/or international level, when no Best Available Techniques are available at EU level. A Best Available Techniques Reference Document (BREF) on hydrocarbon exploration and extraction is currently under development at EU level. The existing BREF on the management of extractive waste is under review and will encompass waste resulting from hydrocarbon exploration and extraction).	۲	C	0
does it anticipate the changing behaviour of the target formation, geological layers separating the reservoir from groundwater and existing wells or other manmade structures exposed to the high injection pressures used in high-volume hydraulic fracturing and the volumes of fluids injected ?	۲	C	0
does it respect a minimum vertical separation distance between the zone to be fractured and groundwater ?	0	0	۲
is it updated during operations whenever new data are collected ?	0	0	0

## Further

## information/comments:

```
Point 1 - The risk assessment will be based on the best available techn
ique that follows standard industry practice.
Point 2 - Is a part of the EIA-process and risk-assessment.
Point 3 - There is no fixed minimum vertical separation distance to gro
undwater - nor horisontal - due to versatility of geology, aquifers and
interaction between the two. Any approval is based on specific ground c
```

```
onditions, as opposed to generalized rules or guidelines.
Point 4 - All risk assessment is dynamic and is required to be updated
to reflect all anticipated and known risks at any time.
```

## Point 5.4

Are measures in place to ensure that no site is selected if the risk assessment concludes that high-volume hydraulic fracturing will

	Yes	Partially	No
result in a direct discharge of pollutants into groundwater?	0	0	0
cause damage to other activities around the installation?	۲	0	0

#### Further information/comments:

```
A part of the EIA-proces.
```

## 6. Baseline study

Point 6.1 Before high-volume hydraulic fracturing

operations start, does the operator determine the environmental status (baseline) of the installation site and its surrounding surface and underground area potentially affected by the activities and describe it appropriately?\*

- Yes
- Partially
- No

Further comments/information

Directive 2011/92/EU is transposed into Danish Legislation.

## Point

6.1. Is the baseline reported to the competent authority before high-volume hydraulic fracturing operations begin?\*

- Yes
- Partially
- No

comments/information

Directive 2011/92/EU is transposed into Danish Legislation.

## Point 6.2

Before high-volume hydraulic fracturing operations start, is the baseline determined for the following elements (both at the site and in the surrounding surface and underground area potentially affected by the activities):

	Yes	Partially	No
quality and flow characteristics of surface water?	C	0	0
quality and flow characteristics of ground water?	۲	0	0
water quality at drinking water abstraction points?	۲	0	0
air quality?	۲	0	0
soil condition?	۲	0	0
presence of methane and other volatile organic compounds in water?	۲	0	C
seismicity?	6	0	0
land use?	O	C	0
biodiversity?	6	0	0
status of infrastructure and buildings?	0	۲	0
existing wells and abandoned structures?	0	۲	0

## Further

information/comments:

Status of infrastructure, building, existing wells and abandoned struct ures will depend on the area of influence and definition hereof, hence answered partially. For the site of operation the answer is Yes.

## 7. Installation design and construction

Point 7. Are measures in place to ensure that

the installation is constructed in a way that prevents possible surface leaks and spills to soil, water or air?\*

- Yes
- Partially

No

## Further

comments/information

```
Through approval/permit system in place.
```

## 8. Infrastructure of a production area

## Point 8. Are measures in place to ensure

that

	Yes	Partially	No
operators or groups of operators apply an integrated approach to the development of a production area with the objective of preventing and reducing environmental and health impacts and risks?	۲	0	0
adequate infrastructure requirements for servicing the installation are established before production begins ?	۲	0	0
where an installation's primary purpose is producing oil using high-volume hydraulic fracturing, specific infrastructure is installed that captures and transports associated natural gas ?	۲	C	0

## Further

comments/information

Directive 2011/92/EU is transposed into Danish Legislation.

## 9. Operational requirements

Point 9.1 Are measures in place to ensure that

operators use best available techniques and good industry practice to prevent, manage and reduce impacts and risks ?(Note: best available techniques are to be understood as best techniques that are available at local, national and/or international level, when no Best Available Techniques are available at EU level. A Best Available Techniques Reference Document (BREF) on hydrocarbon exploration and extraction is currently under development at EU level. The existing BREF on the management of extractive waste is under review and will encompass waste resulting from hydrocarbon exploration and extraction)\*

- Yes
- Partially

No

## Further

comments/information

Through approval/permit system in place.

## Point

## 9.2 Are measures in place to ensure that operators

	Yes	Partially	No
develop a project-specific water management plan to ensure an efficient use of water?	0	6	0
take into account seasonal variations in water availability in such project-specific water management plan and avoid using water resources that are under stress?	C	۲	0
ensure the traceability of water flows?	0	۲	C
develop transport management plans?	0	۲	0
capture gases for subsequent use?	0	۲	0
minimise flaring?	6	0	C
avoid venting?	0	0	0
limit venting of methane and other air pollutants to the most exceptional operational circumstances for safety reasons?	6	C	0
carry out the high-volume fracturing process in a controlled manner and with appropriate pressure management with the objective of containing fractures within the reservoir and avoiding induced seismicity?	6	C	0
ensure well integrity through well design, construction and integrity tests that are reviewed by an independent and qualified third party?	6	0	0
develop risk management plans?	۲	0	0
take measures necessary to prevent and/or mitigate the impacts and the measures necessary for response?	۲	C	0
stop operations and urgently take any necessary remedial action if there is a loss of well integrity?	۲	0	0
stop operations and urgently take any necessary remedial action if pollutants are accidentally discharged into groundwater?	۲	0	0
	6	0	C

immediately report to the competent authority in the event of		
any incident or accident affecting public health or the		
environment? (including specification of the causes,		
consequences and remedial steps taken, using the baseline		
study as a reference)		

information/comments:

```
Measures are put into place in connection with the approval system (wel
l approval, development approval, EIA-process).
Answered Partially in 1-5 because:
As part of a possible high-volume hydraulic fracturing phase it will be
reviewed whether there is a need for further administrative and/or lega
l measures.
```

#### Point 9.3

Do you promote the responsible use of water resources in high-volume hydraulic fracturing?\*

- Yes
- Partially
- No

#### Further

comments/information

Directive 2011/92/EU is transposed into Danish Legislation.

#### 10. Use of chemical substances and water in high-volume hydraulic fracturing

#### Point 10.1 Are measures in place

to ensure that

	Yes	Partially	No
manufacturers, importers and downstream users refer to "hydraulic fracturing" when complying with their obligations under REACH Regulation (EC) n°1907/2006 ? ( <i>Note: The</i> <i>European Chemicals Agency (ECHA) is currently preparing an</i> <i>update of its database ("use descriptor system") which will</i>	۲	C	0

allow searching for chemical substances registered under REACH and used for hydraulic fracturing purposes. Changes in the ECHA database and associated guidance should be made in 2015/2016, subject to a stakeholders' consultation process.)			
the use of chemical substances in high-volume hydraulic fracturing is minimised?	۲	0	0
the ability to treat fluids that emerge at the surface after high- volume hydraulic fracturing is considered during the selection of the chemical substances used in fracturing ?	۲	C	0

information/comments:

```
Point 1. Is regulated on under REACH Regulation (EC) n°1907/2006.
Points 2. and 3. As part of a possible high-volume hydraulic fracturing
phase it will be reviewed whether there is a need for further administr
ative and/or legal measures.
```

## Point 10.2

Do you encourage operators to use fracturing techniques that

	Yes	Partially	No
minimise water consumption,	6	0	0
minimise waste streams,	0	0	0
and do not use hazardous chemical substances, wherever technically feasible and sound from a human health, environment and climate perspective?	۲	C	0

Further information/comments:

```
In connection with the well approval, approval of development and EIA-p roces.
```

## **11. Monitoring requirements**

Points 11.1 and 11.2 Are measures in place to ensure that operators regularly monitor the installation and the surrounding surface and underground area potentially affected by the operations using the baseline study as reference? \*

- Yes
- Partially
- No

## Further

information/comments:

-

## Point

## 11.1. Is such monitoring conducted

	Yes	Partially	No
during the exploration phase?	۲	0	0
during the production phase?	۲	0	0

## Further

information/comments:

```
A part of the well approval, approval of development and EIA-process an d follows general industry practice.
```

## Point 11.1 In particular, is such monitoring

## conducted

	Yes	Partially	No
before high-volume hydraulic fracturing ?	۲	0	0
during high-volume hydraulic fracturing?	۲	0	0
after high-volume hydraulic fracturing?	0	C	0

#### Further

information/comments:

Point 11.3 Are measures in place to ensure that

the operator monitors

	Yes	Partially	No
the precise composition of the fracturing fluid used for each well?	۲	0	0
the volume of water used for the fracturing of each well?	۲	C	0
the pressure applied during high-volume fracturing?	۲	C	0
the return rate of fluids that emerge at the surface following high-volume hydraulic fracturing?	۲	0	0
the volumes of fluids that emerge at the surface following high-volume hydraulic fracturing?	۲	0	0
the characteristics of fluids that emerge at the surface following high-volume hydraulic fracturing?	۲	0	0
the quantities reused for each well?	۲	0	0
the quantities treated for each well?	0	0	0
air emissions of methane, other volatile organic compounds and other gases that are likely to have harmful effects on human health and/or the environment?	۲	0	C

comments/information:

```
A part of the well approval, approval of development and EIA-process. M onitoring follows the general industry practice.
```

## Point 11.4 Are measures in place to ensure that

the operator monitors the impact of high-volume hydraulic fracturing on the integrity of wells and other man-made structures located in the surrounding surface and underground area potentially affected by the operations?\*

- Yes
- Partially
- No

## Further

comments/information

```
The concept of man-made structures is a very wide definition. Denmark e xpects to follow an evaluative approach to which man-made structures se em reasonable to monitor.
```

Point 11.5

Are measures in place to ensure that the operator reports the monitoring results to the competent authorities?\*

Yes

- Partially
- No

Further

comments/information

```
The information is reported to the competent authority, e.g. in the fin al well report.
```

## 12. Environmental liability and financial guarantee

Point 12.1 Are measures in place to

ensure that the provisions on environmental liability are applied to all activities taking place at an installation site including those that currently do not fall under the scope of Directive 2004/35/EC?\*

- Yes
- Partially
- No

Further

comments/information

In accordance with section 35a of the license, the licensee shall be li able to pay damages for any loss, damage or injury caused by the activi ties carried on under the licence, even though such loss, damage or inj ury was caused accidentally. Directive 2004/35/EC is transposed into Danish legislation, but does no t currently cover the Subsoil Act. An assessment will be conducted to c

larify this. National law requires companies to present a parent compan y guarantee or bank guarantee.

## Point

12.2 Prior to the start of operations involving high-volume hydraulic fracturing, does the operator provide a financial guarantee or equivalent covering

Yes	Partially	No

http://ec.europa.eu/eusurvey/printcontribution?code=ff6257dc-2b6e-4888-ae52-636f7... 18-12-2014

the permit provisions ?	۲	0	C
potential liabilities for environmental damage ?	۲	C	0

comments/information

Operations involving high-volume hydraulic fracturing are carried out w ithin granted licenses. Licenses are only awarded if the licensees pres ent required insurance and financial capacity for the agreed work to be carried out within the license.

## 13. Administrative capacity

Point 13.1 Do competent authorities

have adequate human, technical and financial resources to carry out their duties related to exploration and production of hydrocarbons using high volume hydraulic fracturing?\*

- Yes
- Partially
- No

#### Further

comments/information

```
To be evaluated in case of commercial production. A production phase re
quires further human, technical and financial resources in the state ad
ministration.
```

#### Point 13.2 Are measures in place to prevent

conflicts of interest between the regulatory function of competent authorities and their function relating to the economic development of the resources?\*

- Yes
- Partially
- No

Further

comments/information

To be evaluated in case of commercial production.

#### 14. Closure obligations

Point 14. Is a closure survey carried out after each

installation's closure to compare the environmental status of the installation site and its surrounding surface and underground area potentially affected by the activities with the status prior to the start of operations, as defined in the baseline study?\*

- Yes
- Partially
- No

#### Further

comments/information

```
Environmental status of the installation is an ongoing commitment and o
bligation. Any closure survey will focus on best attainable environment
at point in time and might not be an exact measure against the status p
rior to operation, as this status could be affected by other factors as
well.
```

#### 15. Dissemination of information

Point 15. a) Are measures in place to ensure that the

operator publicly disseminates information on the chemical substances and volumes of water that are intended to be used and are finally used for the high-volume hydraulic fracturing of each well?\*

- Yes
- Partially
- No

#### Further

comments/information

```
The only shale gas operator in Denmark has proposed to publish this inf
ormation regarding chemical substances used in the exploration well pla
nned in Denmark. All operators in Denmark have to submit drilling progr
ams including use of chemicals for government approval, as well as repo
rting used substances when a well has been finalized.
```

Point 15. a) Does this information list the names and

Chemical Abstracts Service (CAS) numbers of all substances and include a safety data sheet, if available, and the substances' maximum concentration in the fracturing fluid?\*

- Yes
- Partially

No

## Further

comments/information

```
The Operator in the licence where a shale gas well is planned has infor
med the Government administration that they intend to publish which che
micals that will be used. Information about which chemicals will be use
d is also incluced in an EIA report.
```

## Point

15.b) Is the following information made available by competent authorities on a publicly accessible internet site

	Yes	Partially	No
the number of wells completed and planned projects involving high-volume hydraulic fracturing?	۲	0	0
the number of permits granted?	۲	0	0
the names of operators involved?	۲	0	0
the permit conditions?	۲	0	0
the baseline study?	۲	0	C
monitoring results?	۲	0	0

## Further

information/comments:

Homepage: http://www.ens.dk/en/node/4216

## Point 15.c) Is the public informed by competent

authorities without undue delay of:

	Yes	Partially	No
incidents and accidents?	0	0	0
results of inspections?	۲	C	0
non-compliance?	۲	0	0
sanctions?	6	0	0

## Further

information/comments

There are requirements concerning publications of inspection reports an d to conduct inspection when significant environmental accidents have t aken place. The inspection reports must be published at the latest 4 mo nths after the inspection of the site.

## Any other

comments (E.g. further measure taken at local, regional or national level to prevent or manage and mitigate health and environmental risks and impacts of the exploration and production of hydrocarbons not addressed in the Recommendation)

-

You may upload relevant documents here:

Thank you for your contribution !

## Useful links DG ENV webpage on unconventional fossil fuels (http://ec.europa.eu/environment/integration/energy/unconventional\_en.htm)

**Background Documents** 

Introductory note (/eusurvey/files/22fce4b3-b129-4dda-a89f-c3771f115261)

Contact

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