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Consultation on legislation to measure and mitigate methane emissions in the energy sector

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Introduction

This consultation aims to collect views and suggestions from stakeholders and citizens with respect to a policy proposal for a legislative act to further reduce methane emissions in the energy sector planned for 2021, as announced in the Communication on an EU strategy to reduce methane emissions, adopted on 14 October 2020 (hereafter 'the Communication')[1].

Current policies for non-CO2 emissions are projected to reduce methane emissions in the EU by 29% by 2030 compared to 2005 levels. However, the 2030 climate target plan's impact assessment[2] concluded that stepping up the level of ambition for reductions in greenhouse-gas emissions to at least 55% by 2030 compared to 1990 would also require an accelerated effort to tackle methane emissions. The EU has reduction targets for 2030 for all greenhouse gases, with anthropogenic methane emissions covered by binding national emission reduction targets under the Effort Sharing Regulation (ESR)[3]. However, there is currently no policy dedicated to the reduction of anthropogenic methane emissions from the energy sector.

The specific objectives of the policy proposal are two-fold: i) to improve the availability and accuracy of information on the specific sources of methane emissions associated with energy consumed in the EU, and ii) to put in place EU obligations on companies to mitigate those emissions across different segments of the energy supply chain.

Point i) on improving information relates to the actions outlined in the Communication on the methane strategy on compulsory measurement, reporting, and verification (MRV) for all energy-related methane emissions at company-level, building on the methodology of the existing global voluntary initiative called the Oil and Gas Methane Partnership (OGMP[4]), which covers the upstream oil and gas sectors. As made clear in the Communication, the Commission is actively promoting the widespread implementation of the MRV framework devised by OGMP, considering it the best existing vehicle for improving MRV capability in the energy sector. In addition, the Communication announces that the Commission is working to extend the OGMP framework to more companies in the gas upstream, midstream and downstream (via OGMP 2.0), as well as to the coal sector and closed or abandoned sites.

Point ii) on mitigation relates to the action in the Communication on the methane strategy on an obligation to improve leak detection and repair of leaks (LDAR) on all fossil gas infrastructure, as well as any other production, transport or use of fossil gas, including as a feedstock; and to the action on eliminating routine venting and flaring in the energy sector covering the full supply chain, up to the point of production. The basis of all policy options to be assessed by the Commission in the area of mitigation will be measures to conduct leakage detection and repair and measures to eliminate routine venting and flaring according to prevailing and emerging best practices, including from industry, across different segments of the supply chain.

Variations in options could be in terms of sectoral scope (thus, going beyond the scope of fossil gas and also including oil, coal and biogas/biomethane) and supply chain coverage (including or not including imports), as well as the types of methodologies and/or some of the key elements of methodologies, such as the frequency of checks, standards, as appropriate.

As also highlighted in the Communication, methane emission standards, targets or other such incentives based on robust scientific analysis can play an effective role to ensure methane emission reductions in the EU and globally. The Communication announces that the Commission will examine all the options available, informed by the work of the foreseen independent international methane emissions observatory - building on the methane supply index, and that in the absence of significant commitments from international partners on methane emissions reductions, the Commission will consider proposing legislation on targets, standards or other incentives to reduce methane emissions from fossil energy consumed and imported in the EU.

[1] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU strategy to reduce methane emissions (COM(2020) 663 final) https://ec.europa.eu/energy/sites/ener/files/eu_methane_strategy.pdf

[2] EU 2030 climate target plan Impact Assessment, https://eur-lex.europa.eu/resource.html?uri=cellar:749e04bb-f8c5-11ea-991b-01aa75ed71a1.0001.02/DOC_2&format=PDF

[3] Regulation, (EU) 2018/842.

[4] The Climate and Clean Air Coalition created a voluntary initiative to help companies reduce methane emissions in the oil and gas sector. The Oil & Gas Methane Partnership was launched at the UN Secretary General's Climate Summit in New York in September 2014. https://www.ccacoalition.org/en/activity/ccac-oil-gas-methane-partnership

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Netherlands

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1. Types of instruments

Most jurisdictions with methane-specific oil and natural gas regulations have relied heavily on prescriptive requirements (such as MRV, LDAR or restrictions on flaring or venting) to achieve emissions reductions. An alternative approach to regulating methane emissions in the energy sector is via performance-based requirements, which establish a mandatory performance standard on regulated entities (such as targets set at the level of individual companies for a specific piece of equipment or facility, or a flaring efficiency standard) but do not dictate how the target must be achieved.

In a recent report delivering recommendations on methane regulations[5], the IEA states that while performance-based requirements can produce more economically efficient outcomes, such approaches often require thorough methane estimates or measurements requirements and a developed and robust measurement and reporting scheme. This is particularly the case for performance-based requirements applied at a wide-scale, such as a company-wide or facility-wide performance target. The IEA therefore recommends that prescriptive requirements (such as MRV, LDAR and restrictions on venting and flaring) can serve as a useful first step on the path to more flexible and economically efficient regulations because they are relatively simple to administer for both the regulator and the firms as it is clear what must be done to comply and it is relatively easy for regulators to determine if the standard has been met. The IEA adds that such requirements have the potential for a significant impact on overall emissions but do not require an accurate baseline understanding of the level of emissions or a robust measurement and estimation regime.

[5] Driving Down Methane Leaks from the Oil and Gas Industry: A Regulatory Roadmap and Toolkit, January 2021. https://www.iea.org/reports/driving-down-methane-leaks-from-the-oil-and-gas-industry.

1.1 Do you agree with the policy design approach described above, notably to start off with prescriptive measuring and mitigation requirements in order to establish a robust measurement and reporting scheme, then consider performance-based requirements in a second step?

at most 1 choice(s)

- ☑ Yes, this is the correct way to develop effective methane regulations in the energy sector.
- ☐ No, this is not the correct way to develop effective methane regulation in the energy sector.
- ☐ Other answer.

Please justify your answer

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Knowledge of emissions is needed before you can set performance-based
requirements. The Netherlands advocates for setting reductiontargets per sector.
Experience with the Dutch offshore energy sector shows that through a sectoral
approach, rather than per installation, a reduction is more likely to be
achieved at lower costs. The method for measuring and reporting in NL has worked
well (over 50% reduction in 2 years) - see answer to questions in chapter 3.
Furthermore, the Dutch energy sector has already significantly reduced methane
emissions in the past and the sector should not be burdened disproportionately
because of its achievements in the past.
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1.2 Do you consider that prescriptive mitigation requirements, in and of themselves, can be sufficient to drive further decreases in methane emissions in the energy sector in the EU?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Prescriptive requirements (such as MRV, LDAR and restrictions on venting and
flaring) can be helpful in reducing methane emissions, but cost-effectiveness
must always be considered.
```

1.3 Do you consider that performance-based requirements are necessary to achieve significant methane emissions reductions in the energy sector?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

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If MRV data is c, target requirements can lead to cost-effective reduction.
Experience with the Dutch offshore energy sector shows that through a sectoral
approach, rather than per installation, a reduction is more likely to be
achieved at lower costs. The method for measuring and reporting in NL has worked
well (over 50% reduction in 2 years).
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1.4 Do you agree that company or facility wide performance-based requirements need a robust measurement and reporting regime to function properly and that they require an accurate baseline understanding of the level of emissions?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Experience with the Dutch offshore energy sector shows that through a sectoral
approach, rather than per installation, a reduction is more likely to be
achieved at lower costs. Regarding the baseline understanding: one of the issues
we ran into when developing the NL Methane convenant was that different
operators were applying different emission factors for different sources. If
emission factors were already categorized differently in NL, this difference
will be observed more strongly between all operators across the EU. Clarity on
definitions, categories and methods of emissions monitoring and reporting is
crucial.
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Another type of instrument that could be used to regulate methane emissions in the energy sector in the EU is an economic type of instrument, which induces action by providing a financial incentive, such as a subsidy or a tax deduction. For instance reduced taxes or targeted financial and fiscal incentives have already been put in place in some jurisdictions to stimulate abandoned mine methane projects[6].

[6] Legal and Regulatory Status of Abandoned Mine Methane in Selected Countries: Considerations for Decision Makers. US EPA. December 2018.

1.5 For each of the following sectors, do you think that such instruments should have a part to play to incentivise utilisation of methane in certain specific situations, such as when the incentives are lacking? Please justify your answer.

	Please provide your response here.
Oil	Yes: Whether economic instruments have a part to play depends on specific situations and whether methane emissions are reduced for these sectors. It is difficult to specify this for each sector.
Fossil gas	Yes
Coal	Yes
Biogas/ biomethane	Yes

Further questions related to the types of instruments are also included in section 3, in the case of a wider scope including fossil energy importers to the EU.

2. Identifying models for an EU regulation on methane emissions in the energy sector

There are many regulations in place across the world which impose specific requirements with regard to methane emissions in the energy sector. Proposals for EU regulations should seek inspiration from tried and tested regulations which are considered as best practice and have delivered significant methane emission reductions over time. The Commission announced in the Communication that it intends to base its legislative proposals on MRV on the methodology of the OGMP, the already existing global voluntary oil and gas industry initiative, considering it the best existing vehicle for improving MRV capabilities of companies in the energy sector. There are however no comparable international or indeed European joint industry initiatives that companies have signed up to which commit those companies (albeit on a voluntary basis) to conduct LDAR campaigns or to limits on venting or flaring.

2.1 Do you support the intention of the Commission to base its legislative proposals on MRV for oil and/or gas on the methodology of the OGMP?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer

The NL supports a robust measurment and reporting regime and therefore underlines the necessicty of an accurate baseline understandig of emissions. Clarity on definitions, categories and methods of emissions monitoring and reporting is crucial. However, in many cases, the definitions in the OGMP are not clear. It is therefore hardly possible to estimate the impact of using OGMP definitions. This means that the reporting system of OGMP cannot be adopted as it stands. This will have to be worked out in specific terms and there will have to be clear coordination between the European Commission, member states and the industry regarding definitions, categories and methods. The Dutch electronic environmental annual report (e-MJV) is based on internationally recognized and validated methods and measurement techniques. To push aside these existing systems seems like reinventing the wheel.

2.2 Are there any elements of the OGMP framework which you think the Commission should not replicate in its proposals/any elements not contained in the OGMP framework which the Commission should consider?

OGMP requires reporting against a company-specific timeline for achieving reasonable progress. It is not clear how such company-specific timelines match with EU goals on GHG emissions reduction. In general, it is not clear what elements from the voluntary approach are expected to form part of EU regulations on methane emissions in the E&P sector.

OGMP notes that the use of direct measurements should be increased as a matter of principle. As we understand, not all sources can best be determined by means of direct measurement. The methodology should leave room for flexibility to select the best means of quantifying and reporting individual sources. Also, measurements may function as a means to (periodically) evaluate the accuracy of reported emissions, based on e.g. modelling and/or emission factors.
As an example: the NL offshore energy methane protocol identifies all relevant sources (and source categories). For each source, a list of possible quantification methods is presented in the order of preference, including the minimum standard to be used for each of these methods. This leaves room for flexibility, while assuring accuracy and comparability among operators. It avoids excessive costs which would arise when all sources should be measured in all instances.
In general, NL operators already report according to OGMP 2.0 level 3 / 4.
The upstream catergories in OGMP 2.0 are also part of the NL reporting requirements.

Regarding the framework of the OGMP 2.0: The framework is published, but the underlying methodology (template) is not. Details of the methodology that the Commission believes will become leading are known only to OGMP members, not to all non-members. Therefore, it is hard to take a position on the chosen methodology.

2.3 Are there any other methodologies/standards/voluntary frameworks on MRV relevant to oil and/or gas which the Commission should pay close attention to, and why? Please state.

Existing national systems NL, UK, N and other oil and gas producing Member States should be considered: E&P companies already report according to national legislation and/or agreements. The decade long experience with hese systems holds value and should be considered. Using elements of these systems will avoid duplication of work. The EC should make sure that national, EU, regional and international requirements are aligned as much as possible. Diverging obligations could lead to increased administrative burden for both Authorities and industry. It could also lead to an increased risk of publication of diverging figures on the same type of emissions. That could cause confusion which would be damaging for the credibility of emission data.

OGMP refers to IEA as a reliable source of methane emission data. However, industry, including NOGEPA (Dutch Oil and Gas Exploiration Association), has noted that the emission data published by IEA deviates significantly from the official reports (assessed and approved by national authorities). There is a need for a common set of emission data, preferably based on official reports from Member States.

2.4 Which existing regulations on MRV for oil and/or gas should the Commission also take into account, and why? Please state.

As mentioned in 2.3, national legislation and/or agreements are already in place in EU Member States. Furthermore, the EU best available techniques guidance document on upstream hydrocarbon exploration and production (27 February 2019) provides useful information.

2.5 Are there any standards/ voluntary frameworks/ methodologies/ regulations on MRV relevant for coal methane emissions which the Commission should pay close attention to, and why? Please state.

There are no active coal mines located in the Netherlands.

2.6 Are there any industry standards/ voluntary frameworks/ regulations on MRV relevant for methane emissions from biogas and biomethane production which the Commission should pay close attention to, and why? Please state.

In the Netherlands a standard has been developed for biogas installations (NEN 8771) with requirements to limit methane emissions to a minimum. This standard is curently being finalised and will be published this year. Moreover, on the European level, work has been conducted in the Metharmo en Evembi projects aimed at European harmonisation of methods to quantify methane emissions from biogas plants and developing a European voluntary system for GHG emission mitigation. See:
https://www.dbfz.de/fileadmin/user_upload/Referenzen/DBFZ_Reports/DBFZ_Report_33.pdf
https://www.europeanbiogas.eu/project/evembi/

2.7 Which existing regulations on LDAR for oil and/or gas should the Commission also take into account, and why? Please state.

The EU best available techniques guidance document on upstream hydrocarbon exploration and production (27 Februaru 2019) provides useful information (e.g. paragraph 16.2, 16.3, 26.2, 26.3).

2.8 Are there any methodologies/standards/voluntary frameworks on LDAR relevant to oil and/or gas which the Commission should pay close attention to, and why? Please state.

Member States have legislation in place. In NL, a dedicated protocol for the determination of methane emissions from all sources - including fugitive emissions - was published in 2018. This protocol was agreed with relevant authorities. Independent offshore emission measurements by TNO (the Netherlands Organisation for applied scientific research) revealed that the emissions reported by operators, based on this protocol, match with measurements in the field.

2.9 Which existing regulations on limiting venting and flaring for oil and/or gas should the Commission also take into account, and why? Please state.

In NL, a dedicated protocol for the determination of methane emissions from all sources was published in 2018. A covenant between the Dutch offshore sector and NL Authorities (August 2018) contains quantified reduction targets for offshore methane emissions: -50% by the end of 2020 compared to 2017 emissions.

Also, the Mining act and other legislation provides generic regulations on the prevention of emissions from venting and flaring:

Art. 38 & 84 Mining regulation:
1. It is prohibited to blow off or flare off natural gas in the open air or to emit other pollutants at a mining work.
2. Paragraph 1 shall not apply if the blowing off or flaring off of natural gas or the emission of other pollutants is unavoidable for normal operations at the mining work. In that case, all measures shall be taken to prevent or limit as far as possible any damage resulting from the blowing off or flaring off of natural gas or the emission of other pollutants.

In case of flaring, operators must provide a flaring program (art. 24 Barmm):
"1. In case a flare is used, it shall be designed for optimal flare combustion with a minimum efficiency of 99%.
2 At least 48 hours prior to flaring, a flaring programme shall be submitted to the Inspector General of Mines, addressing:
a. duration of the flaring;
b. time at which the flaring will take place;
c. measures to prevent or limit noise pollution for local residents.
3 The Inspector-General of Mines (regulator) may set requirements for flaring to protect the environment and prevent noise pollution."

2.10 Are there any methodologies/standards/voluntary frameworks on limiting venting and flaring relevant to oil and/or gas which the Commission should pay close attention to, and why? Please state.

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The approach in the NL covenant mentioned in 2.9 entails a platform-specific
approach, focussing on the most cost effective measures, thus yielding the
largest emission reductions. This approach has proven very succesful: a
reduction of 50% within 2 years.

NB: Here definitions are of crucial importance. E.g.: what is the definition of
routine flaring and venting? What sources and/or events are in/out of scope of
this definition?

The EU guidance document also provides useful information.

EXAMPLE of Industrial Standard with more quantification:

1. New design: Provide equipment/facilities to export, re-inject or use the
produced associated gas.
(Applies to Major Installations, Sources and projects that extract associated
gas equivalent to more than 10,000 tonnes of Carbon Dioxide equivalent (CO2e)
per year, if this gas were flared).

2.  Modify existing: to
- less than 10,000 tonnes of CO2e per year; or
- less than 1% by mass of hydrocarbon throughput; or
- As Low As Reasonably Practicable (ALARP).
(Applies to Major Installations, Sources and projects, where:
• Flaring And Venting Intensity exceeds 1% by mass (mass of hydrocarbon flared
and vented/mass of hydrocarbon throughput); and
• combined Flaring And Venting exceeds 10,000 tonnes of CO2e per year).

Exceptions:
- flare pilot gas, vent purge, flaring or venting requiered for start-up and
shut-down, emergency releases, well flow test conducted as part of exploration
or appraisal to gather field data to a maximum of three months.
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2.11 Are there any methodologies/ standards/ voluntary frameworks/ methodologies/ regulations on mitigation of coalmine methane emissions which the Commission should pay close attention to, and why? Please state.

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No active coal mines are located in the Netherlands.
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2.12 Are there any methodologies/ standards/ voluntary frameworks/ regulations on mitigation of methane emissions from biogas & biomethane production which the Commission should pay close attention to, and why? Please state.

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In the Netherlands, a standard has been developed for biogas installations (NEN
8771) with requirements to limit methane emissions to a minimum. This standard
is curently being finalised and will be published this year. On the European
level moreover, work has been conducted in the Metharmo en Evembi projects aimed
at European harmonisation of methods to quantify methane emissions from biogas
plants and developing a European voluntary system for GHG emission mitigation.
See also:
https://www.dbfz.de/fileadmin/user_upload/Referenzen/DBFZ_Reports/DBFZ_Report_33
.pdf
https://www.europeanbiogas.eu/project/evembi/

Of importance is the distinction between sewage treatment plant with sludge
digestion that produce biogas, and sewage treatment plants without sludge
digestion that fall under waste treatment. The latter category must not be added
to any MRV system applicable to the energy sector.
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3. Sectoral, emissions and supply chain coverage and/or scope

Sectoral scope

Other than the methane emissions occurring at the various stages of the oil and gas chain (as included, and described below, in the OGMP scope), other significant or non-negligible direct sources of methane emissions in the EU energy sector and which can clearly be attributed to specific activities include methane emissions from coal production and from biogas production/biogas upgrading into biomethane. For this reason, the Commission intends to assess the case for including those areas of the energy sector in its policy proposals on both MRV and methane emissions mitigation.

3.1 Are you supportive of the intention of the Commission to assess the case for including coal in its policy proposals on MRV?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

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It is important to include all sectors that emit a significant share of methane.
```

3.2 Are you supportive of the intention of the Commission to assess the case for including biogas/biomethane in its policy proposals on MRV?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

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The Netherlands is supportive of assessing through which mechanisms methane
emissions from the biogas/ biomethane sector can best be mitigated.
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3.3 Are you supportive of the intention of the Commission to assess the case for including coal in its policy proposals on methane emissions mitigation?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
MRV should be applied to all sectors with significant methane emissions.
```

3.4 Are you supportive of the intention of the Commission to assess the case for including biogas/biomethane in its policy proposals on methane emissions mitigation?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
The Netherlands is supportive of assessing through which mechanisms methane
emissions from the biogas/ biomethane sector can best be mitigated.
```

3.5 Are there any other forms of energy which you think that the Commission should consider including in its policy proposals on MRV? Please state and justify your answer.

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

3.6 Are there any other forms of energy which you think that the Commission should consider including in its policy proposals on mitigation of methane emissions? Please state and justify your answer.

```
No.
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While the initial OGMP voluntary initiative framework that the Commission has committed to basing its MRV obligations on exists for oil and gas upstream, the new OGMP framework (OGMP 2.0[7]) which was launched in October 2020 has an extended scope. Specifically, the new framework includes all segments of the oil and gas sector where “material” quantities of methane can be emitted. This includes upstream exploration and production, gathering and processing, liquefaction and regasification terminals, gas transmission, underground gas storage and distribution (gas downstream). This includes all assets and facilities along the gas value chain as well as oil exploration and production facilities where associated gas is co-produced, whether used, marketed or re-injected.

[7] Mineral Methane Initiative OGMP 2.0 Framework” https://ccacoalition.org/en/files/ogmp-20-reporting-framework-finalpdf

3.7 Do you consider that the scope of the EU regulation on MRV as regards oil and gas should at least cover the same scope as OGMP 2.0?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
The scope of OGMP 2.0 is too broad (e.g. underground gas storage). Regarding the
framework of the OGMP 2.0: The framework is published, but the underlying
methodology (template) is not. Details of the methodology that the Commission
believes will become leading are known only to OGMP members, not to all non-
members. Therefore, it's difficult to take a position on methodology.
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3.8 Do you consider that the framework of OGMP 2.0 could serve as a good basis for developing obligations for MRV in the coal sector?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
Regarding the framework of the OGMP 2.0: The framework is published, but the
underlying methodology (template) is not. Details of the methodology that the
Commission believes will become leading are known only to OGMP members, not to
all non-members. Therefore, it's difficult to take a position on methodology.
```

3.9 Do you consider that the framework of OGMP 2.0 could serve as a good basis for developing obligations for MRV in the biogas/biomethane sector?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
For the fossil fuel industry: a European standardization commitee with members
from different European countries is active since ± 2000, the first standard was
published in 2005. since 2020 the Working Group CEN/TC 234 WG 14 has started to
develop a standard on: Assessment of methane emissions for gas transmission and
distribution systems. The aim of the working group is to investigate the methane
emissions (where in the chain they occur and the level of the methane
emissions). The OGMP is a partnership of international companies active in the
fossil fuel industry and also involved in the work of this CEN/TC. The biogas
industry is a completely different sector: still developing, still depending on
governement subsidies, much smalller scale, largely made up of SMEs with smaller
budgets.  For the biogas/ biomethane sector developing a separate MRV based on
the current initiatives mentioned would seem more appropriate.
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Scope of emissions

The OGMP 2.0 framework applies to direct emissions of methane that occur from sources that are owned or controlled by the reporting company (also called scope 1 emissions as defined by the GHG Protocol Corporate Standard). The OGMP 2.0 framework does not cover end users. For example, methane

emissions associated with oil refining and chemical manufacture (both considered by the OGMP methodology as ends users) as well as gas end use are currently not within the OGMP framework reporting scope.

3.10 Should the scope of the policy proposals on methane extend coverage to end users?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

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This will most likely lead to duplicating emissions in different measurement
systems.
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Methane emissions can be categorised into three scopes. Scope 1 covers direct emissions. Scope 2 emissions (which are indirect emissions from the generation of purchased energy consumed by the reporting company) and scope 3 emissions (includes the indirect emissions resulting from the consumption and use of the reporting company's products) are not within the scope of the OGMP 2.0 framework. Scope 1, 2 and 3 emissions together cover the total emissions from a company's activities.

IPIECA (the global oil and gas industry association for advancing environmental and social performance) recommends the GHG Protocol scope 3 standard[8] to companies in the oil and gas industry wishing to report scope 3 emissions, advising that category 11 'Use of sold products' is the most relevant to the oil and gas industry and noting that there is a growing stakeholder interest related to scope 3 disclosures[9] . Some oil and gas companies are already reporting scope 3 emissions voluntarily.

[8] GHG Protocol establishes global standardized frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions. https://ghgprotocol.org/standards/scope-3-standard

[9] IPIECA Sustainability reporting guidance for the oil and gas industry, March 2020.

3.11 Would you consider the Greenhouse gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard as an appropriate standard to serve as basis for EU legislation for scope 3 methane emissions?

at most 1 choice(s)

- [x] Yes
- [ ] No

If no, why not, and which alternative standard could be considered?

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There is an added value in using an existing standard rather than developing a
new standard from scratch. However, there is much duplication with eg ETS
monitoring requirements and the EU taxonomy. Criticism on this standard lies in
the quality of the data: much of the reporting is based on assumptions and
averages and verification of data is not an obligation. Before implementing this
standard into policy, the quality of data should be improved. Governments
(especially in the EU) have a lot of emission data on companies and may be able
to use this data anonymously (think of the benchmarks of the ETS).
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3.12 In which end-use sectors do you consider that better information on methane emissions is necessary?

- [x] Industry

- [x] Power generation
- [ ] District heating
- [ ] Transport (e.g. maritime, please specify below)
- [ ] Residential
- [ ] Other

Please provide details if possible.

3.13 On which of the following appliances below do you think that better information on methane emissions would be welcome?

- [ ] Gas turbines
- [ ] Gas engines
- [ ] Gas boilers (industrial)
- [ ] Gas boilers (residential)
- [ ] Other, please specify below

Please provide details if possible.

3.14 Are you aware of national requirements (measurement and/or mitigation) regarding methane emissions from the following appliances?

- [ ] Gas turbines
- [x] Gas engines
- [ ] Gas boilers (industrial)
- [ ] Gas boilers (residential)
- [ ] Other, please specify below

Please provide details if possible.

National legislation: NL Activity Decree, articl 3.10f for gas engines

3.15 Should the provision of information on expected methane emissions by end-use appliances be mandated from manufacturers?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

3.16 For power generation, should methane emissions be part of the emission threshold for generation under capacity market mechanisms?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

Including exporters to the EU in the scope

The Communication highlights that the external carbon or methane emissions associated with EU fossil gas consumption (i.e. the emissions released outside the EU to produce and deliver fossil gas to the EU) are between three to eight times the quantity of emissions occurring within the EU. For oil, possibly even more of the emissions linked to oil consumed in the EU are occurring outside of the EU borders given that the largest share of methane emissions in the oil sector are occurring in the upstream segment whereas the largest share of methane emissions in the fossil gas sector are occurring in the downstream segment.

This means that if the EU wants to include in the scope of its regulation all of the methane emissions linked to its oil and gas consumption, it must consider either imposing obligations directly also on exporting companies of gas and oil to the EU or it could obligate importers of gas and oil into the EU. For instance, it could be examined whether obligations on MRV, LDAR and venting and flaring could somehow be extended to cover exporting companies of oil and gas, or even all fossil energy, to the EU.

3.17 Do you think that EU legislation on methane emissions in the energy sector should extend obligations to companies importing fossil energy into the EU/companies exporting fossil energy to the EU?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
The NL supports an ambitious implementation of the EU Methane Strategy.  The aim
of the strategy is to reduce methane emissions. Since the EU imports a
significant amount of its fossil energy sources, clear rules on reduction and
effective monitoring of methane emissions should be imposed across EU borders to
oversee the whole chain. This will also benefit the level playing field for
European fossil energy producers. Therefore, the NL supports broadening the
scope to actors from outside the EU.
```

3.18 Specifically, do you think it is feasible to impose the same obligations on MRV, LDAR and venting and flaring equally on all actors of the oil and gas value chain for oil and gas consumed in the EU, including actors from outside of the EU?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
The NL supports an ambitious implementation of the EU Methane Strategy. The aim
of the strategy is to reduce methane emissions. Since the EU imports a
significant amount of its fossil energy sources, clear rules on reduction and
effective monitoring of methane emissions should be imposed across EU borders to
oversee the whole chain. This will also benefit the level playing field for
European fossil energy producers. Therefore, the NL supports broadening the
scope to actors from outside the EU.
```

In this context, and with reference again to performance-based requirements (see previous section) the Communication states that in the absence of significant commitments from international partners on methane emissions reductions, the Commission will consider proposing legislation on targets, standards or other incentives to reduce methane emissions from fossil energy not only consumed but also imported into the EU.

3.19 Would you be supportive of EU legislation imposing performance requirements on companies exporting fossil energy to the EU?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
The NL supports an ambitious implementation of the EU Methane Strategy.  The aim
of the strategy is to reduce methane emissions. Since the EU imports a
significant amount of its fossil energy sources, clear rules on reduction and
effective monitoring of methane emissions should be imposed across EU borders to
oversee the whole chain. This will also benefit the level playing field for
European fossil energy producers. Therefore, the NL supports broadening the
scope to actors from outside the EU.
```

Another means of incentivising methane emissions reductions from fossil energy imported into the EU which could either work in addition to extending MRV, LDAR and venting and flaring regulations to exporters or in isolation, could be to use market transparency tools which provide information on important emissions sources from around the globe, developed using available information from technologies that can provide accurate estimations or measurements of methane emissions such as satellite data, as well as emission data from bottom-up sources, such as inventory data.

The Communication highlights the contribution of the EU's Copernicus programme for earth observation towards improved indirect air surveillance and the monitoring of methane emissions, and suggests that Copernicus could contribute to an EU-coordinated capability for detecting and monitoring global super-emitters, which refer to a specific site or facility with disproportionately high-emissions for a site or facility of that kind. Globally, 5% of methane leaks in the coal, oil and fossil gas sectors contribute 50% of the energy sector's emissions. Satellite technology is key to identifying these hotspots and guiding leak detection and repair on the ground as well as reconciling bottom-up data from company reporting.

The Communication also highlights that when launched in 2025, the Copernicus CO2-monitoring (CO2M) mission, which involves a constellation of three satellites, will support the identification of smaller and more prevalent sources of emissions.

The government funded International Methane Emissions Observatory, which the European Commission is currently in the process of setting up together with the United Nations Environmental Programme (UNEP), the Climate and Clean Air Coalition (CCAC) and the International Energy Agency, will be tasked with collecting, reconciling, verifying and publishing anthropogenic methane emissions data at a global level. It will also be tasked with compiling and publishing a methane-supply index (MSI) at EU and international level, composed using existing and reported data from countries' emissions inventories as well as satellite data and, in time, global data processed and published by the IMEO. The intention with this MSI would be to empower buyers to make informed choices on the methane intensity of fossil energy sources before the purchasing decision.

The MSI developed by the IMEO would be an example of such a market transparency instrument.

There seems to be an increasing need for such instruments, as interest in the environmental credentials of fossil energy companies increases, in particular as regards oil and fossil gas, in order to determine what role they could play in the transition towards carbon neutrality. There are recent examples of such an interest, specifically regarding the methane intensity of certain sources of fossil gas.

How such information could be used would then have to be explored. At the very least, coupled with data on imports of fossil fuels into individual Member States, it would allow purchasers, governments, citizens and consumers to have transparency on the methane intensity of fossil fuel imports, and would likely incentivise markets for low methane intensity fossil energy. At its most extreme, it could form the basis for conditioning imports of fossil energy into the EU according to a certain methane intensity. The widespread publication and recognition of such data could act as a strong incentive for operators to put in place effective regulations and to reduce their methane emissions.

Readings from Copernicus Sentinel 5P satellites of methane concentrations from across the globe are currently being processed to identify large sources of emissions such as from oil, gas and coal operations, and the results are being published in the media. This recently revealed for instance that the number of large methane leaks from the oil and gas industry globally rose by nearly a third in the first eight months of 2020[10]. Providing a platform for public access to such sources information, such as via the future web-site of the IMEO, in cooperation with satellites and data processing firms, and an instrument such as the MSI enabling purchasers of fossil energy to make more informed choices, could be considered very useful[11].

[10] https://www.reuters.com/article/us-climate-change-energy-methane/despite-green-plans-energy-sectors-methane-leaks-are-up-kayrros-idUSKBN26Z1DA

[11] Other transparency tools exist. For instance, the Canadian State of Alberta publishes an annual report that includes a list of oil and gas operators ranked by their flaring and venting emissions.

3.20 Are you generally supportive of the development of such methane transparency tools and the announced intentions of the Commission in this area, regarding the setting up of the IMEO and the development of a methane supply index?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer

```
If companies want to develop it themselves, that could be encouraged, but
developing transparancy tools at the EU level seems a step too far.
```

3.21 How prominently do you think that such transparency tools should play a role in the future?

at most 1 choice(s)

- [ ] They should play a central role, and be the key instrument to provide the energy sector the incentives to reduce their methane emissions;
- [ ] They should play a role alongside and together with obligations on MRV, LDAR and limits on venting and flaring on exporters of fossil energy into the EU;
- [ ] They should play a role together with methane intensity standards on exporters of fossil energy into the EU;
- [ ] They should play a key role, alongside both prescriptive and performance based requirements on exporters of fossil energy into the EU;
- [x] They should play no role.

Please justify your answer

4. Legislating on leakage detection and repair

Fugitive (unintentional) leaks represent one of the main sources of methane emissions from the gas and oil sectors.

It is widely considered that the main mitigation strategy for reducing emissions from fugitive methane leaks from pressurized equipment used in the oil and gas industry is a leakage detection and repair (LDAR) program.

Key elements of LDAR programs of importance for devising LDAR regulations are widely considered to be:

1. Instruments used for leak detection;
2. Frequency of LDAR campaigns;
3. Quantification of emissions;
4. Leak repair considerations, such as time taken between leak detection and repair.

4.1 Are there any other elements which should be considered key elements of LDAR programmes of importance for devising LDAR regulations?

at most 1 choice(s)

- [x] Yes
- [ ] No

If yes, please justify your answer

Key elements in a classical LDAR program (using sniffing methods) are how to deal with inaccessable points and emission points under isolation.

The definition of fugitive emission needs to be specified. Unintentional leaks can be fugitive, but not all are. In NL, the definition of "fugitive emissions" is related to whether an emission is channelled or not. Again, what emissions/events are in/out of scope of the definition of fugitive emissions?

Under this NL definition, the contribution of fugitive emissions is very low in NL.

If "leaks"are so high as stated, the site cannot be safe. In practise if a seal really starts to leak due to a failure, the gas detection will pick it up and the plant will shut down automatically. LDAR is there to support the quality of the maintenance and to determine which equipment has the best performance, but over last decades it did not contribute significantly to emission reduction.

Definitions are important:
Leak Detection and Quantification (LDAR) is a program that identifies - unintended - fugitive emissions from equipment in an oil and gas, chemical or petrochemical installation.

What's included:
Unintentional releases of natural gas (≥10 wt.% methane).
Unintentional releases of any hydrocarbon streams (with ≥10 wt.% volatile organic compounds).
Intentional releases (as per equipment design) of natural gas and hydrocarbon vapours in excess of normal operating specifications (e.g. due to component failure, malfunction or excessive wear and tear).

What's excluded:
Intentional releases (as per equipment design) of natural gas and hydrocarbon vapours within their normal operating specifications – this is venting.
Releases of non-hydrocarbon gases (e.g. instrument air, steam, water vapour, N2, CO2).

Instruments used for leak detection

While there are many instruments used for leak detection in the oil and gas industry, the use of optical gas imaging (OGI) cameras has become common. These are infrared imaging devices with optics, filters and cooled sensors made specifically for detecting methane which are used at close range during inspections carried out on foot. These devices produce an image that allows an otherwise invisible plume of leaked gas to be seen. Several types of these cameras are available with different minimum detection capabilities. OGI devices have become the standard leak detection device used by the regulatory LDAR programs required in North America in the upstream and midstream (i.e: gas processing plants) segments and are also recognised by many other jurisdictions [12][13]. In some jurisdictions, OGI cameras are equally recommended both in offshore and onshore facilities.

Other portable leak detectors such as Flame Ionisation Detectors are also sometimes used and allowed in regulations but tend to be used much less for a number of reasons[14].

Methane detectors more sensitive than OGI cameras are usually used in downstream industry segments because distribution system leaks are often smaller, and generally below the OGI detection threshold[15]. For small leaks, ultrasound detectors are recommended in some jurisdictions.

While close-range instruments using handheld Instruments are indispensable for identifying and documenting component-level fugitive sources, they are relatively labour intensive. Rather than relying exclusively on handheld instruments, regulations in Canada and the US are moving towards the integration of screening technologies. For instance, fixed sensors, mobile ground labs, unmanned aerial vehicles, manned aircraft and satellites, which until now have been used for research-based applications and for monitoring other air pollutants are gaining interest as tools for LDAR[16].

[12] Potential ways the gas industry can contribute to the reduction of methane emissions, Report for the Madrid Forum (5 - 6 June 2019)

[13] Methane Guiding principles: Reducing Methane Emissions: Best Practice Guide on equipment leaks, November 2019

[14] Methane Guiding principles: Reducing Methane Emissions: Best Practice Guide on equipment leaks, November 2019

[15] Methane Guiding principles: Reducing Methane Emissions: Best Practice Guide on equipment leaks, November 2019

[16] A review of close-range and screening technologies for mitigating fugitive methane emissions in upstream oil and gas. Thomas A Fox et al 2019 Environ. Res. Lett. 14

4.2 Should EU legislation on LDAR include the type of device to be used for detecting leaks?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
EU legislation should mention the devices that serve as a minimum level to
ensure a level playing field. However, to allow innovation, devices that could
serve as an alternative that at the same minimum level should be allowed as
well. Prescribing specific methods that could lead to inefficient, costly and/or
unreliable quantfication of sources should be avoided.
```

4.3 Among the following devices, which should be recommended as the devices of choice in the following sectors and to what extent? – specify:

1. For highly recommended,
2. For recommended depending on the type of leak or other factor,
3. Not appropriate

	Production	Processing	LNG terminals	Transmission pipelines	Transmission compressor stations	Underground storage	Distribution pipelines	Distribution pressure regulating and metering stations
Optical gas imaging	2	2	1	1	1	1	1	1
Flame ionisation detectors	2	2	1	1	1	1	1	1
Ultrasonic detectors	2	2	3	3	3	3	3	3
Fixed detectors	2	2	3	3	3	3	3	3
Soap spray/soap bubble screening	2	2	3	3	3	3	3	3

Bagging	2	2	2	2	2	2	2	2
High flow sampler	2	2	3	3	3	3	3	3
Mass flow meters	3	3	3	3	3	3	3	3
Laser detectors	2	2	3	3	3	3	3	3
Catalytic bead sensors;	2	2	3	3	3	3	3	3
Semiconductor detectors	3	3	3	3	3	3	3	3
Electrochemical detectors	2	2	1	1	1	1	1	1
Cavity ring down spectroscopy	2	2	3	3	3	3	3	3
Radial plume mapping	2	2	2	2	2	2	2	2
Mobile gas chromatography	2	2	2	2	2	2	2	2
Tracer gas release	2	2	2	2	2	2	2	2
Mobile ground labs	2	2	3	3	3	3	3	3
Unmanned aerial vehicles	2	2	3	3	3	3	3	3
Manned aircraft	3	3	3	3	3	3	3	3
Satellites	3	3	3	3	3	3	3	3

Other (please specify)

```
There is no ultimate tool, always first the measurement program objectives must
be defined and then you can decide on the tool.

Satelliets can only detect high levels of methane emissions, that is not LDAR
where the leak rates are much lower. And above the sea satellites doe not work
properly.

In cooperation with KNMI, it was determined that no CH4 emissions from Dutch
offshore installations are detected by using satellites. Since fugitive
emissions are only a small fraction of the total methane emissions, satellites
will not be suitable for detecting fugitives. Any CH4 emission that would be
picked up by a satellite would clearly be caused by an incident.

Again, any regulations on devices should allow for innovation and developments.
Perhaps, the EU could develop a BAT document, which will be updated on the basis
of developments.
```

Frequency of LDAR campaigns

The frequency of LDAR campaigns is an important determining factor for reducing fugitive emission. The more often they are carried out, the lower the release of fugitive emissions[17]. According to the Methane Guiding Principles[18], the US Environment Protection Agency considers that detection and repair in upstream and midstream operations can produce a 40% reduction in emissions from fugitive leaks if carried out once a year, a 60% reduction if carried out once every three months, and an 80% reduction if carried out once a month[19].

[17] Potential ways the gas industry can contribute to the reduction of methane emissions, Report for the Madrid Forum (5 - 6 June 2019), GIE-Marcogaz, page 108

[18] A voluntary, international multi-stakeholder partnership between industry and non-industry organisations with a focus on priority areas for action across the natural gas supply chain, from production to the final consumer. https://methaneguidingprinciples.org/who-we-are/

[19] Methane Guiding principles: Reducing Methane Emissions: Best Practice Guide on equipment leaks, November 2019

4.4 Should EU legislation on LDAR determine the frequency of LDAR campaigns?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes: A level playing field is necessary. However, NL permits require an approved
plan. This allows for focus on the basis of significance of emissions. Frequency
should be defined risk based, i.e. installation by installation.

LDAR measurements starts with a “initial” phase: is not a clear cut, but usually
sufficient time to establish baseline, implement survey/repair processes and
gather data on existing performance. In the “production and maintain” phase the
frequency may be 'risk based' revised at facility/unit/equipment/component
level, based on learnings ('bad actors') and business objectives.
```

4.5 If you consider that EU legislation on LDAR should determine the frequency of LDAR campaigns, which of the following parameters are important to take into account and set into legislation? For each, please state the level of importance.

	Highly important	Moderately important	Neutral	Relatively unimportant	Completely unimportant	No opinion
The leak detection device/approach used	●	○	○	○	○	○
The type of potentially leaking component concerned	○	●	○	○	○	○
The results of previous LDAR campaigns	○	●	○	○	○	○
The cost-effectiveness of LDAR campaigns	●	○	○	○	○	○
The safety risk evaluation	○	○	○	○	●	○
The environmental risk evaluation	○	○	●	○	○	○
The operating pressure	○	○	●	○	○	○

Other? Please specify and rate the importance in the same terms as provided in the table.

4.6 Please specify the recommended frequency of LDAR campaigns according to the following type of potentially leaking component (in terms of frequency per year):

	Frequency per year
Valves	yearly
Connectors	every 4 years
Open-ended lines	every 4 years
Flanges	every 4 years
Control valves	every 4 years
Pressure relief valves	yearly
Pumps	yearly
Compressor stations	yearly
Regulating / reduction / metering stations	every 4 years
Valve stations	every 4 years
Measurement stations	
Gas delivery station	
Pressure regulating stations	every 4 years
Metering stations	every 4 years
City gate stations	
Other (please specify)	

Quantification of emissions

Emissions from fugitive leaks can be quantified either via models (using emission factors), via engineering estimations, or by direct measurement. To effectively estimate and reduce fugitive methane emissions, direct measurements via field surveys are considered of paramount importance[20].

[20] Potential ways the gas industry can contribute to the reduction of methane emissions, Report for the Madrid Forum (5 - 6 June 2019), GIE-Marcogaz, page 105

4.7 Should EU legislation on LDAR determine the methods to be used to quantify fugitive leaks?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

As we understand, quantifying is not the main goal of LDAR surveys. Quantification of leaks is technically challenging, and quantified leaks during inspections may nog give an accurate picture of site leak emissions. Considered should be how long have leaks been leaking. The largest leaks are difficult to quantify quickly and quantifying can be expensive. Regulations should encourage operators to repair leaks rather than wait for quantification.
The LDAR (OGI) techniques can be used as a standalone service where to provide 'leak' or 'no-leak' information.

4.8 If you consider that EU legislation on LDAR should determine the methods to be used to quantify fugitive leaks used in LDAR campaigns, would you recommend that direct measurements via field surveys are used in all instances when it is technically feasible to do so?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer

No, as we understand, direct measurments via fields surveys would not be necessarry in all instances. However, it is desirable that the models used to quantify leaks are directly measured through field surveys periodically (say every 6 years) to check whether the models are still accurate. Focus must be on repairing the - unintended or avoidable - fugitive emissions. The mass leak information is not significant compared to the overall methane emissions.

4.9 Can you list instances in which it is acceptable to estimate fugitive leaks via modelling or engineering estimations instead of direct measurements? Please specify.

This is already specified in EPA methods: safety is important. Leak detection is mainly done to ensure that after opening equipment, all is correct and no gas escapes. Futhermore, the costs per ton methane reduced via LDAR should be considered.

4.10 Are there any cases in which direct measurements can never be used?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please specify.

```
Technically, direct measurement should always be possible, since you should be
able to repair all leaks. However, the question is whether direct measuring
isalways proportionate.
```

4.11 If there are cases in which it is acceptable to estimate fugitive leaks via modelling or engineering estimations instead of direct measurements, do you agree that some harmonization in approaches used should be included in legislation?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
In order to come to comparable standards throughout Europe, harmonisation should
be included to ensure that operators and reporting parties have comparable data.
```

4.12 If you answered yes above (to 4.11), please specify what elements of such approaches should be harmonized.

```
Point sources where estimation can be used, recommended/default emission factors
for calculation and estimation. Furthermore: pressure, temperature, type of
leakage
```

Leak repair considerations

The time taken between leak detection and repair in LDAR campaigns has some bearing on the amount of methane emissions from fugitive leaks. It depends on many factors, including safety, environmental concerns, leak size, accessibility and cost-effectiveness considerations. In all segments of the gas and oil chains where LDAR campaigns are carried out, such considerations lead to a categorisation of urgency of actual repair following inspection and detection which spans from immediate repair to repair only after several years. For leaks that are not or cannot be repaired immediately, typically as part of LDAR campaigns, a number of details on the leak needs to be recorded which together will be used to determine when the leak should be repaired. After the repair, leaks can also be measured to verify the effectiveness of the repair, after which periodic controls can also be carried out, depending on the circumstances.

Safety considerations are often the key consideration, and both the frequency of leak monitoring and speed of action of leak repair are typically determined by elements which have a bearing on risk to safety. To take the example of gas distribution networks, this would include maximum operating pressure, location of leaking/potentially leaking component (characterised in terms of whether the leaking component is in a rural, urban/industrial location, or close to a building), numbers of leak (per km of pipeline), the risk of the leak leading to intoxication, burning or explosion. It is not clear whether there are requirements to repair all detected leaks across all EU jurisdictions. It is certainly at least theoretically feasible to imagine, given the traditional focus in the case of distribution networks on safety considerations, that very low risk leaks are left unrepaired for many years or indefinitely, leading to high levels of actual methane fugitive emissions over time.

4.13 Should EU legislation on LDAR impose a requirement to repair all detected leaks?

at most 1 choice(s)

- [x] Yes
- [ ] No

If no, please justify your answer

```
Yes, all repairs should be repaired. However, the overall HSE benefit (avoided
environmental emission and safety (fire, explosion hazard) should be greater due
to the repair than by any additional vent / flaring activity) should be
considered. Repairs should take place at the latest at the next maintenance
stop.
```

4.14 Should EU legislation on LDAR determine the time taken for leaks to be repaired, according to a classification of leaks, after detection?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes, in order to prevent that reparations of leakages are postponed. However,
the overall HSE benefit (avoided environmental emission and safety (fire,
explosion hazard) should be greater due to the repair than by any additional
vent / flaring activity possible) should be considered. Repairs should take
place at the latest at the next maintenance stop.
```

4.15 What elements should be taken into consideration in a classification of leaks? Please provide a ranking for your answers, from highly important, important to unimportant.

	Highly important	Moderately important	Neutral	Relatively unimportant	Completely unimportant	No opinion
Safety	○	○	○	●	○	○
Environmental concerns	○	●	○	○	○	○
Leak size	●	○	○	○	○	○
Accessibility/ease of repair	●	○	○	○	○	○
Cost effectiveness	●	○	○	○	○	○

Other? Please specify at which level of importance.

```
There are already a number of definitions which could be referred to:

EU Common Regulation 112/2015:

'Major gasleaks' (> 300 kg), between moment of discovery and remedying the
leakage, safety threatening) must be reported to regulator within 10 working
days per CDR form (EU Common Regulation 112/2015).
'Significant gasleaks' (> 1kg - 300 kg between the moment of discovery and
remedying), must be reported to regulator within 10 working days per CDR form
(EU Common Regulation 112/2015).

The Sniffers method:
Fugitive emissions:
- A device where a concentration equal to or higher than the leakage limit is
measured is considered a leak. The leakage limit is 500 ppm for currents with an
average concentration of 5% or more of substances with a minimumisation
obligation. For all other currents, the leakage limit is 1000 ppm, regardless of
the nature of the device.
- Fugitive emissions to be repaired:  > 500 ppmv

Guidance document on Commission Implementing Regulation (EU) No1112/2014 of 13
Oktober 2014.:
 - < 3 kg/hr or < 20% LEL at 50 cm distance, do not need to be reported to the
regulator.
```

4.16 Should EU legislation on LDAR campaigns include provisions for fines if repair delays are not respected?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
Fines should be organised on MS level, in that way local circumstances can be
taken into account.
```

5. Legislating on venting and flaring

Excess gasses in oil, gas and coal production and processing can be a safety hazard and must therefore be processed, either by trapping and utilisation or by flaring or venting. Flaring is the process of burning associated, unwanted or excess gases and liquids released during normal or unplanned processes in, inter alia, oil-gas extraction, refineries, chemical plants, and coal mining. Venting is the process of directly releasing gasses into the atmosphere, often for the same reasons as listed previously for flaring, as well as to balance pressure within gas infrastructure throughout the supply chain. While flaring is sometimes seen as a suitable substitute for venting, it can only ever be regarded as poor second best to full emission abatement.

As announced in the Communication, venting and routine flaring should be restricted to unavoidable circumstances, for example for safety reasons, and recorded for verification purposes. Venting and flaring need to be approached both from a within-EU perspective on domestic production, transmission, and distribution as well as from the perspective of the EU being a large-scale importer of fossil gas for which venting and flaring represent major upstream greenhouse gas emission sources.

Venting is the single largest source of methane emissions in the oil and gas sector, responsible for as much as 4.7Bt CO2eq globally. In addition to releasing waste gas, venting is also used to balance pressure within gas infrastructure, particularly in distribution and transmission.

While venting is an important contributor to emissions of both the oil and gas sectors, most flaring that takes place today is known as routine flaring and occurs during normal oil production operations. An estimated 145 bcm of gas is flared globally every year, which represents around 30% of the European Union's annual gas consumption.

The proportion of gas burnt during flaring is referred to as 'flare efficiency', i.e. the ratio between the mass flow rate of methane in the exhaust gas of the flare and the mass flow rate of methane in residual gas stream that is flared. In theory, more than 99% of the gas is combusted when flaring is done in optimal conditions. In real-world conditions, however, flaring can be significantly less efficient due to sub-optimal combustion dynamics (e.g. variable heat content, flame instability). As a result, substantial volumes of methane can be released (so called methane slip), along with other potent GHGs. The Communication on an EU to reduce methane emissions, further announces that flaring efficiency will be tackled as a priority.

Flaring in the EU accounts for only 0.17% of total global flaring, as such this is overwhelmingly an issue as regards supply chains linked to the EU rather than within the EU.

Nevertheless, addressing emissions from both venting and flaring in the EU can help towards domestic greenhouse gas reduction objectives and improve local air quality.

5.1 How far do you agree/ disagree with this statement: 'It is feasible to eliminate routine venting and flaring associated with energy produced and consumed in the EU'?

at most 1 choice(s)

- [ ] Fully agree
- [x] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Totally disagree
- [ ] No opinion

Comment (optional)

```
Agree. Upstream routine venting and flaring is already prohibited in the
Netherlands under the Mining Act. A specification of the definition of 'routine'
is desirable.
```

5.2 Should there be a phase-out period for routine venting and flaring? If yes, how long should it be?

- [x] None
- [ ] 1 year
- [ ] 2 years
- [ ] 3 years

- [ ] 4 years
- [ ] 5 years
- [ ] More than 5 years

Please justify your answer

```
In the NL, upstream routine venting and flaring is prohibited under the mining
act.
```

Definitions

Venting and flaring can occur as a response to unexpected incidents to preserve health and safety, or as part of operations in what is often referred to as ‘routine’. Terms such as ‘non-routine’, ‘safety circumstances’, and ‘testing circumstances’ are commonplace in regulatory frameworks globally to indicate circumstances where venting and flaring can be carried out without a permit. Although there are common understandings of how each form of venting and flaring can be defined, there are no widely held standards defining the parameters within which venting and flaring can take place in these circumstances. If not clearly defined and monitored, these circumstances provide loopholes for companies to avoid acquiring permits or utilising associated gas.

5.3 Do you think a common set of definitions and parameters for venting and flaring is necessary?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes, this is important  for level playing field.  GGFR definitions could be used
as a basis, as they are already being used.  And especially "routine" should be
defined for gas production (upstream) both for flaring and venting.
```

5.4 Should the EU devise a common set of definitions and parameters for venting and flaring?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes, however, the EU could base its defintions on the already existing GGFR
definitions and industry should be consulted.
```

5.5 Should the EU establish an inventory of clearly defined circumstances under which venting and flaring is necessary to provide a better monitoring frame?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes: This would serve transparency and comparability. Experience has shown that
without very clear and agreed definitions, reporting will be more inaccurate and
effectiveness of measures can be more difficult measured.

Examples:
- Flaring and venting required for safe start-up and shutdown;
- emergency releases,
- well flow tests conducted as art of exploration or appraisal wells to gather
field data.
```

5.6 In your opinion, what can be considered routine/non-routine venting and flaring? Would you subscribe to any existing definitions? If so, please name them. Please specify.

```
Global Gas Flaring Reduction Partnership Gas Flaring Definitions are widely
accepted, also by the international Majors for oil production. There are no
definitions for gas production, as in principle in case of gas production all
gas can be brought to the market, except what is needed for safety purposes.

Examples:
non routine:
- Flaring and venting required for safe start-up and shutdown;
- Emergency releases,
- Well flow tests conducted as art of exploration or appraisal wells to gather
field data.
- Shutdown (maintenance)
- For safety reasons routine venting at a very low level is allowed to prevent
inflow of oxygen.
```

Voluntary Initiatives

Increasing visibility on the issues of venting, flaring and methane slip (the emission of unburned methane from a flare or the use of gas) can help to change industry norms and bring global attention. This visibility can incentivise accountability at the national and company level. Voluntary initiatives can play an important role in developing new approaches to abatement and in demonstrating what is possible and practicable. There are a number of voluntary, including industry-led, efforts to reduce methane emissions from oil and gas operations, including the Methane Guiding Principles (MGP - a multi-stakeholder collaborative platform aiming to advance understanding and best practices for methane emissions reduction) and the World Bank's Global Gas Flaring Reduction Partnership (GGFR - a Multi-Donor Trust Fund composed of governments, oil companies, and multilateral organizations) works to end routine gas flaring at oil production sites across the world with its Zero Routine Flaring by 2030 initiative.

5.7 Which of the above voluntary initiatives would you consider as an important basis on which to base EU legislation on venting and/or flaring to be imposed as obligations on companies? Please list and indicate the importance you attach to them.

```
Arguably both; MGP has many major operators as signatories.  It would be logical
to have the MGP has a 'minimum requirement', to ensure confidence and maintain a
good reputation as an industry and use EU best available techniques guidance
document on upstream hydrocarbon exploration and production.
```

5.8 Specifically, should the EU adopt and further develop the current World Bank Global Gas Flaring Reduction Partnership (GGFR) definitions of routine, non-routine and safety flaring and further extend the

terminology?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes, as we understand, without clear definitions, it is not possible to
accurately report and implement legislation.
```

5.9 Can you recommend any other voluntary initiatives or existing regulations on venting and/or flaring that you think should be considered best practice and a basis for EU legislation?

at most 1 choice(s)

- [x] Yes
- [ ] No

If yes, which initiative or regulation?

```
Yes: We recommend to consider the NL offshore methane covenant.

Also, the EU guidance document background provides useful information (see 2.7)
```

Verification of reporting

Reporting accuracy is an important aspect to the tracking and elimination of venting and flaring. Where regulatory frameworks exist at a national or subnational level, they often lack independent auditing and verification of data. Significant discrepancies between reported data and satellite data on methane emissions have been identified, which undermines the scope for regulators to hold companies accountable for underreported or unreported emissions. For example, the National Oceanic and Atmospheric Administration (NOAA) satellite data systematically indicates a greater volume of flaring than the data collected by states and the US Energy Information Administration (EIA). Also according to the IEA, venting, flaring and methane slip are all potentially underestimated in company reporting, partially as a result of an absence of independent verification but also frequent use of estimations in place of specific measurement.

5.10 Do you think industry can be relied on to accurately report venting and flaring activities without third party verification?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes: provided the right obligations are set in place. For instance when
flowmeters are installed and they are properly maintained, the regulator can
check whether these are in compliance during inspections.
```

5.11 Should voluntary industry initiatives be encouraged to create own auditing and verification systems?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
No: To get more confidence in the figures, comparability and checks by the
competent authorities is a must. American data estimates can not be applied to
European datasets.
```

5.12 Should voluntary industry initiatives be encouraged to create harmonised methods for measuring, data handling, estimation, and use of specific models?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes: Level playing field is important.
```

5.13 Would you consider the establishment of independent third-party auditing and verification necessary?

```
Indepedent third-party auditing and verification is crucial for reliable data.
```

5.14 At which level (national, regional, global, other) should auditing and verification be organised?

```
National
```

5.15 Should the EU commission consider setting up an independent global auditing authority to verify company data?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

5.16 Should the EU Commission consider adoption of harmonised methods for measuring, data handling, estimation, and use of specific models?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
It would be beneficial to establish harmonised methods for national, EU,
regional and international purposes. Efficiency should be improved,
administrative burden due to duplication of efforts should be minimized.
```

5.17 If independent monitoring and verification identifies misreporting of emissions from venting and flaring by companies within EU jurisdiction, should EU legislation include provisions on fines?

- [ ] Yes
- [x] No

Please justify your answer

```
This should be organised at MS level
```

5.18 If independent monitoring and verification identifies misreporting of emissions from venting and flaring by companies outside EU jurisdiction, should EU legislation include provisions on restricted access to EU markets?

- [x] Yes
- [ ] No

Please justify your answer

```
The NL supports an ambitious implementation of the EU Methane Strategy.  The aim
of the strategy is to reduce methane emissions. Since the EU imports a
significant amount of its fossil energy sources, clear rules on reduction and
effective monitoring of methane emissions should be imposed across EU borders to
oversee the whole chain. This will also benefit the level playing field for
European fossil energy producers. Therefore, the NL supports broadening the
scope to actors from outside the EU.
```

5.19 Which of the following measures should be taken to achieve reductions in venting and flaring associated with energy produced in the EU? Please mark your rating with an 'X'.

	Very appropriate	Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**
Encourage sharing of best practices on avoiding venting and flaring						x	
Encourage company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring						x	
Mandate company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring						x	
Developing a database of all routine vents and flares						x	

Developing a database of all routine vents and flares, cross-referencing this information with databases of permits and exemptions						x	
Set a total cap on venting and flaring activities for the entire EU						x	
Mandate detailed environmental impact assessments of new oil and gas operations that account for the potential emissions from venting and flaring						x	
Introduction of financial incentives for reductions in emissions from venting and flaring (taxes/penalties or allowances).						x	
Outright ban on venting and flaring (except where no other ramification is available for health and safety reasons).						x	

Others (please elaborate)

```
Routine venting/flaring is not permitted in NL under the Mining Act. No opinion
```

Venting

This section focuses specifically on venting, which is the process of directly releasing associated, unwanted or excess gases into the atmosphere, during normal or unplanned processes, such as in oil-gas extraction, refineries, chemical plants and coal mining, as well as to balance pressure within gas infrastructure throughout the supply chain.

5.20 In which parts of the value chain do you consider Venting most relevant? (multiple answers possible)

	Gas	Oil	Coal (active and abandoned mines)
Exploration	☑	☑	☑
Production	☑	☑	☑
LNG	☑	☑	☑
Transmisison	☐	☐	☐
Storage	☐	☐	☐
Distribution	☐	☐	☐
Use (industrial)	☐	☐	☐

Please elaborate.

Quantification methods for methane emissions deliver a rate, such as mass per time (e.g. kilograms per hour) or volume per time (e.g. standard cubic meters per hour), and can be produced by engineering estimations, by direct measurement of the methane sources, or by use of models. Recording of venting requires appropriate measurement and verification. This is in part an issue of the quality of data from companies, as many companies do not measure their emissions from venting but rather estimate them based on emission factors.

5.21 In your opinion, is the use of emission factors a sufficient approach to the quantification of venting?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
The composition of an oil or gas field determines the composition of the vented
emissions. NL experience shows that a combination of measureing, modelling and
emission factors provides good quality data, as demonstrated by independent
measurements.
```

5.22 In your opinion, are there situations in which the use of emission factors is the only feasible approach to the quantification of emissions from Venting?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
In the NL, upstream routine venting is prohibited under the Mining Act.
Operators frequently asses the composition of the produced gas. The result of
this assesment can be used in combination with the measured volume to determine
the emissions. However, as we understand it,  some sources can best be
calculated, e.g. blowdown, flash gas and gas from produced water.
```

5.23 Can you list instances in which it is acceptable to estimate venting emissions via modelling or engineering estimations instead of direct measurements? Please specify.

```
As we understand it, this would be in the case of (very) small flows. Vent
emissions are normally low and it can be difficult to accurately measure these
streams. Also composition measurement is required, because in a central vent
stream with a different methane content are gathered. And in the blow down
scenario, the volume can be much more accurate calculated based on system
pressure and volume than on a flow meter that cannot handle the high peaks.
```

5.24 Are there any cases in which direct measurements can never be used? Please specify.

```
Technically it would be possible: the flow can always be measured. The
composition can be determined regularly, so not on a continuous base. However,
the question is whether it is proportional: it may require a lot of
effort/cost/time.
```

5.25 Are there appropriate technological solutions available for the direct measurement and quantification of venting along the different parts of the oil and gas (and coal) value chains? Please name them. Do you consider them cost-effective?

	Available technologies	Level of quantification	Cost-efficiency
Exploration	As long as the required accuraccy is not defined (like under EU-ETS), you cannot answer such a question. Conditions during venting can differ significantly, making measuring difficult. Especially at the normally very low flow conditions and the extreme flow conditions during blow down make it difficult to measure. And also to determine the methane emission, the composition must be known, which is not always constant.		
Production			
Transmission			
LNG			

Storage			
Distribution			
Use (industrial)			

The 'Best Practice Guidance for Methane Management in the Oil and Gas Sector' (United Nations Economic Commission for Europe) specifies several accepted and recommended methods of direct measurement for venting. Those methods include using a calibrated vent bag, a high-volume sampler, flow meters, or anemometers.

5.26 Do you consider these and other available best practices as comprehensive enough to enable companies to accurately measure and quantify methane emissions from venting?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer

```
Yes: Not direct measurement systems, but independent (top-down) measurement
campaigns have shown that emission quantification by NL operators through
emission registration systems (measurements, modelling and emission factors)
correspond to measurements in the field. Therefore, the answer is yes.
```

5.27 Should the EU mandate direct emission measurement for venting within the EU supply chain?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

No, as we understand direct measurments are not always the preferred option.
- Cost of measurement can be excessive
- Measurement is not always the most accurate method, especially at very low flows or when there is a high turn down factor between lowest and highest flow or when calculation of volume and pressure result in a more accurate result (blow down for example)

5.28 Should the EU mandate the use of specific approaches for the measurement and quantification of venting?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

No, as we understand there are many possiblities to determine vent emissions, and more are under development. It is better to mandate that an operator should have a monitoring plan, which details how the vent emisions are determined per source, including accuracy.

5.29 Would you consider the available best practices referred to above as sufficient basis for such mandates?

at most 1 choice(s)

- [ ] Yes
- [ ] No

Please justify your answer

5.30 Would you consider the Clean Development Mechanism methodologies as a feasible basis for mandates on measurement of venting emissions?

at most 1 choice(s)

- [ ] Yes
- [x] No

If yes, which?

As mentioned in the previous questions, we think there are alternatives for direct measuring. We are not familiar with The 'Best Practice Guidance for Methane Management in the Oil and Gas Sector' (United Nations Economic Commission for Europe) document that is referred to.

5.31 If you consider that EU legislation on Venting should determine the means of quantifying emissions, would you recommend that on site measurement is used in all instances?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer

```
As mentioned in 5.28, we understand that there are many possiblities to
determine vent emissions. The NL aproach (a combination of measurements,
modelling and emission factors) works well.
```

5.32 If you consider that there are instances in which such determination is not feasible or proportionate, please name them.

```
As we understand, determination is possible by using emission factors. There are
emissions which cannot be determined without the use of emission factors, e.g.:
- non-constant composition of vent gas
- methane slip from flares and other combustion processes (normally factors are
used for this)
- not enough flow in the vent stack
```

5.33 Should the EU mandate the use of specific intervals or continuous measurement of venting?

at most 1 choice(s)

- [ ] Yes
- [ ] No

Please justify your answer

```
The question gives two potential options, but a yes/no answer is required.
```

5.34 How appropriate do you think the following measures would be in reducing venting associated with energy produced in the EU?

	Very appropriate	Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**
Mandating the replacement of pieces of equipment known to cause emission from venting with non-emitting substitutes.				Not very appropriate. In the NL, the main source of venting is process and safety related. There is no opportunity for replacement (like replacing equipment that uses instrument gas).			

An industry report from GIE and Marcogaz presented at the 2019 Madrid Forum highlighted, among other, solutions to avoid venting in the EU gas system.[21]

[21] GIE Marcogaz, (2019). Potential ways the gas industry can contribute to the reduction of methane emissions, Retrieved on 16.12.2020 from https://ec.europa.eu/info/sites/info/files/gie-marcogaz_-_report_-_reduction_of_methane_emissions.pdf

5.35 How appropriate do you think the following measures would be in reducing venting in the EU?

	Very appropriate	Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**
UPSTREAM							
Implement Gas to Power units to use the vented or flared gas at remote production sites (avoid venting the associated gas).		x					
Minimise venting of hydrocarbons from purges and pilots, without compromising safety, through measures including installation of purge gas reduction devices, flare gas recovery units and inert purge gas.	x						
TRANSMISSION, STORAGE, DISTRIBUTION							
Implement minimising vents programmes.	x						
Recompression instead of venting						x	
Use of vacuum pressure pumps during commissioning of distribution networks.						x	
Replacing natural gas starters with electric engine starters at compressors, hence reducing operational venting						x	

Please provide any other measures you would deem appropriate for the reduction of venting and flaring in the EU gas system

Flaring

This section focuses specifically on Flaring, which is the process of burning associated, unwanted or excess gases and liquids released during normal or unplanned industrial processes, such as oil-gas extraction, at refineries or chemical plants.

5.36 In which parts of the value chain do you consider Flaring most relevant?

	Gas	Oil
Exploration	☑	☑
Production	☑	☑
LNG	☐	☐
Transmisison	☐	☐
Storage	☑	☐
Distribution	☐	☐
Use (industrial)	☑	☑

Quantification methods for methane emissions deliver a rate, such as mass per time (e.g. kilograms per hour) or volume per time (e.g. standard cubic meters per hour), and can be produced by engineering estimations, by direct measurement of the methane sources, or by use of models. Recording of Flaring requires appropriate measurement and verification. Independent studies have consistently found company data to underreport flaring activities. [22] [23] [24] This is in part an issue of the quality of data from companies, as many companies do not measure their emissions from flaring but rather estimate them based on emission factors. In the below questions, measurement of flaring refers to the amount of burnt gases and liquids, flare efficiency will be addressed separately in the next section.

[22] IEA estimate 80Mtoe of flaring compared to 15Mtoe on the basis of flaring efficiency claims by companies (i.e. they estimate there is far more flaring than what is reported by companies). (IEA, (2020), Flaring Efficiency).

[23] EDF, (2020). Permian Methane Analysis Project, Retrieved on 17.12.2020 from https://data.permianmap.org/pages/flaring

[24] Leyden, (2020). Satellite data confirms Permian gas flaring is double what companies report, EDF, http://blogs.edf.org/energyexchange/2019/01/24/satellite-data-confirms-permian-gas-flaring-is-double-what-companies-report/

5.37 In your opinion, is the use of emission factors a sufficient approach to the quantification of flaring?

at most 1 choice(s)

- ☑ Yes
- ☐ No

Please justify your answer

```
In the NL, upstream routine flaring is prohibited under the Mining Act. Emission
factors are sufficient as a minimum requirement.  Other methods (flow meters
etc) are difficult to quantify. If emission factors can be improved, then this
could be discussed.
```

5.38 In your opinion, are there situations in which the use of emission factors is the only feasible approach to the quantification of emissions from Flaring?

at most 1 choice(s)

- ☑ Yes
- ☐ No

If yes, please specify

```
As mentioned in 5.37, upstream routine flaring is prohibited under the Mining
Act in the NL. Other techniques are possible, but emissions factor will provide
minimum quantifiable baselin
```

5.39 Can you list instances in which it is acceptable to estimate flaring emissions via modelling or engineering estimations instead of direct measurements? Please specify

```
As we understand, measurement of flares may not provide more reliable results
than modelling. Furthermore, estimating can be acceptabel for very low
throughput facilities or for production at the end of field life.
```

5.40 Are there any cases in which direct measurements can never be used? Please specify

```
See 5.39: As we understand, measurement of flares may not provide more reliable
results than modelling. Furthermore, estimating can be acceptabel for very low
throughput facilities or for production at the end of field life.
```

5.41 Do you consider appropriate technological solutions for the direct measurement and quantification of flaring along the different parts of the oil and gas value chains are available? Please name them. Do you consider them cost-effective?

	Available technologies	Level of quantification	Cost-efficiency
Exploration			
Production	Flowmeter in stack	High	High, when applied only at larger units
Transmission			
LNG			
Storage			
Distribution			
Use (industrial)	Flowmeter in stack	High	High, when applied only at larger units

5.42 Should the EU mandate direct emission measurement for flaring within the EU supply chain?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
Not relevant for upstream non-routine flaring. Could be an option for routine
flaring.
```

5.43 Should the EU mandate the use of specific approaches for the measurement and quantification of flaring?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

```
Not relevant for upstream non-routine flaring. Could be an option for routine
flaring.
```

5.44 Would you consider the Clean Development Mechanism methodologies as a feasible basis for mandates on measurement of flaring emissions?

at most 1 choice(s)

- [ ] Yes
- [x] No

If yes, which?

```
Not relevant for upstream non-routine flaring. Could be an option for routine
flaring.
```

5.45 If you consider that EU legislation on flaring should determine the means of quantifying emissions, would you recommend that on-site measurement is used in all instances?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer

```
See 5.43, we don't think this is relevant for upstream non-routine flaring.
```

5.46 If you consider that there are instances in which such determination is not feasible or proportionate, please name them.

```
See 5.45
```

5.47 Should the EU mandate the use of specific intervals or continuous measurement of flaring?

at most 1 choice(s)

- [ ] Yes
- [ ] No

Please justify your answer

```
The questions gives two potential options, but only yes/no answer is required.
```

5.48 How appropriate do you think the following measures would be in reducing flaring associated with energy produced in the EU?

		Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**
	Very appropriate						
Mandate equipment standards and conditions for flaring in the EU	Very appropriate: Mandate equipment standards and conditions for flaring in the EU. Operators should consider BAT.						

Others (please elaborate)

Flare efficiency

Flaring is often seen as a favourable substitute to venting and therefore there is the possibility that in an effort to minimise venting there can be an increase in flaring. With a high-level of combustion efficiency, this can make significant reductions in methane emissions, but will still generate other environmentally and socially damaging by-products. In the case of low combustion efficiency, it can mean relatively little greenhouse gas emission reductions versus venting. It is also suboptimal to other options for the abatement of emissions. Where flaring is strictly necessary, it should be under optimal burning conditions and to high standards to minimise the release of methane and other harmful pollutants.

Flaring efficiency has been shown to be largely determined by wind velocity, gas exit velocity at the tip of the flare, flare tip diameter (tip size), and the energy content of flare gas. The best flares can achieve high efficiencies, 99% or better, but in the worst cases efficiencies could be as low as 50%, even 0% if the flame extinguishes. It is often assumed that flares on average operate at 98% efficiency, meaning that 2% of the waste gas is not burned, and approximately 2 million metric tons per year of methane is released into the atmosphere as unburned gas. However, some stakeholders estimate average flare efficiency to be substantially lower. In its methodology for estimating flare efficiency (defined as methane destruction efficiency) for open flares and enclosed flares, and subject to conditions, the UNFCCC recommends using a default 50% efficiency for open flares and a 90% default efficiency for enclosed flares[25].

In most countries with large-scale flaring activity, flaring is associated with conventional oil and gas production. However, flaring may also be associated with unconventional oil and gas production. Flow rates of flared gas can vary widely between locations. A small fraction of sites can account for the majority of the flared gas. This distribution may affect the economic viability of mitigation strategies. Flow rates of flared gas can also vary over time, particularly for unconventional oil production (where production declines rapidly), or in regions where the infrastructure for using gas is being constructed. The duration of flaring may also influence how economically viable certain mitigation strategies are.

Accurate monitoring of methane slip in flaring operations and its mitigation can provide at least a second-best advance towards emission reductions.

[25] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf/history_view

Note that the methodology is designed for flare gases that contain only methane, hydrogen and carbon monoxide. It is designed to be used for gas from organic decomposition such as anaerobic digesters or for gas vented in coalmines. Nonetheless, it may be used to derive estimates of flaring efficiency in the oil and gas sector. In any case, the 90% flare efficiency default can be considered as conservative estimate.

5.49 Should EU regulation address flare efficiency?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please specify.

```
Yes: There would be a benefit for the EU te establish common flare design
efficiency criteria for upstream. It should be noted that the efficiency of
flares is not optimal on startup an can be influenced by weather conditions
and/or feed (gas composition).
```

5.50 How appropriate do you think the following measures would be in reducing emissions from inefficient flaring?

	Very appropriate	Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**
Transparency requirements on reporting of flaring efficiency by EU companies			x				
Prescriptive provisions on the monitoring of flare efficiency				x			
Prescriptive provisions/methodology for the quantification of flare efficiency					x		
Prescriptive provisions on technical configuration of flares					x		
Establish flaring efficiency targets for oil and gas companies in the EU		x					

Other, please specify.

```
There would be benefit for the EU te establish common flare design efficiency
criteria for upstream. It should be noted that the efficiency of flares is not
optimal on startup an can be influenced by weather conditions and/or feed (gas
composition).
```

To directly measure and monitor flaring efficiency, a number of instrumentation techniques can be used. These techniques are classified into two groups – extractive and non-extractive. In extractive technique, samples are removed from the flare plumes and analysed using combined Gas Chromatography and Mass Spectroscopy. Extractive techniques are shown to provide reliable estimates of flaring efficiency. In non-extractive technique, instead of removing samples from the flare plumes, chemicals present in the flare are identified and quantified using infrared spectroscopy. Remote sensing techniques have been shown to provide slightly less accurate but still acceptable estimates of flaring efficiency. In these techniques, instruments are mounted on the ground or aerial platforms and are located close to the flare sites.

5.51 Do you consider the available technological solutions for the direct measurement of flaring efficiency to be technically sufficient for accurate monitoring and quantification of methane emissions?

at most 1 choice(s)

- [ ] Yes
- [ ] No

If no, please justify your answer.

```
Emphasis should be on the use of BAT.  Different solutions will provide
different results.  BAT will ensure that measurements are done to as high a
standard as possible, in the most cost effective way.
```

5.52 Do you consider the available technological solutions for the direct measurement of flaring efficiency to be cost effective? Are you aware of relevant methods which should be considered best practice for the direct monitoring and quantification of flaring efficiency?

```
Emphasis should be on the use of BAT.  Different solutions will provide
different results.  BAT will ensure that measurements are done to as high a
standard as possible, in the most cost effective way.
```

5.53 Are there any cases in which direct measurements can never be used? Please specify.

```
Technically, direct measurments can always be done, however, the question is
whether it is proportional: it may require a lot of effort/cost/time. As we
understand, measurement may not provide more reliable results than modelling.
Furthermore, estimating can be acceptabel for very low throughput facilities or
for production at the end of field life.
```

5.54 Should direct measurement and quantification of flaring efficiency be mandated for flaring activities within the EU?

```
No, this would not be necesarry for non-routine flaring upstream. In the NL,
upstream routine flaring is prohibited under the Mining Act.
```

5.55 Should such a mandate include intervals for measurement? Please specify.

```
No, routine flaring for upstream is prohibited in the NL, so deciding on an
interval would not be logical.
```

Besides optimisation of flare conditions, flaring efficiency can be improved by steam injection and air injection, also known as steam-assist and air-assist. Steam-assisted and air-assisted flares produce smokeless flares by adding steam or air into the combustion zone, which creates turbulence for mixing and provides more air for combustion. However, too much steam or air has been to shown to have detrimental effects on flaring efficiency.

5.56 Are you aware of industry best practices for the improvement of flare efficiency? Please specify.

```
Methane Guiding Principles, Reducing Methane Emissions: Best Practice Guide
Flaring (Nov 2019)
BAT (EU Guidance)
```

5.57 Should EU regulation stipulate technical requirements for the operation of flares with regard to optimisation of efficiency?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer.

```
Routine flaring for upstream is prohibited in the NL under the Mining Act.  It
should be noted that the efficiency of flares is not optimal on startup an can
be influenced by weather conditions and/or feed (gas composition), thus effiency
cannot always be directed.
```

5.58 Should EU regulation stipulate technical inspection requirements for the setup of flares?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

Satellite technology allows the monitoring of global oil and gas sector flaring. Already current satellites can provide daily coverage of flaring activities globally. However, to accurately estimate flare efficiencies through satellite observation, accurate information on quantity and composition of the gas passing through flares is necessary.

5.59 Should the provision of information on quantities and composition of gas sent through flares be mandated to enable efficiency monitoring?

- [ ] Yes
- [x] No

Please justify your answer.

```
Routine flaring is prohibited for upstream in the NL under the Mining Act and
the gas composition varies in time, dependent on well systems, glycol, etc.
However, this could be useful for routine flaring activities.
```

Super-emitters and energy imports

As satellite data improves, it could be viable to create a detection protocol for particularly problematic venting and flaring sources globally. This could be absorbed into the 'super emitter detection service' envisaged for the International Methane Emission Observatory (IMEO). The Methane Guiding Principles advocate creating an inventory of venting activities, for example.[26]

[26] Methane Guiding Principles, (2019). Reducing Methane Emissions: Best Practice Guide Venting, Retrieved on 17.12.2020 from https://methaneguidingprinciples.org/wp-content/uploads/2019/11/Reducing-Methane-Emissions-Venting-Guide.pdf

5.60 Would you support the creation of an inventory of venting activities?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

```
Seems useful for knowledge sharing.
```

5.61 Which data sources should such an inventory comprise?

```
Emissieregistratie.nl / SODM/ RIVM / IEA (when data is crosschecked and
accurate)
```

5.62 Do you consider effective verification of data feasible?

```
Yes, this is common practice in the NL.
```

5.63 Where would you see such an inventory best hosted?

```
The earlier mentioned international observatory, European Environment Agency,
National Emission Authorities
```

5.64 How appropriate do you think the following measures would be in reducing venting and flaring associated with energy imported into the EU?

	Very appropriate	Appropriate	Neutral	Not very appropriate	Inappropriate	No opinion	**Please explain your choice. If you consider it very appropriate or appropriate, please describe possible implementation.**

Supporting emission abatement from venting and flaring through financial aid in developing countries							
Supporting emission abatement from venting and flaring through sharing of best practices and regulatory support in developing countries							
Require certification of associated venting and flaring for energy imported into the EU							
Set a target for EU companies importing energy into the EU for associated venting and flaring							
Ban imports of energy for which absence of associated venting and flaring cannot credibly be demonstrated.							
Impose carbon border pricing on imports into the EU for countries that do not apply effective or enforceable venting and flaring penalties							

Other, please specify.

```
The NL supports an ambitious implementation of the EU Methane Strategy.  The aim
of the strategy is to reduce methane emissions. Since the EU imports a
significant amount of its fossil energy sources, clear rules on reduction and
effective monitoring of methane emissions should be imposed across EU borders to
oversee the whole chain. This will also benefit the level playing field for
European fossil energy producers. Therefore, the NL supports broadening the
scope to actors from outside the EU.
```

6. Mitigation costs and benefits

The benefits from improved measuring and reporting of methane emissions through EU legislation would be an increased understanding of where and how emissions occur in the energy sector. This understanding can form the basis for effective mitigation and would lead to the achievement of larger reductions in methane emissions in that sector, with all the associated beneficial consequences in environmental, health and safety terms.

Fugitive emissions from leaking equipment, infrastructure or closed and abandoned sites as well as emissions from venting and incomplete combustion of methane represent the majority of methane emissions in the energy sector, so enshrining into EU law mitigation measures based on best practices targeting those areas of methane emissions could potentially lead to significant methane emission reductions in the energy sector.

For owners of the energy, mitigation techniques such as leak detection and repair or reduced venting and flaring can lead to benefits in terms of extra revenues from the gas saved and subsequently sold. Technologies that can prevent vented and fugitive emissions are reasonably well-known. In many cases, investment in abatement technologies is economic, as the gas saved quickly pays for the installation of better equipment or the implementation of new operating procedures. That said, the economic incentives are not always there, even when the business case seems to be apparent. Companies may decide to prioritise on more lucrative investments and/or they may not be taking into account environmental costs into their investment calculations. And there are certainly a number of cases where it could be considered that the business case for emission abatement is simply not there, such as in the case of closed or abandoned sites, or of unprofitable operations.

Information on the magnitude and distribution of costs associated with measuring, reporting and mitigation of methane emissions would be helpful to ensure the prioritisation of cost-effective measures where feasible, as well as to attempt to strike the right balance between regulatory, compliance (direct and indirect, e.g. through loss of competitiveness), social, environmental costs and other relevant costs, in order to effectively inform policy-making.

For the moment, the only known publically available source of information on the costs of mitigation of methane emissions in the energy sector is the International Energy Agency (IEA), which publishes a methane tracker database which contains country and regional estimates for methane emissions as well as abatement costs for oil- and fossil gas-related methane emissions by mitigation measure[27]. It indicates that 73% of global methane emissions can be abated with available technologies and methods and 40% at no net cost (at 2019 natural gas prices). For Europe the estimates are similar, 72% of methane emissions can be abated in total, 37% at no net cost. This includes a range of mitigation measures targeted at different parts of energy supply chains. The IEA estimations are focussed on oil and fossil gas-related abatement costs. The Commission's own modelling shows a cost-effective mitigation potential for methane emissions of 37% by 2030 from 2005 levels, a substantial part of which is in the energy sector[28].

However, there are no known publically available sources of actual costs of emission abatement in the energy sector reflecting actual costs at the level of companies/operators. For example, there is no public knowledge available today of the costs of achieving OGMP (or indeed IPCC GHG inventories) higher tier standard of measurement and reporting of emissions even for a standard company oil and/or gas company. Nor are there any such sources of cost information for leak detection and repair in the EU or elsewhere, or of the cost-implications of introducing legislation limiting flaring to safety reasons.

[27] https://www.iea.org/articles/methane-tracker-database

[28] Climate Target Plan impact assessment, https://eur-lex.europa.eu/resource.html?uri=cellar:749e04bb-f8c5-11ea-991b-01aa75ed71a1.0001.02/DOC_2&format=PDF

6.1 Do you generally consider that the overall benefits – including economic, social, environmental and other relevant benefits - of putting in place legislative measures to ensure robust and effective measurement, reporting and mitigation of methane emissions in the energy sector generally outweigh the costs to industry?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

Yes, while at the same time considering proportionality and cost-effectiveness.

Under the NL covenant on offshore methane emission reduction, the NL offshore industry discovered substantial emission reductions could be achieved at limited costs. A dedicated and focussed programme was implemented, in which operators were systematically challenged by experts on possible improvements and related costs. Also a systematic exchange of information between operators was crucial to identify the full reduction potential. A significant portion of the total emission reduction was achieved at net zero cost (although that portion was smaller than suggested by IEA). Setting a reduction target based on agreed cost efficiency levels proved very efficient. CE levels were based on CO2eq pricing (based on average CO2 price under the ETS). In 2019, NL Authorities and E&P industry agreed on 20 €/ton CO2eq.

This also leads to important notes of caution:
1. The potential for methane emission reduction differs from country to country. It even differs from installation to installation. There is no silver bullet for methane emission reduction measures. And regulations on MRV should allow for flexibility to address specific circumstances. Regulations should allow for innovation, be goal setting, rather than imposing rigid detailed methods. That will lead to an increased burden to the industry and Authorities, rather than to the desired emission reduction;
2. For installations / countries that have achieved large emission reductions in the (recent) past, operators will have much more difficulty identifying cost effective reduction measures than for those where systematic reduction approaches have not been implemented yet. Early movers should be rewarded, not punished by imposing additional reduction targets.
3. The EU should make sure that any regulations on MRV and mitigation are creating a level playing field

6.2 Please specify below for the following cases whether you would consider generally, that the benefits of putting in place legislative measures to ensure robust and effective measurement, reporting and mitigating of methane emissions outweigh the costs? Please indicate yes/no and provide details where possible.

	Benefits outweigh costs?
Upstream gas	Yes, depending on the measures
Upstream oil	Yes, depending on the measures
Midstream gas	Yes
Midstream oil	Yes
Downstream gas	Yes
Downstream oil	Yes
Operating coal mines	Yes

Closed/ abandoned coal mines	Yes
Biogas/ biomethane plants	Further analysis here is needed, taking into consideration the fact that the biogas/ biomethane sector fundamentally differs from the oil, gas and coal sectors. The biomethane sector is a still developing sector, largely characterised by small scale installations operated by SMEs.

6.3 Other than the IEA data, what sources can you point to which provide what you would consider useful information on the levels of costs and/or benefits of putting in place legislative measures to ensure robust and effective measurement, reporting and mitigating of methane emissions in any of the above areas of the energy sector?

```
National inventories based on national reporting obligations are the best source
of national methane emissions. The IEA data, in its current form, do not provide
reliable data on methane emissions in Europe.
```

In the context specifically of fossil gas, contrary to producers, transmission, storage, and distribution systems operators (including many LNG terminals) are regulated businesses and do not own the gas they handle. They do not benefit directly from methane emission abatement, as the value of the saved gas would not accrue to them. The treatment of costs related to methane emission monitoring and abatement by National Regulatory Authorities determines the incentives (i.e. revenue) of regulated entities.

6.4 In the EU, are there any instances whereby regulated entities are required by law to monitor and abate their methane emissions and yet that these costs are not included as allowed costs and considered as part of the general duties of the operator to maintain the infrastructure?

at most 1 choice(s)

- [ ] Yes
- [x] No

If yes, please state the Member State(s).

```
Not that we are aware of. In the Dutch Methane Emissions reduction covenant the
costs to implement the emission reduction measures were compared to the
prevented harm of the emissions. The comparison was made with the ETS-trading
price (at that time, 20 euros), calculating the CH4-emissions in CO2-eq.
```

6.5 In such Member States, are there any other incentives to monitor and abate methane emissions?

at most 1 choice(s)

- [ ] Yes
- [ ] No

If yes, please specify.

```
See 6.4
```

6.6 If such costs have so far not been recognised by the National Regulatory Authority, has this substantially impacted the level of monitoring and abatement activities of regulated entities?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please elaborate.

```
Under the Dutch covenant (6.4) a 50%-methane reduction has been realised.
```

6.7 If such costs have so far not been recognised, why should EU legislation require that they be recognised in the future?

7. Legislating mitigation of emissions from biogas/biomethane

Fugitive emissions from processing biogas/biomethane (as in biogas upgrading) plants from anaerobic digestion of biomass represent one of the non-negligible sources of methane emissions from the EU energy sector, and it should therefore be considered whether further obligations to measure, report and mitigate such emissions shouldn't also be included in the policy proposals to regulate methane emissions in the energy sector. Currently, methane emissions from biogas/biomethane facilities (incl. leakage, venting and flaring) are being reported in the EU GHG inventory, and as such are subject to the overall reduction requirement of the EU effort sharing legislation.

While regulation of measurement and reporting of such emissions could be included together in the upcoming regulation of methane emissions in the energy sector, at least parts of the requirements on the mitigation of methane leakage in biogas/biomethane plants could also be included in the Renewable Energy Directive (RED).

In order to be counted towards the RED targets, biogas/biomethane has to demonstrate compliance with the RED sustainability criteria - which includes minimum greenhouse gas savings thresholds - either via the use of default greenhouse gas savings values contained in the RED for different substrates or when these are insufficient for demonstrating compliance, operators have the opportunity to deliver calculations of actual greenhouse gas emissions savings of their production, following a strictl and detailed methodology defined in the RED and subject to a specific system of sustainability compliance which includes sustainability certification, also defined in the RED.

The RED's methodology to calculate actual values includes the requirement to take into account emissions from leakages occurring during the processing stage. The default values of the RED also already have some incentives for minimising methane leaks by offering higher default savings values for closed rather than open digestates.

What is not shown in the RED however is default methane leakage values broken down by source of emission and for different types of anaerobic digestion plants. Explicitly including such default values in the RED would enable operators to incorporate them in their overall greenhouse gas emissions calculations as part of the existing requirement in the RED to include leakage (of methane) as part of process emissions, and to do so without having to calculate actual values corresponding to their specific production process. The methane loss values assumed in the RED's default values should also be reviewed to ensure that they are in line with the most recent estimations available, and also to ensure that they are set at relatively conservative levels so that they can incentivise operators to put in place more effective technologies or leak

mitigation measures leading to less leakage than those default values, and to deliver evidence of those actual values according to a specific methodology, which would also need to be developed.

Regulating in the RED has the additional advantage of being applicable equally to all producers of biogas/biomethane – whether based in the EU and elsewhere - wishing to have their production counted towards the renewable energy targets of the RED.

7.1 Do you consider that biogas/biomethane producers should be obligated by law to reduce their fugitive methane emissions?

at most 1 choice(s)

- [ ] Yes
- [x] No

If no, please justify your answer.

```
Given the current stage of development of the biogas/ biomethane sector,
incentivising methane emisssions might be more suitable.
```

7.2 Do you agree that the RED should be further developed as suggested above, thereby complementing any reporting and/or mitigation measures also included in the methane energy sector regulation?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer.

```
The provided analysis does insufficiently clarify the added value and pro's/
con's of regulating methane emissions from the biogas/ biomethane sector through
various instruments. The Netherlands prefers regulating methane emissions in the
biomethane sector via one instrument. A detailed assessment of the possible
instruments (including the RED) and their pro's/ con's is required in this
respect.
```

7.3 Do you consider that separate mitigation measures should also be developed in the upcoming regulation on methane in the energy sector in complement to the RED?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer.

```
The provided analysis does insufficiently clarify the added value and pro's/
con's of regulating methane emissions from the biogas/ biomethane sector through
various instruments. The Netherlands prefers regulating methane emissions in the
biomethane sector via one instrument. A detailed assessment of the possible
instruments (including the RED) and their pro's/ con's is required in this
respect.
```

7.4 Are you supportive of the idea to regulate such emissions in the RED by explicitly including default values for processing methane leakages at conservative levels to incentivise mitigation and the delivery of

lower actual values?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer.

```
In principle the concept of incentivising mitigation by setting conservative
standards, and thereby providing operators the possibility to demonstrate that
their performance is better than these standards, is supported by The
Netherlands.
```

7.5 Are you supportive of the idea to develop a methodology to estimate actual values of methane losses in biogas/biomethane plants, and to be included as part of sustainability compliance in the RED?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

```
In principle the concept of incentivising mitigation by setting conservative
standards, and thereby providing operators the possibility to demonstrate that
their performance is better than these standards, is supported by The
Netherlands.
```

8. Legislating mitigation of emissions from coal

The IEA Methane Tracker estimates the global total of methane emissions from the coal sector at 39Mt per year, representing 9% of global methane emissions. In Europe specifically, 34% of methane emissions in the energy sector are fugitive emissions from the coal sector[29], amounting to some 1.1Mt of reported emissions for the EU-27 (57% of which come from Poland).[30] These fugitive emissions come from surface mines, underground mines, post-mining activities, and abandoned mines. Underground mines represent the largest source of reported emissions from the coal sector (87%)[31].

In underground mines, methane leakage is an important health and safety issue as it can lead to explosions for certain concentrations of methane in the air. Production releases methane trapped in coal seams, called coalmine methane (CMM). Once production is halted and the mine is abandoned, it continues to release methane, referred to as abandoned mine methane (AMM), over a long period of time.

Since 1990, certain EU countries have massively reduced methane emissions from coal mining, such as Germany, the UK and also the Czech Republic. In comparison, no changes have been recorded in Romania, while in Poland, methane emissions from coal have been reduced by only around 17%[32]. Some projections consider that the decrease in coal production will lead to a decrease in coal-related methane emissions[33]. However, recent studies have shown that these emissions might be currently underestimated, and are likely to increase in the future because of continued abandoned mine methane emissions, and exploitation of deeper and gassier deposits due to the exhaustion of shallow coal reserves [34].

Mitigating coalmine methane can be challenging as methane concentration of emissions in operating mines is often very low and can fluctuate in quality and quantity. The lower the concentration of methane, the more technically difficult and costly it is to abate[35].

At present, there are no EU-wide specific regulations limiting coalmine methane emissions, in operation or after their closure. In some Member States, national legislation is in place to reduce the fugitive methane losses from coal production[36]. In Germany, coal mine methane and abandoned mine methane are treated as a renewable resource and are eligible for feed-in-tariffs when used to generate electricity. In the UK, legislation has provided tax breaks for CMM projects[37]. In France, mine methane is also used for electricity generation and benefits from renewable energy tariffs[38].

The EU has funded a number of research and development projects to introduce improved tools for methane emissions control[39]. The forthcoming Commission proposal to reform the Research Fund for Coal and Steel also supports research in this field. In addition, the initiative for Coal Regions in Transition, now part of the Just Transition Platform, can serve as a forum for discussing good practices and best available techniques.

[29] Climate and Clean Air Coalition (CCAC) Scientific Advisory Panel, (2020), UNFCCC 2017

[30] Ember, Poland's second BEŁCHATÓW, 2020; UNFCCC 2018 data

[31] UNFCCC 2017 reported data on greenhouse gas emissions: EEA Report No 6/2019, Annual European Union greenhouse gas inventory 1990–2017 and inventory report 2019, Submission under the United Nations Framework Convention on Climate Change and the Kyoto Protocol, 27 May 2019

[32] Ibid

[33] Global Non-CO2 Greenhouse Gas Emission Projections & Mitigation Potential: 2015-2050, EPA, 2019

[34] Global methane emissions from coal mining to continue growing even with declining coal production, N. Kholod et al, Journal of Cleaner Production, 2020,

[35] IEA, World Energy Outlook 2019

[36] Global Methane Initiative (2013). European Commission Global Methane Reduction Actions, Ref. Ares (2013)2843722-06/08/2013.

[37] N. Kholod et al., Legal and Regulatory Status of Abandoned Mine Methane in Selected Countries: Considerations for Decision Makers, 2018

[38] French Electricity Act 2000

[39] Global Methane Initiative (2013). European Commission Global Methane Reduction Actions, Ref. Ares (2013)2843722-06/08/2013.

8.1 In light of the above, do you consider that the EU regulation to reduce methane emissions in the energy sector should cover coalmine methane?

at most 1 choice(s)

- [x] Yes and it should cover both CMM from operating and closed/abandoned mines;
- [ ] Yes and it should cover only CMM from operating mines;
- [ ] No

If no, please justify your answer.

```
It should cover both sources depending on their specific contribution.
```

Certain EU Member States are currently already measuring and reporting fugitive methane emissions in the coal sector using higher tier methods based on mine-specific measurements and calculations. According to IPCC Guidelines however, it is not yet feasible to collect mine-specific higher tier measurement data for surface mines. But there are still a number of EU Member States that do not report their data according to direct measurements, and rely instead on estimations.

8.2 Do you consider that the current levels of reporting of coalmine methane and abandoned mine methane emissions in the EU are sufficient?

```
Yes, it seems that the methane emission data is available
```

8.3 Should all EU Member States be obligated to achieve highest tier levels of reporting for all underground mines within a certain time schedule?

```
No, not all abandoned coal mines emit methane. The methane emissions of the
Dutch coal mines (all abandoned) was researched in 2016. It was concluded that
the emissions were not significant. Most of the coal layers are submerged and
therefore don't emit any gasses anymore.
```

8.4 Are there any reasons why full 'higher tier' reporting for all underground mines may not be feasible?

```
The locations may be inaccesible and or submerged
```

8.5 In the interest of more accurate estimation of emissions, should reporting on underground mine methane emissions include details on coal rank, extraction method and depth?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

```
Yes, that might be helpful to estimate the composition of the emitted gasses
```

Coalmine methane mitigation

In active underground mines, atmospheric methane concentration is continuously controlled. Methane drainage can be used to lower the percentage of methane in the air: capturing the gas to prevent it from entering mine airways. Methane can be captured before, during and after mining by pre- and post-mining drainage techniques, respectively.

The recovered methane can be used (most commonly for power generation, direct thermal, and pipeline injection), vented or flared when utilisation is not possible. Ventilation air from underground mines contains diluted concentrations of methane and is referred to as ventilation air methane (VAM). It can be mitigated by oxidation, with or without energy recovery (methane molecules are broken down in an exothermic reaction), or used as a supplementary fuel (i.e: combustion air for boilers, turbines)[40].

Although CMM activities would increase local and regional NOx emissions near project sites, at the EU-wide scale the overall effects of grid electricity displacement result in net reductions in overall NOx emissions[41].

[40] Ventilation Air Methane (VAM) Utilization Technologies, EPA, July 2019 https://www.epa.gov/sites/production/files/2017-01/documents/vam_technologies-1-2017.pdf.pdf

[41] Karl H. Schultz & Linus M. Adler for the Joint Research Centre, Environmental and Sustainability Assessment of Current and Prospective Status of Coal Mine Methane Production and Use in the European Union, 2015 https://publications.jrc.ec.europa.eu/repository/bitstream/JRC96133/lb-na-27402-en-n%20.pdf

8.6 Which of the following factors are important considerations which explain why methane from operating mines cannot be systematically recovered and used?

- [x] Safety requirements for ventilation
- [ ] Safety requirements for mine drainage
- [ ] Cost of abatement
- [x] Insufficient concentration of methane
- [ ] Lack of infrastructure for methane use (proximity to pipelines)

Other, please specify.

8.7 Are there instances whereby venting of CMM is unavoidable? If so, what instances? [

```
Yes, might be unavoidable in emergency situation
```

8.8 For instances in which release of methane is unavoidable, should EU legislation specify obligations to prevent direct venting from active coalmines? Please describe feasibility of available prevention techniques (e.g. capture, flaring, other).

```
Instances with unavoidable methane release should be prevented. Flaring could be
an option as a safety measure when possible.
```

8.9 Should the EU require the use of technologies to mitigate ventilation air methane emissions?

at most 1 choice(s)

- [ ] Yes, with a recovery of its energy value
- [x] Yes, even without recovery of its energy value
- [ ] No

Please explain your choice.

Abandoned mine methane mitigation

In most parts of the EU, underground coal mining activities have been declining considerably for a number of years, principally due to the closure of coalmines for economic reasons.

Technologies to recover methane from closed or abandoned mines are available and already operational in certain parts of the EU such as flaring of excess drained gas, exploitation of drained gas for power generation, pipeline gas, chemical feedstock and others, and use or abatement by oxidation of ventilation air methane.

Emissions from abandoned mines are estimated rather than measured (with IPCC or EPA methodologies). Direct measurement of total AMM is not technically feasible[42]. Satellites such as GHGSat are able to monitor and quantify (with 40–45% precision) emissions from mine vents[43].

[42] Global methane emissions from coal mining to continue growing even with declining coal production, N. Kholod et al, Journal of Cleaner Production, 2020,

[43] Quantifying Time-Averaged Methane Emissions from Individual Coal Mine Vents with GHGSat-D Satellite Observations, D. J. Varon et al, Environmental Science & Technology, 2020, https://pubs.acs.org/doi/10.1021/acs.est.0c01213

8.10 What would you consider appropriate measures to enable AMM mitigation? Please described possible barriers to implementation.

```
Measures should be simple and low-cost. Measures should be proportional: the
emitted amount of methane should be proportionate in relation to other sources
of methane emissions.
```

8.11 How important would you consider the following factors to be in the decision to engage in AMM mitigation:

	Highly important	Important	Unimportant	No opinion
Public health	○	◉	○	○
Technological innovation	○	○	○	◉
Social benefits (e.g. employment)	○	○	○	◉
Environmental benefits (local and global)	○	◉	○	○
Regional development	○	○	○	◉

Other, please specify.

Uncertainty about the ownership rights for methane emitted from abandoned sites can be a regulatory barrier to its capture and utilisation. Clearly defined ownership rights can help companies mitigate risks in their contractual arrangements. Countries with successful AMM projects have created an enabling environment by eliminating restrictions on transferring rights to the gas, regardless of where the gas is used.

8.12 Should AMM ownership rights be addressed in EU legislation?

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer.

```
No, mining laws are on a MS level
```

8.13 Are you aware of existing frameworks for AMM ownership that the Commission should take into account?

```
No, mining laws are on a MS level
```

8.14 Should EU methane legislation set an obligation on mine operators to install recovery systems for future gas recovery after abandonment/closure?

at most 1 choice(s)

- [x] Yes
- [ ] No

Please justify your answer.

When the emissions are significant

9. Synergies with other sectors

The main sources of anthropogenic methane emissions in the EU are from the agriculture, waste and energy sectors. The Communication on the Methane Strategy indicated that while the most cost-effective methane emission savings can be achieved in the energy sector, there are potential synergies and trade-offs for mitigating the cost of emission reductions in agriculture and waste via energy-sector based measures. The Communication for instance highlights the production of biogas from non-recyclable, sustainable, sources of human and agricultural waste (e.x. manure) and residue streams as such an example.

9.1 Can you provide other examples of initiatives or regulatory measures in the energy sector which could also contribute to cost-effective methane emissions mitigation in other high methane emitting sectors such as agriculture and waste?

Thank you for your participation.

Contact

Contact Form (/eusurvey/runner/contactform/3ce8224a-1558-ce5f-f157-24658c443c66)