RESPONSE TO PUBLIC CONSULTATION OF THE EUROPEAN COMMISSION

Legislation to measure and mitigate methane emissions in the energy sector

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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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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.
- [x] Other answer.

Please justify your answer

We believe that a well-structured, robust and fit for purpose MRV system is core for better management and more accurate detecting and quantifying methane emissions. Transparency and reliability will bring harmonisation among stakeholders. We support an appropriate translation of the OGMP 2.0 framework into EU legislation to be applicable to the full energy supply chains (from upstream to downstream, excluding utilisation).
This MRV system should be in parallel to the setting of individual targets by the companies and the definition of their methane emissions mitigation strategies.
On the mitigation strategies, we consider that appropriate and efficient LDAR programs and minimization of venting & flaring should be the priorities.
Besides this we need legislation that is not too prescriptive to give operators flexibility opportunities to choose the most cost effective measures available for mitigation.
Once accurate data is available and the companies have defined their methane emissions reduction targets and strategies, it could be analysed whether performance-based requirements or other policy instruments are needed.

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)

- [ ] Yes
- [x] No

Please justify your answer

Mitigation requirements, in parallel with a robust MRV and individual targets are required. Methane emissions quantification at a sufficient level of accuracy allows companies to define their strategies.

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)

- [ ] Yes
- [ ] No

Please justify your answer

Performance-based requirements can contribute to methane emissions reduction. However we recommend to start with standardisation measures (e.g. ongoing MRV process, activities under CEN/TC 234 WG14, …), once this is in place, performance-based requirements or policy tools could be explored

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

Yes, it is key

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	Not Applicable
Fossil gas	Once sufficiently reliable methane emissions data are available (fit for purpose MRV in place), the need and impact for this type of instruments could be analysed.
Coal	Not Applicable
Biogas/biomethane	Not Applicable

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)

- [x] Yes
- [ ] No

If no, please justify your answer

In general we agree, please see the answer 2.2.

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?

In general, we support the translation of the OGMP framework into EU legislation to be applicable to the energy supply chains (from upstream to downstream, excluding utilisation). However, there is still limited experience with top-down technologies, industry is in the learning process with these technologies and how data will be reconciled with the bottom-up data. There are lot of grey areas in the technologies and uncertainty/lack of maturity of the existing technologies especially for mid and downstream sectors. We recommend currently not to include the level 5 in the legislation.
In addition, it should be clarified that not all the companies need to achieve the highest levels in 3 years, some flexibility should be given to the industry. We have identified this as a barrier for companies to join OGMP voluntarily.

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.

Companies should have a complete internal inventory/report of all the methane emissions data and information to ensure an accurate quantification and reporting.
In addition to OGMP 2.0 framework, MARCOGAZ methodology, the EN 15446 standard* for fugitive emissions, the CEN/TR 16388:2012 on gas-Specific Environmental Document (Guideline for incorporating within standards to minimize the environmental impact of gas infrastructure across the whole life cycle) and the ongoing developments under CEN/TC234/WG14 on a methane emissions quantification technical standard (based on the MARCOGAZ assessment report) are very important.
Also reporting schemes have to be harmonised and duplication and double counting should be avoided. Gas companies stand ready to collaborate with the national authorities to prepare the GHG National Inventory Reports (NIR) every year. We recommend to connect the national reporting to OGMP 2.0.
(*The EN 15446 standard was not designed for the natural gas sector and therefore the correlation factors need to be updated.)

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

No answer.

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.

No answer.

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.

No answer.

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

We are aware of regulations on LDAR in other jurisdictions (mainly for upstream) and in some EU Members States (mainly covering distribution). It is important to recognise that one solution does not fit all the assets, operations and equipment along the value chains. Different requirements (frequency, methods, technologies…) for different types of assets/equipment should be allowed.
We would like to highlight that flexibility is needed. MARCOGAZ has developed a technical recommendation on LDAR based on the best practices implemented by the industry. This work provides a common base for mid and downstream: we recommend to use it as basis for developing the EU legislation

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.

MARCOGAZ technical recommendation on LDAR.
EN15446 Fugitive and diffuse emissions of common concern to industry sectors - Measurement of fugitive emission of vapours generating from equipment and piping leaks.
Methane Guiding Principles best practices guides to reduce methane emissions: https://methaneguidingprinciples.org/best-practice-guides/

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.

We are aware of regulations in other jurisdictions, particularly in North America. An analysis of the adjustments to these regulations is needed as well as the implications and potential impact to the EU.
We would like to highlight that flexibility is needed.
MARCOGAZ has developed a technical recommendation on venting and flaring based on the best practices implemented by the industry. We recommend to use it as basis for developing the EU legislation.

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.

Methane Guiding Principles best practice guides.

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.

No answer

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.

No answer

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)

- ☐ Yes
- ☐ No

Please justify your answer

No answer

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)

- ☐ Yes
- ☐ No

Please justify your answer

No answer

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)

- ☐ Yes
- ☐ No

Please justify your answer

No answer

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)

- ☐ Yes
- ☐ No

Please justify your answer

No answer

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
- [ ] No

Please justify your answer

No 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 answer

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)

- [x] Yes
- [ ] No

Please justify your answer

We support an appropriate translation of the OGMP framework into EU legislation to be applicable to the energy supply chains (from upstream to downstream, excluding utilisation). This will allow to improve the reporting level as well as the credibility of the data, having all reported emissions related to the energy sector under the umbrella of the future International Methane Emissions Observatory (IMEO).
In addition, it should be clarified that not all the companies need to achieve the highest levels in 3 years, some flexibility should be given to the industry. We have identified this as a barrier for companies to join OGMP voluntarily.

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
- [ ] No

Please justify your answer

No answer

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
- [ ] No

Please justify your answer

No answer

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)

- [x] Yes
- [ ] No

Please justify your answer

Yes, but not immediately.
In the long term a policy should cover the end use in order to reduce emissions of this part of the chain. The implementation of a regulation should be done in a manner that gives the industry time to adapt and develop products/appliances/process that can comply with future requirements. In the same time, tools for the implementation of such policy (laboratory capacity, standards) should be developed. The policy should take into account the nature of the market and the differences between end users.

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)

- [ ] Yes
- [x] No

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

GHG Protocol Scope 3 emissions are not relevant in the context of mid/downstream operators, due to the EU unbundling rules, gas operators are not the owners of the gas. We believe that the methane legislation should address only those emissions that the organizations can directly manage and influence.
The establishment of indirect emission reporting scope is also in some cases unclear and double counting of indirect emissions among companies for the same part of the gas value chain could occur. If EC's goal is to cover all emission across the value chain, it can achieve it by extending the sectoral coverage.

3.12 In which end-use sectors do you consider that better information on methane emissions is necessary?

- [ ] Industry
- [ ] Power generation

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

Please provide details if possible.

Industries are already subject to regulations regarding emissions and environmental impact. Industries are so already aware of emissions management and reporting when relevant for their activities.
We believe that emissions from all sectors (Industry, power generation etc..) should be investigated as at the moment the picture of emissions from end use is not very clear or quite unknown for some sectors.
In complement of what is already done for the other parts of the gas chain, emissions from end use are also studied. Stakeholders in the gas industry are presently investigating the emissions by technology/sector including among other the analysis of existing literature to have information on the level of emissions and understanding the mechanism of generation of unburned hydrocarbons (in view of preparing mitigation solutions).
It is a difficult task as there are > 300 millions of EU users covering 100's of different technologies and at this stage no segment of appliances should be excluded.
Therefore, the list of technologies given should by the way be extended so to take into account the diversity of the appliances and technologies present on the market.
The list given in the question is not complete. We suggest segmenting the market as following: Residential & commercial / Power production / Industry / Transport.
For each segment above there are also sub-segments by technologies (boilers, water heaters, cookers, engines, turbines, etc.)

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.

See previous answer

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

- [ ] Gas turbines
- [ ] Gas engines
- [ ] Gas boilers (industrial)

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

Please provide details if possible.

No, we are not aware.

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

at most 1 choice(s)

- [ ] Yes
- [ ] No

Please justify your answer

No 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
- [ ] No

Please justify your answer

No 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)

- ☐ Yes
- ☐ No

Please justify your answer

European Commission should encourage exporting countries to support gas producers to join the efforts to reduce methane emissions in the energy sector (e.g. through OGMP 2.0).

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)

- ☐ Yes
- ☐ No

Please justify your answer

No answer

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)

- ☐ Yes
- ☐ No

Please justify your answer

It is necessary to have reliable data. Collaboration with governments is key to ensure that producers are joining OGMP 2.0 and properly quantifying methane emissions, in parallel with the establishment of a mitigation strategy.

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)

- [x] Yes
- [ ] No

If no, please justify your answer

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;
- [x] 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;
- [ ] They should play no role.

Please justify your answer

It could play a role in the future alongside and together with obligations on MRV, LDAR and limits on venting and flaring. It is important to analyse the implications on Security of Supply and in the markets/end-users.

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

Harmonised definitions should be included, according to our recent glossary:

- Fugitive emissions are leaks due to tightness failure and permeation.
- Leaks are unintentional emission from pressurized equipment used in the gas industry. Leaks are usually caused by imperfections in or ordinary wear and tear of sealed joints, such as flange gaskets, screwed connections, valve-stem packing, or by poorly seated valves. Leaks can also come from the wall of a pressurized vessel or pipeline, as a result of corrosion or damage.
- LDAR programs are used to identify and repair the equipment or infrastructure that can be a source of emissions due to leaks from pressurized equipment. It is often accomplished by a periodic inspection survey to identify leaks, followed by repair of any found leaks.

It is important not to impose blanket obligations and rules across the whole value chain but to allow for flexibility for defining thresholds, instruments to be used for detection and measurement, frequencies (detection, repair), etc.

Quantification is not part of the LDAR programs. However, LDAR programs provide a good opportunity to do the measurements in parallel.

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)

- [ ] Yes
- [x] No

Please justify your answer

Legislation should indeed give some flexibility to operators to choose the most effective solution to perform LDAR, regarding the context, the type of facilities and the local constraints. Technologies are evolving very quickly. Then, legislation should also leave the possibility to introduce innovative solutions and should not be too prescriptive.
European industry is using at the moment different technologies and instruments for the LDAR. Also a mix of technologies is normally used to achieve an optimal outcome. Based on survey carried out by GIE and MARCOGAZ, the most frequent technologies are soap spray, gas detectors/sensors, IR cameras, FID, portable/foot gas detectors, car gas sensors, laser, high flow sampler,... (additional information can be found in the MARCOGAZ technical recommendation on LDAR)

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								
Flame ionisation detectors								
Ultrasonic detectors								
Fixed detectors								
Soap spray /soap bubble screening								
Bagging								
High flow sampler								
Mass flow meters								

Laser detectors								
Catalytic bead sensors;								
Semiconductor detectors								
Electrochemical detectors								
Cavity ring down spectroscopy								
Radial plume mapping								
Mobile gas chromatography								
Tracer gas release								
Mobile ground labs								
Unmanned aerial vehicles								
Manned aircraft								
Satellites								

Other (please specify)

Please see previous answer to the question 4.2.

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)

- ☐ Yes
- ☐ No

Please justify your answer

MARCOGAZ recommends (see MARCOGAZ technical recommendation on LDAR) that assets are periodically inspected. This means that for different parts of the gas chain different inspection frequencies apply.
Based on the MARCOGAZ-GIE survey, detection is performed on a large variation in frequency, on type of asset and on granularity among the companies.
Flexibility should be given to the industry depending on the type and condition of the assets. The frequency of the inspections is set in some countries through the national regulation and/or technical standards (mainly for safety reasons) or by the operators (for both safety and environmental reasons) while in other countries there may not be a pre-defined frequency for inspection.

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	
Connectors	
Open-ended lines	
Flanges	
Control valves	
Pressure relief valves	
Pumps	
Compressor stations	
Regulating / reduction / metering stations	
Valve stations	
Measurement stations	
Gas delivery station	
Pressure regulating stations	
Metering stations	
City gate stations	
Other (please specify)	See previous comment on flexibility

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

☑ No

Please justify your answer

LDAR is detection and repair of leaks. Quantification is something different, even if the LDAR campaigns are a good opportunity to quantify the emissions in some occasions (e.g. EN 15446) and to establish emission factors,...
Different type of assets demands different type of quantification methods.
For the use of the EN15446, see MARCOGAZ technical recommendation on LDAR

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

☐ No

If no, please justify your answer

No answer

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.

Yes, it is possible as far as emissions factors are based on measurements of representative samples, simulation tools and/or engineering calculations. Especially for small amounts, the efforts to perform direct measurements can be disproportional.
Please see answer 4.10.

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

at most 1 choice(s)

☑ Yes

☐ No

Please specify.

It is not always technically possible or the most cost-effective way to quantify. Some leaks are inaccessible or have a complex geometry and cannot be measured.
In case of an emergency situation, direct measurements cannot be performed.
Often, leaks at low pressure, leaks on buried installations or leaks on high components can even not be quantified by bagging or any other method.

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)

- [ ] Yes
- [ ] No

Please justify your answer

Gas industry is currently working on voluntary initiatives to ensure harmonisation. For example OGMP 2.0 is currently developing some technical guidance documents that will bring harmonisation on the quantification for the different reporting levels. These ongoing developments could be taken into account for future harmonisation in the legislation.

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

No answer

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, however some considerations and constraints shall be taken into account (Please see MARCOGAZ technical recommendation on LDAR.):
- Midstream (transmission, UGS and LNG terminals):
The detected leaks needs to be repaired as soon as possible taking into account safety, technical and economic aspects.
Immediate repair can be understood as the repair done during the routine maintenance carried out just following the detection campaign, having both activity synchronized allow to repair quickly most of the leak in safe conditions (e.g. replacement of seals, greasing and/or quick adjustments). The responsible for the LDAR programme assesses whether the reparation is feasible at that moment (parallel repair).
Leaks that cannot be directly repaired are classified. The classification of the leaks takes into consideration the safety and environmental impact, the amount of methane emitted, the concentration of the leak, the accessibility, and the cost-effectiveness.
For those leaks that cannot be repaired directly, monitoring is recommended.
Based on the classification of the leaks, prioritisation and a planning of the repairs are included in the maintenance plan.
It is recommended to carry out the repairs within 1 year from detection considering its safety impact, the environmental aspects and its cost-effectiveness. Some specific situations need to be solved via dedicated procedures with possibility to deviate from the 1 year recommendation.
After each repair, it is recommended to remeasure the leak and check the result of the repair (mainly done for larger leaks) and to carry out periodic controls.
-Downstream (distribution)
The detected leaks needs to be repaired as soon as possible taking into account safety, technical and economic aspects. Immediate repairs are those carried out during the campaign, at the same time of detection (e.g. retightening, seal replacement and/or adjustments). The person responsible for detecting and measuring assesses whether the repair is feasible at the same moment (instant repair). If so, that person will initiate the appropriate repair procedure.
Repairs that cannot be performed immediately are planned and they need to be classified taking into consideration different aspects such as safety impact, amount of methane emitted, concentration of the leak, accessibility, cost-effectiveness evaluation. Those leaks are included in the monitor and repair plan.
It is recommended to carry out the repairs within 1 year from detection considering its safety impact, the environmental aspects and its cost-effectiveness.

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, however some considerations and constraints shall be taken into account. Please see MARCOGAZ technical recommendation on LDAR and answer to 4.15.

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.

Additional information and examples can be found in the MARCOGAZ technical recommendations on LDAR and on venting and flaring.

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

It is important to recognise that some repairs may take longer (please see annex of the MARCOGAZ technical recommendation on LDAR). For example in the case that repairs can be done only during equipment or facility downtimes. Industry should not be penalised in these cases.

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

Comment (optional)

Not completely due to technical constraints (security of supply, strong operational constraint, safety…) and disproportional costs.
An important part of the following answers depends on "routine venting and flaring" definition.
In mid and downstream, there is no reason to vent or flare to balance production and demand. None of the gas has to be vented or flared because it cannot be dispatched to the market.

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

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

More than 5 years

Please justify your answer

It is understood that important reduction results can be achieved at shorter time horizon. For technical and logistic reasons, more than 5 years will be necessary to complete extensive reduction programs (asset unavailability management for example). Investments will be required and the vast majority of the mid /downstream operators are regulated entities. The period will also depend on the incentives defined by the Regulators.

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

Please see answer 5.6.

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, at least for definitions. It is not clear for us what parameters means. Please see answer 5.6.

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

It should be general guidance (e.g. safety, security of supply,…). Please see MARCOGAZ technical recommendation on venting and flaring.

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.

MARCOGAZ has developed a technical recommendation on venting and flaring which contains definitions, explanations on avoidable and unavoidable emissions as well as examples.
According to that “technical/operational” definition of routine, all routine venting and flaring emissions cannot be considered as avoidable.
Existing definitions are related to upstream mainly, we propose the followings:
1. Vented emissions : Gas released into the atmosphere intentionally from processes or activities/devices that are designed to do it, or unintentionally when equipment malfunctions or operations are not normal.
2. Flaring : Controlled burning of gases (for disposal) mainly for safety reasons.
3. Routine venting/flaring : Operational release of gas carried out on a regular and/or periodic basis. Routine flaring does not include safety flaring, even when continuous.
4. Safety venting/flaring : Safety venting/flaring of gas is venting/flaring to ensure safe operations.
5. Non-routine venting/flaring : Non-routine venting/flaring of gas is all venting/flaring other than routine and safety flaring.

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.

These initiatives are focused mainly on upstream.
MARCOGAZ has developed a technical recommendation on venting and flaring in the gas mid and

downstream segments.
MARCOGAZ and GIE are supporting organisations of the Methane Guiding Principles where a specific guide was developed for the mitigation of methane in the mid and downstream sector.

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

Maybe it can be used as inspiration, but it is important to ensure that mid and downstream are specifically taken into account

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?

See MARCOGAZ technical recommendation on venting and flaring

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

As far as the reporting/quantification process are harmonized and well standardized (see question 5.11).

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

at most 1 choice(s)

☑ Yes

☐ No

Please justify your answer

OGMP/IMEO is a voluntary initiative that will contribute to the verification. Also auditing/verification systems (e.g. ISO 14001, ISO 50001,…), are already existing.

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)

☑ Yes

☐ No

Please justify your answer

Harmonization is always beneficial when quantification is concerned.

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

No, see answer to the question 5.11.

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

Global if OGMP/IMEO is considered.
At company/national level when existing standard verification process are used (e.g. ISO 14001, 50001), additional cost recovery related to such auditing process should be considered.

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

at most 1 choice(s)

☐

Yes

☑ No

Please justify your answer

See answer to previous question (5.14).

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)

☑ Yes

☐ No

Please justify your answer

Harmonisation is needed to ensure accuracy and transparency.

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

☑ No

Please justify your answer

The industry is intensively working to improve the accuracy of the data. At this stage, it is important not to penalize the industry in case of unintentional mistakes, but to ensure that improvement of MRV becomes a priority for them.
It is important to recognize the limitations of the available technologies, the uncertainties associated to the quantification and the high costs associated to the used of more than one technology in parallel.
In addition, in the past the industry did important efforts mainly on the detection and mitigation of methane emissions, while for the quantification the industry relied on bibliographic emissions factors. During the last years, accurate quantification has also become a priority for the industry. Measurement technologies are less evolved than detection technologies/instruments.
Once the process will be mature, the possibility to define fines for intentional misreporting could be explored.

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?

☐ Yes

☐ No

Please justify your answer

No answer.

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							
Encourage company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring							

Mandate company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring							
Developing a database of all routine vents and flares							
Developing a database of all routine vents and flares, cross-referencing this information with databases of permits and exemptions							
Set a total cap on venting and flaring activities for the							

entire EU							
Mandate detailed environmental impact assessments of new oil and gas operations that account for the potential emissions from venting and flaring							
Introduction of financial incentives for reductions in emissions from venting and flaring (taxes/penalties or allowances).							
Outright ban on venting and flaring (except where no other ramification is available for health and safety reasons).							

Others (please elaborate)

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.

We welcome an analysis to split the methane emissions per sector, oil, gas and coal.

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
- ☐ No

Please justify your answer

Yes, depending on the type of vent. In some cases it can be sufficient if the emission factors are based on a representative sample of measurement and also taken into account proven engineering calculations

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

This also depends on the type of vent. For example, in case of pneumatic devices (extensive population of small emitters) the use of measurement based emission factors together in some cases with proven engineering calculations could be the only feasible approach.

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.

In a lot of cases a calculation is particularly relevant (and may be more accurate than a measurement). Typically when the level of pressure and the geometrical volumes of the vented asset are known or when fixed flow rate are set. e.g. gas compressor stops, asset/pipeline depressurization for maintenance, third party damage, emission from measurement device sampling flow...

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

In some cases it is not possible as for example third party damages, service line replacement, emergency /safety situations, small depressurisations…
In other cases, it could be technically possible but with disproportionate costs or not the most accurate approach (See answer to 5.23).

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			
Production			
Transmission	please see: 1 - Reducing Methane Emissions: Best Practice Guide Identification, Detection, Measurement and Quantification https://methaneguidingprinciples.org/wp-content/uploads/2020/09/Reducing-Methane-Emissions_Identification-Detection-Measurement-and-Quantification_Guide.pdf 2 - MARCOGAZ technical recommendation on venting and flaring.		
LNG	please see: 1 - Reducing Methane Emissions: Best Practice Guide Identification, Detection, Measurement and Quantification https://methaneguidingprinciples.org/wp-content/uploads/2020/09/Reducing-Methane-Emissions_Identification-Detection-Measurement-and-Quantification_Guide.pdf		

	2 - MARCOGAZ technical recommendation on venting and flaring.		
Storage	please see: 1 - Reducing Methane Emissions: Best Practice Guide Identification, Detection, Measurement and Quantification https://methaneguidingprinciples.org/wp-content/uploads/2020/09/Reducing-Methane-Emissions_Identification-Detection-Measurement-and-Quantification_Guide.pdf 2 - MARCOGAZ technical recommendation on venting and flaring.		
Distribution	please see: 1 - Reducing Methane Emissions: Best Practice Guide Identification, Detection, Measurement and Quantification https://methaneguidingprinciples.org/wp-content/uploads/2020/09/Reducing-Methane-Emissions_Identification-Detection-Measurement-and-Quantification_Guide.pdf 2 - MARCOGAZ technical recommendation on venting and flaring.		

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, when measurement are relevant (see previous comments on quantification via calculation).

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

Vents should be accurately quantified with appropriate emission factors, engineering calculations or direct measurements. However, as stated before, measurement is not always the most suitable option.

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

Flexibility should be given as there is a diversity of cases or situations and technologies are evolving very quickly.

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

at most 1 choice(s)

- [x]

Yes

- [ ] No

Please justify your answer

Yes, when measurement are relevant (see previous comments on quantification via calculation). See also the MARCOGAZ technical recommendation on venting and flaring.

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
- [ ] No

If yes, which?

No answer

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

There are different options, flexibility should be given (see comment on calculation possibilities and use of emission factors on extensive population of small emitters).

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

Case where the calculation is possible and cases where Emission Factors based on representative samples can be used (see previous comments).

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

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

That kind of process should be applied depending on concerned device specificities. Also a cost evaluation needs to be performed.

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.							

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).							
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.							
TRANSMISSION, STORAGE, DISTRIBUTION							
Implement minimising vents programmes.							It is appropriate. This is applicable to specific process circumstances and not to regular emissions from some devices. It is recommended that the companies carry out an analysis of their venting policy and adapt it.
Recompression instead of venting							Very appropriate but with limitations on time and costs
Use of vacuum pressure pumps during							

commissioning of distribution networks.							Not very appropriate. But depending on the volumes concerned.
Replacing natural gas starters with electric engine starters at compressors, hence reducing operational venting							

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 case of the midstream segment, flares are sometimes located in LNG regasification terminals and underground gas storages. These flares are often installed for safety purposes (when there is an emergency in the asset).
In addition, in the case of transmission and distribution grids, sometimes portable flares are used to avoid venting (e.g. a maintenance activity when it is not feasible or cost effective to recompress/reinject the gas into the grid).
Companies are doing maintenance to the flaring equipment to ensure that they work properly.
Therefore, the methane emissions associated to the flares in the mid/downstream segments are negligible and cannot be compared to those from a production site (see MARCOGAZ technical recommendation).
For this reason, mid/downstream segments have limited experience in measuring the methane emissions from flares because they are not material. Quantification is normally done based on the emission factors, e.g. UNFCCC IPCC guidelines.
Therefore, we recommend the legislation not to consider flaring further than quantification and reporting based on generic emission factors, as far as the emitted volumes associated to flaring remains negligible.

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

This is the normal practice in the mid/downstream segments. See previous answer.

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

See previous answers on flaring, question 5.38.

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

The costs of direct measurements for mid and downstream would be very high. Therefore, we recommend to continue the reporting based on the emission factors. This should be sufficient to prove the materiality of the flared emissions.

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			
Transmission			
LNG			
Storage			
Distribution			
Use (industrial)			

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 for mid/downstream as the methane emissions from flaring are very low and costs would be disproportionate, especially for mobile flares.

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 for mid/downstream as the methane emissions from flaring are very low and costs would be disproportionate, especially for portable flares.

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
- [ ] No

If yes, which?

No answer

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

Not for mid/downstream segments as the methane emissions will be very low and the costs of continuous measurements would be very high, especially for portable flares. See answer 5.37.

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

Not appropriate for portable flares at least in mid and downstream segment.

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

at most 1 choice(s)

- [ ] Yes
- [x] No

Please justify your answer

No. The associated costs would be very high. Generic emission factors could be used for mid/downstream. See 5.37.

5.48 How appropriate do you think the following measures would be in reducing flaring 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.**
Mandate equipment standards and conditions for flaring in the EU							

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)

- [ ] Yes
- [x] No

Please specify.

Not for mid/downstream. As stated in the answer to the question 5.37, the emissions associated to flaring from mid- and downstream segments are immaterial. The flare efficiency should not be addressed for mid and downstream in the future EU regulation.

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							
Prescriptive provisions on the monitoring of flare efficiency							
Prescriptive provisions /methodology for the quantification of flare efficiency							
Prescriptive							

provisions on technical configuration of flares							
Establish flaring efficiency targets for oil and gas companies in the EU							

Other, please specify.

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.

No answer

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?

No answer

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

No answer

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

At least not for mid/downstream as the costs will be disproportional compared to the environmental benefits

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

No answer

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.

No answer

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
- ☐ No

Please justify your answer.

No answer

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

at most 1 choice(s)

- ☐ Yes
- ☐ No

Please justify your answer.

No 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
- ☐ No

Please justify your answer.

No answer

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)

- [ ] Yes
- [x] No

Please justify your answer.

OGMP 2.0 members will be annually reporting their methane emissions and this information will be aggregated in IMEO.
Companies are frequently reporting their emissions to the National Authorities to be integrated in the National Inventory Report.
Therefore, we don't see added value in having a specific inventory of venting activities for mid/downstream.

5.61 Which data sources should such an inventory comprise?

No answer

5.62 Do you consider effective verification of data feasible?

OGMP 2.0 and IMEO will contribute to this verification.
Verification/data Reconciliation can be difficult depending on the considered granularity and the type of asset (e.g. distributed networks)

5.63 Where would you see such an inventory best hosted?

See answer 5.60

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.

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)

- ☐ Yes
- ☐ No

Please justify your answer.

The vast majority of the mid and downstream companies are regulated entities. It is important to highlight that the investments on MRV, LDAR and mitigation measures undertaken by infrastructure operators should be recognised within the scope of regulated activities by the national regulatory authorities. In the case of non-regulated operators, authorities should also ensure the investments and efforts through European and national incentives.

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	
Upstream oil	
Midstream gas	
Midstream oil	
Downstream gas	
Downstream oil	
Operating coal mines	
Closed/abandoned coal mines	

Biogas/biomethane plants	

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?

Collaboration with the industry could help to gather relevant and useful information on costs. At this moment we do not have a complete estimate of the potential costs related to measurement, reporting and mitigation. In the MARCOGAZ technical recommendationon venting and flaring you will find some information on the costs associated with mitigation.

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
- ☐ No

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

No answer

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.

No answer

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.

An important part of the companies are doing it on voluntary basis due to their environmental commitment although the cost are not recognized by national regulatory authorities
However, there are still companies doing it only for safety reasons.
To ensure that additional efforts on LDAR and on the implementation of mitigation measures are in place, these costs should be recovered. Harmonized level playing field should be considered.

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

To ensure that additional efforts are made possible.
Harmonized level playing field should be considered.

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
- ☐ No

If no, please justify your answer.

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
- ☐ No

Please justify your answer.

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
- [ ] No

Please justify your answer.

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
- [ ] No

Please justify your answer.

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)

- [ ] Yes
- [ ] No

Please justify your answer.

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)

- ☐ 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.

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?

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?

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

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)

- ☐ Yes
- ☐ No

Please justify your answer.

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?

- ☐ Safety requirements for ventilation
- ☐ Safety requirements for mine drainage
- ☐ Cost of abatement
- ☐ 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? [

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).

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
- ☐ 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.

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
- No

Please justify your answer.

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

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)

- Yes
- No

Please justify your answer.

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

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