Climate Action Network (CAN) Europe is Europe's leading NGO coalition fighting dangerous climate change. With over 170 member organisations from 38 European countries, representing over 1.500 NGOs and more than 47 million citizens, CAN Europe promotes sustainable climate, energy and development policies throughout Europe.

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

Submission by Climate Action Network Europe
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All answers are written in blue.

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.

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?

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

Any policy design approach to measuring and mitigating methane emissions from the energy sector should commit to both improved measuring and mitigation alongside setting performance-based requirements. The short atmospheric lifecycle of methane means that taking action now, can quickly reduce atmospheric concentrations helping to meet the EUs commitments under the Paris Agreement, the European Green Deal and the intentions of the Methane Strategy.

The policy design approach should deliver several key milestone improvements in order to improve both measurement and mitigation. This includes delivering:

(1) An immediate ban on venting and flaring fossil gas, through legislation that comes in 2021. Gas suppliers should be prohibited from placing on the market fossil gas, including energy derived therefrom, where venting and flaring occurs during production and processing unless evidence is provided that the limited use of flaring is for a legitimate purpose, (*e.g.* safety testing or safe disposal of harmful gases, and no technique exists that could in actual fact capture the methane).

(2) Mandatory LDAR at production sites, supported by verified evidence of reductions, that also limits gas suppliers access to the EU market - without evidence of mandatory and periodic (at least quarterly) LDAR their ability to place fossil gas on the EU market should be prohibited. Minimum LDAR requirements, drawing upon industry-wide source-by-source best practices should also be implemented.

(3) Mandatory monitoring, reporting and verification (MRV) where gas suppliers are prohibited from placing fossil gas on the EU market without systematic and mandatory methane monitoring, reporting and verification (MRV), including documentation of LDAR compliance. Reporting should be based on a comprehensive equipment survey and application of the most up-to-date emission factors, with a directive to move to actual measurement data within two years. Data on methane emissions and LDAR should be publicly available and serve as the basis for prioritizing the phase-out of the most polluting forms of fossil gas.

(4) The adoption of a mandatory, ambitious methane performance standard that caps methane emissions at 0.2% along the entire supply chain for both domestic and imported gas sold and consumed in the EU by 2025.

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?

- Yes
- No

Yes and No. Any action on methane emissions specifically, must be accompanied by an EU commitment to phase out all fossil gas by 2035 at the latest. However prescriptive measures to mitigate methane emissions are still a useful and powerful tool to avoid even faster global warming in the near future.

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

- **Yes**
- No

Performance-based requirements can be a useful part of legislation on reducing methane emissions - capping methane emissions at 0.2% along the entire supply chain for both domestic and imported gas sold and consumed in the EU by 2025. However, priority should be given to fossil gas phase out by 2035, an immediate ban on routine venting and flaring, increased MRV and LDAR compliance and regulation, then performance standards - in that order.

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?

- **Yes**
- No

The requirement of a baseline understanding of emission levels is important, this requirement should not however lead to a further postponement of measures. Therefore it is important to outline a graded approach able to accomodate accurate data to replace estimations as soon as they are available.

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.

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	The upcoming UNEP Global Methane Assessment report indicates that the reduction of methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of global warming, with ~80% of available targeted measures to reduce methane having low mitigation costs. With this in mind, the low-cost burden to improve methane measurement and mitigation should remain with industry. No public funding or financial support should be given to assist in the monitoring or mitigation of methane emissions by industry. The clean up costs should be funded by the industries responsible, tax breaks, incentives should not be provided to industry to clean up the emissions related impact they create.
Fossil gas	The upcoming UNEP Global Methane Assessment report indicates that the reduction of methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of global warming, with ~80% of available targeted measures to reduce methane having low mitigation costs. With this in mind, the low-cost burden to improve methane measurement and mitigation should remain with industry. No public funding or financial support should be given to assist in the monitoring or mitigation of methane emissions by industry. The clean up costs

	should be funded by the industries responsible, tax breaks, incentives should not be provided to industry to clean up the emissions related impact they create.
Coal	The upcoming UNEP Global Methane Assessment report indicates that the reduction of methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of global warming, with ~80% of available targeted measures to reduce methane having low mitigation costs. With this in mind, the low-cost burden to improve methane measurement and mitigation should remain with industry. No public funding or financial support should be given to assist in the monitoring or mitigation of methane emissions by industry. The clean up costs should be funded by the industries responsible, tax breaks, incentives should not be provided to industry to clean up the emissions related impact they create.
Biogas/biomethane	The upcoming UNEP Global Methane Assessment report indicates that the reduction of methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of global warming, with ~80% of available targeted measures to reduce methane having low mitigation costs. With this in mind, the low-cost burden to improve methane measurement and mitigation should remain with industry. No public funding or financial support should be given to assist in the monitoring or mitigation of methane emissions by industry. The clean up costs should be funded by the industries responsible, tax breaks, incentives should not be provided to industry to clean up the emissions related impact they create.

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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?

- Yes
- **No**

Legislative proposals on MRV for oil and gas should be based on independently verified methodology, not industry guided methodologies. The OGMP methodology is currently weak, greatly emphasises industry-estimates, does not cover monitoring or verification, and awards a “gold-standard” label to MRV efforts even in the case where requirements can not be met or can only be met with a delay. The EU Commission should not base important climate and energy

legislation like methane emission legislation on a methodology by both the fossil gas/fuels upstream as well as the gas transport industry. Similarly, any such methodology should be enshrined in EU law in order to be a valid form of emissions reporting, and should address the full supply chain of oil & gas.

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?

The MRV should be designed to apply across the whole supply chain up to the point of production and should include more robust requirements - focused on granular data rather than aggregated data as the OGMP currently does. More accurate data makes for better policy design in the future, and helps to better estimate emissions and mitigation. The framework should be drafted and verified by independent experts, not the industry, with increased transparency on data (which should be in an easy to access format).

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.

The Commission should focus on mandatory regulatory programs for MRV rather than looking at any voluntary programs.

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

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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.

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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.

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

LDAR programs should focus on inspecting a broad range of facilities and equipment as frequently as possible, so that leaks can be fixed as soon as possible after they occur - given that many leaks come from worn out equipment or abnormal operating conditions. Strong LDAR regulations should require frequent instrument-based inspections at all oil and gas sites across the entire supply chain. The regulations should include a framework to ensure that technologies used to manage LDAR achieve equivalent or better emissions reductions.

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.

The Commission should focus on mandatory regulatory programs for LDAR rather than looking at any voluntary programs.

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.

Vented emissions occur as an intentional product of how some oil and gas equipment operates. Therefore, it's not about repairing broken equipment but about retrofitting with lower-emitting equipment or changing operational practices to reduce overall venting emissions. A ban on routine venting and flaring (except for safety testing or safe disposal of harmful gases) would help to encourage this necessary shift.

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.

The Commission should focus on mandatory regulatory programs for LDAR rather than looking at any voluntary programs.

2.11 Are there any methodologies/ standards/ voluntary frameworks/ methodologies/ regulations on mitigation of coalmine methane emissions which the Commission should pay close attention to, and why? Please state.

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2.12 Are there any methodologies/ standards/ voluntary frameworks/ regulations on mitigation of methane emissions from biogas & biomethane production which the Commission should pay close attention to, and why? Please state.

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3. Sectoral, emissions and supply chain coverage and/or scope

3.a - 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?

- **Yes**
- No

The European Environment Agency's annual European Union greenhouse gas inventory report (2019) showed that EU coal mines leaked 32 million tons of CO2 equivalent of methane, 0.8% of the EU's GHG emissions. As a priority the EU should phase out the use of coal as urgently as possible, until such time, accompanying measures to abate methane emissions are needed. Currently there are no regulations (other than safety) that would require emitters to adhere to common MRV standards, resulting in difficulties in monitoring the abatement process and quantification of the full scale of coal mine methane emissions. Therefore, MRV of methane emissions from coal mining operations, including abandoned coal mines where ownership is known should be mandatory should be initiated - with standardised MRV across the EU. In fact, it should be a precondition for coal supplies who wish to place coal and coal products, including energy derived therefrom, on the EU market.

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?

- **Yes**
- No

Current measurements and reporting of methane losses from biogas/biomethane plans are not well documented. Some literature estimates up to 5.5% of leakage upstream on site for older installations (from badly designed digesters, operation and maintenance faults, and/or leakage from the cogeneration unit) while more recent installations are assumed to have smaller losses. Yet, the downstream leakages and likely leakages during the upgrading process are even less documented. There is currently not enough research to provide accurate accounting. The inclusion of biogas/biomethane in the Commission's policy proposals on MRV would be beneficial for estimating the accuracy of default values, which help to mitigate these emissions, as well as the full methane emissions leakage across the supply chain of biogas/biomethane.

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?

- **Yes**
- No

For years, large volumes of methane have been irreversibly released into the atmosphere from coal mine methane (CMM). The scale of negligence shows that unless the Commission includes CMM in its policy proposals on methane emissions mitigation, it is unlikely that voluntary initiatives will lead to a significant change in near future, necessary to achieve EU-wide climate targets. Mandatory methane mitigation measures should be put in place for active and abandoned coal sites under this legislation. These measures should require ventilation air methane (VAM) capture and utilisation at all active coal mines as well as capture and utilisation of methane from coal degasification operations at both active and decommissioned coal mines. Additionally, economic incentives should be provided to third-party companies to mitigate methane from abandoned coal mines where no existing owner is liable.

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?

- **Yes**
- No

Provided that mitigation measures take into account the full supply chain of biogas/biomethane, looking at leaks beyond just the processing stage and that this is coherent with legislation under the revision of REDII and truly ensures a reduction in methane emissions. However, any potential accounting of reduced methane emissions under the sustainability criteria of the REDII requires further investigation.

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.

- **Yes**
- No

See answer to 3.6.

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.

During **oil drilling**, fossil gas is sometimes produced as a co-product that is often wastefully vented or flared. In cases such as this, accompanying measures specific to oil wells whose oil or oil products are destined for the EU market should be adopted to abate these methane emissions from oil drilling and ensure any gas is collected and not wasted. These specific measures should include: an immediate ban on venting and flaring of fossil gas (unless evidence is provided for legitimate purpose, e.g safety testing or safe disposal of harmful gases); prohibition of oil suppliers from placing oil or oil products on the EU market where flaring and venting has occurred during drilling and/or production; mandatory and periodic (at least quarterly) LDAR at production sites supported by verified evidence of reductions; minimum LDAR requirements drawing upon industry-wide source-by-source best practices; and prohibition of oil suppliers from placing oil or oil products on the EU market without undertaking mandatory and periodic (at least quarterly) LDAR.

Similarly, there need to be accompanying measures on **natural gas liquids (NGL)**. Across this supply chain specific measures should include: an immediate ban on venting and flaring of fossil gas during production or processing (unless evidence is provided for legitimate purpose, e.g safety testing or safe disposal of harmful gases); prohibition of NGL suppliers from placing NGL or NGL products on the EU market where flaring and venting has occurred during gas production or processing; mandatory and periodic (at least quarterly) LDAR at production sites supported by verified evidence of reductions; minimum LDAR requirements drawing upon industry-wide source-by-source best practices; and prohibition of NGL suppliers from placing NGL or NGL products on the EU market without undertaking mandatory and periodic (at least quarterly) LDAR. This should be accompanied by an immediate ban on NGL and NGL products produced by fracked gas.

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.

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?

- **Yes**
- No

At the very least, EU MRV should cover the scope of OGMP 2.O. However it should add in additional sources that are not covered, such as LNG import terminals, LNG ships, refineries, chemical manufacturing and all end use sectors to ensure full supply chain coverage.

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?

- Yes
- No

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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?

- Yes
- No

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3.b - 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 end 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?

- **Yes**
- No

In order to get the full picture of methane emissions from fossil gas, oil, coal mine methane mines, and natural gas liquids we need to document the full supply chain. This includes 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 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. Some oil and gas companies are already reporting scope 3 emissions voluntarily.

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?

- Yes
- No

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

- Industry **X**
- Power generation **X**
- District heating **X**
- Transport (e.g. maritime, please specify below) **X**
- Residential **X**
- Other **X**

Oil refining and chemicals manufacturing should be areas where the commission requires additional information.

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

- Gas turbines **X**
- Gas engines **X**
- Gas boilers (industrial) **X**
- Gas boilers (residential) **X**
- Other, please specify below

In particular, better information on gas boilers and methane emissions would be useful given that gas in heating covers 40% of EU gas use.

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

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

- Yes
- No

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

- Yes
- No

3.c - 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?

- **Yes**
- No

Yes, the Commission should extend its MRV-LDAR-BRVF framework across the supply chain, ensuring its application to all fossil gas and oil consumed in the EU.

As a major importer of fossil gas and oil, the EU is a significant contributor to global methane emissions with the largest share occurring in the upstream segments and, as a result, predominantly outside of the EU in the case of imports. Put another way, the EU is essentially outsourcing its methane emissions to non-EU countries by importing fossil fuels after most

methane has already been emitted – in conflict with the European Green Deal and the EU climate ambitions. Moreover, since the MRV-LDAR-BRVF framework will apply on EU domestic actors, it is necessary to ensure a level playing field and avoid further carbon leakage to non-EU countries.

Arguments that the EU does not have the ability to extend its MRV-LDAR-BRVF framework across the supply chain should be flatly rejected. It is well-established that, under WTO jurisprudence, the EU may condition market access upon compliance with certain measures so long as well-defined conditions are met, for example that the measures are equally applicable to EU domestic actors, that they are necessary to achieve the level of protection set out by the EU, that they are not applied in a discriminatory manner and that they afford third countries that ability to rely upon measures that are "comparable in effectiveness" to demonstrate compliance. Indeed, with respect to allowing measures that are comparable in effectiveness, this is not unlike the flexibility afforded to countries when required to meet a performance standard, for example. Several relevant WTO cases outline the contours of how to design and adopt a regulatory framework on methane applicable across the supply chain, including: United States – Standards for Reformulated and Convention Gasoline, United States – Import Prohibition on Certain Shrimp and Shrimp Products, European Communities – Measures Affecting Asbestos and Asbestos-Containing Products, Brazil - Measures Affecting Imports of Retreaded Tyres and United States – Measures Affecting the Production and Sale of Clove Cigarettes, among others.

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?

- **Yes**
- No

Yes. Specifically, imposing obligations that are comparable in effectiveness is feasible.

Countries are not prohibited from imposing measures on imports that restrict trade - assuming they are not arbitrary and unjustifiable or a disguised restriction on trade - but should ensure that such measures meet well-defined conditions as set out in WTO jurisprudence. One such condition is that countries (or, more specifically, their national actors subject to the measures) be allowed the ability to comply with alternative measures that are comparable in effectiveness. On this, the EU must resist the temptation to allow geopolitical considerations to influence the development of its MRV-LDAR-BRVF framework, ensuring that the measures apply even-handedly to all countries where the same conditions prevail and that they are in line with the chosen level of protection. For MRV, this speaks to clearly setting out the minimum requirements that ensure the accuracy of its measurement, reporting and verification obligations against which alternative MRV measures that countries seek to rely upon to demonstrate compliance can be compared for accuracy and completeness. For LDAR, this speaks to setting out minimum requirements for an LDAR programme (*e.g.* frequency, repair, re-survey, technologies) and, importantly, the inclusion of an effectiveness metric against which an alternative LDAR programme can be compared. For BRVF, this speaks to blanket a prohibition on routine venting and flaring with clear definitions of allowable instances of non-routine venting and flaring. In all instances, the EU should ensure that the measures are not arbitrary or unjustifiable, which speaks to designing and adopting the MRV-LDAR-BRVF framework in good faith with clear relationship to methane emission monitoring and mitigation and EU climate objectives.

*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?

- **Yes**
- No

In light of previous answers in this section and the previous section, any requirements placed on the EU market should also apply to companies outside the EU looking to export to the EU.

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

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

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

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

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

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

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

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

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?

- **Yes**
- No

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

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

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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?

- **Yes**
- No

Measures to monitor leakage detection and repair must be coupled with restrictions that incentivise vast reductions in this source of emissions. Measurement alone will not be sufficient to tackle the problem. In order to ensure that measurement is coupled with a reduction in leakage, a minimum LDAR requirement should be established that draws on industry-wide source-by-source best practices, along with measures to confirm any repairs have been successful (surveying the repaired leak). Additionally, gas suppliers should be prohibited from placing fossil gas on the EU market without proof of LDAR compliance from undertaking mandatory and periodic (at least quarterly) LDAR at production sites, supported by verified evidence of reductions.

4.a - 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. 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. 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. 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.

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

- **Yes**
- No

It is important to standardise LDAR apparatus in order to ensure coherent accounting of leaks across both gas, oil and coal supply chains. Data and results must be publicly available and the frequency of testing should be enshrined in law.

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								

4.b - 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. According to the Methane Guiding Principles, 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.

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

- **Yes**
- No

EU legislation on measures to monitor leakage detection and repair must include clear indications for the frequency of campaigns. Mandatory and periodic LDAR at production sites should be completed at (the very) least quarterly, supported by verified evidence of reductions. The more frequent the inspection the better.

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	X					
The type of potentially leaking component concerned	X					
The results of previous LDAR campaigns		X				
The cost-effectiveness of LDAR campaigns		X				
The safety risk evaluation		X				
The environmental risk evaluation	X					
The operating pressure		X				

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)	

4.c - 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.

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

- Yes
- No

/

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?

- Yes
- No

/

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.

/

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

- Yes
- No

/

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?

- Yes
- No

/

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

/

4.d - 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?

- **Yes**
- No

EU legislation on LDAR should impose a requirement to repair all detected leaks - as nearly all leaks are considered economical to repair as documented in the report: “Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras” (https://www.catf.us/resource/quantifying-cost-effectiveness-ldar/).
This requirement should be applied to fossil gas, oil, and gas liquids, for which it should extend to include pellets and plastics derived therefrom. Repair requirements of all detected leaks should be applicable along the full supply chain.

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

- **Yes**
- No

EU legislation on LDAR should impose a time requirement for the repair of all detected leaks. This requirement should be applied to fossil gas, coal, oil, and natural gas liquids (NGL). Repair requirement time limits should be applied to all detected leaks and should be applicable along the full supply chain. The time limit should be as quickly as is feasibly possible, - which for most cases can be immediate - with penalties for a failure to meet the time limit. Leak repair should include inspection to confirm the leak was successfully repaired.

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	X					
Environmental concerns	X					
Leak size	X					
Accessibility/ease of repair		X				
Cost effectiveness		X				

Other? Please specify at which level of importance

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

- **Yes**
- No

It is critical that failure to repair leaks detected through LDAR campaigns are accordingly reprimanded. In order to achieve the necessary emissions reductions from methane in the gas, oil and coal sector, there must be a clear financial deterrent that encourages industry to immediately

repair leaks when detected - otherwise the LDAR only achieves measurement objectives and not mitigation objectives, which are crucial for meeting the EU's new 2030 climate targets. These fines must be proportionate to the need to urgently reduce greenhouse gas emissions in light of the EU 2030 Climate Targets, and in this case, high enough to deter industry from failing to repair within the given timeframe.

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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'?

- **Fully agree**
- Agree
- Neutral
- Disagree
- Totally disagree
- No opinion

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
- More than 5 years

Please justify your answer

Except in the case for venting and flaring for safety testing or the safe disposal of harmful gases, for which evidence must be provided, there is no condition under which venting or flaring should be permitted to take place. Therefore, venting and flaring should be phased out immediately. Gas suppliers should be prohibited from placing fossil gas, including energy derived therefrom, on the market where venting and flaring occurred during production and processing.

5.a - 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?

- **Yes**
- No

A common set of definitions and parameters for venting and flaring is necessary for clarifying the only acceptable instances for venting and flaring to occur, such as for safety testing or the safe disposal of harmful gases, for which evidence must be provided. Clear definitions and parameters on when, under what exceptional circumstances, and how this venting and flaring will look, in

addition to guidelines on how to prove these conditions were met, will be critical for achieving an effective ban on routine venting and flaring. These definitions and parameters should be restricted however, to only outlining permissible venting and flaring in exceptional cases. All other venting and flaring should be banned.

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

- **Yes**
- No

Any common definitions and parameters for venting and flaring should recognise that the only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring, including routine venting and flaring, should be immediately banned. This common set of definitions and parameters should be proposed by an independent party.

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?

- **Yes**
- No

Any inventory of permissible venting and flaring should recognise that the only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring, including routine venting and flaring, should be immediately banned. This inventory should be proposed by an independent party.

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.

The only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring, including routine venting and flaring, should be immediately banned.

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.

EU legislation on venting and flaring, should include an immediate ban on venting and flaring. Suppliers should be prohibited from entering the market where venting or flaring occurs during the production and/or processing, unless third party verified proof can be provided that this only took place for exceptional circumstances such as for safety testing or safe disposal of harmful gases. Voluntary initiatives should not be the model for this kind of critical emissions reduction obligation.

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?

- Yes
- No

/

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?

- Yes
- No

/

5.b 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?

- Yes
- **No**

Self reporting on venting and flaring by the coal, oil, and gas industry could result in creative accounting of emissions, diluted volumes, and a general underestimation of emissions. Third party verification of reporting would be fundamental to accurate reporting. Suppliers should be prohibited from entering the market where venting or flaring occurs during the production and/or processing unless third party verified proof can be provided that this only took place for exceptional circumstances such as for safety testing or safe disposal of harmful gases.

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

- Yes
- **No**

The regulation of activities such as venting and flaring and auditing and verification of such activities by the coal, oil, and gas industry should be enforced under EU legislation. Suppliers should be prohibited from entering the market where venting or flaring occurs during the production and/or processing, unless third party verified proof can be provided that this only took place for exceptional circumstances such as for safety testing or safe disposal of harmful gases. Industry voluntary initiatives should therefore be replaced with EU regulated conditions.

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

- **Yes**
- No

However, the regulation of activities and monitoring of venting and flaring should be supported by legislation. Suppliers should be prohibited from entering the market where venting or flaring occurs during the production and/or processing, unless third party verified proof can be provided that this only took place for exceptional circumstances such as for safety testing or safe disposal of harmful gases. Industry voluntary initiatives should therefore be replaced with EU regulated conditions.

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

Yes, as this would allow the standardisation of MRV and LDAR, and verification of the data from companies' internal audits. This is fundamental to achieving accurate data on methane emissions that avoids creative accounting of emissions, diluted volumes, and a general underestimation of emissions.

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

/

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

- Yes
- No

/

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

- Yes
- No

/

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

It is critical that when an independent MRV identifies misreporting on emissions from venting and flaring, repercussions are instituted - such as fines. To achieve a full ban on routine venting and flaring, which is necessary, there needs to be strong incentives to discontinue this practice. Any such fines must be proportionate to the urgent need to reduce our emissions in light of global warming, and in this case, high enough to act as a genuine deterrent to industry. This kind of provision should go hand in hand with legislation that calls for a total ban on venting and flaring except under proven legitimate purposes such as safety testing or the safe disposal of harmful gases.

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

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.
Encourage sharing of best practices on avoiding venting and flaring	X						Sharing of best practices to avoid venting and flaring will be a crucial way to meet the necessary ban on venting and flaring except for safety testing or safe disposal of harmful gases, for which proof will be required.
Encourage company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring					X		Regulation of venting and flaring should not be managed by industry led voluntary initiatives, it should be a binding commitment under EU legislation.

Mandate company participation in global voluntary initiatives to share best practices and work towards the elimination of routine venting and flaring					X		Regulation of venting and flaring should not be managed by industry led voluntary initiatives, it should be a binding commitment under EU legislation.
Developing a database of all routine vents and flares					X		The only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring should be immediately banned negating the need for a database on routine venting and flaring.
Developing a database of all routine vents and flares, cross-referencing this information with databases of permits and exemptions			X				The only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring should be immediately banned negating the need for a database on routine venting and flaring. However, documentation of permits and exemptions would be useful and should be part of the burden of proof for these activities.
Set a total cap on venting and flaring activities for the entire EU		X					The only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring should be immediately banned. However, if the total cap was set low enough, this could be a tool to encourage an effective ban - but the cap would need to be very low.
Mandate detailed environmental impact assessments of new oil and gas operations that account for the potential emissions from venting and flaring	X						The only permissible use of flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring should be immediately banned. Any gas or oil operations that participate in routine venting and flaring should not be allowed access to EU markets of gas or oil. Additionally, there needs to be EU commitments to phase out fossil gas by 2035, which would negate the justification for any new fossil gas infrastructure. Any environmental impact assessments of new oil and gas operations in the interim should include accounting of potential venting and flaring emissions - this should

							be reason enough to reject any such proposals.
Introduction of financial incentives for reductions in emissions from venting and flaring (taxes/penalties or allowances).					X		Venting and flaring should simply be banned. No public money or finances should be directed to supporting the industry in the measurement, mitigation or clean up of methane emissions from venting and flaring. This low-cost should be born by the industry.
Outright ban on venting and flaring (except where no other ramification is available for health and safety reasons).	X						The only permissible use of venting and flaring would be for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. All other venting and flaring should be immediately banned. This is one of the most effective ways to ensure a reduction in methane emissions from the energy sector.

5.c - 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			
Transmission			
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 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?

- Yes
- No

/

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?

- Yes
- No

/

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.

/

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

/

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			
LNG			
Storage			
Distribution			
Use (industrial)			

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

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

- Yes
- No

/

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

- Yes
- No

/

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

- Yes
- No

/

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

- Yes
- No

/

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

- Yes
- No

/

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?

- Yes
- No

/

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

/

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

- Yes
- No

/

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.	X						This measure should be implemented immediately, and should accompany an immediate ban on venting and flaring except for safety testing or safe disposal of harmful gases, and evidence would need to be provided to justify such activity. Suppliers of fossil gas, oil, coal and natural gas liquids (NGL) should be prohibited from placing their products, or products derived therefrom on the EU market where venting and flaring occurred (unless under the exceptional conditions described).

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.							
Recompression instead of venting							
Use of vacuum pressure pumps during commissioning of distribution networks.							
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.

/

5.d 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. 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.

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

- Yes
- No

/

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?

- Yes
- No

/

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

/

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

/

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?

- Yes
- No

/

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

- Yes
- No

/

5.44 Would you consider the Clean Development Mechanism methodologies as a feasible

- Yes
- No

/

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?

- Yes
- No

/

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

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

- Yes
- No

/

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.
Mandate equipment standards and conditions for flaring in the EU							

Others (please elaborate)

5.e 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.

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?

- Yes
- No

/

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.
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?

- Yes
- No

/

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?

/

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

/

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

/

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

/

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.

/

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

- Yes
- No

/

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

- Yes
- No

/

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

/

5.f 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]

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

- Yes
- No

/

5.61 Which data sources should such an inventory comprise?

/

5.62 Do you consider effective verification of data feasible?

/

5.63 Where would you see such an inventory best hosted?

/

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.

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							

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.

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?

- **Yes**
- No

The upcoming UNEP Global Methane Assessment report indicates that the reduction of methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of global warming, with ~80% of available targeted measures to reduce methane having low mitigation costs. With this in mind, the low-cost burden to improve methane measurement and mitigation that should be carried by the industry is absolutely outweighed by the overall benefits.

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

	Benefits outweigh costs?
Upstream gas	Yes
Upstream oil	Yes
Midstream gas	Yes
Midstream oil	Yes
Downstream gas	Yes
Downstream oil	Yes
Operating coal mines	Yes
Closed/abandoned coal mines	Yes
Biogas/biomethane plants	Yes

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?

/

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?

- Yes
- No

/

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

- Yes
- No

/

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?

- Yes
- No

/

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

/

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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 strict 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?

- **Yes**
- No

This obligation should take into account the full supply chain of biogas/biomethane, including leaks beyond just the processing stage when looking to reduce fugitive methane emissions.

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?

- **Yes**
- No

Yes, coherence across the two pieces of legislation is important for securing no loopholes in reporting and mitigation measures. Additionally, any reporting and/or mitigation measures should take into account the full supply chain of biogas/biomethane, looking at leaks beyond just the processing stage.

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?

- **Yes**
- No

Yes, coherence across the two pieces of legislation is important for securing no loopholes in reporting and mitigation measures. Any mitigation measures should ensure that methane emissions from biogas/biomethane are not increasing, and methane leaks are appropriately managed.

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?

- **Yes**
- No

In the short term yes. Provided that the default values are reviewed as soon as possible to ensure they are in line with the most recent, and accurate, estimates available. In the longer term, actual values would be a more appropriate measure.

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?

- **Yes**
- No

Current measurements and reporting of methane losses from biogas/biomethane plans are not well documented. Some literature estimates up to 5.5% of leakage upstream on site for older installations (from badly designed digesters, operation and maintenance faults, and/or leakage from the cogeneration unit) while more recent installations are assumed to have smaller losses. Yet, the downstream leakages and likely leakages during the upgrading process are even less documented. There is currently not enough research to provide accurate accounting. A methodology to estimate actual values across the full supply chain of biogas/biomethane would be beneficial for estimating the accuracy of default values as well as the full methane emissions leakage across the supply chain of biogas/biomethane. However any potential accounting of methane mitigation measures towards the sustainability criteria under RED requires additional analysis.

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%).

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 coal mine 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.

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?

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

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? Explain

/

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? Explain

/

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?

- Yes
- No

/

8.a 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].

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)

/

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?

● Yes, with a recovery of its energy value

● Yes, even without recovery of its energy value

● No

/

8.b 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].

8.10 What would you consider appropriate measures to enable AMM mitigation? Please describe 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	X			
Technological innovation		X		
Social benefits (e.g. employment)	X			
Environmental benefits (local and global)	X			
Regional development		X		

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?

- **Yes**
- No

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?

- Yes
- No

/

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? /