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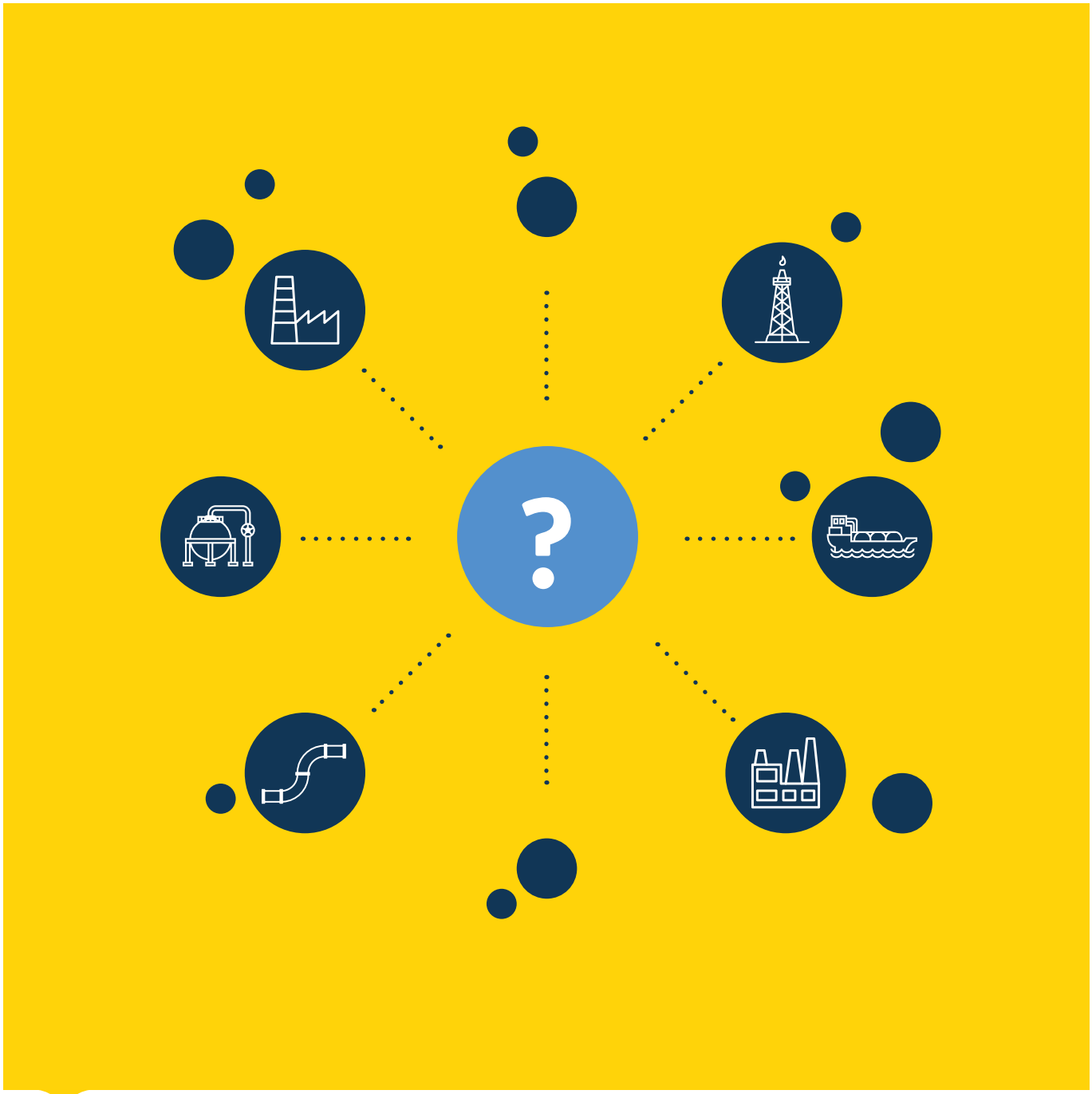
Deutsche Umwelthilfe



2nd Market Survey:

Methane Emissions from Fossil Gas Companies

May 2022

Deutsche Umwelthilfe e.V.

Introduction

Methane is an extremely climate-damaging greenhouse gas. Over 20 years, it is 83 times more harmful to the climate than CO_2, leaking along the entire fossil gas value chain.[1] Recent research suggests that these so-called methane leakages from the energy sector are 70% higher than indicated by official figures.[2]

The industry and political decision makers can no longer ignore the climate relevance of the problem in the face of social and political pressure, as shown by the growth of initiatives such as the *Oil and Gas Methane Partnership* (OGMP) and *the Global Methane Pledge*. But what are individual companies in the fossil gas industry doing specifically to stop methane leakages and what exactly do they know about them?

In order to get answers to these questions, Deutsche Umwelthilfe and urgewald have conducted a survey with a questionnaire sent to 51 companies active in the fossil gas industry. This is the second such survey we conducted. The results of the first survey were published in March 2021.[3]

Based on more than 30 individual questions, we wanted to know from the companies:

1. **Are you living up to your product responsibility?**
2. **Do you know the level of your emissions?**
3. **Are you taking measures to reduce emissions?**
4. **What are your views on methane regulation?**

The results of the survey are presented and evaluated below.

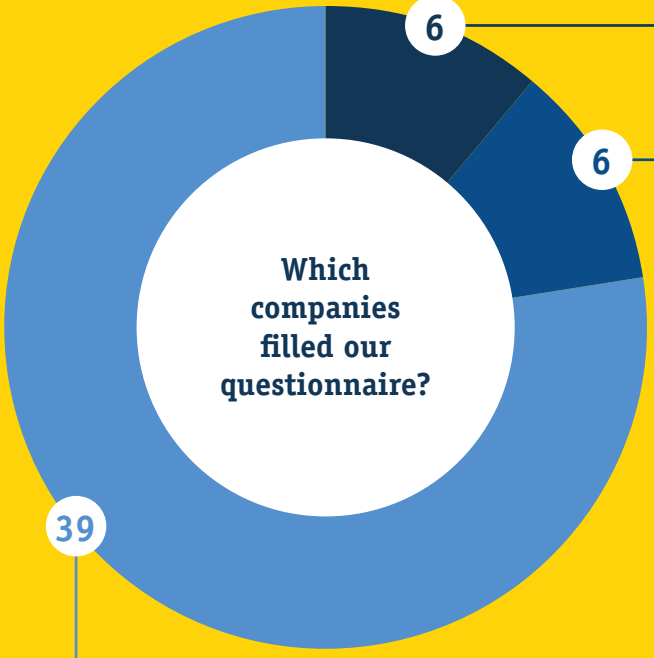
Selection and response rate of surveyed companies

The survey questionnaire was sent to 51 companies, covering major energy companies and gas traders operating mainly in Europe, as well as fossil gas producers headquartered in Europe but operating globally (see graphic next page). 12 companies responded, equalling a response rate of 24%.[4] Of these, six companies completed the full questionnaire, while the other six sent in partial responses. 39 companies did not respond at all to the questionnaire, despite two follow-up emails and a response period of 11 weeks.

The 12 company respondents account for a significant share of the global gas industry in the upstream, midstream and downstream segments. The table[5] on the right compares production, trade volume and installed capacity of the respondents with Europe-wide and global figures.

	Survey respondents	Europe	World
Fossil gas production	156 bcm	54 bcm	3,854 bcm
Fossil gas trade volume	56 bcm	326.1 bcm (imports) 5.6 bcm (exports)	940 bcm
Power plant capacity	134 GW	267 GW	1,839 GW

bcm = billion cubic meters
GW = Gigawatt
Source: DUH calculations, BP Statistical Review 2021, Statista, Energy Brainpool[5]



Questionnaire filled in:

EnBW
ENGIE
Fortum Oyj
Uniper
Vattenfall
Wintershall Dea

Questionnaire partly filled in:

British Petroleum
Enel
Ørsted
RWE
Stadtwerke Bremen
Stadtwerke München

No answer:

BWB
CEPSA
CEZ Gruppe
EDF
Edison
Electricity Supply Board
Eneco
Enercity
Energias de Portugal
Eni
Entega
Equinor
Exxon Mobil
Gas Terra
Gazprom
Harbour Energy
Iberdrola
Ineos
Lukoil
LVV
Mainova
MET Gruppe
MOL Gruppe
Naturgy
Neptune Energy
N-Ergie
Novatek
OMV
Petrom
PGNiG
PKN ORLEN
Repsol
Rheinenergie
Rosneft
Royal Dutch Shell
Total Energies
Trianel
Verbundnetz Gas
Wingas

List of interviewed companies

The responding companies cover a variety of roles in the fossil gas industry, as shown in the following general characterization of the survey population:

- Two of the responding companies are major gas and oil producers, while the remaining ten operate mainly as energy utilities, with some of these among the largest power producers in Europe and two representing municipal utilities.
- Several of the large utility respondents also engage in gas trading, gas storage or operate distribution grids. These activities are typically handled by subsidiary companies.
- Seven of the surveyed companies buy or sell Liquefied Natural Gas (LNG) and three obtain gas from fields using hydraulic fracturing (fracking).
- Three of the companies are fully state-owned, four are partially state-owned and the remaining five are privately owned.
- Responding companies are headquartered in Germany, Sweden, Denmark, the United Kingdom, Italy and France. None of the contacted companies from Eastern Europe, Spain, the Netherlands or Norway responded to the survey.
- More than half of the respondents, i.e. seven out of 12, are members of the OGMP, or have subsidiaries that are a member. This indicates that mainly companies already motivated to tackle methane emissions participated in the survey.

Classification: the size of the problem

The world economy continues to rely on fossil gas, with an annual consumption of 3,823 billion cubic meters (bcm).[6] Even with the impact of COVID-19, global fossil gas demand is set to rise significantly over the coming years to almost 4,400 bcm in 2025[7] due to the lack of ambitious climate action and many countries switching from coal to fossil gas. Demand is set to fall in Europe, as implementing the "Fit for 55" package would already reduce fossil gas consumption by 100 bcm by 2030[8] and these efforts will likely be intensified in light of Russia's invasion of Ukraine. However, there are no clear phase-out plans for fossil gas in the EU, with many member states planning to build new fossil gas infrastructure such as pipelines, LNG terminals and power plants. Despite the risk of a substantial carbon lock-in, fossil gas is often

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Impact of the Ukraine War on company strategies

The survey was conducted before Russia's invasion of Ukraine, and many companies have changed their plans significantly as a result. While most European Energy companies have not yet stopped their long-term gas supply contracts with Russian energy companies or their ongoing production in Russia, more and more are moving away from Russia in the medium and longer term. They look for alternative suppliers or will not take on new long-term contracts. Some divest from exploration or production activities in Russia, stop new investments or pull out of infrastructure consortia (e.g. Nord Stream 2). See recent information here: https://defuel-russias-war.org.

However, this does not significantly affect their climate strategies or methane reduction efforts, except for companies pulling out of production in Russia. None of the utilities participating in the survey is based in Russia, though many buy Russian gas. Only one continues to extract fossil gas in Russia as of 28.3.2022. In the medium term, companies are generally focusing on their own operations rather than the supply chain in reducing carbon and methane emissions.

Methane emissions reporting of companies like Gazprom is known to be unreliable and too optimistic (see below). However, switching to other suppliers will not necessarily mean that Europe's gas imports will have a lower methane intensity. Supply chains are getting longer and higher LNG imports mean that additional leakage can occur during liquefaction, regasification and transport over water. LNG production in the USA, for instance, relies heavily on fracking gas, which has particularly high methane emissions because of the high number of extraction wells involved. Reducing methane emissions from fossil gas imports thus remains critical for combating climate change, despite the increasing shift to non-Russian sources.

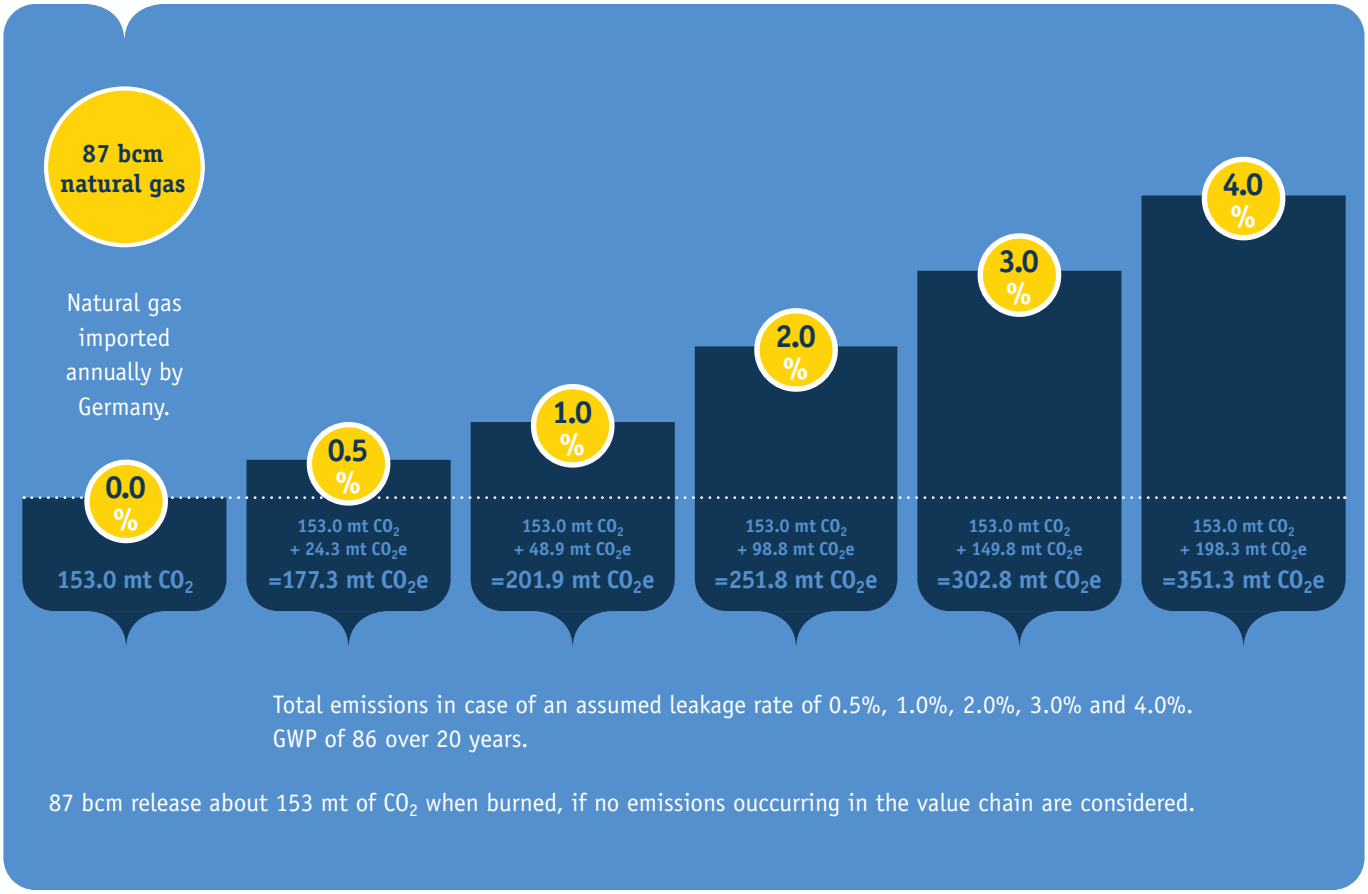
falsely portrayed as a "transitional" fuel and a cleaner alternative to oil and coal.

However, this fossil gas not only causes CO_2 emissions during its combustion, but also leads to the emission of greenhouse gases along the entire value chain from extraction, processing and transport to storage and consumption. In this context, the release of methane, the main component of fossil gas, plays a particularly important role. Recent scientific research suggests that these so-called methane leakages are much higher than previously assumed. IEA figures show that energy sector methane emissions are 70% higher than official figures suggest.[9] The methane concentration in the atmosphere has reached a record high and is still rising, with annual emissions having increased by 10% over the last decades, despite efforts to phase out fossil fuels.[10] According to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), methane emissions need to be reduced by a third until 2030 to limit global warming to 1.5°C.[11]

These emissions must be included in any greenhouse gas balance report to realistically reflect the climate impact of fossil gas. Fossil gas loses its climate advantage over coal as soon as between 2.4 and 3.2% of the total production escapes into the atmosphere (the so-called leakages). Measurements from the USA, for example, show leakage rates of 2.3% to 9%. But what relevance do different leakage rates have for the overall greenhouse gas balance of a company or even a state? In the following, this problem is illustrated using the sum of fossil gas imports to Germany.[12]

Example: Germany imports about 87 billion cubic metres (bcm) of fossil gas annually.[13] Combustion this quantity would produce about 153 million tonnes (mt) of CO_2.[14] However, if leakages in the upstream chain are added, the total value increases accordingly. For example, assuming an average leakage rate of 2.3% for Germany's fossil gas supply, methane leakages increase emissions by about 113 million metric tons of CO_2 equivalents (CO_2e) from the original 153 million metric tons to a total of about 266 million tonnes of CO_2e.[15] Assuming a leakage rate of 4% (see graphic below), emissions already increase by 202 million tonnes of CO_2e to a total of 355 million tonnes, i.e. more than twice the emissions that would occur without any leakages.[16]

The amount of leakage in the supply chain is therefore crucial to correctly determine the climate impact caused by the use of fossil gas. Unfortunately, the magnitude of this problem is unknown in most cases. For countries like Russia, where much of the EU's fossil gas still comes from, there is little independent



Greenhouse gas emissions of German fossil gas imports assuming different methane leakage rates (GWP 20)

data.[17] New satellite measurements shown on the map below have found several methane "ultra-emitters" along major gas pipelines leading from Russia to Europe, such as the upstream Russian pipeline system that is fuelling both the Yamal and Nord Stream 1 pipeline, indicating a high amount of methane emissions.[18] The US and Algeria are among the top 5 sources of ultra-emitters in this study, alongside Russia, so switching to imports from other countries does not reduce the urgency of addressing the problem.

Overall, the data that does exist, as well as the findings from the US, show that the problem is much bigger than previously thought and more transparency by companies is urgently needed to even get an accurate picture of the climate costs of our fossil gas consumption.

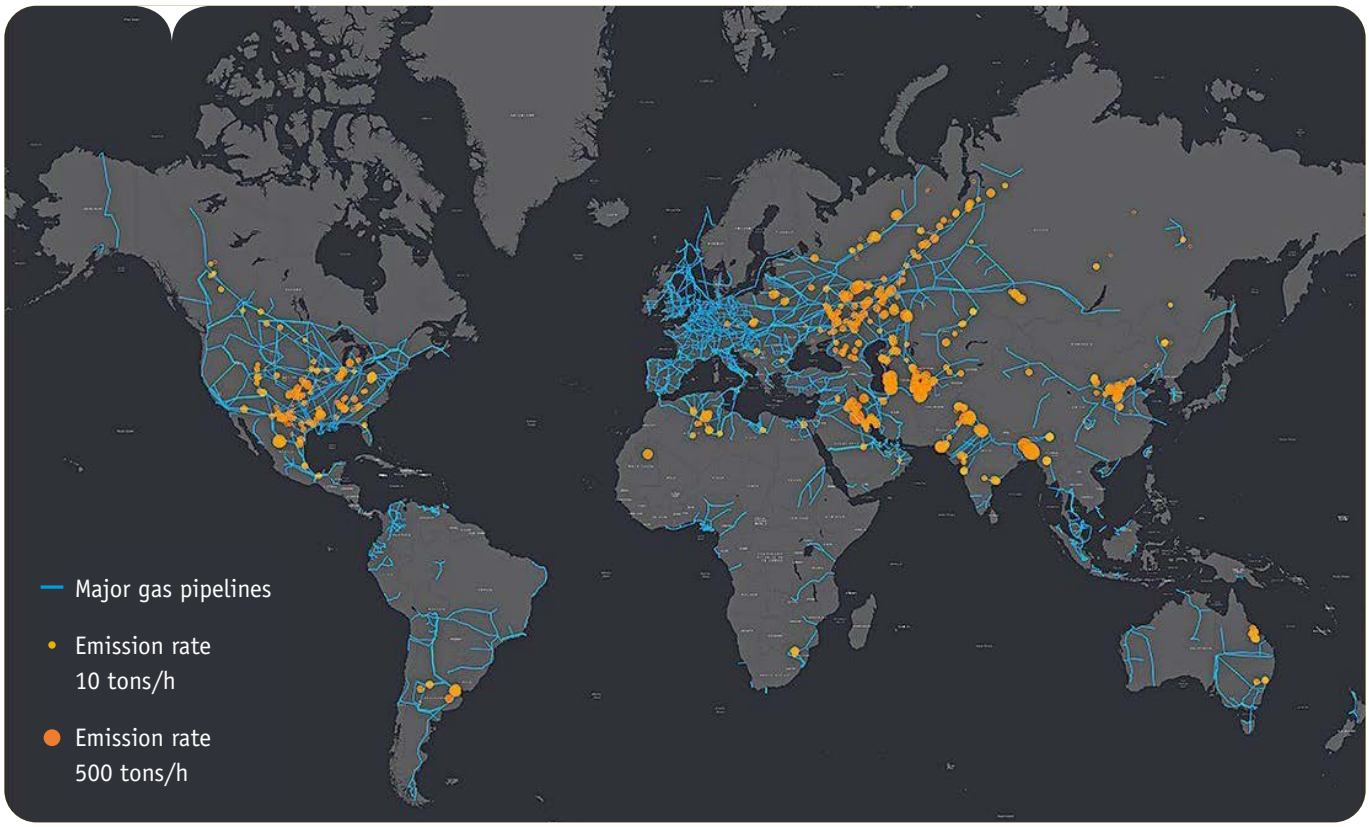
In the context of the Ukraine war, reducing methane leakage along the supply chain becomes even more important. The Russian invasion has for the first time raised the credible risk of a complete disruption of Russian gas supplies to Europe, either because of EU or Russian sanctions. Assuming an optimistic leakage rate of 2.3%, as in the calculation above, around 13 bcm of methane escapes into the atmosphere every year from EU fossil gas consumption along the supply chain, rather than being used for heat or power generation.[19] An annual shortfall of 150-190 bcm[20] would have to be covered in the event of a Russian gas disruption.

Gas companies all along the supply chain can contribute to significant gas savings by taking responsibility for fixing methane leaks at the infrastructure and facilities they operate and pressuring their suppliers to do the same – even before new EU regulation comes in. According to the IEA, 70% of oil and gas sector methane emissions can be avoided with current technology, and 45% can be avoided at no net cost to companies.[21] There is really no excuse for continuing to tolerate this level of methane leakage in the current situation.

Results of the survey

1. Reduction targets and strategies of the companies surveyed

All except one of the responding companies have set targets to become climate neutral by mid-century at the latest, and the one company without such a goal reports to be currently working on a climate neutrality strategy. Two companies want to reach climate neutrality across Scope 1-3 emissions by 2040 already (see info box on page 8). Most companies have targets to reduce Scope 1 and 2 GHG emissions by 50-80% in 2030 and some have set ambitious intermediate targets, with one company planning to reach net-zero generation by 2025 and two companies by 2035.



Map showing the location of the main gas pipelines and the main sources of methane emissions related to the oil and gas industry
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International initiatives: OGMP, IMEO and the *Global Methane Pledge*

In recent years, a number of voluntary industry initiatives have been founded to help reduce methane emissions. One of the best-known associations is the Oil and Gas Methane Partnership (OGMP), which was launched in 2014 under the auspices of the United Nations (UN). The OGMP has grown rapidly over the last years, now including 75 companies that cover over 50% of global oil and gas production. Companies that want to become members must, among other things, check their facilities for methane emissions according to defined criteria, analyse cost-effective measures to reduce emissions and report annually on their progress. In 2020, the reporting framework was revised and OGMP 2.0 was launched. OGMP 2.0 is currently the only comprehensive, measurement-based reporting framework for the oil and gas sector and has thus become central to international methane reduction efforts.

Companies participating in the OGMP aim to reduce their methane emissions by 45% by 2025 and by 60-70% by 2030 - starting from 2015 levels. However, the baseline can only be estimated due to lack of data. The goal is to reach "near zero" methane emission by 2050. OGMP 2.0 is particularly characterised by the fact that future reporting is to be based on actual measured reduction data and no longer on estimates.

The International Methane Emissions Observatory (IMEO), an initiative by the UN Environment Programme, was launched at the G20 summit in October 2021 just before the Glasgow Climate Summit. IMEO is set up to collect and assess methane emissions data from various sources, such as company reporting, national inventories, scientific studies and satellite measurements. Its objective is to provide increased transparency on methane emissions and enable monitoring of the pledges undertaken by companies under the OGMP and by countries under the Global Methane Pledge.

The Global Methane Pledge was launched at the Glasgow Climate Change Conference (COP 26) in November 2021. It is the first ever international commitment to address rising levels of atmospheric methane, with a target of reducing global methane emissions by 30% until 2030, compared to a 2020 baseline. Participating countries also commit to improve the transparency, accuracy and completeness of methane emissions reporting under the United Nations Framework Convention on Climate Change (UNFCCC). 112 countries have signed up to the pledge so far, representing nearly 50% of global anthropogenic methane emissions and over two thirds of global GDP. Notably, several top gas-producing countries like Russia und Algeria have not joined, and the world's largest economy China is also missing from the signatories.

Only five companies have calculated a carbon emissions budget for their operations. While all participating companies have some sort of climate strategy, many of these plans have considerable gaps and typically do not entail major changes to fossil gas operations in the coming years.

Moreover, what climate neutrality actually means differs across the strategies. The definitions include a mix of credible climate measures and unsustainable practices. For example, the conversion of power and combined heat and power (CHP) plants (e.g. from coal to fossil gas, biomethane or Bio-LNG) was cited by nine respondents among the main measures to reach climate neutrality and the use of Carbon Capture and Storage (CCS) technology as well as offsetting[22] are seen as viable decarbonisation measures by five companies. This is despite CCS being unproven at large scale and studies showing that the technology does more harm than good to the climate if methane leakage is taken into account,[23] the use of biogas being unsustainable at current levels,[24] and international offsets being of dubious climate benefit and verifiability.[25]

At the same time, ten respondents are planning to expand their wind and solar energy portfolio and nine to improve the energy efficiency of their operations. Only six companies report methane emissions reductions as a key measure of their climate neutrality strategy, showing that the issue is still not being taken seriously enough among major industry players.

Many companies uphold the role of fossil gas in the short and medium term as a "necessary transition technology" and to "enable reliable and affordable supply", but the majority of them fail to provide a concrete phase-out plan. Replacing existing coal power and heat plants with fossil gas plants is seen by several companies as a measure to reduce GHG emissions, which is particularly problematic when no firm regulation to control methane leakage is in place.

Only two companies stated explicitly that they are planning to exit the fossil gas business by 2040 (both in generation and gas trade). Instead of moving away from fossil gas, the surveyed companies are mostly sticking to their guns and planning to gradually replace fossil gas with so-called low-carbon and climate-neutral gases after 2030 or 2035. Overall, the surveyed companies are betting that the future energy mix will still rely considerably on gases, with only two companies even mentioning electrification of heating as an alternative to gas combustion. As there is significant uncertainty about the scalability of green gas production and the eventual costs e.g. of green hydrogen, major industry players seem to be betting on continuing business as usual for the foreseeable future. This is a key weakness in company strategies, as it is hard to imagine that switching large gas power and heating plant fleets will be feasible, given that combustion is among the least efficient uses of hydrogen.[26,27] Converting solar or wind power through electrolysis into hydrogen and then using the hydrogen for power generation would create a round trip efficiency of less than 40%.[28]

While only a few companies mention biomethane, all of the 12 companies that responded have plans to get into the hydrogen business and are positioning themselves to take advantage of the hydrogen market once it takes off. The use of hydrogen is seen as an important means of decarbonising companies' processes in the medium to long term. In this context, both green hydrogen, produced from renewable electricity, and blue or turquoise hydrogen, produced from fossil gas, are mentioned.[29] Only two companies explicitly state they will focus on using 100% renewables-based hydrogen. This is problematic given that blue and turquoise hydrogen production are based on fossil methane, which is inevitably linked to climate-damaging methane leakages. The use of different types of hydrogen is justified by the need to enable a market ramp-up of the technology and to have sufficient hydrogen quantities available. Several companies state explicitly that the viability of their strategy depends on sufficient hydrogen volumes being available to replace fossil gas.

Nine companies have plans to build electrolysers, equalling more than 10 GW of electrolysis capacity in total until 2030, with some smaller scale electrolysis plants already scheduled to come online in the next years. Most companies specify that this is for green hydrogen production, but only two explicitly aim for 100% renewable hydrogen. It is notable that the rules for renewable and low-carbon hydrogen are still being defined at EU level, and that energy companies are lobbying European Institutions to weaken standards for green hydrogen production.[30] Four companies are actively pursuing opportunities for blue hydrogen production, with 1.7 GW of blue hydrogen capacity already in the pipeline.

Several companies have noted they are exploring further production projects, and are already collaborating with offtake partners e.g. in ammonia, steel, refinery and heavy-duty transport. Two companies plan to operate a network of hydrogen refuelling stations and several are planning to engage in hydrogen trading. Until 2030, several companies also plan to commission dedicated hydrogen pipelines and storage capacity.

As mentioned above, only two companies have plans to exit the fossil gas business by 2040. To put this into context, according to the Paris Agreement Compatible Scenarios for Energy Infrastructure[31] developed by environmental organizations, Europe would need to stop using fossil gas by 2035 to remain on a 1.5°C-compatible pathway. None of the other companies presents a concrete date for a phase-out of fossil gas. Neither of the two oil and gas producing companies that took part cited stopping further fossil fuel extraction activities as part of their climate neutrality strategy. Long-term purchase contracts, wrong political framework conditions, missing economic viability of alternatives or an alleged lack thereof are cited as justifications for the continued reliance on fossil gas. Therefore, even though some companies have already set interim targets for reducing emissions from their fossil gas business, there is a lack of concrete phase-out roadmaps that would make the often-mentioned goal of climate neutrality credible.

Scopes of Carbon Accounting

The *GHG Protocol Corporate Standard* for carbon accounting by companies classifies a company's GHG emissions into three 'scopes':

Scope 1 covers the direct emissions of a company from its own or direct sources. This includes, for example, emissions from the combustion of fossil gas for heating purposes or the generation of electricity.

Scope 2, on the other hand, refers to indirect emissions from the generation of electricity, steam, heat or cooling that the company in question purchases and consumes.

Scope 3 includes all other indirect emissions that occur in the company's value chain. This also includes emissions that occur during the transport and delivery of a purchased energy carrier (such as fossil gas). This part therefore includes methane leakages that occur, for example, at drilling sites, pipelines, valves or compressor stations on the way to the purchasing company. Precisely because these leakages are so decisive for the overall balance of the respective energy carrier, they must be rigorously included and tracked.

2. Information provided by surveyed companies on their methane emissions

While all except one of the participating companies have a climate neutrality strategy, many of these plans have considerable gaps regarding methane emissions. Four of the 12 company respondents have indicated that their strategies do not cover Scope 3 emissions, where the majority of methane leakage occurs, as 90% of EU-consumed gas is imported. Only four of the companies that do include Scope 3 emissions have a 2030 reduction target for these emissions and the envisaged reduction is typically only in the range of 30-35%.[32]

Some improvement on methane measurement can be seen compared to the survey we conducted in 2020/2021. However, the responses to this survey make clear that source- and site-specific measurement of methane emissions is still the exception rather than the rule.

Seven out of the 12 responding companies have not conducted any measurements of methane leaks at all. Of the five who did, all OGMP members, only four were able to provide information on specific detected methane leaks.[33] Only three companies have their methane emission data independently verified and only one is comparing measurements against desktop-based methane emission estimates. One company reported already using satellite measurements. The state of methane measurement in the industry at large is likely to be significantly worse than these figures suggest, as there seems to be little willingness to even consider the issue outside the OGMP.

Even companies that aspire to reach levels 4 or 5 of the OGMP 2.0 framework (see info box page 10), which involves site-specific measurements e.g. by drones, supplemented by source-specific measurements, currently still rely on a mix of methods. Four survey respondents received an OGMP "gold standard" rating, meaning that they have submitted "robust implementation plans on how to achieve level 4/5 reporting by 2024 for operated assets and 2026 for non-operated assets".[34] None of the surveyed companies currently applies the full OGMP 2.0 level 5 or even level 4 standard for all their Scope 1 emissions, i.e. emissions from facilities that they directly control. IMEO confirms in a recent report on the implementation of the OGMP framework by member companies that "the quality of data in most cases is limited, as the majority of companies have not yet ventured into higher reporting levels for the majority of assets".[35]

Even companies actively tackling methane leakage are still establishing a baseline of the actual methane intensity of their operations. Many measurement initiatives cited are relatively recent and generally do not cover the entirety of company operations. One company, for instance, only applies the OMGP 2.0 framework to its gas storage sites, but not to its power generation business. For another company, only some of its subsidiary Distribution System Operators (DSO) are OGMP members. While measurement generally only extends to direct company operations, three companies have mentioned engaging with suppliers on improving methane measurements. Of these, one has commissioned studies into the methane intensity of the fossil gas they purchase.

In the absence of measurements, methane emissions reporting by gas companies is based on emissions factors, estimates and simulations. The fact that energy sector methane emissions are currently much higher than reported figures shows that these methods systematically underestimate methane emissions, e.g. by using low or outdated emissions factors. Companies obtaining fossil gas from Russia rely on Gazprom's figures, for instance, which assume a low leakage rate of 0.29% of the gas transported and 0.02% of the gas produced by the company. However, current satellite data clearly identifies Russia, along with the US, as main sources of methane leakages worldwide (see the map showing Kyrros data above). Only five companies, all OGMP members, have stated that they are planning to improve the quality and/or frequency of methane emissions reporting.

All of the companies participating in the survey assess the GHG effect caused by methane emissions over a 100-year time frame, often referring to international reporting standards such as the widely used the GHG Protocol[36] which recommends that companies use the Global Warming Potential (GWP) value over 100 years (GWP 100) for the greenhouse gas under consideration.[37] This is problematic as methane has a much shorter atmospheric lifespan than CO_2, i.e. its warming effect acts much more quickly. According to the IPCC's Sixth Assessment Report (AR 6), the GWP 20 for methane is 83 and the GWP 100 for methane is only 30.[38] This means that one tonne of methane is 83 times more harmful to the climate than one tonne of CO_2 over a period of 20 years, and 30 times more harmful over a period of 100 years. However, outdated versions of the IPCC Assessment Reports (AR 4 and 5) are used by almost all responding companies, leading to varying emission factors being applied. Only one company uses the most recent AR-6 emissions factors.

Applying a GWP 100 emissions factor means that methane emission reporting underestimates the short-term warming potential of methane, in addition to underestimating the extent of leakage. Companies should report both figures, even in the absence of regulation requiring them to do so, to give an accurate picture of the climate effect of their methane emissions. This is especially crucial in light of scientific knowledge around tipping points in the earth`s climate system that might be reached soon. Given the stark, short-term impact of methane, avoiding methane emissions now could make a world of a difference in terms in the mid- to long-term. However, only one of the surveyed companies mentions that it "might be necessary" to apply a GWP-20 emissions factor in the future.

OGMP 2.0 Reporting levels[39]

The five OGMP 2.0 framework encompasses five reporting levels for methane emissions:

Level 1 – Emissions reported for a venture at asset or country level (i.e. one methane emissions figure for all operations in an asset or all assets within a region or country).

Level 2 – Emissions reported in consolidated, simplified sources categories (based on the International Association of Oil & Gas Producers' 5 emissions categories for upstream, and MARCOGAZ' 3 emissions categories for mid and downstream), using a variety of quantification methodologies, progressively up to the asset level, when available.

Level 3 – Emissions reported by detailed source type and using generic emission factors (EFs).

Level 4 – Emissions reported by detailed source type and using specific EFs and activity factors (AFs). Source-level measurement and sampling may be used as the basis for establishing these specific EFs and AFs, though other source specific quantification methodologies such as simulation tools and detailed engineering calculations (e.g. as referenced in existing OGMP technical guidance documents) may be used where appropriate.

Level 5 – Emissions reported similarly to Level 4, but with the addition of site-level measurements (measurements that characterize site-level emissions distribution for a statistically representative population).

Overall, relying on self-reported industry figures has led to methane emissions being significantly underreported by gas companies. Actual measurement of source-specific emissions combined with site-level and satellite-based measurements to verify reported figures still happens rarely, even among OGMP member companies which are leaders in the field. While some companies organized in the OGMP at least have plans to introduce better measurement practices for all or part of their operations in the coming two to four years, the wider industry shows no interest in improving methane emissions reporting without being required to do so by regulation.

3. Information from the companies on reduction measures

The fact that 70% of oil and gas sector methane emissions can be avoided with current technology, and 45% can be avoided at no net cost to companies, shows that the industry as a whole has not lived up to its responsibility in limiting methane emissions.[40] Eight of the surveyed companies state that they are going beyond the applicable legal regulations in limiting methane emissions. It is concerning that the remaining four do not, as methane regulations are weak in almost all countries, with some exceptions in specific US federal states such as Colorado. Current regulation is largely only concerned with ensuring safety, rather than limiting GHG emissions, and typically relies on unverified reporting of methane leaks by industry.[41]

Regular Leak Detection and Repair (LDAR) campaigns are among the most important measures a company can take to identify and fix leakages. Seven of the surveyed companies state that they are performing LDAR campaigns or that leaks are assessed and repaired as part of regular maintenance cycles, though it is not made clear how often these surveys take place. Companies either refer to LDAR surveys as "regular" or specify a 1-year cycle. The frequency of inspections matters a great deal, however, since yearly LDAR inspections can only address 60% of methane leaking this way, while monthly inspections would enable an 80% reduction.[42] The upcoming EU methane regulation currently foresees quarterly inspections, which would be a considerable improvement on current industry practice.

Another key measure is reducing flaring and venting, which is the practice of burning off methane or venting into the atmosphere. This is done for instance during oil and gas extraction, grid maintenance and at gas storage sites, typically for operational safety to reduce pressure build-up. Both practices fuel climate change, but venting (or incomplete flaring) is far more climate-damaging as methane is emitted rather than CO_2. Much of this flaring and venting can be reduced e.g. by adopting integrated system engineering designs in existing and new assets.[43] It is worrying that only two companies mention commitments to reduce flaring at all. Only one company mentions optimizing venting as gas storage sites and two mention reducing venting during pipeline maintenance through intelligent grid management and special technical equipment. This is one of the areas where industry is most clearly dragging its feet. Indeed, the incoming EU methane regulation is set to ban routine flaring and venting entirely, only allowing it in some clearly defined circumstances.

Some companies claim significant improvements as a result of programs to limit methane leakage. One company, for instance, reports having halved its methane intensity from 0.25% in 2016 to 0.12% in 2020 "on a calculated basis". It is hard to be sure about

the accuracy of such claims, however, if no actual measurements are involved. Several companies also cite divestment, i.e. selling off of gas assets, among the measures employed to achieve methane emissions reductions. This might be true looking at company balance sheets, but it is misleading as the assets will of course continue leaking methane under a new owner.

Most of the gas companies participating in the survey profess a willingness to go beyond the legal minimum in reducing methane emissions, which is not saying much as methane emission are very loosely regulated. None of the surveyed companies already engages in methane reduction at the level of the new regulation proposed by the EU Commission. In particular, gas companies are reluctant to conduct LDAR campaigns more than once per year and to really cut down on venting and flaring. The fact that several companies that claim to conduct regular LDAR campaigns were unable to cite specific detected leaks in the part of the questionnaire dealing with measurement is also concerning.

4. Views on the proposed EU Methane Regulation

The EU Commission published its highly anticipated proposal for a Regulation on Methane Emissions Reduction in the Energy Sector ("EU Methane Regulation") in December 2021. The proposal introduces Monitoring, Reporting and Verification (MRV) requirements in line with the highest level of the OGMP 2.0 framework, along with a ban on routine venting and flaring and quarterly LDAR campaigns with an obligation to fix detected leaks within 15 days. It also includes independent verification of company reporting and regular inspections of facilities by public authorities. The proposed regulation will apply to gas infrastructure in the EU, where it presents a significant advance compared to the lax rules that currently apply and goes beyond what any of the surveyed companies are already implementing. Crucially, however, the regulation does not include fossil gas imports, which make up 90% of all gas consumed in the EU and therefore the vast majority of the EU's methane emissions. The proposed regulation also does not cover the petrochemical sector which is the largest consumer of oil and gas worldwide. This is despite a resolution by the European Parliament calling on the Commission to include both imports and the petrochemical sector in the new regulation.[44]

As part of the survey, we also asked participating companies for their views on this upcoming regulation. It is notable that of the eight companies that were prepared to offer views on how the regulation should be designed, all except one are OGMP members. All of these companies broadly welcome the incoming EU methane regulation.

Not surprisingly, several companies stress the importance of aligning EU rules with the OGMP framework, which the Commission has indeed done in its proposal. Having internationally comparable standards, rather than a proliferation of different standards, is highlighted as very important for globally operating businesses.

Gas companies voice support for including coal and biogas in the regulation, presumably as it is not their core business and they are worried about creating a competitive disadvantage for fossil gas. One company planning a considerable increase of its biomethane production argues against including it in the same regulation as fossil oil and gas, however. One company specifically voiced its opposition to including end users (such as plastics production or gas power plants) in the regulation.

Interestingly, responding companies are divided on the question of including gas imports. Two companies speak out in favour of applying the new rules to exporters to the EU, citing the need to "level the playing field between EU-based companies and those outside the EU". Other companies instead support the Commission's two-step approach of first gathering better information before applying hard rules to imports at an unspecified date. An emissions performance standard is mentioned as a possibility by several respondents. The new Methane Supply Index is generally welcomed by companies as a way to get more accurate information about methane leakage from suppliers.

It is revealing that while voicing support for the regulation as a whole, several companies also propose changes that would significantly weaken its effectiveness. Several companies stress that LDAR surveys should only be annual, rather than quarterly as currently proposed. Several others argue for more flexibility, specifying different frequencies of LDAR surveys or different MRV levels for different types of assets, rather than applying uniform rules for both. Companies also want less ambition on flaring and venting, with some companies arguing the regulation should focus on venting first, only addressing flaring in a second step. One company proposes a "grandfathering rule" for existing infrastructure to "protect long term business certainty", which would presumably entail exemptions from MRV and LDAR requirements.

Gas company views on the upcoming EU Methane Regulation collected in this survey are generally supportive, but the devil lies in the details. Companies seem willing to accept additional obligations to the extent that they are already planning to implement them as part of their OGMP pledges, but strategically call for loopholes and exemptions where this seems too onerous. We can assume that non-OGMP member companies have much more unfavourable views of the Commission's proposal, given that its implementation would be considerably more demanding for them.

Evaluation

Transition strategies

The answers to our survey reveal that companies are still dealing with the issue of climate neutrality too superficially and are not yet taking sufficient responsibility for the emissions that arise from their business model. All companies that answered the questions have the goal of becoming climate neutral by 2050 at the latest. However, there is little awareness that fossil gas consumption needs to be radically reduced in a short time frame, and that particularly the power and heating sectors must shift to alternatives as a result.

Participating companies, while exploring opportunities in renewables and efficiency, overwhelmingly focus on keeping their gas-based business models running for as long as possible. Instead of credible plans to move out of fossil gas, company climate strategies present measures such as CCS, gradual replacement with green and low-carbon gases, and even the reduction of methane leakage as ways to make gas "clean" or "net zero" in the long term. Many are even planning to shift from coal to fossil gas as part of their climate strategies.

In doing this, many companies rely on technologies that are either not climate-neutral or are currently only available to a very limited extent. Blue or turquoise hydrogen, for example, continue to be based on the extraction and processing of fossil gas, which is inevitably linked to climate-damaging methane leakages. Moreover, these options only work in combination with the controversial CCS technology, which leaks some of the CO_2 meant to be compressed into the atmosphere and involves high costs.[45] In addition, projects for turquoise hydrogen are still in the experimental laboratory phase. Whether and when an economic application will be possible is completely uncertain.

DUH and urgewald also reject the use of offsetting because it allows companies to continue emitting greenhouse gases by compensating them elsewhere. This does not solve the basic problem of emissions and prevents avoidance and efficiency strategies from being developed and implemented. There are many poorly designed offsetting projects which register no emissions reduction or even increased emissions. The simple conversion from coal to fossil gas without the use of renewable energies also should not be seen as a climate protection measure as it creates additional carbon lock-in. The use or conversion to biomass, biomethane or Bio-LNG is typically not sustainable either and can lead to unforeseen damages, e.g. if monocultures for these fuels compete with food production or if their cultivation leads to the destruction of primary forests.

Methane emissions measurement and reduction

The received responses show that there is a shocking lack of knowledge among the participating companies about the upstream methane emissions in the fossil gas they purchase. It is welcome that the two upstream oil and gas producers that participated in the survey have undertaken commitments to improve emissions reporting under the OGMP and that they were also among the only four companies responding to the survey that were able to provide details on actual methane leaks. The rest of the companies, operating mid- and downstream, generally have no independent information about the methane intensity of their suppliers. Some are entering into dialogues with suppliers but only one commissioned an independent study into the gas they buy. Scope 3 emissions generally do not feature in the 2030 targets of these companies, signalling little willingness to address the issue in the short term.

For most companies, the responsibility they take on thus ends at the boundaries of their own business operations. This is fatal: on the one hand, methane emissions from this part of the value chain are probably many times higher than the direct methane emissions of the companies. On the other hand, as purchasers of fossil gas, companies could influence their suppliers and trading partners by making independent measurements and the verifiable implementation of reduction measures a condition for cooperation.

Within their own operational business (Scope 1), many of the participating companies use regular and partly proactive checks of their infrastructure to detect and eliminate methane leaks at an early stage. Many are taking steps to improve measurement, reporting and verification for at least part of their operations, in particular production, pipeline transport and gas storage. OGMP member companies, not surprisingly, are leading the industry on this. From the point of view of DUH and urgewald, these positive steps are welcome.

Measurement data is still the exception, though, with none of the surveyed companies currently observing the highest levels of OGMP 2.0 reporting for all their assets. Several companies even responded that they are not planning to improve measurements or go beyond the applicable regulations at all. This shows clearly that relying on industry self-regulation will not be enough to get the wider industry to change their practices, particularly with a view to 2030 reduction targets.

Mandatory standards need to be imposed on companies through regulation to get the industry as a whole to tackle methane emissions in earnest. The upcoming EU Methane Regulation presents a first step in this direction, though while many companies profess support for the initiative, they are lobbying behind the scenes to weaken specific provisions, e.g. on leak detection and repair as well as flaring and venting.

The most important measure for reducing methane emissions is and remains the reduction of fossil gas consumption. If no more fossil gas is extracted and transported, no unintentional emissions occur. Initiatives such as OGMP 2.0 can help to reduce methane emissions. However, it must always be clear that fossil gas remains a fossil fuel that the world must phase out as soon as possible. If the clear goal of phasing out fossil gas is not envisaged, voluntary initiatives risk becoming a fig leaf that continues to legitimise and perpetuate fossil fuel business models instead of contributing to climate protection goals.

Summary

The evaluation of the questionnaires reveals three core problems:

1. There is little willingness to measure and reduce methane emissions outside the OGMP. The responding non-member companies typically do not measure methane emissions at all and often do not have leak detection and repair programs. Many profess no intention to improve measurements in the future or go beyond current legal obligations. Even within the OGMP, progress towards measurement-based reporting is slow, though several measurement methods are available today and could already be applied. It is also notable that 76% of the contacted companies did not reply to our questionnaire, indicating a lack of engagement on methane emissions in the industry more broadly. It is clear that voluntary approaches alone will not be enough to get the gas industry to act. Regulatory requirements are needed to create transparency and motivate companies to implement reduction measures across the board.

2. Mid- and downstream companies largely ignore upstream methane emissions. The companies that are taking concrete steps to reduce methane leakage focus on their own operations, largely ignoring the methane intensity of the gas they purchase to use or trade. While mid- and downstream companies do not directly control their gas suppliers, improving the methane intensity of their purchases would arguably be the most effective methane reduction measure they can take, as the vast majority of leaks occur during production and transport. A few companies mention being in dialogue with their suppliers, but companies are largely unwilling to pressure their suppliers to fulfil certain reporting standards or performance-based criteria.

3. No recognition of the urgency of a fossil gas phase-out. There is no realistic assessment of how the reduction of total emissions on the way to climate neutrality is supposed to work. For example, many companies are citing offsetting, CCS or pseudo-solutions such as blue and turquoise hydrogen as key measures in their transition to climate neutrality, without foreseeing major changes to their fossil gas business models in the coming years. Overall, gas companies see a considerable role for gases in a climate-neutral economy, with fossil gas largely being replaced by green and so called “low-carbon” gases. This future vision is not viable, given projections of declining gas demand in the EU and justified doubts about the sustainability and scalability of biogas and hydrogen. Only two of the surveyed companies have explicit plans to exit the fossil gas business by 2040.

Conclusion

The companies considered are currently doing too little to live up to their responsibility in the climate crisis. It is extremely time-critical that the companies immediately use all available means to identify and, if possible, eliminate not only their direct but also their indirect methane emissions, as it is already technically possible today to avoid 70% of the emissions occurring in the oil and gas industry.[46] Modern satellite technology and drones, among other things, can be used to do this. The responses to our survey show, however, that companies outside the OGMP framework are barely taking any steps to address their methane emissions, with even OGMP members currently mostly making plans and announcements that have yet to be implemented.

In addition, companies should tie the quantities of fossil gas they still wish to use to the Paris Agreement target of 1.5°C, which is not yet happening consistently. Problematic measures such as blue hydrogen, offsetting and CCS feature too prominently in company climate strategies, which seem largely designed to maintain the viability of fossil gas for as long as possible. Hydrogen is seen by many as a panacea, even though quantities will likely be too limited for the large-scale use in power and heat generation that companies are planning. There is also a lack of clear commitment to green hydrogen. Moreover, many companies still rely on the switch from coal to fossil gas instead of investing directly into renewables for power generation or large-scale heat pumps for heating. Our survey illustrates that there is little to no understanding among gas companies that business as usual is not an option and that fossil gas use must end as soon as possible. It is clearly not enough to rely on voluntary industry commitments to achieve this. Further measures are needed to prevent the global phase-out of coal from leading to the increased use of fossil gas and to ensure that energy companies comply with the Paris climate target rather than undermining it by betting on fig-leaf solutions.

DUH and urgewald therefore recommend:

- **Regulatory requirements for transparency and methane reduction measures** must be adopted as soon as possible. The proposed EU Methane Regulation should be strengthened by defining a shorter transition phase to the full monitoring, reporting and verification rules and requiring monthly leak detection and repair surveys. Most importantly, the regulation should also cover fossil imports, which account for the vast majority of methane emissions.[47]

- Companies should present **clear strategies for the phase-out of fossil gas** and the reduction of methane emissions, based on 1.5°C-compatible emission budgets. These must be reported on **regularly** and **transparently**.

- Companies should carry out **their own measurements** of methane emissions along the supply chain, involving their suppliers and trading partners, instead of relying on estimates and calculations. The data collected must be **freely available** and **verifiable by independent bodies**.

- Companies should assume **product responsibility**. They must not ignore emissions from their **supply or upstream chain**, but actively engage with partners to ensure methane emissions are tackled across the entire supply chain.

- Companies rely too much on **pseudo-climate policy solutions** such as **blue and turquoise hydrogen, CCS** and **offsetting**. These technologies are rejected by DUH and urgewald given the many issues associated with them. Instead, a real transformation towards a completely decarbonised energy supply must now be undertaken.

Endnotes

1 *The effect of a greenhouse gas on global heating (the so-called Global Warming Potential, GWP) depends on the chosen period of observation. Because our climate system threatens to exceed critical climate tipping points within the next one to two decades and because methane has a comparatively short residence time in the atmosphere of about 12 years, it is particularly important to consider the period of 20 years (GWP20) in this case. If tipping points were to be exceeded, such as the collapse of the West Antarctic Ice Sheet, the risk that global heating would take on a life of its own and continue to increase without human intervention would increase significantly ("runaway climate change"). For a period of 100 years, the GWP of methane is 30 (see* www.ipcc.ch/report/ar6/wg1/*).*

2 *See* www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures.
See also www.duh.de/fileadmin/user_upload/download/Projektinformation/Energiewende/FAQ_Methanemissionen_EN.pdf

3 *See* www.duh.de/fileadmin/user_upload/download/Projektinformation/Energiewende/Positionspapier_Markabfrage_Gas_2021_ENG_20210316_FINAL.pdf

4 *Our first survey, conducted in 2020/2021, had a higher response rate of 30% but fewer responses overall as only 20 companies were contacted.*

5 *DUH calculations based on 2020 annual reports of participating companies. World and Europe comparison figures were drawn from* www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-natural-gas.pdf, www.statista.com/statistics/217252/global-installed-power-generation-capacity-of-natural-gas/ *and* https://www.energybrainpool.com/en/analysis/europeanpowerplantdatabase.html

6 *See* www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-natural-gas.pdf

7 *See* www.iea.org/data-and-statistics/charts/global-gas-demand-in-initial-and-revised-forecasts-2019-2025

8 *See* https://eur-lex.europa.eu/resource.html?uri=cellar:71767319-9f0a-11ec-83e1-01aa75ed71a1.0001.02/DOC_1&format=PDF

9 *See* www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures.
See also www.duh.de/fileadmin/user_upload/download/Projektinformation/Energiewende/FAQ_Methanemissionen_EN.pdf

10 *See* https://www.nature.com/articles/d41586-020-02116-8

11 *See* www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/

12 *See* www.duh.de\fileadmin\user_upload\download\Projektinformation\Energiewende\FAQ_Methanemissionen_EN.pdf

13 *See* www.bmwi.de/Redaktion/DE/Artikel/Energie/gas-erdgasversorgung-in-deutschland.html

14 *Calculation: 87 billion m³/a [quantity of fossil gas] * 8.8 kWh/m³ [calorific value of fossil gas] * 0.2 kg CO_2/kWh [carbon content of fossil gas] = 153.12 million tonnes CO_2/a.*

15 *In the calculation, it is assumed that the fossil gas imported by Germany represents the total production volume minus the emissions that occurred in the upstream chain due to leakage. Assuming a leakage rate of 2.3%, the total production volume here would accordingly be 89.04 billion m³ of fossil gas, of which 87 billion m³ (97.7%) arrive in Germany. 2.04 billion m³, or 2.3% of the total production volume, escaped along the upstream chain as leakage. Since fossil gas consists largely of methane, the effect of this release must be converted into CO_2 equivalents (CO_2e). Under normal pressure of one bar and 15°C, the climate impact of the released methane is calculated as follows: 2,040,000,000 m³ [methane leakage, here 2.3% of total production] * 0.6709 kg/m³ [density of methane] = 1,368,636,000 kg = 1,368,636 t methane. Over 20 years, methane has about 83 times the effect of CO_2 (GWP=86): 1,368,636 t methane * 83 = 113.6 mt. CO_2e. Results in the graph are approximate.*

16 *The approach used here to calculate total emissions is highly simplistic and conservative, because not only methane escapes along the upstream chain due to unintentional leakage or intentional discharge. CO_2 is also emitted, for example when fossil gas is flared along the way or consumed at gas-powered compressor stations. Emissions also occur with electrically powered compressors due to the electricity grid, which has not yet been decarbonised. These emissions are not taken into account here; accordingly, the calculations tend to represent the lower limit of the spectrum of emissions that actually occur.*

17 *See* https://www.iass-potsdam.de/de/ergebnisse/publikationen/2016/uncertain-climate-cost-natural-gas-assessment-methane-leakage

18 www.derstandard.de/story/2000133106052/satellitendaten-enthuellen-die-groessten-methanlecks-der-welt;

19 *Total EU fossil gas consumption of 552 bcm (2021) was used as the basis for this calculation.*

20 *See* www.reuters.com/business/energy/what-are-europes-options-case-russian-gas-disruption-2022-03-10/

21 *See* https://iea.blob.core.windows.net/assets/585b901a-e7d2-4bca-b477-e1baa14dde5c/CurtailingMethaneEmissionsfromFossilFuelOperations.pdf

22 *Purchase of certificates through which the avoidance of emissions at another location is to be triggered, compensation the company's own emissions.*

23 *See* https://research.american.edu/carbonremoval/2019/11/13/jacobson-mark-2019-why-carbon-capture-and-direct-air-capture-cause-more-damage-than-good-to-climate-and-health/

24 *See* www.umweltbundesamt.de/publikationen/biorest-verfuegbarkeit-nutzungsoptionen-biogener

25 *See* www.csmonitor.com/Environment/2021/0924/Carbon-offsets-are-growing-fast-but-climate-benefits-remain-murky

26 *See* www.pik-potsdam.de/en/news/latest-news/hydrogen-instead-of-electrification-potentials-and-risks-for-climate-targets *or* www.iee.fraunhofer.de/en/presse-infothek/press-media/overview/2020/Hydrogen-and-Heat-in-Buildings.html

27 *One company notes it is conducting research into engaging in research into optimizing electrolysis of water to hydrogen, storage and re-conversion to electricity.*

28 *See* www.rechargenews.com/energy-transition/why-hydrogen-fired-power-plants-will-play-a-major-role-in-the-energy-transition/2-1-1045768

29 *Green hydrogen is produced from renewable electricity via electrolysis. Blue hydrogen is produced by steam-reforming fossil gas with additional carbon capture and storage (CCS) for the CO_2 emissions associated with that process. Hydrogen produced this way without CCS is referred to as grey hydrogen. This is how most hydrogen for industrial use is currently produced. Turquoise hydrogen is produced from fossil gas using the so-called molten metal pyrolysis technology, where fossil gas is passed through a molten metal that releases hydrogen gas as well as solid carbon.*

30 *See* https://bellona.org/publication/will-hydrogen-cannibalise-the-energiewende

31 *See* www.pac-scenarios.eu/

32 *One company has a Scope 3 target for 2032 and two companies have such a target for 2035.*

33 *It is notable that the OGMP 2.0 framework only covers scope 1 emissions, i.e. emission directly related to the companies' operations.*

34 *See* https://wedocs.unep.org/bitstream/handle/20.500.11822/37283/AEM_IMEO.pdf

35 *See* www.unep.org/resources/report/eye-methane-international-methane-emissions-observatory-2021-report*, page VI*

Endnotes (continuation)

36 *The GHG Protocol is the most widely used methodological standard for determining emission levels, see* www.umweltpakt.bayern.de/energie_klima/fachwissen/374/klimamanagement.

37 *See* https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

38 *Fossil methane is up to 108 times more harmful than CO_2 over 20 years. The middle GWP data is 82.5 +/- 25.8. IPCC, AR6, Table 7.15, Page 1739* www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf

39 *See* http://ogmpartnership.com/sites/default/files/files/OGMP_20_Reporting_Framework.pdf

40 *See* https://iea.blob.core.windows.net/assets/585b901a-e7d2-4bca-b477-e1baa14dde5c/CurtailingMethaneEmissionsfromFossilFuelOperations.pdf

41 *See here for the case of Germany:* www.duh.de/fileadmin/user_upload/download/Projektinformation/Verkehr/Methan/Ziehm_Gutachten_Methanleckagen_final_geschw%C3%A4rzt.pdf

42 *See* www.edf.org/sites/default/files/content/wzi_expert_report_01062014.pdf

43 *See* www.iea.org/reports/flaring-emissions

44 *See* www.europarl.europa.eu/doceo/document/TA-9-2021-0436_EN.html

45 *See* https://theicct.org/blog/staff/carbon-capture-storage-and-leakage

46 *See* www.iea.org/reports/sustainable-recovery/fuels

47 *More detailed recommendations can be found in a recent position paper by several European NGOs. See* www.duh.de/fileadmin/user_upload/download/Projektinformation/Methan/Joint_NGO_Position_Paper_-_EU_Methane_Regulation__March_2022_.pdf. *See also a study by Green Budget Germany, commissioned by DUH, on policy options for pricing methane emissions across the supply chain:* www.duh.de/fileadmin/user_upload/download/Pressemitteilungen/Energie/Thema_Gas/2021-09_FOES_DUH_Pricing_Methane.pdf.

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