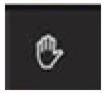
Follow-up meeting on Methane Emissions in the Gas Sector

16th of June of 2020

Housekeeping rules

- ✓ Turn off your camera
- ✓ Mute your microphone
- ✓ Write your questions on the Teams chat or raise the hand 

Thank you very much in advance ☺

Welcome and introduction

Predrag GRUJICIC
Jos DEHAESELEER
Tania MEIXUS

Training session: 26 – 27 Nov in Vienna

DAY 1 – INTRODUCTION TO THE METHANE EMISSIONS CHALLENGE

9:30 - Arrival and welcome coffee

10:00 - Welcome address

Predrag GRUJICIC (Energy Community Secretariat)

10:10 - *Tour de table*

10:20 - Introduction to the course

Francisco DE LA FLOR (GIE) // Jos DEHAESELEER (MARCOGAZ)

10:30 – Why focus on methane emissions?

Francisco DE LA FLOR (GIE) // Jos DEHAESELEER (MARCOGAZ)

11:00 - The clock is ticking: limiting methane emissions a must

Carmen Magdalena OPREA (European Commission DG ENER)

11:30 - Methane emissions from oil and gas operations – where and how they are regulated?

Maria OLCZAK (Florence School of Regulation)

12:15 – Lunch break

13:30 – Introduction to the report "Potential ways the gas industry can contribute to the reduction of methane emissions" and to the European scenario

Francisco DE LA FLOR (GIE) // Jos DEHAESELEER (MARCOGAZ)

13:50 – Methane emissions. National inventories and industry initiatives

Luciano OCCHIO (GIE / MARCOGAZ)

14:20 – Methane emissions management: Assessment, reporting and validation

Ronald KENTER (GIE / MARCOGAZ)

14:50 – Methane emissions management: Main technologies and tools

Pascal ALAS (GIE / MARCOGAZ)

15:30 – Coffee break

16:00 – Emissions' reduction targets. Recommendations

Jose Miguel TUDELA (GIE / MARCOGAZ)

16:30 – Collaborative industry initiatives

Francisco DE LA FLOR (GIE)

16:50 – Wrap-up and next steps

Francisco DE LA FLOR (GIE) // Jos DEHAESELEER (MARCOGAZ)

17:00 - Closure of day one

DAY 2 – METHANE GUIDING PRINCIPLES – OUTREACH PROGRAMME

Trainers: Sustainable Gas Institute – Imperial College London (Dr Adam Hawkes and Dr Paul Balcombe)

8:30 - Arrival and welcome coffee

9:00 – 11:00

Short introduction

The Methane Emissions Reduction Business Case

Reducing methane emissions: Understanding methane

Introducing the Reducing Methane Emissions Best Practices - Overview

RMEBP and Case Study: Venting

RMEBP and Case Study: Pneumatic devices

11:00 – Coffee break

11:15 – 12:45

RMEBP and Case Study: Flaring

RMEBP and Case Study: Equipment Leaks

RMEBP and Case Study: Operational Repairs

Interactive session: Methane mitigation decision making- the RMEBP Cost Model

12:45 – Lunch break

14:00 – 16:00

RMEBP and Case Study: Energy Use

RMEBP and Case Study: Engineering Design and Construction

RMEBP: Continual Improvement

Interactive session: Methane management in action- the RMEBP Gap Assessment Tool

16:00 - Closure of the training programme

Feedback received on the training session

What is your overall opinion on this training session?

Poor	0
Good, but needs improvement	1
Good, according to my expect...	5
Very good	16
Excellent	4

How relevant was the content?

Not really relevant	0
Moderately relevant	9
Extremely relevant	17

Would you like to join and effectively support GIE/MARCOGAZ activities (action plan)?

Yes (I would like to receive the...	21
No	2

Would you like to be involved in future sessions/workshops on CH4 emissions?

Yes	22
No	1

Will your company modify anything on the methane management?

Yes	19
Yes, I would like to share it wit...	3
No	1

Next steps (November)

- ✓ GIE and MARCOGAZ invite the participants to join the action and the gas industry meetings
- ✓ A follow-up will be done in 6 months
- ✓ GIE and MARCOGAZ invite the participants to contact us for additional information and support
  - Quantification and reporting of data
  - Mitigation measures and setting reduction targets

Agenda

Follow-up meeting on methane emissions in the gas sector

16th of June of 2020 - 9:30 to 12:30

AGENDA

9:30 – Welcome and introduction

Predrag GRUJICIC (Energy Community)

Jos DEHAESELEER (MARCOGAZ)

Tania MEIXUS (GIE)

9:45 – Energy Community – Ongoing activities on methane emissions

Karolina CEGIR (Energy Community)

10:00 – GIE and MARCOGAZ – Ongoing activities on methane emissions

GIE and MARCOGAZ team

- Action list *(Bogdan SIMION)*
- EU Methane Strategy / Study "Limiting methane emissions in the energy sector" / Frequent Q&A on methane emissions *(Tania MEIXUS)*
- Assessment of methane emissions / CEN Technical report *(Pascal ALAS)*
- OGMP 2.0 – Methane emissions reporting framework *(Ronald KENTER /Tobias VAN ALMSICK)*
- Guidelines for methane target setting *(Jose Miguel TUDELA)*
- Methane Guiding Principles – ongoing collaboration *(Luciano OCCHIO)*
- GERG Research Roadmap on methane emissions *(Mures ZAREA - GERG)*

11:00 – Collaboration among Energy Community, GIE and MARCOGAZ. Next steps

Karolina CEGIR (Energy Community)

Tania MEIXUS (GIE / MARCOGAZ)

11:15 – Coffee break

11:30 – Expert Panel I: Methane emissions management

Moderator:

Matthew GOLDBERG (MARCOGAZ)

Panellists:

Aart Tacoma (NOGEPA)

Luciano OCCHIO (SNAM)

Jihane LOUDIYI (GRDF)

11:55 - Expert Panel II: Regulatory challenges in addressing the methane emissions

Moderator:

Tania MEIXUS (GIE)

Panellists:

Maria OLCZAK (Florence School of Regulation)

Brendan DEVLIN (European Commission)

Boyko NITZOV (ACER)

12:20 – Wrap-up and concluding remarks

Predrag GRUJICIC (Energy Community)

Ronald KENTER (MARCOGAZ)

Francisco DE LA FLOR (GIE)

12:30 - Closure of the meeting

Energy Community – Ongoing activities on methane emissions

Karolina CEGIR

Energy Community

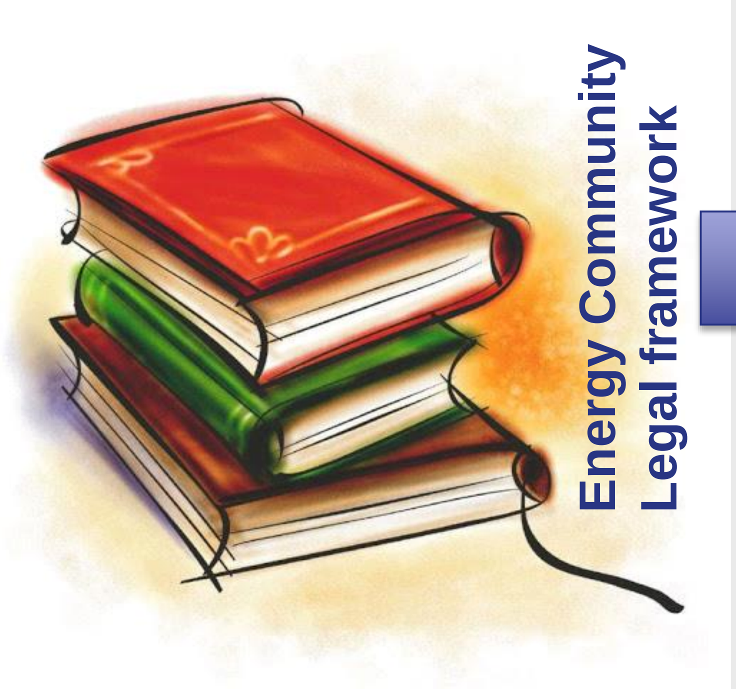
Energy Community – Ongoing activities on methane emissions

GIE&Marcogaz&ECS Follow up meeting, 16 June 2020

Follow up: November 2019 – June 2020 [1]

ECS has joined Methane Guiding Principles as a Supporting organization

- To demonstrate future direction of the Energy Community
- To include the Energy Community to the relevant EU processes



Mandatory:

Gas Directive
EE Directive
RED
Energy Statistics

On the way:

RED II
Governance Regulation
NECPs
Monitoring Mechanism Regulation

All Contracting Parties signatories to the Paris Agreement,
Reporting emissions by National Inventory Reports

Follow up: November 2019 – June 2020 [2]

Launching internal project on methane leakage (ECS CH4L)

- Focus on gas sector and methane leakage by all stakeholders involved in production, transmission, storage and distribution of natural gas
- Collection of data on CH_4 emissions, based on the Marcogaz' questionnaire and methodology – to have a base line for any further actions
- Strengthening cooperation between different sectors and ministries (within the Contracting Parties, with ECS)
- Strengthening cooperation between gas stakeholders (Contracting Parties – EU)

Contracting Parties – gas industry

Total natural gas consumption ~ 38 Bcm/y

Total natural gas production ~ 20 Bcm/y

UGS capacity ~ 31 Bcm

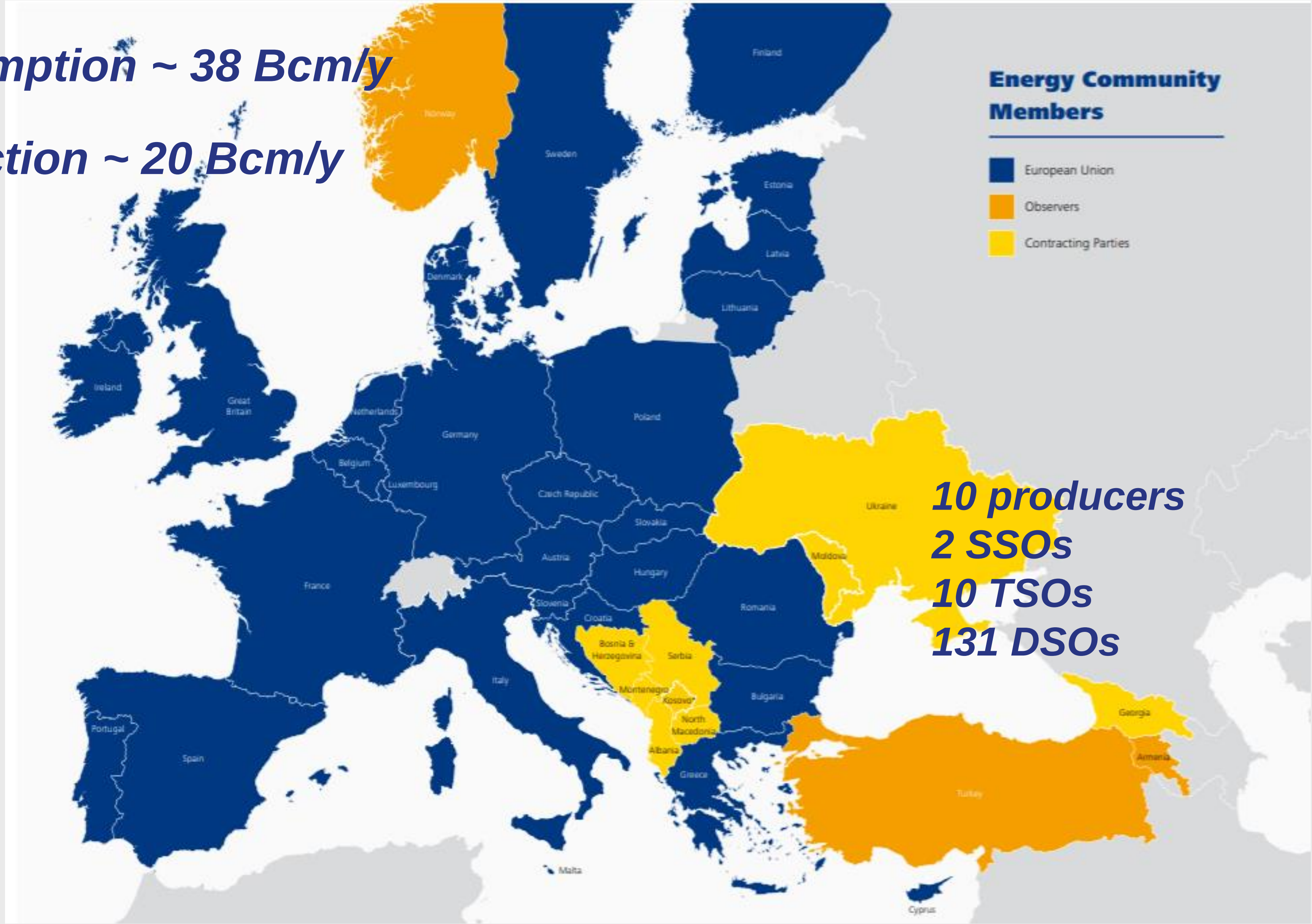
No LNG terminals

Transmission network

~ 45.000 km

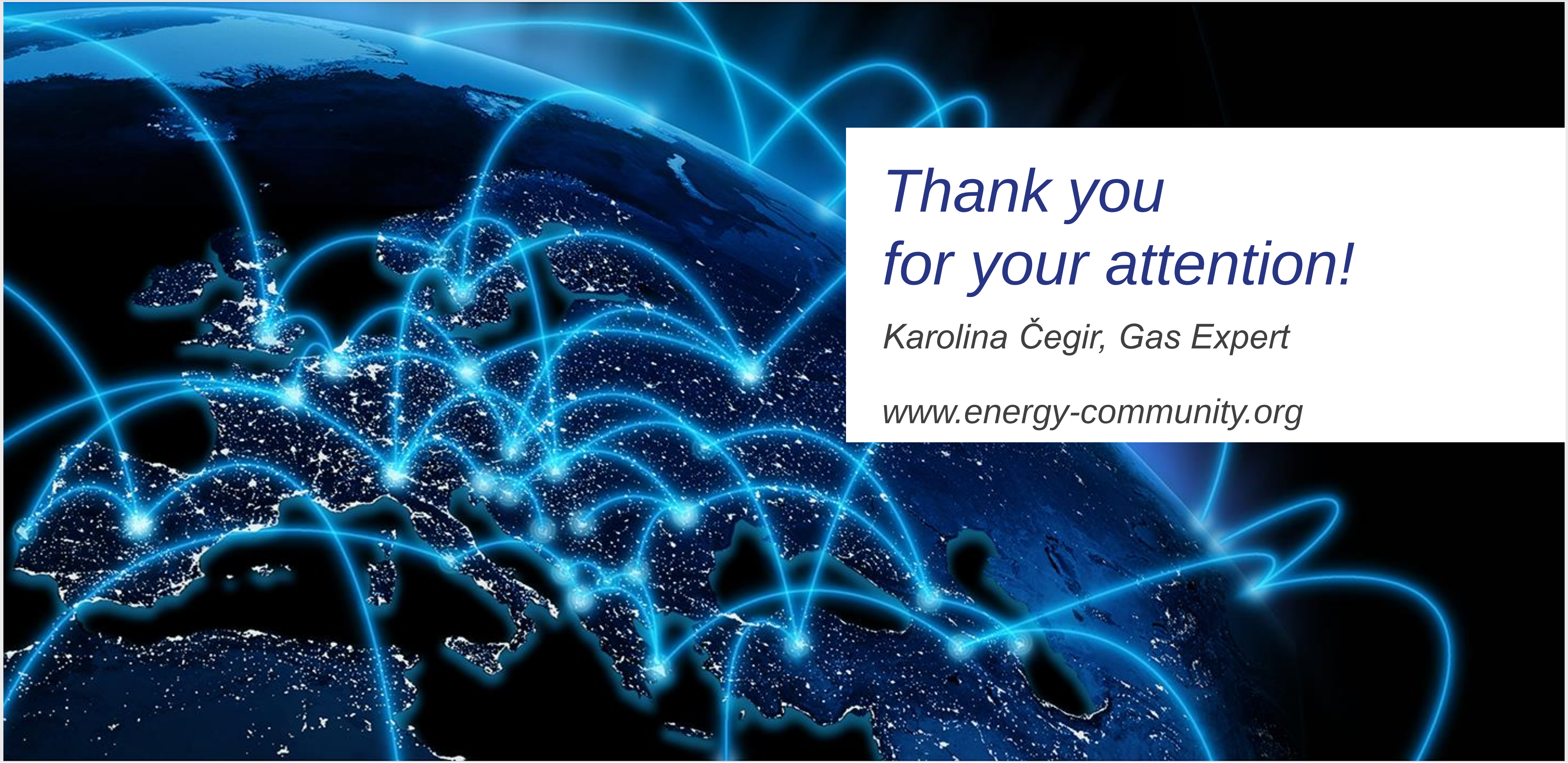
Distribution network

~ 370.000 km



10 producers
2 SSOs
10 TSOs
131 DSOs

Energy Community



Thank you for your attention!

Karolina Čegir, Gas Expert

www.energy-community.org

GIE and MARCOGAZ – Ongoing activities on methane emissions

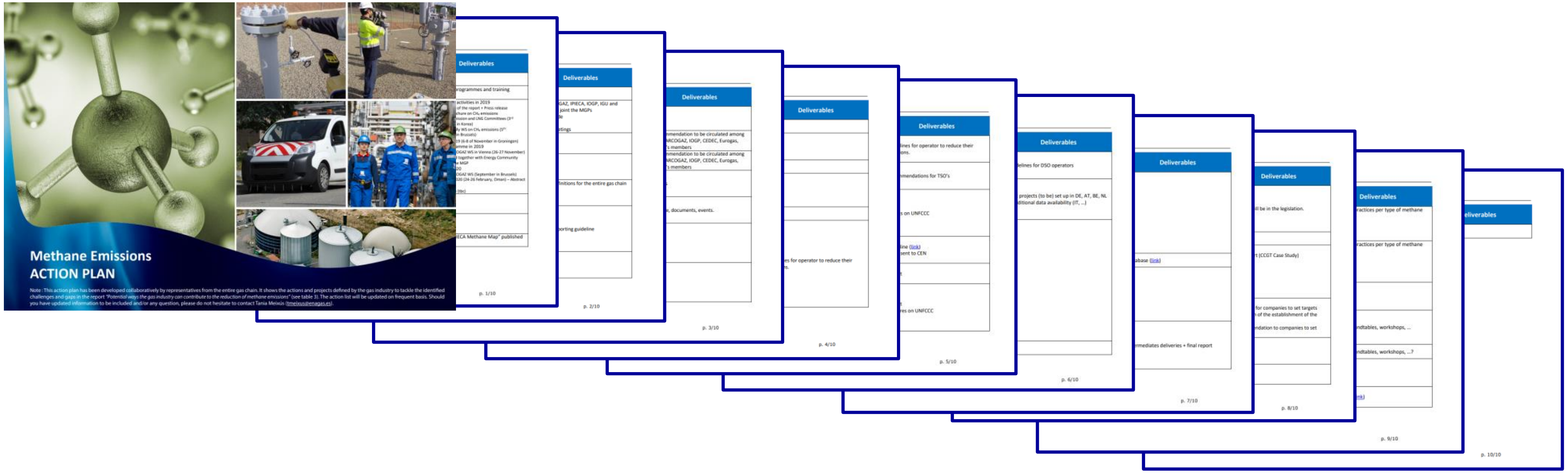
Action plan

Bogdan SIMION

Action Plan - published

More than 50 actions and projects

Identification → Detection → Quantification → Reporting → Verification → Mitigation



- Industry meeting on 5th of September of 2019 to work on the action plan
- Next industry meeting foreseen in September/October 2020

https://www.gie.eu/index.php/gie-publications/methane-emission-report-2019

Action plan - GIE & MARCOGAZ involvement

GIE and MARCOGAZ are collaborating in the following activities:

- Supporting the European Commission and the appointed consultant (Wood, the Sniffers, Carbon Limits and TNO) on the study "Limiting methane emissions in the energy sector"
    - Workshop on 10th of June 2020
    - Report to be published in August 2020
- Collaboration with the OGMP 2.0 - UNEP / EC / EDF – Methane reporting guidelines
- Collaboration with the Methane Guiding Principles
    - Best practices on reducing methane emissions (TSO, DSO, SSO, LTO)
    - Best practices on detection, measurement and quantification
- GERG – Research Roadmap on methane emissions
- Additional collaborations:

Action plan - GIE & MARCOGAZ involvement

GIE and MARCOGAZ are leading the following activities:

- MARCOGAZ 'Assessment of methane emissions for gas Transmission and Distribution system operators' (Available on MARCOGAZ' website)
    - Ongoing discussions with CEN to launch the standardisation process
    - Ongoing discussions with IOGP / MGP to cover the entire gas value chain
    - Involvement of MARCOGAZ' WG Storage and WG LNG
- Guidelines for methane emissions target setting (Available on GIE and MARCOGAZ' websites)
- Frequent Q&A document on methane emissions
- GIE Policy recommendations on methane emissions, with the technical support of MARCOGAZ
- Harmonisation of definitions

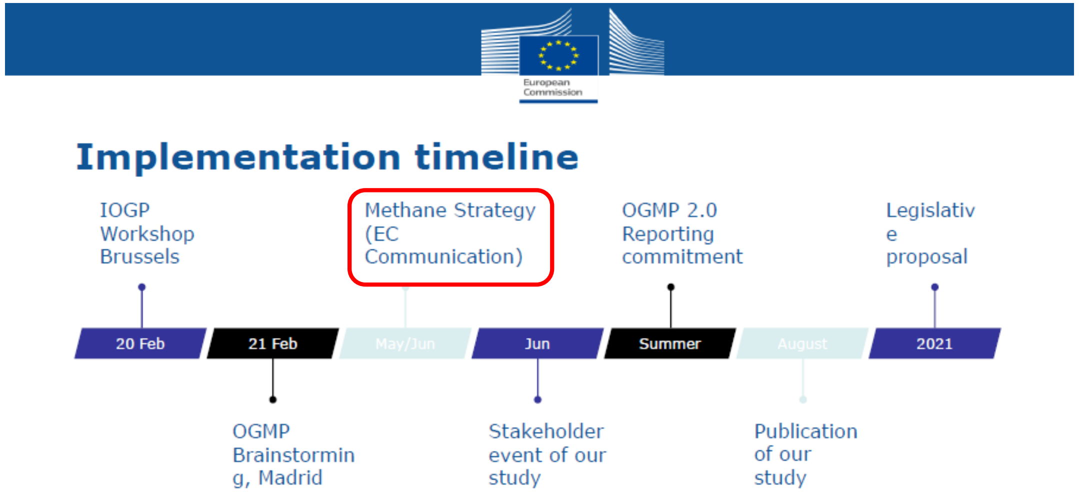
EU Methane Strategy

Study "Limiting methane emissions in the energy sector"

Frequent Q&A on methane emissions

Tania MEIXUS

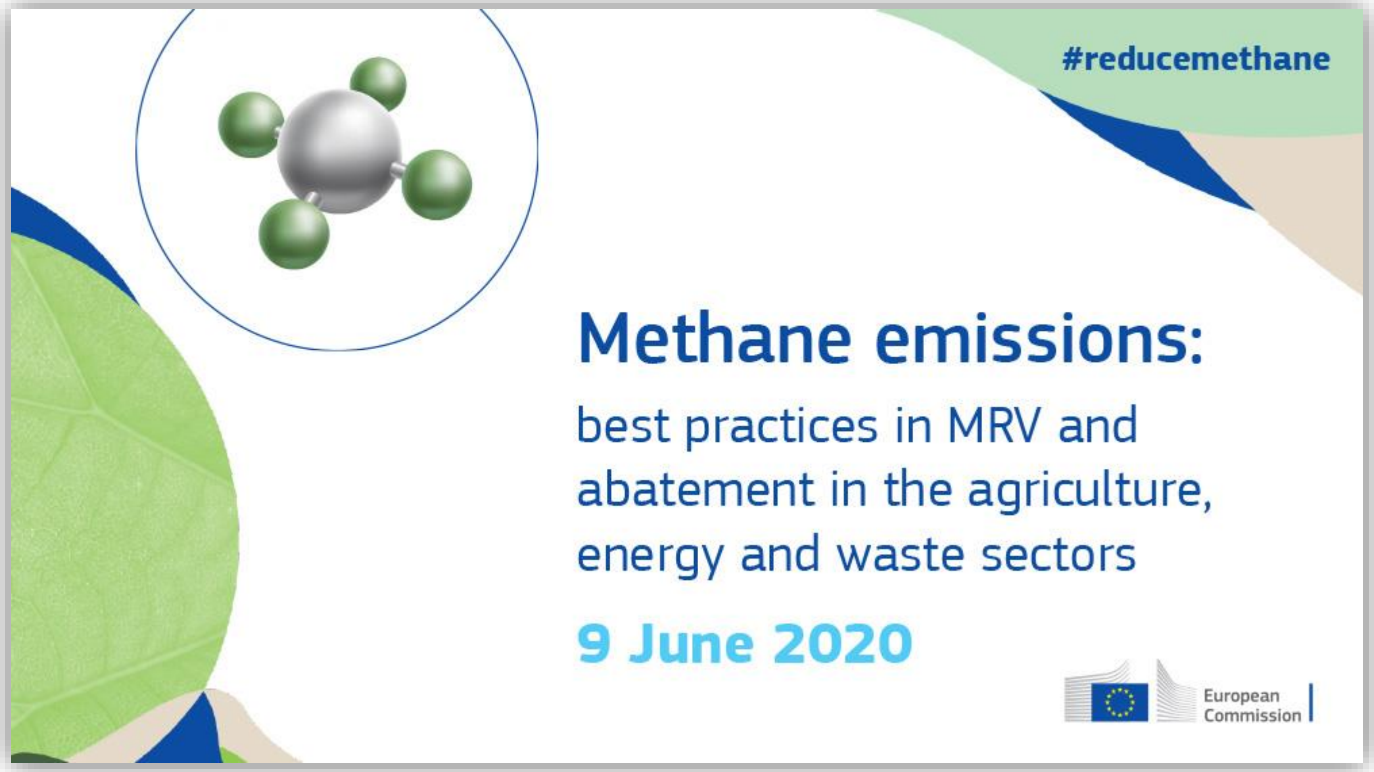
EU strategic plan to reduce methane emissions



Methane Strategy

- ✓ To be published after the Summer break
- ✓ To cover coal mines, agriculture and waste (under analysis)
- ✓ The aim is to implement a robust MRV(-IV) system and the creation of an Institute to improve the credibility and transparency of the data
- ✓ Translate the OGMP reporting framework into legislation?
- ✓ Mitigating action in parallel with data gathering efforts (e.g. LDAR campaigns)
- ✓ International cooperation (global issue)

EC Stakeholder event on MRV and abatement



Stakeholder event on methane emissions: best practices in MRV and abatement in the agriculture, energy and waste sectors (Link)

GIE and MARCOGAZ welcome the organization of this stakeholder event and **wish to make a short presentation** during the first part of the session dedicated to best practices on methane **measurements, reporting and verification (MRV)**.

Methane emissions management and reduction is not a new topic for the gas industry, as we have been routinely conducting identification, detection, quantification and mitigation of methane emissions for a long time, as a safety requirement and for economic reasons. Nowadays the motivation of the gas industry is also more focused on environmental aspects.

GIE and MARCOGAZ are willing to collaborate with the EC to propose a coordinated and comprehensive way for the EU to achieve Tier 3 MRV. We recognise the need of having accurate methane data to adopt a solid and long-term abatement strategy. For these reasons, GIE and MARCOGAZ have prioritised the following activities:

- **Assessment of methane emissions for Gas Transmission & Distribution System Operators** (this document can be found on this link). This document gives coherent technical guidance to gas grid operators across Europe to assess their methane emissions in accordance with a harmonized and transparent method. The principles of this methodology can also be applied to other parts of the gas value chain (i.e. upstream, LNG regasification terminals and underground gas storages). This methodology can contribute to ensure that all methane emissions data reported is based and verified on the same methodology all over Europe, contributing to transparency and comparability of data.

  MARCOGAZ is working with the CEN to bring this document into a CEN Technical Report in a near future.

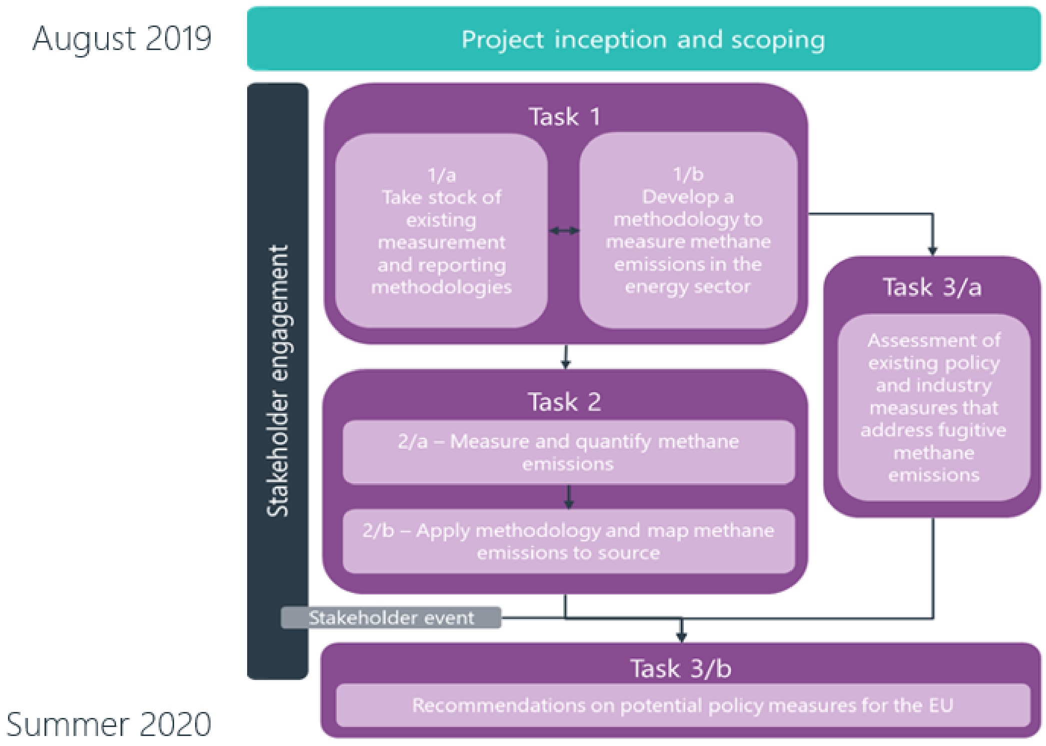
- **Common methane emissions reporting framework**. GIE and MARCOGAZ are currently collaborating with the EC, UNEP and EDF with the aim of having a common methane emissions reporting framework. A reporting template and a technical guideline covering transmission networks, LNG regasification terminals, underground gas storages and distribution networks is currently under development based on the previous experience and knowledge of MARCOGAZ.

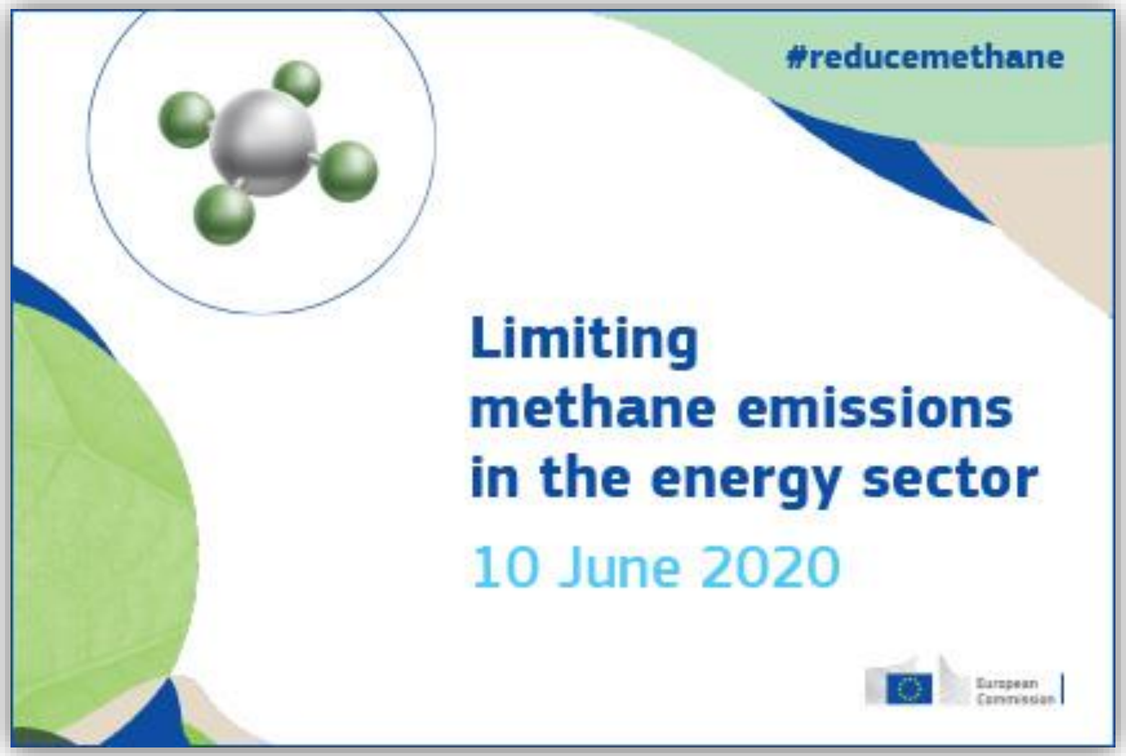
  We support the proposal of creating an independent institution aimed at improving credibility and transparency of methane emissions data.

- **Guidelines for methane emissions target setting** (this document can be found on this link). This document helps companies from the entire gas value chain to set methane emission reduction targets as complement to mitigation strategies. We encourage gas companies to set their own methane emission reduction targets as soon as possible. Based on this information, methane emissions reduction targets for the different segments of the European gas value chain could be set for 2025 and 2030.

EC Stakeholder event on limiting methane emissions in the energy sector

Project approach - overview





GIE Policy Recommendations with the technical support of MARCOGAZ

Policy recommendations on methane emissions

Background

The effort of the European Union (EU) to reduce the greenhouse gas (GHG) impact of its energy system is focused on mitigating carbon dioxide (CO_2) emissions. However, the Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action *[1]* requires the European Commission (EC) to propose an EU strategic plan for methane emissions, which will become an integral part of an EU long-term climate strategy aiming to achieve the Paris Agreement targets.

On the 11th of December 2019, Ursula von der Leyen unveiled the European Green Deal *[2]* – a vision designed to transform the EU into the first climate neutral economy by 2050. The achievement of the climate neutrality objective requires substantial reduction of all GHGs.

At the 31st European Gas Regulatory Forum (Madrid Forum) held in October 2018, the Directorate General for Energy of the EC invited GIE and MARCOGAZ to investigate the potential ways that the gas industry can contribute to the reduction of methane emissions and to report their findings at the 32nd Madrid Forum in June 2019. Responding to the request, GIE and MARCOGAZ conducted an industry-wide study, with contributions from representatives of the entire gas value chain. This comprehensive report *[4]* includes a set of policy recommendations which are further developed in this paper.

Methane emissions management and reduction is a top priority for the European gas industry, to ensure and demonstrate that the gas sector can become carbon-neutral and remain part of the future energy mix.

Due to the important role of methane emission in short time climate change, any future methane emission regulation should address all economic segments.

The aim of this paper is to provide methane emission policy recommendations to the announced European Green Deal, the EU strategic plan for methane emissions, as well as to the appointed consultants performing the study "Limiting methane emissions in the energy sector". This document is mainly focused on gas infrastructure operators.

1

Policy and regulatory recommendations on methane emissions

To ensure that proposed measures are feasible and effective, the gas industry should be consulted and involved from the start of the process to develop a policy and related regulatory supporting tools.

As the experience level among gas operators may vary, gradual implementation of the future EU methane policy could be considered, together with a straightforward, affordable and transparent implementation roadmap.

Policies and regulatory tools should encourage the industry by allowing enough flexibility to achieve the highest reductions at the lowest cost. The effectiveness of measures should be appropriate in terms of both, contribution to the overall emission reduction and costs incurred.

Costs efficiently incurred by the regulated companies related to the improvement of monitoring, reporting and verification (MRV) and to the implementation of mitigation measures should be allowed and accordingly incentivised by the Regulatory Authorities. Regulated companies could submit for approval by the Regulatory Authorities their plans to put in place a robust MRV and the actions to mitigate methane emissions including the assessment of costs, benefits and abatement opportunities.

Before evaluating the possibility to implement economically efficient instruments/market-based mechanisms (tradable permits, taxes, incentives), it is necessary to obtain sufficient accurate data in a harmonised way to make them comparable between the different parts of the gas value chain. The following instruments will contribute to this aim:

- Harmonised definitions[1]
- Identification of a set of reliable methodologies and recommendations to quantify methane emissions for each part of the value chain to be included in international standards, i.e. for TSOs and DSOs a reference to the MARCOGAZ 'Assessment of methane emissions for gas Transmission and Distribution System Operators' *[5]* should become the EU standard.
- Methane emission reporting process should be validated in accordance with reference standards.
- A single methane emissions reporting framework[2] should be established, as well as a single platform for data collection to increase transparency. These developments should be done in parallel to the improvement of the National Inventory Reports (NIR) to avoid duplication. The gas industry should be involved in these processes.

A number of guidance documents covering good practices and Best Available Techniques (BATs) to reduce methane emissions are already available. The gas industry, together with the European Commission, should consolidate and develop specific reference instruments to encourage their uses.

- LDAR (Leak Detection and Repair) campaigns taking into account the characteristics of the different gas infrastructures should be carried out by each company.

Gas companies should set their own methane emission reduction targets for 2025 before end of 2021. Based on that, methane emissions reduction targets for the different segments of the gas value chain should be set for 2025 and 2030.

[1] GIE and MARCOGAZ working on this based on IPIECA glossary. A reference to the future document should be included in the EU regulation.
[2] GIE and MARCOGAZ welcome the initiative of the OGMP as long as midstream and downstream segments are appropriately covered. A reference to that single methane emissions reporting guideline should be included in the EU policy. GIE and MARCOGAZ are willing to contribute to the developments.

2

The new policy should incentivise effective and continuous actions, taking into account the previous efforts made by the gas companies, as well as promote innovation, development and implementation of new technologies and practices to improve MRV and to mitigate emissions.

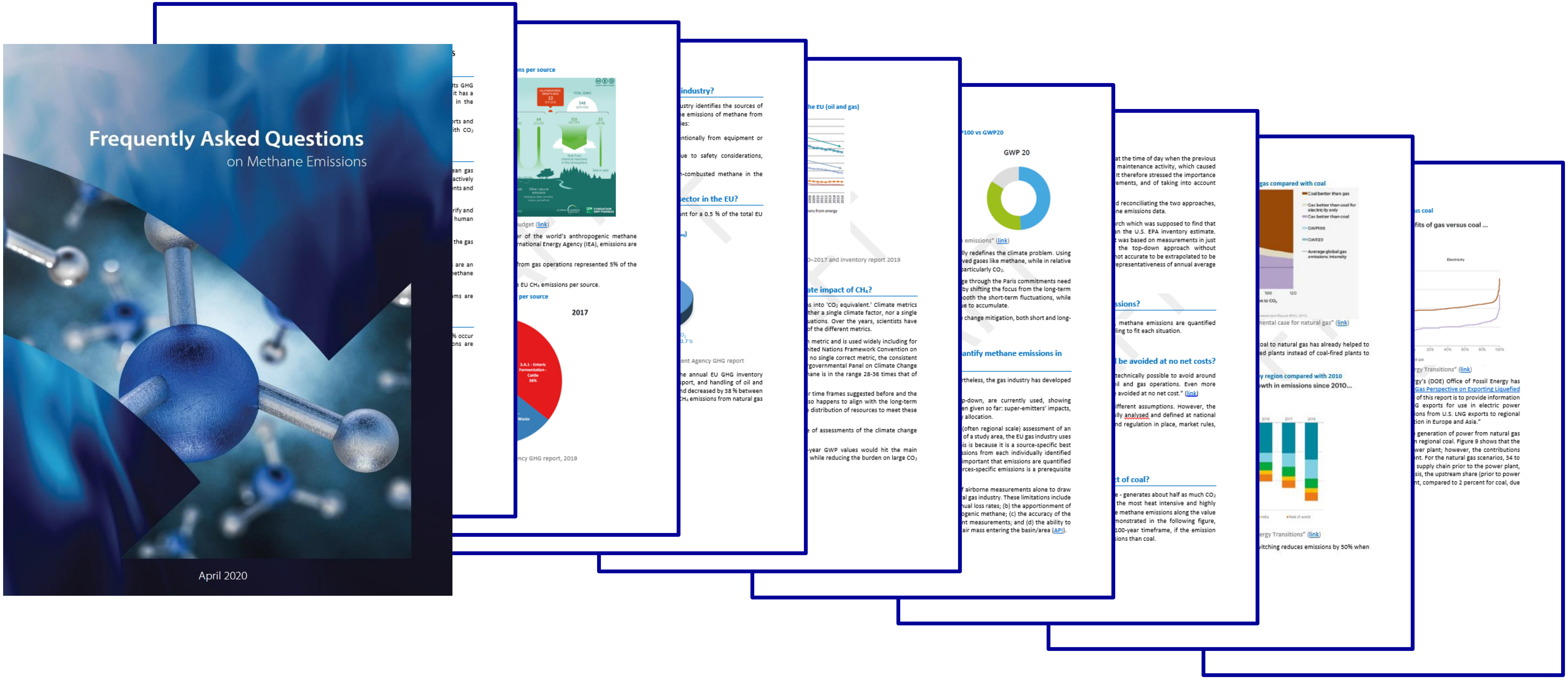
The new methane emission policy should cover the complete energy sector. This approach leads to the following recommendations:

- Methane emissions originating from oil and coal should be separated from those related to the gas value chain.
- Cooperation with non-EU countries is key to ensure consistency and to foster the impact of the new methane emission policy.
- European gas infrastructure operators should only be responsible for the costs related to methane emissions from the assets under their control.

The new methane policy should ensure a fair distribution of the efforts across all industries. The gas sector could contribute to the sharing of knowledge to reduce methane emissions in other sectors such as waste and agriculture (i.e. production of biomethane and injection into the gas grid).

3

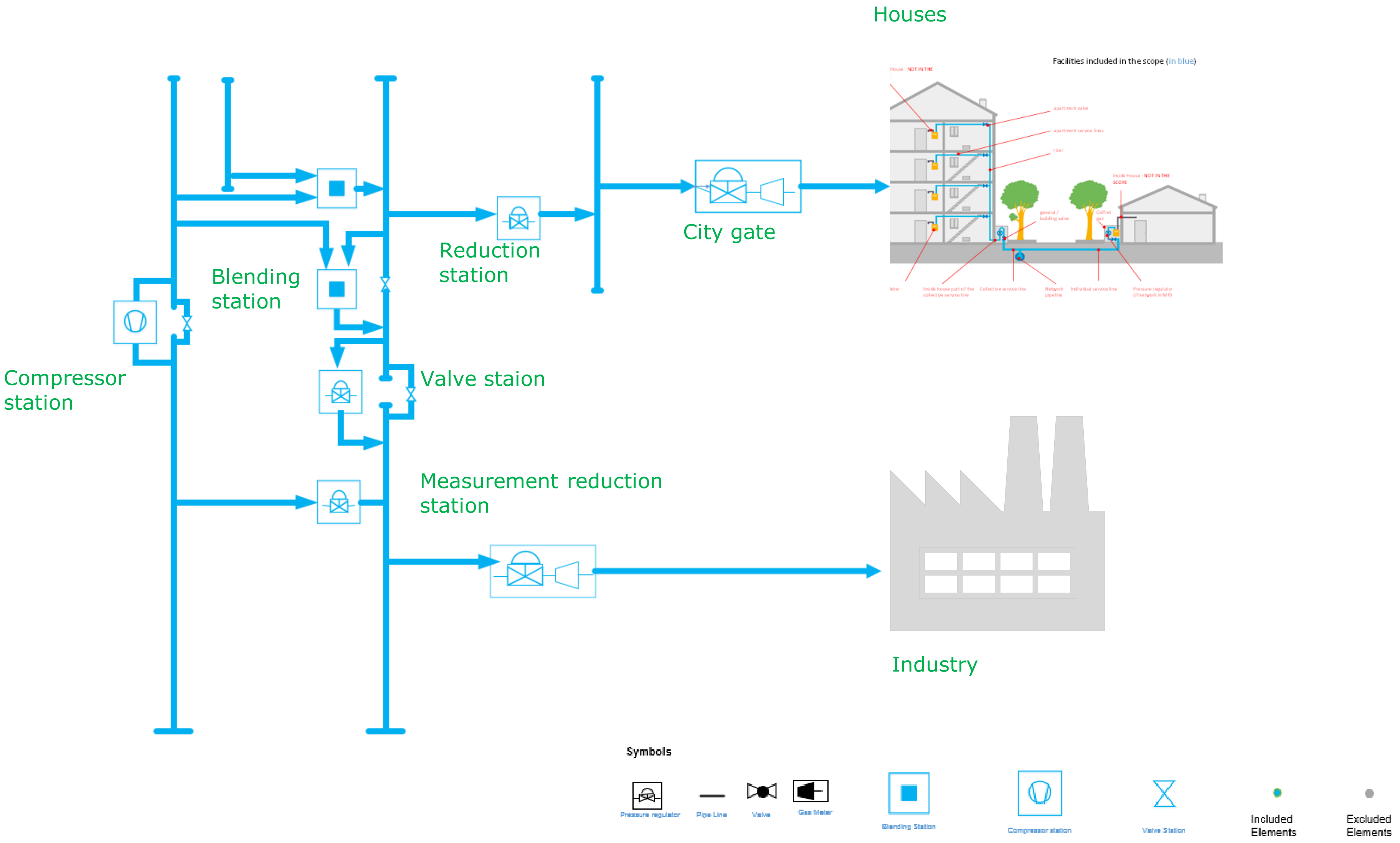
Frequent Q&A on methane emissions



MARCOGAZ Assessment of methane emissions, CEN Technical Report

Pascal ALAS

Assessment of methane emissions report: Scope



Content in brief

- Prescription on methane emission sources identification
- Quantification strategy
- Overview of available measurement methods
- Prescription of estimation and calculation methods
- Uncertainty assessment
    - ✓ Definitions aligned with already existing CEN documents
    - ✓ Bottom-up approach based on Tier III approach
    - ✓ MEEM GERG report based

Types of emissions

<table>
<tr><th colspan="4">Methane emissions</th></tr>
<tr><th colspan="3">Types of emissions</th><th>Examples</th></tr>
<tr><td rowspan="2">Fugitives</td><td colspan="2">Leaks due to connexions</td><td>Tightness failure</td></tr>
<tr><td colspan="2">Permeation</td><td></td></tr>
<tr><td rowspan="4">Vented</td><td rowspan="3">Operational emissions</td><td>Purging/venting for works, commissioning and decommissioning</td><td>Works, maintenance</td></tr>
<tr><td>Regular emissions of technical devices</td><td>Pneumatic emissions actuators, flow control valves, …</td></tr>
<tr><td>Starts & stops</td><td>Emissions from start and stops of compressors, …</td></tr>
<tr><td colspan="2">Incidents</td><td>Third party, corrosion, construction defect/material failure, ground movement, failure of installation</td></tr>
<tr><td colspan="3">Incomplete combustion</td><td>Unburned methane in exhaust gases from combustion installations.</td></tr>
</table>

Structure of the report

		Types of emissions						
		Fugitives		Vented				Incomplete combustion
				Operational emissions				
		Permeation	Leaks due to connections	Purging/venting for works, commissioning and de-commissioning	Regular emissions of technical devices (e.g. pneumatic)	Start & Stop	Incidents	
Groups of assets	Main lines & service lines	§ 6.4.1	§ 6.4.2	§ 6.5.2.1			§ 6.6	
	Connections (flanges, seals, joints)		§ 6.4.2					
	Measurement devices (chromatographs, analysers …)		§ 6.4.2		§ 6.5.2.2			
	Valves² (regul. stations, blending stations, compressor stations, block valve stations)		§ 6.4.2	§ 6.5.2.1	§ 6.5.2.2			
	Pressure / Flow regulators		§ 6.4.2		§ 6.5.2.2			
	Safety valves		§ 6.4.2				§ 6.6	
	Combustion devices (turbines, engines, boilers…)		§ 6.4.2	§ 6.5.2.1		§ 6.5.2.3		§ 6.7
	Compressors & compressor seals		§ 6.4.2	§ 6.5.2.1	§ 6.5.2.2	§ 6.5.2.3	§ 6.6	
	Flares					§ 6.5.2.3		§ 6.7

Determination of Emission Factors (EF)

Detection Measurement Quantification

Technique	Description of technology /operation	Advantages	Disadvantages	Device
Pressure decay / Flow fluctuation	The pressure decay method can be used as a quantitative leak measurement technique, where the methane emissi pipeline is measure isolated parts of a c network. Pressure i during a specific tin calculated from the known (estimated) The sensitivity of th depends on the leal the outlet of the pip no change in pressu	• Simple and requires no telemetry.	• Uncertainty associated with unknown changes of gas	Pressure sensors, flowmeters
Refraction wave method (acoustic pressure waves)	The acoustic pressu refraction waves pr When a pipeline wa escapes in the form produces negative p propagate in both d and can be detected of a pressure wave			
Balancing methods	These methods bas conservation of mas flow entering the le the mass flow leaving it. Mass imbalance indicates leak.			
Point-source measurements	Measurement of emis points based on flow composition. Engines typical point-source e			
			over large source areas • Single bagging may not capture all variability in emissions. Provides an measurement that must be repeated to capture temporal trends.	
			• Quantifies diffusive emission rates from a small source area (typically 1 m^2 or less). • Labour intensive • Provides measurement that must be repeated to capture	Chambers of different volumes

Technique	Description of technology /operation	Advantages	Disadvantages	Device
	monitoring periods by the chamber volume/area ratio. Dynamic chambers quantify emissions using inlet/outlet methane concentrations with a known rate of the flux.	• Can measure the variability of emissions over large source areas	• Provides measurement that must be repeated to capture temporal trends	
External tracer	Rele from trac plum emis and	• Measures total methane	• Difficult to isolate individual	
Perimeter facility line measurements	Mea bour alon emis	temporal trends in emissions	• Appropriate topographic and meteorological conditions are necessary. • Difficult to determine the area contributing to leakage	

Method	Description	Technical Specifications
Thermal dispersion	Gas leak rate is estimated based on the size of the cloud observed from thermograms. The amount of gas released depends of the upstream pressures and leak sizes.	
Electrochemical detection[5]	Electrochemical detectors use the porous membrane through which the detected gas goes to the electrode on which it is either oxidized or reduced, resulting in the change of the electric current.	
Soap Bubble Screening	It is easy, quick and low cost to detect leaks with a soap solution. Soap bubble screening consists to spray all the junctions with a mixture of water and soap (or with a specific commercial foaming product). All the junctions (even the junctions inserted in a coating) are targeted (the actuator of the valves, flanges, fitting, caps, insulating joints, …). It is necessary to stay a short time in front of each junction to watch the creation of bubble. This technology can be used for an efficient and fast leak detection and repair campaign, operational team are familiar with that very well know historical methodology. Not effective on large openings. Cannot be used on equipment above the boiling point or below the freezing point of water.	-

Method	Description	Technical Specifications
Flame ionisation detection	The operation is based on the ionization of the detected gas in the hydrogen flame that is generated inside the FID. It enables to detect the methane concentrations from very low levels, but reacts not only to methane, but to other hydrocarbons as well.	The sensitivity of a GC-FID machine is around 0.1 ppm[4] and a maximum range of about 2000 ppm.
Semiconductor based	In the presence of the detected gas, the semiconductor's resistance decreases due to the oxidation, or reduction, of the gas on the metal oxide surface. The method is not selective, as some other gases, such as ozone, volatile organic compounds ensor must come in tor sensors work r ultrasonic	Detection concentration: 200-10.000 ppm (Natural gas / Methane), Operating temperature: 14 to 122°F (-10 to 50°C)
	sensors to detect nd-held or remotely s or through mobile -held units are a of components. The d detect function. An y viewing a live image ration required, some	Min. detectable leak rate (methane) – 0,35 g/h

Leak Flow capturing

Method	Description	Technical Specifications
Acoustic leak detection	Acoustic leak detectors capture the acoustic signal of pressurized gas escaping from a valve plug or gate that is not tightly sealed. They can detect either low or high frequency audio signals and are useful for detecting internal through valve leaks or ultrasonic signals from blowdown valves and pressure relief valves (ultrasonic signals at a frequency of 20 - 100 kHz). Most detectors typically have frequency tuning capabilities which allow the sensor to be tuned to a specific leak. The operator can also gain a relative idea of a leak´s size as a louder reading will generally indicate a higher leak rate. For airborne ultrasonic signals, an ultrasonic leak detector is pointed at a possible leak source up to 30 meters away and by listening for an increase in sound intensity through the headphones. Ultrasonic leak detectors can also be installed on mounting poles typically around 2m above the ground around a facility and send a signal to a control system indicating the onset of a leak.	Sensitivity: Detects a leak of 0,1 mm at 3 bars at 20 m Temperature range: - 10°C to + 50°C
Laser leak detection	A popular detector is the Remote Methane Leak Detector (RMLD), which uses a tunable diode-infrared laser that is tuned to a frequency which is specifically absorbed by methane. As the laser beam from an RMLD device passes through a gas plume (and is reflected back to the camera) it will detect if methane is present in the beam path by comparing the strength of the outgoing and reflected beams. Simple to operate, especially handheld versions, useful for detecting methane leaks originating from hard-to-reach sources or throughout difficult terrain. Allows the detection of methane in the beam path up to a distance of approximately 30m. Specifically tuned to detect methane and does not give a false reading for other hydrocarbons (No cross-sensitivity) require a background surface to reflect back laser beam (not applicable for open fields).	Measurement Range: 1-50k ppm
Combustible gas detection	When gas that is aimed to be detected goes through the catalyst it is combusted what heats up the catalyst and changes the resistance, which subsequently enables detecting of the searched gas. The catalyst poisoning may be an issue decreasing its reliability.	Measurement Range: 1ppm-100%

CEN decision

DECISION 17/2020 taken by CEN/TC234 taken on 2020-04-01+02

Subject: CEN/TC 234 – Marcogaz proposal for Assessment of methane emissions for TSOs and DSOs

CEN/TC 234 Gas infrastructure

- referring to the presentation given by Marcogaz at the meeting and the related document Assessment of methane emissions for TSOs and DSOs based on the Marcogaz document (CEN/TC 234 N 1196)
- considering the expressed interest to include the elaboration of a related CEN deliverable into the CEN/TC 234 work program (CEN/TC 234 Dec 21/2019)
- recognising the use and the interests to follow a global approach

- confirms the interest to take the lead of the standardisation for gas transmission and distribution systems on European level in a globally agreed approach.
- decides to put a NWIP forward for a TR, that will be questioned when a decision on a global approach is adopted.
- decides to form a dedicated WG; a call for convenorship and experts will be put forward; the involvement of liaisons need to be ensured.
- requests an exchange in parallel with the interested parties (CEN/TC 12, CEN/TC 234, ISO/TC 67, Marcogaz, GIE, IOGP, OGCI, OGMP….) to set-up the global approach.
- requests Francoise de Jong and also IOGP to reflect this decision in the strategic IOGP meeting on 28 April 2020.

The decision was taken by unanimity.

Steps forward

- Inquiry for NWI TR approval, call for experts, convenorship & secretariat, launched by TC234 (Gas Infrastructure)
- Technical Report Timeline:
  - WG 14 kick off, Summer 2020
  - First Working Draft, Nov. 2020
  - TR Ballot, May 2021
- Possible to join, via national standardisation bodies or via a liaison organisation
- Discussions launched between CEN, IOGP, OGCI and MARCOGAZ, to understand what could be the approach to have a global standard
- Discussions launched to integrate UGS and LNG terminals

OGMP 2.0 – Methane emissions reporting framework

Ronald KENTER
Tobias VAN ALMSICK

Kick-off meeting on the OGMP 2.0

The Oil and Gas Methane Partnership (OGMP) brings together governments, international organizations, NGOs, and industry

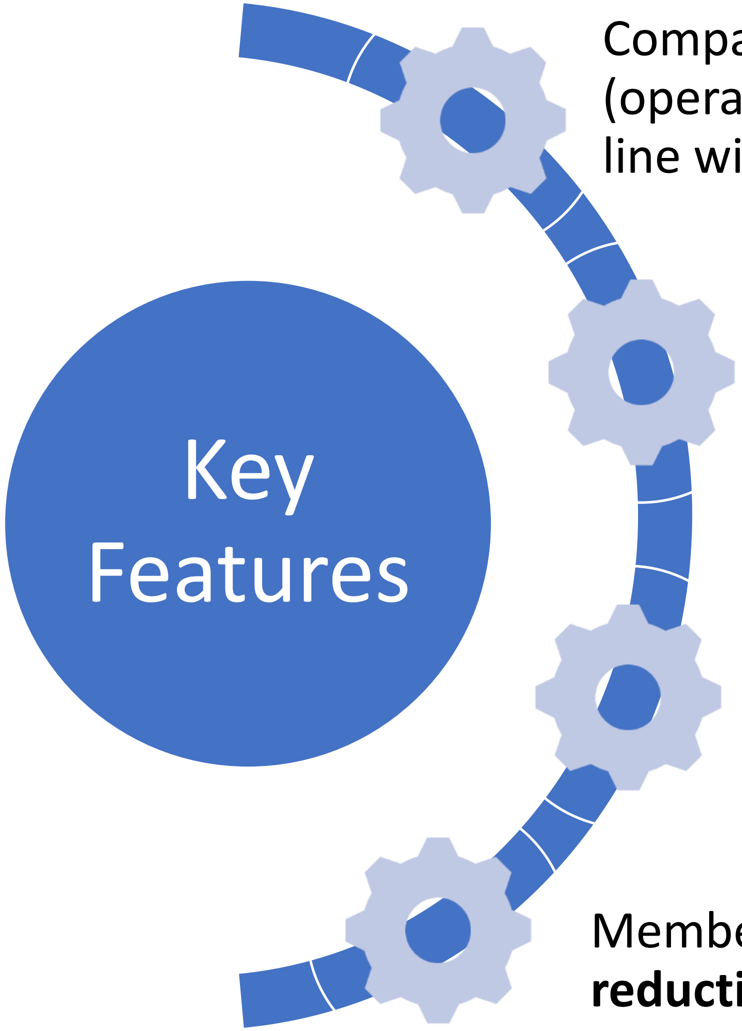
OGMP Structure and Membership

Hosting Organizations	UN environment; Climate & Clean Air Coalition to reduce short-lived climate pollutants
Partners	EDF Environmental Defense Fund; European Commission; Norway; United Kingdom
Member Companies	bp; ecopetrol; eni; equinor; PEMEX; Neptune Energy; PTTEP; Repsol; Shell; Total

Key Facts:

- Launched 2015
- The only multi-stakeholder initiative working on methane
- Raised awareness on methane globally
- Voluntary company initiative
- Covers 15% of oil and gas production
- Created series of Technical Guidance Documents

OGMP 2.0: The new “gold standard” of methane reporting



Companies report methane emissions from all assets, **operated** (operational control) and **non-operated** (financial investment) in line with their reporting boundaries

All segments of the up-, mid and downstream sector (utilization is not part of the scope)

All material sources of methane emissions

(OGMP 1.0 nine sources + midstream and downstream sources, incomplete combustion from flaring, offshore sources)

Member companies will announce individual **reduction targets** that will be periodically reviewed

OGMP 2.0 allows companies to categorize asset-level reporting by 5 categories

Level 1	**Venture/Asset Reporting** • Single, consolidated emissions number • Only applicable where company has very limited information sharing
Level 2	**Emissions Category** • Report emissions based on methane emissions categories • Estimates based on emissions factors
Level 3	**Emission Source Level** • Emissions allocated to individual source types • Estimates based on generic emissions factors
Level 4	**Emission Source Level** • Emissions allocated to individual source types • Estimates based on specific EFs and direct measurement
Level 5	**Site Level** • Emissions allocated to individual source types • Reporting based on site-level measurements to reconcile source and site level emission estimates

Next steps

JUNE / JULY

- Webinar with the EC and UNEP (19/06)
- Finalisation of the reporting framework
- Finalisation of the reporting template (circulated among EU gas industry)
- To inform UNEP if companies intend to join OGMP

MAY / JUNE

- To start reporting to the Global Institute

2020

2021

SEPTEMBER

- Virtual high-level event to launch OGMP
- Finalisation of explanatory document of the reporting template / technical guideline

2020-2022/2023	2023/2024	2024/2025	2025/2026
• Companies work to achieve compliance for operated and non-operated ventures	• Deadline to achieve full compliance (Level 4/5) for **operated ventures**	• Companies continue to work to achieve compliance for non-operated ventures	• Deadline to achieve full compliance (Level 4/5) for **non-operated ventures**

Definition of assets and levels of reporting (Proposal) TSO

Calculation									LEVEL 1 / 2 / 3 / 4									LEVEL 5		
		Activity Factors		Emission Factors					Total Emissions			Source for own data						Total Emissions		Comments
				Marcogaz Range			Company		Natural Gas	Methane	Level							Natural Gas	Methane	
No..	System Category	Data	Unit	Minimum	Average	Maximum	Data	Unit	Nm^3/y	kg/y	Please indicate the Level of the data: 1 / 2 /3 / 4	Measurements	EF Measurements	EF Literature	Calculation	Modelling	Estimation	Nm^3/y	kg/y	
1.	**TSO -Total**																			
	Length of network		km					Nm^3 / km*y	0	0										
1.1.	**TSO - Pipeline Main lines**								0	0								0	0	
1.1.a	**Vents**								0	0										
1.1.a.1.	**Operational emissions**								0	0										
	Vent Maintenance								0	0										
	Vent Commissioning / Decommissioning								0	0										
1.1.a.2.	**Incident / Emergency vents**								0	0										
1.1.b	**Incomplete combustion**									0										
	Total emission caused by flares		Nm^3	0,00		0,00		mg/Nm^3		0										
1.2.	**TSO - Compressor station for transmission pipelines (Each one will be reported separately)**								0	0								0	0	
1.2.a	**Fugitive Emissions**								0	0										
1.2.a.1.	**Connections (flanges, seals, joints)**		No.	0,00		0,00		Nm^3/y	0	0										
1.2.a.2.	**valves and control valves**		No.	0,00		0,00		Nm^3/y	0	0										
1.2.a.3.	**pressure relief valves**		No.	0,00		0,00		Nm^3/y	0	0										
1.2.a.4.	**BD-OEL (blow-down open ended line)**		No.	0,00		0,00		Nm^3/y	0	0										
1.2.a.5.	**OEL**		No.	0,00		0,00		Nm^3/y	0	0										
1.2.a.6.	**Others**			0,00		0,00		Nm^3/y	0	0										
1.2.b	**Vents**								0	0										
1.2.b.1.	**Maintenance vents**								0	0										
1.2.b.2.	**Regular emission tec. devices (pneumatic)**								0	0										
	Number of valves with pneumatic operation		No.	0,00		0,00		Nm^3/No./y	0	0										
	Gas analyser		No.	0,00		0,00		Nm^3/No./y	0	0										
	Seals of the compressor units		No.	0,00		0,00		Nm^3/No./y	0	0										
1.2.b.3.	**Start/stop vents**								0	0										
	Total emission caused by starts								0	0										
	Total emission caused by stops								0	0										
1.2.b.4.	**Incident / Emergency vents**									0										
1.2.c	**Incomplete combustion**									0										
1.2.c.1.	**From flares**		Nm^3	0,00		0,00		mg/Nm^3		0										
1.2.c.2.	**From turbines**		Nm^3	0,00		0,00		mg/Nm^3		0										
1.2.c.3.	**From engines**		Nm^3	0,00		0,00		mg/Nm^3		0										
1.2.c.4.	**From others (heaters/pre-heating system/boilers)**		Nm^3	0,00		0,00		mg/Nm^3		0										

Definition of assets and levels of reporting (Proposal) DSO

Organisation	
Company:	
Country	
Emissions for the Year:	2019
Responsible Person:	

Natural Gas Composition		
Average Methane Content of Natural Gas:		% (Vol.)
Density of Methane:	0,7175	kg/Nm³ (273,15 K / 101.325 Pa)*
Conversion Factor from m³ Nat.gas to g CH4:		g CH4 / Nm³ Gas
specific Exhaust Gas Volume (dry)		m³/m³

* G. T. Armstrong, T. L. Jobe Jr., "Heating Values of Natural Gas and Its Components", NBSIR 82-2401, Washingotn: US Department of Commerce, 1982

Calculation		Activity Factors		Emission Factors						LEVEL 1 / 2 / 3 / 4										LEVEL 5		Comments
					Marcogaz Range			Company		Total Emissions			Source for own data							Total Emissions		
										Natural Gas	Methane	Level								Natural Gas	Methane	
No..	System Category	Data	Unit		Minimum	Average	Maximum	Data	Unit	Nm³/y	kg/y	Please indicate the Level of the data: 1 / 2 /3 / 4	Measurements	EF Measurements	EF Literature	Calculation	Modelling	Estimation		Nm³/y	kg/y	
4.	DSO -Total																					
	Length of network (company)		km	Pressure range (bar (MOP))					Nm³ / km³y	0	0											
4.1.	DSO - Pipelines: Main lines									0	0									0	0	
4.1.a.	Fugitives									0	0											
4.1.a.1.	Permeation (PE Pipes)									0	0											
	Pressure range 1		km						Nm³/km/y	0	0											
	Pressure range 2		km						Nm³/km/y	0	0											
	Pressure range 3		km						Nm³/km/y	0	0											
4.1.a.2.	Permeation (PVC Pipes)									0	0											
	Pressure range 1		km						Nm³/km/y	0	0											
	Pressure range 2		km						Nm³/km/y	0	0											
4.1.a.3.	Permeation (PA Pipes)									0	0											
	Pressure range 1		km						Nm³/km/y	0	0											
	Pressure range 2		km						Nm³/km/y	0	0											
	Pressure range 3		km						Nm³/km/y	0	0											
4.1.a.4.	Permeation (Other Non-Metal Pipes)									0	0											
	Pressure range 1		km						Nm³/km/y	0	0											
	Pressure range 2		km						Nm³/km/y	0	0											
	Pressure range 3		km						Nm³/km/y	0	0											
4.1.a.5.	Leaks derived from systematic survey									0	0											
	Pressure range 1		No.leaks						Nm³/y	0	0											
	Pressure range 2		No.leaks						Nm³/y	0	0											
	Pressure range 3		No.leaks						Nm³/y	0	0											
4.1.b.	Vented									0	0											
4.1.b.1.	Operational emissions / Maintenance									0	0											
	Purging		No.		0,00		0,00		Nm³/y	0	0											
	Venting		No.		0,00		0,00		Nm³/y	0	0											
4.1.b.2.	Incident / Emergency vents									0	0											
	Third party damages (incl. repair)									0	0											
	Pressure range 1		No.						Nm³/y	0	0											
	Pressure range 2		No.						Nm³/y	0	0											

Definition of assets and levels of reporting (Proposal) SSO

gie marcogaz

Organisation	
Company:	
Country	
Emissions for the Year:	2019
Responsible Person:	

Natural Gas Composition		
Average Methane Content of Natural Gas:		% (Vol.)
Density of Methane:	0,7175	kg/Nm³ (273,15 K / 101.325 Pa)*
Conversion Factor from m³ Nat.gas to g CH4:		g CH4 / Nm³ Gas
specific Exhaust Gas Volume (dry)		m³/m³

* G. T. Armstrong, T. L. Jobe Jr., "Heating Values of Natural Gas and Its Components", NBSIR 82-2401, Washingotn: US Department of Commerce, 1982

Calculation		Activity Factors		Emission Factors					LEVEL 1 / 2 / 3 / 4									LEVEL 5		Comments
				Marcogaz Range			Company		Total Emissions			Source for own data						Total Emissions		
									Natural Gas	Methane	Level							Natural Gas	Methane	
No..	System Category	Data	Unit	Minimum	Average	Maximum	Data	Unit	Nm³/y	kg/y	Please indicate the Level of the data: 1 / 2 /3 / 4	Measurements	EF Measurements	EF Literature	Calculation	Modelling	Estimation	Nm³/y	kg/y	
2.	UGS (Each one will be resported separately)																			
	Number of gas wells (observation and production)		No.																	
	Number of work-over or drilling by year		No.																	
	Total storage usefull capacity		Nm³					Nm3/m³y	0	0										
2.1	UGS - Compressor Stations (Injection)								0	0								0	0	
2.1.a	Fugitive Emissions								0	0										
2.1.a.1.	Connections (flanges, seals, joints)		No.	0,00		0,00		Nm³/y	0	0										
2.1.a.2.	valves and control valves		No.	0,00		0,00		Nm³/y	0	0										
2.1.a.3.	pressure relief valves		No.	0,00		0,00		Nm³/y	0	0										
2.1.a.4.	BD-OEL (blow-down open ended line)		No.	0,00		0,00		Nm³/y	0	0										
2.1.a.5.	OEL		No.	0,00		0,00		Nm³/y	0	0										
2.1.a.6.	Others			0,00		0,00		Nm³/y	0	0										
2.1.b	Vents								0	0										
2.1.b.1	Maintenance vents								0	0										
2.1.b.2	Regular emission tec. devices (pneumatic)								0	0										
	Number of valves with pneumatic operation		No.	0,00		0,00		Nm³/No./y	0	0										
	Gas analyser		No.	0,00		0,00		Nm³/No./y	0	0										
	Losses of seals of the compressor units		No.	0,00		0,00		Nm³/No./y	0	0										
2.1.b.3	Start/stop vents								0	0										
	Total emission caused by starts								0	0										
	Total emission caused by stops								0	0										
2.1.b.4	Incident / Emergency vents									0										
2.1.c	Incomplete combustion									0										
2.1.c.1	From flares		Nm³	0,00		0,00		mg/Nm³		0										
2.1.c.2	From turbines		Nm³	0,00		0,00		mg/Nm³		0										
2.1.c.3	From engines		Nm³	0,00		0,00		mg/Nm³		0										
2.1.c.4	From others (heaters/pre-heating system/boilers)		Nm³	0,00		0,00		mg/Nm³		0										

Definition of assets and levels of reporting (Proposal) LNG terminals

gie marcogaz

Organisation	
Company:	
Country	
Emissions for the Year:	2019
Responsible Person:	

Natural Gas Composition		
Average Methane Content of Natural Gas:		% (Vol.)
Density of Methane:	0,7175	kg/Nm³ (273,15 K / 101.325 Pa)*
Conversion Factor from m³ Nat.gas to g CH4:		g CH4 / Nm³ Gas
specific Exhaust Gas Volume (dry)		m³/m³

* G. T. Armstrong, T. L. Jobe Jr., "Heating Values of Natural Gas and Its Components", NBSIR 82-2401, Washingotn: US Department of Commerce, 1982

Calculation		Activity Factors			Emission Factors					LEVEL 1 / 2 / 3 / 4										LEVEL 5		Comments
					Marcogaz Range			Company		Total Emissions			Source for own data							Total Emissions		
										Natural Gas	Methane	Level								Natural Gas	Methane	
No..	System Category	Data	Unit		Minimum	Average	Maximum	Data	Unit	Nm³/y	kg/y	Please indicate the Level of the data: 1 / 2 /3 / 4	Measurements	EF Measurements	EF Literature	Calculation	Modelling	Estimation		Nm³/y	kg/y	
3.	LNG Terminal (Each one will be resported separately)																					
	With flare - Send out		Nm³						Nm3/m³y	0	0											
	Without flare - Send out		Nm³						Nm3/m³y	0	0											
3.1.	LNG Terminal									0	0									0	0	
3.1.a	Fugitive Emissions									0	0											
3.1.a.1	Connections (flanges, seals, joints)		No.		0,00		0,00		Nm³/y	0	0											
3.1.a.2	valves and control valves		No.		0,00		0,00		Nm³/y	0	0											
3.1.a.3	pressure relief valves		No.		0,00		0,00		Nm³/y	0	0											
3.1.a.4	BD-OEL (blow-down open ended line)		No.		0,00		0,00		Nm³/y	0	0											
3.1.a.5	OEL		No.		0,00		0,00		Nm³/y	0	0											
3.1.a.6	Others		No.		0,00		0,00		Nm³/y	0	0											
3.1.b	Vents									0	0											
3.1.b.1	Operational vents																					
	Boil-Off-Gas				0,00		0,00		Nm³/y	0	0											
3.1.b.2	Maintenance vents									0	0											
3.1.b.3	Regular emission tec. devices (pneumatic)									0	0											
	Number of valves with pneumatic operation		No.		0,00		0,00		Nm³/No./y	0	0											
	Gas analyser		No.		0,00		0,00		Nm³/No./y	0	0											
	Losses of seals of the compressor units		No.		0,00		0,00		Nm³/No./y	0	0											
3.1.b.4	Incident / Emergency vents										0											
3.1.c	Incomplete combustion										0											
3.1.c.1	From flares		Nm³		0,00		0,00		mg/Nm³		0											
3.1.c.2	Gas Generators		Nm³		0,00		0,00		mg/Nm³		0											
3.1.c.3	Fuel gas consumption compressors, heaters / boilers, etc.		Nm³		0,00		0,00		mg/Nm³		0											
4.	DSO -Total																					
	Length of network (company)		km	Pressure range (bar (MOP))					Nm³ / km*y	0	0											
4.1.	DSO - Pipelines: Main lines									0	0									0	0	

Guidelines for methane target setting

Jose Miguel TUDELA

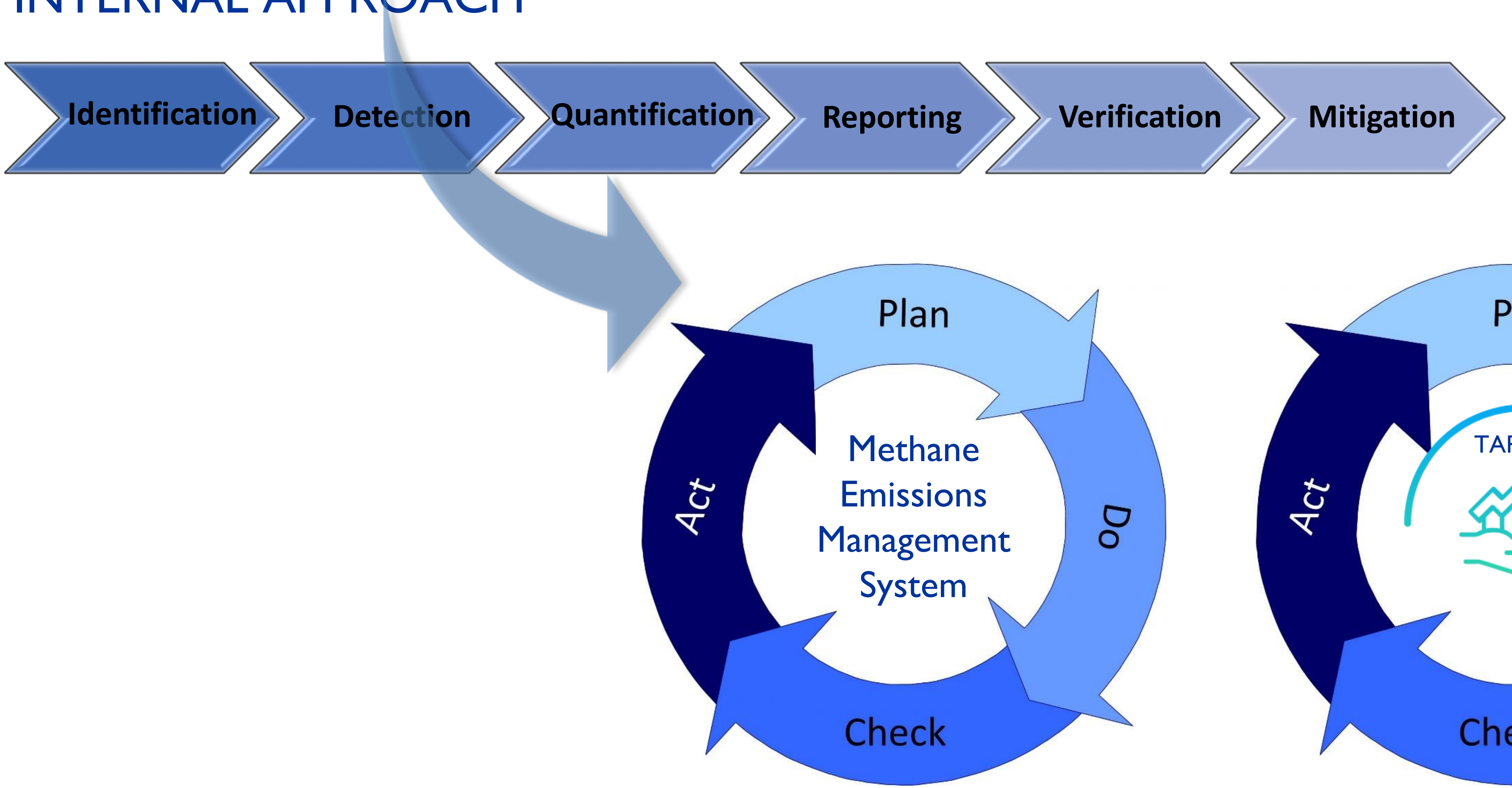
Content


Guidelines
for Methane Emissions
target setting
April 2020
marcogaz


Methane
target
setting
1. Why is
important
to set a
target?
2. Key elements
in target setting
3. Current
situation in
Europe
4. How to start?

1. Why is important to set a target?

INTERNAL APPROACH



1. Why is important to set a target?

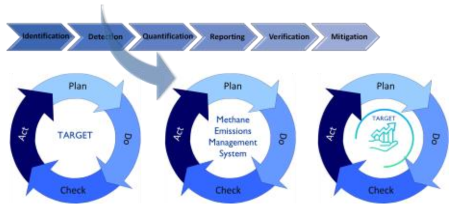
EXTERNAL APPROACH

COMMITMENT

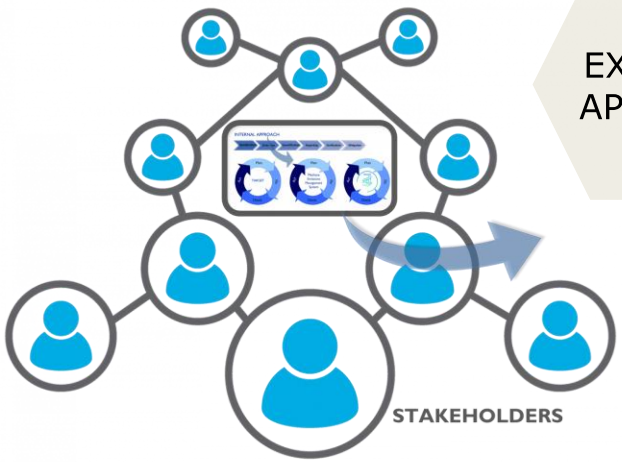
TRANSPARENCY

STAKEHOLDERS

1. Why is important to set a target?



INTERNAL APPROACH



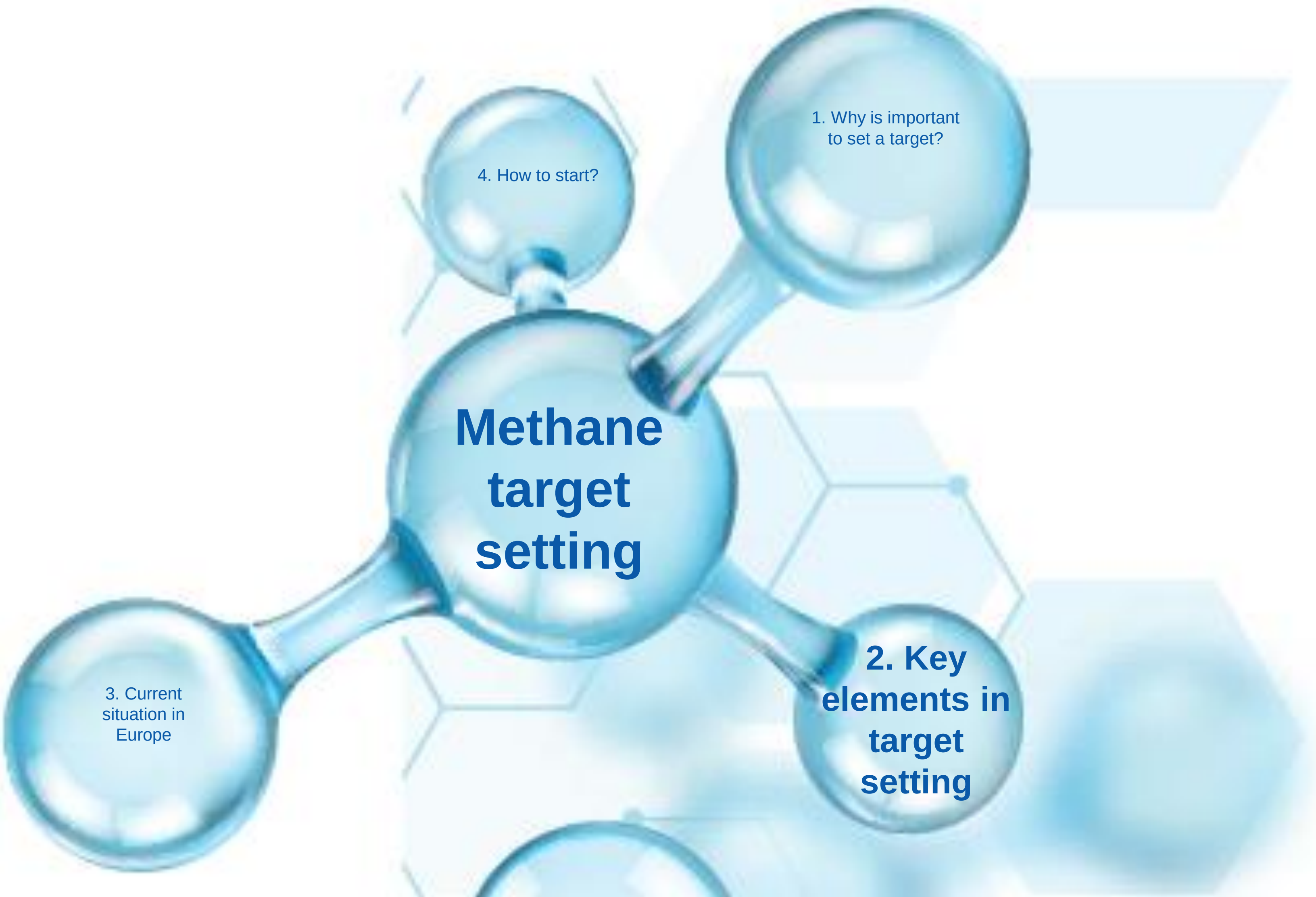
EXTERNAL APPROACH

Why Set a CH_4 Target?

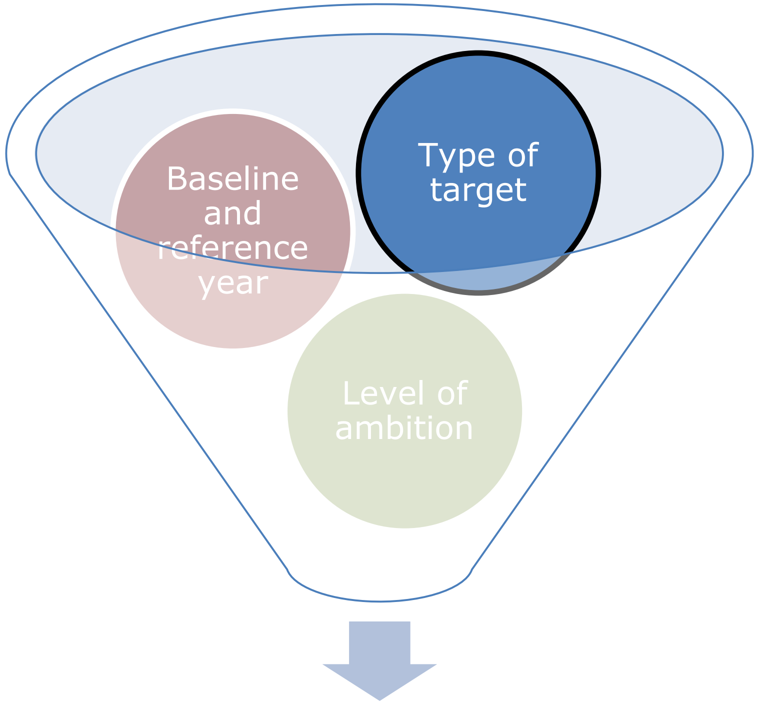
- stimulating INNOVATION
- Demonstrating TRANSPARENCY AND COMMITMENT
- Preparing for future REGULATIONS
- Achieving COST savings
- Planning for necessary INVESTMENT
- Minimizing and managing GHG/Methane RISKS
- Participating in VOLUNTARY PROGRAMS
- Demonstrating Leadership and CORPORATE RESPONSABILITY
- Focusing on what matters in the gas value chain to play a real role in ECONOMY DECARBONIZATION

Source: GHG Protocol and own elaboration

Content


1. Why is important to set a target?
4. How to start?
Methane target setting
3. Current situation in Europe
2. Key elements in target setting

2. Key elements in target setting



Key elements in target setting

Absolute vs intensity target

An **absolute** target describes a reduction in actual emissions in a future year when compared to a base year.

Intensity target describes a future reduction in emissions that have been normalized to a business metric when compared to the same normalized business metric emissions in a base year.

It is important to well-define the relationship of scale between the absolute quantities and the **normalization factors**. In general, when using intensity targets, organizations should define the target in ways that align with business decision making and in ways that allow clearer communication of performance to stakeholders.

GHG vs Methane Targets

In general, **GHG targets are set in CO_2e** and include all GHGs derived from an organization activities covered by the kyoto:

- CO_2
- **CH_4**
- N_2O
- HFCs
- PFCs
- SF_6
- NF_3

GHG targets can relate to Scope 1, Scope 2 and/or Scope 3 emissions in full or in part.

Methane specific targets can be set individually apart from a GHG target and contribute to achieve GHG emissions targets. Methane emissions are expressed either in tCH_4 or normalized in tCO_{2eq}.

Investors are increasingly asking for specific methane targets in the O&G sector, so it is **considered a Best Practice** to set methane specific targets.
It is **highly advised that companies set specific methane targets** together with GHG emissions targets.

GRTgaz

*67% **absolute methane** emissions reduction by 2020 compared to 2016.*

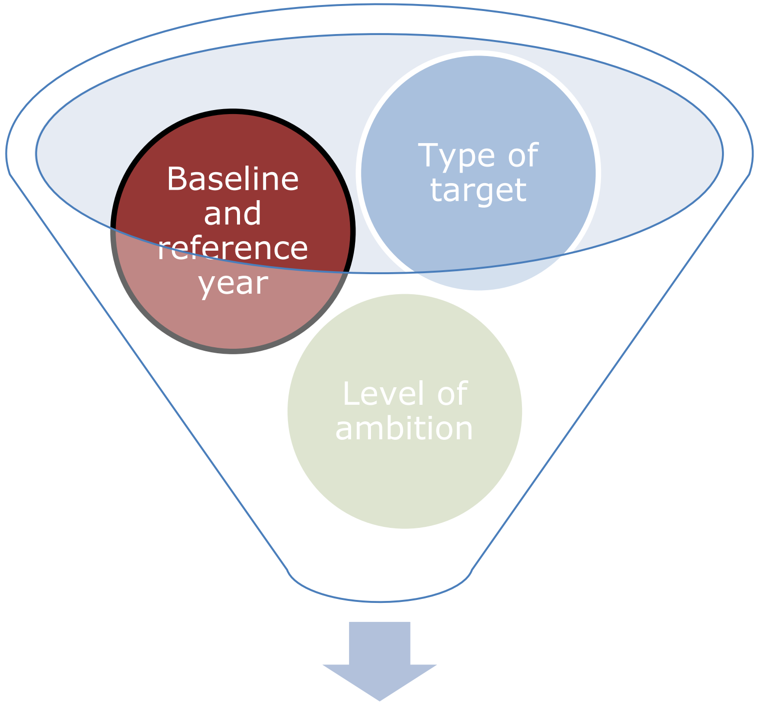
snam

*Reduce **GHG emissions** of 40 % by 2030 compared to 2016 levels.*

OGCI – OIL AND GAS CLIMATE INITIATIVE

*Reduce the collective average **methane intensity** of their aggregated upstream O&G operations to below 0.25% by 2025 (from a baseline of 0.32 % in 2017), with an ambition to achieve a level of 0.2%.*

2. Key elements in target setting



Key elements in target setting

Baseline year

The **base year** is the year against which companies compare their reduction target.

Organizations can have:

- Fixed target base year
- Year-on-year rolling target
- Target based on average emissions over a period of time (e.g. 5-year average).

Reference year

Target year defines the target completion date and depends on the length of the commitment period.

Organization can have:

- A single year commitment period.
- Multi-year commitment period.

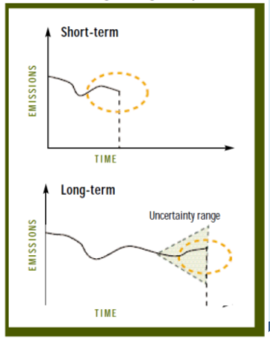
The target completion date determines whether the target is set for the short, medium or long term.

Best Practices for GHG targets include the setting of at least two targets to cover both the medium (5-15 years) and long time frames (>15 years).

For Methane Targets, International initiatives such as the Global Methane Alliance refers to 2025 and 2030.

Generally, long-term targets depend on uncertain future developments. Adding intermediate targets and/or milestones increases the credibility of these long-term commitments by giving investors more clarity on how this vision is going to impact the short-term.

FIGURE 13. Defining the target completion date



Source: GHG Protocol

Gasunie

Up to 2030 annually an average of 4% reduction in GHG emissions compared with the emissions in the three previous years.

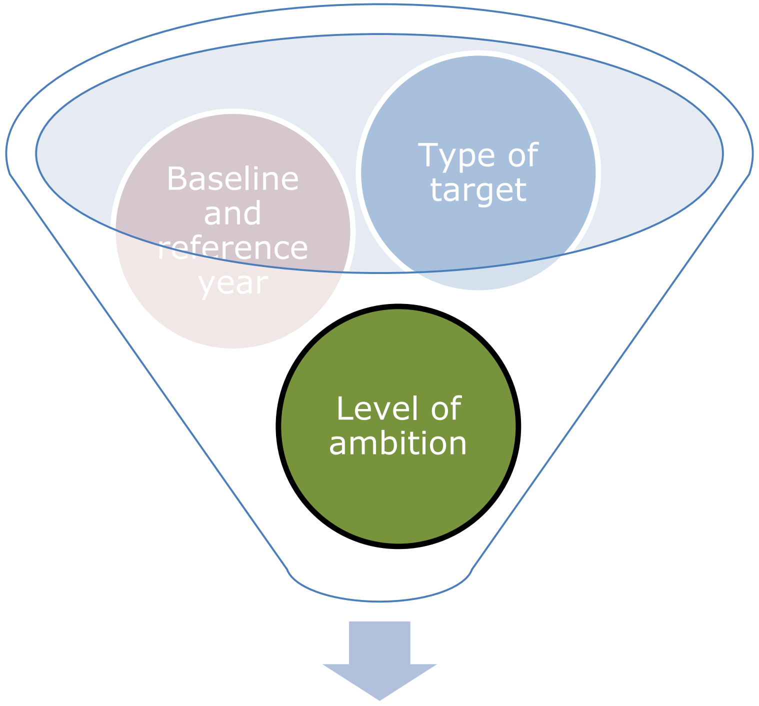
Naturgy

Reduce the average absolute emissions, in Scope 1 and 2, by 17.8 % for 2013-2030 compared to the 2012 base year.

enagas

Reducing GHG emissions an average of 5% in the period 2019-2021 compared to 2018.

2. Key elements in target setting



Key elements in target setting

Level of ambition

Main factors to determine the **level of ambition** include:

- Methane reduction potential based on the implementation of BATs or improvement of operational activities.
- Drivers affecting methane emissions, this is, the relationship between methane emissions and business metrics, investment and growth strategy.
- International/national initiatives with a specific level of ambition (eg. MGA ambition level: reduce by 45% by 2025 and 60%-70% by 2030).
- Alignment with other companies (benchmarking of methane targets with similar organizations).
- Science based targets scenarios to ensure that targets are in line with the IPPCC scenario toward Paris agreement goals.

Generally, organizations that have not previously invested in energy and other GHG reductions should be capable of meeting more aggressive reduction levels because they would have more cost-effective reduction opportunities.

fluxys

Reduce methane-emission 50% by 2025 (ref-year 2017).

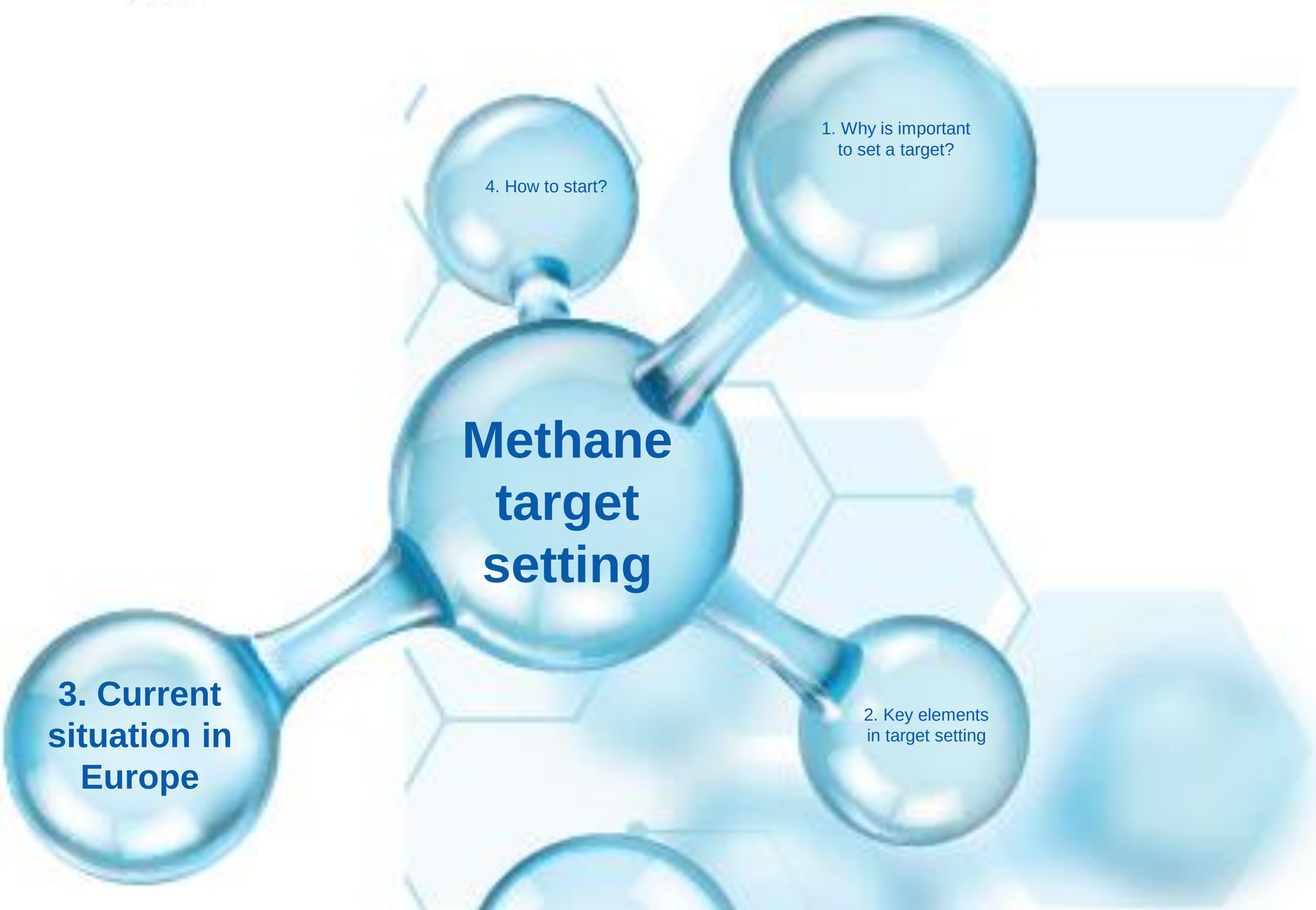
ExxonMobil

15 % methane emissions reduction from global operations by 2020 versus a 2016 baseline.

ENERGINET

The Energinet group has set a target to reduce methane emissions by 10% in 2020 compared to the 2015-2017 average.

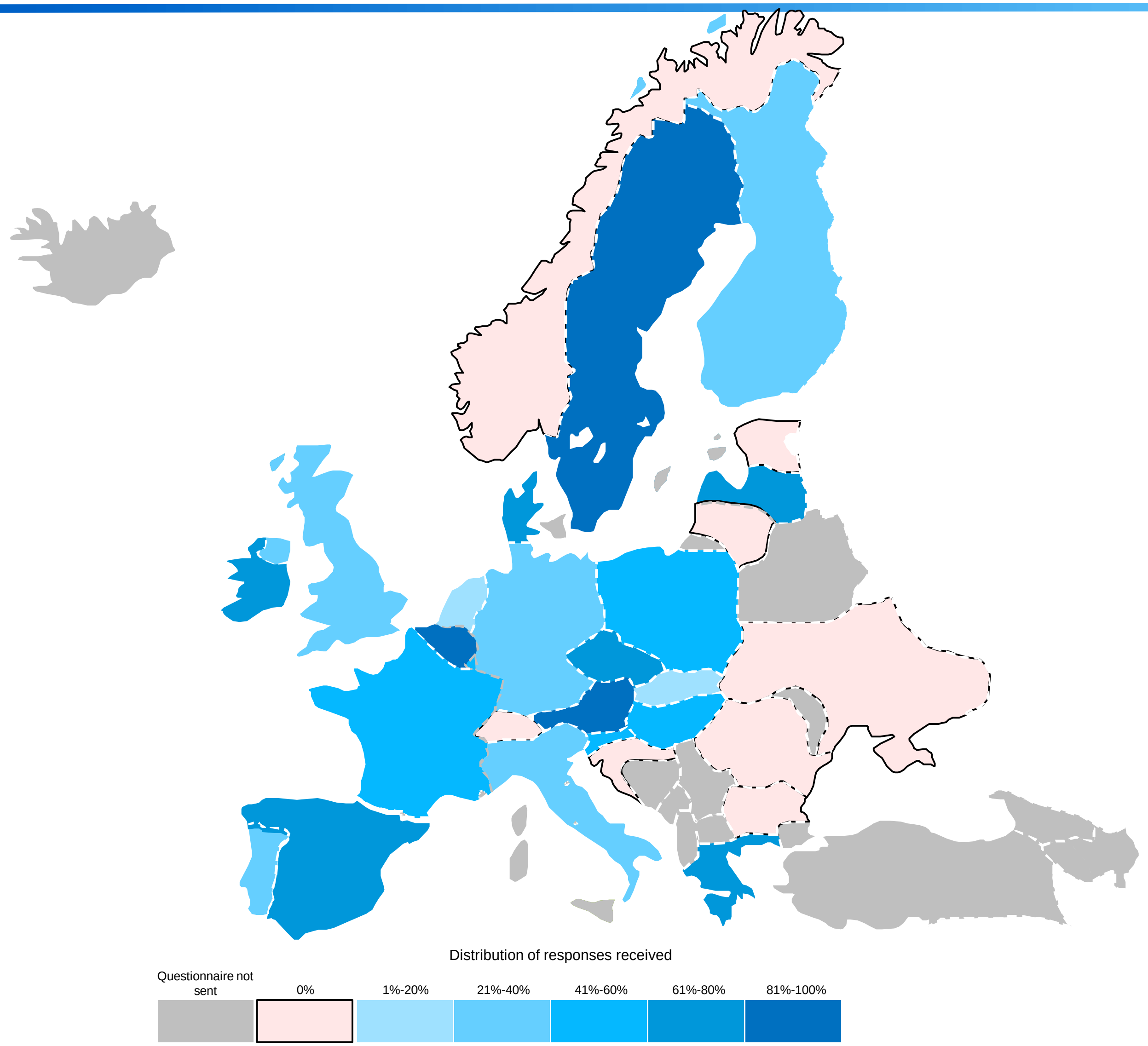
Content



1. Why is important to set a target?
4. How to start?
Methane target setting
3. Current situation in Europe
2. Key elements in target setting

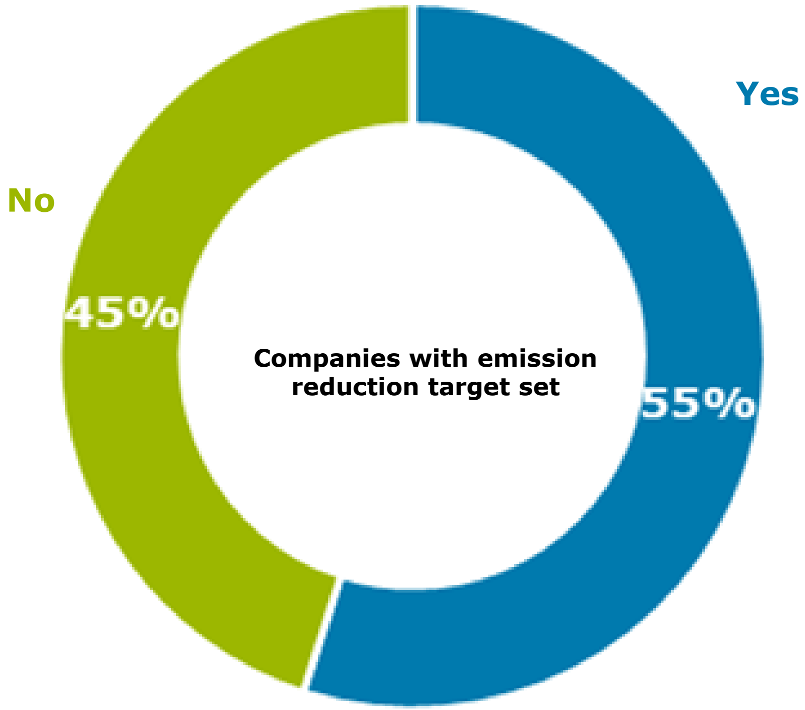
3. Current situation in Europe

A short questionnaire on CH4 emissions was sent. Answers from 40 companies were received covering all parts of the gas value chain.



3. Current situation in Europe

European companies with emission reduction target



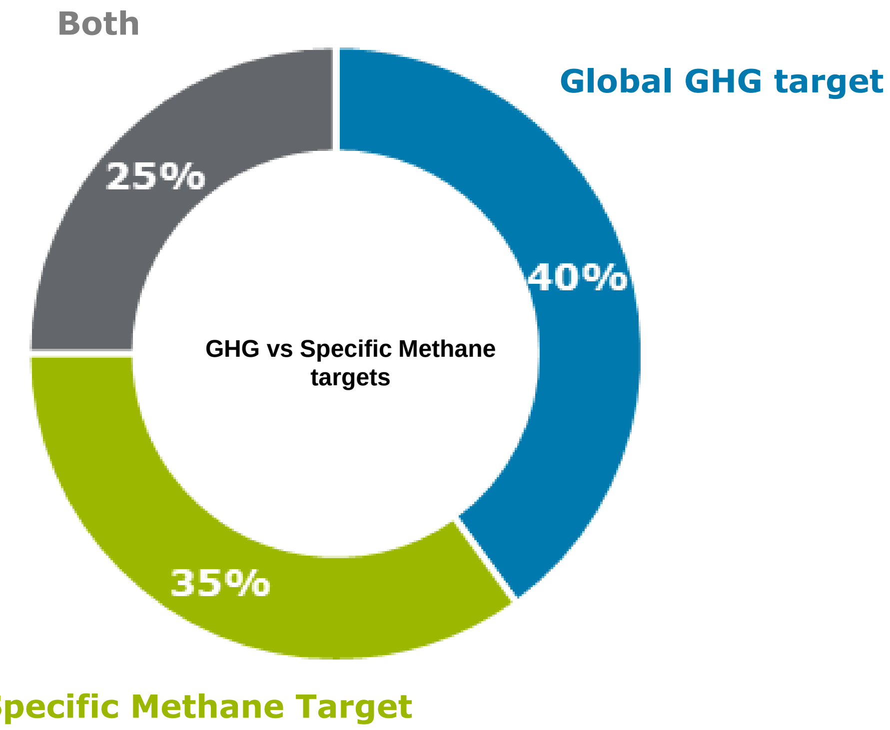
55% of the Companies have already set Emission Reduction Targets (GHG or methane).

33% of companies with no targets are willing to implement them

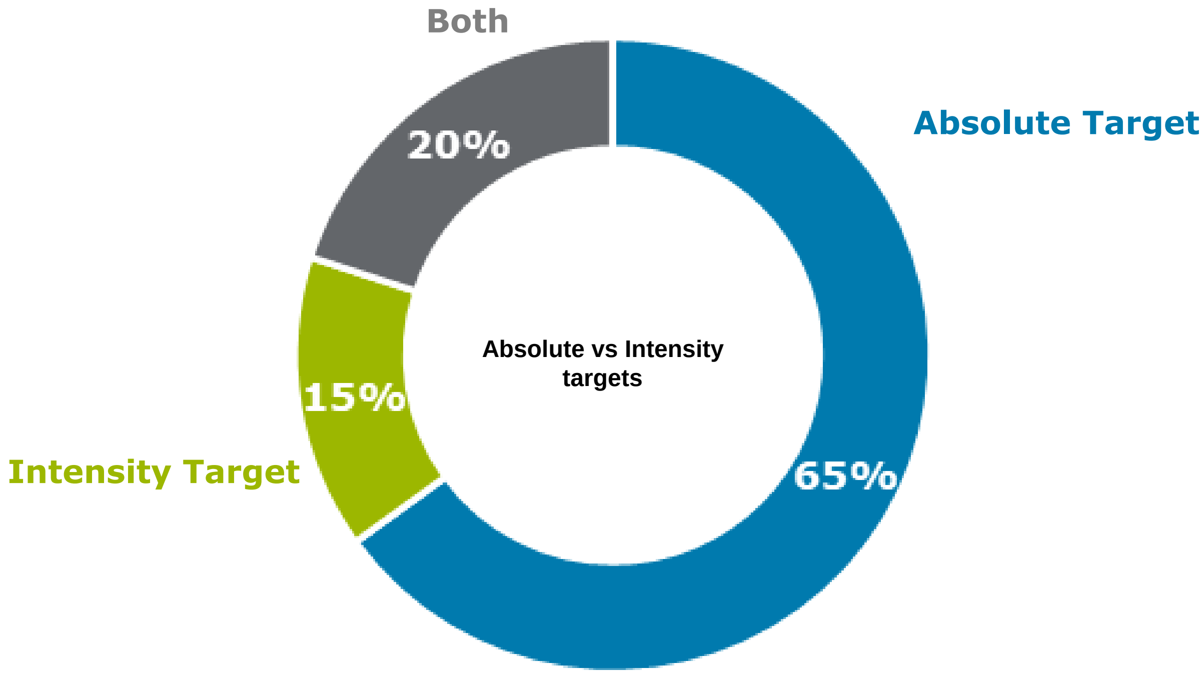
3. Current situation in Europe

TYPE OF TARGET

GHG vs Methane Targets



Absolute vs intensity target



(*)32% of companies with more than 1 target set.

3. Current situation in Europe

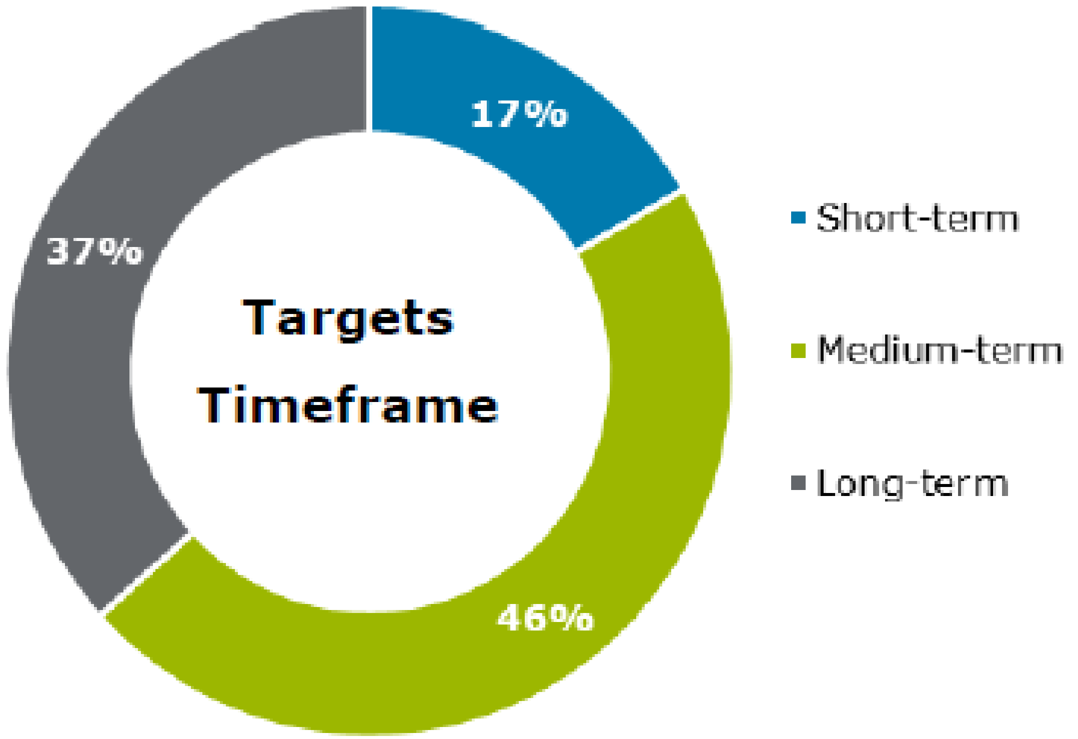
BASELINE AND REFERENCE YEAR

Baseline Year

- 2018 is the "most popular" base year among targets reported by companies.

Reference Year

- 2030 is the "most popular" target year among targets reported by companies.
- Only one company has established a target beyond 2030.



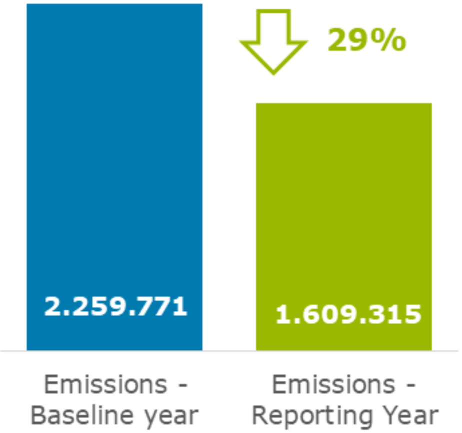
(*) Timeframe (years): Short-term: 0 ≤ 3 years; Medium-term: > 3 ≤ 10 years; Long-term: > 10 years

3. Current situation in Europe

LEVEL OF AMBITION

How much has the gas sector reduced to date?

Methane emission reduction already achieved (tCH4):



650,456 tCH_4
from 23 companies

(*) Emissions in baseline year represents 88% of European Methane emissions considered by Methane Tracker (2,582 ktCH4).

What is the level of ambition for the future?

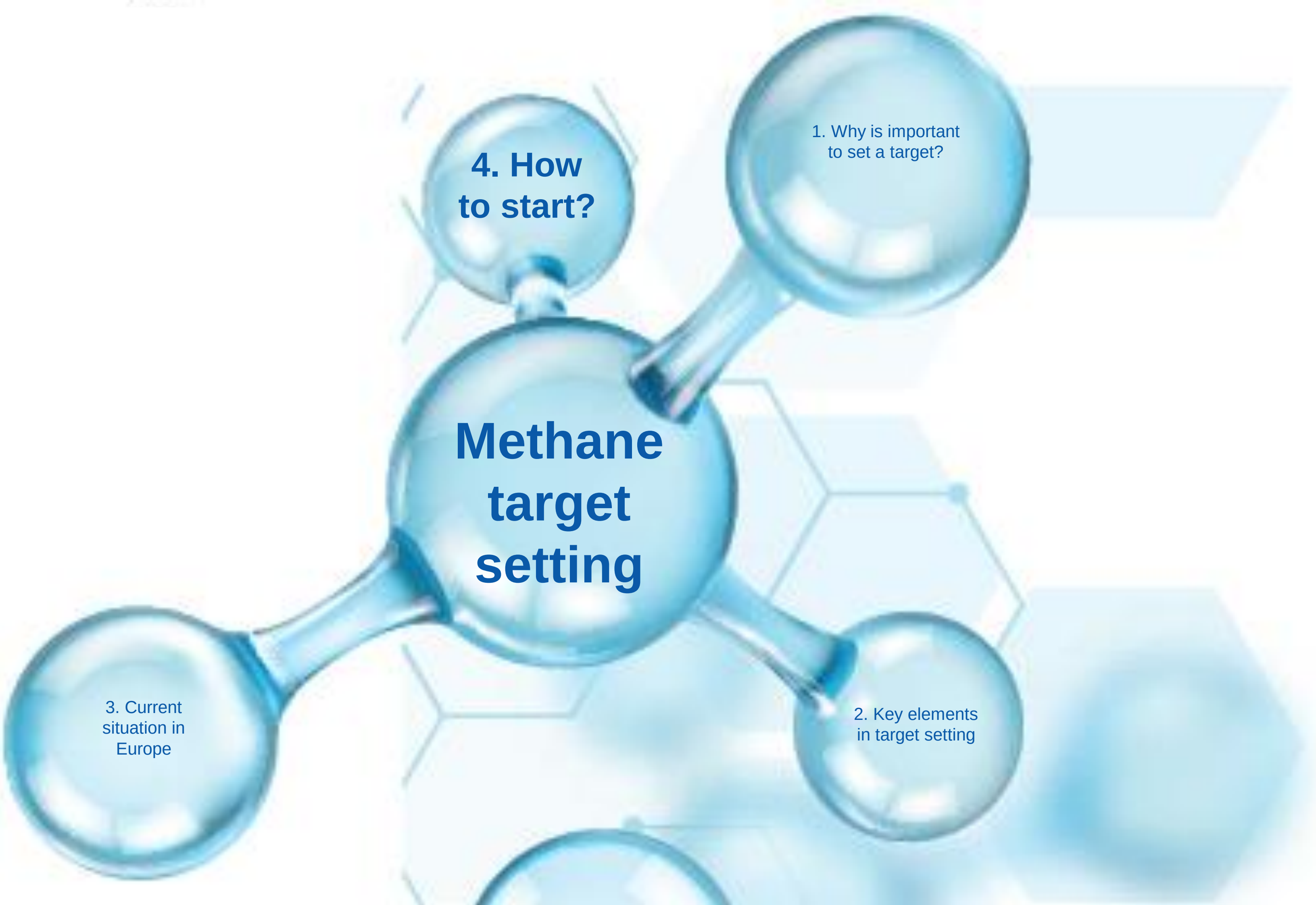
GHG

- Most of the **GHG absolute targets** have been set for **2020-2040** with **a level of ambition between -5% and -60%** (compared to baseline years between 2012-2018).

Methane

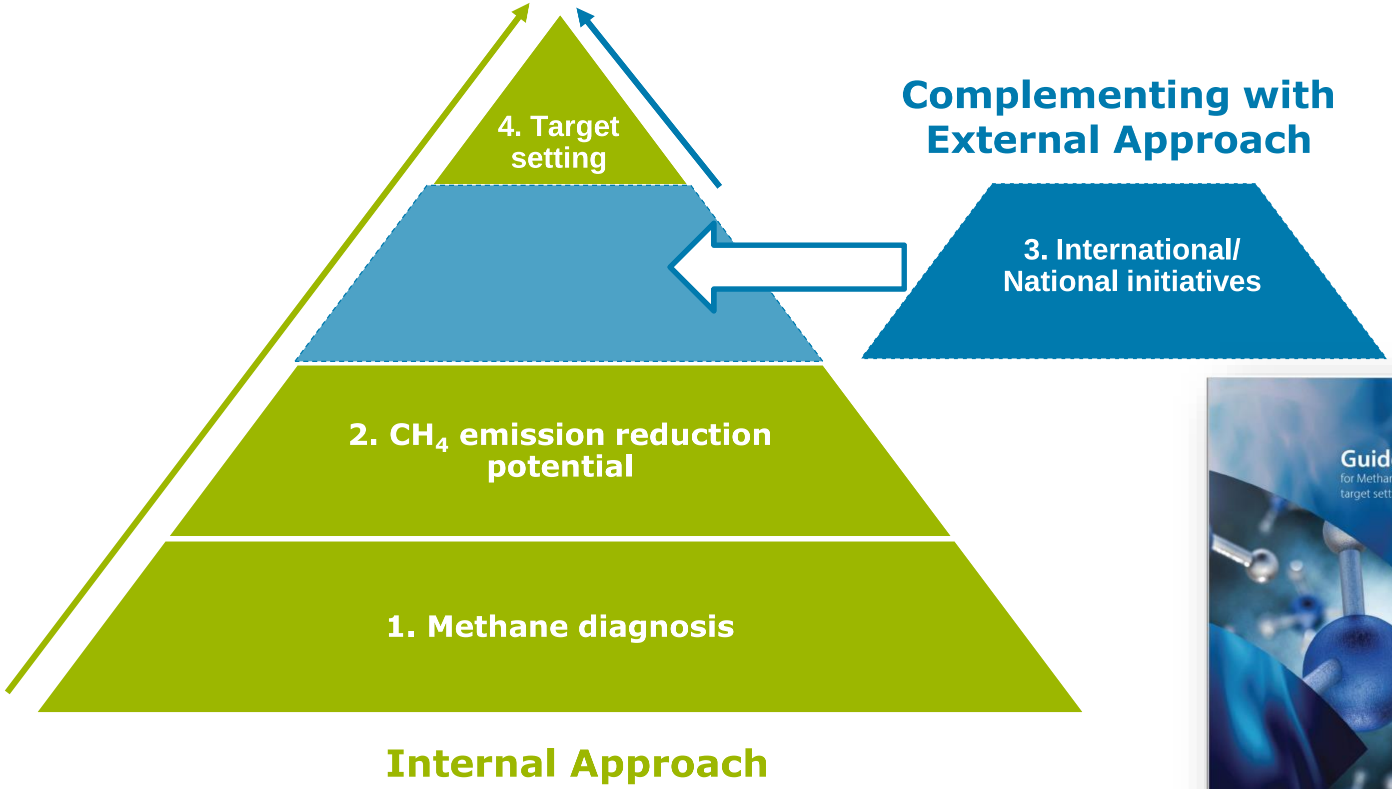
- Most of the **methane absolute targets** have been set for 2020-2025 with **a level of ambition between -7% and -66%** (compared to baseline years between 2014-2018)
- Only **two companies** have established **methane reduction targets for 2030** (reduction between 60% - 80% compared to 2014 and 2013).

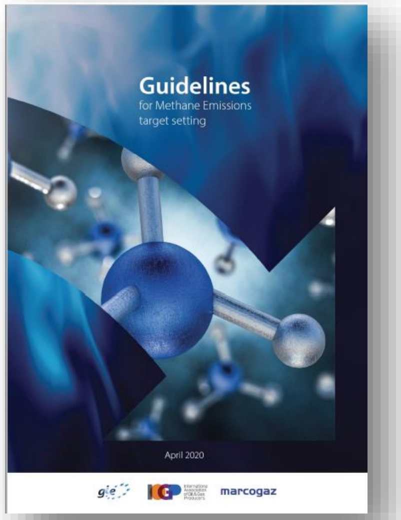
Content


1. Why is important
to set a target?
2. Key elements
in target setting
3. Current
situation in
Europe
4. How
to start?
Methane
target
setting

4. How to start?
A guideline in target setting

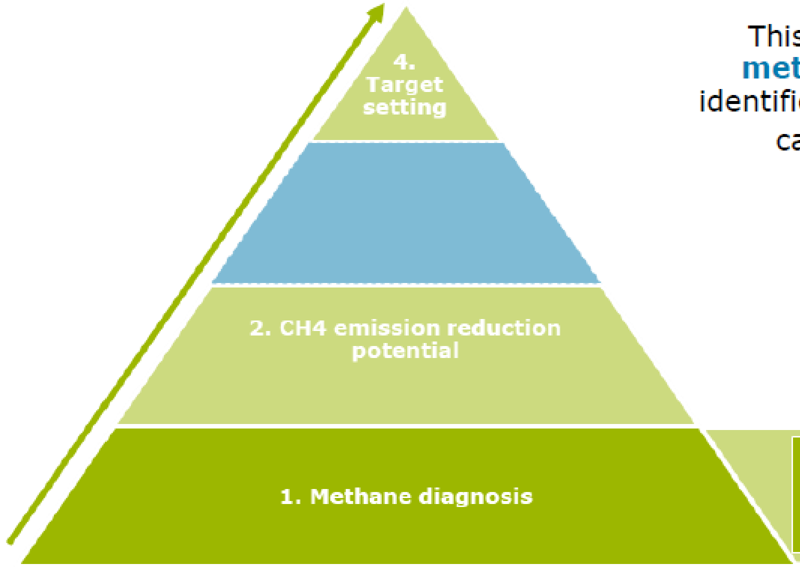
The two most common methodologies used for CH4 target setting are considering only an Internal Approach and adding an External Approach.





The document ***"Guidelines for Methane target setting"*** was published in April 2020 (link).

4. A guideline in target setting
I. Methane diagnosis



This phase aims at elaborating a **methane diagnosis** through the identification of all CH_4 sources and the calculation of CH_4 emissions.

Full content of each phase is available here .

Full content of each phase is available here .

1. 1 Methane emission sources identification:

Objective:

Identification of all methane emissions sources.

Tasks

a) Setting organization boundaries

Companies should select an approach for consolidating methane emissions and select those businesses and operations for the purpose of accounting and reporting CH_4 emissions (equity share or operational control approach).

b) Setting operational boundaries[27]

After determining the organizational boundaries, companies should identify CH_4 emissions associated with their operations. To this end, operational activities[28] as well as equipment[29] and components[30] are analyzed and classified as follows:

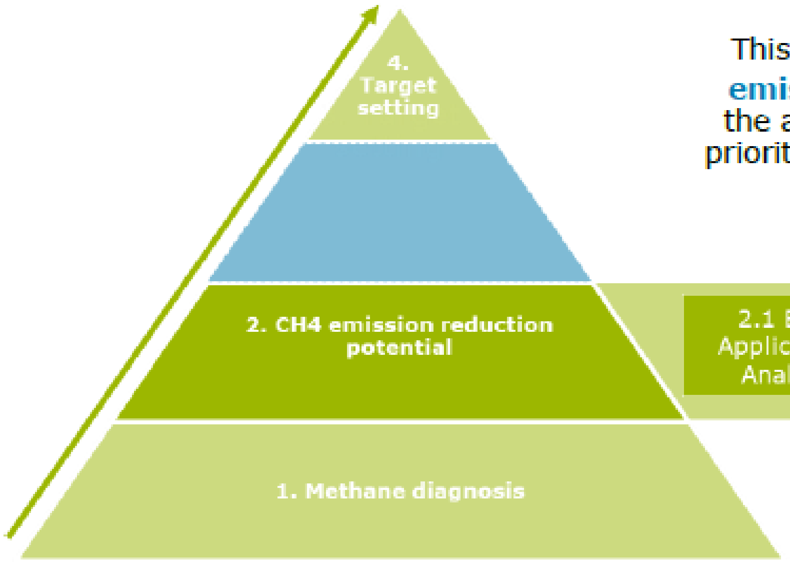
- Incomplete combustion from burning of fuels as well as flaring.
- Fugitive emissions from leaking equipment and components.
- Vents from operating activities, maintenance/repairs works, emergency situations, etc.

Output:

Inventory of all CH_4 emission sources linked to the organization’s activities.

4. A guideline in target setting

2. CH4 emission reduction potential



This phase aims at establishing the CH_4 emission reduction potential through the analysis of applicability, cost-benefit, prioritization and planning of Best Available Techniques (BATs).

Full content of each phase is available here .

2.1 BATs Applicability Analysis:

Objective:

Analyze whether the BATs are applicable to the organization's business considering the facilities owned and operated by the organization. This task only seeks to understand whether BATs apply to the facilities; a further analysis is then carried out in task *2.2 Cost-Benefit Analysis* to assess if BATs can be technically and economically implemented.

Tasks

a) Identification of BATs

The company should identify what BATs for methane emissions reduction can be applied in their business operations. To this end, a benchmark analysis should be carried out considering BATs implemented by gas companies as well as official publications from international/national organisms or initiatives (e.g. GIE/MARCOGAZ[35], the Methane Guiding Principles[36], OGMP technical guidance documents[37], etc.).

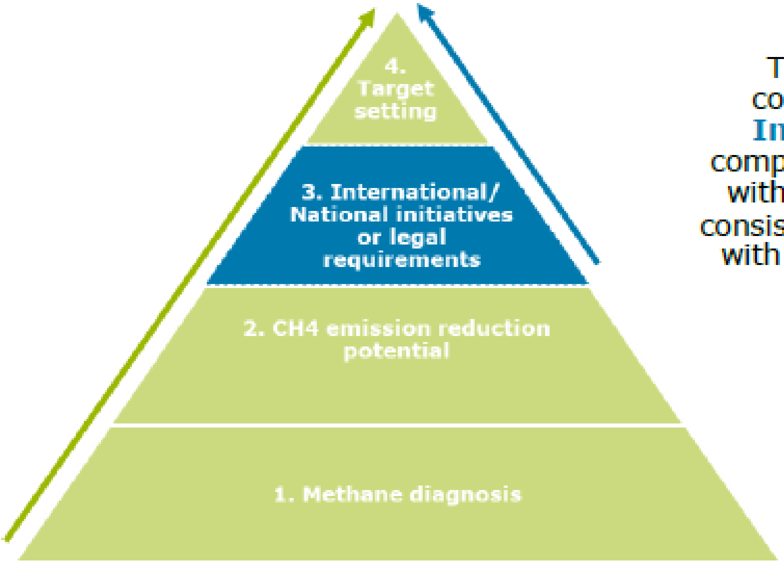
b) Applicability Analysis

Once BATs have been identified, companies should analyze whether they are applicable to their segment of the gas chain, facilities and/or operations. To this end, companies will analyze if BATs can be implemented in the facilities (e.g. improvements in pneumatic valve only if the organization use this kind of valves).

Output:

List of BATs applicable to an organization facilities and operations.

4. A guideline in target setting
3. External approach



This phase would only apply to companies which have follow the **Internal Approach** and want to complement the target setting process with an External Approach to ensure consistency and methodology alignment with international/national initiatives.

3.1 Identification of international/National initiatives:

Objective:

Include in the target setting approach the analysis of external initiatives related to CH_4 emission reduction to ensure that target is aligned with international/national standards.

Tasks

a) Methane reduction target benchmark

Companies should conduct a benchmark to identify what are the current and upcoming trends in CH_4 emissions reduction. Benchmark should include:

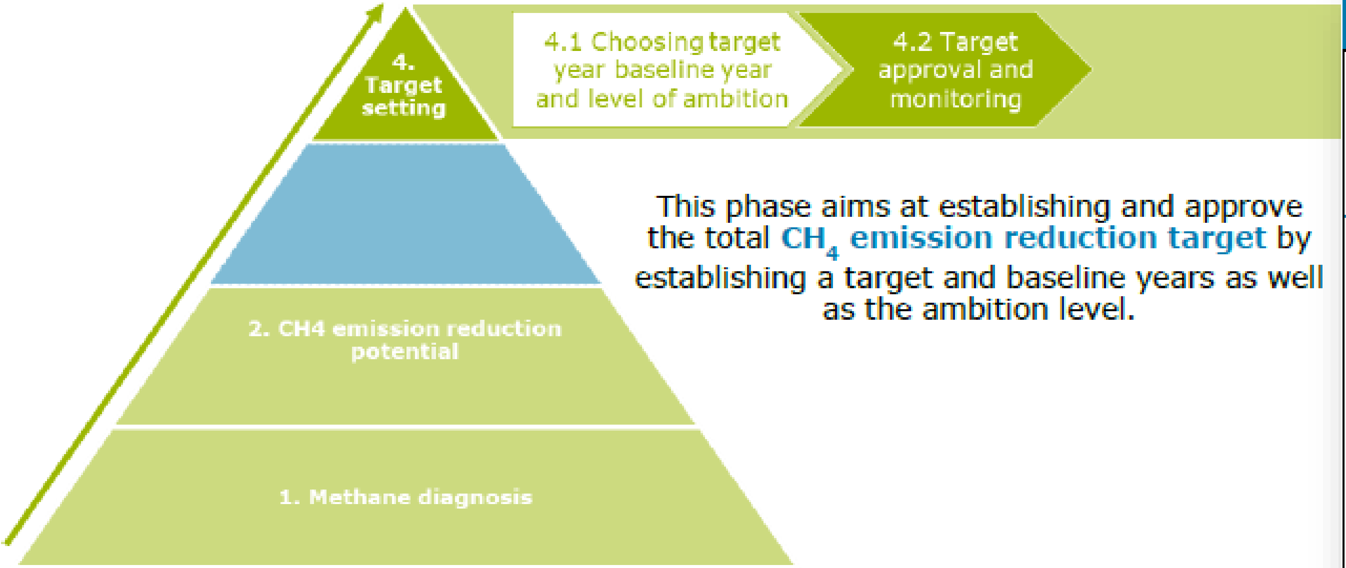
1. Type of target including intensity vs absolute as well as GHG vs methane targets.
2. Base year and target year to determine the baseline and well as the time horizon.
3. Level of ambition to consequently plan the implementation of BATs.

This analysis should include public and private sector along the whole gas value chain. In addition, the company should analyze its GHG emission reduction strategy to align the CH_4 reduction pathway. This analysis will allow to adjust the methane reduction pathway as well as the global methane target. To be in line with external initiatives, additional BATs might have to be considered to reach the level of ambition set by legislation or other initiatives.

Output:

Alignment of methane target with external initiatives for CH_4 emission reduction.

4. A guideline in target setting
4. Target setting



This phase aims at establishing and approve the total CH_4 **emission reduction target** by establishing a target and baseline years as well as the ambition level.

Full content of each phase is available here .

4.2 Target approval:

Objective:

Approval of total CH_4 reduction target and methane reduction pathway by obtaining senior management commitment and transparency

Tasks

a) Target approval

Total CH_4 emissions reduction target as well as CH_4 reduction pathway should be corporate approved to guarantee that technical and economic resources are available to achieve targets.

After approval process, companies should consider sharing the commitment in external and public means (e.g. website, Annual Reports, press release) and internally to ensure that they are clear at all levels.

b) Target monitoring

Organizations should monitor and track performance against targets and set corrective measures as necessary. To this end, regular monitoring is recommended.

In addition, annual reporting and verification is recommended.

Output:

Total CH_4 target and CH_4 reduction pathway approved.

Methane Guiding Principles – ongoing collaboration

Luciano OCCHIO

Methane Guiding Principles

- The Methane Guiding Principles MGP is a voluntary, international multi-stakeholder partnership between industry and non-industry organisations. It has a focus on priority areas for action along the natural gas supply chain, from production to the final consumer.

- GIE & MARCOGAZ have the commitment to review the documents from the midstream perspective – End of Q2. Final stage

Reducing methane emissions through emissions identification, detection, measurement and quantification

Best practice for reducing methane emissions – document 9

Prepared for the signatories to the

Methane Guiding Principles

MGP

Reducing methane emissions in transmission, storage, LNG terminals and distribution operations

Best practice for reducing methane emissions – document 10

Prepared for the signatories to the

Methane Guiding Principles

MGP

Methane Guiding Principles

- Gas companies are promoting and implementing mitigation measures to reduce GHG emissions, in particular focusing on the management of methane emissions. Reference documents are available (Marcogaz..) or under development (MGP) to identify, detect, measure, quantify and reduce methane emissions.

- Emission sources should be identified and quantified on a regular basis, to incorporate new data on emissions rates from equipment and operations

- The analysis of the technical and economic feasibility of the Best Practices to reduce methane emissions should be done on a case by case basis together with a cost-benefit analysis, taken into account the "one size does not fit all" principle. This will allow gas companies to select the most effective methane emission reduction.

MGP – BATs document

REDUCING METHANE EMISSIONS: BEST PRACTICES
SCALING AMBITION TO DRIVE DOWN EMISSIONS

METHANE GUIDING PRINCIPLES

NATURAL GAS STAR PROGRAMME
Recommended technologies to reduce methane emissions

OIL AND GAS METHANE PARTNERSHIP
Technical Partnership Documents

ENGINEERING DESIGN AND CONSTRUCTION

Systematically minimise methane emissions

Engineer and design equipment to reduce emissions including:

- Minimising potential fugitive and venting sources;
- Optimising combustion and operational efficiency; and
- Equipment selection and consideration of future upgrades.

FLARING

Reduce methane emissions from flaring

Eliminate or reduce flaring wherever feasible.

Where flaring is necessary, maximise its combustion efficiency.

Check your flare systems are operating according to design.

ENERGY USE

Reduce methane emissions that result from energy use

Use smart metering and controls to reduce end-user energy use and emissions (e.g. gas turbines and boilers).

Maintain gas fired equipment to operate according to design.

When replacing equipment, update with the latest proven energy efficient models.

Consider upgrading to continuous or predictive emissions monitoring.

EQUIPMENT LEAKS

Reduce methane emissions from fugitives and wells

Systematically perform fugitive inspections and prioritise repairs.

Build your fugitive inspection and repair capability and skills, including operator discipline.

Consider new technology e.g. detection, quantification, condition monitoring and predictive maintenance.

Consider modern, high integrity materials and jointing technology when constructing downstream distribution networks.

VENTING

Reduce methane emissions from process and cold venting

If methane needs to be released –prioritise recycling or flaring over venting.

Avoid or reduce venting from tanks, compressor seals and other potential emission sources (e.g. vapour recovery).

Conduct regular monitoring of vented emission sources (e.g. compressor seals and tanks).

Minimise emissions during well completion and maintenance activities (e.g. green completions).

PNEUMATIC DEVICES

Reduce methane emissions from natural gas driven pneumatic equipment

Replace natural gas driven pneumatic equipment with compressed air, electric or mechanical equipment where practical (e.g. power availability).

Confirm that your pneumatic equipment is operating per design and repair or replace malfunctioning equipment.

Phase out use of high-bleed pneumatic control devices where practical.

Conduct preventative maintenance on pneumatic equipment.

OPERATIONAL REPAIRS

Reduce methane emissions related to equipment repairs

Make reducing emissions a key aim of your repair planning.

Plan and make repairs promptly and safely.

Verify repairs are successful through follow-up leak monitoring surveys.

When depressurising equipment minimise venting by recycling or flaring where feasible.

CONTINUAL IMPROVEMENT

Systematically improve methane management

Optimise emissions monitoring frequency in operations and maintenance programs.

Incorporate emission reduction considerations into overall business and operating strategies.

Share learnings within your company and across the natural gas industry.

Phase-in use of the latest proven lower emission technology and approaches where practical.

Regularly review the scope, quality and frequency of emissions reporting.

GERG – Research Roadmap on methane emissions

Mures ZAREA

The European Gas Research Group

Our members

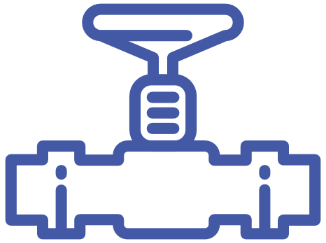
Friends of GERG

EC-funded Projects

DEO • CONRAD • DIGBUILD • VOGUE • MICROMAP • PRESENSE • LABNET • GIGA • COMBO • NATURALHY • ORFEUS • INTEG-RISK • GASQUAL• LNG DENSITOMETER • ELEGANCY •THYGA • Biomethane Barriers

- Collaborative R&D group for gas with strong industry focus
- Over 30 members from 12 countries: gas companies, research centres and universities

Methane Emissions Mitigation: a GERG Strategic Priority



- The European gas industry has always been working to limit the leakage from networks, first from a **safety** point of view, then from an **environmental** one.
- Three decades of work on development & testing of new technologies and methodologies, first for leak detection, then also for methane emissions reduction.
- The recent Marcogaz 'Assessment of Methane Emissions for Gas Transmission and Distribution System Operators' report is based on the GERG project **MEEM: 'Methane Emissions Estimation Method**'. The report will be used as the basis for downstream gas industry reporting on methane emissions (integrated into the OGMP 2.0 framework).

Some methane Emissions related projects:

- PRESENSE (EC Framework 5 Project)
- Gas migration in soil from an underground gas leakage
- Quantifying underground leakages from (gas) pipelines
- Measurement of the emission of gas from the transmission system
- Advisory on "Hamburg" Methane Emissions Project

MEEM (Methane Emission Estimation Method)

Phase I

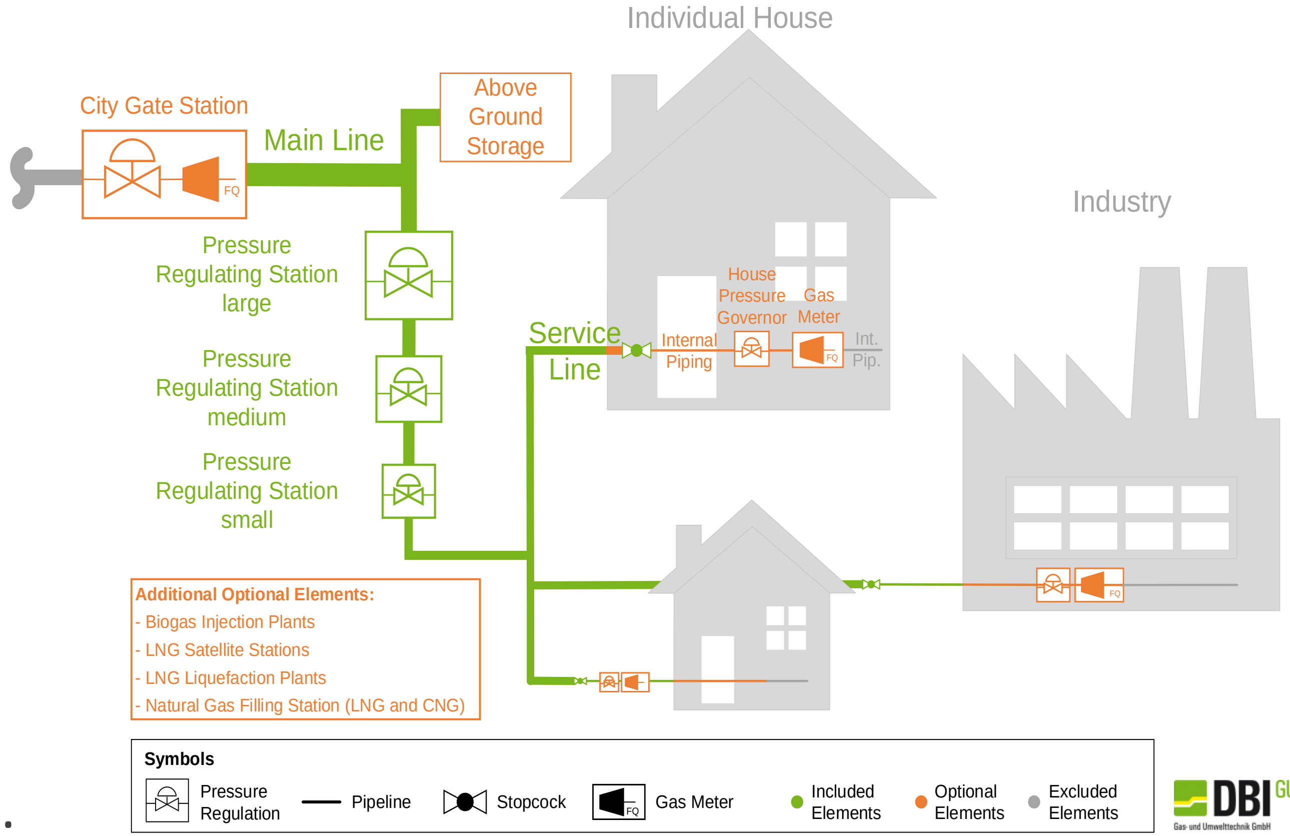
Analysing methods for determining methane emissions from the gas distribution grid

Overview of European methane emissions registration methods.

Phase II

Development of an Accurate and Consistent Method for Methane Emission Estimation from the Gas Distribution Grid

Development of a pan-European method for estimating methane emissions of the gas distribution grid.



Methane Emissions Measurement

- In addition to the industry standard of bottom-up technologies of methane emissions measurement, top-down measurement technologies are being investigated.
- **Vehicle**:

Vehicle surveys have been implemented in Europe for the last 30 years; Picarro's mobile detection system, using sensitive methane/ethane sensors, has proven efficient to quickly **detect** large leaks. However, extensive measurement campaigns in the USA (NYSEARCH) showed large uncertainty related to the quantification of large number of small leaks, which makes it unsuitable to **directly quantify** emissions. A reduction coefficient based on extensive networks characterisation (done in USA) is required. Differences in networks & parctices between EU and USA require such work to be undertaken also in EU. A few % largest leaks when fixed, abate the majority of emissions

- **Satellite**:

For the moment, satellite observations don't seem fit for purpose from a mid & downstream perspective.

In 2017, methane emissions from EU distribution networks = 330-500 kT/yr

Uncertainty band for ME in the recent paper on Permian basin = +/- 500 kT/yr

Main Challenges:

- Correlation between Top-down and Bottom-up measurement techniques
- Estimation of emissions: management of uncertainty
- Resource allocation: Refining residual leaks estimation VS most efficient abatement of emissions from larger leaks

To address these challenges, GERG has set up a Methane Emissions Working Group, tasked with developing a roadmap to close knowledge gaps on the topic through a structured process.

Addressing Research Priorities: GERG Working Groups

Methane Emissions

Biomethane

Hydrogen

Brainstorming phase

Gathering of insights from GERG industry professionals and experts.

→

I.Definition of research topics

Scoping of research knowledge gaps and evaluation of criticality.

→

I.Production of the roadmap

Summary of results and recommendations for the most prominent research topics.

→

I.Project creation in the GERG Programme Committees:

Distribution and Utilisation

Transmission and Storage

LNG

Roadmaps coordinated with other associations: PRCI, ERPG, APGA, Future Fuels CRC, NYSEARCH, etc.

Methane Emissions WG: first results

<table>
<tr><th>Value Chain Segment / Methane Emissions Action</th><th>Biomethane</th><th>LNG</th><th>Transmission</th><th>Distribution</th><th>End Use</th></tr>
<tr><td>Measurement</td><td></td><td rowspan="2">Knowledge gathering</td><td colspan="2">Frequency of inspection

Top-down vs Bottom-up correlation and quantification of emissions

‘Quick-scan’ detection for pipelines and stations</td><td>Test Protocols (In situ Test & labs Test)</td></tr>
<tr><td>Estimation</td><td></td><td colspan="2">Harmonise emission factors

PPM to Flow Rate Conversion

Standardisation of methods</td><td>Establish emission factors for all segments of utilisation</td></tr>
<tr><td rowspan="3">Mitigation</td><td colspan="5">Continuously evaluate the cost-effectiveness of mitigation approaches and ensure maximum impact of approach to repair
Consider the long-term impact and the consequences of transition to new gases.</td></tr>
<tr><td rowspan="2">negative potential emissions.</td><td rowspan="2">Transfer technologies

Small-scale LNG.</td><td colspan="2">Improve speed and reliability of repair methods</td><td rowspan="2">CH4 emissions in combustion (lab Test, CFD etc)

Impact of H2NG blends on the emissions during combustion</td></tr>
<tr><td>Summarise mitigation methods that have been used so far – Image of Industry</td><td>Cost-effective reduction of small leaks.

Look into inline repair of pipelines</td></tr>
</table>

Methane Emissions Mitigation: underground leaks issues

- Characterizing the measurement uncertainties of several leak detection& quantification methods: different vehicle-based methods, suction methods, tracer methods, etc., over 4 decades of known flowrates in different representative soils, and on a statistically significant sample size
- Characterise on several EU networks the distribution of leak flowrates on a statistically significant sample size Use it to provide correction factors when accounting for measurement uncertainties of the implemented detection method
- Use it to provide correction factors when accounting for measurement uncertainties of the implemented detection method

COFFEE BREAK

Expert Panel I: Methane emissions managemen

Moderator: Matthew GOLDBERG

Panellists:

- Aart Tacoma (NOGEPA)
- Luciano OCCHIO (SNAM)
- Jihane LOUDIYI (GRDF)

METHANE EMISSIONS IN THE GAS SECTOR

Reducing methane emissions in the Dutch Offshore sector

Aart Tacoma

Secretary Health, Safety & Environment

NOGEPA

16 June 2020

NOGEPA

Emission intensity gas production NL

NIR 2017
Total GHG emissions NL: 193,7 mln ton CO_2eq
Total NL CH_4 emissions:
9.3 % of total GHG: 18,0 mln ton CO_2eq

Contribution CH_4 emissions total NL gas chain 2017:
- 3.9 % of all NL CH_4 emissions
- 0.37 % of all NL GHG emissions (CO_2eq)

IEA: International average
CH_4 emission intensity total gas chain = 1.7 %
NL gas chain = 0.1 %
- Onshore E&P: 0,012%
- Offshore E&P: 0,069%

Covenant August 2019: reducing offshore E&P CH_4 emissions
- Measures offshore E&P <= 20 €/ton CO_2eq lead to -50% end 2020 compared to 2017
  - Emissions 2017 = ~~8.562~~ → 9.353 ton
  - Agreed reduction by end 2020 = ~~-4.281~~ → - 4.677 ton

I.e. minus 131 kton CO_2eq (factor: 28) in 3 years

Next steps:
- Boundary conditions for electrification;
- H_2 production and transport
- CCS
- Prolongued domesic gas production:
  - Smaller carbon footprint (30%)
  - Bridging the gap EOF → new functions

Challenges:
- Gas price
- Level playing field
- National policies e.g. nitrogen
- Covid-19
- Bridging the gap EOF → H_2 / CCS

Note:
- Emissions will reduce:
  - Measures
  - EOF
- Emission intensity will rise:
  - Cease Groningen production
  - Depletion small fields

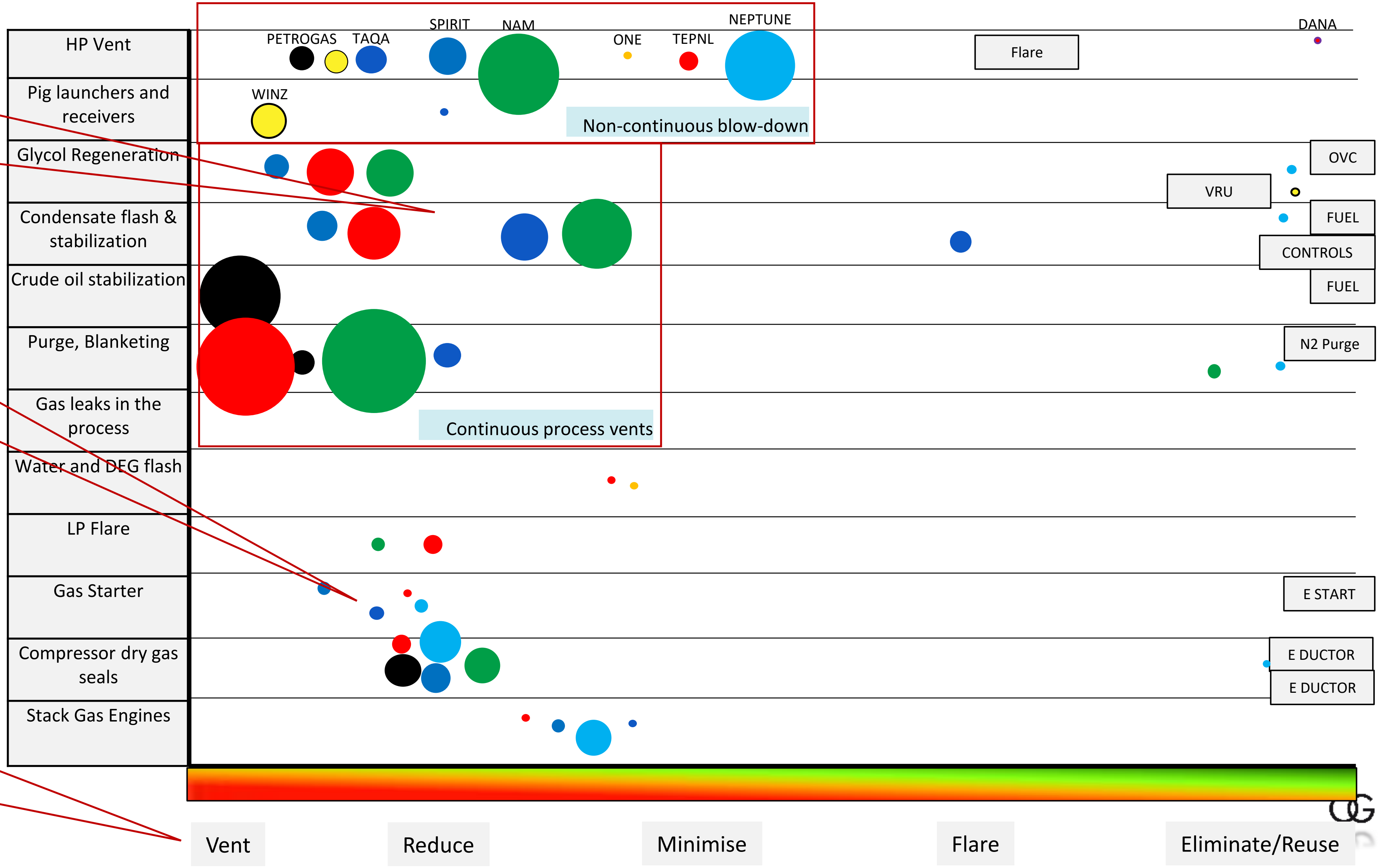
Addressing emission sources (2017)

Focus on main sources:

- Non-continuous blowdown
- Continuous process vents

Avoid focus on small emitters which are perceived BAT

Seek for measures which are high on the abatement ladder



Remaining emissions (end 2020)

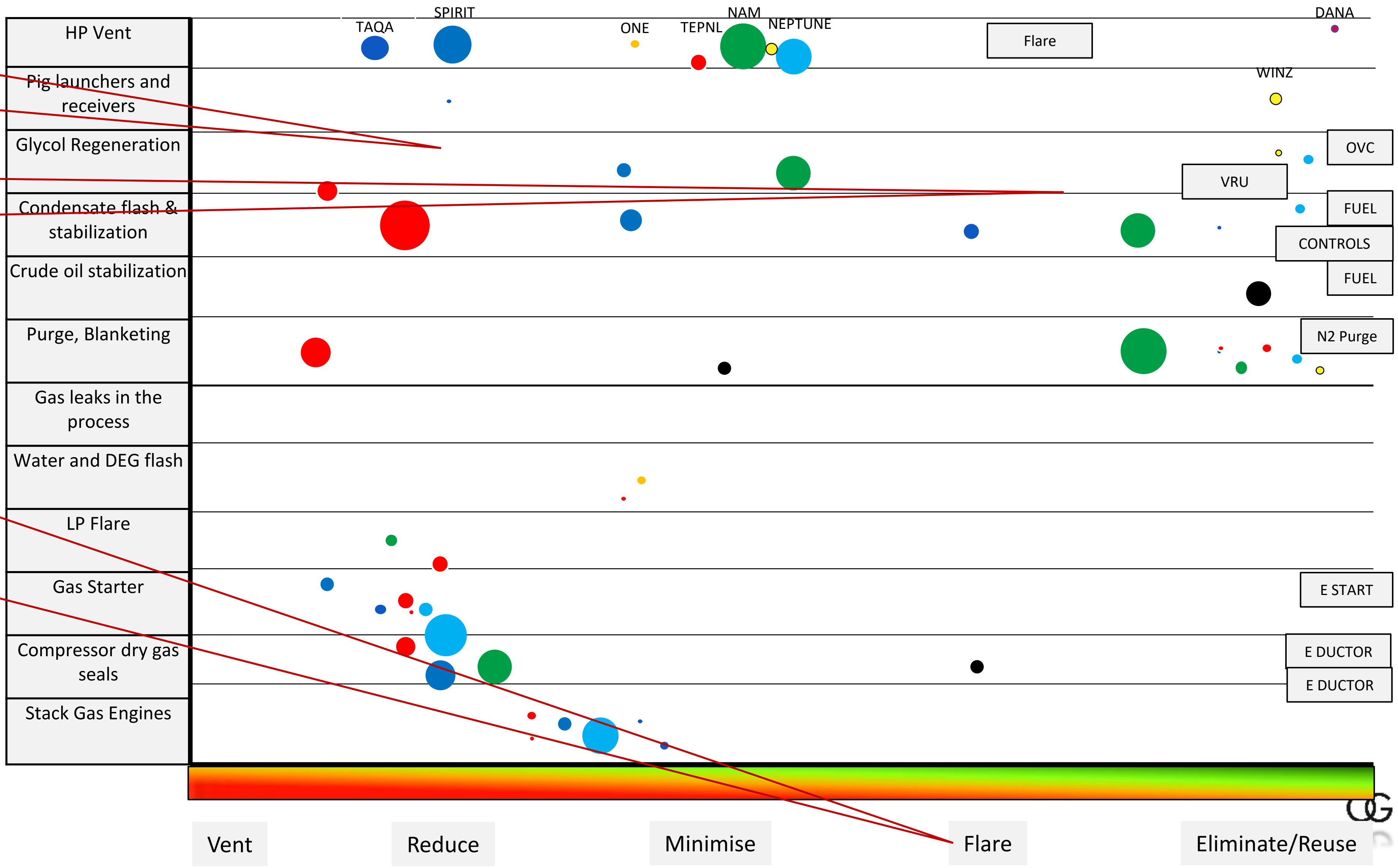
MACH10
Machinery Advice and Consultancy Hardeveld 2010

Large emission reductions by addressing main sources

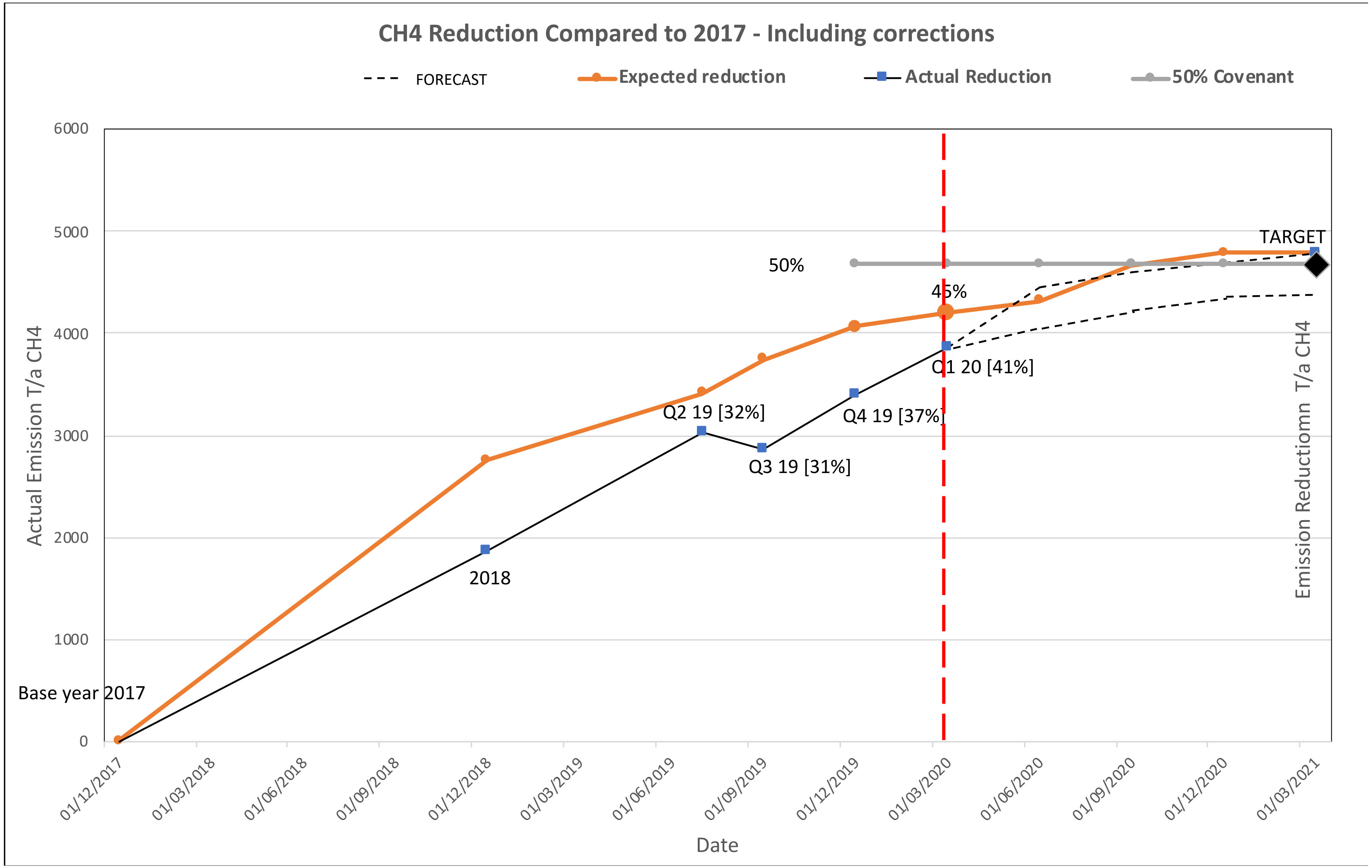
Shift towards more advanced state of technology

Wish from govt for switch from vent to flare will be surpassed by minimization and re-use of gas.

Original intent of bird protection is not jeopardized.



Reduction forecast



Methane emissions management

Energy Community 16 June 2020

Luciano Occhio - HSEQ Energy Management & Climate Change

Snam

Snam is one of the world’s leading energy infrastructure operators. Hydrogen, biomethane, CNG/LNG, energy efficiency are the pillars of Snam’s strategy for the energy transition

Network ~ 32,625 km

Compressor stations 13

Gas demand ~ 74 bcm

8 supervisory and controlling districts

48 maintenance centers with operating functions

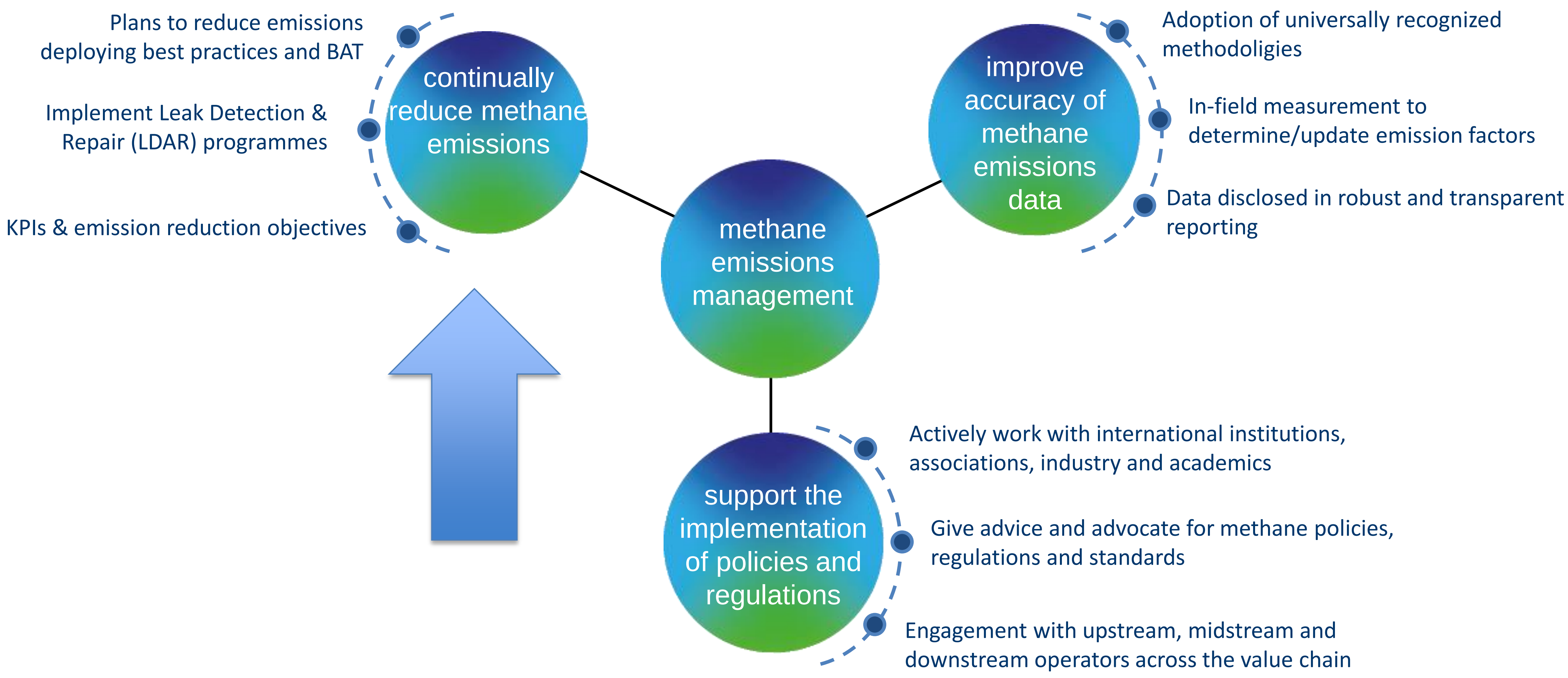
Storage concessions 9

Gas moved ~ 19 bcm

Natural gas storage capacity ~ 12.5 bcm

Max. regasification capacity 3.5 bcm

Methane emissions: what we do



Mitigation – Vents network

- ✓ When maintenance is needed on pipeline sections, operators block the smallest possible linear section of the pipeline and depressurize it by venting gas to the atmosphere.

- ✓ Operators can reduce venting using a mobile compressor that removes gas from the pipeline section to be vented and recompresses it into a nearby section. Thirteen interventions with mobile compressors were made in 2018 with 5.4 Mm^3 saved gas (37% reduction of potentially vented emissions), and in 2019 Snam saved 3.4 Mm^3 using mobile compressors (8 interventions).

- ✓ In 2018 Snam saved 0.8 Mm^3 (7% reduction of vented emissions), and in 2019 1.5 Mm^3 lowering pipeline pressure through gas consumption

Mitigation – Vents network

- ✓ Hot tapping is an alternative procedure that makes a new pipeline connection while the pipeline remains in service, flowing natural gas under pressure. The hot tap involves attaching a branch connection and valve on the outside of an operating pipeline, and then cutting out the pipe-line wall within the branch and removing the wall section through the valve.

- ✓ Hot tapping avoids product loss, methane emissions, with 100% reduction of potential vented gas and disruption of service to customers. In 2018, 6 hot-tapping interventions saved 1.7 Mm^3 of gas (14% reduction of vented emissions), and in 2019 hot-tapping interventions saved 1 Mm^3 of gas.

Mitigation – Vents CS

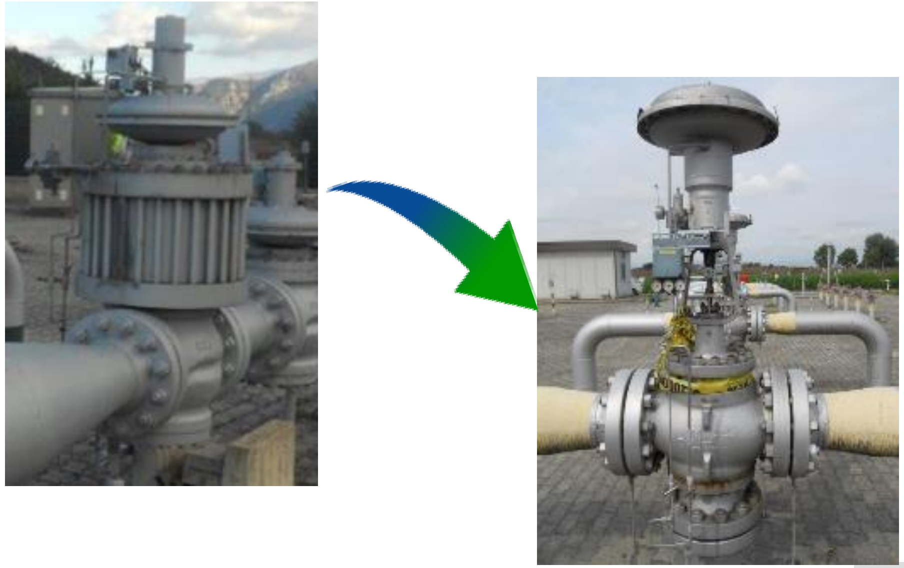
- ✓ When compressors and/or piping are taken out of service for operational or maintenance purposes in compressor stations, gas is usually depressurized to the atmosphere. This emission can be avoided by instead depressurizing to a connected or nearby low-pressure system or through the use of an electric driven compressor to reroute the gas.
- ✓ The reduction in vented gas is about 80-90% for each intervention. The gas saved depend on the operating conditions (typical gas saved is about 30-50000 m^3/y per installation). However, the cost is high, and this practice is mainly approved for environment reasons; the applicability could be limited due to the available area needed to do the assembly.

Mitigation – Regular emissions from Pneumatic

More than 3,000 components were replaced or dismantled:

- ✓ Pneumatic instrument systems powered by natural gas are used across gas industries for process control. Conversion of pneumatic vs. air / electrically controlled devices is an important option to reduce emissions;
- ✓ Replacement of high-bleed regulating valve control devices with low emission devices;
- ✓ Installation of new heaters, mounted on skid, with lower emissions and high efficiency.

As a result of the pneumatic equipment replacement initiatives, Snam pneumatic emission reduction from 2013 to 2019 was about -43% that equals at about 7.8 million m^3 of natural gas saved per year.



Mitigation – Fugitive

- Installation in pressure reducing stations of valves to reduce emissions from the condensate tank of filters (approx. 350 stations) and from the blowdown vents (more than 200 stations);

- Replacement of gate valves with ball valves in compressor stations (station and TC blowdowns)

Mitigation – UGS - LNG

- UGS - Flash tank separators in glycol dehydrators. In glycol dehydration unit dry gas flows to the network, while the wet glycol mixture passes to the glycol "regenerator" where, by distillation, the water is vaporised and methane contained in the mixture is generally vented. Installing a flash tank separator it's possible to recover approximately 90% of the methane contained in the wet glycol/gas mixture

- UGS - Well integrity management system (standards, policies, practices and procedures to safely operate the wells, providing benefit for methane emission prevention)

- LNG Boil-off gas recovery (e.g. install high-pressure BOG compressors to inject non-recoverable boil-off gas into the gas grid)

- Use of N_2 for the purge of the LNG tubes

Flash tank separator

Mitigation – Fugitive (Leak Detection & Repair)

Elements of a LDAR program

1

Identifying components & leak definition

Documentation analysis and identification of potentially leaking elements by using technical documents such as P&IDs, process diagrams, parameters (assigned a unique ID number to each emitting component in the Enterprise Asset Management (EAM) IT system)

Definition of leaks criteria, threshold limit value

2

Detection/Monitoring components

Onsite monitoring and detection, quantification, (according to EN 15446, and/or measurements of the flow rate)

3

Repairing components

Immediate on-field repair, where feasible. New measurement after repair
Classification considering safety aspects, amount of methane, concentration, accessibility, cost - effectiveness evaluation)
Prioritisation of the reparations, development of the maintenance plan

4

Recordkeeping

Recording of the result of the surveys in EAM to update facility emissions on a site specific approach.

Snam’s GHG emissions and Targets

Green House Gases that Snam releases into the atmosphere are carbon dioxide (CO2) and methane. The Company increased the targets for reducing its methane emissions by 2025, going from -25% to -40% compared with 2016, setting also a target of -40% by 2030 for Scope 1 and 2, including new target related to the 55% use of green electricity by 2030.

Snam also joins **Carbon Disclosure Project,** a not-for-profit charity that runs the global disclosure system for investors, companies, to manage their environmental impacts and **CLIMATE RELATED FINANCIAL DISCLOSURES** by the Financial Stability Board with the goal to improve the disclosure of companies on financial aspects related to climate change.

2030: -40%

Scope 1
Direct emissions

- CO_2 emissions produced by fuel combustion
- CH_4 emissions produced by the release of natural gas and methane into the atmosphere
- other GHG emissions (ex. HFC)

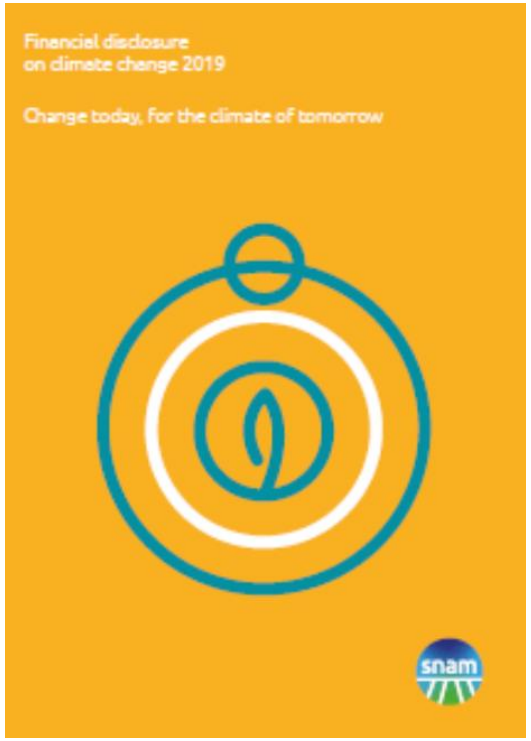
2025: -40%

2030: -40%

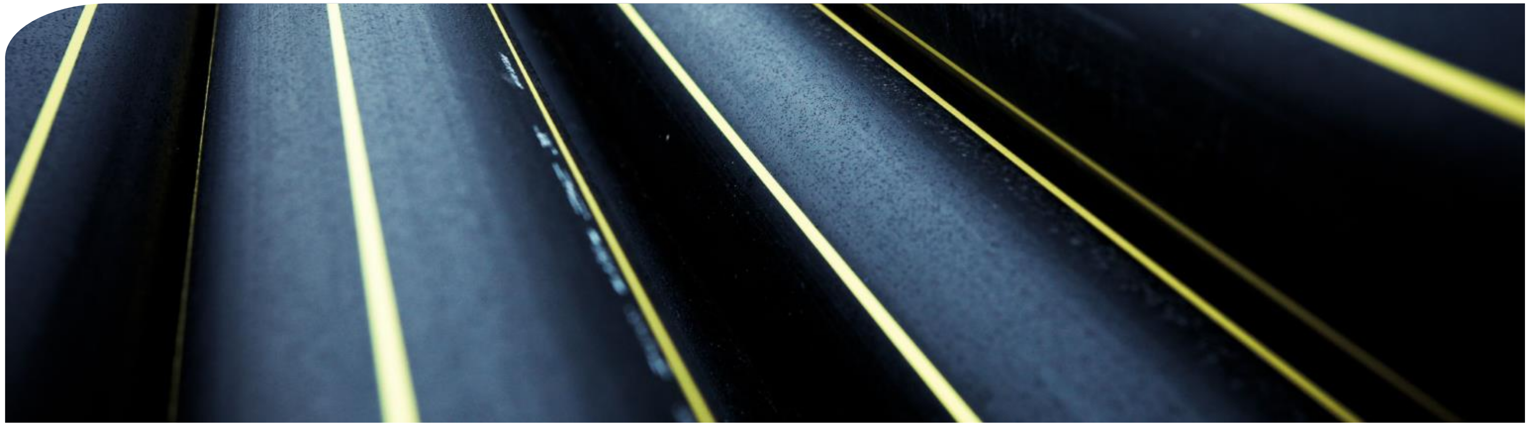
Scope 2
Indirect emissions

- CO_2 emissions produced through the purchase of energy from third parties (such as electricity or heat)
- MB and LB approach

2030: electric 55% green



GRDF
GAZ RÉSEAU DISTRIBUTION FRANCE



Methane Emission
GRDF Case Study

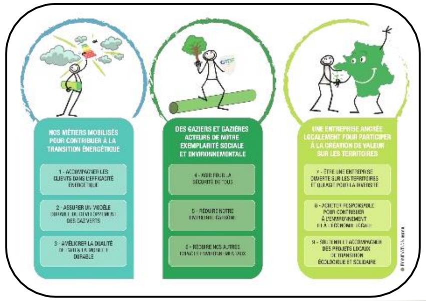
Jihane LOUDIYI– Environmental Officer
16/06/2020

Who is GRDF ?

The main french gas distributor, operating 200 000 km of network, ~280 TWh distributed in 2019

11 million customers in France
5 million gas smart meters rolled out at the end of 2019, 11 million to be installed by 2023

A strong commitment to the development of biomethane and renewable gases & energy efficiency
Ambition of 100 % renewable gas in 2050
~35 to 56 $MtCO_2$ /year reduction in 2035



2019 – 2023 CSR policy
Commitments to reduce GRDF’s carbon footprint (CH_4 emission is the main contributor), to reduce CO_2 emissions of clients & to achieve 12 TWh of biomethane

GRDF & Methane Emissions

- GRDF methane emission amounted 25.2 ktCH_4 in 2019, it accounts for ~ 0.16 % of the gas distributed and ~0.13 % of France GHG total emissions.

- An action plan, related to our CSR and our Technical policies, is in place with an approach of constant improvement

Quantification & Reporting

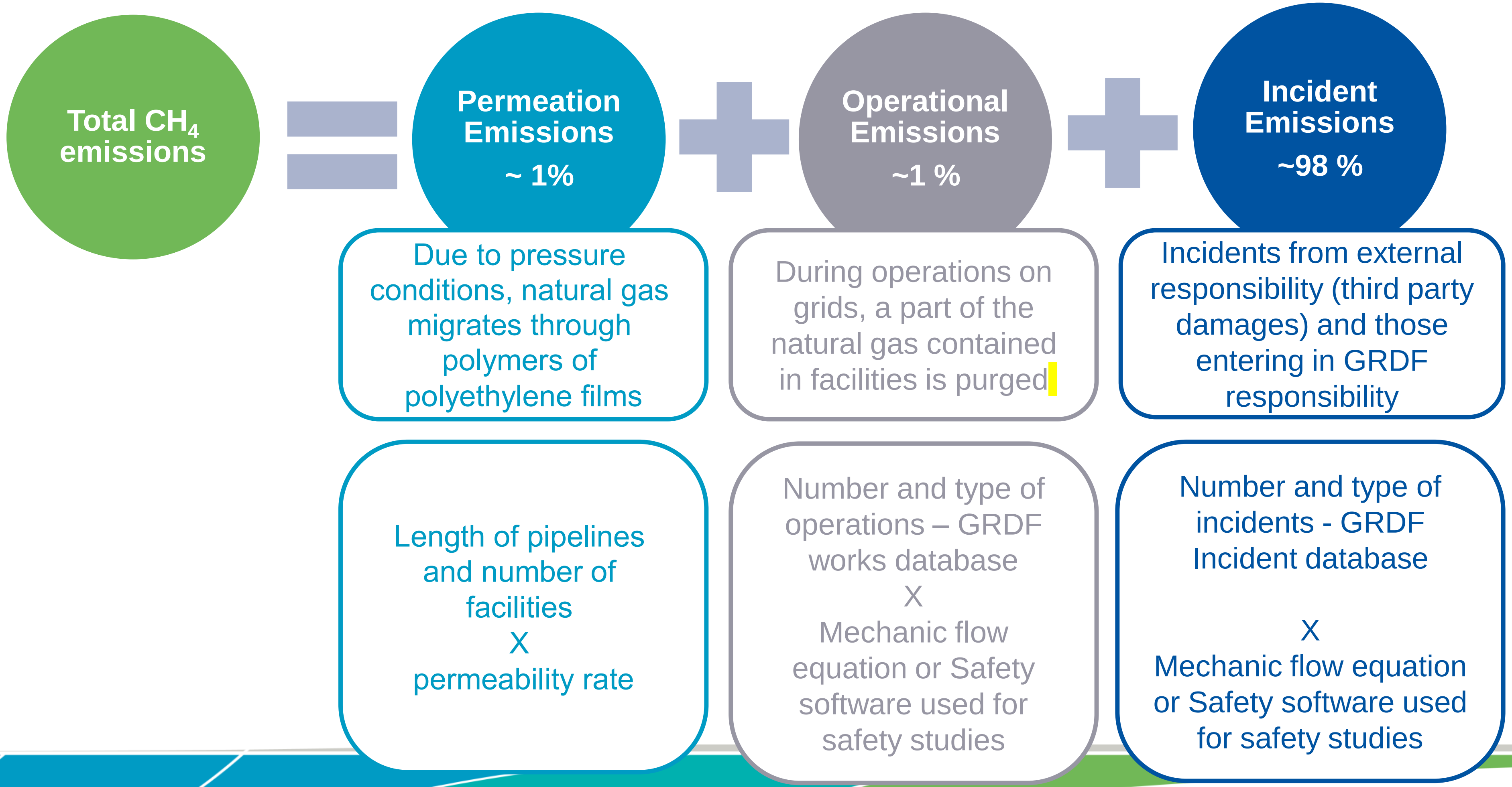
- CSR Key Performance Indicator on CH_4 emission
- Annual quantification of CH_4 emission
- Annual reporting to our group (ENGIE), to CITEPA for the National Inventory Report, GRDF website publication, …

Mitigation actions

- Leak Detection And Repair
- Organization & Prevention actions on third party damages
- Investments to modernize the network, pipelines and facilities replacement, maintenance policy, service lines protection devices

Methane Emissions - Quantification

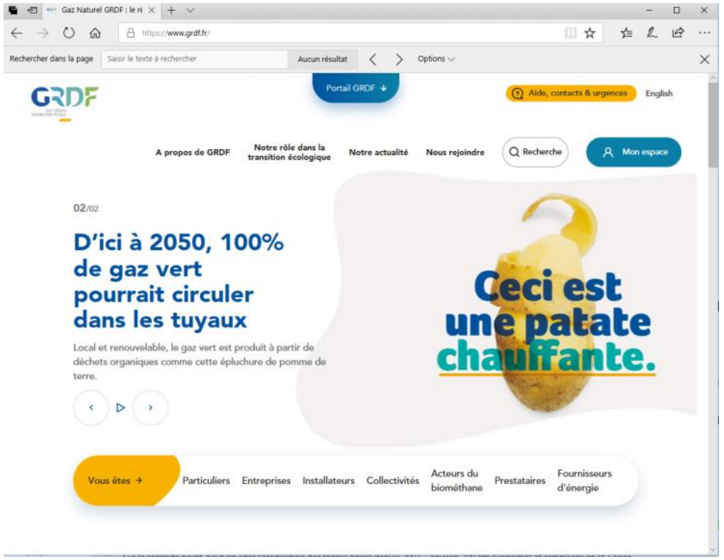
- GRDF quantifies its CH_4 emissions on a yearly basis with the support of ENGIE Research Center
- Improvements of the methodology : linear method before 2012, then « per event » methodology for more accuracy and representivness



Methane Emissions – Reporting / publication

Public Carbon french database

National Inventory Report



GRDF website

Methane Emissions – Mitigation actions
Systematic leakage search on distribution network

- The gas distribution network is monitored throughout the year by a systematic leakage search, divided into two distinct methods, Pedestrian and Vehicular (depending on the accessibility of the area).

- ~100, 000 km checked every year (50 % of the network)

Systematic leak research by VSR vehicle

- The vehicle, equipped with a GPS, transmits to an embedded software (NGS) the necessary information to track the rounds: GPS position, vehicle itinerary, detected index by sensors. Measurement is taken at ground level by sampling tubes mounted on a suction ramp.

- Concentration higher than 1 ppm are detected

- If immediate action is needed, the emergency security office sends a specialized team for intervention.

- If not, repair is performed immediately when feasible, or under 22 days in average

GRDF
GAZ RÉSEAU
DISTRIBUTION FRANCE

Methane Emissions – Mitigation actions

Organisation & Prevention actions to avoid third party damage and reduce its consequences

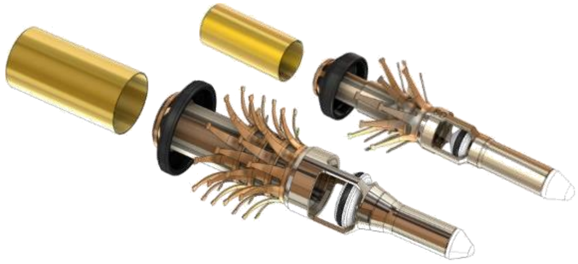
- Improvement of network cartography accuracy
- Analysis and feedback after third-party damages
- Partnerships with relevant stakeholders such as the national federation of civil works or local authorities, outreach and prevention actions on third party damages : 18, 000 employees of local authorities and 56, 000 employees of civil works companies trained with these actions since 2006.
- Focus on civil works companies regularly involved in network damages
- Reduced intervention duration in case of emergency : geo positioning of intervention vehicles
- Innovations under development to reduce damages : artificial intelligence to identify new risk criteria and identify risky work sites, diagnostic assistance tools for operational staff, study on warnings systems embedded on mechanical shovels

Methane Emissions – Mitigation actions

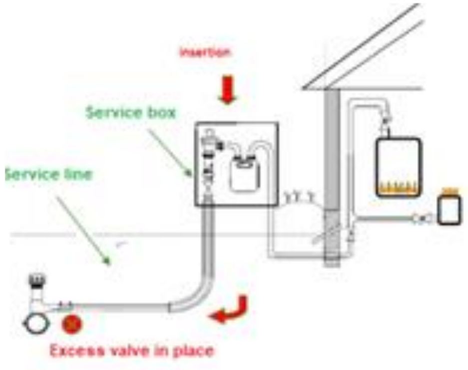
- 300 M€/ year investment program in safety and modernization of the grid
- 150 M€ / year maintenance program

  - The renewal of 400 km of pipelines every year leads to methane emission reduction, by replacing materials used in the past by polyethylene or steel (98 % of the network)

  - To reduce the amount of methane emitted when a damage occurs on a service line : protection devices (PBDI / DPBE), that automatically stop gas flow in case of third party aggression, are implemented on new and existing service lines.



Excess flow valve for existing service lines
Dispositif de protection branchement existant (DPBE)



Insertion in the service line
- **Trenchless**
- **No interruption of gas flow**

Expert Panel II: Regulatory challenges in addressing the methane emissions

Moderator: Tania MEIXUS

Panellists:

Maria OLCZAK (FSR)
Brendan DEVLIN (EC)
Boyko NITZOV (ACER)

European University Institute

ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES

FSR ENERGY & CLIMATE

Florence School of Regulation

Follow-up meeting on methane emissions in the gas sector

Regulatory challenges in addressing methane emissions

Maria Olczak, Andris Piebalgs, FSR

16 June 2020

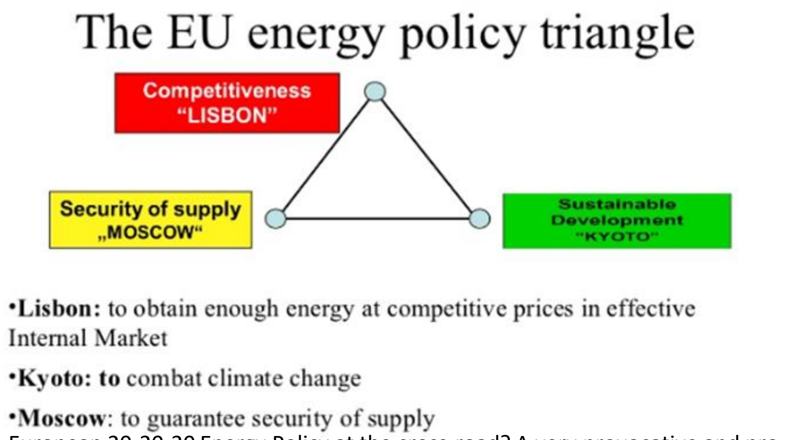
The European Green Deal and the gas sector

"The Commission will present by mid-2020 measures to help achieve smart integration. In parallel, **the decarbonisation of the gas sector** will be facilitated, including via:

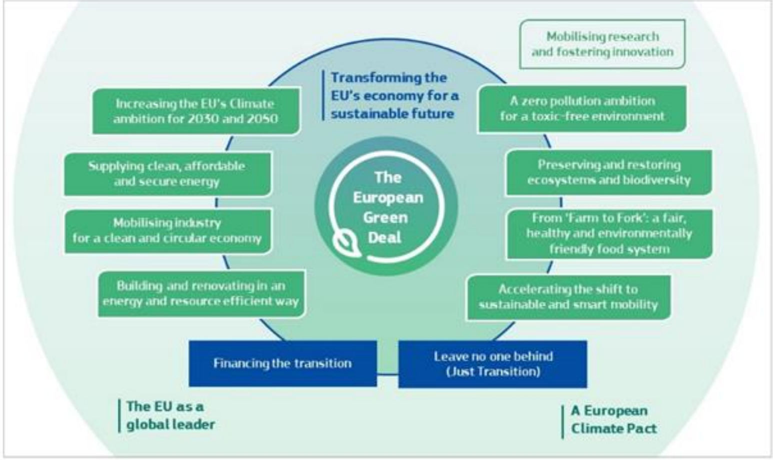
- **enhancing support** for the development of decarbonised gases,
- a **forward-looking design** for a competitive decarbonised gas market,
- and by **addressing the issue of energy-related methane emissions**".

Addressing the EU methane emissions

- Roughly 75% of the methane emissions in the EU oil and gas sector arises in mid- and downstream (IEA Methane Tracker)
- Following the liberalisation of the EU gas market, these segments of the gas value chain are operated by the regulated entities: liquefied natural gas (LNG) system operators, storage system operators (SSOs), transmission system operators (TSOs) and distribution system operators (DSOs).
- Changing market conditions and policy priorities?



European 20-20-20 Energy Policy at the cross-road? A very provocative and pro-business view… Jean-Michel Glachant Florence School of Regulation & Loyola de Palacio EU Energy Chair Madrid, 25 November 2011



Source: European Commission, 2019

ACER-CEER The Bridge Beyond 2025 Conclusions Paper (2019)

Investment in and operation of natural gas infrastructure

Investments geared solely towards fossil fuels should be avoided or require a quick payback of costs, while investments in gas infrastructure should be future-proof, meaning that they should also be useful for "low-carbon" or "green" gases, properly defined.

Furthermore, TSOs, storage operators and LNG operators, as well as DSOs above a size threshold, should be obliged to measure and report their methane emissions according to a standard methodology, with sufficient granularity to allow the identification of the highest emitters. The data should be publicly available through a European Methane Emissions Observatory, as well as in the audited annual reports of the operators, which should also cover other sources of methane emissions. The measurements should be followed by an action plan at system operator level to address emissions. NRAs should recognise efficiently incurred costs for regulated entities. Once emission data are sufficiently robust, tradeable permits or taxes on actual emissions could be introduced.

ACER Agency for the Cooperation of Energy Regulators

CEER Council of European Energy Regulators

KEY CONCLUSIONS

The priority for Europe's energy sector is to decarbonise while maintaining security of supply, affordability for consumers and competitiveness for businesses. For the electricity sector, the "Clean Energy for all Europeans" Package (CEP) sets the path. For the gas sector and for cross-cutting aspects, such as infrastructure planning, legislation and policy need to be updated to facilitate decarbonisation, improve market functioning and maximise the opportunities arising from sector coupling.

Following extensive consultation, our key conclusions include:

- Decarbonised gases should be able to be integrated into existing gas markets, with full valuation of their environmental benefits, and captured in market monitoring through sustainability indicators published alongside GTM metrics. Clear definitions and categorisation of decarbonised gases, including carbon capture and use or storage, should be established in European legislation, and consistent principles should be applied across the EU to facilitate the blending of decarbonised gases. Legislation should be sufficiently flexible to allow the emergence of new gases/technologies.
- To improve market functioning and address emerging issues, a new system of dynamic and targeted regulation should be established in EU law, based on the Agency's market monitoring and NRA analysis and action. In order to maintain flexibility to adjust metrics and thresholds over time and to decide on appropriate interventions at national or regional level, the detailed indicators and thresholds should not be fixed in legislation but rather established transparently by the Agency in collaboration with the NRAs.
- Transmission System Operators (TSOs) and National Regulatory Authorities (NRAs) currently lack the means to act in an effective and timely manner to deal with fraud. *Ex-ante* measures for registration and licensing can contribute to mitigating the risk of fraudulent behaviour. Furthermore, TSOs should develop harmonised counterparty risk management policy at European level and set up a centralised EU database on creditworthiness and market behaviour accessible to TSOs, NRAs, the Agency and the European Network of Transmission System Operators for gas (ENTSOG), in order to avoid that the costs of fraud and/or default are socialised.
- To ensure that licensing requirements do not act as a barrier to entry, there should be mutual recognition across the EU of licensing for wholesale traders (or an equivalent mechanism). This should be accompanied by a mechanism for enforcement action, such as revoking the licence without undue delay if needed. In addition, further steps are needed to mitigate the risk of fraud, including the right to exclude parties found to have breached requirements in another Member State.
- A technology-neutral, level playing field should be established between different conversion and storage facilities across the energy sector, so that they face equivalent categories of costs in network tariffs and levies, and equivalent recognition of environmental and security of supply benefits. To facilitate this, the Agency could be requested to undertake an assessment of the current situation and provide recommendations.

Methane emissions mitigation and Gas network companies

- **Methane Emission Monitoring and Action Plans for Regulated Companies and harmonization of MRV at the EU level**
  1) identify and measure emissions
  2) reduction targets
  3) define actions for the upcoming year and the next 5 years
  4) verify and publish

- **European Methane Emissions Observatory**
  - OGMP Reporting Framework 2.0
  - European Environment Agency + ACER

- **How to Create the Right Incentives for Regulated Companies to Effectively Reduce Methane Emissions?**
  - examples from the electricity sector: incentive-based regulation
  - greater transparency

European University Institute

FSR ENERGY
Florence School of Regulation

Issue 2020/13
April 2020

POLICY BRIEF

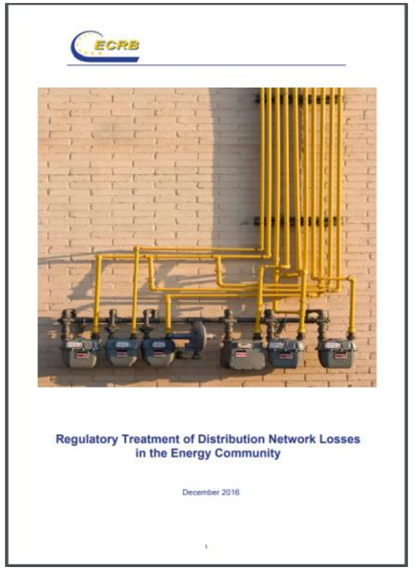
Methane Emission Reduction – An Important Step in Strengthening the Sustainability Dimension in Gas Network Companies

By Maria Olczak and Andris Piebalgs, Florence School of Regulation

Highlights

- The European Green Deal envisages an important role for gas in the energy transition. To follow this pathway, the gas value chain should be more oriented towards sustainability. Methane emission reduction should also be strongly pursued by gas network companies.
- A regulation to limit methane emissions by the gas sector should be established at the European level. It should strive to establish dynamic targets, create a robust and transparent Monitoring, Reporting and Verification (MRV) framework and incentivise the network companies to establish and realise ambitious action plans.
- The creation of a European Methane Emissions Observatory could provide an efficient tool for substantially reducing methane emissions. The Observatory would be well-placed to reconcile data from bottom-up corporate reporting and top-down aerial surveys and satellite measurements, creating the necessary transparency in the results obtained.
- National Regulatory Authorities (NRAs) should recognise the efficiently incurred costs for regulated entities. A form of incentive-based regulation oriented to minimising network losses based on the experiences of the electricity sector could provide a promising approach.

Source: Cadmus, 2020



ECRB

Regulatory Treatment of Distribution Network Losses in the Energy Community

December 2016

Source: Energy Community, 2016

Expert Panel II:
Regulatory challenges in addressing the methane emissions

Boyko Nitzov
Team Leader – Gas Infrastructure - ACER

Follow-up meeting on methane emissions in the gas sector
Energy Community - GIE - Marcogaz
16th of June of 2020

ACER – CEER Recommendation (Bridge beyond 20205)

- TSOs, storage operators and LNG operators, as well as DSOs above a size threshold, should be obliged to:
  - Measure their methane emissions
  - Report their methane emissions
  - According to a standard methodology, with sufficient granularity to allow the identification of the highest emitters.
- The data should be publicly available through a European Methane Emissions Observatory, as well as in the audited annual reports of the operators.
- Reports should also cover other sources of methane emissions.
- The measurements should be followed by an action plan at system operator level to address emissions.
- NRAs should recognise efficiently incurred costs for regulated entities.
- Once emission data are sufficiently robust, tradeable permits or taxes on actual emissions could be introduced.

Measuring an event *vs.* measuring impact *vs.* reasons

- **Measuring an event: say measurements show an emission of methane. What next?**
- **Measuring the impact (magnitude):**
  - ✓ **Duration? Flow rate? Is the event continuous, periodic (regular, irregular?), one-off?**
- **Other considerations re the event:**
  - ✓ **Technology driven, e.g. line test?**
    - ✓ **Caused by subpar practices (avoidable), or**
    - ✓ **By technology features (assuming best used)?**
  - ✓ **Emergency driven, e.g. valve failure?**
    - ✓ **Due to negligence (avoidable)?**
    - ✓ **Due to force majeure?**
- ***Report total emissions:*** **own emissions *and* purchased energy emissions *and* other energy emissions (unrelated to the direct purchase of energy - goods and services, employee commuting, business travel, etc.)**

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What is measured matters

Risk = probability * impact magnitude

ACER Agency for the Cooperation of Energy Regulators

How can regulation be conducive to methane emissions abatement?

- **Provide guidance re reporting:**
  - Scope item, event ID vs. volume vs. risk
  - Acceptable accuracy (granularity), confidence interval
  - Attribution to emitter (entity vs. location)
  - Format (e.g. ID alert vs. report vs. analytics and assessments) as applicable to various scope items
  - National requirements (regulation is national domain-bound!)
  - Cross-border consistency
  - Data stores / access / avoiding duplication / technology synergies
  - Best practices sharing
- **Need dynamic regulation, two-way bridge:**
  - What can technology do (scope!) and the focus of the regulatory effort (purpose!)
  - Technology tools and enabling operators and regulators to use them within their legal domain
  - Technology costs and benefits (ID of an emission event is not enough!)
  - Best industry practices and regulation
  - Best regulatory practices and technical norms and methods
- **Standards matter**

Thank you for your attention!

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Collaboration among Energy Community, GIE and MARCOGAZ - Next steps

Collaboration – Next steps

Participation of Energy Community → Gas industry meeting on methane emissions to be held in September/October

Involvement of Energy Community → Ongoing and upcoming activities on methane emissions at European level (dissemination of best practices and materials, exchange of information, questionnaires, development of new documents)

Next meeting in October/November in Vienna

Wrap-up and concluding remarks

Predrag GRUJICIC
Ronald KENTER
Francisco DE LA FLOR

Thank you!