Monitoring and reducing Methane Emissions

We will start at 13.02 to allow participants to finish previous meetings and join the call

Gas Transmission

Slido.com
#GT9

Welcome and Opening

Thank you for joining us today

Steven Vallender
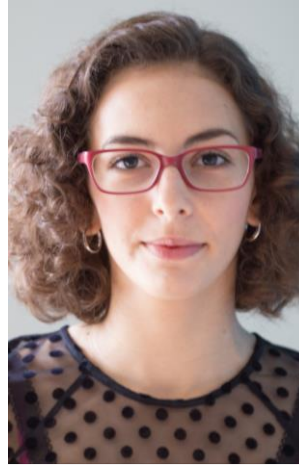Director of Asset

Who will be speaking?

Matthew Williams
Methane Emissions Reduction Lead

Gas Transmission

Violeta Bescós Roy
Research and Development Technician
Enagas

Magali Aurand
Consultant

Guidehouse

Monika Oczkowska
OGMP 2.0 Coordinator

UNEP

Ollie Stafford
Customer and Stakeholder Associate

Gas Transmission

Logistics

Should last for approximately about 60 min

Questions and polling via slido.com #GT9

Believe in children
Barnardo's

All callers will be placed on mute

MUTE

We will circulate the slides and a recording of this webinar

Agenda

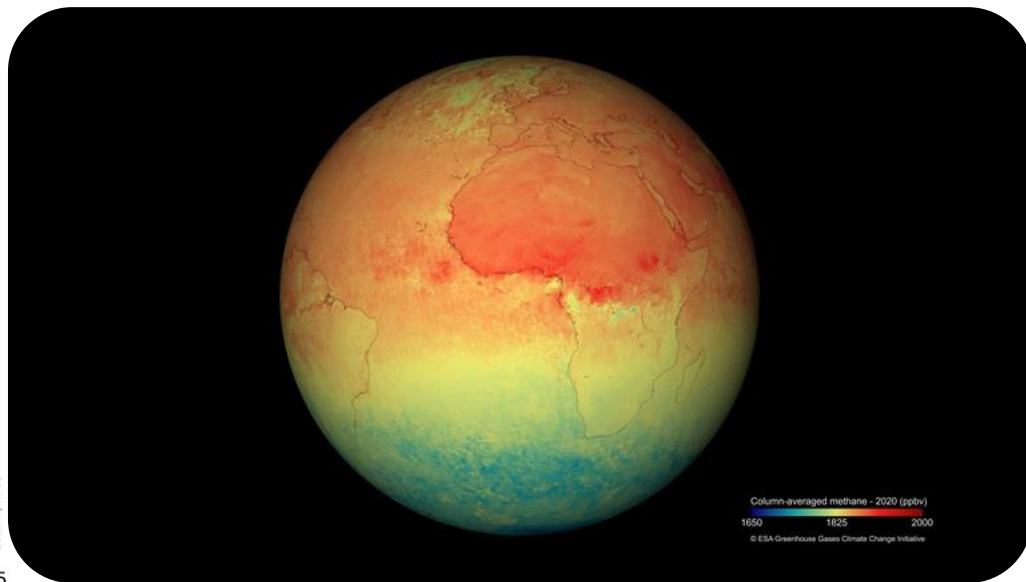**1. Methane Emissions – Performance & Strategy**
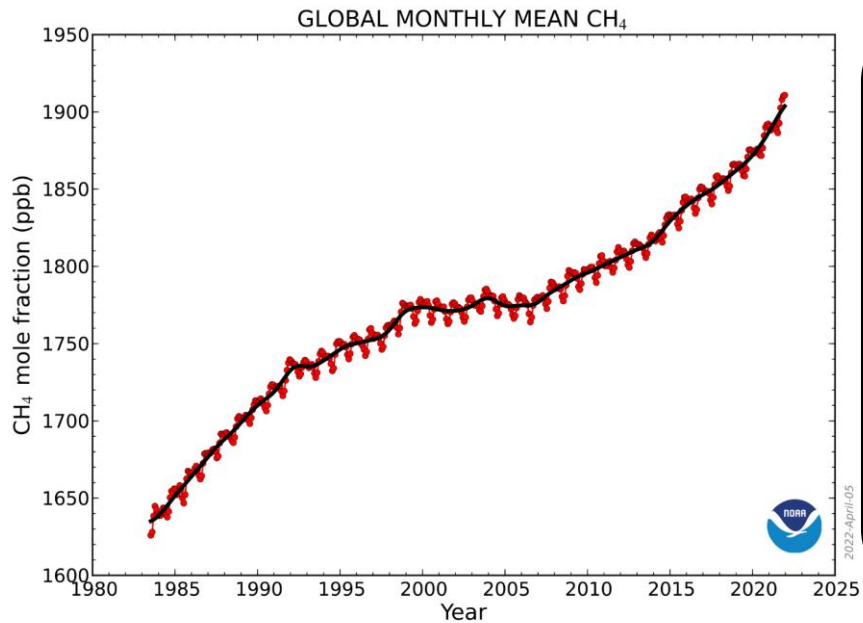
2. The GERG Project

3. The Digital Platform for Leakage Analytics (DPLA) Project

4. Oil and Gas Methane Partnership 2.0

Methane Emissions
Performance & Strategy

Gas
Transmission

How responsible is methane?
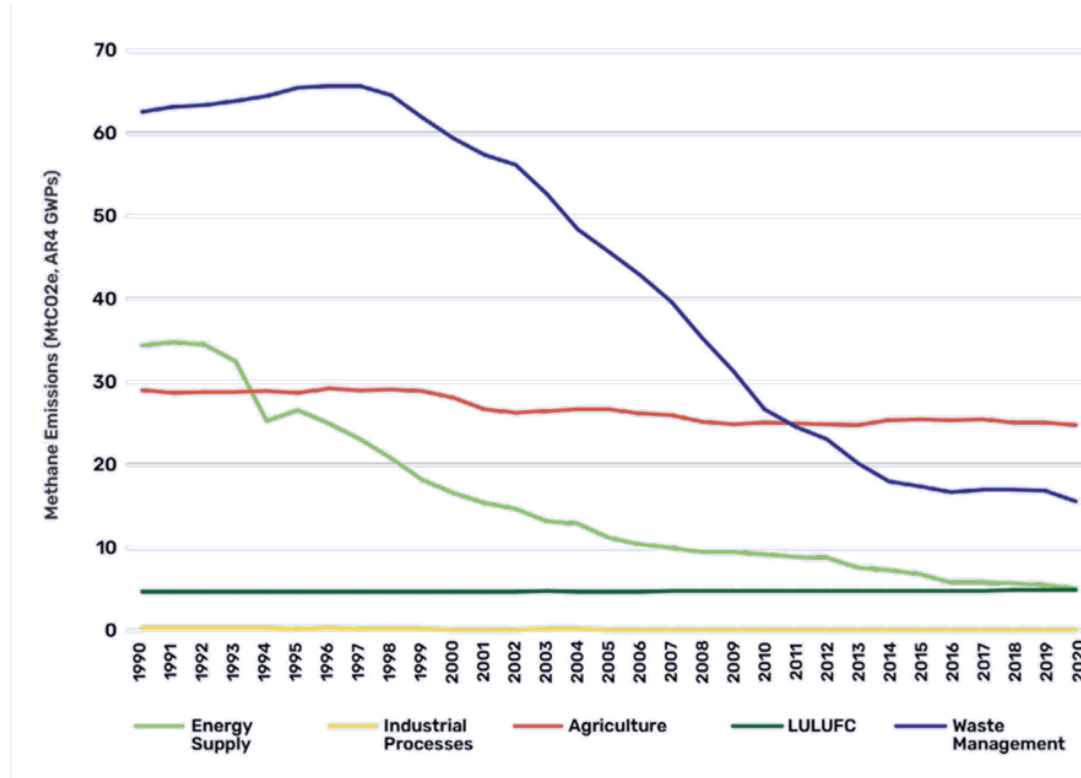
Methane – in the news

- UK, US and EU commit to 30% reduction in methane emissions by 2030 from 2020 levels in the Global Methane Pledge at COP26

- Reinforced at COP27; more 150 countries now signed up. Countries developing methane action plans, UK included.
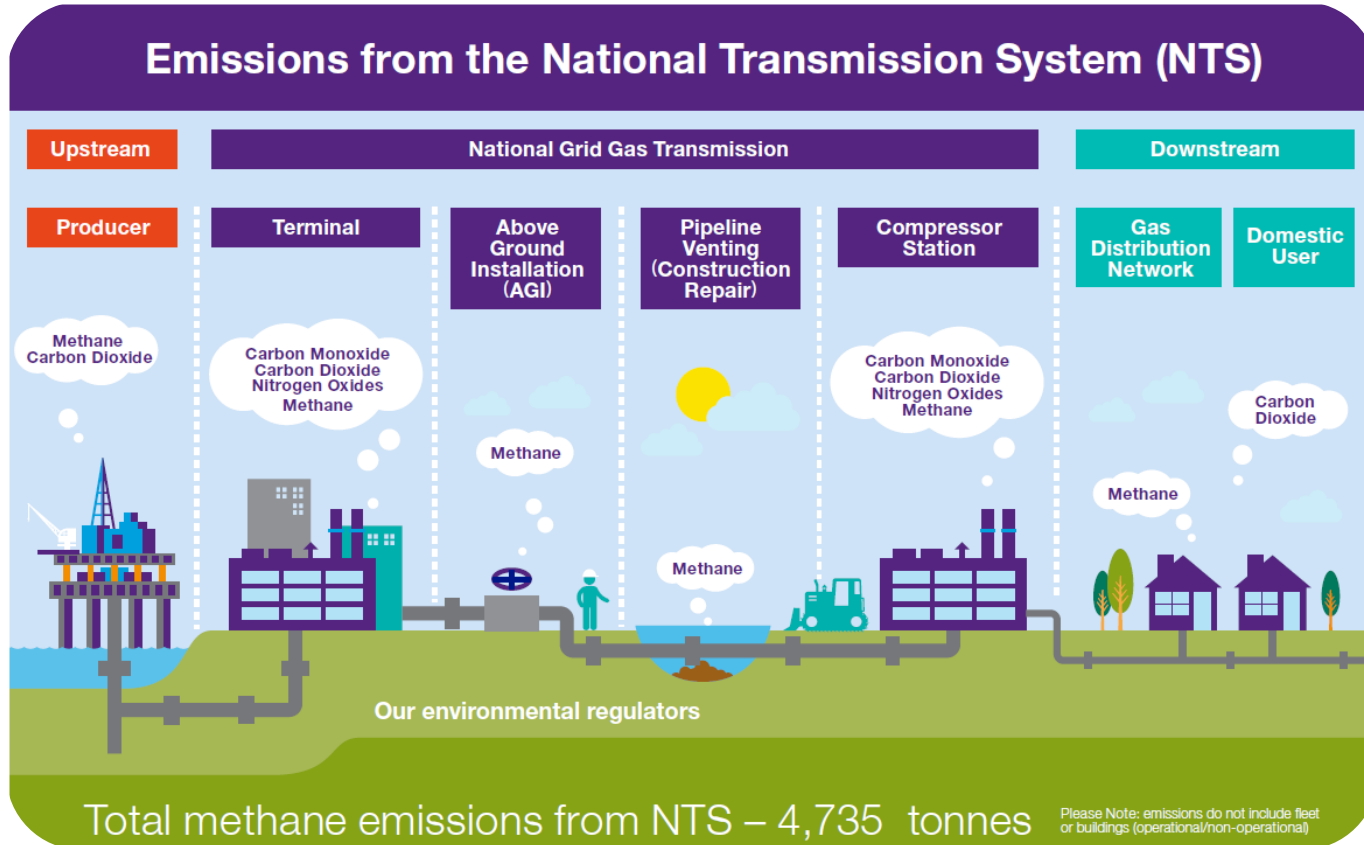
UK methane emissions

UK methane emissions by IPCC sector UK only Source BEIS, UK 1990-2020 Greenhouse Gas Inventory

Where do methane emissions occur?

Emissions from the National Transmission System (NTS)

Upstream | National Grid Gas Transmission | Downstream

Producer | Terminal | Above Ground Installation (AGI) | Pipeline Venting (Construction Repair) | Compressor Station | Gas Distribution Network | Domestic User

Methane Carbon Dioxide

Carbon Monoxide Carbon Dioxide Nitrogen Oxides Methane

Methane

Carbon Monoxide Carbon Dioxide Nitrogen Oxides Methane

Carbon Dioxide

Methane

Methane

Our environmental regulators

Total methane emissions from NTS – 4,735 tonnes

Please Note: emissions do not include fleet or buildings (operational/non-operational)

Gas Transmission

10

Our sources of methane emissions

Our 2021 performance is 4.735 kt CH_4, equivalent to 118.38 $ktCO_2e$
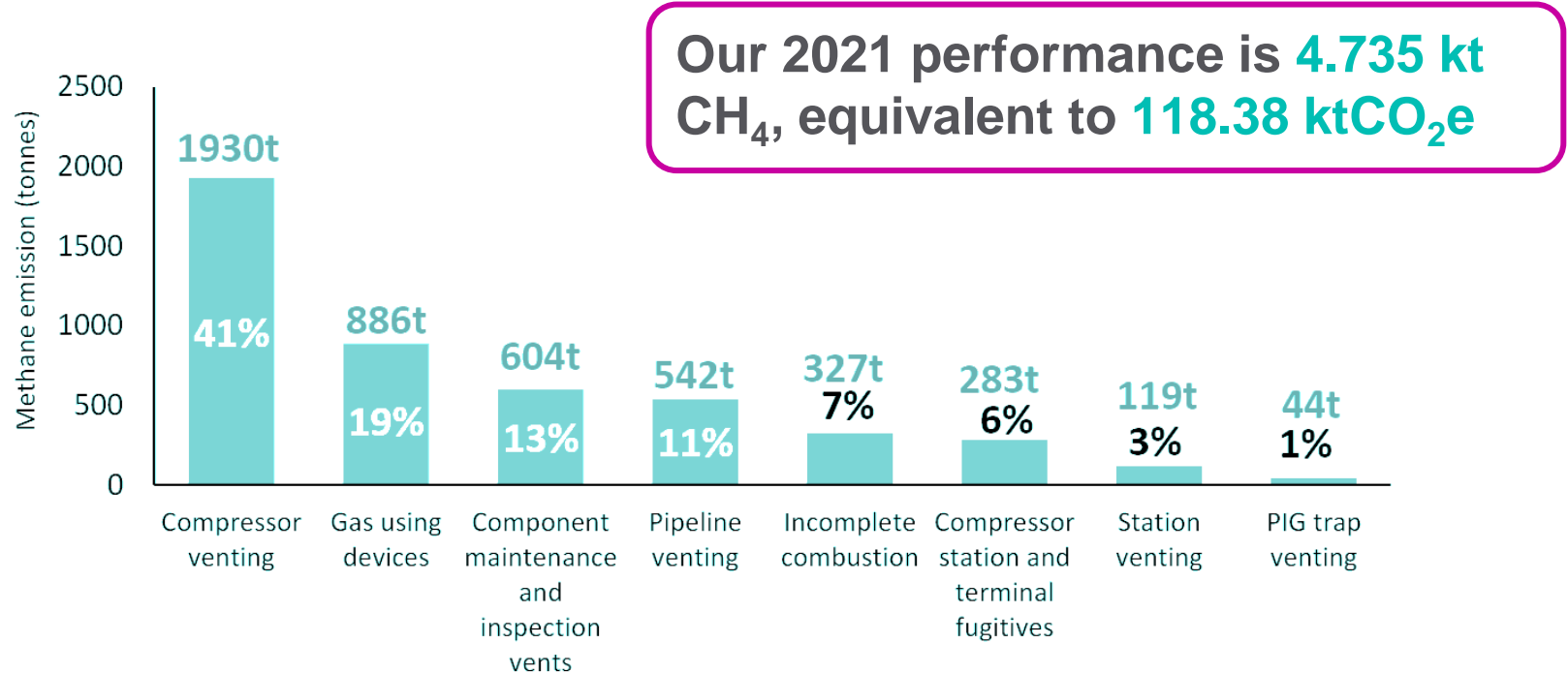
Quick Poll

We are considering the most appropriate way to measure and report our methane emission performance which includes target setting. Should we set:

An intensity-based target; for example annual methane emissions as a percentage of gas transported

An absolute target; for example a set annual mass emission of methane

Both

We are already working on this…

But we know we can do more…Our uncertainty mechanism submissions

- Expand our current pipeline recompression capability and procure equipment to capture PIG trap emissions and emissions from whole compressor station depressurisations

- Improve detection and quantification of fugitive methane emissions through expanded leak detection and repair programme

- Trial compressor machinery train recompression or zero loss compressor seal solutions to reduce compressor venting

Summary

Great progress by the UK gas transmission and distribution networks to reduce leakage and losses of natural gas and methane

Up to 14% reduction in transmission methane emissions with the RIIO-2 period through our proposed investments

Collaborate and innovate on solutions to make the next step change in methane emission reduction

Poll Results

We are considering the most appropriate way to measure and report our methane emission performance which includes target setting. Should we set:

An intensity-based target; for example annual methane emissions as a percentage of gas transported

An absolute target; for example a set annual mass emission of methane
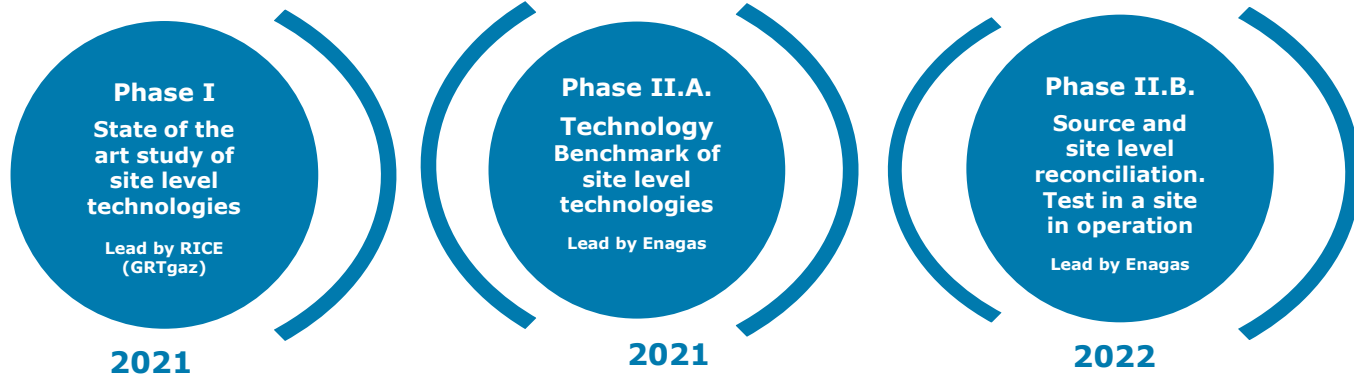
Both

Context

GERG Project(s) on Site Level Technologies for Gas Infrastructure

Series of projects launched by GERG recently focusing on site level technologies

for Mid-Stream (High Pressure) Gas Infrastructure

Phase I
State of the art study of site level technologies
Lead by RICE (GRTgaz)

2021

Phase II.A.
Technology Benchmark of site level technologies
Lead by Enagas

2021

Phase II.B.
Source and site level reconciliation. Test in a site in operation
Lead by Enagas

2022

Phase II.A. Technology benchmark

A first-of-its-kind research project covering midstream assets
Blind controlled release tests to analyse the performance of most promising site level technologies

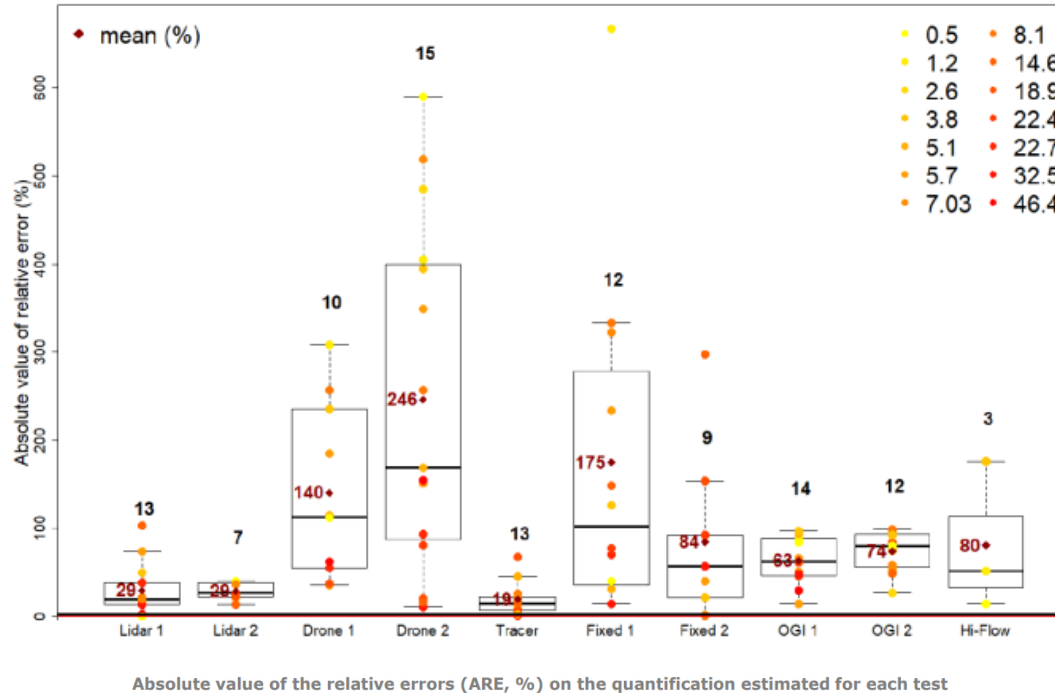|					
Inerted and isolated Compressor Station	9 most promising site-level technologies 3 bottom-up	1 week of blind tests with controlled releases of methane	17 different emissions rates	Different heights and gas diffusion at the outlet	Independent analysis to assess accuracy and repeatability

Phase II.A. Technology benchmark

A first-of-its-kind research project covering midstream assets
Blind controlled release tests to analyse the performance of most promising site level technologies

Absolute value of the relative errors (ARE, %) on the quantification estimated for each test

https://www.gerg.eu/projects/methane-emissions/gerg-technology-benchmark-for-site-level-methane-emissions-quantification-phase-ii-a

Phase II.B. Site and source level reconciliation

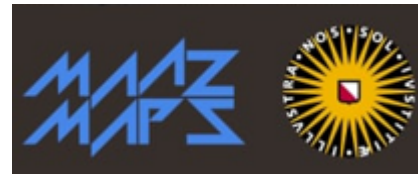**Measurements** in **a Compressor Station in Belgium (Fluxys)**

→ **Systematic bottom-up quantification by recognized provider.**

→ **Selection of site level technologies adapted to the site.**

Measurements to be performed as simultaneously as possible

Tests took place in Spring 2022

Final aim is be to elaborate a set of guidelines to be applied when top-down methodologies are used, establishing a harmonised approach within EU (midstream sector) for the application of top-down in combination with bottom-up estimations

Bottom-up

Top-down/ Site-level

Continuous monitoring

Reconciliation and analysis of the data to be done with external support

-- Analysis of Measurements Results Underway --

ADVISORY BOARD to validate the scope and test program and to contribute to the data analysis of the results
Internationally recognized experts from Authorities and Institutions, Academia, Industry and Civil Society

Phase II.B. Site and source level reconciliation

Compressor Station in Belgium

Small plant --> Ideal for testing different technologies, first pilot on reconciliation.

- 4 electric driven compressors and 23 meters high vent stack

- Compressors depressurized (mode 1) + 1 compressor pressurized (mode 2). 2 days of tests.
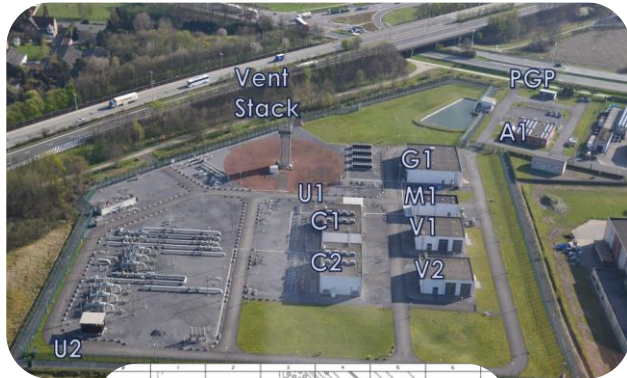
Sources of emissions & bottom up quantification

Vents/open ended lines: detection with OGI and FID analyser. Quantification with anemometer or bagging**.**

Fugitive emissions: Inventory of all potential leaking components. FID for detection. Correlation factors EN 15446 for quantification & bagging of a sample of fugitives & QOGI for inaccessible leaks.

Incomplete combustion: 3 'domestic' boilers. Emissions only during start/stops.
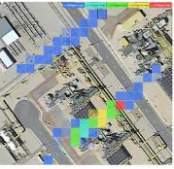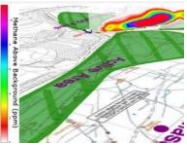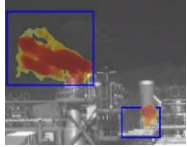
Phase II.B. Site and source level reconciliation

Technologies involved for the reconciliation

Continous monitoring

Top-down/site-level technologies

	AEROMON	CHARM	DIAL (NPL)	ABB Mobile Guard	ABB HoverGuard	Tracer Gas Methodology (DGC)
Picture of the equipment						
Picture of their measurements				no results in previous phase	no results in previous phase	
Sensor used	Tunable Diode Laser Spectrometry (TDLS)	Differential Absorption Lidar (DIAL)	Differential Absorption Lidar (DIAL)	Off-Axis Integrated Cavity Output Spectroscopy (OA–ICOS)	Off-Axis Integrated Cavity Output Spectroscopy (OA–ICOS)	Concentration of methane and acetylene measured with a ultra portable gas analyzer: off-axis integrated cavity output spectroscopy (OA-ICOS)
Platform used	Drone: UAV Matrice 300 RTK from DJI	Helicopter (AirLloyd)	Truck	Car	Drone: DJI 600 Pro	Van

Sensia	Sensirion
	didn't participate in previous phase
Carolyne fyl (an uncooled LWIR detector) and Mileva 33-F (cooled MWIR detector).	MOx sensors
Unmanned cameras	Unmanned fixed sensors across the site (downwind potential sources)

Phase II.B. Site and source level reconciliation
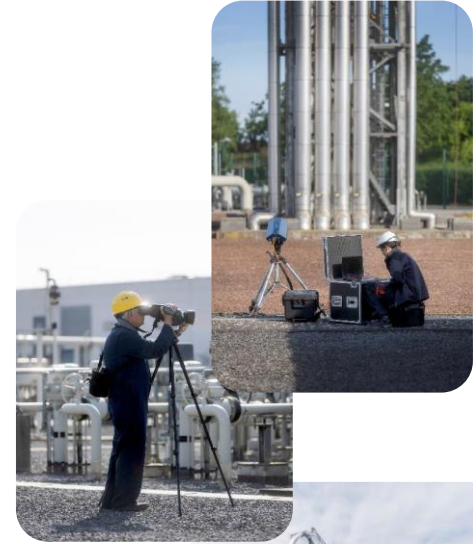
Photos Fluxys Belgium - David Samyn

Phase II.B. Site and source level reconciliation

PRELIMINARY CONCLUSIONS

- **Top down measurements** complementary to bottom up quantification are important to identify **all emission sources in a site.**
  - Not all technologies are sufficiently accurate to allow a quantitative comparison.
  - In any case, **qualitative analysis** of sources found by top down measurements is the key point.
  - Some OGI cameras have potential to qualify for reconciliation.

- **Qualitative reconciliation in a snapshot of time for known values of operational parameters is our preferred approach.**
  - Once there is a clear understanding of all potential emission sources in the site, efforts on improving bottom up estimations might be more effective than frequent top down measurements.

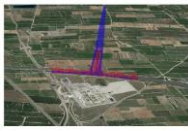**2023: GERG will collaborate with UNEP for IMEO's campaing of measurements across EU**

Phase II.B. Site and source level reconciliation

Funding Partners

The Digital Platform for Leakage Analytics (DPLA) Project

The DPLA project is funded by Ofgem and Innovate UK through the Strategic Innovation Fund (SIF)

What is the Strategic Innovation Fund?

🎯 **SIF Innovation Challenges**

Whole systems	Data & digitalisation	Heat	Transport

The aim of the Ofgem Strategic Innovation Fund is to **decarbonise** gas and electric energy distribution and transmission networks and **benefit the consumer**.

SIF Phases

Discovery > **Alpha** > **Beta**

- March-April 2022
- Up to £150k

- August 2022-February 2023
- Up to £500k

- July 2023, up to 5 years (+)
- Up to £10m (+)

Project Partners

Lead Network
Cadent *Your Gas Network*

Network Partners
Northern Gas Networks
SGN *Your gas. Our network.*
WALES&WEST UTILITIES
nationalgrid

Delivery Partner
Guidehouse *Outwit Complexity*

The DPLA concept merges physics-based models, machine learning, and novel leak sensors to create a first-class leak detection platform

External data and analytics fed into cloud-hosted leakage analytics platform

Data about gas network assets, topology, and maintenance schedules

Network operational data: Pressures, flows, temperatures

In-field leak detection
Leak-sensing tech attached to drones, helicopters, and trucks have machine-learning analytics inbuilt which detect and localise leaks[1]

Cloud Environment

Real-time network mapping
Hybrid hydraulic model combines *physics-based model* of gas network and *machine learning-based models* which account for real-time network data and correct for missing values

Leak detection, characterisation, localisation
Machine learning analytics driven by the *hybrid hydraulic model* and by *network data* combine to detect and characterise points of leakage across the network

Further analytics to provide insights for external reporting
Expert system performs analytics on model outputs to deliver insights e.g., isolating network areas experiences regular leaks, and calculating the expected reduction in leakage for new asset replacement scenarios

User interface to present outputs
Dashboard displays key outputs, such as GIS maps of detected leaks, calculated leakage emissions, leaks in most need of engineer intervention

[1] Sensor data will also be fed into the machine learning models during a training phase for DPLA to improve model database and understanding of 'leak signatures'

Digital Platform for Leakage Analytics - Strategic Innovation Fund

DPLA has the potential to accelerate decarbonisation, bring value to the consumer and deliver reporting and operational improvements

Accelerating decarbonisation

Customer Benefits

Reporting Benefits

Increased Accuracy

Real-time Inputs

Digital Platform for Leakage Analytics: Objectives & Progress Update

Discovery Outcomes

- Verified the **feasibility** of the DPLA concept from a technical, conceptual, regulatory and economic angle

- Identified potential **technology options** and deployment modes

- Carried out a **cost benefit analysis** demonstrating the economic benefits of the DPLA

Alpha Progress

- Assessed **vendors** and developed the detailed design of the digital leakage analytics platform

- Considered a **change impact assessment**

- To assess **regulatory options** for roll out

- To refine the **cost benefit analysis**

Digital Platform for Leakage Analytics - Strategic Innovation Fund

Next steps: Beta phase and beyond

Beta Application
22nd March 2023

Beta Funding Announcement
June 2023

Beta Phase
July 2023 – up to 2028

Roll out to BAU
Post Beta phase

SIF Beta Expectations

- Multi-year, large-scale projects

- Budgets will start at £500k and duration at 6 months

- Expecting several multi-million £ programmes

- The projects will focus on build, operation and/or demonstration of the concept

DPLA Beta High-Level Objectives

- Build and test a minimum viable product

- Demonstrate several methane detection technologies

- Test the scalability of the technology across different regions and pressure tiers

- Identify and deliver quick win methane reduction initiatives

- Prepare for network-wide roll out of DPLA

Oil and Gas Methane Partnership 2.0 and the role of the International Methane Emissions Observatory

Better emissions data for methane mitigation in the oil and gas sector

Gas Transmission

Oil and Gas Methane Partnership 2.0

What is OGMP 2.0?

- The only comprehensive, measurement-based reporting framework for oil and gas industry

- Global coverage and scope (over 80 companies)
  - Upstream, midstream and downstream segments
  - Public, private and national oil companies

- Assets in scope represent 30% of global oil and gas production in over 60 countries

- Over 65% of LNG flows, over 20% of global natural gas transmission and distribution pipelines, over 10% of global storage capacity.

OGMP 2.0 Partners

Snapshot of Company Membership

OGMP 2.0: "gold standard" of methane reporting

Comprehensive reporting framework
- *Focus on direct measurements, to help companies identify and mitigate largest emissions sources*
- *Covering all material sources from both operated & non-operated assets across all segments of the value chain*

Community of practices

Platform for peer learning and experience sharing between industry's experts

Increasingly recognised as a global MRV standard:

- *OGMP 2.0 as "the best existing vehicle for improving measurement, reporting and verification capability in the energy sector" (EU Methane Strategy, Oct 2020)*

- *OGMP 2.0 serves as basis for the European Commission's methane regulation (Dec 2021)*

OGMP 2.0 Reporting Levels

Level 1
Venture/Asset Reporting
- Single, consolidated emissions number
- Only applicable where company has very limited information

Level 2
Emissions Category
- Emissions reported based on IOGP and Marcogaz emissions categories
- Based on generic emissions factors

Level 3
Generic Emission Source Level
- Emissions reported by detailed source type
- Based on generic emissions factors

Level 4
Specific Emission Source Level
- Emissions reported by detailed source type using specific emissions and activity factors
- Based on direct measurement or other methodologies

Level 5
Level 4 + Site Level Measurement Reconciliation
- Direct measurement methodologies at a site or facility level*, including through sensors mounted on a mobile platform
- Reconciled with Level 4
- *   on a representative sample of facilities

GOLD STANDARD

Integrating "bottom-up" source-level reporting, with independent site-level measurements for the majority of assets

UN
environment
programme

OGMP 2.0: Reporting Timeline

Companies submit first report by 31 May based on previous year data

Member companies achieve gold standard for **operated assets** based on previous year data

Year 0 → Year 1 → Year 2 → Year 3 → Year 4 → Year 5

Company joins OGMP

Member companies achieve gold standard for **non-operated assets** based on previous year data

UN environment programme
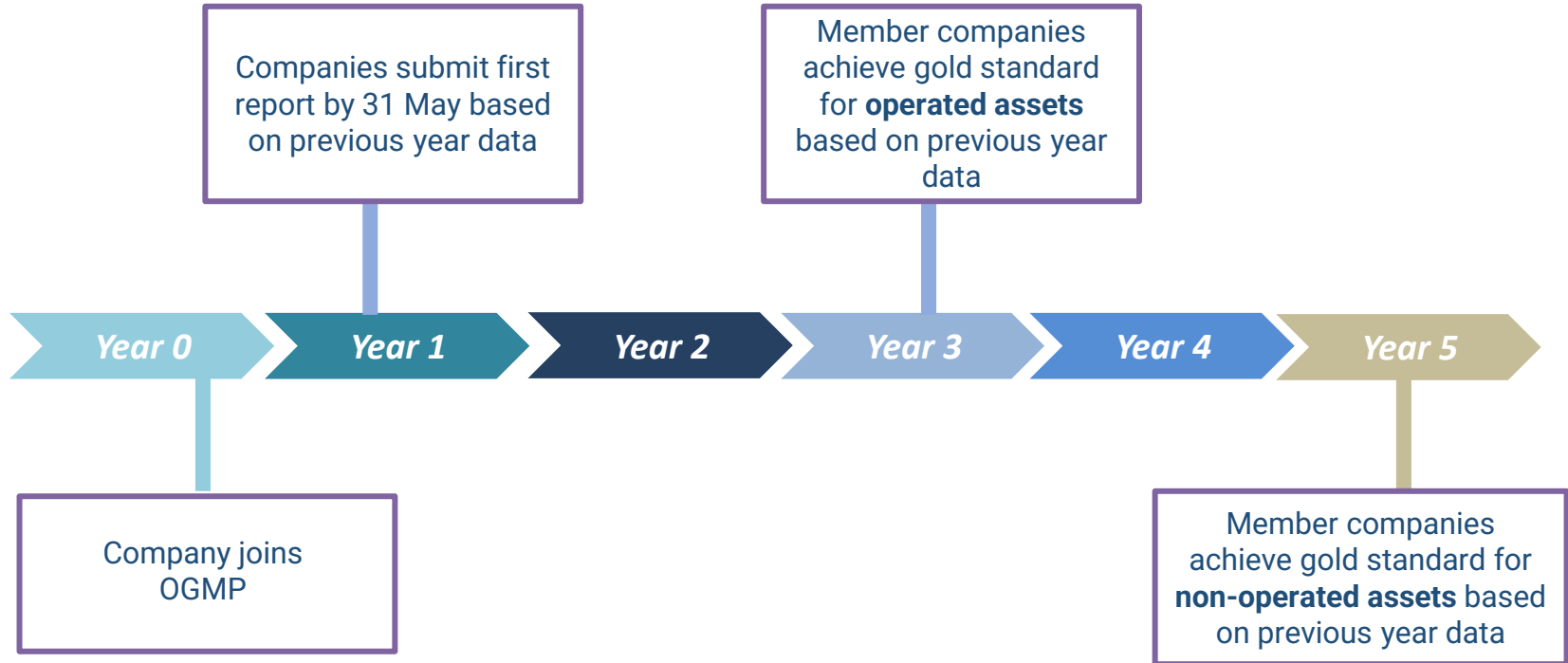
OGMP 2.0 Requirements and Data Disclosure

UN@
environment
programme

OGMP 2.0 requirements	- Define & disclose **2025 methane reduction target** - Submit **implementation plan** on pathway to **Gold Standard** - **Report annually** on methane emissions from **operated** & **non-operated assets**

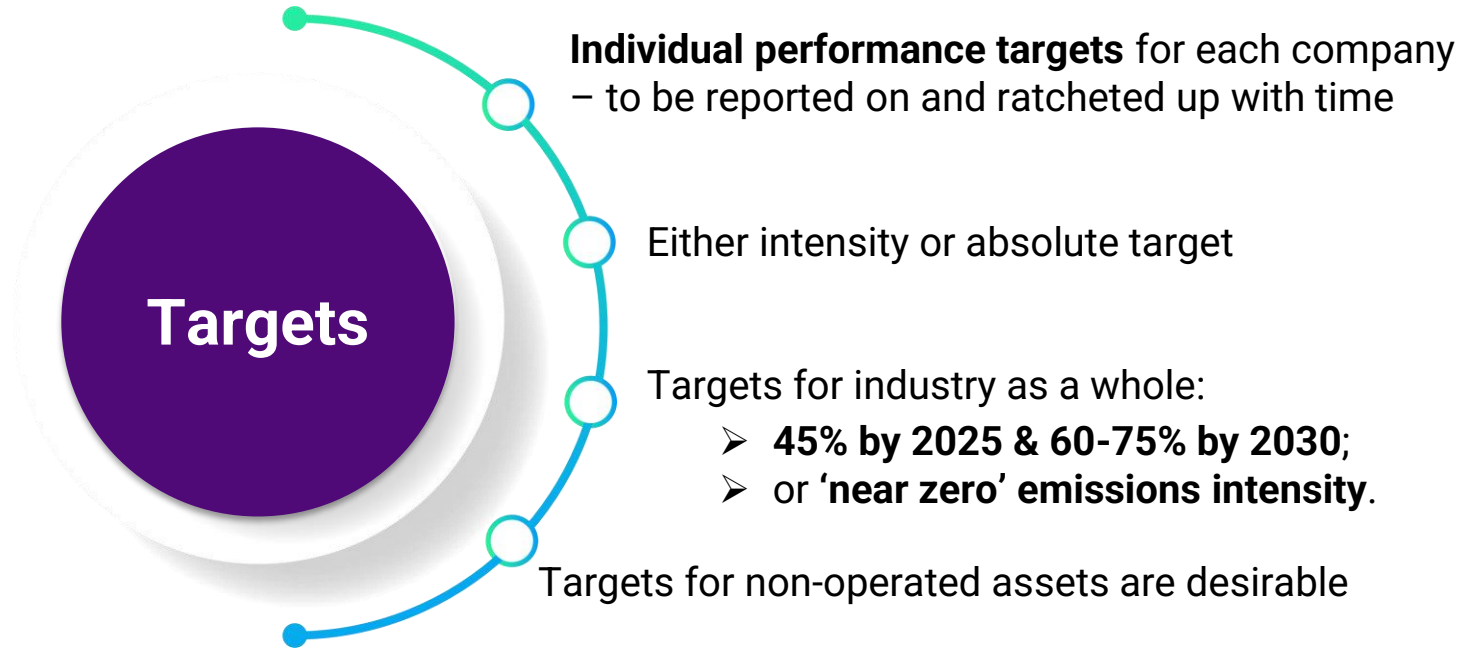| **Publicly reported data**	- Declared methane **reduction targets** of companies - Company total emissions (**aggregated** by core source and by level (1-5) & distinct operated and non-operated ventures) + **progress towards targets** - Members can review company fact sheet before publication - **Confidential asset level data and/or country level emissions data will not be publicly disclosed**

Company Performance Targets

Targets

Individual performance targets for each company – to be reported on and ratcheted up with time

Either intensity or absolute target

Targets for industry as a whole:
- ➤ **45% by 2025 & 60-75% by 2030**;
- ➤ or **'near zero' emissions intensity**.

Targets for non-operated assets are desirable

UN
environment
programme

OGMP 2.0 Guidance

– All guidance is **principles-based** rather than rules-based and relies on operators' judgement
– All guidance is available on the OGMP 2.0 website under 'Resources' section

1. **Technical Guidance Documents** on how to meet reporting requirements for most common material sources at Level 3 and 4

Natural gas driven pneumatic controllers, pumps and measurement devices	Glycol dehydrators	Gas well hydraulic fracture completion venting/flaring	Incidents, third party damages and energy stops
Fugitive component and equipment leaks	Un-stabilized liquid storage tanks	Flare efficiency	Level 1 and 2 reporting
Centrifugal compressor shaft seals (wet and dry seals)	Gas well liquids unloading	Incomplete combustion	Leaks & Permeation from Underground Pipes
Reciprocating compressors	Oil well casinghead venting/flaring	Purging and venting, starts and stops and other process and maintenance vents	General TGD

2. **Uncertainty & Reconciliation Guidance**
Offers considerations for operators to approach **L4 inventory** and **L5 estimate development**, including reconciliation.

3. **Reporting Templates & Associated Guidance**

UN environment programme

Joining the OGMP 2.0

UN
environment
programme

Why Join?

- Credibility & Transparency
- Knowledge and Experience Sharing

How to join?

- No Fee
- Sign an MoU with UNEP
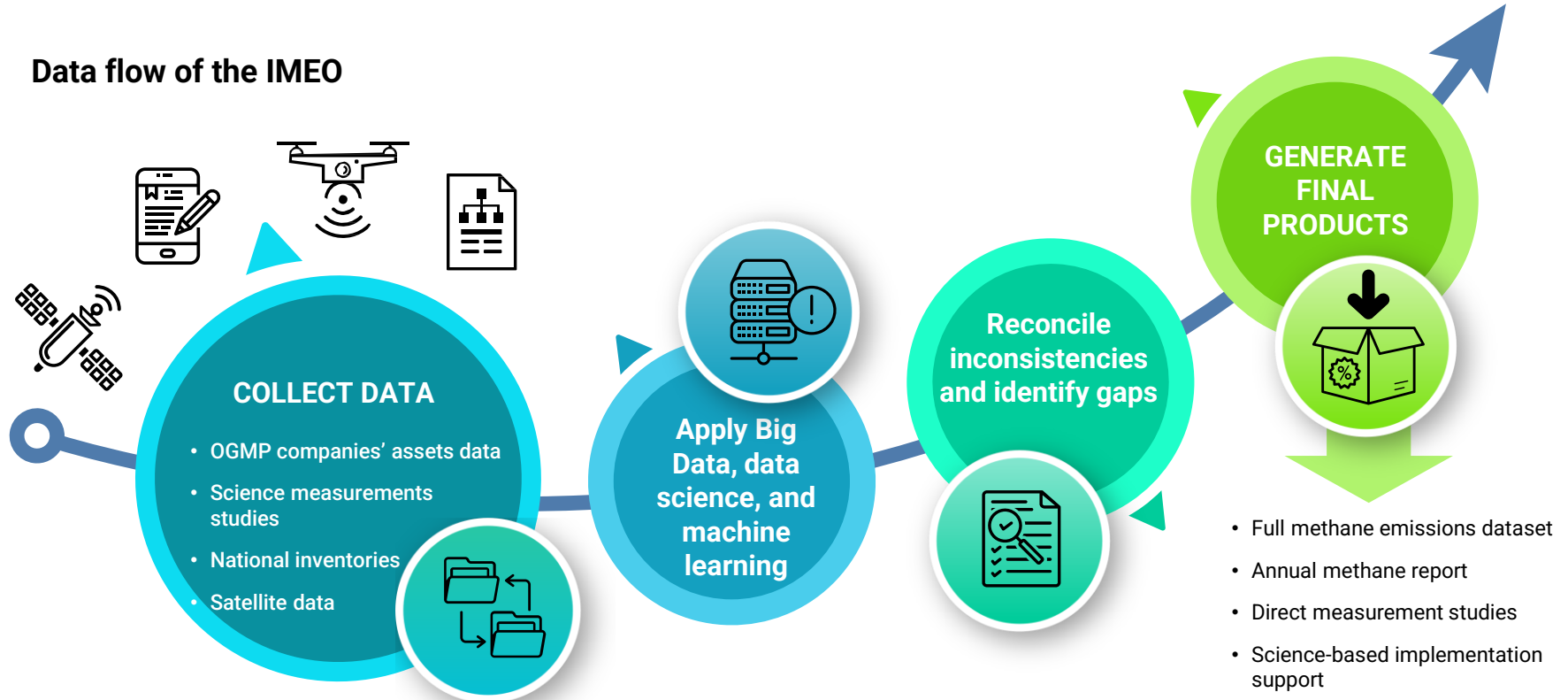- MoU is countersigned

For more information, please contact

monika.oczkowska@un.org

International Methane Emissions Observatory:
Better data for methane mitigation in the oil and gas sector

Data flow of the IMEO

COLLECT DATA

- OGMP companies' assets data
- Science measurements studies
- National inventories
- Satellite data

Apply Big Data, data science, and machine learning

Reconcile inconsistencies and identify gaps

GENERATE FINAL PRODUCTS

- Full methane emissions dataset
- Annual methane report
- Direct measurement studies
- Science-based implementation support

Increased momentum on methane:
Global Methane Pledge

150 — Countries that have signed on to the EU- and US-led Global Methane Pledge

70% — Portion of the global GDP covered by signatories

30% — Methane reduction target by 2030

IMEO is a core implementing partner of Global Methane Pledge, that will provide emissions data to analyze its progress and facilitate technical assistance on science & transparency.

2022 IMEO Report launched at ADIPEC

UN environment programme

Summary &
Questions

Gas
Transmission

Summary

Monitoring	
Reporting	
Verification	?

Questions

What next?

You will receive the recording and material from today's session

If you have any further questions or would like to discuss anything specific please get in touch with oliver.stafford@nationalgrid.com

Feedback is important to us, therefore if you have not already taken part, we would like to put you forward for a survey

Webinar Programme

https://ngrid.com/3ESgN1t

Event Name	Date / Time	Presenters
Facilitating Commercial & Regulatory Change	Tuesday 29th November @ 09:30	Ian Radley, System Operations Director
Sustainable Construction	Wednesday 30th November @ 09:00	Mark Lissimore, Construction Director
Accessing Energy Data	Thursday 1st December @ 11:00	Mark Lissimore, Construction Director
Operating the Network	Friday 2nd December @ 13:00	Ian Radley, System Operations Director
Blending	Monday 5th December @ 10:00	Tony Green, Hydrogen Director
Transitioning to 100%	Tuesday 6th December @ 11:00	Martin Cook, Commercial Director
Hydrogen Regulatory Framework	Wednesday 7th December @ 12:00	Tony Nixon, Regulation Director
Monitoring and Mitigating Methane Emissions	Thursday 8th December @ 13:00	Steven Vallender, Asset Director
Future of Heat	Friday 9th December @ 13:30	Tony Green, Hydrogen Director
FutureGrid - Progress Report	Monday 12th December @ 14:00	Tony Green, Hydrogen Director
Innovation	Tuesday 13th December @ 13:00	Tony Green, Hydrogen Director
Driving a Positive Environmental & Community Impact	Wednesday 14th December @ 10:00	Jake Tudge, Corporate Affairs Director

Thank you for joining us

Gas Transmission