

Welcome

**How can operators & stakeholders along
the value chain implement the EU
Methane Regulation**

#1 Leak Detection And Repair (LDAR)
12 March 2024



Type 1 & 2 measurement technologies: fugitives



Type 1

- OGI + FID/PID - qOGI
- Ultrasound camera
- RMLD (Laser technology)
- Continuous monitoring Fixed point sensor networks (Future ?)

Type 2

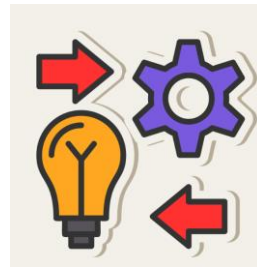
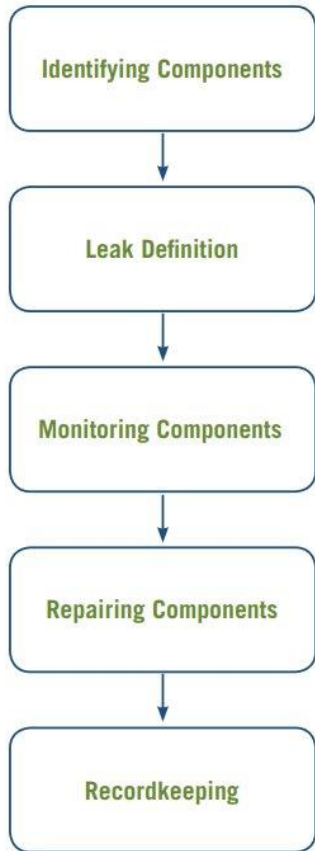
- FID/PID
- Infrared sensors
- High Flow Sampling



Preferred Measurement techniques for all source types

Stationary combustion	Flaring	Fugitive component and equipment leaks	Natural gas- driven pneumatic equipment	Compressor centrifugal / compressor reciprocating / glycol dehydrators/tanks and other storage equipment	Well liquids unloading / Well casinghead venting / hydraulic fracture completions	Venting	Other sources
Modelling: CEMS/PEMS/ SPEMS	Modelling: SPEMS	LDAR: High Flow Sampling + FID + IR Sensors	Measurements for accessible sources: • High Flow Sampling + FID	Quantification for accessible sources : • OGI + High Flow Sampling + FID • Anemometer	Venting to atmosphere through a vent stack: • High Flow Sampling + FID • Anemometer • OGI + qOGI	Modelling (Flow meter)	Inventory of other sources (example: pig launchers, incidents, corrosion in pipeline tanker loading/unloading , Emission factors)
Combustion efficiency Direct measurement: • Testo 350 • FID Remote measurement: • Drone measurement technologies	Destruction efficiency Remote measurement: • Drone measurement technologies • Bi Spectral Camera • VISR Camera	Measurement for inaccessible sources: OGI + qOGI , IR sensors	Measurement for inaccessible sources: • OGI + qOGI	Quantification for inaccessible sources : • OGI + qOGI	Directly to atmosphere: • HFS + FID	Quantification for accessible sources : OGI + High Flow Sampling + FID • Flow meter (Anemometer) Non – accessible qOGI – or make accessible in a safe manner (Cherry Picker – scaffolding, extension probe)	Depending on source
	Acoustic measurements to detect internal leaks for baseline flaring	Fugitives on vents : BAT: HFS+FID, Flow meter, ogi + qOGI				Quantification for inaccessible sources : • OGI + qOGI	Remote Methane Laser Detector (RMLD) for buried pipelines
Inventory of sources	Inventory of sources	Inventory of sources	Inventory of sources	Inventory of sources	Inventory of sources	Inventory of sources	Car with in-built laser detector for buried pipelines

Implementation ?



- Divide **assets** into several categories
E.G. Compressor stations , valve stations, distribution network , etc.
- Divide **categories** into source types
E.G. Compressor station : Fugitives emissions, vents, Pneumatics, process losses and so on.
- Link said **source types** to types of **measurements , frequencies & technologies**
Fugitives emissions , Inventory , Type 1 – OGI + FID; Type 2 – FID + HFS
Vents , modelling, flow meter

[illegible]

		L3	L4							
		AVERAGE_FACTOR	OGI	FID	HFS	QOGI	FLOW_METER	EXHAUST_GAS_ANALYSIS	MULTISPECTRAL_RADIOMETRIC_IMAGING	REVERSE_DISPERSION_MODELING
COMBUSTION	FLUKE									
	STATIONARY									
	VENTING	 <small>Industrial Process Control</small>								
COMBUSTION	FLUKE									
	STATIONARY									
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COMBUSTION	FLUKE									
	STATIONARY									
	VENTING	 <small>Industrial Process Control</small>								

Level 1 (optional)		Levels 2, 3 & 4			Level 5		
	Methane	Level	Comments	Source for the data (reference number or URL)	Methane	Comments	
		1/2/1	Please indicate the Level of the data		1/2/1	Please feel free to provide additional information	
			1/2/1/4	Measurements taken by the company or by a third party			
1	Transmission						
	Total for transmission network						
1.1	High-voltage main lines						
1.1.1	Losses						
1.1.2	Leakage & venting (anthracene, propane, acetylene & butane, acetylene)						
1.1.3	Leakage / Emergency vent						
1.1.4	Other						
1.2	Intermediate conductors						
1.2.1	Losses						
1.3	150 - Reduction & regulating stations / Measurement stations / Analysis stations / Consumer supply stations for refuelling and recharging						
1.3.1	Engine emissions						
1.3.1.1	Leakage (leakage, vent, spill)						
1.3.1.2	Valves and control valves						
1.3.1.3	Pressure relief valves						
1.3.1.4	Oil cut (three down open ended line)						
1.3.1.5	Oil cut						
1.3.1.6	Others						
1.3.2	Vents						
1.3.2.1	Leakage & venting (anthracene, propane, acetylene & butane, acetylene)						
1.3.2.2	Leakage (leakage, vent, spill)						
1.3.3	Pneumatic devices						
1.3.3.1	Gas analysis						
1.3.3.2	Others						
1.3.3.3	Leakage / Emergency vent						
1.3.4	Other						
1.4	Intermediate conductors						
1.4.1	Losses						
1.4.2	Gas collection devices						
1.4.3	High-voltage heating electrodes, gas distribution unit						
1.4.4	Other						
Total	Total methane emissions						
Level 1	Emissions reported for a venture at asset or country level						
Level 2	Emissions reported per type of methane emissions						
Level 3	Emissions reported by detailed source type and using generic emission factors						
Level 4	Emissions reported by detailed source type and using specific emissions factors, measurements, simulation tools and detailed engineering calculations						
Level 5	Emissions reported similarly to Level 4, but with the addition of site-level measurements						

[illegible]P&ID
snapshot

Equipment photo

[illegible]

Maintenance follow up & Repair Orders

Added value for using a accredited service provider

Cost Efficiency

- Utilization of combined frequencies and techniques
- Optimization of resources for effective implementation

Avoid penalties

- Trustworthy partnerships emphasized
- Compliance certifications such as MRV (Monitoring, Reporting, Verification)

Regulatory Requirements vs Technologies

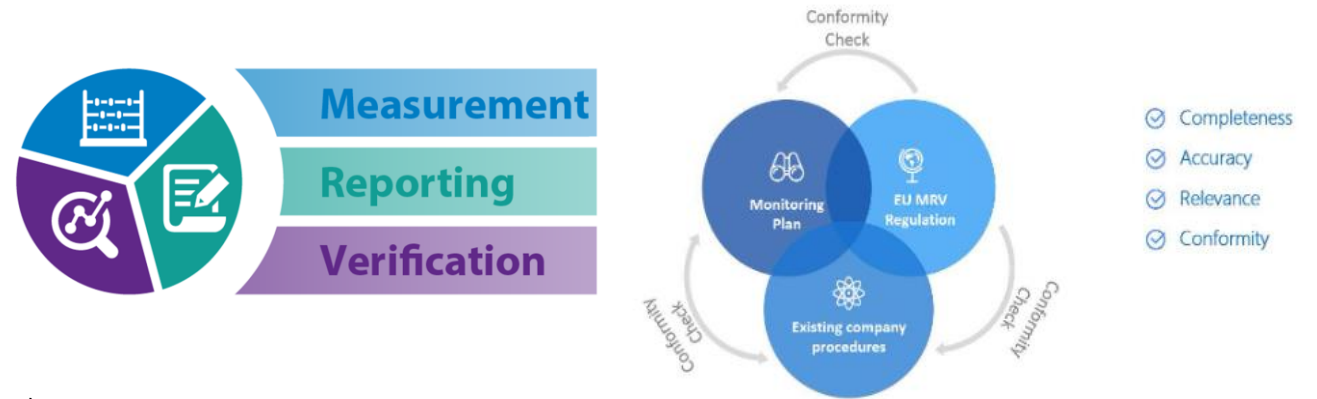
- Alignment of BAT solutions with evolving regulatory landscape
- Adaptation to ensure compliance while maximizing efficiency

Frequency

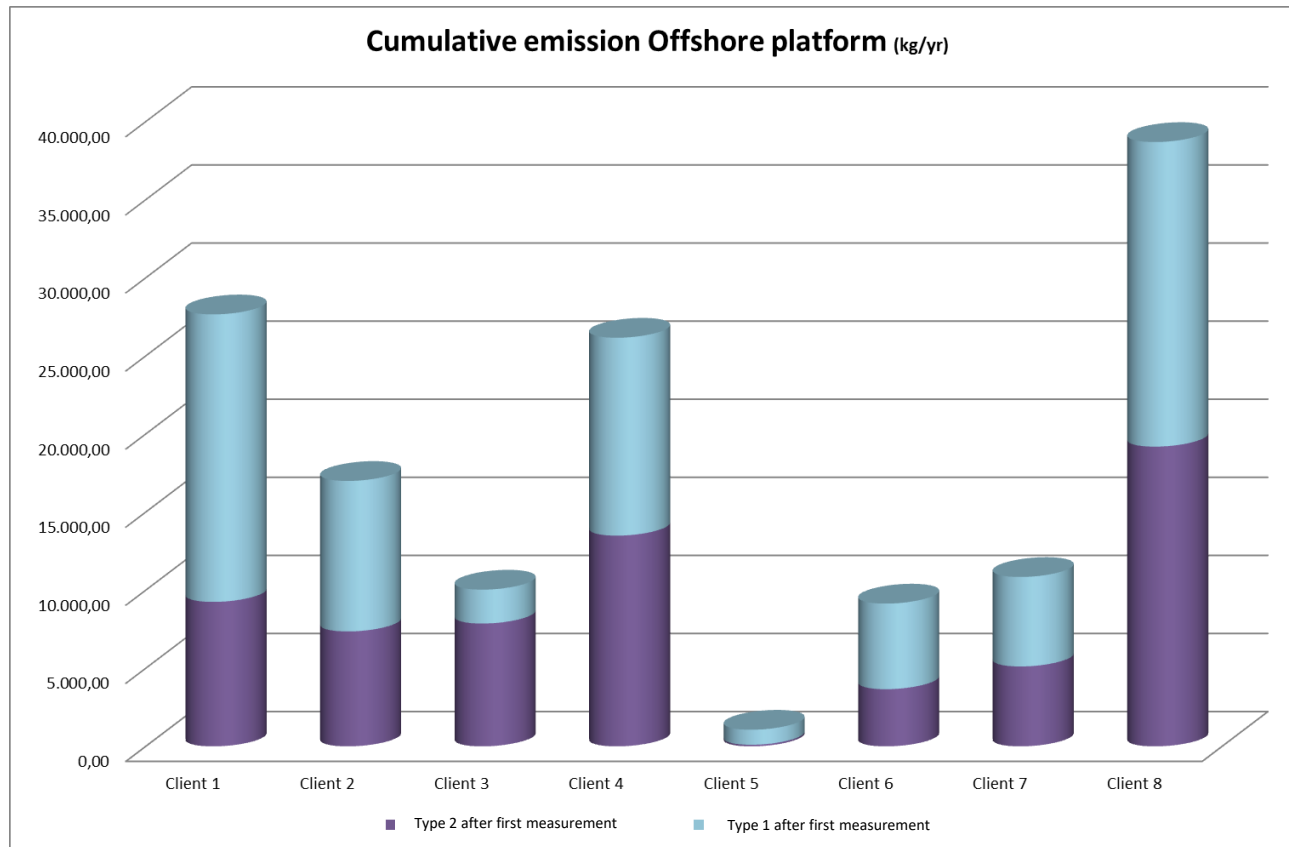
- Adherence to scheduled contracts for timely compliance
- Regular monitoring and reporting to meet regulatory demands

Special Advisory Team & Experienced LDAR technicians

- Dedicated experts to guide implementation and compliance efforts
- Resource for navigating complex frameworks



Benchmark for Type 1 & Type 2 after first measurement on offshore platform



Thank you.

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