LDAR program: **Quantification and reduction of fugitive methane emissions**

The LDAR (Leak Detection and Repair) program is used to detect and repair methane leaks from equipment on petrochemical industrial sites. This reliable and proven method reduces methane emissions and provides significant productivity gains.

Project start date	Bureau Veritas has been an experienced global provider of LDAR services since 2015.
Project location Project implementation locations at this stage and target geography if reproducibility	Services provided internationally (Europe, Middle East, Latin America, China).
The project's intended objectives Nature of climate innovation of the project with reminder of the problem/issue addressed	Emissions of methane (one of the major GHGs - GreenHouse Gases) are the second largest cause of global warming. Reducing global methane emissions by 50% over the next 30 years would help to keep global warming below +1.8°C by 2050. Furthermore, the reduction of fugitive GHG emissions is a key element in Scope 1 of Bureau Veritas's clients for achieving their defined carbon neutrality targets. Although focussing on fugitive methane emissions, LDAR services (initially applied to all VOCs (Volatile Organic Compounds)) are equally applicable to other GHGs, such as SF6 (sulphur hexafluoride).
Detailed description of the project	The LDAR program consists mainly of making regular use of leak detection means (such as the FID analyser and the OGI camera) for the preparation of associated repair actions and quantification of these resulting emissions and gains. Given the large amount of information to be managed and the importance of the traceability and history of collected data, an LDAR quality program is necessarily organised around dedicated management software such as "GEF VOC", the LDAR software developed and maintained by Bureau Veritas. This software must be able to calculate fugitive emission rates in accordance with applicable standards and regulations. In addition, one of the key points in ensuring the compliance and reliability of an LDAR program is the establishment of a rigorous and comprehensive quality system, including a robust process for the qualification of participants.

Main means used by the project to reduce greenhouse gas emissions

Reduction means	Details on associated aspects of the project
☐ Energy efficiency and resources (particularly behaviours)	
☒ Decarbonisation of energy	Reduction of the environmental impact by eliminating fugitive leaks
☒ Improved energy efficiency	Reduction of energy losses by eliminating fugitive leaks
☐ Improved efficiency in non-energy resources	
☐ Absorption of emissions: creation of carbon sinks, negative emissions (BECCS, CCU/S, …)	
☐ Financing of low-carbon emitters or divestment of carbon assets	
☒ Reduction of other greenhouse gases	LDAR services apply to all GHGs carried by pipelines such as SF6, CO2, refrigerants, etc.

Scope(s) of emissions on which the project has a significant impact and quantification of reductions of GHG emissions by scope of emissions

	Project aspects contributing to the reduction of emissions by category of emissions	Quantification of associated GHGs emissions by category of emissions

			Please respect the quantification methodology used in the Afep note.
	Reduction of the company's dependence on carbon		
	Scope 1 *Direct emissions generated by the company's activity.*		
	Scope 2 *Indirect emissions associated with the company's electricity consumption and heating.*		
	Scope 3 *Emissions induced (upstream or downstream) by the company's activities, products and/or services on its value chain.*	Main phases of an LDAR program: 1. Process Review 2. Identification of potential sources of emissions 3. Detection and measurement of emissions 4. Quantification of emissions 5. Preparation for maintenance operations 6. Maintenance 7. Remeasurement after maintenance 8. Quantification of the gain 9. Conversion of emissions into $eqCO_2$ Reporting	60,000 t $eqCO_2$/year for companies that request Bureau Veritas to conduct their programs
	Increase in carbon sinks		
	Absorption of emissions *Creation of carbon sinks, (BECCS, CCU/S, …)*		
	GHG emissions avoided by the company at others		
	Avoided emissions *Emissions avoided by the activities, products and/or services of the company's carrying the project financing of emission reduction projects.*		

Details of the calculation or other comments:
On average, LDAR campaigns conducted by Bureau Veritas can monitor approximately 10,000,000 potential sources of fugitive emissions each year.

~ 30% of these potential emission sources carry methane (i.e. ~ 300,000 sources).

A robust LDAR program reduces emissions by 80% from their initial level.

The average initial level of fugitive emissions generally observed is of the order of 10 kg/year/potential source of emission.

300,000 sources x 10 kg/year x 80% reduction = 2,400 t CH_4/year

2,400 t CH_4 x 25 = 60,000 t $eqCO_2$/year

Method of verifying this quantification	**Calculation reference used (based on ADEME, GHG protocol, etc.):** GHG Protocol + EPA95 correlations, Standard EN15446, US AWP Leak / No_Leak factors **Calculation check (internal or external):** Veritas "GEF VOC" specialised software is EN15446 certified
Other environmental and social benefits of the project	The reduction of fugitive emissions that are not limited to GHGs also provides the following benefits: • Improved safety (reduction in the ATEX risk) • Improved health (reduction of emissions of CMR: Carcinogenic, Mutagenic and Reprotoxic) compounds This Good Practice contributes to the following SDGs: • SDG 7 Clean and affordable energy: less consumption of carbon energy • SDG 13 Measures to combat climate change: lower carbon emissions for better preservation of the climate

Maturity level of the project	☐ Prototype laboratory test (TRL 7) ☐ Real test (TRL 7-8) ☐ Pre-commercial prototype (TRL 9) ☐ Small scale implementation ☒ Medium- to large-scale implementation **Comments**: > 2,000 LDAR campaigns implemented over the last 30 years. Some governed by the regulations, others in the form of a voluntary approach and also some during the regulatory framework development phase.
Project reproducibility potential and condition with associated potential for impact on the climate	Since the early 2000s, Bureau Veritas has implemented an "internal" replication process for the LDAR business. This strategy is based on the following key principles: • Creation of continental Centres of Excellence • Support by the Historic Centre of Excellence • Support by Oil & Gas Global Service Line • Support by the Technical and Quality Division With its experience as an international player, Bureau Veritas also regularly provides technical support to local authorities during the process of establishing regulations dedicated to LDAR.
Amount of investments made (in €)	Bureau Veritas invests ~ €300 k annually for: • Updating and improving our GEF VOC software • Maintenance and improvement of the Quality system • Training of managerial staff and persons concerned in the field • Support to the Network (replication and support to technical) • Logical and regulatory techno watch • Participation in various normative committees and work groups
Project economic cost effectiveness (ROI)	☒ ST (0-3 years) ☐ MT (4-10 years) ☐ LT (> 10 years) **Comments:** Click or press here to enter text.
Partnerships engaged	The traditional range of LDAR services is centred on Bottom-up type services. Bureau Veritas has set up partnerships with several companies to expand its services catalogue with Top-down type approaches (drones, satellites, laser detection, etc.) to address the problem of fugitive emissions from a different perspective, in particular allowing its customers to prioritise their actions based on the criticality of emissions observed using these techniques.
Free comments from the project carrier	The LDAR is a recognized BAT (Best Available Technique), having proven its effectiveness for almost 40 years. Its implementation does not require significant investment and has many advantages in terms of the environment, energy efficiency, improved safety and health.
For further information about the project	
Contact the company carrying out the project	fugitive.emissions@bureauveritas.com
Project URL links	hiips://ldar.bureauveritas.com/
Project illustrations