Enagás – Methane target setting

September 2021

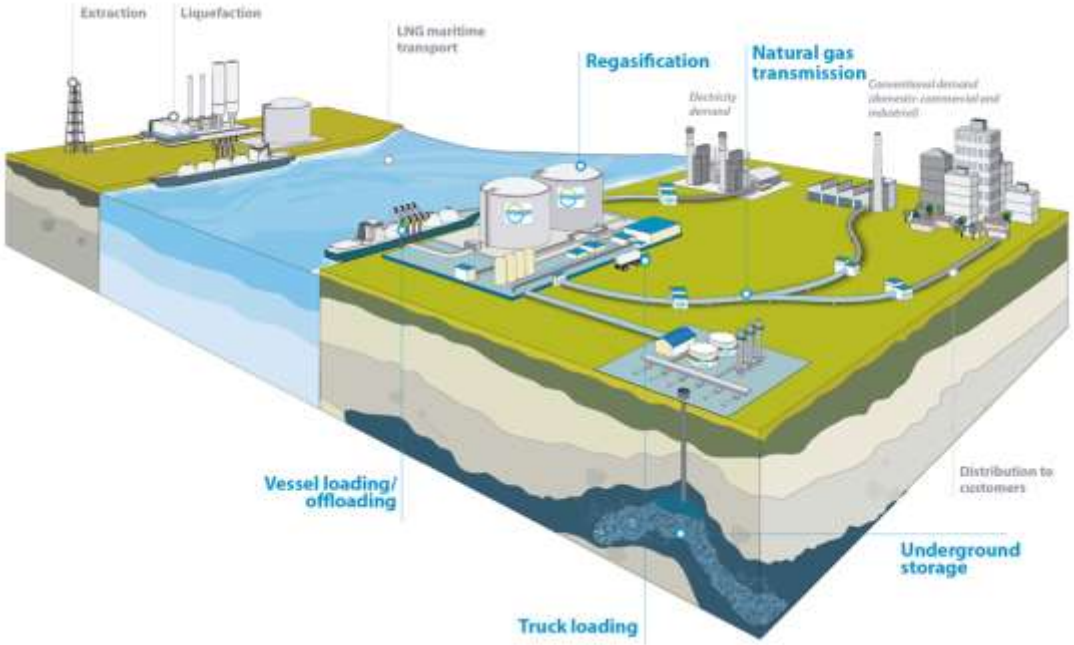
Content

50 years' experience

A midstream company

Leader in energy infrastructures

Our technological skills, expertise, leadership and experience in managing gas infrastructure development, operation and maintenance, combined with our sound financial structure, position us as leading international player.



European Union-accredited **independent TSO**

Top natural gas transmission company in Spain

Technical Manager of Spain's Gas System

1. Methane diagnosis

1.1 Methane emission source identification:

Setting organization boundaries:

Enagás follows an operational control approach, same as our verified Carbon Footprint

Setting Operation boundaries:

We include all Methane emission sources:

- Incomplete combustion
- Fugitive emissions
- Vents

Output:

Inventory of CH4 sources per asset

Technical document review

- ✓ Process diagrams (P&IDs)
- ✓ Equipment inventory (combustion devices, gas analysers, compression units…)
- ✓ Mass balance reports
- ✓ Review of industrial/sectorial documentation (Marcogaz, OGMP's TGDs…)

1.2 Methane emission calculation

Enagás relies on different methane calculation methodologies based on the best available data priorizating, whenever possible, measurements over calculations or estimations.

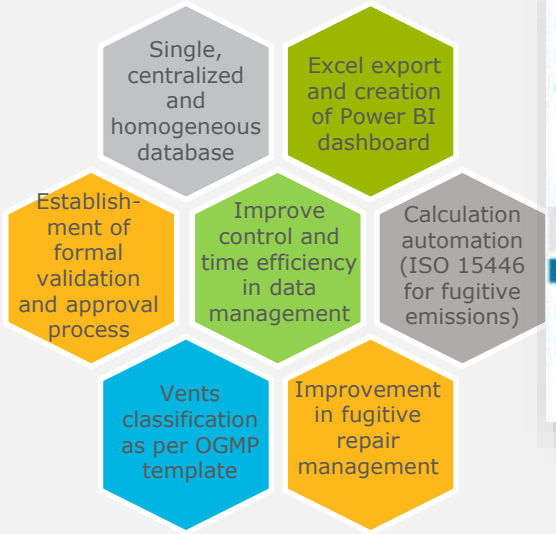
Fugitive	✓ Direct measurements (tCH4) - Annual LDAR campaigns following EN 15446
Vents	✓ Combination of direct volumes measurements (egg. ultrasonic flow meters), engineering calculation (egg. based on T, P, section volume), and estimations.
Incomplete combustion	✓ Combination of direct volumes measurements (egg. natural gas meters) and engineering calculations. Use of bibliographic emission factors (IPCC).

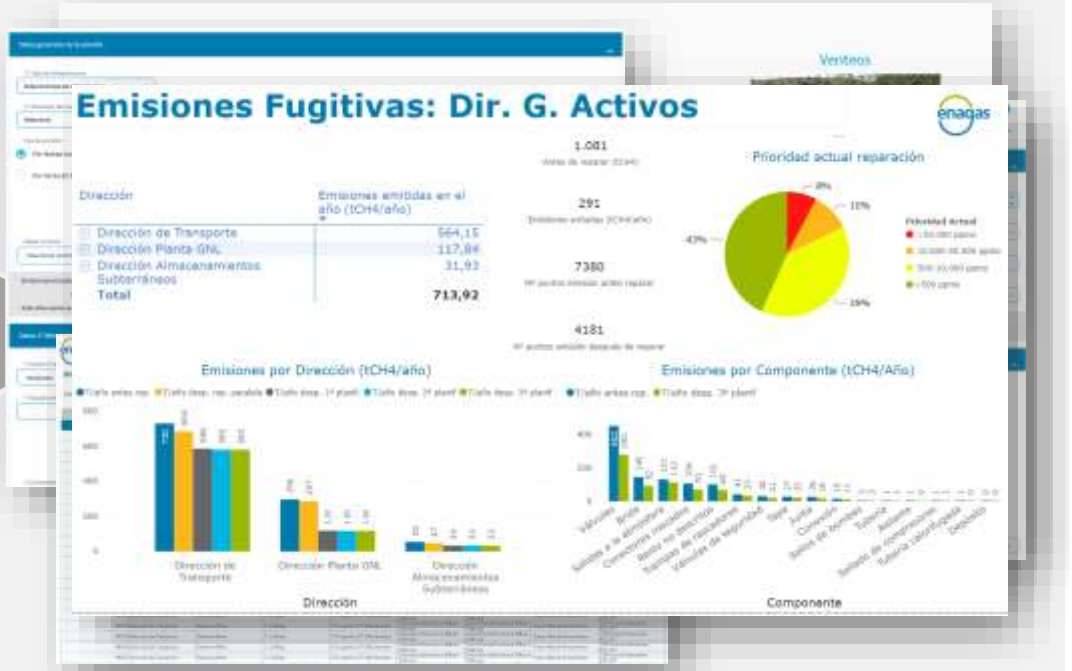
Enagás' calculation methodology is being revised according to the OGMP's Technical Document Guidelines.

1. Methane diagnosis: Enagás Methane IT Tools

Enagás has developed an in-house IT platform to record methane emissions. Fugitive and vents from transmission network are recorded, calculated and managed through this platform.

Advantages of digitalization





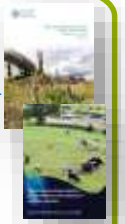
Complementary drivers | **Development of technical instructions** | **Online and webinar trainings**

2. Methane emission reduction potential

2.1 Identification of BATs and applicability analysis

Benchmark analysis of BATs:

- ✓ Best Practices Guides published by the Methane Guiding Principles.
- ✓ Potential ways the gas industry can contribute to the reduction of methane emissions.
- ✓ OGMP Technical Guidance Documents.
- ✓ US, Canada and México legislation.



2.2 BATs cost-benefit analysis

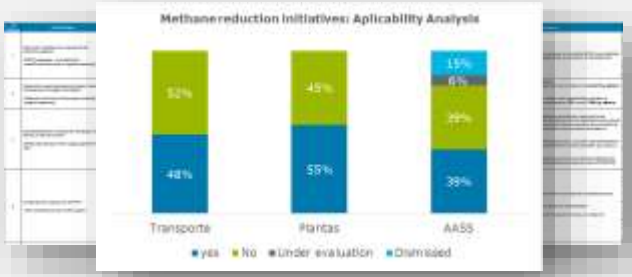
- ✓ **Technical analysis**: this analysis will involve engineering evaluation
- ✓ **Economic analysis**: including cost evaluation and budget allocation needed for BAT implementation.

2.3 Priorization and planning

- ✓ **Priority to BATs** with highest reductions at the lowest cost combined with their level of ambition.
- ✓ Implementation of **methane emission reduction initiatives**.

Creation of Methane reduction database

+50 potential methane reduction measures identified



+30 specific methane reduction studies conducted

Integration into our **Global Energy Efficiency and Emission Reduction Plan:**

- ✓ Short/medium/long planning to meet GHG and CH4 reduction targets.
- ✓ Quarterly monitoring.
- ✓ Annual third party verification process.

2. Methane emission reduction potential

Fugitives emissions

- ✓ **LDAR campaigns** according to the European standard EN15446.
- ✓ Detection and measurement of leaks is carried out using **different technologies (e.g. laser, sniffer, ultrasound cameras)**
- ✓ Since 2020 LDAR campaigns are conducted **every year** at all facilities.
- ✓ **Parallel repairs** (carried out at the same time of detection) and **planned repairs** (those that cannot be repaired at the moment of detection and are included in the maintenance plan).




Vents

- ✓ LNG truck loading: system to exchange vapors between tanks and tank vehicles + use of N_2 for the purge of the LNG hoses + installation of **dry disconnect couplings** in the LNG truck installations to avoid methane emissions (ongoing project)

- ✓ **High-pressure BOG compressors:** installed to inject non-recoverable BOG into the grid during loading and unloading operations and zero or low send-out modes.
- ✓ **Gas analysers:** gas used at sample conditioning systems is reused/recovered to BOG process lines.
- ✓ Reciprocating compressors (rod packing):when possible vented emissions are recovered by **routing gas to process lines**.
- ✓ Use of **portable flares / compressor units** during commissioning/decommissioning and maintenance activities in pipeline.


Incomplete combustion

- ✓ Use of **BOG Recovery Units**: recovering, compressing and sending BOG to the recondenser to be converted to LNG is implemented in our 3 terminals.

- ✓ **Reduction on the flare's pilot pressure** resulting on a gas flow decrease used in pilots.
- ✓ **Use of N_2 as purge gas at the flare's molecular seal** instead of natural gas.
- ✓ **Electrification of Turbocompressor** to avoid vented emissions (from start/stops + seals) as well as incomplete combustion.

4. Alignment of targets

3.1 Alignment with international initiatives

Oil and Gas Methane Partnership (OGMP) 2.0 Framework

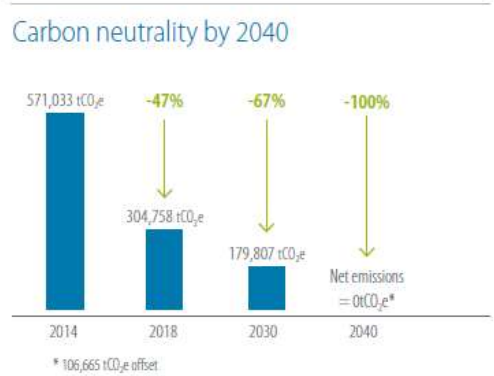
CCAC Mineral Methane Initiative

Global Methane Alliance

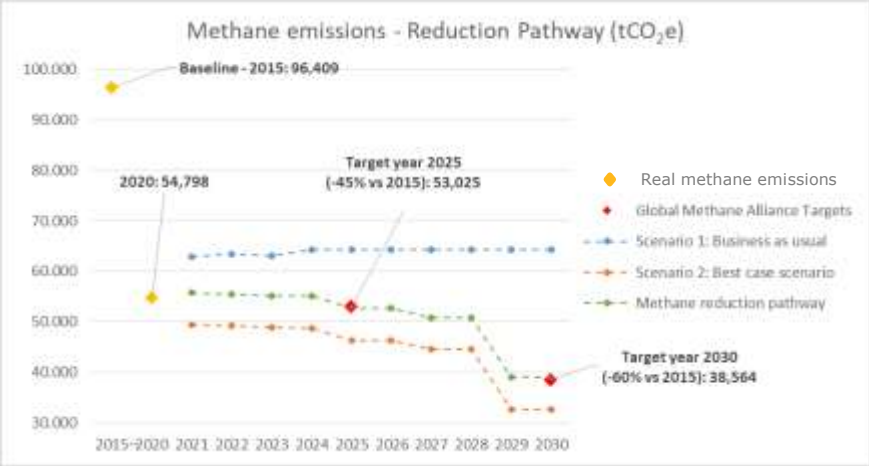
- ✓ **Absolute reduction target**: 45% reduction in methane emissions by 2025 and 60% to 75% by 2030.
- ✓ **Intensity target of "near-zero"** methane emissions. Countries that select this approach should target an intensity of 0.25% or below.

3.2 Alignment with other corporate GHG reduction targets

Our Methane Target is integrated into our Decarbonization Strategy. In fact, the reduction of methane emissions is a cornerstone to meet our Carbon Neutrality Target by 2040 as well as intermediate targets:



5. Target setting



- ✓ **Scenario 1**: **Business as usual** – No methane reduction measures
- ✓ **Scenario 2: Best case scenario –** Implementation of all methane reduction measures. Main methane mitigation measures include:

Fugitive emissions	Vents
LDAR Campaign	Electrification of turbocompressors (reduction of start/stops vents and vents from seals)

- ✓ **Methane reduction pathway**: alignment with level GMA level of ambition and leaving a "buffer" to allow flexibility and reduce risk of non-compliance.

Reduce Methane emissions by 45% in 2025 and 60% in 2030 with respect to 2015 figures

Type of target: Absolute target

Baseline year: 2015 (in line with GMA)

Target year: 2025 (medium term) and 2030 (ong term) (in line with GMA and OGMP 2.0 framework)

Level of ambition: -45% in 2025 and 60% in 2030

Management measures reduce risk of non-compliance

Intermediate annual goals to ensure compliance

Quarterly monitoring

Continuous methodology improvement

Thank you