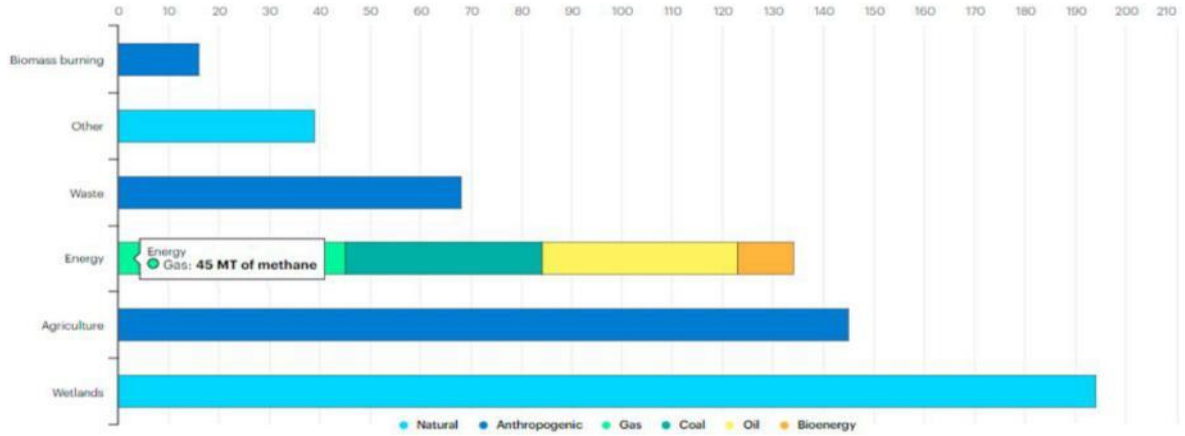
ENGIE, a player committed to reducing methane emissions

Context

CH_4 is an anthropogenic greenhouse gas (GHG), second only to CO_2. Annual global methane emissions are currently about 570 million tons (Mt). About 40% come from natural sources and 60% from human activities.



The natural gas sector itself is responsible for about 45 Mt of methane emissions (about 13% of the anthropogenic emissions).

Source: IEA, 2020

Fugitive natural gas emissions (mainly methane) from the gas infrastructures controlled and operated by ENGIE are one of the sources of the Group's greenhouse gas (GHG) emissions.
They are the primary source of direct GHG emissions for the Group's activities as operator of distribution networks, storage facilities or LNG terminals, and the second largest source for its activities as operator of transmission networks, just after the emissions linked to the consumption of gas as the driving force of the transmission network.

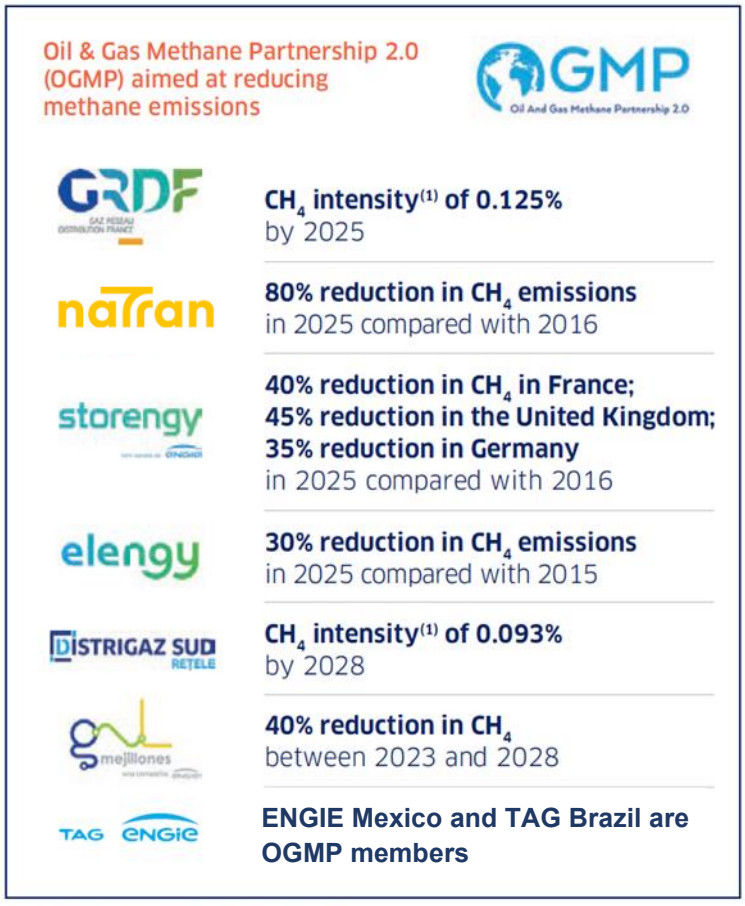
Methane releases generally occur during operations or maintenance (e.g. venting of a pressure-reducing station), venting the gas is a safety procedure for gas infrastructures operation and then vented emissions may be the results of testing this procedure or real implementation of this procedure in case of danger[1]. More rarely during commissioning or shutdown operations (e.g. purging of a pipeline), and very exceptionally during operating incidents (e.g. following damage to a pipeline caused by the work of a third-party operator). The other minor sources of GHG emissions from gas infrastructure operators are direct emissions from the entities' vehicle fleets (Scope 1), indirect emissions linked to energy consumption in buildings (Scope 2) and those linked to purchases of goods and services (Scope 3)

[1] In the case of Storengy France : during maintenance operations, a fortuitous shutdown of a site or security tests required by the administration, UGS operators must carry out venting security operations with strict compliance with gas storage underground gas storage regulation.

ENGIE's commitments

ENGIE has been committed for several years to reducing its emissions and today, thanks to these efforts, the group's CH_4 emissions are 0.96 Mt CO_2 eq in 2024, **which represents less than 1% of the Group's total balance of 157 Mt CO_2 eq.**
Methane emissions from gas networks account for approximately less than 1% of the carbon footprint (5% of Scope 1). They relate to gas networks controlled or operated by the Group and are mainly due to venting safety procedures. The year 2024 marked a major step forward in Latin America, with the Group's entities Mejillones in Chile, TAG in Brazil and the DSO & TSO in Mexico joining OGMP 2.0 (Oil & Gas Methane Partnership, an initiative led by the United Nations Environment Program to minimize methane emissions and share an internationally recognized reporting framework). They joined the Group's French (GRDF, NaTran, Elengy, and Storengy) and Romanian (Distrigaz Sud Retele) entities already committed to this initiative. In addition to the commitments made by these entities, ENGIE has set itself the overall target of reducing methane emissions from its consolidated global gas networks (transport, distribution, LNG terminals and storage) by 50% between 2017 and 2030.

The commitments are detailed below:



(1) CH_4 emissions/volume of gas distributed.

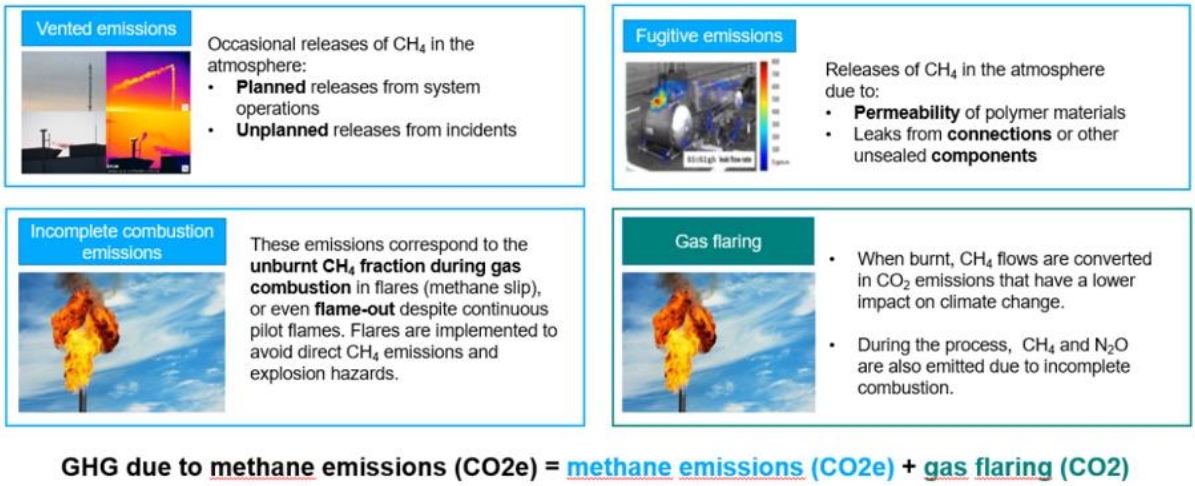
For more information, please visit: Oil & Gas Methane Partnership

The commitments of these entities are monitored by the United Nations Environment Program (UNEP), which has created an International Methane Emissions Observatory called “An Eye on Methane”.
Full details are available in the report: https://www.unep.org/resources/eye-methane-2024

In addition to the commitments of its entities, in 2024 ENGIE decided to go further in its commitment to reduce methane emissions and made a Group commitment. **ENGIE is committed to reducing methane emissions from its transmission, distribution, storage and regasification infrastructures (consolidated, excluding equity entities) worldwide by 50% in 2030 compared to 2017.**

Find ENGIE's Commitments in our ESG publications: https://www.engie.com/en/group/social-responsibility/csr-publications.

What categories of methane emissions are we tracking?



There are 3 main categories of methane emissions and gas flaring as considered by OGMP 2.0 Framework (Oil & Gas Methane Partnership).

Figures in detail

The following table shows the direct GHG emissions (scope 1) of each of the Group's infrastructure activities worldwide.

Direct GHG emissions (scope 1)	Unit	2022	2023	2024
Transport	t CO_2 eq	488 887	449 674	327 290
Distribution		975 494	1 159 354	685 481
Storage		155 683	134 939	105 442
LNG terminals		110 481	197 117	124 979
Methanization		-	21 791	-
Total Group Infrastructures		1 730 545	1 962 875	1 243 192

In addition to methane emissions, other sources of direct emissions are: emissions from the entities' vehicle fleets, emissions from stationary combustion and CO_2 emissions from gas flaring.

The table below shows the CH_4 emissions of each of the Group's infrastructure activities worldwide.

Methane emissions	Unit	2022	2023	2024
Transport	t CO_2 eq	192 740	176 880	126 915
Distribution		947 586	1 068 498	685 360
Storage		78 928	72 918	65 223
LNG terminals		44 354	135 151	82 949
Total Group Infrastructures		1 263 608	1 453 447	960 448

The table below shows the absolute CH_4 emissions per unit of activity for each type of infrastructure illustrate the unit performance of each activity in this area expressed in g CO_2 per kWh:

Methane emissions	Unit	2022	2023	2024
Transport	g $CO_{2\,eq}$ / kWh transported	0.2624	0.2952	0.2350
Distribution	g $CO_{2\,eq}$ / kWh distributed	2.8726	3.5688	2.5445
Storage	g $CO_{2\,eq}$ / kWh stored	0.3923	0.3664	0.6023
LNG terminals	g $CO_{2\,eq}$ / kWh re-gasified	0.2078	0.7482	0.5860

Or in % of energy delivered, with a conversion factor of 15.13 kWh/kg for methane and a Global Warming Potential (GWP) of 30 for methane:

Methane emissions	Unit	2022	2023	2024
Transport	%	0.013%	0.015%	0.012%
Distribution		0.146%	0.180%	0.129%
Storage		0.020%	0.018%	0.031%
LNG terminals		0.011%	0.038%	0.030%

Concrete actions implemented to reduce our emissions

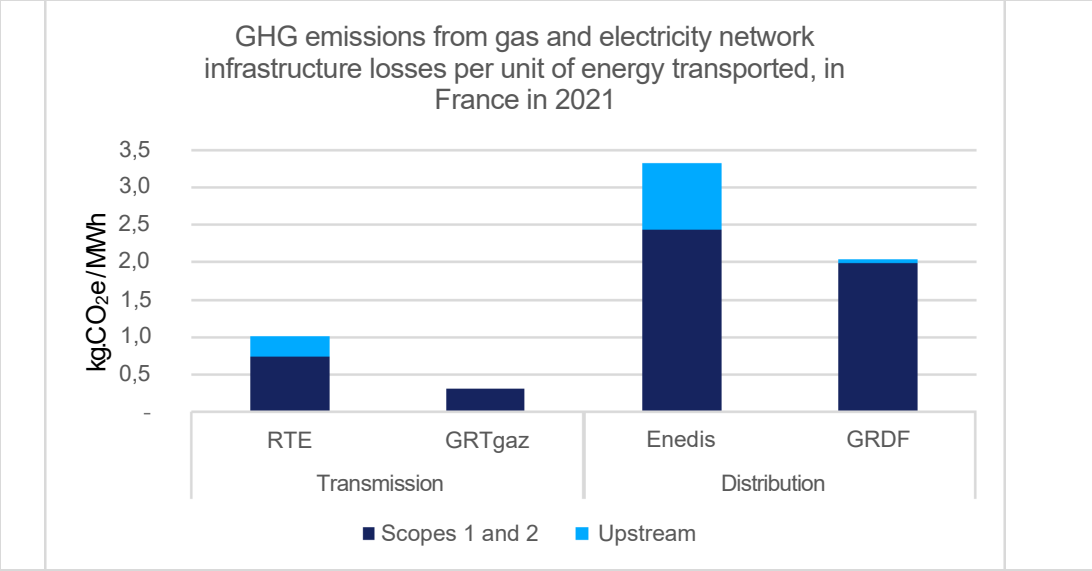
Here are some concrete actions that are being implemented this year, as part of these commitments to reduce methane emissions:

STORENGY	Detection & Reporting: - Measurement of methane emissions by Top-Down drone and regular LDAR campaign. - Improvement on MRV (monitoring, reporting and verification) through systems ensuring direct (in)measurements/calculations and continuous monitoring at source level of methane emissions; testing Site level technologies (as Drones). Reduction of fugitive emissions: - Implementation of Leak Hunter (i.e. LDAR) campaigns every 2 years - Accelerate repairs of leaking equipment (valves, plugs/fittings, valves) Reduction of vented gases: - Planning/mutualization of maintenance actions - Systematic lowering of pressure before venting - Gas Booster (a gas recompression system to reduce methane emissions from site maintenance activities.) This compression system allows the gas to be transported to another section of the pipeline rather than being released into the atmosphere - Nitrogen piston effect as an alternative of venting pipelines after maintenance. - Mobile Flare to avoid venting before maintenance work. Investment program to decrease equipment methane emissions

NATRAN	- Leak Detection And Repair (LDAR) program. - Combined measures of pressure reduction, plus gas booster plus flaring to reduce emissions related to scheduled works. For several years, NaTran has been saving more than 90% of the gas that would otherwise have been vented without these measures. - Investment program to adapt assets. - R&D projects carried out by the Research and Innovation Centre for Energy (RICE), the R&D department of NaTran. - Assessment of NaTran's actions according to the Methane Guiding Principles. The 2021 /2022 assessment has been published on the MGP website : Methane Guiding Principles Signatory - 2024 For more information, consult NaTran's integrated report : https://www.natrangroupe.com/medias/actualites/rapport-integre-2024
ELENGY	ELENGY is adherent to the OGMP 2.0 reporting through NaTran, as a subsidiary (non-operated assets). - Campaigns of fugitive emission quantification carried out on the terminals based on bagging methodology (source level emission quantification technique). - Commitment to improve CH_4 emissions quantification techniques in accordance with the schedule set by the OGMP 2.0 framework. Ex: Site level measurement campaigns to be carried out as soon the techniques are available. - Investment program to reduce the CH_4 emissions. - Solutions of gas booster considered in order to avoid venting or flaring when commissioning / decommissioning facilities.
GRDF	- Acculturation of employees. - Tighter control of the carbon trajectory (3 times a year) and monitoring by KPI - R&D actions underway - Action plan from 2020 to 2030: progressive reduction of third-party damages, reduction of intervention times on third-party damages, excess flow valve targeted deployment, etc. For more information, see the GRDF website: https://www.grdf.fr/institutionnel/grdf/notre-engagement-societal

Gas networks generate fewer emissions per MWh transported than losses on electricity networks

ENGIE's efforts have significantly reduced the carbon footprint of methane emissions from our gas networks, particularly in France. We have compared the greenhouse gas emissions linked to energy losses in the gas and electricity transmission and distribution networks in France for the year 2021. **It appears that losses on gas networks generate fewer emissions per MWh transported than losses on electricity networks.**



In order to take into account the differences in volumes transported/distributed, the results are presented in kg.CO_2e / MWh transported or distributed by the network[2]. The emissions considered correspond to :

- For gas networks, the "scope 1" direct emissions are greenhouse gas emissions linked to gas flaring and methane emissions (fugitive, planned and unplanned venting). And for "scope 3", emissions upstream of the value chain, linked to the extraction and transport of gas to the networks.
- For electricity grids, these are the emissions induced by line losses, "scope 2", i.e. the emissions linked to the fuels burnt by the power plants, and "scope 3", i.e. the upstream of the value chain of fuels and construction and operation of the power plants[3].

Despite the high Global Warming Power of methane (30 kg.CO_2e/kg.CH_4, according to the latest IPCC report), the better performance of gas networks is explained by much lower loss rates than on electricity networks, which suffer from the physical constraints of electricity transport (dissipation by Joule effect). Moreover, it can be noted that the French electricity network is particularly decarbonised[4], and that the emissions gap would widen even more with a more carbon-based mix.

[2] Although the uses are different, we considered that 1 MWh of electricity and 1 MWh of gas (expressed in HCV, Higher Calorific Value) transported were two comparable quantities.

[3] Note: Fugitive emissions of sulphur hexafluoride (SF_6, which has a global warming potential 23,500 times greater than CO_2 over a period of 100 years) are not included in the calculation, despite their significant weight in the carbon footprint of electricity networks.

[4] Mix France 2021 - ADEME carbon base: 38 g.CO_2e/kWh (Scope 2) and 14 g.CO_2e/kWh (Scope 3 'upstream')