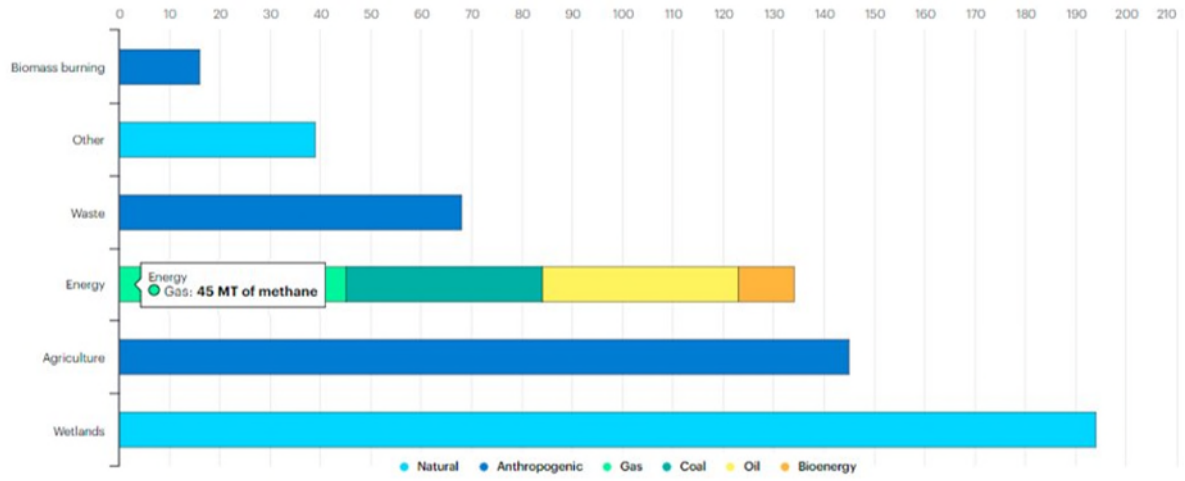
ENGIE, a player committed to reducing methane emissions

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: IAE 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.

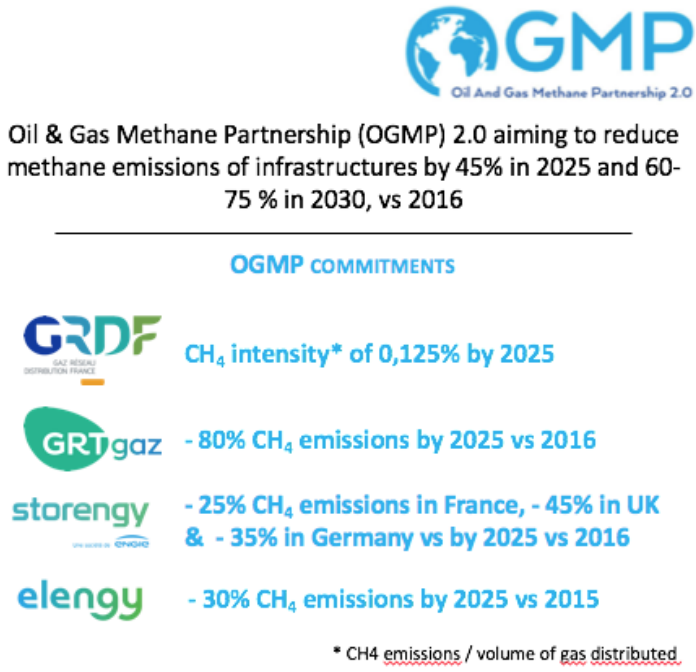
Methane releases generally occur during operations or maintenance (e.g. venting of a pressure-reducing station), venting the gas is a safety procedure for gas infrastructures operation and then vented emissions may be the results of testing this procedure or real implementation of this procedure in case 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] during maintenance operations, a fortuitous shutdown of a site or security tests are required by the French administration. So, French UGS operators must carry out venting security operations with strictly 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 1.57 Mt $CO_{2\ eq}$ in 2021, which represents less than 1% of the Group's total balance of 166 Mt $CO_{2\ eq}$.**

This voluntary commitment has been translated into commitments at the entity level. In 2020, the Group's gas infrastructure operators GRDF, GRTgaz (including ELENGY) and STORENGY (STORENGY France, STORENGY UK, STORENGY Deutschland) joined the Oil & Gas Methane partnership 2.0 initiative managed by the United Nations Environment Program, which aims to minimize fugitive methane emissions and to share an internationally recognized reporting framework in this area and focus on reduction approach. These commitments are detailed below:



For more information, please visit: http://ogmpartnership.com/

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".
The observatory has ranked GRDF (Cf.report page 109), GRTgaz (Cf. report pages 78-79), GRTgaz Deutschland, ELENGY, STORENGY France, UK and Germany (Cf report pages 93-95) at the highest level of commitment in 2021, namely gold standard. Full details are available in the report: https://www.unep.org/resources/report/eye-methane-international-methane-emissions-observatory-2021-report

Figures in details

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

Direct GHG emissions (scope 1)	unity	2019	2020*	2021
Transport	t CO_2 eq	639 091	490 781	443 049
Distribution		1 305 062	1 147 8322	1 223 114
Storage		160 926	148 039	171 542

LNG terminals		113 519	118 998	130 403
Total Group Infrastructures		**2 223 694**	**1 905 656**	**1 968 108**

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.

Méthane émissions	unity	2019	2020*	2021
Transport	t CO_2 eq	305 097	237 814	247 550
Distribution		1 278 578	1 123 285	1 197 204
Storage		80 677	78 678	92 691
LNG terminals		62 520	76 577	86 637
Total Group Infrastructures		**1 726 874**	**1 516 355**	**1 624 082**

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

Méthane émissions	unity	2019	2020*	2021
Transport	g $CO_{2\ eq}$ / kWh transported	0,4688	0,3981	0,4291
Distribution	g $CO_{2\ eq}$ / kWh distributed	3,3095	3,1468	3,1441
Storage	g $CO_{2\ eq}$ / kWh stored	0,4463	0,4179	0,4434
LNG terminals	g $CO_{2\ eq}$ / kWh regasified	0,4573	0 ,5716	0,6722

Or in % of energy delivered, with a conversion factor of 15.13 kWh/kg for methane:

Méthane émissions	unity	2019	2020*	2021
Transport	%	0,021%	0,018%	0,018%
Distribution		0,147%	0,140%	0,132%
Storage		0,020%	0,019%	0,019%
LNG terminals		0,020%	0,025%	0,028%

**Note that the year 2020 with COVID is a particular year marked by a lower economic and industrial activity.*

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 (ie 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
GRTgaz	- 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, GRTgaz 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 GRTgaz. - Assessment of GRTgaz's actions according to the Methane Guiding Principles. The 2021 /2022 assessment has been published on the MGP website GRTgaz_Methane-Guiding-Principles-Reporting-2022.pdf (methaneguidingprinciples.org) For more information, consult GRTgaz's integrated report : https://www.grtgaz.com/sites/default/files/2022-05/Rapport-integre-GRTgaz.pdf
ELENGY	ELENGY is adherent to the OGMP 2.0 reporting through GRTgaz, 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/decommissionning 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/actualite/publications/bilan-des-emissions-de-gaz-a-effet-de-serre The latest GRDF greenhouse gas emission balances (based on 2019 datas) are available on the ADEME database at the following address: https://bilans-ges.ademe.fr/fr/bilanenligne/detail/index/idElement/5794/back/bilans