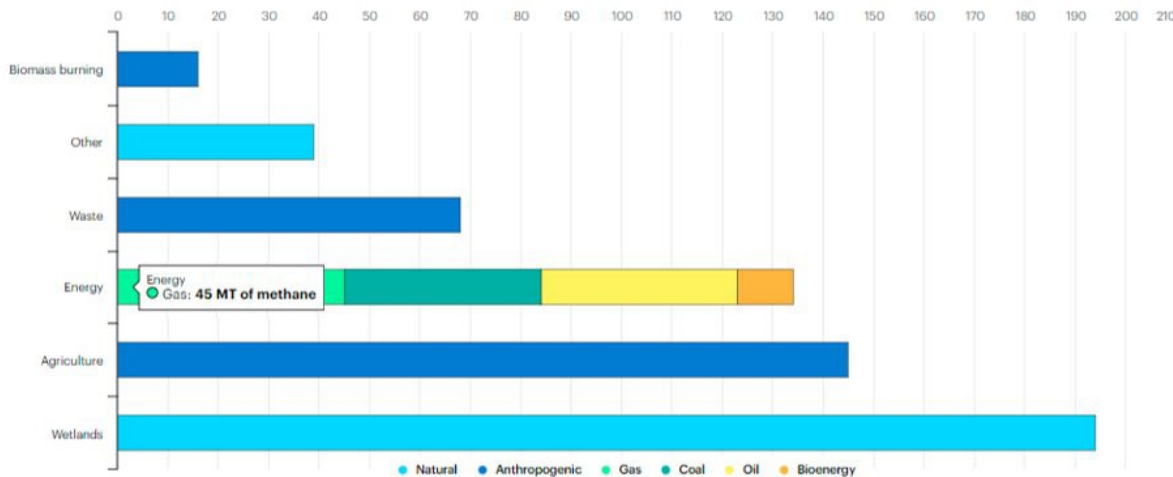


ENGIE, a player committed to reducing methane emissions

Context

CH₄ is an anthropogenic greenhouse gas (GHG), second only to CO₂. 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 danger¹. 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 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 CH₄ emissions are 1.3 Mt CO₂ eq in 2022, which represents less than 1% of the Group's total balance of 174 Mt CO₂ eq.**

This voluntary commitment has been translated into commitments at the entity level. In 2020, the Group's gas infrastructure managers 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:



Oil & Gas Methane Partnership (OGMP) 2.0 aiming to reduce methane emissions of infrastructures by 45% in 2025 and 60-75 % in 2030, vs 2016

OGMP COMMITMENTS



CH₄ intensity* of 0,125% by 2025



- 80% CH₄ emissions by 2025 vs 2016



- 25% CH₄ emissions in France, - 45% in UK & - 35% in Germany vs by 2025 vs 2016



- 30% CH₄ emissions by 2025 vs 2015

* CH₄ emissions / volume of gas distributed

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, GRTGAZ, GRTgaz Deutschland, ELENGY, STORENGY France, UK and Germany 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-2022-report>.

Finally, this year 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 30% in 2030 compared to 2017.**

Find this commitment and our climate policy in our integrated report 2023 / climate notebook :

https://www.engie.com/sites/default/files/assets/documents/2023-03/ENGIE_RI23_VA_VDEF.pdf

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	2020*	2021	2022
Transport	t CO ₂ eq	490 781	443 049	488 887
Distribution		1 147 839	1 223 114	975 494
Storage		148 039	171 542	155 683
LNG terminals		118 998	130 403	110 481
Total Group Infrastructures		1 905 656	1 968 108	1 730 545

In addition to methane emissions, other sources of direct emissions are: emissions from the entities' vehicle fleets, emissions from stationary combustion and CO₂ emissions from gas flaring.

The table below shows the CH₄ emissions of each of the Group's infrastructure activities worldwide.

Méthane émissions	unity	2020*	2021	2022
Transport	t CO ₂ eq	237 814	247 550	192 740
Distribution		1 123 286	1 197 204	947 586
Storage		78 678	92 691	78 928
LNG terminals		76 577	86 637	44 354
Total Group Infrastructures		1 516 355	1 624 082	1 263 608

The table below shows the absolute CH₄ emissions per unit of activity for each type of infrastructure illustrate the unit performance of each activity in this area expressed in g CO₂ per kWh:

Méthane émissions	unity	2020*	2021	2022
Transport	g CO ₂ eq / kWh transported	0,3981	0,4291	0,2624
Distribution	g CO ₂ eq / kWh distributed	3,1473	3,1446	2,8726
Storage	g CO ₂ eq / kWh stored	0,4179	0,4434	0,3923
LNG terminals	g CO ₂ eq / kWh regasified	0,5716	0,6722	0,2078

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

Méthane émissions	unity	2020*	2021	2022
Transport	%	0,018%	0,018%	0,013%
Distribution		0,140%	0,132%	0,146%
Storage		0,019%	0,019%	0,020%
LNG terminals		0,025%	0,028%	0,011%

*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

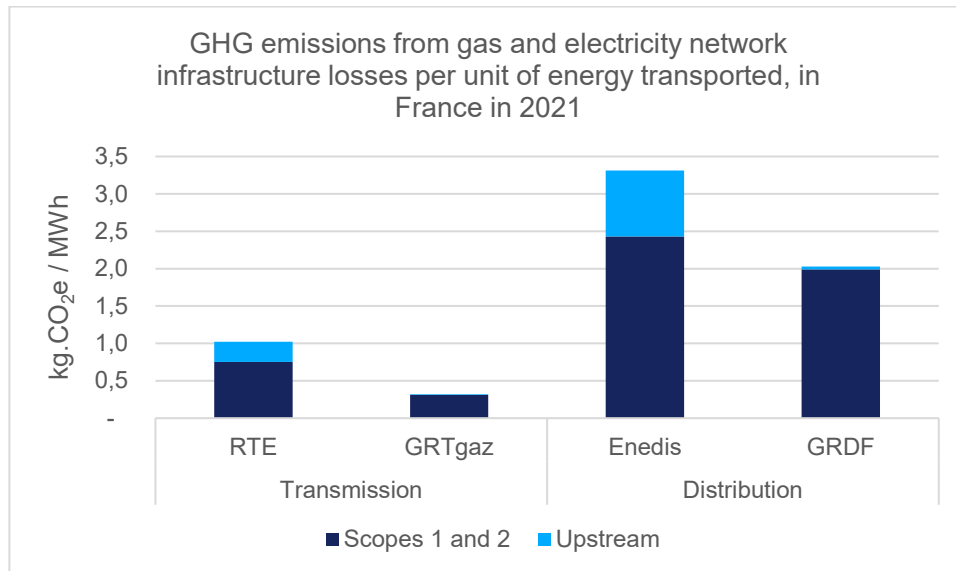
Here are some concrete actions that are being implemented this year, as part of these commitments to reduce methane emissions:

STORENGY	<p>Detection & Reporting:</p> <ul style="list-style-type: none"> -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). <p>Reduction of fugitive emissions:</p> <ul style="list-style-type: none"> -Implementation of Leak Hunter (ie LDAR) campaigns every 2 years
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	<p>-Accelerate repairs of leaking equipment (valves, plugs/fittings, valves)</p> <p>Reduction of vented gases:</p> <ul style="list-style-type: none"> - 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. <p>Investment program to decrease equipment methane emissions</p>
GRTGAZ	<ul style="list-style-type: none"> - 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) <p>For more information, consult GRTgaz's integrated report : https://www.grtgaz.com/sites/default/files/2022-05/Rapport-integre-GRTgaz.pdf</p>
ELENGY	<p>ELENGY is adherent to the OGMP 2.0 reporting through GRTGAZ, as a subsidiary (non-operated assets).</p> <ul style="list-style-type: none"> - Campaigns of fugitive emission quantification carried out on the terminals based on bagging methodology (source level emission quantification technique). - Commitment to improve CH4 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 CH4 emissions. - Solutions of gas booster considered in order to avoid venting or flaring when commissioning/decommissioning facilities.
GRDF	<ul style="list-style-type: none"> - 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. <p>For more information, see the GRDF website: https://www.grdf.fr/institutionnel/actualite/publications/bilan-des-emissions-de-gaz-a-effet-de-serre</p>

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.CO2e / MWh transported or distributed by the network². 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 plants³.

Despite the high Global Warming Power of methane (30 kg.CO2e/kg.CH4, 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 decarbonised⁴, 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 (SF6, which has a global warming potential 23,500 times greater than CO2 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.CO2e/kWh (Scope 2) and 14 g.CO2e/kWh (Scope 3 'upstream').