

Scopes 1 and 2

	2018	2019	2020	2021	2022
Scope 1: total direct greenhouse gas emissions (GHG) (in thousands of tonnes of CO ₂ -eq.) ^(a)	16,082	16,239	15,345	15,536	16,273*
Scope 2: total indirect GHG (in thousands of tonnes of CO ₂ -eq.) ^(b)	16,976	16,927	17,184	20,829	23,033*
Total emissions as reported (in thousands of tonnes of CO₂-eq.)	33,058	33,166	32,529	36,364	39,306^{(c)*}
Total restated emissions (in thousands of tonnes of CO₂-eq.)^(d)	–	–	39,564	40,085	39,464

(a) (b) and (c) Actual Group emissions taking into account significant perimeter changes (up and down) having an impact on CO₂ emissions during the year as of their effective date.

(a) Reporting taking into account a minimum of 95% of the Group's emissions. The methodology and reporting of excluded sources are subject to a continuous improvement process.

(b) Total of indirect GHG emissions generated by the production of electricity and steam purchased outside the Group. Emissions are reported using the "market-based" methodology.

(c) Corresponding emissions using "location-based" methodology are 38,330 kt CO₂-eq.

(d) Emissions are reported using the "market-based" methodology, restated, from 2020 and each subsequent year, to include the emissions of the assets for the full year, taking into account (upwards and downwards) changes in scope having a significant impact on CO₂ emissions.

* Indicator verified by the independent verifier.

The Group's direct emissions (Scope 1) increased from 15.5 million tonnes of CO₂ equivalent in 2021 to 16.3 million tonnes reflecting the integration of the TotalEnergies hydrogen production unit in Gonfreville, France as of 15 June 2022, and an increased use of cogeneration units due to the energy context.

The Group's as reported indirect emissions (Scope 2) increased from 20.8 million tonnes of CO₂ equivalent in 2021 to 23 million tonnes in 2022, an increase of 10%. This variation is due to the inclusion of new assets in the scope, in particular the assets acquired from Sasol, which were integrated into the CO₂ emissions reporting scope on 24 June 2021, which impacted the full year in 2022. The corresponding emissions will be reduced in the future thanks to an ambitious plan to procure renewable electricity. As demonstrated by the 220 MW long-term contract of renewable power signed by Air Liquide and Sasol with Enel Green Power, this plan is being concretely implemented.

As reported emissions by hub ^(a)	Scope 1	Scope 2
Europe (in thousands of tonnes of CO ₂ -eq.)	5,334	3,695
Americas (in thousands of tonnes of CO ₂ -eq.)	8,072	2,568
Asia Pacific (in thousands of tonnes of CO ₂ -eq.)	1,138	8,880
Middle-east & Africa (in thousands of tonnes of CO ₂ -eq.)	1,729	7,890
Total (in thousands of tonnes of CO₂-eq.)	16,273	23,033

(a) Actual hubs emissions including assets acquired during the year as of their acquisition date.

More than 80% of the Group's direct emissions in Europe and Americas are due to cogeneration units and hydrogen production capacity.

Indirect emissions are related to installed capacity in various regions and to the local power generation mix. The amount of coal-based power generation in Asia and South Africa explains the relative importance of Scope 2 emissions in these geographies, which represent more than 70% of the Group's indirect emissions.

On a comparable basis, it is important to note that the Group's emissions have remained stable for the second consecutive year, while activity is growing strongly.

Scope 3

Scope 3 emissions correspond to Air Liquide's indirect emissions from its value chain (outside of Scope 2 emissions) and are separated into 15 different categories that can be split between the upstream and the downstream of the value chain.

Scope 3 categories ^(a)	2021 (in thousands of tonnes CO ₂ -eq.)	2022 (in thousands of tonnes CO ₂ -eq.)
1 – Purchased goods and services	3,286	3,161*
2 – Capital goods ^(b)	523	1,035*
3 – Energy (not included Scopes 1 or 2)	7,591	8,749*
4 – Upstream transportation and distribution	83	541*
6 – Business travel	30	49*
7 – Employee commuting	70	73*
9 – Downstream transportation ^(c)	358	Not relevant ^(c)
11 – Use of sold products ^(d)	9,236	7,282*
13 – Downstream leased assets	1,070	1,244*
TOTAL SCOPE 3 EMISSIONS (in thousands of tonnes of CO₂-equivalent emissions.)	22,247	22,134*

(a) See methodology in 2022 Universal Registration Document page 427.

(b) The variation between 2021 and 2022 is due to a better allocation of purchasing categories between categories 1 and 2 of Scope 3.

(c) These emissions were previously reported by Air Liquide in Scope 1 up to 2020, in category 9 in 2021 and will be reported in category 4 from 2022 to better align with the GHG Protocol.

(d) From 2022 onwards, these emissions also include downstream emissions related to acetylene sales and residual natural gas sales at refueling stations not yet fully converted to biomethane. In addition, emissions related to sales of biogenic CO₂ are no longer included in the total; they represent 0.5 MtCO₂-eq.

* Indicator verified by the independent verifier.

The Group's Scope 3 emissions are mainly related to energy (category 3) as well as the use of products sold, especially CO₂ and N₂O. The Energy category increase in 2022 is due to an increase in the Group's energy consumption during the year and to the impact of the assets acquired from Sasol and including the CO₂ emissions reporting scope on June 24, 2021, which was taken into account for the full year in 2022. In category 11, the increase of emissions related to acetylene sales and residual natural gas sales at refueling stations not yet fully converted to biomethane leads to a marginal increase, which is far more compensated by two effects: on the one hand, the withdrawal of emissions related to biogenic CO₂ sales and, on the other hand, the implementation of methodologies allowing to take into account more precisely the part of the products sold that is actually re-emitted during their use by customers.

In total, Scope 3 emissions are nonetheless slightly down, despite significant growth in sales.

Environmental footprint of transportation

Transportation: Industrial Merchant business

	2018	2019	2020	2021	2022
Kilometers traveled by all vehicles delivering gas in liquid or cylinder form (in millions of km)	601	596	559	593	590*
Estimate of CO ₂ emissions generated by these vehicles in the Industrial Merchant business (in thousands of tonnes)	666	660	483	572	590*
Change in distance traveled per tonne of liquid industrial gas delivered (oxygen, nitrogen, argon, carbon dioxide) ^(a) (truck delivery)	101.7	98.1	97.6	98.3	99.0
Estimate of truck transportation kilometers avoided through on-site customer units (in millions of km)	-58	-56	-103	-106	-146
Estimate of CO ₂ emissions avoided by these on-site customer units (in thousands of tonnes)	-59	-56	-104	-107	-155
Percentage of deliveries of air gases and hydrogen via pipeline or on-site	85%	85%	85%	86%	87%

(a) In kilometers per tonne delivered for the Industrial Merchant business. 2015 base of 100.

* Indicator verified by the independent verifier.