4.6 ENVIRONMENTAL INDICATORS

4.6.1 Flight Operations

			Air France-KLM Group			
Environmental indicators		**Unit**	**2014**	**2015**	**2016**	**16/15**
Consumption						
Consumption of raw materials	Fuel √	ktonnes	8,755	8,752	**8,681**	-0.8%
Emissions						
Greenhouse gas emissions	CO_2 (3) √	ktonnes	27,577	27,569	**27,344**	-0.8%
Emissions of substances contributing to acidification and eutrophication	NO_x low altitude *(< 3.000 ft)*	ktonnes	9.9	10.2	**9.8**	-3.9%
	SO_2	ktonnes	11.8	11.8	**12.7**	7.6%
	SO_2 low altitude *(< 3.000 ft)*	ktonnes	0.89	0.88	**0.93**	5.7%
In-flight fuel jettison	Occurences of fuel jettison	number	36	N/A(4)	**N/A(4)**	
	Fuel jettisoned	tonnes	1,283	N/A(4)	**N/A(4)**	
Other emissions	HC low altitude *(< 3.000 ft)*	ktonnes	0.8	0.8	**0.8**	0.0%
Noise impact						
Global noise energy indicator		10^{12} kJ	1.54	1.70	**1.65**	-2.6%

√ Figures verified by KPMG for 2016 (reasonable level of assurance).
(1) Air France Group scope: all flights under AF and A5 code operated by Air France and HOP!, all flights under TO code operated by Transavia France.
(2) KLM Group scope: all flights operated by KLM, KLM Cityhopper, Martinair and Transavia.
(3) Greenhouse Gas Protocol scope 1.
(4) Data not available in 2015 and in 2016.

Air France Group [1]				KLM Group [2]			
2014	2015	2016	16/15	2014	2015	2016	16/15
4,903	4,886	**4,883**	0.0%	3,852	3,866	**3,798**	-1.8%
15,443	15,392	**15,382**	0.0%	12,134	12,177	**11,962**	-1.8%
6.0	6.2	**6.2**	0.0%	3.9	4.0	**3.6**	-10.0%
6.9	6.8	**6.4**	-5.9%	4.9	5.0	**6.3**	26.0%
0.56	0.55	**0.51**	-7.2%	0.33	0.33	**0.42**	27.0%
20	N/A[4]	**N/A[4]**		16	10	**12**	20.0%
671	N/A[4]	**N/A[4]**		612	318	**493**	55.0%
0.6	0.6	**0.6**	0.0%	0.2	0.2	**0.2**	0.0%
1.03	1.02	**1.00**	-2.0%	0.51	0.67	**0.65**	-3.0%

4.6.2 Ground Operations

			Air France-KLM Group			
		Unit	2014	2015	2016	16/15 Pro forma (4)
Consumption						
Water consumption		m^3	792,767	806,038	**546,622**	3.3%
Electricity consumption		MWh	374,064	366,243	**297,768**	-5.0%
Consumption of other energies		MWh	451,626	446,276	**375,972**	-4.1%
Emissions						
Greenhouse gas emissions	CO_2 (3)	tonnes	78,842	76,807	**63,255**	-4.1%
Emissions of substances contributing to photochemical pollution	Emissions of volatile organic compounds VOC	tonnes	107	98	**78**	-20.4%
	Emissions of HC	tonnes	158	145	**126**	-3.9%
Emissions of substances contributing to acidification and eutrophication	NO_x	tonnes	638	622	**511**	-1.7%
	SO_2	tonnes	14.5	7.8	**6.8**	4.6%
Waste						
Waste production	Quantity of non-hazardous industrial waste	tonnes	57,895	55,259	**19,896**	-7.4%
	Quantity of hazardous industrial waste	tonnes	5,808	6,291	**6,445**	3.8%
	% of hazardous industrial waste recovered	%	51%	58%	**69%**	+11pts
Effluents						
Compliance rate of effluents with regulatory limits	Nitrogen compounds	%	100%	100%	**N/A (6)**	N/A (6)
	Phosphorus compounds	%	98%	97%	**N/A (6)**	N/A (6)
	Metals (5)	%	100%	99%	**N/A (6)**	N/A (6)

(1) Air France and subsidiaries: HOP! (Airlinair, BritAir, Regional!), Sodexi, CRMA, BlueLink and Transavia France.
(2) KLM and its subsidiaries: KLM Cityhopper BV (KLC), KLM Equipment Services (KES), KLM Catering Services (KCS), KLM Health Services (KHS), Cygnific BV, Martinair and Transavia. EPCOR has been included for waste since 2014.
(3) Greenhouse Gas Protocol scope 1.
(4) Pro forma calculated without Servair figures.
(5) Cr, Cd, Ni, Cu, Pb, Sn et Zn.
(6) Data not available for the Air France Group in 2016.

Air France Group [1]				KLM Group [2]			
2014	2015	2016	16/15 Pro forma [4]	2014	2015	2016	16/15 Pro forma
640,588	649,494	**390,629**	4.8%	152,179	156,545	**155,993**	-0.4%
279,945	276,265	**210,721**	-5.8%	94,119	89,978	**87,047**	-3.3%
260,891	244,557	**185,560**	-4.0%	190,735	201,719	**193,412**	-4.1%
36,704	33,466	**21,679**	-4.2%	42,138	43,341	**41,576**	-4.1%
55	52	**42**	-19.2%	52	46	**36**	-21.7%
100	91	**75**	-2.9%	58	54	**51**	-5.6%
387	426	**321**	-0.9%	251	196	**190**	-3.1%
11.1	4.8	**3.1**	-11.5%	3.4	3.0	**3.7**	23.3%
40,269	38,604	**4,025**	-16.9%	17,626	16,655	**15,871**	-4.7%
4,280	4,730	**3,985**	-15.7%	1,528	1,561	**2,459**	57.5%
43%	51%	**56%**	+5pts	75%	79%	**90%**	+11pts
94%	100%	**N/A [6]**	N/A [6]	100%	100%	**100%**	0pt
97%	95%	**N/A [6]**	N/A [6]	100%	100%	**100%**	0pt
100%	99%	**N/A [6]**	N/A [6]	100%	98%	**100%**	+2pts

4.7 NOTE ON THE METHODOLOGY FOR THE REPORTING OF THE ENVIRONMENTAL INDICATORS

In 2005-06, under the aegis of the Air France-KLM Group's Disclosure Committee, and validated by the college of Statutory Auditors, the Group's environmental performance indicators were defined to comply with the requirements of the French New Economic Regulations law (*Les Nouvelles Régulations Économiques*, NRE, May 15, 2001) and the European Regulation (EC 809/2004).

Since 2013, and in accordance with the provisions of Article L. 225-102-1 of the Code of Commerce, it has been the responsibility of our Independent Third Party Body to:

- attest that the required CSR Information appears in the management report and that the exclusion of any information is explained in accordance with paragraph 3 of article R. 225-105 of the French Code of Commerce (Attestation of completeness of CSR Information);
- express a limited assurance on the fact that the Information is presented fairly, in all material aspects, in accordance with the Guidelines (opinion on the fair presentation of CSR Information)[(1)].

Furthermore, the data relating to the "fuel consumption" and "CO_2 emissions" indicators linked to the air operations have been verified with the highest level of assurance, reasonable assurance (indicated by the symbols √) since 2007-08.

4.7.1 Scope covered and scope N-1

For the flight operations, the environmental consolidation scope covers:

- all the commercial flights under the AF and A5 codes operated by Air France, HOP!, and the TO codes operated by Transavia;
- all the commercial flights under the KLM code operated by KLM and its subsidiaries KLM Cityhopper BV (KLC), Martinair and Transavia.

For the ground operations, the consolidation scope for the environmental reporting has changed since Servair (Catering activity of the Air France Group) was divested in 2016. The scope covers nearly 100% of the sites in France and the Netherlands (some very small subsidiaries being excluded). The international and overseas outstations are not taken into account.

- in 2016, the Air France consolidated subsidiaries are: HOP!, CRMA, Sodexi, BlueLink and Transavia France.

  Furthermore, for Air France, the indicators in the domestic outstations are not reported when there is no detail available on the charges invoiced by airports. The contribution of the domestic outstations affected by this issue is, however, marginal compared with the reported data.
- the KLM consolidated subsidiaries are: KLM Cityhopper BV, KES (KLM Equipment Services), KCS (KLM Catering Services), KHS (KLM Health Services), Transavia, Martinair and EPCOR (for a portion of the indicators).

4.7.2 Reporting tools

The environmental indicators are assembled at local level *via* two reporting tools: Osyris (Enablon software) for Air France and CaeSaR for KLM, which are available, respectively, in each Air France and KLM subsidiary.

The reliability of the reporting process is supported by definitions of each indicator and tool user guides made available to contributors. Consistency tests have also been implemented.

The consolidation of the Air France-KLM Group's environmental data is carried out by the Air France CSR department.

4.7.3 Details and methodology, comments on variations

At Air France-KLM Group level, the regulatory requirements and the reporting and consolidation principles are outlined in a document called the Environment Instruction Memo, which is updated annually. The modalities for the assembly of the data and for the calculation and consolidation methodologies are defined in procedures which are specific to Air France and KLM, and are harmonized whenever possible.

Within the framework of an improvement-based approach, methodological details are provided on some indicators, and particularly on their definitions. When these changes have a significant impact on the data, comparison with the figures for previous years is not meaningful.

When the data is not available, the figure reported for the year (N) is estimated based on the value reported for the previous year (N-1).

The reporting period for the Group's environmental data is set at a rolling twelve months from October 1 N-1 until September 30 N.

(1) The review work was carried out pursuant to the ISAE 3000 international audit standard (International Standard for Assurance Engagements) specific to the verification of extra-financial data.

4.7.4 Flight operations

CO_2 emissions

The CO_2 emissions are those in the Greenhouse Gas Protocol scope 1 (direct emissions).

The Air France-KLM Group's CO_2 emissions were stable between 2014 and 2016, in line with the Group's activity.

Note that there are differences between the scope of the CO_2 emissions reported and those of the European Emissions Trading Scheme for Greenhouse Gas emission quotas (EU-ETS), so comparison is not meaningful.

SO_2 and SO_2 low altitude (LTO) emissions

Note: the "low altitude" and "LTO" for Landing-TakeOff cycle denominations are equivalent.

The calculation of the SO_2 emissions from flight operations is based on the average sulfur content of the fuel loaded, respectively, on the Amsterdam and Paris platforms which is applied, respectively, to all fuel used during the year by KLM and its subsidiaries, and by Air France and its subsidiaries.

The differences between 2015 and 2016 are mainly the result of changes in the level of sulfur content in kerosene.

NO_x and HC low altitude emissions (LTO)

The methodology used for the calculation of low altitude emissions, *i.e.* below 3,000 feet, is common to Air France and KLM. It is based on the LTO (Landing-TakeOff) cycle and on engine data communicated by the ICAO[1]. The taxiing time taken into account is the actual taxiing time, which is more precise than standard values recommended by the ICAO methodology. Note that, since the actual taxiing time is not available for Transavia France, the standard ICAO values have been used for this subsidiary.

In-flight fuel jettison

An exceptional operation (less than one flight in 10,000 per year) involving the jettisoning of a quantity of fuel in flight to avoid an overloaded plane on landing whenever a flight is aborted. Each operation is effected in close coordination with air traffic control under strict conditions governing geographical location (avoiding urban zones) and altitude (generally at or above 2,000 meters).

For the Air France Group, the data on in-flight fuel jettison were not available in time for publication of the figures. Due to the significant volatility from one year to another linked to the exceptional nature of this type of operation, the indicator may change and cannot be estimated from a year to another.

Total noise energy

This indicator was established by the Air France-KLM Group to manage the evolution in the noise footprint of its activity. The total noise energy indicator is calculated according to the methodology defined by the DGAC[2]. It applies to all flights with the AF or KLM Commercial Code operated, franchised and chartered, code share excepted.

The trend in noise energy and traffic is determined by comparing the total noise energy calculated for the calendar year with the value for the year 2000.

For the KLM Group, the decline in total noise energy between 2015 and 2016 is explained by fleet renewal. Martinair (MP) and Transavia (HV) were not included in the indicator calculation in 2015.

4.7.5 Ground operations

Water consumption

The consumption of water is taken into account for all ground activities. Water used on board flights is not included.

Consumption of other energies

The indicator includes the different sources of energy consumed:

- natural gas for heating buildings, aircraft painting workshops in Maintenance and cooking (the catering activity in particular). The conversion factor of the quantity of gas used as energy is calculated by taking into account the quality of gas specific to France and the Netherlands;
- superheated and iced water for climate comfort. For Air France, superheated and iced water is supplied by ADP (Paris Aéroport) at the Orly and Roissy sites. The KLM facilities do not consume this type of energy;
- jet fuel A1 for testing engines;
- domestic Fuel Oil (DFO) for power generators;
- non-road diesel fuel for a portion of the Air France runway equipment;
- petrol and diesel fuel for Air France and ground support equipment (Air France and KLM).

For KLM, the energy consumption returned to normal after a weather-related increase in 2015.

Emissions from ground operations (CO_2, SO_2 and NO_x)

As for the air operations, the CO_2 emission calculation is based on the Greenhouse Gas Protocol scope 1 (direct emissions).

CO_2, SO_2 and NO_x emissions and their trends are linked to the energy consumption listed above.

For Air France, the NO_x emissions related to engine testing are calculated based on a methodology similar to the one used for flight operations which reflects the actual testing conditions.

(1) International Civil Aviation Organisation.
(2) Direction Générale de l'Aviation Civile.

The CO_2 emissions for the 2016 reporting campaign are based on the emission factors in the Ademe Carbon Database, http://bilans-ges.ademe.fr/, except for kerosene for which the factor is the one used by the ICAO.

The decrease in SO_2 emissions for the Air France Group is explained by a reduction of sulfur content in the Jet fuel for testing engines, and a reduction of the use of generator sets in datacenters.

Despite the decrease in fuel consumption, there was an increase in SO_2 emissions for KLM. This was due to a significant increase of sulfur content in the fuel.

NO_X emissions for the Air France Group remained stable. The figures are based on the European standards EURO I to 6 for light vehicles, and Stage I to IV for diesel engines (European Directive 97/68/EC for non-road mobile machinery), setting the emission limits based on engine power.

For KLM, the NO_X emissions from vehicles and runway equipment are determined by direct measurements, or from manufacturer data or external databases.

VOC Emissions

VOC emissions are calculated based on the direct emissions of solvents contained in the products used. VOCs contained in disposed waste are excluded.

The decrease between 2015 and 2016 for Air France and KLM was due to a decline in aircraft painting activities.

HC Emissions

Hydrocarbon (HC) emissions include the emissions from vehicles and ground support equipment, engine testing and aircraft fueling.

Non-hazardous waste

Since Servair has been divested, non-hazardous waste mainly comes from the catering activity, which represented about 55% of Ground Operation waste. Last year, this type of waste represented 80% of total waste.

The 20% reduction for Air France is mainly explained by the quantity of waste which had not been communicated in time for the closing date of the reporting campaign. This represents 5% of the Air France-KLM Group data.

For the KLM Group, the decline is due to a reduction in the quantity of waste generated by the Maintenance activities.

The waste arising from demolition is not taken into account.

Hazardous industrial waste

When the quantity of hazardous waste has not been communicated by service providers at the end of the reporting campaign, the quantity mentioned in the specification slip is taken into account. This is, however, estimated to be marginal.

The reprocessing channels taken into account are those in the European Regulation.

The increase for the KLM Group is due to the fact that PFOS was found (perfluorooctane sulfonate, a former ingredient in fire-fighting foams) in the oil/water waste generated from cleaning oil skimmers. As a result, the oil separators were not cleaned for a period in 2015, leading to an increase in oil/water/sludge waste in 2016. Also in 2016, an additional oil separator was added to the cleaning program.

Effluents

Both Air France and KLM entities are required to comply with the French and Dutch legislation on effluents. Each relevant site has regulatory limits on effluents and the frequency of measurement.

The reported data reflect the number of times a regulatory threshold is exceeded relative to the number of measurements for each type of effluent.

The figures were not available in time for the Air France Group in 2016.