KLM N.V.

Assurance report by the independent third party verifier, expressing a reasonable assurance on the KLM CO₂ emissions and fuel calculator

Civil year 2017

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This report contains 4 pages and one appendix

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Following your request, we conducted our work to enable us to provide reasonable assurance on the KLM CO_2 emissions and fuel calculator presented at the date of this report on the website of KLM (hereinafter the "Calculator").

The conclusion below is limited to the online CO_2 emissions and fuel calculator and does not cover upon the entire website.

Responsibility of the company

The environmental management of KLM is responsible for the Calculator and the calculation methodology used in the Calculator to determining the CO_2 emissions and fuel data presented in the accompanying document the "CO2 and Fuel CALCULATOR KLM" (hereinafter the "Calculation Methodology", see appendix 1). There is currently no normative reference for the calculation of CO_2 emissions of aircrafts. Thus, KLM has developed its own methodology presented in the Calculation Methodology. This document is also available, on demand, to the CSR and Environmental Strategy Department of KLM N.V.
The quantification of these emissions has an inherent uncertainty due to incomplete scientific knowledge used to determine emission factors.

Responsibility of the independent third party

Our responsibility is to express a reasonable assurance conclusion on whether the KLM and KLM Cityhopper operated flights CO_2 emissions and fuel data are calculated, through the Calculator, in accordance with the methodology as described in the Calculation Methodology.

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Nature and scope of our work

We performed the procedures below in accordance with the International Standard for Assurance Engagements (ISAE) 3410[1]. That standard requires that we comply with ethical requirements, including independence requirements, and plan and perform our procedures to obtain reasonable assurance about whether the CO_2 emissions and fuel data calculated by the calculator are free from material misstatement, in all material respects.

We performed the following activities:

- We reviewed the system and processes in place and, in particular, the Calculation Methodology used for the Calculator,

- We interviewed the persons responsible for the Calculator to gain a thorough understanding of the calculation process and system in place and to ascertain that the Calculation Methodology had been applied correctly,

- We verified that the quantification of CO_2 emissions and fuel data was established in compliance with the Calculation Methodology,

- We performed detailed tests on a sample of flights in order to verify that the calculation process had been implemented correctly in accordance with the Calculation Methodology. For these flights, we performed arithmetic tests on the CO_2 and fuel calculation process,

- We reviewed the consistency between the calculations performed by the Calculator and the information provided in the methodology note for the Calculator published on KLM's website.

During our work, we have been assisted by the experts in Environment and Sustainable Development from the Sustainability Services department of KPMG.

We believe that the sampling methods and sample sizes used, based on our professional judgement, were sufficient to enable us to provide reasonable assurance.
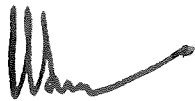
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[1] ISAE 3410 - *Assurance Engagements on Greenhouse Gas Statements* – standard that transposes the standard ISAE 3000 - *Assurance engagements other than audits or reviews of historical financial information* – to the assurance engagements related to GHG emissions declarations

Conclusion

Based on our work, the KLM and KLM Cityhopper operated flights CO_2 emissions and fuel consumptions are calculated, through the Calculator, in all material respects, in accordance with the methodology as described in the Calculation Methodology.

Paris-La Défense, March 28th 2018

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Appendix 1: CO2 and Fuel CALCULATOR KLM

The purpose of KLM's CO$_2$ and fuel calculator is to calculate the amount of CO$_2$ emissions and fuel consumption of passengers and cargo loads during a specific flight defined by the departure airport and the arrival airport. Only regular (scheduled) flights are taken into account. For the flights operated by KLM's integrated network with Air France (AF) and Delta Airlines (DL) the aligned data based on their own CO$_2$ emission calculations have been added. For code share partners the average emissions are assumed to be equal to the overall efficiency of the KLM operations for short, medium and long haul flights.

I. OBTAINING THE DATA

For KLM and KLC flights, the necessary data are based on actual flight data gathered at each flight by the aircraft onboard systems. All these data are automatically transferred to the KLM data warehouse for use in calculations and analysis.

The operational figures used for the emission and fuel calculator are based on the fuel consumption data per aircraft type used by KLM and KLC: Actual fuel use per 100 kg payload per 100 km "bird eye distance", the passenger-kilometres travelled (PKT) and the ton-kilometres travelled (TKT). The principles of IPCC 2006[2], TIER 3A are being used in collecting and calculating data on fuel burn and actual load per O&D-segment[3] and aircraft type.

These fuel consumption data, as abstracted over the previous calendar year, are translated into fuel-efficiency data for the fleet of KLM and KLC. These data have been part of the assurance engagement for KPMG[4] and are used for the CO$_2$-and fuel calculator. For the non KLM/KLC operated flights we based ourselves on data provided by Air France and Delta Airlines or average values (for flights operated by code share partners).

II. PRINCIPLES OF CALCULATION

The methodology is based upon determination of the average fuel consumption per passenger and per ton of cargo for each flight of the network of KLM.

a) KLM methodology to split up fuel burnt between passengers and cargo

The allotment of fuel between passengers and cargo is proportional to the respective overall masses of passengers and cargo. The **overall mass** is constituted by the mass of the payload (passengers – luggage included - or cargo) to which is added the mass of the specific equipment necessary to the transportation of this kind of payload, named the equipped mass.

The two equipped masses were estimated for each type of operation (regional, medium haul and long haul). These masses are used to get the average fuel efficiency per passenger and the average fuel efficiency per ton of cargo for each type of aircraft. KLM is using average factors for the equipment weights per passenger and amount of cargo load as derived from ICAO calculator principles[5] and aligned with AF.

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[2] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 3.6 Civil Aviation
[3] O&D stands for origin and destination
[4] Delta Airlines and Air France data have not been part of the KPMG engagement
[5] ICAO Carbon Emissions Calculator, april 2008

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b) How to evaluate flight distances

The "bird eye distance" between the departure airport and the arrival airport is not the same as the actual "**flying distance**", the distance effectively flown by the aircraft, which depends upon the flight plan which takes into account operational constraints like military air zones and waiting loops above airports. KLM uses the flying distance to express amounts of CO_2 per km.

c) Calculation of the CO_2 emissions per Origin and Destination

First we determine the expected fuel efficiency per passenger (or 100 kg cargo) on a specified O&D. This is done by taking the weighted fuel efficiency of all aircraft types that will be used on this O&D. The weighting is according to the frequencies of the aircraft types on this O&D in the next scheduled plan period of 7 months and to the average actual payload per trip per aircraft type. Actual distances of the flown route are also taken into account.

The average amount of fuel per passenger (or 100 kg cargo) for an O&D can then be calculated by multiplying the weighted average fuel efficiency per passenger (or 100 kg cargo) and the distance.

Finally the amount of CO_2 emissions of a flight can be calculated by multiplying the average amount of fuel burn per passenger (or cargo) in tons on this flight by the factor 3.15 (one tonne of fuel produces 3.15 tonnes of CO_2). This factor is based on EU-ETS regulations[6], to align the monitoring protocols.

The **origin and destination entry file** for the calculator comprises for each segment the IATA code of the departure airport and of the arrival airport (these codes define the segment), the average fuel consumption in liters and the average amount of CO_2 in kilograms (per passenger and per ton of cargo) and the "flying distance".

This file contains all the segments[7] of the KLM and KLC network, but it does not contain all the lines of this network, since a line can consist of two or more segments in case of stopovers. Consequently this file has been manually completed to include all the lines KLM and KLC operate. For example, the value for AMS-CGK (Amsterdam to Jakarta) corresponds to the sum of the values for AMS-KUL (Amsterdam to Kuala Lumpur) and KUL-CGK (Kuala Lumpur to Jakarta).

III. Implementation for KLM and KLC

The method described in section II. is integrally applied to calculate the emissions of KLM/KLC flights run by KLM/KLC aircrafts. The output of this calculation is connected to our booking tool and other web based information to show our customers and other stakeholders what emissions and fuel consumptions are related to their trips and travels.

The networks of AF and DL and code share partners are also connected to our calculation interface. The segment based database of AF and DL have not been part of the KLM validation process and have been calculated by these airlines. The code share flights have been estimated with the average emission of short haul, medium haul and long haul performances of the KLM-fleet .

We consider that KLM efficiency is benchmarked as 'best in class' and hence this estimation might be undervalued, however no other objective and actual data are currently available.

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6 EU-ETS regulations (Directive 2003/87/EC): Annex IV, part B – Monitoring and reporting of emissions from aviation activities

7 A segment is a direct flight –without any stopover- between a departure airport and an arrival airport. For example, AMS-JFK counts as one segment.