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Dear Jolene,

Re: Request for Information - Aviation Climate-Aligned Finance Working Group

We write to you in connection with the request for information (**RFI**) contained in your email to me dated 28th March 2023.

As your questions are specific, we thought it helpful to introduce the AWG carbon calculator (**ACC**) more generally, and provide our proposal for potentially working together, before turning to your questions.

ACC introduction

Based on limited availability of quality data on, and the inconsistency and complexity of alternative methods of calculating, carbon emissions in aviation, the ESG subgroup of the Aviation Working Group (**AWG**) proposed to create the ACC, available to the industry, for the purposes of calculating carbon dioxide (**CO2**) emissions for aircraft and aircraft portfolios based on original equipment manufacturer (**OEM**) source data, which is widely acknowledged to represent the best source data for aircraft CO2 emissions performance (where actual aircraft fuel burn data is unavailable). The participating OEMs are Airbus, ATR, Boeing, and Embraer.

The ACC enables users to perform advanced calculations to generate reliable and consistent CO2 emissions information for aircraft and aircraft portfolios based on aircraft-specific operational information that is generally available to airlines, aircraft lessors, aircraft financiers, and other aviation investors.

In respect of any aircraft for which carbon emissions are to be calculated, the ACC requires the user to (a) select the relevant aircraft model, (b) input the number of flight hours per annum and cycles per annum for that aircraft, and (c) confirm whether a degradation factor should apply (for example, where the aircraft model is out-of-production or an engine on the relevant aircraft is close to overhaul). Where flight hours per annum and cycles per annum are not known by the user, the user can select to apply default utilization data provided by the OEM for that aircraft model.

The OEMs provide CO2 emissions data in respect of each aircraft model within their fleet at agreed mission lengths. Where the user inputs correspond to a mission length other than those mission lengths provided for in the OEM data, the ACC will either (a) use linear interpolation and extrapolation of the OEM data to calculate an approximated figure for the annual CO2 emissions for that mission length or (b) return an error message where the user inputs are outside the specified range for that aircraft model. The OEMs have confirmed that CO2 emissions increase on a linear basis relative to the mission length, provided that such mission lengths fall within the specified range for that aircraft model.

The ACC will then, in respect of such user inputs, confirm (a) CO2 emissions per annum, (b) CO2 emissions per flight hour, and (c) CO2 emissions per mission/cycle. The ACC will provide CO2 emissions in metric units, but this can be converted to imperial units using the ACC. Users can combine saved aircraft within a portfolio of aircraft. The ACC will, in respect of a portfolio, confirm (a) details of the relevant user outputs for each aircraft, (b) the corresponding user inputs for each aircraft, and (c) the aggregate annual CO2 emissions for the portfolio.

Users can generate a report for a portfolio of aircraft. The report confirms relevant portfolio information and provides tabular and graphical outputs based on aircraft type, aircraft model and selected aircraft. Users are also able to generate a comparison report in respect of two portfolios, with relevant portfolio information and tabular and graphical outputs for easy comparison. Graphical outputs are presented in various forms to aid users in visualizing the data, including bar chart, pie chart, radar chart, scatter chart and bubble chart. Users are also able to produce certificates confirming annual CO2 emissions for selected aircraft or aggregate annual CO2 emissions for selected portfolios. Aircraft and portfolio data are exportable in CSV format, graphical outputs are exportable in JPEG or PNG format, and certificates are exportable in PDF format.

The OEM data is provided by the OEMs based on agreed and consistent methodology and assumptions. Further details are provided in the Calculation Methodology Document, which is available at the following link: <https://awg-carbon-calculator.awg.aero/Calculation%20Methodology%20Document.pdf>

Working together

To assist with your consideration of the ACC for use in connection with the CAF framework, we propose the following:

1. We share a call to discuss the ACC generally; please confirm an appropriate time for this call. We can provide further details in relation to the ACC and its workings. However, please do note that we would require representatives of the OEMs to provide further details on the OEM data that drives the ACC, and the assumptions used in the provision of this data.
2. If, following this response and our call, there is legitimate interest in the potential selection of the ACC for use in connection with the CAF framework, and subject to agreement by the OEMs, we may be able to arrange for representatives of the OEMs to join a call with you to discuss the OEM data and assumptions, the reasoning for the selection of those assumptions, and the accuracy of the OEM data.
3. We provide free access to the ACC to you for a specified period for testing purposes. We can discuss and agree the specific requirements for such testing on our call.

We are in the process of considering further modifications to the ACC. We would be happy to explain our current thinking for such modifications, and if the ACC is selected for use in connection with the CAF framework, we would consider minor and technical modifications that might be helpful in support of the CAF framework.

The AWG would need to understand how ACC data will be used in connection with the CAF framework before it would grant access for use of the ACC. We expect that the OEMs would be resistant to ACC data being blended with data supplied by competitor carbon calculators.

We set out below our responses to your questions. Please do read our responses in conjunction with the above.

Core Data Requirements

1. *For each of the data categories enumerated above (1-6), is respondent able to provide the requested data? If not, what is the closest format available?*

In relation to the definitions in your RFI, we note as follows:

- *Aircraft Model:* ACC aircraft models appear to be aligned with your aircraft model requirements in that it is noted by reference to aircraft models (aligned with ICAO codes) but differentiated by passenger or freighter variants.
- *Airline:* The ACC gives the user flexibility to group aircraft into portfolios. However, the ACC is an aircraft-related tool, and so please do note that the user would need to know what aircraft are operated by an airline (or airline group) to determine airline-related emissions.
- *Emissions Boundary:* ACC data does not include upstream fuel refining emissions in its data, and so is not 'well-to-wake'. We would also welcome the opportunity to discuss this requirement with you as, based on our discussions with other aviation industry bodies, we are not sure that it is appropriate to include upstream fuel refining emissions in this context, and we also query whether there is sufficiently accurate data in respect of the same. The emissions factor used in the ACC is 3.16. The noted excluded items are also excluded from the ACC.
- *Sector boundary:* ACC aircraft models are limited to commercial passenger or freighter aircraft falling within the following broad aircraft types: widebody, single-aisle, regional, and turboprop.

In respect of the data categories noted in the RFI, we respond as follows:

- *Aircraft-Model-Average (Airline and Lessor Financing):* If a user had details of the relevant aircraft of that model in the airline's (or, as applicable, lessor's) fleet, including their flight hours and cycles, then the ACC can be used to obtain annual average tank-to-wake (**TTW**) CO₂ emissions in metric tonnes. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate.
- *Full-Fleet Total (Airline Financing):* If a user had details of the relevant aircraft in the airline's fleet, including their flight hours and cycles, then the ACC can be used to obtain total annual TTW CO₂ emissions in metric tonnes. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate.
- *Full-Fleet Total (Lessor Financing):* If a user had details of the relevant aircraft in the lessor's fleet, including their flight hours and cycles, then the ACC can be used to obtain total annual TTW CO₂

emissions in metric tonnes. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate.

- *Aircraft-Model-Average (Airline and Lessor Financing)*: The ACC provides information on aircraft emissions and does not provide traffic data. We would be interested to understand the use of RTKs in the CAF framework as our view is that financings are made *ex ante* and operator use is outside of a financier's control, and so its inclusion in any calculation for financiers would seem inappropriate.
- *Full-Fleet Total (Airline Financing)*: The ACC provides information on aircraft emissions and does not provide traffic data.
- *Full-Fleet Total (Lessor Financing)*: The ACC provides information on aircraft emissions and does not provide traffic data.

2. *In cases of emissions data (categories 1-3), what is the method of calculation/estimation?*

a. *What is the primary method of calculation/estimation?*

The data is from fuel burn information available to the OEMs and based on agreed mission lengths and agreed assumptions, and then converted to CO2 emissions using an emissions factor of 3.16. Linear interpolation and extrapolation of the OEM data is then used to calculate an approximated figure for the annual CO2 emissions based on specific user inputs. Please see above, and the Calculation Methodology Document, for further details.

b. *Are any adjustments made after the primary calculation/estimation? If so, how?*

No.

c. *What is the full list of factors which impacts the calculation/estimation? (i.e. airframe age)*

User inputs are limited to aircraft model, flight hours, cycles, and whether a degradation factor should be applied (for example, where the aircraft model is out-of-production or the aircraft is close to overhaul). We note that 'airframe age' itself (i.e. exclusive of whether the model is out-of-production or where the aircraft is close to overhaul) as noted in your question is unlikely to have any meaningful impact on CO2 emissions.

3. *In cases of emissions estimation (categories 1-3), is respondent able to provide data in well-to-wake format? If not, in tonnes of fuel?*

No. The ACC provides CO2 emissions but, as we have provided the emissions factor used, tonnes of fuel can be easily calculated.

4. *Is respondent able to identify purchases of sustainable aviation fuel at the airline level, by type of fuel?*

No.

5. *In cases of traffic data (categories 4-6) what is the method of calculation/estimation? Please specify separately for passenger, belly cargo, and dedicated cargo*

Not applicable.

a. *What external data sources are used for establishing aircraft capacity? (i.e., manufacturer seating configuration)*

Not applicable.

b. *Are load factors used for converting capacity to traffic? If yes, what load factors are used? (i.e., airline-average passenger load factor)*

Not applicable.

c. *If load factors are used, how are they sourced?*

Not applicable. However, we note that the load factor is relatively immaterial in the context of CO2 emissions for an aircraft. To represent a conservative approach, the ACC assumes 100% passenger

occupancy, typical express freight payload for single-aisle and medium widebody freighter aircraft, and typical general freight payload for large widebody freighter aircraft.

- d. *Are alternative load factors available for use in estimation?*

Not applicable.

6. *In cases where an aircraft is owned by a lessor, is respondent able to identify the operating airline?*

No, that information would need to come from the lessor.

7. *In cases where ownership or operational control of an aircraft is transferred during a calendar year, is respondent able to identify the length of ownership or operational control associated with each airline and/or lessor?*

As the ACC uses annual flight hours and cycles information, the calculation would be made on the relevant flight hours and cycles (and so, for an airline, this would be the flight hours and cycles flown by it, and for a lessor, the sum of the flight hours and cycles flown by both airlines during the relevant calendar year).

8. *In cases where an airline is specified, is the respondent able to identify the full set of aircraft operationally linked to the airline (i.e. including subsidiaries)?*

No, the user would need to separately obtain that information. However, once that information is known, the ACC can perform the relevant emissions calculations.

- a. *If so, how is this identification accomplished?*

Not applicable.

- b. *Is not, what additional information would be required from users to enable full-fleet totals to be calculated?*

The user would need to obtain details of all aircraft in the fleet, including flight hours and cycles. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate.

9. *In cases where a lessor is specified, is the respondent able to identify the full set of aircraft owned by that lessor (i.e. including special-purpose vehicles)?*

No, the user would need to separately obtain that information. However, once that information is known, the ACC can perform the relevant emissions calculations.

- a. *If so, how is this identification accomplished?*

Not applicable.

- b. *Is not, what additional information would be required from users to enable full-fleet totals to be calculated?*

The user would need to obtain details of all aircraft in the fleet, including flight hours and cycles. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate.

Data formatting and availability

10. *What input data is required from users for estimates to be produced (i.e., aircraft MSNs/tail numbers, hours, and cycles)? If this differs by data category, please specify for all available data.*

Aircraft model, flight hours, cycles, and whether a degradation factor should apply. Where flight hours and cycles information are unavailable, default utilization data (based on OEM expected usage) can be selected to provide a good approximate. A degradation factor should only apply where there is specific need to include. The aircraft MSN is helpful for naming purposes within the tool, but this is not a requirement.

11. *In what format is output data available? If this differs by data category, please specify for all available data.*

Aircraft and portfolio data are exportable in CSV format, graphical outputs are exportable in JPEG or PNG format, and certificates are exportable in PDF format. As the aircraft and portfolio data is exportable in CSV format it should then be importable into most other systems.

12. *At what point in the calendar year following the reporting year is data available, i.e., in what month of 2023 are annual totals from 2022 able to be calculated?*

Data is available at any time based on the relevant aircraft information (e.g. flight hours and cycles).

Validation

13. *Does respondent wish to provide any accuracy or validation information for any data offerings? If so, please append to this RFI response.*

We do not, as a matter of course, provide accuracy information. However, as ACC data uses OEM source data, it can be considered as highly accurate based on the applicable assumptions. As noted above, where there is legitimate interest in the potential selection of the ACC for use in connection with the CAF framework, we may be able to arrange for representatives of the OEMs to join a call with you to discuss, among other things, the accuracy of the OEM data.

14. *Is respondent willing to provide sample data for a limited example portfolio constructed by RMI, to be used confidentially for internal evaluation? If so, please indicate that RMI should distribute the example portfolio to respondent.*

As noted above, we can provide free access to the ACC to you for a specified period for testing purposes. During this period, you can create an example portfolio within the ACC to generate ACC data outputs for your evaluation.

15. *Is respondent willing to provide a live demonstration of the data tool to RMI, to be performed on a set of test data not provided in advance of the demonstration? If so, please indicate the best way for RMI to schedule a demonstration call.*

Yes, we would be able to provide a live demonstration of the ACC. We can determine an appropriate time for the demonstration on our call.

We look forward to hearing from you. Please do let us know if you require any further information prior to our call. Finally, and given the complexity of the subject, the proprietary nature of the OEM data, and our organizational hurdles, our preference is that we mutually determine whether it is appropriate to advance to more detailed discussions following our call, the live demonstration of the ACC, and your testing of the ACC.

The material contained in this letter is highly confidential. Any disclosure to any third party may harm the interests of the AWG and its members. If you are contemplating disclosing this letter or any information contained in it to a third party, prior written consent should be sought from me at Jeffrey.Wool@awg.aero.

Yours sincerely,



Jeffrey Wool

secretary general
Aviation Working Group