

ATTACHMENT to State letter AN 1/17-09/093

**QUESTIONNAIRE CONCERNING VOLUNTARY ACTIVITY FOR GHG REDUCTION/MITIGATION
IN THE AVIATION SECTOR**

A copy of the questionnaire, in Microsoft Word format, has been posted on the Internet at
<http://www.icao.int/icao/en/env/measures.htm>.

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Q1. Name of the voluntary activity.

SIA Fuel Conservation Committee

Q2. Type¹ of the voluntary activity.

<input checked="" type="checkbox"/> Unilateral commitment <input type="checkbox"/> Public voluntary scheme <input type="checkbox"/> Negotiated agreement <input type="checkbox"/> Other (Please describe the activity in the box below.)
In 2004, a fuel conservation committee within SIA was formed which comprises of stakeholders from Flight Operations, Engineering and In-flight Services which formulates and reviews various fuel conservation initiatives within the airline.

Q3. Please mark all the participants² of the activity.

<input checked="" type="checkbox"/> Airline <input type="checkbox"/> Airline association <input type="checkbox"/> Manufacturer <input type="checkbox"/> Manufacturer association <input type="checkbox"/> Airport authority <input type="checkbox"/> Air traffic control <input type="checkbox"/> Government <input type="checkbox"/> Other (Please specify in the box below.)
Although Singapore ATC may not be a participant in this Committee, SIA Flight Operations worked very closely with them to bring about ATC related changes in making Changi Airport more efficient. SIA is also involved in a joint effort with Singapore ATC and IATA in route restructuring activities over the years at ICAO meetings.

Q4. Is the voluntary activity accompanied by a side agreement³?

<input type="checkbox"/> Yes (Proceed to Q4-1.) <input checked="" type="checkbox"/> No (Proceed to Q5.)

¹The features of each type of voluntary activity are as follows.

- Unilateral Commitment: The environmental improvement plan established by the participant itself, and declared to the stakeholders, such as employees, stockholders, consumers, etc. Target and measures to environmental improvement are established by the participant itself.
- Public Voluntary Scheme: The scheme which the participant agrees voluntarily with the standard on environmental improvement target, technology, management, etc. established by public organization such as Ministry for Environment.
- Negotiated Agreement: Contract based on negotiation between public organization (national government/local government) and industries. Both parties can independently decide whether to agree to the contract.

² If you marked "Public voluntary scheme" on Q2, the public organization which establishes the standard is included in the participants. If you marked "Negotiated agreement" on Q2, the public organization which agrees to the contract is included in the participants.

³ "Side agreement" is the agreement between the participant of the activity and a third party. For example, the agreement between an airline and an engine manufacturer, which prescribes that the manufacturer assist the airline to attain its target by introducing new emission-reducing technologies, is considered as a side agreement. For more information, please refer to Part II Paragraph 6.5.2 on "Template and Guidance on Voluntary Measures", released on ICAO CAEP website (http://www.icao.int/icao/en/env/Caep_Template.pdf).

Q4-1. If the voluntary activity is accompanied by side agreement, please describe the parties and outline the side agreement.

Although there is no specific agreement, SIA works closely with Singapore ATC to bring about efficiency in change airport. This includes trips to other countries to learn how they managed their traffic.

Q5. Please answer the following questions concerning the coverage of the voluntary activity:

Q5-1. Select all green house gases (GHGs) which are part of the voluntary activity.

Carbon dioxide (CO₂)
 Methane (CH₄)
 Nitrous oxide (N₂O)
 Hydrofluorocarbons (HFCs)
 Perfluorocarbons (PFCs)
 Sulphur hexafluoride (SF₆)
 Nitric oxide & Nitrogen dioxide (NO_x)
 Water vapor (H₂O)
 Other (Please specify in the next box.)

Q5-2. Please select all operations⁴ which are part of the voluntary activity.

International passenger flight
 Domestic passenger flight
 International cargo flight
 Domestic cargo flight
 Other (Please specify in the next box.)

Q6. Please answer the following questions concerning the index to measure the effect of the voluntary activity.

Q6-1. Select the index used to measure the effect of the voluntary activity.

Absolute quantity of GHG emissions⁵ (Please outline the index in the box below.)
 Unit of GHG emissions⁶ (Please outline the index in the box below.)
 Introduction of specific technology
 Introduction of specific procedure
 Other (Please specify in the box below.)

1) Absolute CO₂ emissions in million kg
 2) CO₂ per unit of load-tonne-km (kg/LTK)

⁴ In case that the voluntary activity describes its coverage from the other viewpoint than listed above, such as “operation under IFR”, “operation of aircraft larger than specific weight”, etc. and that aim of the activity is not linked to operation directly, for example introduction of new technology which contributes reduction/mitigation of GHGs, please mark “other” and please describe feature.

⁵ The example of the unit is Ton-CO₂, Ton-C, m³-CO₂, etc.

⁶ The example of the unit is g-CO₂/RPK(Revenue Passenger Kilometer), g-CO₂/ASK(Available Seat Kilometer), g-CO₂/RTK(Revenue Ton Kilometer), g-CO₂/ATK (Available Ton Kilometer), etc.

Q6-2. Please outline the procedure to acquire data to calculate or describe the index of Q6-1.

- 1) Fuel Consumption data is extracted from fuel logs and calculated using Method B (under EU ETS MRV guidelines)
- 2) CO₂ emissions is calculated from fuel consumed multiplied by 3.15 CO₂ emission factor (for jet A1)
- 3) For LTK, Payload data (load-tonne) is extracted from SIA Departure Control System and Distance (km) data is extracted from LIDO Flight Planning system

Q7. Please answer the following questions concerning the target of the voluntary activity.

Q7-1. Is the target of the voluntary activity clearly defined?

- Yes (Proceed to Q7-2.) No (Proceed to Q8.)

Q7-2. Please describe the target of the voluntary activity, including substance of the target, target year, base year.

Target is not declared.

Q8. Please list the measures to attain the target or to reduce/mitigate GHGs.

Flight Operations

- Continuous Descent Approach trials at Changi Airport
- ASPIRE flight on LAX-NRT-SIN
- A380 Optimised Departure at LHR
- User Preferred Routing over Pacific Ocean
- Active participation in international arena on route restructuring for more efficient routings
- Enhanced fuel policy e.g. uplift of optimised contingency fuel
- Flight planning procedures for flights to fly more efficient routes when possible & close-in alternates
- NDAP 2 as preferred departure procedures
- Cost Index Cruise
- Low drag profile approach
- Idle reversers after landing
- Active participation in various environmental related taskforce

Aircraft and Engine Improvements

- B777 Performance Improvement Package
- Engine Wash

Aircraft Weight Reduction

- Tailored Water Uplift
- Operation items reduction such as galley carts, pantry and in-flight sales

Airport Operations

- Reducing taxi fuel by assigning gates near to take-off/landing runways
- Optimising fuel uplift based on final zero fuel weight
- Fixed gate electrical and pre-conditioned air supply to reduce APU usage
- In trail separation to reduce separation between departing/arriving aircraft
- Introduction of RNAV SID/STARs at Changi Airport

Q9. Please answer the following questions concerning periodic review of the voluntary activity.

Q9-1. Is the progress of the voluntary activity reviewed periodically?

Yes (Proceed to Q9-2.) No (Proceed to Q10.)

Q9-2. Please describe the frequency of the periodic review.

Twice a year

Q9-3. Is a third party's opinion considered/to be considered in the periodic review?

Yes (Proceed to Q9-4.) No (Proceed to Q10.)

Q9-4. Please outline the third party opinion.

Q10. Please answer the following questions concerning legislative obligation.

Q10-1. Is there any legislative obligation on attainment of the target?

Yes (Proceed to Q10-2.) No (Proceed to Q11.)

Q10-2. Please describe legislative obligation, including measures taken in case that the participant of the voluntary activity fails to attain the target.

Q11. Please answer the following questions concerning disclosure of information⁷ on the voluntary activity:

Q11-1. Is the name of the participant of the voluntary activity disclosed to the public?

Yes No

Q11-2. Is the target of the voluntary activity disclosed to the public? (If you marked "no" at Q7-1, the answer to this question shall be "not applicable".)

Yes No Not applicable

Q11-3. Are the measures taken/to be taken by the participant of the voluntary activity to attain the target/reduce or mitigate GHGs disclosed to the public?

Yes No

Q11-4. Is the result of each periodic review disclosed/to be disclosed to the public? (If you marked "no" at Q9-1, the answer to this question shall be "not applicable".)

Yes No Not applicable

Q11-5. Is the effect of the voluntary activity disclosed/to be disclosed to the public?

Yes No

Q12. Please answer the following questions concerning effect of the voluntary activity:

Q12-1. Is third party's opinion considered/to be considered when examining the effect of the voluntary activity?

Yes (Proceed to Q12-2.) No (Proceed to Q12-3.)

⁷ Item(s) to which the answer is/are "no" from Q11-1 to Q11-5, are considered but this information will not be included in the final report.

Q12-2. Please outline the third party opinion.

Q12-3. How much of GHGs amount emitted per year, in CO₂ weight equivalent are reduced or mitigated/expected to be reduced or mitigated by the voluntary activity?

Since 2005, SIA fuel efficiency measured in LTK per American Gallon (LTK/AG) has improved by 8% in FY 2009/2010. Compared to last year, SIA fuel efficiency has improved by 3.9%.

Q13. Please provide the website address for the voluntary activity, if any, in the box below.

http://www.singaporeair.com/saa/en_UK/content/company_info/responsibility/environment.jsp

Q14. Please describe additional information, if any.

SIA Environment Report:

http://www.singaporeair.com/saa/en_UK/docs/company_info/environment/Report2010.pdf

Duly completed questionnaires should be returned to:

Voluntary Measures Focal Point
ICAO Committee on Aviation Environmental Protection (CAEP)
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