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MAURITIUS ACTION PLAN

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THREE MAIN STAKEHOLDERS

- The Department of Civil Aviation which is the regulatory body and the provider of air navigation services;
- Our National Carrier, Air Mauritius which is the only airline operator in Mauritius; and
- Airports of Mauritius (AML) the licensed aerodrome operator for Sir Seewoosagur Ramgoolam International Airport.





In line with the broad international consensus, the Action Plan sets an aspirational goal to improve fuel efficiency from a 2007-2012 baseline by an average annual rate of at least initially one percent per year until 2020.

To help ensure we reach this goal, the Action Plan identifies three key measures that are expected to have the greatest environmental impact:

- Modernise Airport facilities introducing new taxiways;
- More Efficient Air Operations; and
- Improved Capabilities in Air Traffic Management





We have had the close collaboration of our main stakeholders.

We did encounter some difficulties to finalise the action plan. Our main problem was how to quantify those mitigation measures, how to calculate how much fuel will be saved after implementing each of these eight measures.

E.g. The Airport operator has improved the aerodrome infrastructure with new taxiways but were unable to quantify these measures in terms of fuel savings.





A working group was set up to analyze the measures and with the help of statistics from the Air Traffic Management and a round table involving pilots from National airline with the personnel from ATM, we managed to work out figures regarding fuel efficiency related to respective measures.

We were also assisted by specialists from the Ministry of Environment to assist us regarding specific technical matters.





Measure 1: Construction of a parallel taxiway and additional Taxiways & commissioning of these TWYs.

Measure 2: Pre departure planning Flow management involving adjacent TMA

Measure 3:Continuous Descent App & Continuous Climb Departures

Measure 4: Awareness building among ATM staff





Measure 5: Upgrading avionics capabilities of fleet to meet RNP to fly direct routes.

Measure 6: Introduction of Taxi in on one engine for the ATR aircraft

Measure 7: Operational flight Plans (OFPs) for long flights destination were revisited and optimised routes retained.

Measure 8: Operational flight plans fuel Consumption Review





MEASURE 2

Pre Departure Planning & Flow Management Involving Adjacent TMA





MEASURE 3

Continuous Descent Approach

&

Continuous Climb Departure





CONTINUOUS DESCENT APP & CONTINUOUS CLIMB DEPARTURE

OCEANIC SECTOR FL240-FL460 throughout the FIR

APPROACH SECTOR 3,500- FL245 Approximate radius of 150NM

Control Zone GND - 3,500 feet
Radius of 15 Nm





MEASURE 4

Awareness Building Among ATM Staff





MEASURE 5

Aircraft Related Technology Development





MEASURE 6

Reduce Engine Taxi





MEASURE 7

Rerouting of Operational Flight Plans (OFPs)





MEASURE 8

Operational Flight Plans (OFPs)

Fuel Consumption Review





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SYNERGY

SYNERGY





The Action Plan also highlights that these measures will benefit other international airlines including the overflying trans-oceanic flights connecting South-East Asia to Africa including Australia. Our FIR covers a very vast area where the benefits to many international airlines are really tangible. (E.g. UPR)

The Action Plan is a living document and will be reviewed on a regular basis through:

- Annual reporting on the progress towards achievement of the Action Plan's fuel efficiency target;
- An audit that will occur at least once over; and
- Semi-annual meetings between different stakeholders creating a synergy





Air Mauritius has provided fuel statistics for the past seven years including RTK. Air Mauritius projected growth for the next five years has targeted 4-5% in seat capacity but is subjected to adaptations based on evolution in economic/market conditions.

The expected result has been computed using Method 1 from the ICAO Excel template, by extrapolating the baseline (2007-2012), applying the assumption that the traffic growth forecast for National carrier is 4.5% (Air Mauritius projected growth) and that the intended mitigation measures would initially aggregate to around 1% fuel saving annually.





The preparation of the action plan has resulted in a closer coordination between different stakeholders thus generating a better synergy .

The main stakeholders have realised the importance of this action plan and the associated benefits and have decided that it should be an on-going process to review our course of action through close collaboration and more regular discussions to improve operation efficiency and need to identify future projects such as extending Taxiway Y to the threshold RWY 14 or renewal of fleet among others.





Measure 1: Refleeting of Air Mauritius Aircraft

Measure 2: Restructure of the Air Mauritius
Flight Information Region

Measure 3: Dynamic Flight Plan

Measure 4: Optimised of Aircraft Maintenance-
Engine Wash





Historical data from 2007-2019

ICAO Environmental Benefit Tool (EBT) has been used in developing and forecasting the future baseline fuel consumption. Growth rate 5%

Method B Case 1 from ICAO DOC 9988 has been used.

Domestic Measures

1. Painting of Aircraft Lead-in line/Stop Line for Different Aircraft Type
2. Reduce energy demand and prefer cleaner energy sources
3. Conversion of ground Support Equipment to cleaner fuels
4. Implementation of solar lights at the Airport Car Park Facilities
5. Implementation of a solar Farm at the Airport
6. Installation of LED lights instead of classic lights by Airport Terminal Operations Ltd
7. Replacement or Conversion of all Fresh Air Handling Units into Demand Control Type Units





Refleeting of Air Mauritius Aircraft

Renewal of the National airline fleet, thereby operating a fleet of young technologically advanced aircraft which are more fuel efficient compared to the conventional four engine A340 aircraft

Phase out four engines Airbus A430 replace with A350

Two A330 fitted with a better fuel efficient engine

ICAO DOC 9988 Appendix C to calculate benefits

Annual Improvement in fuel consumption (tonnes) 13,997.59

Annual Reduction in CO₂ Emission (tonnes) 44,232.40





Restructure of Mauritius FIR

1. Introduction of RNP4 as the navigation specification within the oceanic airspace of Mauritius FIR instead of RNP 10
2. Introduction of RNP1 as the navigation specification within the Mauritius TMA
3. Provision of RNP1 SIDs & STARS also introducing CCOs and CDOs

The aim of this airspace review is to enhance Efficiency, Capacity, Interoperability and Safety as well as reduce impact on the ENVIRONMENT

The annual fuel savings have been estimated using the ICAO rule of thumb formula from ICAO Doc 9988 and Air Mauritius estimated fuel savings data

ANNUAL Reduction in CO2 (Tonnes) 2,940





DYNAMIC FLIGHT PLAN

Dynamic Flight Plan and Accuracy of Flight Planning Software

Air Mauritius uses the latest communications means to be able to cater for last minute changes in Zero Fuel Weight .This reduces unnecessary extra fuel carriage for each flight.

The annual fuel savings have been estimated using the ICAO rule of thumb formula from ICAO Doc 9988

For calculation purpose, Air Mauritius estimates an average of 300 kg (0.3 tonnes) weight drop whenever a DFP is issued

Fuel Savings = weight reduction * flight time * 3.87%

ANNUAL Reduction in CO2 (Tonnes) 120)





Optimised Aircraft Maintenance- Engine Wash

Air Mauritius conducts engine wash as per their aircraft maintenance program for engine performance program for engine performance and fuel savings resulting in reduction of CO2 emissions

We have referred to ICAO DOC 9988 Guidance on the Development of States' Action plan on CO2 Emission Reduction Activities Appendix C to estimate the annual fuel savings when performing engine wash as follows:

Engine wash

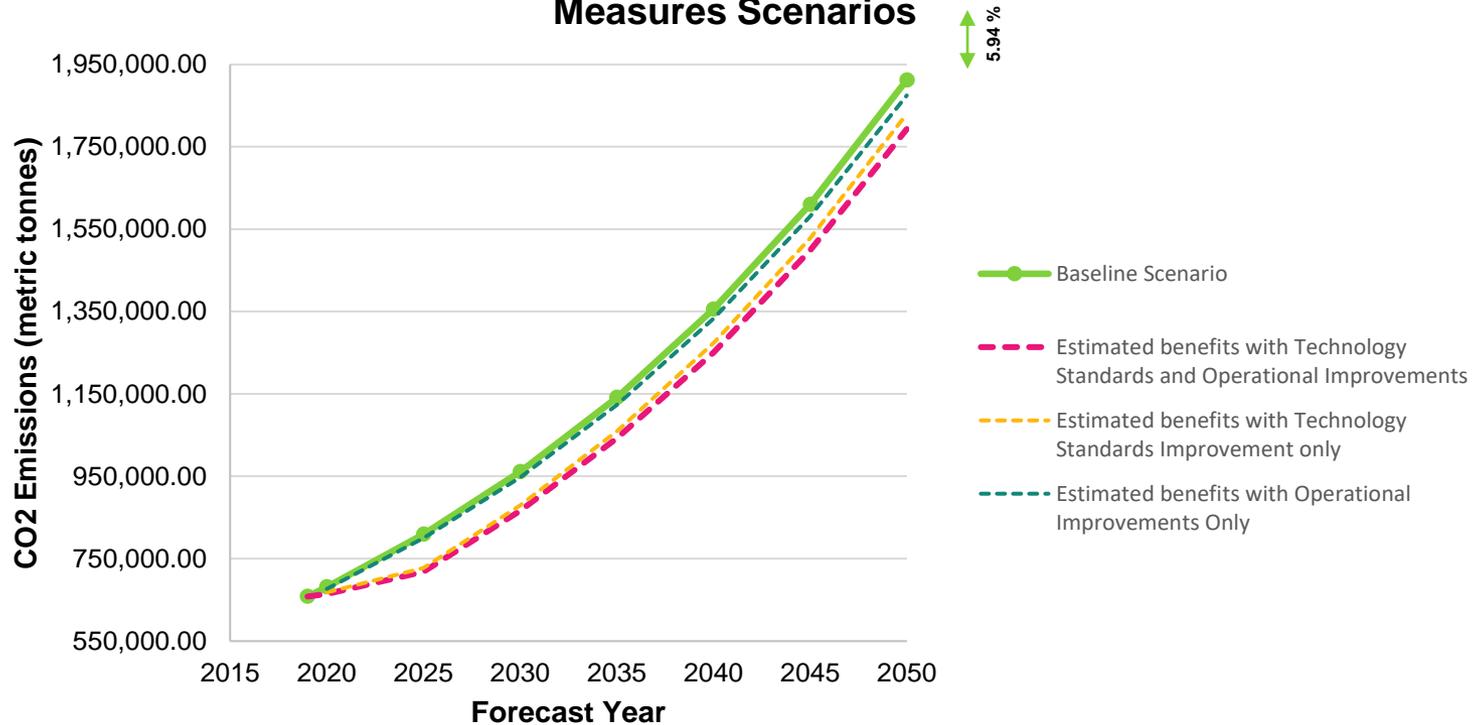
Fuel Savings = [1%] * fuel burn

ANNUAL Reduction in CO2 (Tonnes) 4,550



Forecasted CO2 Emissions Reduction up to 2050

CO2 Emissions Forecast for the Baseline and Implemented Measures Scenarios



Mauritius Mitigation Measures – Expected Action Plan Results

Year	International Fuel (litres)	International CO ₂ emissions – Baseline Scenario (metric tonnes)	Emissions Savings from Technology and Standards (metric tonnes)	Emissions Savings from Operational Improvements (metric tonnes)	Total Emissions Savings (metric tonnes)	Remaining emissions after implementation of measures (metric tonnes)
2014 <i>(historic)</i>	269,670.53	671,878.95				
2015 <i>(historic)</i>	267,153.40	665,820.63				
2016 <i>(historic)</i>	281,632.82	700,792.98				
2017 <i>(historic)</i>	292,090.32	727,604.45				
2018 <i>(historic)</i>	292,850.92	728,781.38				
2019 <i>(historic)</i>	264,456.36	658,236.88				
2020 <i>(forecast)</i>	269,492.03	681,275.85	12,951.21	4,582.89	17,534.10	663,741.75
2025 <i>(forecast)</i>	320,073.58	809,146.01	82,170.07	9,238.93	91,409.00	717,737.01
2030 <i>(forecast)</i>	380,148.90	961,016.41	82,170.07	11,791.47	93,961.54	867,054.87
2035 <i>(forecast)</i>	451,499.88	1,141,391.69	82,170.07	15,049.24	97,219.31	1,044,172.38
2040 <i>(forecast)</i>	536,242.89	1,355,622.01	82,170.07	19,207.07	101,377.14	1,254,244.87
2045 <i>(forecast)</i>	636,891.49	1,610,061.69	82,170.07	24,513.63	106,683.70	1,503,377.99
2050 <i>(forecast)</i>	756,431.06	1,912,257.72	82,170.07	31,286.29	113,456.36	1,798,801.36





The impact of improved aircraft technology standards indicate an overall 4.30% reduction of fuel consumption and CO₂ emissions in 2050 compared to the baseline scenario. Operational improvement measures will lead to a reduction of CO₂ emissions of around 1.64% by 2050. Overall CO₂ emissions, including the effects of new aircraft technology standards and operational improvement measures, are projected to improve to lead to a 5.94% reduction in 2050 compared to the baseline.





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THANK YOU

