



Action Plan on the Reduction of Greenhouse Gas Emissions from International Aviation in Mozambique



ICAO



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TECHNICAL SPECIFICATIONS

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Organisation: Maura Laice and Almira Nhabinde

Contributors: IACM, LAM, MEX, Mozambique Airports, MITADER

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Civil Aviation Authority of Mozambique

Maputo City

Mozambique

Alameda do Aeroporto, Maputo, Caixa Postal 227

Tel: (+ 258) 21 46 89 00/ 21 46 89 00 Fax : (+258) 21 46 54 14

Cel: (+ 258) 82 30 21 250/ 70

E – mail: iacm@tv.co.mz

Web: www.iacm.gov.mz

FOREWORD

Recognising that climate change represents an urgent and potentially irreversible threat to human societies and to the planet, requiring, therefore, the widest cooperation of all sectors to curb greenhouse gas (GHG) emissions, Mozambique has adopted several legal measures and instruments since 1994, when the Ministry for the Cooperation of Environmental Action was created. Aligned with this purpose, Mozambique has ratified the United Nations Framework Convention on Climate Change, through Resolution 1/94, from August 24th 1994.

In this sense, this Action Plan on the Reduction of Greenhouse Gas Emissions from the International Aviation shows that the civil aviation sector in Mozambique has been active and is in the correct path to promote and to enforce best practices related to environmental sustainability, aimed at reducing GHG emissions.

This document consolidates the set of actions and measures taken by the different stakeholders in the civil aviation sector as part of the country's efforts to follow the guidelines enshrined in the Paris Agreement.

Likewise, this document is also part of Mozambique's commitment to the guidelines and goals set forward by the International Civil Aviation Organisation, also known as ICAO.

ABBREVIATIONS

APU - Auxiliary Power Unit CH_4 - Methane

CO_2 - Carbon Dioxide

CO_2e - Carbon Dioxide equivalent

COP - Conference of the Parties to the UNFCCC

CORSIA - Carbon Offsetting and Reduction Scheme for International Aviation

GHG - Greenhouse Gases

GPS - Global Positioning System - navigation system based on satellites

GPU - Ground Power Unit

HFCs - Hydrofluorocarbons

IACM - Civil Aviation Authority of Mozambique

IPCC - Intergovernmental Panel on Climate Change

N_2O - Nitrous Oxide

ICAO - International Civil Aviation Organisation

SDO - Sustainable Development Objectives

UN - United Nations

OSA - Operational Safety Assessment

GWP - Global Warming Potential

BPS - Biofuel Policy and Strategy

PFCs - Perfluorocarbons

RNAV - Area Navigation

RNP - Required Navigation Performance SF_6 - Sulphur Hexafluoride

UNFCCC - United Nations Framework Convention on Climate Change

INTRODUCTION

The Republic of Mozambique is committed to the reduction of GHG emissions, not only in the transport sector (civil aviation), but also in other sectors, such as agriculture and forestry. For this purpose, several legal instruments were adopted to regulate the activities that result in GHG emissions. This Action Plan on the Reduction of Greenhouse Gas Emissions in the International Aviation consolidates the initiatives from the civil aviation sector of Mozambique to curb its emissions.

The Republic of Mozambique has been a Contracting State of ICAO since 1977 and ratified the Chicago Convention in 2008, by Resolution 63/2008 from 28th November 2008.

The Chicago Convention establishes the rights and obligations to all the Contracting States and provides Standards and Recommended Practices – SARPs related to the safety, security, regularity and efficiency of air navigation.

Environmental protection is also a part of ICAO's agenda and was defined as a strategic objective of the organization. In this context, since the 1970's, ICAO has taken actions to minimize adverse environmental effect of civil aviation activities and has published volumes of Annex 16 to the Chicago Convention, namely:

- Volume I, which contains the SARPS for noise certification of aircraft as well as international specifications, relating to the measurement and methods of assessment of aircraft noises;
- Volume II contains the SARPs for the certification of aircraft engine noise;
- Volume III deals with the emission of carbon dioxide (CO₂) by aircraft;
- Volume IV establishes the requirements for the implementation of CORSIA.

ICAO has also defined the following strategic objective related to environmental protection, and in consistency with the UN system environmental protection policies and practices:

- Minimize the adverse environmental effects of civil aviation activities.

In 2004, ICAO has also established three major environmental goals:

- a. limit or reduce the number of people affected by significant aircraft noise;
- b. limit or reduce the impact of aviation emissions on local air quality; and
- c. limit or reduce the impact of aviation greenhouse gas emissions on the global climate.

In this context, the Contracting states must ensure the enforcement of the standards, norms and procedures related to environmental protection, according to the applicable legislation, as well as to protect the environment in the vicinities of aeronautical infrastructures.

The civil aviation authorities of each ICAO Contracting State have the responsibility of establishing the domestic regulatory framework for curbing emissions of pollutants from the civil aviation sector and for the certification of noise levels.

This Action Plan has thus the following goals:

- To act in conformity with the objectives contained in the ICAO Resolution A38-18;
- To reduce the CO₂ emissions coming from the international civil aviation;
- To evaluate the initiatives and precautionary measures taken by regional operators;
- To ensure that regional operators act in conformity with the civil aviation regulations.

CHAPTER I – GENERAL CONTEXT OF THE CIVIL AVIATION IN MOZAMBIQUE

1.1. CONTINENTAL LEGAL FRAMEWORK.

- Resolution number 24/2016.

The Republic of Mozambique ratified the Constitution of the African Civil Aviation Commission, signed in Dakar, in Senegal, on 16th December 2009. The Resolution aims to coordinate and integrate policies regarding the social and economic development of Africa, in particular in the area of civil aviation, to contribute for the development of safe and orderly air transport services from and to Africa, as well as to allow that the country's rules comply with international regulations.

The objectives of the Constitution of the African Commission of Civil Aviation are as follows:

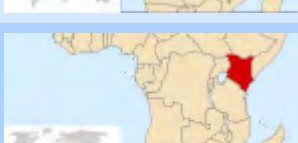
- To coordinate civil aviation matters in Africa and to cooperate with ICAO and with other organisations and relevant bodies involved in the promotion and development of civil aviation in Africa;
- To facilitate, coordinate and ensure the effective implementation of the Yamoussoukro Decision through the oversight and management of the African liberalised air transport industry.
- To formulate and enforce appropriate standards and regulations which provide fair and equal opportunities to all stakeholders and promote an equitable and fair competitive environment.
- To promote the understanding about political matters between Member States and States of other parts of the world.

1.1.1. MEMBERS OF THE AFRICAN CIVIL AVIATION COMMISSION.

	Name	Flag	Capital	Area (km ²)	Population	Map
1	South Africa (Republic of South Africa)		Pretoria (executive) Bloemfontein (judiciary) Cape Town (legislative)	1 221 037	48 375 645	
2	Angola (Republic of Angola)		Luanda	1 246 700	19 088 106	
3	Algeria (People's Democratic Republic of Algeria)		Argel	2 381 741	38 813 722	
4	Benin (Republic of Benin)		Porto-Novo	112 622	10 160 556	
5	Botswana (Republic of Botswana)		Gaborone	582 000	2 155 784	
6	Burkina Faso		Ouagadougou	272 967	18 365 123	
7	Burundi (Republic of Burundi)		Bujumbura	27 834	10 395 931	
8	Cape Verde (Republic of Cape Verde)		Praia	4 033	538 535	
9	Cameroon (Republic of Cameroon)		Yaoundé	475 442	23 130 708	

	Name	Flag	Capital	Area (km ²)	Population	Map
10	Chad (Republic of Chad)		N'Djamena	1 284 000	11 412 107	
11	Comoros (Union of Comoros)		Moroni	1 862	766 865	
12	Côte d'Ivoire (Republic of Côte d'Ivoire)		Yamoussoukro (constitutional) Abidjan (headquarters of the Government)	322 463	22 848 945	
13	Djibouti (Republic of Djibouti)		Djibouti	23 200	810 179	
14	Egypt (Arabic Republic of Egypt)		Cairo	1 002 450	86 895 099	
15	Eritrea (State of Eritrea)		Asmara	117 600	6 380 803	
16	Ethiopia (Federal Democratic Republic of Ethiopia)		Addis Ababa	1 104 300	96 633 458	
17	Gabon (Republic of Gabon)		Libreville	267 668	1 672 597	
18	Gambia (Islamic Republic of The Gambia)		Banjul	11 295	1 925 527	
19	Ghana (Republic of Ghana)		Accra	238 533	25 758 108	

	Name	Flag	Capital	Area (km ²)	Population	Map
20	Guiné (Republic of Guiné)		Conakry	245 857	11 474 383	
21	Guiné-Bissau (Republic of Guiné-Bissau)		Bissau	36 125	1 693 398	
22	Equatorial Guinea (Republic of Equatorial Guinea)		Malabo	28 051	722 254	
23	Lesotho (Kingdom of Lesotho)		Maseru	30 355	1 942 008	
24	Liberia (Republic of Liberia)		Monrovia	111 369	4 092 310	
25	Libya (State of Libya)		Tripoli	1 759 540	6 244 174	
26	Madagascar (Republic of Madagascar)		Antananarivo	587 041	23 201 926	
27	Malawi (Republic of Malawi)		Lilongwe	118 484	17 377 468	
28	Mali (Republic of Mali)		Bamako	1 240 192	16 455 903	
29	Morocco (Kingdom of Morocco)		Rabat	446 550	32 987 206	

	Name	Flag	Capital	Area (km ²)	Population	Map
30	Mauritius (Republic of Mauritius)		Port Louis	2 040	1 331 155	
31	Mauritania (Islamic Republic of Mauritania)		Nouakchott	1 030 700	3 516 806	
32	Mozambique (Republic of Mozambique)		Maputo	801 590	26 692 144	
33	Namibia (Republic of Namibia)		Windhoek	825 616	2 198 406	
34	Niger (Republic of Niger)		Niamey	1 267 000	17 466 172	
35	Nigeria (Federal Republic of Nigeria)		Abuja	923 768	177 155 754	
36	Kenya (Republic of Kenya)		Nairobi	580 367	45 010 056	
37	Central African Republic		Bangui	622 984	5 277 959	
38	Democratic Republic of Congo		Kinshasa	2 344 858	77 433 744	
39	Republic of Congo		Brazzaville	342 000	4 662 446	

	Name	Flag	Capital	Area (km ²)	Population	Map
40	Rwanda (Republic of Rwanda)		Kigali	26 338	12 337 138	
41	São Tomé and Príncipe (Democratic Republic of São Tomé and Príncipe)		São Tomé	964	190 428	
42	Senegal (Republic of Senegal)		Dakar	196 722	13 635 927	
43	Sierra Leone (Republic of Sierra Leone)		Freetown	71 740	5 743 725	
44	Seychelles (Republic of Seychelles)		Victoria ^[note 40]	452	91 650	
45	Somalia (Federal Republic of Somalia)		Mogadishu ^[note 41]	637 657	10 428 043	
46	Swaziland (Kingdom of Swaziland)		Lobamba (royal and legislative) Mbabane (administrative)	17 364	1 419 623	
47	Sudan (Republic of Sudan)		Khartoum	1 886 068	35 482 233	
48	South Sudan (Republic of South Sudan)		Juba	619 745	11 562 695	
49	Tanzania (United Republic of Tanzania)		Dar es Salaam (administrative) Dodoma	945 087	49 639 138	

	Name	Flag	Capital	Area (km ²)	Population	Map
50	Togo (Republic of Togo)		Lomé	56 785	7 351 374	
51	Tunisia (Republic of Tunisia)		Tunis	163 610	10 937 521	
52	Uganda (Republic of Uganda)		Kampala	241 550	35 918 915	
53	Zambia (Republic of Zambia)		Lusaka	752 612	14 638 505	
54	Zimbabwe (Republic of Zimbabwe)		Harare	390 757	13 771 721	

1.2 NATIONAL LEGAL FRAMEWORK.

Mozambique has taken important and significant steps in the development and approval of a legal framework on the environmental protection. In addition to the strengthening of the constitutional regime, to the approval of policies and strategies and to the adoption of the main international instruments related to the environment, there is amongst us a rather updated Environment Act, a remarkable effort to set forward regulation on this issue. It should also be mentioned the inclusion of environmental aspects in the legislation that deals with economic activities, such as transport, including air transport, currently regulated by the Institute of Civil Aviation of Mozambique (IACM).

Environmental protection has become a central issue in the national political scene and it constitutes one of the crosscutting areas of the main programmatic instrument of the Mozambican Government – the Five-Year Plan. Currently, Mozambique has a legal framework which can be considered updated, comprehensive and diverse, focusing on varied aspects in the environmental area.

This legal framework is fundamentally based on the Constitution of the Republic of Mozambique (dated 2004), on the Environment Act (Law number 20/97, from 1st October, 1997), and on the respective regulations, approved by a Decree of the Council of Ministers.

1.2.1 THE CONSTITUTION OF THE REPUBLIC OF MOZAMBIQUE.

The Constitution, first and foremost, promotes the environment to the category of a fundamental legal asset of the community, alongside with other traditional assets, such as life, physical integrity, human freedoms, amongst others. The constitutional protection of the environment was significantly reinforced in Article 117 of the Constitutional Act of 2004, as well as in conformity with Article 90 of the same Act, which not only stressed the fundamental right of every citizen to a balanced environment, but also establishes their respective duty to protect it.

The protection of the environment is a duty from both – the State and each member of our society. In this sense, it is possible, for instance, to file a popular motion in order to protect the collective rights of people, amongst them the environmental protection. Finally, it is worthy mentioning that sustainable development is a enshrined principle in Mozambique's Constitution.

1.2.2 THE ENVIRONMENT ACT.

The Environment Act establishes the pillars of the legal protection regime related to the environment. According to the respective Article 2, the objective of the Act “is to define the legal bases for the correct use and management of the environment and its components, aimed at promoting the sustainable development system in the country”. In this context, article 9 provides for the prohibition of pollution, expressly foreseeing that “it is not allowed, in the national territory, the production, disposal in the soil and underground, throwing to the water or to the atmosphere, of any toxic and polluting substance as well as the practice of activities which accelerate erosion, desertification, deforestation or any other way of degradation of the environment, beyond the legally established limits”.

1.2.3 BIOFUEL POLICY AND STRATEGY – BPS.

The BPS was approved by Resolution Number 22/2009 of 21st May. It is a legal instrument that defines the policies and measures aimed at providing general guidelines for the production, consumption and commercialisation of biofuels in the country. The vision of BPS is to contribute for energy security and sustainable socio-economic development of the country. Its guiding principles are inclusiveness, transparency, environmental and social protection, gradualism, tax sustainability and innovation.

1.2.4 CIVIL AVIATION ACT - ACT NUMBER 5/2016.

According to the provision of Article 1, the objective of the Civil Aviation Act is to “define the bases and the general principles to be followed and enforced in the area of civil aviation in order to ensure security, regularity, competitiveness and efficiency of air transport operations”. By this Act, the Civil Aviation Authority of Mozambique was created as the Institute of Civil Aviation of Mozambique – IACM.

1.3. INSTITUTIONAL FRAMEWORK OF CIVIL AVIATION IN MOZAMBIQUE.

1.3.1. INSTITUTE OF CIVIL AVIATION OF MOZAMBIQUE (IACM).



IACM is an autonomous entity responsible for regulating civil aviation in Mozambique. The Institute plays the role of technical and economic regulator of civil aviation, defining and enforcing policies, overseeing the sector, enforcing the national norms and the recommendations of ICAO. It is also responsible for the certification of aeronautical infrastructures, the issuance of aeronautical and para-aeronautical licences and the authorization for the use of helicopters.

1.3.1.1. MISSION.

As a regulatory and oversight authority, it promotes the establishment and maintenance of secure and safe conditions for undertaking the activities of civil aviation in a sustainable, sound and competitive environment in the interest of service users and suppliers.

1.3.1.2. VISION.

To be an effective organisation in the promotion of security and safety in aeronautical service, creating a culture of service quality and promoting the sustainable development of civil aviation.

1.3.1.3. DUTIES.

IACM is responsible for regulating the civil aviation in conformity with the Mozambican laws, with the provisions of the Chicago as well as in accordance with the conventions, agreements, treaties and protocols signed by the Republic of Mozambique. IACM is also in charge of the regulation, oversight and inspection of the civil aviation activities, and it also enforces compliance to the law and rules.

The competencies of IACM are essentially focused on the following areas:

- Aeronautical and para-aeronautical personnel;
- Flight equipment and material;
- Flight operations;
- Air transport;
- Aeronautical infrastructures and support to air navigation services;
- Structuring and management of air space;
- Organisation of aircraft maintenance;
- Training institutions of aeronautical and para-aeronautical personnel.

1.3.2. MOZAMBIQUE AIRLINES – LAM.



The Mozambique Airlines – LAM was created on 14th May 1980, by Decree number 8, and it has taken on all the rights and obligations resulting from acts undertaken or signed by its predecessor, DETA - *Direcção de Exploração do Transporte Aéreo* - which had been in operations since 1936.

CURRENT STRUCTURE.

LAM was transformed into a Limited Shareholder Company, adopting the designation of LAM – *Linhas Aéreas de Moçambique* or Mozambique Airlines, by Decree number 69/98, of 23rd December 1998.

The State owns 91% of the shares of the new company, and the management, technical staff and workers of LAM own the remaining 9% of the shares.

1.3.2.1. MOÇAMBIQUE EXPRESSO – MEX.



Moçambique Expresso - SARL is headquartered in Maputo, Mozambique. It runs domestic and regional regulated and chartered services. Its main basis is the Maputo International Airport. The air company was created in September 1995 as a Department of Special Operations of LAM, Mozambique Airlines. It started the operations and became Moçambique Expresso in 1995 as an independent air company. Currently, it is fully owned by LAM.

1.3.3. MOZAMBIQUE AIRPORTS.



AEROPORTOS DE MOÇAMBIQUE, E.P.

Mozambique Airports, E.P., also known as ADM EP, is a Mozambican public-owned company responsible for the management of the country's airports and aerodromes. It is headquartered in Maputo.

The first service created specifically to manage aeronautical infrastructures was the *Serviços de Aeronáutica Civil* (SAC), on 11th May 1954. After the national independence, the National Directorate of Civil Aviation was created, in 1976, with the objective to coordinate the Mozambican civil aviation.

A thorough reorganisation of the sector led to the foundation, on 1st November 1980, of the *Empresa Nacional dos Aeroportos de Moçambique E.E. (Empresa Estatal)* or National Company of Mozambique Airports E.E. (State Enterprise). Its statute was transformed from a state enterprise into a public-owned enterprise, and the designation changed to the current one, on 10th February 1998.

Table 1 - Airports in Mozambique

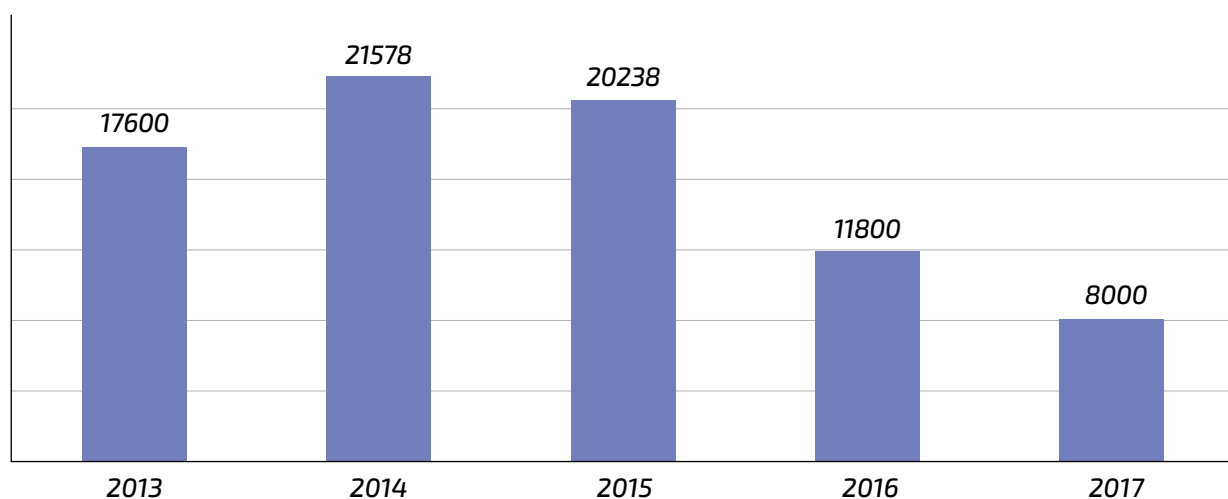
Maputo Airport	Pemba Airport (Mozambique)	Inhambane Airport
Nampula Airport	Quelimane Airport	Nacala Airport
Beira Airport	Chimoio Airport	Lichinga Airport
Tete Matunda Airport	Vilanculos Airport	

CHAPTER II – HISTORICAL SECTOR EMISSIONS DATA

2.1. INTERNATIONAL RTK FROM NATIONAL AIR CARRIERS.

Figure 1 shows the volume of passengers and cargo transported regionally by national operators in RTK terms. There was a significant increase in 2014, but after that year, there was a gradual decrease in the country's RTK. The year of 2017 is certainly the one with the lowest volume of passengers transported by national operators in regional flights.¹

Figure 1 - Mozambique RTK.



Source: ICAO RTK

2.2. FUEL CONSUMPTION FROM INTERNATIONAL OPERATIONS AND CO₂ EMISSIONS.

According to the information in Figure 2, which shows the international fuel consumption from international air operations, we can see an increase in the consumption from 2013 to 2014 and, Afterwards, there was a slight fall in 2015, becoming more sharply from 2016 to 2017, reflecting the decrease in the country's RTK in the same period.

¹ não veio texto da referência.

Figure 2 - International fuel consumption

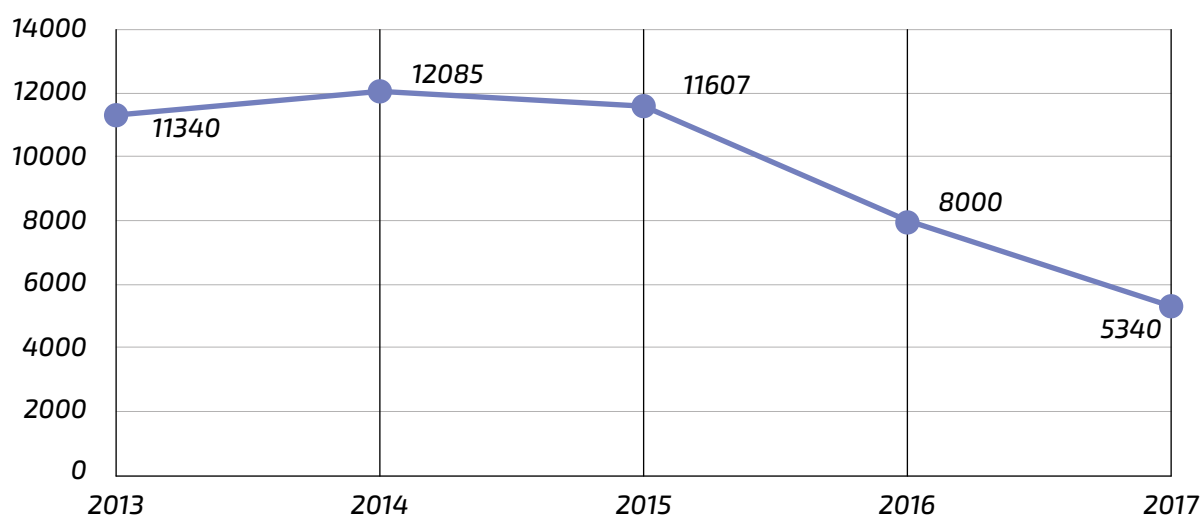
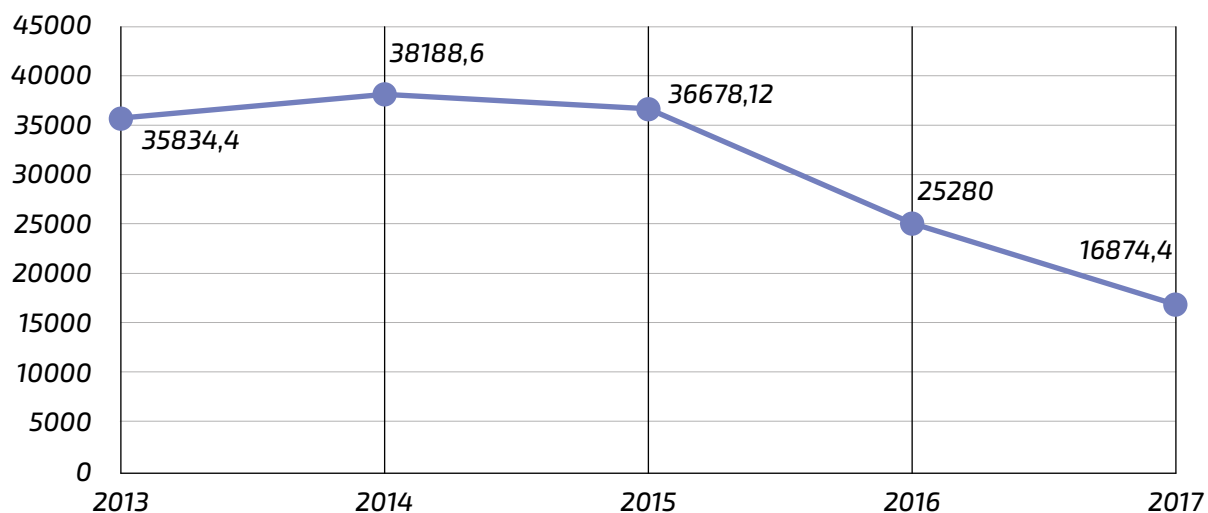


Figure 3 presents the CO₂ emissions in the period from 2013 to 2017. Accordingly to the applied methodology, the calculation of the CO₂ emissions has taken into account the fuel conversion factor of 3.16 (in Kg CO₂/Kg fuel).

Figure 3 - CO₂ Emissions



CHAPTER III –ACTION PLAN

3.1. BASKET OF MITIGATION MEASURES FOR THE SECTORIAL EMISSIONS IN MOZAMBIQUE.

The mitigation measures chosen for the reduction of CO₂ emissions of the international aviation in Mozambique are focused on two of the categories employed by ICAO:

1. Improved Air Traffic Management (ATM) and infrastructure use;
2. More efficient operations.

More detailed information of the basket of measures chosen by Mozambique is available on Appendice 1 of the Action Plan.

a) IMPROVED AIR TRAFFIC MANAGEMENT (ATM) AND INFRASTRUCTURE USE.

The Mozambique Airports is currently implementing the PBN of taking-off and approach procedures (PBN SID/STAR). The PBN en-route implementation has already been initiated, a process that should be completed in 2030. Although there are not enough data to estimate the reduction of CO₂ emissions resulting from this measure, it is expected that the PBN en-route implementation contributes significantly for the reduction of fuel consumption by national and foreign companies that operate in the country.

In addition, the air company called MEX is adopting measures to improve the optimum use of the long-distance cruising flight level, allowing the reduction of fuel consumption.

The measure related to the improvement in airports refers to the installation of fixed ground power units (GPU) which will allow the APU (Auxiliary Power Unit) disconnection of the aircraft during boarding processes of passengers. The measure will be implemented at Pemba International Airport and must contribute in a significant way, in individual terms, to the reduction of CO₂ emissions proposed in this Action Plan.

b) MORE EFFICIENT OPERATIONS.

Measures aimed at more efficient operations will be implemented by air companies of Mozambique, and are mainly relating to the reduction of weight on board of aircraft, cleaning of engines and of the aircraft and the use of only one engine during the taxing of aircraft.

3.2. BASELINE EMISSIONS FROM INTERNATIONAL AVIATION.

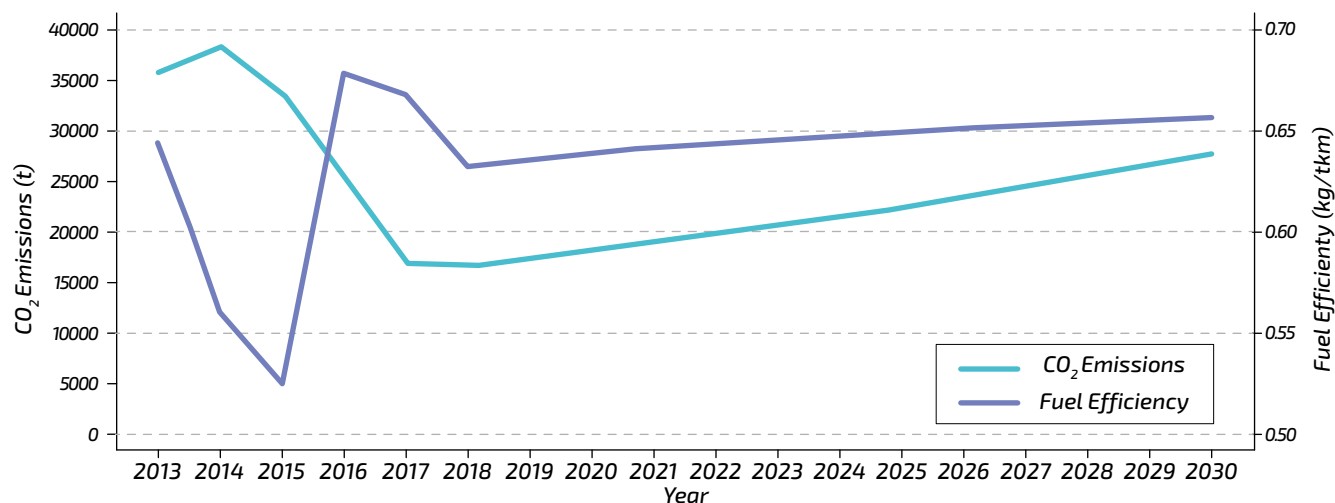
The baseline CO₂ emissions by 2030 is described in *Table 2* and in *Figure 4*. According to those results, in the absence of mitigation measures, the CO₂ emissions from international aviation will decrease from 35,834 tonnes of CO₂ (tCO₂) in 2013 to 27,634 tCO₂ in 2030. According to this baseline scenario, in the absence of any mitigation measure, the CO₂ emissions from international aviation are likely to increase in Mozambique, albeit slightly, in the years of 2018 to 2030.

Table 2 –Baseline 2013-2030

Year	BASELINE			
	International RTK (ICAO)	Fuel burn	International CO ₂ emissions (Kg) ²	Fuel efficiency
2013	17.600.699	11.340.00	35.834.40	0.644
2014	21.578.464	12.085.00	38.188.60	0.560
2015	20.238.929	10.607.00	33.518.12	0.524
2016	11.800.000	08.000.00	25.280.00	0.678
2017	08.000.000	05.340.00	16.874.40	0.668
2018	08.320.000	05.264,81	16.636.81	0.633
2019	08.652.800	05.504.20	17.393.28	0.636
2020	08.998.910	05.750.31	18.170.98	0.639
2021	09.358.870	06.004.12	18.973.02	0.642
2022	09.733.220	06.266.43	19.801.90	0.644
2023	10.122.550	06.537.91	20.659,80	0.646
2024	10.527.450	06.819.20	21.548.68	0.648
2025	10.948.550	07.110.89	22.470.41	0.649
2026	11.386.490	07.413.54	23.426.79	0.651
2027	11.841.950	07.727.72	24.419.60	0.653
2028	12.315.630	08.053.99	25.450.61	0.654
2029	12.808.260	08.392.91	26.521.61	0.655
2030	13.320.590	08.745.07	27.634.41	0.657

*Data processed by ICAO EBT.

Figure 4 – Baseline by 2030



3.3. EXPECTED RESULTS.

The implementation of mitigation measures selected by Mozambique must result in an average reduction of 628 tCO₂ emissions per year.

For the quantification and estimative of reduction of CO₂ emissions, the ICAO Environmental Benefit Tool (EBT) was used. Some of the measures relating to the implementation of the performance-based navigation (PBN) were not estimated in terms of the reduction of CO₂ and, thus, were not included in the results. Nevertheless, those measures are part of this Action Plan.

In the baseline scenario, the annual improvement of fuel efficiency was 0.13%. With the implementation of the proposed measures, it is expected that the annual improvement index of fuel efficiency grows to 0.34%.

The expected results are described in *Table 3*. *Figure 5* foresees a representation of the results confronted with the reduction of CO₂ emissions and improvement of the expected fuel efficiency in comparison to the baseline scenario.

Table 3 – Expected results

Year	International RTK (ICAO)	EXPECTED RESULTS		
		Consumption of international fuel after the mitigation measures	International CO ₂ emissions (Kg)	Annual saving of CO ₂ (Tonnes)
2013	17.600.699	11.340.00	35.834.40	-
2014	21.578.464	12.085.00	38.188.60	-
2015	20.238.929	10.607.00	33.518.12	-
2016	11.800.000	08.000.00	25.280.00	-
2017	08.000.000	05.340.00	16.874.40	-
2018	08.320.000	05.166.09	16.324.85	311,96
2019	08.652.800	05.287.05	16.707.07	686,20
2020	08.998.910	05.529.53	17.473.33	697,65
2021	09.358.870	05.782.28	18.272.00	701,02
2022	09.733.220	06.043.48	19.097.40	704,50
2023	10.122.550	06.313.83	19.951.69	708,11
2024	10.527.450	06.593.94	20.836.84	711,84
2025	10.948.550	06.884.40	21.754.70	715,71
2026	11.386.490	07.185.78	22.707.07	719,73
2027	11.841.950	07.498.64	23.695.70	723,90
2028	12.315.630	08.823.54	24.722.38	728,23
2029	12.808.260	08.161.04	25.788.88	732,73
2030	13.320.590	08.511.71	26.897.01	737,40

Figure 5 – Expected results from the baseline

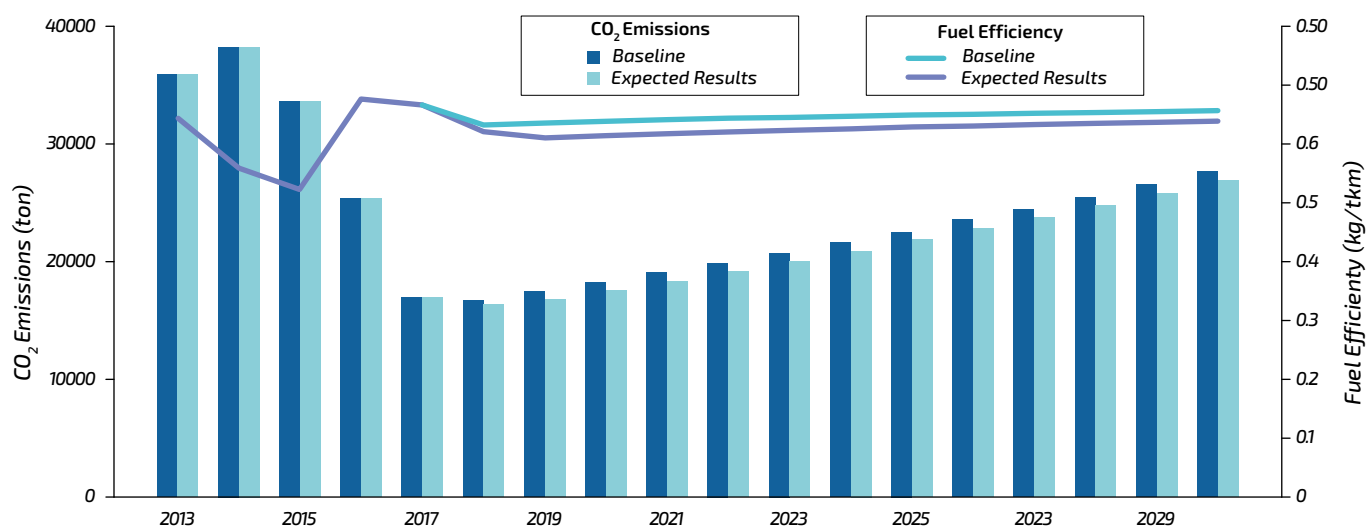
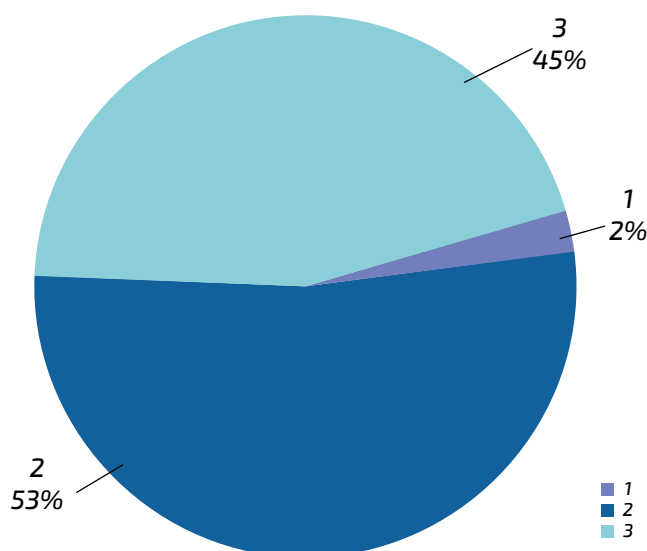


Table 4 – Participation of each type of measure in the reduction of CO₂ emissions

	Number of measures	Expected results (tCO ₂ /year)	Expected results (%)
Measures 1 (ATM)	2	5	02.3%
Measures 2 (Operations)	3	119.25	52.9%
Measures 3 (Airports)	1	101.12	44.8%
Total	6	225.37	100%

Figure 6 – Expected reduction of CO₂ emissions from international aviation



According to the data generated from the EBT, we expect that approximately 225,37 tonnes of CO₂ will be mitigated per year as a result from the implementation of the measures foreseen in the basket of measures chosen by Mozambique.

CONCLUSION

The elaboration of the Mozambique Action Plan on the Reduction of Greenhouse Gas Emissions from the International Aviation constitutes a unique opportunity to the country. The global efforts undertaken so far, and the commitments made by the Parties to the Paris Agreement represent a qualitative step towards the improvement of the quality of our ecosystems, not only at national and regional levels, but also worldwide.

The present Action Plan had the direct collaboration of national operators whose activities encompass the regional and the international air transport, as it is the case of **LAM** - Mozambique Airlines and **MEX** - Moçambique Expresso SARL. The data were collected by the Civil Aviation Authority of Mozambique (IACM) in accordance with the methodology provided by ICAO to estimate the amount of CO₂ emissions generated by the air transport sector.

In this framework, IACM is committed to follow and to promote, in coordination with other appropriate institutions, the implementation of the measures set forth in this document. The results are to be achieved in the medium and long terms, without compromising the development of the aviation activities in the country.

The Mozambican Government recognises the importance of the various tools and guidelines endorsed by ICAO, which will promote the harmonisation in the mitigation measures adopted by Member States to mitigate the GHG emissions from the civil aviation sector. We, as ICAO member States, must take on this challenge and successfully and effectively implement the measures that will lead us to the sustainable development of air transport.

TECHNICAL TEAM

João Martins de Abreu: Representative of the Authority of Civil Aviation of Mozambique

Maura Laice and Almira Nhabinde: Collaborators and Environment and CORSIA Focal Points
- IACM

Manuel Vieira: Collaborators of Mozambique Airports

Sonia de Almeida, Yasser Alibhay and Jean Mujisha: Collaborators of LAM

Helder Domingos: Collaborator of MEXnbn

Measure	Description	Start date	Completion date	Expected results (tCO ₂ reduced/year)	Stakeholder
Improved Air Traffic Management (ATM) and infrastructure use					
Measures to fully utilize navigation capabilities	Implementation of en-route PBN.	2010	2030	To be defined.	Aeroportos de Moçambique E.P.
Measures to improve the use of optimum flight levels	Option for the Long-Range Cruise.	2019	2019	5	MEX
More efficient operations					
Minimising weight	Reduction of weight on-board (i.e. Electronic flight bag, checked luggage).	2019/2020	2019/2020	2019 – 11,300 From 2020 – 13,89	LAM and MEX
Single engine taxi	Engine Out – Taxi In Engine Out – Taxi Out	2019	2019	76,61	MEX
Engine wash	Although this measure is already in place, it will be extended to all the aircraft.	2019	2019	28,97 (on average)	LAM and MEX
Aircraft wash	Periodic washing of engines and aircraft.	2018	2019	To be defined.	LAM and MEX
Airport infrastructure					
Installation of fixed electrical ground power and pre-conditioned air to allow aircraft APU switch-off	Reduced APU use.	2019	2019	101,12	LAM, MEX and Aeroportos de Moçambique E.P.

