



## ACTION PLAN FOR CO<sub>2</sub> EMISSION REDUCTION FROM INTERNATIONAL CIVIL AVIATION IN CABO VERDE



**MARCH 2022**

This State Action Plan was developed under the *Second Phase of the ICAO Assistance Project - Capacity Building for CO<sub>2</sub> Mitigation from International Aviation – Development of ICAO States' Action Plans for 10 States.*



ICAO



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## ACRONYMS

AAC	Civil Aviation Authority
AIAC	Aeroporto Internacional Amílcar Cabral
AICE	Aeroporto Internacional Cesária Évora
AIPNM	Aeroporto Internacional da Praia, Nelson Mandela
AP	Action Plan
ASA	Airport Manager and Air Navigation Service Provider
ATC	Air Traffic Control
ATM	Air Traffic Management
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CNS	Communication, Navigation and Surveillance
CO2	Carbon dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CVH	Cabo Verde Handling
DNA	Direction of Air Navigation
EU	European Union
FIR	Flight Information Region
IATA	International Air Transport Association
ICAO	International Civil Aviation Authorization
NAPT	National Action Plan Team
PBN	Performance Based Navigation
RNP	Required Navigation Performance
SAF	Sustainable Aviation Fuel
TACV	Transporte Aéreo de Cabo Verde
TMA	Terminal Control Area

## ACKNOWLEDGEMENTS

The Cabo Verde Civil Aviation Agency (AAC) acknowledges technical, and strategic support of the International Civil Aviation Organization (ICAO) in the frame of the ICAO Assistance project “Capacity Building for CO2 Mitigation from International Aviation - Development of ICAO States' Action Plans for 10 States” with European Union Funding. This assistance from ICAO has been essential at every stage of the development of the State Action Plan on CO2 Emissions Reduction, including the training provided to the personnel, the support for the National Action Plan Team meetings, the establishment of the baseline, and the identification of innovative mitigation measures for a sustainable aviation in Cabo Verde.

We would also like to thank all the members of the national action plan team, **Arlindo Borja, Armando Veiga, Alécia Branco, Francisco Martins, Ariel Assunção, Alécia Pires, Ester Brito, Alexandre Rodrigues, and Carlos Monteiro** in charges of developing the action plan for CO2 emission reduction for the aviation sector in Cabo Verde, to contribute with ICAO, to the target for the reduction of CO2 emissions from international aviation.

## ABOUT THE SECOND PHASE OF THE ICAO CAPACITY BUILDING PROJECT

With the goal of assisting States in their efforts to mitigate CO2 emissions from international aviation, and to ensure that all States have the capacity required to develop their Action Plans and implement mitigation measures, ICAO launched in 2013 the first phase of the Assistance Project Capacity building for CO2 mitigation from international aviation, in partnership with the European Union (EU). The project successfully supported 14 States in Africa and the Caribbean, and met all its expected results, exceeding the initial targets by its completion in 2019.

Building on this successful partnership, ICAO initiated the second Phase of its Assistance Project with the European Union funding. The Project seeks to contribute to the mitigation of CO2 emissions from international civil aviation in the selected States by implementing capacity building activities to support the development of low carbon air transport and environmental sustainability. The EU’s overall Action under this second phase involves three Areas of Activities, with ICAO responsible for Area of Activity 1, funded at 1.5 million, and focusing on the Preparation and/or update and implementation of ICAO’s State Actions Plans.

Since 2020, ICAO has officially kicked off the implementation of the Second Phase entitled “Capacity Building for CO2 Mitigation from International Aviation-Development of ICAO States’ Action Plans for 10 States”, planned to be carried out until October 2023, and providing support to five States from the Eastern and Southern African Region (Botswana, Madagascar, Rwanda, Seychelles and Zimbabwe), and five from the Western and Central African Region (Benin, Cabo Verde, Côte d'Ivoire, Mali, and Senegal).

For more information, visit

[https://www.icao.int/environmental-protection/Pages/ICAO\\_EU\\_II.aspx](https://www.icao.int/environmental-protection/Pages/ICAO_EU_II.aspx)

## **I. Executive summary**

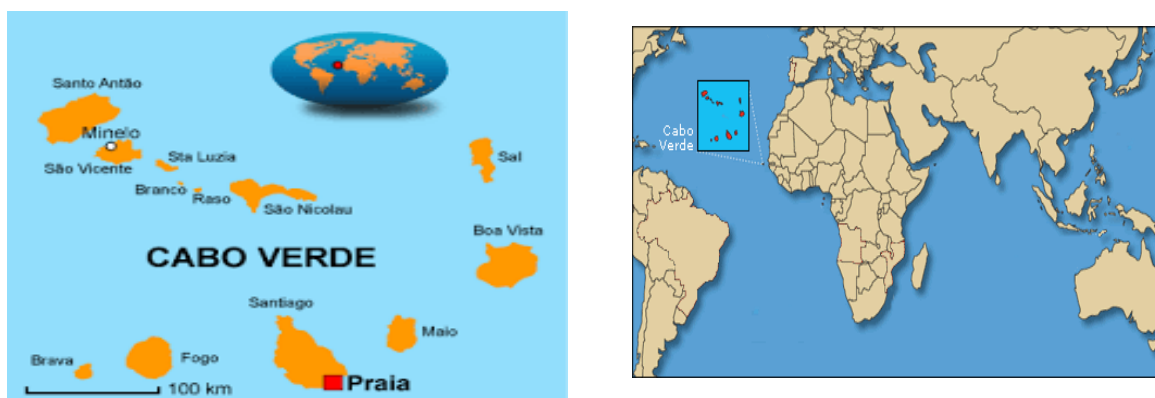
The present document "**Cabo Verde's Action Plan for CO2 emissions reduction from international aviation** " was prepared in accordance with Resolution A40-18 of the Assembly of the International Civil Aviation Organization (ICAO), "Consolidated statement of ICAO's continuing policies and practices related to environmental protection Environment - Climate Change" and contains the five sections set out in Document 9988 "Guidance on the development of action plans for CO2 emission reduction activities" developed by ICAO, for States to contribute through their action plans to the global goals of international civil aviation to protect the environment.

This plan includes a geographical overview of Cabo Verde and its civil aviation system, and also describes the five (05) steps in the development of the Action Plan, including:

- The action plan development team;
- The baseline scenario calculation process;
- The selected mitigation measures;
- The results obtained from the mitigation measures;
- The identification of assistance needs.

## II. Introduction

Cabo Verde is an island country formed by ten volcanic islands in the central Atlantic Ocean. At about 570 kilometers off the coast of West Africa, the islands cover a total area of over 4000 Km<sup>2</sup>. Discovered by Diego Gomes in 1460 at the service of the Portuguese crown. Diego Gomes found these islands uninhabited and with no evidence of any human presence or activity, having become a Portuguese colony until 1975, when the State gained its independence. Official language is the Portuguese language, but the national language of the country, the so-called people's language is Cabo Verdean Creole, which is different on each of the country's islands.



**Figure 1** – Cabo Verde geographical location

Located in the sub-Saharan zone, with an arid or semi-arid climate. The Canary Current moderates the temperature. The annual average is rarely above 25 ° C and does not drop below 20 ° C. The seawater temperature varies between 21 ° C in February and 25 ° C in September. The seasons are fundamentally two: "as-águas" (rain) and "as-secas" (drought) or "time of breezes".

It is an archipelago state with an underdeveloped economy, and which suffers from a lack of alternative resources and population growth. The main economic means are agriculture, the archipelago's marine wealth, the services provision (which corresponds to 80 percent of the gross domestic product) and, more recently, tourism (which has gained increasing relevance). The main tourist islands are Sal Island and Boa Vista Island.

With a total population of approximately 532 thousand inhabitants, mostly young, many Cabo Verdeans see emigration as a way of seeking a better life. It can be said that the Cabo Verdean diaspora is larger than the country's own population and the sending of remittances is considered a major boost to its economy.

## III. Overview of the national civil aviation sector

### Brief history of the regulator

With the independence of Cabo Verde, the political organization of the State was promoted, and several services were created, of which the General Directorate of Civil Aviation (DGAC) through Decree No. 5-E / 75 of 23 July. This service organized the civil aviation sector in Cabo Verde and published more than forty diplomas, of which the first version of the Aeronautical Code stands out.



In June 2001, pursuant to Decree-Law no. 14/2001 and Resolution no. 41/2001 of 12 July, the DGAC was ended, and the Civil Aeronautics Institute (IAC) created, with a business character, clearly indicating a paradigm shift in how aviation came to be seen by the country's governance, foreseeing a period of change and growth, with the forecast of an increase in the tourism sector and the expansion of the airport network.

Thus, in 2004 the Government decided to transform the IAC into the current Civil Aviation Agency by publishing Decree-Law No. 28/2004 of July 12, amended by Decree-Law No. 47/2019, of October 28, as the regulatory body of the national civil aviation sector, with the objective of performing the administrative activity of technical and economic regulation, supervision, and regulation of the civil aviation sector.

### National overview of air transport activity

In 2019, 26 air operators operate in Cabo Verde on regular commercial flight and charter commercial flights, among which 24 were foreign air operators and 2 were national air operators. The traffic data collected this year showed that there were 35,202 aircraft movements at national airports.

The national air operator, TACV operated with 2 aircraft B757 (D4-CCF and D4-CCG) in the international flight operations and TICV operated with 3 ATR72 aircraft (D4-CCA, D4-CCB and D4-CCD) on domestic routes.

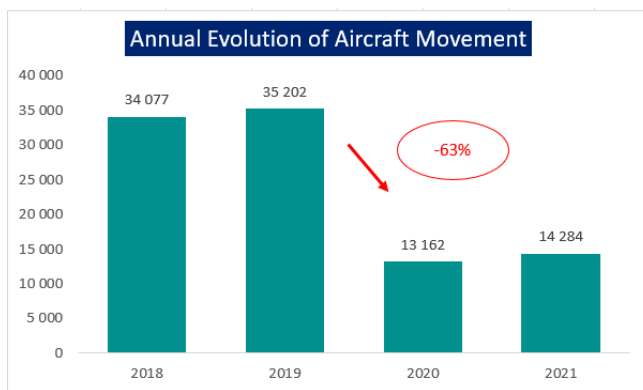
The following list shows the foreign air carriers on the scheduled and non-scheduled (Charter) international air operations in Cabo Verde in 2019:

Nº	Airline	Nacional Airport			
		Sal (AIAC)	Praia (AIPNM)	Boa Vista (AIAP)	São Vicente (AICE)
1	TAP (Portugal)JJ	X	X	X	X
2	Luxair (Lexemburgo) JJ	X		X	
3	Royal Air Maroc (Marocos)JJ		X		
4	Tui Belgium (Bélgica)JJ	X		X	
5	TUI Flight X3 (Germany) JJ	X		X	
6	Tui (Nederland) JJ	X		X	
7	Privilege Style (Spain) CC	X			
8	Neos (Itália)JJ	X			
9	Enter Air (Poland) CC	X		X	
10	Sata (Portugal) JJ e CC	X	X		
11	Air Senegal (Senegal)JJ		X		
12	Transavia (France)JJ e CC	X		X	
13	Smartwings (Checa) CC	X		X	
14	Corendon (Nederland) CC	X			
15	Tui Airways Thomson (Reino Unido)JJ	X		X	
16	Transair (Senegal) JJ		X		
17	Blu Panorama (Italy)JJ	X			
18	Air Tanker (Reino Unido)JJ	X			

19	Brussels Airlines JJ	X			
20	Thomas Cook Airlines Scandinavia CC	X			
21	Tui Nordic Sweden (Sweden) CC	X		X	
22	Binter Canarias (Spain) JJ	X			
23	ASL Airlines France (France) CC	X		X	
24	TAAG (Angola) JJ	X			
jj-scheduled, cc-charter					

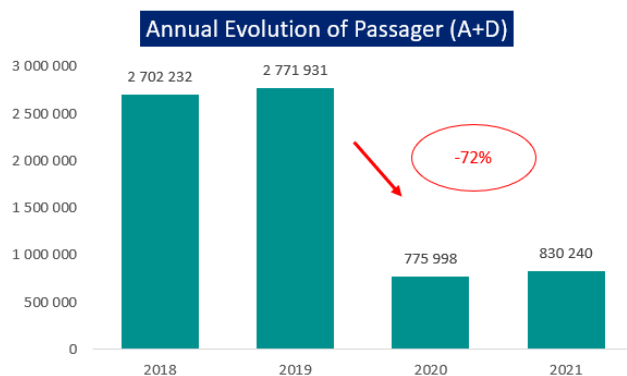
In recent years it can be considered that there was a trend of increasing movement of air transport activity in Cabo Verde, associated with the increase in tourism movement until the year 2019. This trend had a sharp drop in the year 2020 as a consequence of the COVID-19 pandemic.

The following data shows the total evolution of international and domestic air traffic movements at national airports in the last 4 years, from 2018 to 2021.



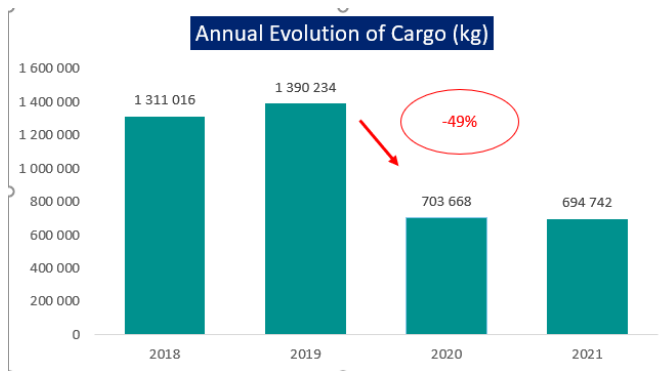
The following graph shows the total of movement of aircraft at national airports in the last 4 years and shows a 63% decrease corresponding to 13,162 aircraft in the year 2020

**Figure 2** – Total Annual Evolution of Aircraft movement



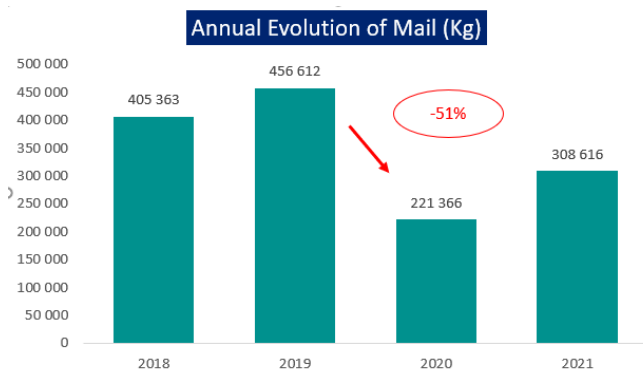
The following graph shows the total passenger traffic (international and domestic) at airport in the last 4 years and shows a 72% decrease relative to 2019, corresponding 775,998 passengers circulating through all national airports in the year 2020.

**Figure 3** – Total Annual Evolution of passengers



**Figure 4 – Total Annual Evolution of cargo**

Regarding the evolution of cargo movement in all national airports in the last 3 years, it shows a decrease of 49% compared to 2019, corresponding to 703,668 kg of transported cargo in the year 2020.



**Figure 5 – Total Annual Evolution of mail**

In relation to the total evolution of mail movement in all national airports in the last 3 years, it indicates a decrease of 51% compared to the year 2019, with total mail transported in 2020 estimated at 221,366 kg

#### IV. Development of the action plan

The State Action Plans (SAP) for the Reduction of CO2 emissions from international aviation is one of the International Civil Aviation Organization (ICAO) initiatives in favor of selecting and implementing measures to mitigate the impact of the civil aviation sector on climate change.

According to Resolution A 40-18, action plans should include information on activities aimed at reducing CO2 emissions from international aviation, including national actions and activities implemented at regional or global level as a result of bilateral and / or multilateral regional agreements.

Therefore, for the preparation of this action plan, the following five elements were considered:

- i. Focal point information and contact and working group
- ii. Baseline: Baseline (without measures) of fuel consumption, CO2 emissions and traffic. The fuel consumption figures, and the 2019 Annual International Aviation 2019 must be presented
- iii. Measures to mitigate CO2 emissions. The selection of measures to mitigate CO2 emissions and improve fuel efficiency
- iv. Estimation of the expected results of the selected measures; and
- v. Need for assistance. The identification of any assistance necessary for the preparation and / or implementation of the plan.

### National Action Plan Team

The National Action Plan Team (ENPA) was established by the Government of Cabo Verde Resolution N° 72/2021 of July 14 (**annex 1**) and has the following attributions

- ✓ Develop the CO2 reduction action plan in the triennium 2021-2023 in accordance with the ICAO guidelines established in Document 9988;
- ✓ Coordinate the definition of policies and activities related to the CO2 emission reduction action plan;
- ✓ Submit to ICAO the action plan by June 30<sup>th</sup> 2022;
- ✓ Evaluate the effective implementation of policies, guidelines and recommendations defined within the scope of the CO2 emission reduction action plan

According to article 3 of the Government Resolution, the team is formed by the following members:



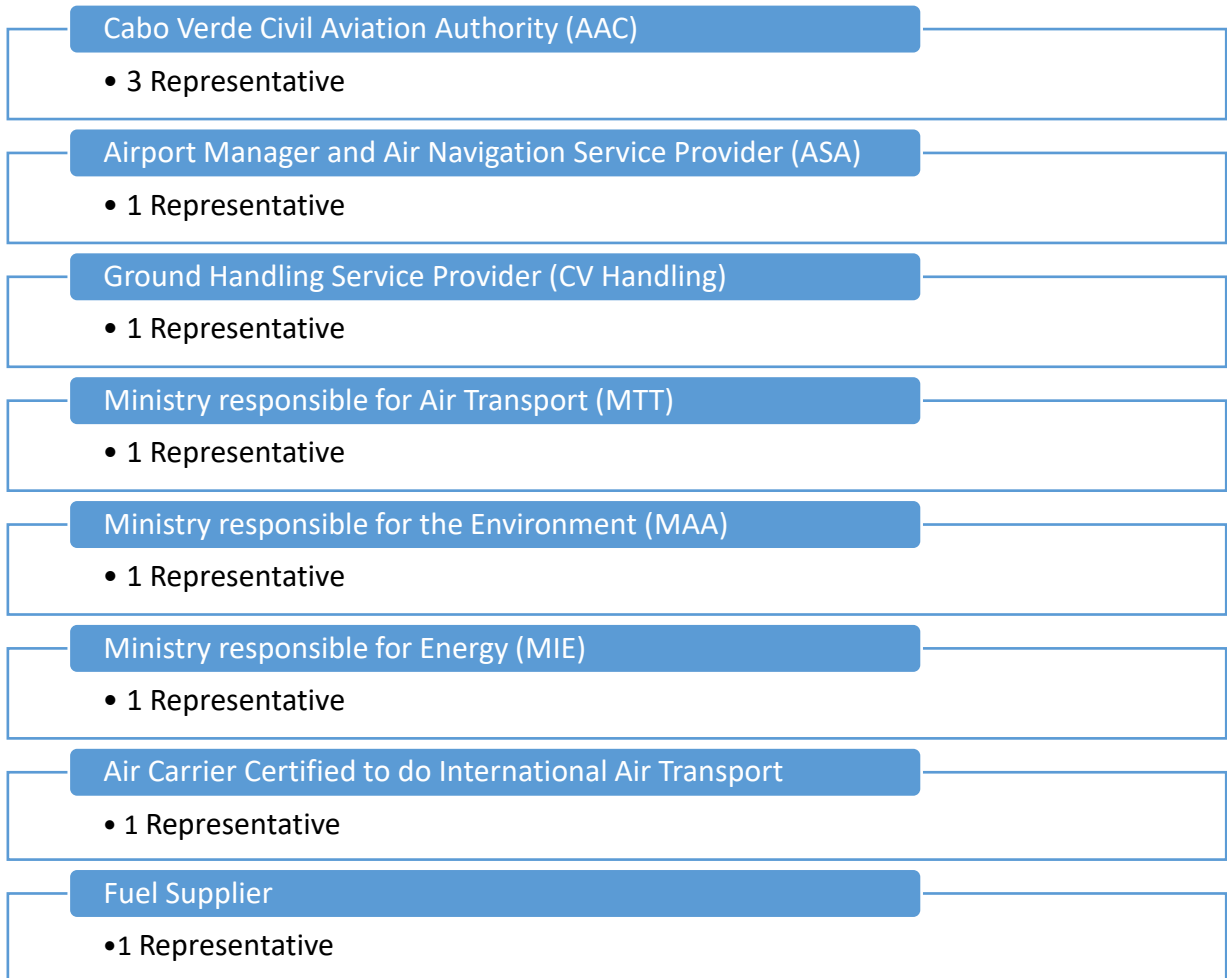


Figure 7 – National Action Plan Team

**Cabo Verde Civil Aviation Authority**

The Civil Aviation Agency (AAC) is the regulatory body for the national civil aviation sector, created by Decree-Law No. 28/2004, of 12 July, amended by Decree-Law No. 47/2019, of 28 October, with the purpose of performing administrative activities of technical and economic regulation, supervision and regulation of the civil aviation sector. It is an independent administrative authority, with an institutional base, endowed with its own legal personality, organs, services, personnel and assets and with administrative and financial autonomy.

AAC is independent in the performance of its functions and is not subject to superintendence or tutelage with regard to its regulatory functions, with the exception of the powers attributed to the Government in matters of political and management guidelines provided by law.

AAC's competence are defined in Decree-Law No. 47/2019 of 27 October, as follows:

- The competence of Economic Regulation;
- The competence of Technical Regulation;
- Supervisory competence;

- Regulatory competence;
- Operational Safety competence;
- Civil Aviation Security competence against Acts of Unlawful Interference and Facilitation of Air Transport;
- The competence of Representation of the Civil Aviation Sector;
- Sanctionary competence;
- Consultative competence;
- The competence over the Commercial Relationship of the operators;
- Competence in competition matters.

In terms of environment, AAC's competence is to contribute to the progressive improvement of technical, economic and environmental conditions in the sector, stimulating, namely, the adoption of practices that promote the efficient use of assets and the existence of adequate standards of service quality and environmental protection.

### **Airport Manager and Air Navigation Service Provider**

The **National Airport and Air Safety Company**, abbreviated as **ASA**, created with the objective of efficiently managing the country's airports and aerodromes and the Flight Information Region (Oceanic FIR) of Sal.

ASA's activity is centered on two lines of business, which are Air Navigation services and Airport Management. The Air Navigation services are provided mainly from the Ocean Control Center on the island of Sal, and the airport network comprises 4 international airports and 3 aerodromes.

ASA mission is to efficiently manage the country's airports and aerodromes and the Flight Information Region (FIR) of Sal, and to contribute to the modernization of the air transport system and the archipelago's economic, social, and cultural development, connecting Cabo Verde to the world.

The international airports are:



Amílcar Cabral International Airport (AIAC)



Praia Nelson Mandela International Airports (AIPNM)



Cesária Évora International Airport (AICE)



Aristides Pereira International Airport (AIAP)

The aerodromes are:

Aerodromes of São Filipe, Fogo Island



Aerodromes of Preguiça, São Nicolau Island

Aerodromes of Maio Island



### **Ministry responsible for air transport**

The Ministry of Tourism and Transportation pursues attributions in matters of tourism policies, air transport, air safety and postal communications.

The Minister of Tourism and Transportation proposes and executes, in articulation with the Minister of Foreign Affairs, Cooperation and Regional Integration, policy measures, actions and programs for planning and managing Cabo Verde's relations with all specialized bodies in the areas of its intervention.

The Minister of Tourism and Transportation, without prejudice to the powers conferred by law to the Council of Ministers and the Minister of Finance, directs, superintends, guides and establishes relations with the services, institutes, public companies and independent administrative authorities with attributions in the areas under the terms of their respective organic structure.

The Minister of Tourism and Transportation shall endeavor to create the administrative and logistical conditions for the Ministry of Tourism and Transportation to be installed in Sal Island, in agreement with the Minister of Finance and Business Development.

The Ministry of Tourism and Transports supervises, manages, oversees and co-responds the following decentralized services, Public Institutes, autonomous funds and public enterprises:

- National Tourism Council;
- Office of Special Tourism Zones Management;
- Office of Tourism Development;
- Institute of Tourism of Cabo Verde;
- Institute for the Prevention and Investigation of Air and Maritime Accidents;
- Social and Tourism Sustainability Fund;
- General Inspection of Games;
- Postal Services of Cabo Verde;
- Air Transport of Cabo Verde (TACV);
- Airports and Security Air;
- Cabo Verde Handling;

### **Ministry responsible for the environment**

The Ministry of Agriculture and Environment is the government department whose mission is to design, coordinate, control, execute and evaluate the specific policies defined by the Government for the sectors of agriculture, forestry, livestock, agro-industry, food safety, environment, water and sanitation, as well as public policies for the agrarian economy, environment and climate change.

Its competencies are defined in the Decree-Law n° 57/2021 of September 29, of which we highlight the following:

- Define, formulate and implement policy guidelines on the environment and climate in close collaboration with the collegial bodies established exclusively for this purpose;
- Propose, disseminate, and ensure the effective implementation of legislative, regulatory, and administrative measures relative to the sectors of its competence
- Define and ensure the implementation of public policies regarding the sustainable use and conservation of natural resources, including water, soil, biodiversity and geodiversity;
- Promote environmental citizenship;



- Participate in the definition of policies of preservation and management of risks and natural disasters and others in the areas of its competence;
- Promote and develop mitigation and adaptation policies to climate change and to strengthen the resilience of sectors and communities;
- Ensure the implementation and dissemination of international principles, agreements and conventions regarding agro-silvo-pastoral production, plant and animal protection, food systems, environment, water and climate, among others.

#### **Ministry responsible for energy**

The Ministry of Industry, Commerce and Energy (MICE) is the government department in charge of designing, proposing, coordinating, executing and evaluating government public policies in the fields of industrial, commercial and energy infrastructure, quality management, intellectual property protection, industrial property rights, the trade system and network, renewable energy and desalination.

The National Directorate of Industry, Commerce and Energy (DNICE) is the service responsible for the design, implementation and evaluation of the energy, industrial and commercial policy, as well as the presentation of proposals aimed at growth, improvement and increased productivity and competitiveness of the sector.

The National Directorate for Industry, Trade and Energy is made up of three services: Industry Service, Trade Service and the Energy Service. The Energy Service Directorate is responsible for the design, implementation and evaluation of energy policy (electricity and fuel sectors) and desalination, as well as the presentation of proposals aimed at growth, improvement and increased productivity and competitiveness of the sector. It also makes the technical regulation, has the responsibility for the sector's planning and for the formulation, monitoring of strategic projects of the sector.

#### **Fuel suppliers**

In the Energy sector, the country has 2 operators that hold a concession granted by the State of Cabo Verde, the operators provide the public service related to import, storage, distribution and commercialization of hydrocarbons for both domestic and international levels. The operators are:

- VIVO ENERGY;
- ENACOL;

#### **Cabo Verde Handling**

Cabo Verde Handling, hereinafter referred to as CV Handling, is a company in the form of sole proprietorship company, created in May 2014, resulting from the spin-off process of the handling activity, previously under the responsibility of the Land Operations Department of Air Transport of Cabo Verde - TACV SA.

CV Handling's main purpose is to provide ground-handling services to Airlines, on their stopovers at airports and aerodromes in the country and has its Headquarters on Sal Island, where the largest center of activity is located. Installed on 7 (Seven) islands, CV Handling's structure is present throughout the country's airport network, organized as follows:

- 4 (Four) International airports, in Sal (SID Scale), Praia (RAI Scale), S. Vicente (VXE Scale) and Boavista (BVC Scale).

- 3 (Three) aerodromes, in S. Nicolau (SNE Scale), in Maio (MMO Scale) and Fogo (FL Scale).

The company's mission is to guarantee passengers and aircraft that their flight experience begins and ends with a ground assistance service of quality and excellence, underlining the confidence in the national air transport industry and airport assistance.

## V. Baseline for CO<sub>2</sub> emissions from international aviation

### ✓ Data collection

The data collected and presented in the State Action Plan were obtained through the ASA CSV file that includes traffic information for all airports in Cabo Verde.

The CSV files are sent to AAC for the purpose of analysis and production of statistical information of the air transport sector published on the AAC website (<https://www.aac.cv/dash>)

The team opted to use only historical traffic data for 2019 from foreign operators departing from airports in Cabo Verde for estimated the baseline scenario.

Due to lack of data and uncertainty regarding the start of operations of national carrier after the CODIV-19 pandemic, the team has decided to use data from the foreign air operator for the baseline calculation.

### ✓ Calculation method

Cabo Verde 's baseline scenario was estimated based on the IPCC methodology provided in ICAO Doc 9988 in which each State reports the CO<sub>2</sub> emissions from the international flights departing from all aerodromes located in the State or its territories (State of Origin).

- Time horizon selected: 2019-2050.
- Method selected from the EBT Tool for the baseline estimation: Method C.
- RTK growth rate assumption: 4% per annum.
- The baseline is estimated through the year 2019 and the data used for the baseline estimation is provided on the Table below:

Year	International RTK	International Fuel Burn (tons)	International CO <sub>2</sub> emissions (t)	Efficiency	Number of type of Aircraft
2019	329,537	89,822	283,839	0.27	15

It was defined as the baseline for CO<sub>2</sub> emissions in international aviation the evolution of CO<sub>2</sub> emissions from international aviation from 2019 to 2050 in the absence of actions (business as usual).

### ✓ Results

The baseline obtained for CO<sub>2</sub> emissions is shown in the table and graphs in Table 1 Baseline and Figure 8 Baseline for CO<sub>2</sub> Emissions from International Aviation respectively. According to these results, without the mitigation measures, CO<sub>2</sub> emissions

from aviation will grow from 283,839,004 kilograms of CO<sub>2</sub> (Kg) in 2019 to 957,426,827 kg in 2050, which represents a 70% increase in thirty-one years.

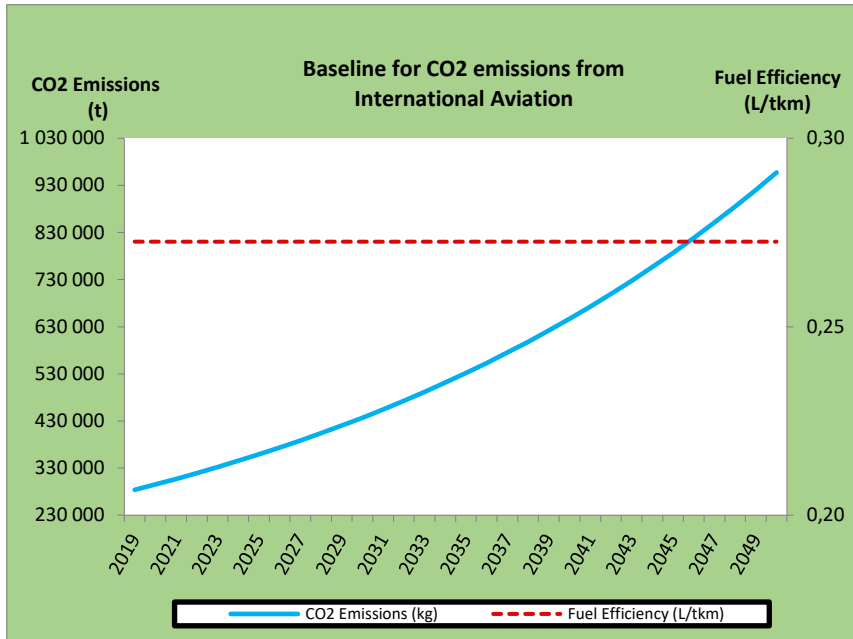


Figure 8- Baseline for CO2emission from international aviation

Table 1 – Baseline

BASELINE				
Year	International RTK ('000)	International Fuel burn (t)	International CO2 emissions (t)	Fuel efficiency
2019	329,537.59	89,822.47	283,839	0.27
2020	342,718.48	93,414.88	295,191	0.27
2021	356,427.22	97,151.48	306,999	0.27
2022	370,684.31	101,037.53	319,279	0.27
2023	385,511.68	105,079.04	332,050	0.27
2024	400,932.15	109,282.20	345,332	0.27
2025	416,969.43	113,653.48	359,145	0.27
2026	433,648.21	118,199.62	373,511	0.27
2027	450,994.14	122,927.61	388,451	0.27
2028	469,033.90	127,844.71	403,989	0.27
2029	487,795.26	132,958.50	420,149	0.27
2030	507,307.07	138,276.84	436,955	0.27
2031	527,599.35	143,807.92	454,433	0.27
2032	548,703.33	149,560.23	472,610	0.27
2033	570,651.46	155,542.64	491,515	0.27
2034	593,477.52	161,764.35	511,175	0.27
2035	617,216.62	168,234.92	531,622	0.27
2036	641,905.29	174,964.32	552,887	0.27
2037	667,581.50	181,962.89	575,003	0.27

2038	694,284.76	189,241.41	598,003	0.27
2039	722,056.15	196,811.06	621,923	0.27
2040	750,938.39	204,683.51	646,800	0.27
2041	780,975.93	212,870.85	672,672	0.27
2042	812,214.97	221,385.68	699,579	0.27
2043	844,703.56	230,241.11	727,562	0.27
2044	878,491.71	239,450.75	756,664	0.27
2045	913,631.38	249,028.78	786,931	0.27
2046	950,176.63	258,989.93	818,408	0.27
2047	988,183.70	269,349.53	851,145	0.27
2048	1,027,711.04	280,123.51	885,190	0.27
2049	1,068,819.49	291,328.45	920,598	0.27
2050	1,111,572.26	302,981.59	957,422	0.27

## VI. Cabo Verde's Mitigation Measures

This section explores the mitigation measures identified in Cabo Verde to reduce CO<sub>2</sub> emissions from international aviation. It first provides an overview of the national clean energy ambitions and landscape in the State that could be leveraged to support the transition to a sustainable aviation. It further presents the measures quantified in this Action Plan. The selected mitigation measures are described in more detail in Annex.

### i) Overview of the energy and climate ambitions in Cabo Verde

To promote clean and affordable energy, Cabo Verde seeks to achieve a penetration rate for renewable energy of 50% by 2030, with a phased-in implementation schedule. Achieving that target would require new solar and wind farm projects. With an average annual wind speed exceeding 9.0 m/s, Cabo Verde presents reliable wind resources that could be harnessed to produce renewable energy for the airports and to power aircraft for international flights.

Some new technologies integrating electricity generation and desalination systems can be examined in Cabo Verde, providing co-benefits for access to both energy and water. Many coastal communities in the country still have limited access to clean drinking water. Desalination systems require electricity and can be run at times when the wind turbines are operating, and electricity demand is low. Additionally, the desalinated freshwater can be pumped into a high-elevation reservoir and used for energy. When demand peaks the water flows back down, spinning hydro turbines and generating electricity in the process.

As for biofuels, around the world, significant progress has been made in the production and use of Sustainable Aviation Fuels. These opportunities have not been sufficiently explored in Cabo Verde to date. At the national level, major agricultural crops include maize and beans, sugar cane, cassava, sweet potato, bananas and coffee. The State is finalizing its National Plan for Bioenergy and aims to explore the feasibility of the production of SAF, and the use of renewable energy at the airports. These projects would require assistance and support from Cabo Verde's technical and financial partners. But with the right incentives in place, a business case could be made for the production of feedstock and/or refining of sustainable aviation fuels based on their life cycle

assessments, and the use of renewable energy at the airports, particularly at those close to the sea such as Sal or Sao Vicente.

### **ii) Operational improvements of Air Traffic Management**

The air navigation service improvement measures (category 3) were selected with a view to ensure the reduction of CO<sub>2</sub> emissions in accordance with national and international standards and regulations and in the best conditions of safety and efficiency, the provision of air navigation services in the Oceanic FIR, both in the upper airspace, TMA (Terminal Control Area) of Sal and national airports.

It is noteworthy that the Air Navigation Service intends to propose and implement the necessary policies to ensure safe, efficient and quality management of air traffic services in Cabo Verde's airspace, airports and national aerodromes and to coordinate the activities of air traffic control (ATC), communication, navigation and surveillance (CNS) and aeronautical information and communications (SGIA) services.

Within the scope of Implementation of Performance Based Navigation (PBN), ASA is in the process of implementing the PBN plan with the introduction of RNP 10 in the upper airspace and instrument flight procedures based on GNSS (RNAV1/RNP1 and RNP APCH) at all national airports. GNSS procedures are already implemented at Aristides Pereira and Cesária Evora International Airports.

The PBN concept brings improvements in terms of efficiency in air traffic management, reduction of fuel consumption and emission of greenhouse gases and even in aircraft noise, since the approaches to land will have a continuous descent (CDA), more regular speed and with optimized trajectories.

The team highlighted the following air navigation measures to be implemented:

- RNP4 implementation in the Europe/South America (EUR/SAM) corridor
- Publication of authorization for the planning of direct routes in the FPL in SAL FIR
- Implementation of PBN procedures at all international airports (Missing Praia and Sal Airport)
- Design and implementation of CCO in all Airport
- Design and implementation of CDO in all Airport
- Adaptation of Taxiway B for medium/large aircraft for the airport.

More details about Operational improvements “Air Traffic Management (ATM)” category 3 are provided in **Annex 3**

### **iii) Supplemental benefits on airport**

ASA and CV Handling have been developing and implementing energy rationalization project at the national Airport, aiming at the continuous monitoring of the main energy consumption points at the Airports and the reduction of energy consumption.

Of the actions implemented within the framework of the project, the following stand out:

- Replacement of Follow-me vehicles and VIP terminal vehicles and maintenance vehicles by electric vehicles;
- Regulation of air conditioning equipment set-points;
- Placement of motion sensors for lighting control in all WCs;
- Installation of more efficient electrical equipment;
- Future acquisitions of GSE cleaner fuels, namely electric GSEs;

- Change the internal procedures regarding disembarkation with the aid of buses, prioritizing the embarkation on foot by managing the stands closest to the terminals.
- Replacement of old generators by more efficient generators (Pedra Rachada);
- Full replacement of conventional lighting by LED in buildings and facilities.
- Installation of photovoltaic panels in the arrival terminal at airport;
- About the idea of installing technologies that are not mature enough (example: vertical axis turbines) compared with solar PV, what we recommend is that they can be used as a pilot project because usually the capex is higher. With a pilot project these technologies can be explored and maybe used in the future.
- Installation of wind park at the airport.
- In the future Cabo Verde plans to install a modern wind park to produce clean and more efficient energy for airport.

In the future Cabo Verde plans to install a modern wind park to produce clean and more efficient energy for airport.



#### **iv) Market based measure**

Regarding the Carbon Market in Cabo Verde, it is still non-existent, and no regulations are in place. But, so far, if an operator is a self-producer (more than 100kW) of energy based on renewable sources, the carbon credits belong to them and with that the operator can go to external markets outside the country and try to get financing in exchange for those credits.

### **VII. Expected results**

The implementation of the selected mitigation measures is expected to lead to the reduction of an average of 7,819 tCO<sub>2</sub> emissions from international aviation per year starting 2024 comparing with baseline. All the expected reductions relate only to operational improvements.

The expected results over the baseline horizon are described in Table 2 Expected Results and Figure provide a graphical representation of these results and confronts them with the expected CO<sub>2</sub> emissions and fuel efficiency in the baseline scenario.

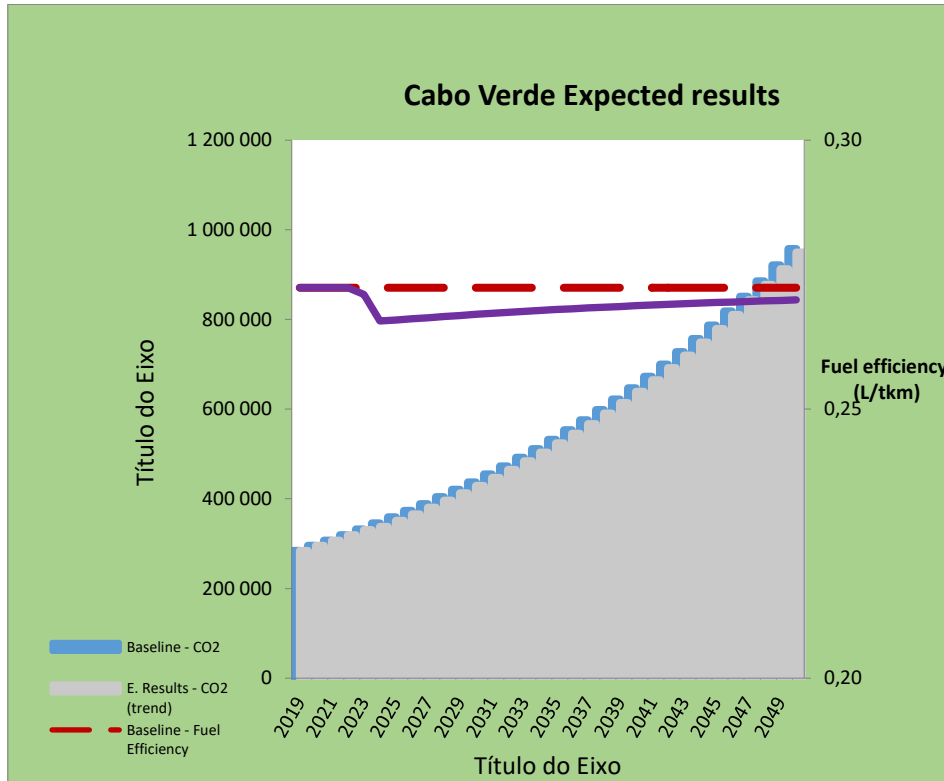


Figure 9 – Baseline and expected results

Table 2 – Expected results

Year	Annual Fuel burn <u>before</u> implementation of mitigation actions (t)	Annual Fuel burn <u>after</u> implementation of mitigation actions (t)	Annual CO2 savings (t)	CO2 Saving (%)
2019	89,822.47	89,822.47	0	0
2020	93,414.88	93,414.88	0	0
2021	97,151.48	97,151.48	0	0
2022	101,037.53	101,037.53	0	0
2023	105,079.04	104,591.99	1,539	-0.46
2024	109,282.20	106,807.83	7,819	-2.26
2025	113,653.48	111,141.59	7,938	-2.21
2026	118,199.62	115,687.73	7,938	-2.13
2027	122,927.61	120,415.71	7,938	-2.04
2028	127,844.71	125,332.82	7,938	-1.96
2029	132,958.50	130,446.61	7,938	-1.89
2030	138,276.84	135,764.95	7,938	-1.82
2031	143,807.92	141,296.02	7,938	-1.75
2032	149,560.23	147,048.34	7,938	-1.68
2033	155,542.64	153,030.74	7,938	-1.61
2034	161,764.35	159,252.45	7,938	-1.55
2035	168,234.92	165,723.02	7,938	-1.49
2036	174,96432	172,452.42	7,938	-1.44

**ACTION PLAN FOR CO2 EMISSION REDUCTION FROM INTERNATIONAL CIVIL AVIATION IN CABO VERDE**

<b>Year</b>	<b>Annual Fuel burn <u>before</u> implementation of mitigation actions (t)</b>	<b>Annual Fuel burn <u>after</u> implementation of mitigation actions (t)</b>	<b>Annual CO2 savings (t)</b>	<b>CO2 Saving (%)</b>
2037	181,962.89	179,450.99	7,938	-1.38
2038	189,241.41	186,729.51	7,938	-1.33
2039	196,811.06	194,299.17	7,938	-1.28
2040	204,683.51	202,171.61	7,938	-1.23
2041	212,870.85	210,358.95	7,938	-1.18
2042	221,385.68	218,873.78	7,938	-1.13
2043	230,241.11	227,729.21	7,938	-1.09
2044	239,450.75	236,938.85	7,938	-1.05
2045	249,028.78	246,516.88	7,938	-1.01
2046	258,989.93	256,478.04	7,938	-0.97
2047	269,349.53	266,837.63	7,938	-0.93
2048	280,123.51	277,611.61	7,938	-0.90
2049	291,328.45	288,816.55	7,938	-0.86
2050	302,981.59	300,469.69	7,938	-0.83



### VIII. Roadmap for the implementation of mitigation measures

N°	Measures	2019	2020	2021	2022	2023	2024	2025
MM1	Conduct a feasibility study to assess the potential of alternative fuel in Cabo Verde							
MM2	RNP4 implementation in the Europe/South America (EUR/SAM) corridor							
MM3	Publication of authorization for the planning of direct routes in the FPL in SAL FIR (Aircraft can fly in SAL FIR from entry point direct to exit point, without intermediates point)							
MM4	Implementation of PBN SID and PBN STAR procedures at Praia and Sal international airports							
MM5	Design and implementation of CCO procedures at all international airports							
MM6	Design and implementation of CDO procedures at all international airports							
MM7	Adaptation of Taxiway B for medium/large aircraft for the airport AICE.							
MM8	Full replacement of conventional lighting by LED in buildings and facilities of all the international airports							
MM9	Installation of photovoltaic panels in international airports Aristides Pereira (AIAP) and Nelson Mandela of Praia							
MM10	Wind park at Aeroporto Internacional Cesária Évora (AICE) and Aeroporto Internacional Amílcar Cabral (AIAC)							
MM11	Replacement of obsolete AC equipment (R22) with modern and more efficient equipment in all the international airports of Cabo Verde							
MM12	Placement of motion sensors for lighting control in all WCs at international airports Cesária Évora and Aristides Pereira							
MM13	Change the internal procedures regarding disembarkation with the aid of buses, prioritizing the embarkation on foot by managing the stands closest to the terminals- CVH							
MM14	Replacement of Follow-me vehicles and VIP terminal vehicles and maintenance vehicles by electric vehicles at international airports of Aristides Pereira, Nelson Mandela and Amílcar Cabral							
MM15	Acquisitions of GSE cleaner fuels, namely electric GSE							

## **IX. Assistance needs**

To achieve the expected results in the implementation of its action plan to reduce CO<sub>2</sub> emissions from international aviation, Cabo Verde needs assistance from civil aviation stakeholders, donors and ICAO support in the following areas, financial and technical assistance, and capacity building.

### **Financial and Technical Assistance**

Adequate financial assistance is needed to develop and implement the following projects:

- RNP4 implementation in the Europe/South America (EUR/SAM) corridor
- Publication of authorization for the planning of direct routes in the FPL in SAL FIR (Aircraft can fly in SAL FIR from entry point direct to exit point, without intermediates point)
- Adaptation of Taxiway B for medium/large aircraft for the airport AICE
- Full replacement of conventional lighting by LED in buildings and facilities of all the international airports
- Installation of photovoltaic panels in international airports Aristides Pereira (AIAP) and Nelson Mandela of Praia (AIPNM);
- Replacement of obsolete AC equipment (R22) with modern and more efficient equipment in all the international airports of Cabo Verde
- Change the internal procedures regarding disembarkation with the aid of buses, prioritizing the embarkation on foot by managing the stands closest to the terminals- CVH
- Replacement of Follow-me vehicles and VIP terminal vehicles and maintenance vehicles by electric vehicles at international airports of Aristides Pereira, Nelson Mandela and Amilcar Cabral.
- Future acquisitions of GSE cleaner fuels, namely electric GSEs – CVH.

### **Capacity Building and Technical Assistance**


Capacity building of civil aviation personnel, in particular air traffic control personnel to:

- RNP4 implementation in the Europe/South America (EUR/SAM) corridor
- Implementation of PBN SID and PBN STAR procedures at Praia and Sal international airports
- Design and implementation of CCO procedures at all international airports
- Design and implementation of CDO procedures at all international airports.

The lists of assistances needs are described in more detail in **Annex 2**.

## ANNEX

### 1. Decision creating the ENPA in charge for the development of the Action Plan on CO2 emissions reduction for Cabo Verde

 IMPRENSA NACIONAL DE CABO VERDE SA


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**Quarta-feira, 14 de julho de 2021**

**I Série**  
**Número 69**




# BOLETIM OFICIAL



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IMPRESA NACIONAL DE CABO VERDE SA

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**CONSELHO DE MINISTROS**

**Resolução n.º 71/2021**

**de 14 de julho**

O Governo de Cabo Verde tem concedido especial importância e prioridade ao ordenamento do território, ao planeamento urbanístico e, em especial, à reabilitação das cidades.

A empresa TECNOVIA CV, LDA, tem sido um importante operador económico e parceiro do Governo no setor da construção civil no país, com participação ao longo dos últimos anos, em empreitadas para as mais diversas entidades públicas e privadas.

Esta empresa vem realizando um conjunto de empreitadas contratadas pela Infraestruturas de Cabo Verde - ICV, no âmbito do Programa de Requalificação, Reabilitação e Acessibilidades – PRRÁ.

Todavia, dado que o país vive uma conjuntura macroeconómica e financeira muito adversa, resultado das medidas, nacionais e internacionais, imprescindíveis de contenção da pandemia da COVID-19, com efeitos económicos e sociais excecionais, à empresa são devidos créditos resultantes de trabalhos já efetuados.

Assim, em linha com a nova estratégia de financiamento para o PRRÁ, a empresa recorrerá a um financiamento bancário de curto prazo, com o aval do Estado, no valor de 103.655.427\$00 (cento e três milhões, seiscentos e cinquenta e cinco mil, quatrocentos e vinte e sete escudos).

O financiamento visa antecipar os créditos que a empresa tem a receber do Estado pelos trabalhos de empreitadas realizados.

Tendo em conta, o manifesto interesse nacional dos projetos em causa e os motivos que justificam o referido financiamento, considera-se que estão reunidas todas as condições exigíveis para a concessão de um aval, pelo que se aprova a presente Resolução.

Assim,

Ao abrigo dos artigos 5.º, 7.º, 8.º e 16.º do Decreto-Lei n.º 42/2018, de 29 de junho, que regula o regime de concessão dos avals do Estado; e

Nos termos do n.º 2 do artigo 265.º da Constituição, o Governo aprova a seguinte Resolução:

**Artigo 1.º**

**Autorização**

É autorizada a Direção-Geral do Tesouro, em linha com a nova estratégia de financiamento para o Programa de Requalificação, Reabilitação e Acessibilidades – PRRÁ, a conceder um aval à TECNOVIA CV, LDA, no valor de 103.655.427\$00 (cento e três milhões, seiscentos e cinquenta e cinco mil, quatrocentos e vinte e sete escudos), para garantia do empréstimo bancário a ser contratado junto do Banco Angolano de Investimentos Cabo Verde.

**Artigo 2.º**

**Prazo**

O aval tem o prazo de doze meses.

**Artigo 3.º**

**Entrada em vigor**

A presente Resolução entra em vigor no dia seguinte ao da sua publicação.

Aprovada em Conselho de Ministros aos 24 de junho de 2021. — O Primeiro-Ministro, *José Ulisses de Pina Correia e Silva*

**Resolução n.º 72/2021**

**de 14 de julho**

As mudanças climáticas e a ameaça que representam para o equilíbrio e o futuro do Planeta constituem um dos maiores desafios enfrentadas pela Humanidade. Enquanto parte do Acordo de Paris, Cabo Verde, na sua Contribuição Nacionalmente Determinada (NDC), definiu como um dos compromissos no horizonte 2030, de limitar as emissões de gases de efeito de estufa (GEE) a um nível de 20% em relação às condições de business-as-usual e apresentou a sua estratégia de desenvolvimento de longo prazo com baixas emissões, com o objetivo de alcançar um desenvolvimento neutro em carbono até 2050, com especial foco nos setores transporte e energia.

Considerando os compromissos assumidos por Cabo Verde no seu NDC enquanto parte do Acordo de Paris, e membro da Organização de Aviação Civil Internacional (OACI), de implementar medidas para a redução e controlo das emissões de GEE;

Considerando a Resolução A39-2 da Assembleia sobre práticas e políticas relativas a proteção do ambiente, em que convida aos Estados-membros a prepararem ou atualizar seus planos de ação de mitigação de redução de dióxido de carbono (CO<sub>2</sub>) no âmbito de aviação civil internacional e submetê-los, com vista a copilar informações relacionadas as metas globais de ambiente;

Considerando que os planos de ação (PA) de redução de emissão de CO<sub>2</sub> representam uma ferramenta dos Estados para comunicar as medidas preconizadas com vista a mitigar as emissões da aviação civil internacional, bem como os resultados expectáveis da implementação dessas mesmas medidas.

Considerando as orientações da OACI estabelecidas no Documento 9988 (Orientação para elaboração de planos de ação dos Estados sobre as atividades de redução das emissões de CO<sub>2</sub>), é necessário a criação de uma equipa de trabalho nacional formado pelos diversos *stakeholder* de várias aéreas do sector com o objetivo de coordenar a elaboração e implementação do plano de ação de redução de emissão CO<sub>2</sub> no setor de aviação civil.

Nos termos do n.º 2 do artigo 265.º da constituição, o Governo aprova a seguinte Resolução:

**Artigo 1.º**

**Objeto**

A presente Resolução cria a Equipa Nacional do Plano de Ação, abreviadamente designada por ENPA, encarregue de desenvolver e implementar o plano de ação de redução de emissão de CO<sub>2</sub> no setor de aviação civil em Cabo Verde.

**Artigo 2.º**

**Atribuições**

A ENPA é responsável por:

- a) Desenvolver o plano de ação de redução de CO<sub>2</sub> no triénio 2021-2023 de acordo com as orientações da OACI estabelecidas no Documento 9988;
- b) Coordenar a definição de políticas e das atividades relacionadas com o plano de ação de redução de emissão de CO<sub>2</sub>;
- c) Submeter à OACI o plano de ação até 30 de junho de 2022;
- d) Avaliar a implementação efetiva das políticas, orientações e recomendações definidas, no âmbito do plano de ação de redução de emissão de CO<sub>2</sub>.

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Artigo 3º

**Composição do Equipa Nacional do Plano de Ação**

1- Integra a ENPA:

- a) Três representantes da AAC;
- b) Um Representante do Gestor Aeroportuário e do Prestador de Serviço de Navegação Aérea;
- c) Um Representante da transportadora aérea certificada a fazer o transporte aéreo internacional;
- d) Um Representante do Ministério responsável pela área do Transporte Aéreo;
- e) Um Representante do Ministério responsável pelo Ambiente;
- f) Um Representante do Ministério responsável pela Energia;
- g) Um Representante de Fornecedor de Fuel;
- h) Um Representante do prestador de serviço de assistência em escala.

2- A ENPA é presidida por um representante da AAC, e, nas suas faltas e impedimentos, é substituído pelo ponto focal de Cabo Verde junto da OACI, responsável pela implementação do Plano de Ação.

3- O Presidente da ENPA pode convidar os responsáveis das unidades orgânicas da AAC, responsáveis ou representantes de outros departamentos governamentais, organismos ou entidades, na qualidade de observadores e de forma *ad hoc*, a participarem das reuniões.

Artigo 4º

**Funcionamento**

1- As reuniões da ENPA decorrem na Sede da Agência de Aviação Civil, salvo convocatória para local diverso.

2- As reuniões da ENPA são dirigidas pelo seu Presidente, competindo-lhe:

- a) Representar a ENPA;
- b) Convocar as reuniões da ENPA e fixar a ordem de trabalhos;
- c) Assegurar o cumprimento das deliberações tomadas;
- d) Suspender ou encerrar antecipadamente as reuniões quando circunstâncias excecionais a justifiquem, mediante decisão fundamentada, a incluir na ata da reunião.

3- A ENPA só pode reunir validamente quando estiverem presentes a maioria dos seus membros.

4- Em cada reunião é lavrada ata que regista o que de essencial se tiver passado nela, indicando, designadamente, a data e o local da reunião, as presenças e as faltas verificadas, os assuntos apreciados, as deliberações tomadas e a forma e o resultado das respetivas votações.

Artigo 5º

**Despesas de implementação**

As despesas inerentes à implementação do plano de ação são suportadas por orçamento de cada entidade representada na ENPA.

Artigo 6º

**Secretariado**

As reuniões da ENPA são secretariadas pelo Gabinete de Apoio ao Conselho de Administração da AAC, cabendo-lhe o apoio técnico, administrativo e logístico para a preparação, desenrolar e seguimento das reuniões, em articulação com o Presidente da ENPA, nomeadamente:

- a) Proceder à conferência das presenças;

b) Registrar as votações;

c) Ordenar a matéria a submeter a votação;

d) Lavrar a ata e submetê-la a aprovação e assinatura;

e) Arquivar as atas, as convocatórias, as ordens de trabalhos e as deliberações e outros documentos por ordem cronológica das reuniões a que disserem respeito;

f) Conservar todos os documentos; e

g) Executar outros trabalhos de que fique incumbido pela ENPA.

Artigo 7º

**Entrada em vigor**

A presente Resolução entra em vigor no dia seguinte ao da sua publicação.

Aprovada em Conselho de Ministro aos 01 de julho de 2021. — O Primeiro Ministro, *José Ulisses de Pina Correia e Silva*

**Resolução n.º 73/2021**

de 13 de julho

Considerando a análise do quadro epidemiológico efetuada pela Direção Nacional de Saúde, relativamente a cada concelho e que confirma a trajetória de evolução da pandemia de COVID-19 no país, nas últimas semanas.

Ciente da importância de manter o nível de prudência neste momento particular do processo de retoma das atividades económicas e sociais, e com o intuito de elevar Cabo Verde a um patamar mais sustentado de segurança sanitária do país, visando a contínua minimização dos riscos de transmissão da infeção;

Finda a vigência da Resolução n.º 65/2021, de 25 de junho, e não obstante se manter a tendência positiva de evolução da situação epidemiológica no país, entende o Governo que as razões de fundo que levaram a que fosse decretada a situação de calamidade nas ilhas de Santo Antão, São Vicente, São Nicolau, Sal, Boa Vista, Maio, Santiago, Fogo e Brava ainda se mantêm válidas, justificando a prorrogação deste quadro, por forma a enquadrar a manutenção das medidas de prevenção e contenção que têm vigorado na presente conjuntura, no âmbito do princípio da precaução em saúde pública.

Assim,

Atento ao disposto no artigo 20º da Lei nº 12/VIII/2012, de 7 de março, que aprova a Lei de Bases da Proteção Civil; e

Nos termos do nº 2 do artigo 265º da Constituição, o Governo aprova a seguinte Resolução:

Artigo 1º

**Objeto**

É prorrogada a situação de calamidade nas ilhas de Santo Antão, São Vicente, São Nicolau, Sal, Boa Vista, Maio, Santiago, Fogo e Brava, com base na evolução da situação epidemiológica no país e nos exatos termos da Resolução n.º 55/2021, de 30 de abril.

Artigo 2º

**Entrada em vigor**

A presente Resolução entra em vigor no dia seguinte ao da publicação e vigora durante quinze dias.

Aprovada em Conselho de Ministros aos 14 de julho de 2021. — O Primeiro-Ministro, *José Ulisses de Pina Correia e Silva*



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**INC.V., S.A. informa que a transmissão de actos sujeitos a publicação na I e II Série do Boletim Oficial devem obedecer as normas constantes no artigo 28º e 29º do Decreto-lei nº 8/2011, de 31 de Janeiro.**

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## 2. List of selected mitigation measures

Keyword	Measure	Start date	End date	CO2 savings	Stakeholders	Cost	Assistance needs	Required action
<b>1. Sustainable aviation fuels</b>								
Development of SAF	Conduct a feasibility study to assess the potential of alternative fuel in Cabo Verde	2022	2023	NA	AAC MICE	150000\$	Yes	Financial & technical assistance
<b>2. Operational improvements</b>								
Use of optimum flight levels	RNP4 implementation in the Europe/South America (EUR/SAM) corridor	2023	2025	<b>109 tCO2</b>	ASA	TBD	Yes	Technical and technical assistance
<p><b>Detail on quantification:</b> Rules of thumb used            -Total arrival movements 2019: 36236 on routes EUR SAM -Fuel savings: 381kg            -50% of arrivals will fly this approach -Minima to carry out a missed approach: 0.005            Fuel save: <math>36236 * 0.5 * 0.005 * 381\text{kg} = 34.51\text{ t}</math> - CO2 save: <math>34.51 * 3.16 = \mathbf{109tCO2}</math></p>								
Use of optimum routings	Publication of authorization for the planning of direct routes in the FPL in SAL FIR (Aircraft can fly in SAL FIR from entry point direct to exit point, without intermediates point)	2020	2023	TBD	ASA	TBD	Yes	Technical Assistance
<b>Detail on quantification:</b> NA								
Fuel efficient departure and approach procedures	Implementation of PBN SID and STAR procedures at Praia and Sal international airports	2017	2022	<b>1,539 tCO2</b>	ASA	TBD	Yes	Technical and training Assistance
<p><b>Detail on quantification:</b> EBT methodology used            PBN SID: Number of movements 2019: 9085 - % of implementation: 100 - Fuel savings/operation: 15kg            PBN STAR: Number of movements 2019: 10022 - % of implementation: 100 - Fuel savings/operation: 35kg            Fuel save: <math>136.28 + 350.77 = 487.05\text{ t}</math> - CO2 save: <math>487.05 * 3.16 = \mathbf{1,539tCO2}</math></p>								

Keyword	Measure	Start date	End date	CO2 savings	Stakeholders	Cost	Assistance needs	Required action
Fuel efficient departure and approach procedure	Design and implementation of CCO procedures at all international airports	2019	2023	<b>3,907 tCO2</b>	ASA	TBD	Yes	Technical and training assistance
<p><b>Detail on quantification:</b> EBT methodology used            Number of movements 2019: 13739 - % of implementation: 90 - Fuel savings/operation: 100kg            Fuel save: 1236.51 t - CO2 save: 1236.51 * 3.16 = <b>3,907tCO2</b></p>								
Fuel efficient departure and approach procedures	Design and implementation of CDO procedures at all international airports	2019	2023	<b>2,372 tCO2</b>	ASA	TBD	Yes	Technical and training Assistance
<p><b>Detail on quantification:</b> EBT methodology used            Number of movements 2019: 13904 - % of implementation: 90 - Fuel savings/operation: 60kg            Fuel save : 750.82 t - CO2 save : 750.82 * 3.16 = <b>2,372 tCO2</b></p>								
More efficient use and planning of airport capacities	Adaptation of Taxiway B for medium/large aircraft for the airport AICE	2022	2024	<b>6.38 tCO2</b>	ASA	TBD	Yes	Financial Assistance (for carrying out the intervention work)
<p><b>Detail on quantification:</b> EBT methodology used            Number of aircraft / year: 2 Number of movements / aircraft in 2019: 336 - % of implementation: 90 - Time savings: 3 min -Average fuel burn (Kg/min: 1            Fuel save : 2.02 t - CO2 save : 2.02 * 3.16 = <b>6.38 tCO2</b></p>								
<b>3. Airport improvements</b>								
Airfield improvements	Full replacement of conventional lighting by LED in buildings and facilities of all the international airports	2021	2023	<b>Co-benefit 16.19 tCO2</b>	ASA and CV Handling	19 562 02 2 ECV	Yes	Technical and financial assistance
<p><b>Detail on quantification:</b> Rules of thumb used            Total kwh/year for light: 134 927            CO2 savings = 0.4 * kWh * Kg of CO2/kWhj = 0.4 * 134 927 * 0.0003 = <b>16.19 tCO2</b></p>								



Keyword	Measure	Start date	End date	CO2 savings	Stakeholders	Cost	Assistance needs	Required action
Use cleaner alternatives sources of power generation	Installation of photovoltaic panels in international airports Aristides Pereira (AIAP) and Nelson Mandela of Praia (AIPNM)	2022	2025	TBD	ASA	4 320 000 ECV	Yes	Feasibility study Technical and financial assistance
<b>Detail on quantification:</b> NA								
Use cleaner alternatives sources of power generation	Installation of wind park at Aeroporto Internacional Cesária Évora (AICE) and Aeroporto Internacional Amílcar Cabral (AIAC)	2024	2026	TBD	ASA	TBD	Yes	Feasibility study Technical and financial assistance
<b>Detail on quantification:</b> NA								
Use cleaner cooler equipment	Replacement of obsolete AC equipment (R22) with modern and more efficient equipment in all the international airports of Cabo Verde	2021	2025	TBD	ASA	4 925 830 ECV	Yes	Technical and financial assistance
<b>Detail on quantification:</b> NA								
Reduce electrical demand	Placement of motion sensors for lighting control in all WCs at international airports Cesária Évora and Aristides Pereira	2021	2023	TBD	ASA	TBD	Yes	Technical assistance
<b>Detail on quantification:</b> NA								
Reduce electrical demand	Replacement of old generators by more efficient generators (Pedra Rachada) - DNA	2019	2025	TBD	ASA	TBD	Yes	Technical and financial assistance
<b>Detail on quantification:</b> NA								

ACTION PLAN FOR CO2 EMISSION REDUCTION FROM INTERNATIONAL CIVIL AVIATION IN CABO VERDE

Keyword	Measure	Start date	End date	CO2 savings	Stakeholders	Cost	Assistance needs	Required action
Reduce distance travelled	Change the internal procedures regarding disembarkation with the aid of buses, prioritizing the embarkation on foot by managing the stands closest to the terminals	2021	2023	TBD	CV Handling	TBD	Yes	Technical and financial assistance
<b>Detail on quantification:</b> NA								
Electrical operated ground vehicles	Replacement of Follow-me vehicles and VIP terminal vehicles and maintenance vehicles by electric vehicles at international airports of Aristides Pereira, Nelson Mandela and Amílcar Cabral	2022	2024	TBD	ASA	33 933 832 ECV	Yes	Technical and financial assistance
<b>Detail on quantification:</b> NA								
conversion of GSE to cleaner fuels	Future acquisitions of GSE cleaner fuels, namely electric GSEs to CV Handling. “Electric vehicles do not release carbon dioxide and are also converters of renewable sources such as solar energy or hydropower, are designed to be more environmentally friendly, and the battery itself can be recycled, thus contributing to the reduction of annual CO2 emissions. We intend to acquire 5 electric tractors”.	2022	2026	TBD	CV Handling	25 000 000 ECV	Yes	Technical and financial assistance
<b>Detail on quantification:</b> NA								

### 3. Operational improvements “Air Traffic Management (ATM)”

#### **KEYWORD: USE OF OPTIMUM FLIGHT LEVELS**

##### **Description: Required Navigation Performance 4 (RNP4) implementation in the Europe/South America (EUR/SAM) corridor**

The current specification for Required Navigation Performance within Sal FIR when outside radar coverage, oceanic en-route, is RNP10.

The decision from EUR/SAM corridor, was to transition to RNP4, with the aim of improving lateral separation minima and to align with global trends.

##### **NEEDS**

To move to RNP4 is first required Performance Based Communication and Surveillance (PBCS), thus ASA will have to be meet the requirements in terms of with Required Communication Performance (RCP 240 ) and Required Surveillance Performance (RSP 180), which will require ground surveillance and communications systems upgrade.

##### **BENEFIT**

- Reduced separation from 50 miles to 30 miles and from 10 minutes to 5 minutes.
- increase the capacity, corridor will be able to allocate more aircrafts on ATS routes;
- improving efficiency on oceanic en-route operations and improved environmental performance.

#### **KEYWORD: USE OF OPTIMUM ROUTINGS**

##### **Description: Publication of authorization for the planning of direct routes in the FPL in SAL FIR**

Presently the air traffic overflying the West section of SAL’s FIR in the direction north-south operates in Direct Routing. This is possible due to the existence of a high number and density of entry and exit points on the FIR’s limits, which allow airlines to plan their routes almost freely. However, there are surveillance and communication difficulties which limit the full implementation and benefits of free route airspace.

For the future SAL FIR will implement full FRA - Free Route Airspace. FRA allows the use of airspace which would otherwise be segregated (i.e., special use airspace) along with flexible routing adjusted for specific traffic patterns.

##### **NEEDS**

For the full implementation, ASA needs to close cooperation with neighboring FIR’s and interoperability with their ATM systems, to allow synchronization of flight trajectories through coordination and automatic flight data transfer messages.

##### **BENEFIT**

- aircraft can fly in SAL FIR from entry point direct to exit point
- create new possibilities for routing and therefore increase the capacity of the sector/FIR.
- greater routing possibilities, reducing potential congestion on trunk routes and busy crossing points, resulting in reduced flight length and fuel burn.

**KEYWORD: FUEL EFFICIENT DEPARTURE AND APPROACH PROCEDURES**

**Description 1: Implementation of PBN SID and PBN STAR procedures at Praia and Sal international airports**

Currently and due to the existence of terrain obstacles, PBN procedures are already implemented in S. Vicente and Boa Vista airports.

Shortly PBN procedures should be implemented in Praia and Sal and in the medium term PBN procedures should also be available for the domestic airports, depending on the potential gains and requirements from a regulatory and safety point of view.

**Description 2: Design and implementation of CCO and CDO procedures at all international airports**

ASA currently have no Continuous Climb Operations (CCO) or Continuous Descent Operations (CDO) in place within Sal FIR. The lack of CCO and CDO means that there is a greater economic and environmental impact (more emissions and noise).

However, at the present ASA has the charts for PBN with CCO and CDO procedures for Sal and Praia airports already finished and they are on process of simulation and is expected to implement as soon as possible.

**NEEDS**

The project of ASA is to implement SID and STARS procedures with CCO and CDO in all international airport, so for this ASA needs to:

- Redesign of TMA airspace will be required, as well as the implementation of new arrival and departure procedures;
- Design CCO and CDO procedures for S. Vicente and Boa Vista airport;
- know which aircraft can support CCO/CDO procedures.

**BENEFIT**

- allow the operators to fly a profile that is as close as possible to the optimum profile with continuous climb or descent during their approach for the international airport.
- enables to attain initial cruise climb FL at an optimum air speed and engine thrust reducing fuel burn and emission and noise reduction.