



**ACTION PLAN FOR CO<sub>2</sub> EMISSIONS  
REDUCTION FROM INTERNATIONAL  
AVIATION  
IN THE DEMOCRATIC REPUBLIC OF  
TIMOR – LESTE  
(DRTL)**

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## ACRONYMS

The following is a list of acronyms used in this document:

**AACTL:** Civil Aviation Authority of Timor-Leste

**ANATL:** Administration of Airports and Air Navigation of Timor-Leste

**APU:** Auxiliary Power Units

**ANS:** Air Navigation Service

**ANSP:** Air Navigation Service Provider

**ATC:** Air Traffic Control

**ATM:** Air Traffic Management

**ATS:** Air Traffic Service

**ATK:** Available Tonne Kilometres

**ASK:** Available Seat-Kilometres

**CNS/ATM:** Communication Navigation Surveillance/Air Traffic Management

**CORSIA:** Carbon Offsetting and Reduction Scheme for International Aviation

**CTA:** Controlled Airspace

**DME:** Distance Measuring Equipment

**FIR:** Flight Information Region

**GHG:** Greenhouse Gas

**GPU:** Ground Power Unit

**GNSS:** Global Navigation Satellite System

**IATA:** International Air Transport Association

**ICAO:** International Civil Aviation Organisation

**ILS:** Instrument Landing System

**IPCC:** Intergovernmental Panel on Climate Change

**PBN:** Performance Based Navigation

**PCA:** Pre-Conditioned Air

**RTK:** Revenue Tonne Kilometre

**RPK:** Revenue Passenger Kilometres

**SAF:** Sustainable Aviation Fuels

**SAP:** State Action Plan

**SID:** Standard Instrument Departure

**STAR:** Standard Instrument Arrival

**WG:** Working Group

## FOREWORD

The ICAO Assembly at its 41<sup>st</sup> Session in 2022 adopted Resolution A41-21: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Climate change. The resolution, considering what has been achieved so far, reiterated the aspirational goals to improve fuel efficiency from a 2020 baseline by an average annual rate of 2% per annum through 2050, carbon-neutral growth from 2020 onward, and the attainment of the Long-Term Global Aspirational Goal (LTAG) of net-zero carbon emissions by 2050.

To achieve the global aspirational goals and to promote sustainable growth of international aviation, ICAO is pursuing a basket of measures, including technology and standards, sustainable aviation fuels, operational improvements, and market-based measures.

ICAO resolution A41-21 further encouraged States to submit voluntary action plans outlining respective policies and actions and annual reporting on international aviation CO<sub>2</sub> emissions to ICAO. The action plans should include information on the basket of measures considered by States, reflecting respective national capacities and circumstances, quantified information on the expected environmental benefits from the implementation of the measures chosen from the basket, and information on any specific assistance needs.

The DRTL supports the position to comply a global approach for monitoring and reducing of aviation emissions that includes implementation of the ICAO Resolution A41-21 provisions.

To meet ICAO Assembly Resolution A41-21, the DRTL through the Civil Aviation Authority of Timor-Leste (AACTL) has created a SAP Focal Point for the development of the Action Plan for CO<sub>2</sub> emissions reduction from international aviation, with the assistance of aviation industry representatives whose activity may affect on the final result: airlines, airports, and air navigation service provider, fuel suppliers, etc.

The Action Plan provides the list of activities that DRTL intends to undertake to address CO<sub>2</sub> emissions from international aviation with the aim of reducing and preventing greenhouse gas (GHG) emissions of aviation, including activities implemented at regional or global level as a result of bilateral and / or multilateral regional agreements. The plan is intended to demonstrate to ICAO the effectiveness of actions being taken and to enable ICAO to measure Timor-Leste's progress towards meeting the global goals set by Assembly Resolution A41-21.

The Action Plan will provide Timor-Leste with the opportunity to implement measures that will improve fuel efficiency and reduce CO<sub>2</sub> emissions. For ICAO, it will help assess future progress toward the achievement of ICAO global aspirational goals. It will also offer an organized means to highlight Timor-Leste's commitment to addressing environmental challenges, report international aviation emissions to ICAO and to

provide information on the basket of measures considered for aviation emissions reduction.

## **1. Executive summary**

The present document "Action Plan for CO<sub>2</sub> emissions reduction from international aviation in the DRTL" was prepared in accordance with Resolution A41-21 of the Assembly of the ICAO, "Consolidated statement of ICAO's continuing policies and practices related to environmental protection Environment - Climate Change" and contains the five elements set out in Document 9988 "Guidance on the development of action plans for CO<sub>2</sub> emissions reduction activities – towards LTAG implementation" 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 general overview of Timor-Leste and its civil aviation system and also describes the five steps in the development of the Action Plan, including:

- The action plan development team,
- The baseline scenario establishment,
- The selected mitigation measures,
- The expected results obtained from the intervention of mitigation measures, and
- The identification of assistance needs.

This plan has been divided into nine sections as defined under the Table of Contents.

## 2. Introduction

The Democratic Republic of Timor-Leste (DRTL) is a country in Southeast Asia formed by volcanic activities, located at eastern end of the archipelago of Indonesia and northwest of Australia at coordinates 8.50' S, 125.55' E. The islands cover a total area of 14,874 square kilometres, including 706 km of the coastline. This includes the main land area, Oe-Cusse exclave, Atauro Island and Jaco Island. The current population of Timor-Leste is 1,387,537 based on the latest United Nations data (1.18 million on census conducted in 2015). Tetum and Portuguese are official languages. The Gross Domestic Product (GDP) in Timor-Leste was worth 1.96 billion US dollars in 2021, according to official data from the World Bank and estimated grow rate of around 3% per year up to 2024.

Timor-Leste has complex topography. There is significant altitudinal variation in the country, ranging from the coasts to the mountainous interior, which is dissected by steep-sided river valleys. The interior of the country is dominated by a mountain range which has several peaks rising to over 2000 meters, the highest of which is Mount Ramelau (2986m).

The climatic condition of Timor-Leste is based on tropical monsoon. Either it is extremely dry (May-November), or it is extremely wet (December-April). Floods and landslides are common within the region.

Petroleum, gold, manganese, marble, and natural gas are the principal natural resources of the country.



**Figure 1.** Timor-Leste geographical location

The Government appreciates that one of the greatest appeal factors of Timor-Leste as a tourism destination is its natural environment, which is relatively untouched as compared to neighbouring Bali and other places in Southeast Asia. The Government also recognises the potential for climate change to have significant negative impacts on the nation. Accordingly, the Timor-Leste's Strategic Development Plan (SDP) 2011- 2030,

developed to plan for a better future and the adopted national civil aviation policy emphasises the need for environmental sustainability.

The Government of the DRTL has recognized in the SDP that Timor-Leste is vulnerable to the effects of climate change and has pledged to reduce the country's emissions. This action is voluntary because, as a Least Developed Country (LDC) as well as a member of Small Island Developing States (SIDS) Timor-Leste is not bound to reduce its greenhouse gases under the United Nations Framework to Combat Climate Change.

The aviation sector plays a central role in the national economy, supporting numerous economic sectors and contributing to the Country development. As such, any measures to limit or reduce the impact of aviation on the environment, pursuant to the global aspirational goals agreed by the 37th Session of the ICAO Assembly and reaffirmed by the subsequent Sessions of the Assembly, should be an integral part of the broader sustainable development priorities and objectives of Timor-Leste. This would promote sustainable growth of aviation while ensuring consistency with any overarching greenhouse gas (GHG) emissions limitation or reduction efforts.

The DRTL is a member of the ICAO from September 2005 and also member of the World Trade Organization (WTO) in August 2024. The DRTL is becoming an ASEAN Member State in October this year (2025). The DRTL is party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.

The DRTL share the view that environmental concerns represent a potential constraint on the future development of the international aviation sector, and fully support ICAO's ongoing efforts to address the full range of these concerns, including the key strategic challenge posed by climate change, for the sustainable development of international air transport. The DRTL is fully committed to and involved in the fight against climate change, and works towards a resource-efficient, competitive, and sustainable multimodal transport system. The DRTL recognises the value of each State preparing and submitting to ICAO a State Action Plan (SAP) on emissions reductions, as an important step towards the achievement of the global collective goals.

The DRTL, with a low power-consuming economy and correspondingly low emissions of greenhouse gases, is committed to the prevention of global climate change.

Considering all mentioned above, in May 2022, the AACTL (linked to ICAO State Letter ENV 6/6 - 18/) recommended that the Government of Timor-Leste participate in the voluntary phases of CORSIA, although as an "Exempt State" it is not mandatory according to ICAO, noting that ICAO strongly encourages even small States with limited aviation industries to participate in the voluntary phases of CORSIA.

The AACTL initiative has been accepted and the President of AACTL informed ICAO about Timor-Leste decision to voluntarily participate in CORSIA Voluntary Phases from 1 January 2023 through the notification letter signed by the Minister of Transport and Communications. Consequently, the DRTL is listed as one of the 115 States that volunteered to participate in CORSIA from 1 January 2023.



The benefits of participating in the CORSIA Voluntary Phases are:

- The CORSIA is a global scheme for the global international aviation industry. The more States join the CORSIA, the more emissions are covered by the offsetting requirements of the Scheme and the higher its environmental effectiveness becomes.
- For Timor-Leste with particular interest in eco-tourism, participation in CORSIA provides the additional benefit of greening air transport connections to the rest of the world.
- Timor-Leste, as voluntarily participant in the pilot phase of CORSIA, may require the assistance within the CORSIA capacity building and assistance programme, with a view to enabling the smooth implementation of the Scheme.
- Timor-Leste participation in CORSIA has added the routes operated by foreign airplanes/operators between Timor-Leste and other participating States, thus increasing the overall emissions coverage of CORSIA.

The objectives of the State action plan are to:

- minimise aviation's impacts on climate change,
- comply with ICAO policies, and
- affirm Timor-Leste's commitments to global, cooperative actions to address climate change.

This initial SAP will provide Timor-Leste an opportunity to specify measures that will improve fuel efficiency and reduce emissions.

For ICAO, it will help assess future progress toward the achievement of ICAO global aspirational goals. This SAP will provide Timor-Leste the ability to promote cooperation, establish partnerships and facilitate technology transfer. It will also offer an organized means to highlight Timor-Leste's commitment to addressing environmental challenges, report international aviation emissions to ICAO (if applicable) and to provide information on the basket of measures considered for aviation emissions reduction.

### **3. Overview of Civil Aviation Sector in Timor-Leste**

#### **3.1 Background**

During the period of the United Nation Transitional Administration in East Timor (UNTAET) (25/October/1999-20/May/2002) the matters of civil aviation were vested under UN administration and the newly established (January 2000) the Civil Aviation

Division (CAD) within the Infrastructure Department of East Timor Transitional Administration (ETTA). It was administrated by international experts. As of 1 July 2001, the CAD functioned as a self financing government entity under the Ministry of Transport and Communications. The function of CAD was to develop national and international aviation in a safe and orderly manner and to ensure that air transport services are established and operated soundly and economically in accordance with the Convention of International Civil Aviation (the Chicago Convention). During this period, the CAD had established basic institutional stability in some key aviation sector. There was, however, no national aviation legislation to regulate aviation. The ICAO Standards and Recommended Practices (SARPs) were adopted to the extent practicable to install a level of confidence in international air transport operators and to pave the way for Timor-Leste to apply for membership to join ICAO.

First international commercial operators (“Merpati Nusantara” and “Air North”) commenced operation into Dili airport in February 2000. Air traffic movements at Dili airport were largely associated with the UN Mission.

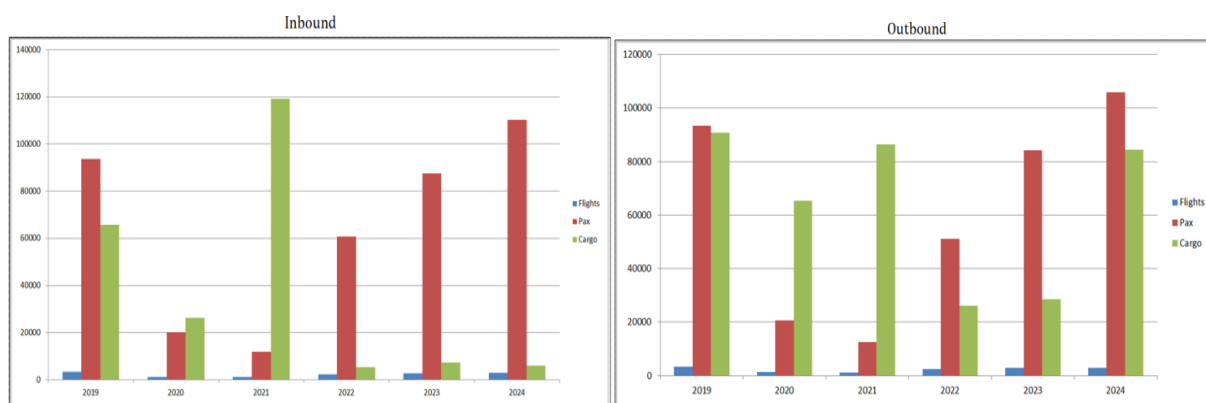
Following independence (20 May 2002), UNTAET was withdrawn and most of the UN’s executive functions, including the civil aviation, were handed over to the new Timorese government. CAD took over the management of Dili airport (renamed in “Presidente Nicolau Lobato International Airport”) and provision of air navigation services and had performed the both the regulatory and service providers functions.

The major legislative document of Timor-Leste in aviation activity is *Decree Law No. 01/2003 - Basic Law on Civil Aviation* in force since 15 October 2003.

The *Decree Law No. 8/2005* and *Government Decree 8/2005* had legally established the Civil Aviation Authority of Timor-Leste (AACTL) and “Administração de Aeroportos e Navegação Aérea de Timor-Leste” (ANATL) as two separated government agencies, under tutelage of the Minister responsible for civil aviation. Even legally existing the formal separation had not been formally established until 2016/2017 when ANATL and AACTL board of directors had been established through specific resolutions of Council of Ministers. During the period until the AACTL/ANATL had not been formally created, both agencies had been managed by the “Direcção Nacional de Aviação Civil” (CAD), based on the Minister’s order from 2009.

### **3.2 Air transport activity**

For the period 2010-2019, it can be considered that there has been a trend of increasing movement of air transport activity in Timor-Leste, associated with the increase in tourism movement and various business activities 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 air traffic movements at national airports in the last 6 years, from 2019 to 2024.



Inbound

Description	2019	2020	2021	2022	2023	2024
Flights	3,348	1,256	1,153	2,413	2,866	2,883
Pax	93,343	20,523	12,622	51,113	84,272	10,5870
Cargo	90,670	65,250	86,340	26,067	28,584	84,355

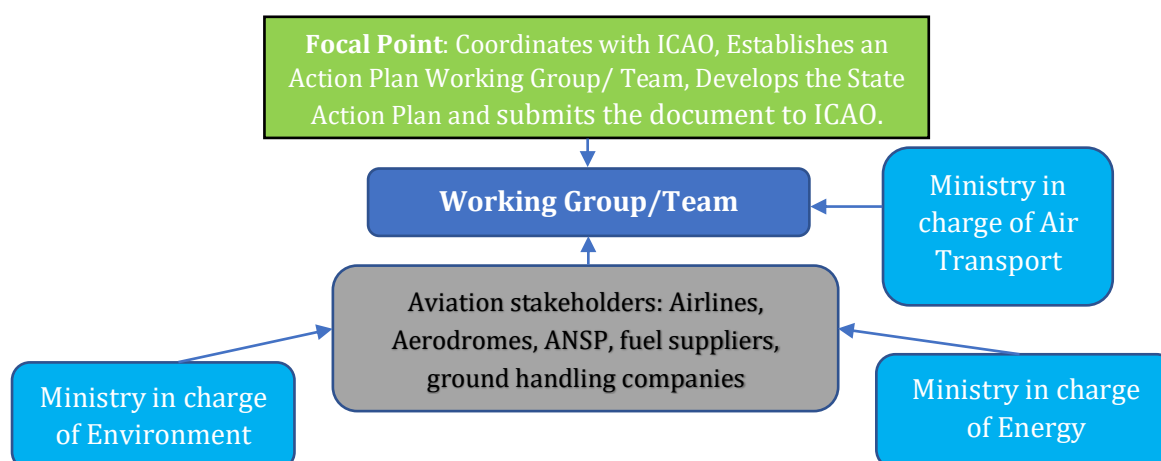
Outbound

Description	2019	2020	2021	2022	2023	2024
Flights	3,348	1,256	1,153	2,413	2,866	2,883
Pax	93,689	20,314	11,904	60,859	87,566	11,0241
Cargo	65,746	26,272	119,270	5,431	7,409	6,096

**Figure 2.** International Air Traffic Movement data at National Airports

#### 4. Development of the action plan

SAP is a voluntary planning and reporting tool for states to communicate information on their activities to address CO<sub>2</sub> emissions from international aviation to ICAO. It is a living document that should be updated at least every three years.



**Figure 3.** The State Action Plan Process

SAP for the reduction of CO<sub>2</sub> emissions from international aviation is one of the ICAO initiatives in favour of selecting and implementing measures to mitigate the impact of the civil aviation sector on climate change. According to Resolution A41-21, action plans should include information on activities aimed at reducing CO<sub>2</sub> 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:

- Focal point information and contact details (and working group).
- Baseline: Baseline (without measures) of fuel consumption, CO<sub>2</sub> emissions and traffic (international operation only)
- Measures to mitigate CO<sub>2</sub> emissions. The selection of measures to mitigate CO<sub>2</sub> emissions and improve fuel efficiency.
- Estimation of the expected results; and
- Need for assistance. The identification of any assistance necessary for the preparation and/or implementation of the plan.

#### **4.1 Working Group**

The WG for the development of the Action Plan for the reduction of CO<sub>2</sub> emissions from international aviation consists of representatives of the Timor-Leste aviation industry whose activity may affect the final result: airlines, airports, fuel suppliers, air navigation service providers, etc. The Working Group has the following powers:

- Develop the CO<sub>2</sub> reduction action plan in the period 2025-2050 in accordance with the ICAO guidelines established in Document 9988,
- Coordinate the definition of policies and activities related to the CO<sub>2</sub> emissions reduction action plan,
- Submit to ICAO the initial action plan by September 2025, and
- Evaluate the effective implementation of national policies, guidelines, and recommendations defined within the scope of the CO<sub>2</sub> emissions reduction action plan.

The WG (team) is formed by the following members/representatives:

- AACTL represented by ICAO SAP Focal Point (WG coordinator) and his alternates,
- ANATL represented by aerodromes (AD) and air navigation services (ANS),
- Ground Handling companies,
- Ministry responsible for civil aviation,
- Ministry responsible for the environment,

- Ministry responsible for energy (renewable energy),
- Air transport operators certified to do International Air Transport, and
- Fuel Suppliers.

#### 4.1.1 Civil Aviation Authority of Timor-Leste (AACTL)

AACTL is the regulatory body for the national civil aviation sector, created by *Decree-Law No. 8/2005*, 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. AACTL is independent in the performance of its functions and is not subject to superintendence or tutelage with regard to its regulatory functions. AACTL's competence are defined in *Decree-Law 8/2005*. In terms of environment, AACTL'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.

#### 4.1.2 Administração de Aeroportos e Navegação Aérea de Timor-Leste

The Administration of Airports and Air Navigation (Administração de Aeroportos e Navegação Aérea de Timor-Leste) abbreviated as ANATL, created by *Government Decree No. 8/2005* with the objective of efficiently managing the country's airports and to provide air navigation services. ANATL's activity is centred on two lines of business, which are operating the aerodromes and Air Navigation services. The Air Navigation Services (ANS) are provided under TL FIR below FL 245 (the ANS above FL245 is delegated to Indonesia/Ujung Padang Control) and the airport network comprises 3 international aerodromes:

- Presidente Nicolau International Airport (PNLIA), Dili
- Aeroporto Internacional Comandante em Chefe das FALINTIL Kay Rala Xanana Gusmão, Suai
- Aeroporto Internacional de Oecusse “Rota do Sândalo”



**Figure 4.** Photos of International Airports in Timor-Leste

ANATL mission is to efficiently manage the country's aerodromes and the Flight Information Region (FIR) of Timor-Leste, and to contribute to the modernization of the air transport system and the Timor-Leste's economic, social, and cultural development, connecting Timor-Leste to the world.

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

The Ministry of Transport and Communications (*Ministério dos Transportes e Comunicações*) is a government department responsible for designing, implementing, coordinating, and evaluating the policy, defined and approved by the Council of Ministers, in the sectors of transport and communications and specifically is in charge of proposing and executing the Ministry's policy on transport and communications and to formulate, develop and ensure the implementation and enforcement of the legal and regulatory framework of the transport and communications sectors. Minister of Transport and Communications, without prejudice to the powers conferred by law on the Council of Ministers, monitors, and establishes relations with the public institutes, public companies and independent administrative authorities having powers in the fields in question, by virtue of their respective organic structure.

The Ministry of Transport and Communications has responsibilities in the area of air transport policy. The Minister of Transport and Communications proposes and executes, in collaboration with the Minister of Foreign Affairs and Cooperation, Timor-Leste's relations with all specialized bodies in the areas of air transport, including air transport agreements.

Under the tutelage of the Ministry of Transport and Communications are:

- 1) Civil Aviation Authority of Timor-Leste – AACTL
- 2) Administration of Airports and Air Navigation – ANATL
- 3) Administration of the Ports of Timor-Leste – APORTIL
- 4) National Communication Authority – ANC
- 5) National Agency for Technology, Information and Communication – TIC Timor

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

The Ministry of Tourism 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 environment, as well as public policies for the environment and climate change.

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

The Ministry of Petroleum and Mineral Resources is the Government department responsible for the design and implementation of energy policy and management of mineral resources. The Ministry of Petroleum and Mineral Resources develops the legal and regulatory framework for activities related to renewable energy sources, supports studies on the capacity of renewable energy sources and alternative energies, and maintains an archive of information on activities and resources of renewable energy.

### **4.1.6 Fuel suppliers**

The Timor-Leste has two operators that hold an authorization granted by the State. The operators provide the public service related to import, storage, distribution, and commercialization of hydrocarbons for both domestic and international levels. The operators are:

- Pertamina International Timor, SA (PITSA) and
- Esperansa Timor Oan (ETO), Lda.

### **4.1.7 Ground Handling Companies**

There are two Ground Handling Companies: Bollore (Ceva Logistics) and STAT that provide respective services in Timor-Leste in accordance with *Decree Law No. 10/2006 Legal Regime on ground Handling operations*. The main purpose is to provide ground-handling services to Airlines, on their stopovers at aerodromes in the country. The company's mission is to guarantee passengers and aircraft that their flight experience begins and ends with a ground assistance service of quality, underlining the confidence in the national air transport industry and airport assistance.

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

The baseline scenario describes the historic evolution of fuel consumption, CO<sub>2</sub> emissions, and traffic in the State and the expected future evolution in the absence of action.

### **5.1 Data collection**

ICAO methodology was used to account for the CO<sub>2</sub> emissions attributed to international flights. ICAO methodology definition is that each State monitors the CO<sub>2</sub> emissions from the international flights operated by aircraft registered in that State.

The definition of international emission as stipulated in the ICAO Doc 9988, Guidance on the Development of States' Action Plans on CO<sub>2</sub> Emissions Reduction Activities, has been applied.

For the purpose of this plan, the WG opted to use only historical traffic data for 2024 from Timor-Leste's national operator for estimating the baseline scenario.

## 5.2 Calculation method

Timor-Leste's baseline scenario was generated by the Environmental Benefit Tool (EBT) version 2.9 which estimated by using Method A.

- Time horizon selected: 2024-2050.
- Method selected: Method A.  
Method A as stipulated in Doc 9988 was adopted for the purpose of this plan, where a single base year value (not more than 10 aircrafts) was used.
- RTK growth rate assumption: 5.8 % per annum, (average of the APAC RTK growth rate)
- The baseline is estimated through the year 2024 and the data used for the baseline estimation is provided on the Table below:  
RTK : 12,491.593,92 tonne-kilometre  
Fuel consumption : 5,200 tonnes

\* Revenue-Tonne Kilometre (RTK) = revenue load (persons and cargo) in tonnes (t) distance flown in kilometres (km) RTK represents a measure of the size of air transport

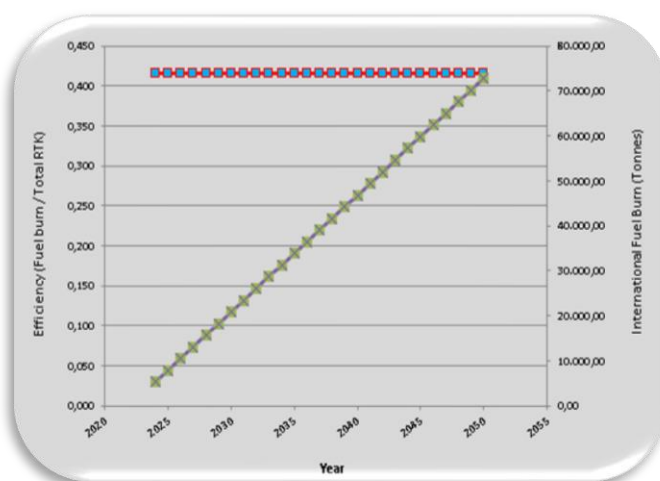
## 5.3 Results

The baseline obtained for CO<sub>2</sub> emissions is shown in Table 1 and Graph 1 below. Baseline table shows the Baseline for CO<sub>2</sub> Emissions from International Aviation without the mitigation measures.



Year	International RTK ('000)	International Fuel burn (Tonnes)	Efficiency (Fuel burn / RTK)
2024	12432	5200	0,416
2025	18738	7800	0,416
2026	24984	10400	0,416
2027	31230	13000	0,416
2028	37476	15600	0,416
2029	43722	18200	0,416
2030	49968	20800	0,416
2031	56214	23400	0,416
2032	62460	26000	0,416
2033	68706	28600	0,416
2034	74952	31200	0,416
2035	81198	33800	0,416
2036	87444	36400	0,416
2037	93690	39000	0,416
2038	99936	41600	0,416
2039	106182	44200	0,416
2040	112428	46800	0,416
2041	118674	49400	0,416
2042	124920	52000	0,416
2043	131166	54600	0,416
2044	137412	57200	0,416
2045	143658	59800	0,416
2046	149904	62400	0,416
2047	156150	65000	0,416
2048	162396	67600	0,416
2049	168642	70200	0,416
2050	174888	72800	0,416

**Table 1. Baseline Scenario**



**Graph 1. Baseline Scenario**

According to these results, CO<sub>2</sub> emissions from aviation will grow from 5,200 tonnes of CO<sub>2</sub> in 2024 to 72,800 tonnes of CO<sub>2</sub> in 2050.

## 6. Timor-Leste's Mitigation Measures

### 6.1 Mitigation measures proposed by ICAO (Doc 9988)

Mitigation measures involve identification of measures that will be implemented in order to achieve CO<sub>2</sub> emissions reductions and/or improve fuel efficiency. The mitigation measures include selection of measures and quantifying the effects on fuel consumption and CO<sub>2</sub> emissions.



**Figure 5.** Contribution of Measures for reducing CO<sub>2</sub> emissions from international aviation

The following is a description of basket of measures to limit or reduce CO<sub>2</sub> emissions from international aviation:

- **Aircraft – related Technology Development**
  - Aircraft minimum fuel efficiency standards
  - Purchase the newest more efficient aircraft (use new aircraft)
  - Aggressive aircraft fuel efficiency standards, setting standards for the future.
  - Retrofitting and upgrade improvements on existing aircraft
  - Avionics
- **Operational Improvements**
  - Improved Air Traffic Management and Infrastructure Use
    - More efficient ATM planning, ground operations, terminal operations (departure, approach, and arrivals) en-route operations, airspace design and usage, aircraft capabilities.
    - More efficient use and planning of airport capacities.
    - Installation of airport infrastructure such as Fixed Electrical Ground Power and Pre-
    - Limit APU (Auxiliary Power Unit) use at gate; solar-at-gate
    - Zero-emissions taxiing
  - More efficient operations
    - Best practices in operations
    - Optimized aircraft maintenance (including jet engine cleaning/washing)

- Selecting aircraft best suited to mission
  - In order to reduce fuel consumption, best practices would be used both in ground operation and during the flight
- **Alternative Fuels**
    - Development of biofuels
    - Development of other fuels with lower lifecycle CO<sub>2</sub> emissions
    - standards/requirements for alternative fuel use

## 6.2 Selected mitigation measures

This subsection explores the basket of mitigation measures identified by aviation stakeholders in the DRTL, reflecting its national capacities and circumstances, to reduce CO<sub>2</sub> emissions from international aviation. It first provides an overview of the national clean energy ambitions that could be leveraged to support the transition to a sustainable aviation.

WG/Team has carried out an exhaustive review of the mitigation measures in the basket of measures proposed in ICAO Doc 9988, as well as those developed by the operators within the framework of their own environmental policies and, selected measures with the potential to mitigate substantially the carbon emissions attributable to international aviation in Timor-Leste.

The selected mitigation measures are described in more detail in the following table:

Name of the measures	Description of the measures	Implementation time horizon	CO <sub>2</sub> Savings per year	Stakeholder(s) involved	Assistance needed
Technology improvement	Purchase of new aircraft	2026 – 2050	893	Aircraft operators	
Use of sustainable aviation fuels	Implementation of SAF	2026 – 2050	Varied	CAA TL, aircraft operators, and fuel supplier	Support to conduct feasibility study
ATM Improvement	Improve efficiency departure and approach procedures (PBN STAR)	2025 – 2050	26	ANATL, aircraft operators, CAA TL, AirNav Indonesia	Capacity-building activities to support the development of PBN procedures
More efficient use and planning of airport capabilities	Improve taxiing procedure	2028 – 2050	Varied	ANATL, aircraft operators, CAA TL, and airport operator	
More efficient operations	Single engine taxi	2026 – 2050	24	Aircraft operators and CAA TL	
	Minimizing weight	2026 – 2050	117	Aircraft	Training/capacity-

				operators	building to develop a weight reduction procedure
Market-based measures	Voluntary participation in CORSIA	2024 – 2035	Varied	Airplane operator and CAA TL	Training/capacity-building for CORSIA MRV and offsetting requirements
Regulatory measures/other	Aircraft movement/slot management	2030 – 2050	Varied	Airport operator, ANATL, aircraft operators, CAA TL	
	Organizing/attending workshops/conference related to aviation environmental protection topics	2025 – 2050	10	All relevant stakeholders (e.g., ANATL, aircraft operators, CAA TL, and airport operator, fuel suppliers, etc.)	Support the organization and participation in relevant events

**Table 2.** Selected Mitigation Measures

The DRTL will, through various actions, aim at limiting CO<sub>2</sub> emissions, informing the aircraft operators, ANSP and airport operators on new internationally promoted technologies, encouraging involvement of national stakeholders in international and national projects aiming at reducing GHG emission in civil aviation and meeting the objectives of aircraft operators by participating in the ICAO CORSIA programme.

### 6.3 Timor-Leste clean energy ambitions

The DRTL is fully engaged to the requirements of the multilateral process under the United Nations Framework Convention on Climate Change (UNFCCC) and its Paris Agreement. The Government of Timor-Leste has formalized the national institutional arrangements for an integrated response to climate change risks. Timor-Leste is one of the lowest contributors to global climate change. However, the government highlights national intentions to integrate climate risk management into all sectoral policies, planning processes, implementation strategies and investment. The latest version of Nationally Determined Contribution (NDC) for the period 2021-2030 issued by the Secretariat of State for Environment will significantly contribute to responding to climate change issues, as well as engaging on climate risk governance, nature-positive growth and transition, low carbon development, climate change adaptation and resilience building with national and international support.

The government has also committed that research will be undertaken to improve the understanding of the economics and potential of biofuel production and the use of sustainable biomass as feedstock for bioenergy production in Timor-Leste.

## **7. Expected results**

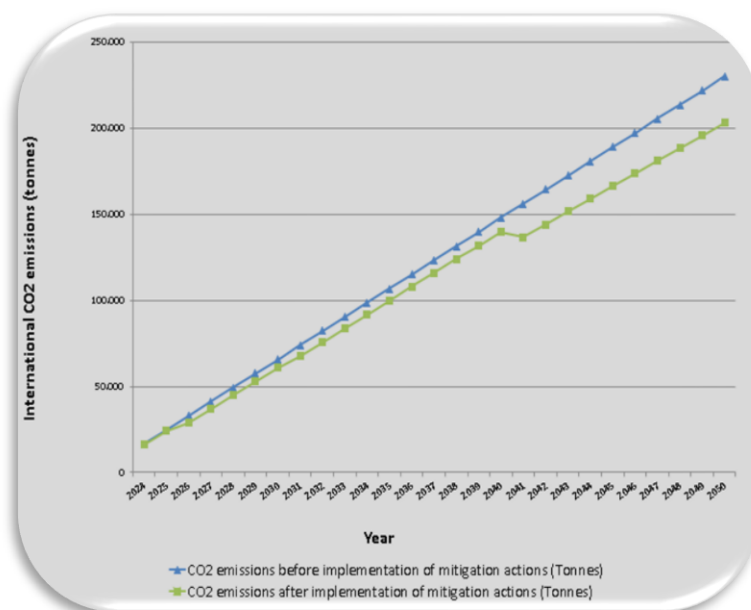
AACTL through the measures included in this Action Plan is willing to contribute achieving ICAO's climate change goals for international aviation, as stated in Assembly Resolution A41-21: to improve fuel efficiency from a 2020 baseline by an average annual rate of 2% per annum through 2050, carbon-neutral growth from 2020 onward, and the attainment of the Long-Term Global Aspirational Goal (LTAG) of net-zero carbon emissions by 2050.

The expected results provide the estimated fuel consumption and CO<sub>2</sub> emissions with the implementation of the selected mitigation measures from the latest available year to 2050.

The expected results project fuel consumption, emissions, and traffic for the same future years provided in the baseline scenario and quantify the effect of the selected mitigation measures. Table 2 presents a graphical comparison of CO<sub>2</sub> emissions before and after the implementation of the proposed measures. It illustrates that by 2050, the potential CO<sub>2</sub> emissions reduction could reach approximately 26,877 tCO<sub>2</sub>.

Year	Annual CO2 emissions before implementation of mitigation actions (Tonnes)	Annual CO2 emissions after implementation of mitigation actions (Tonnes)	Annual CO2 savings (Tonnes)
2024	16432	16021,2	410,8
2025	24648	24115,77	532,23
2026	32864	28727,59	4136,41
2027	41080	36852,88	4227,12
2028	49296	44813,69	4482,31
2029	57512	52940,42	4571,58
2030	65728	61040,64	4687,36
2031	73944	67670,16	6273,84
2032	82160	75627,07	6532,93
2033	90376	83592,29	6783,71
2034	98592	91525,79	7066,21
2035	106808	99474,07	7333,93
2036	115024	107359,66	7664,34
2037	123240	115899,74	7340,26
2038	131456	124098,31	7357,69
2039	139672	131812,18	7859,82
2040	147888	139767,4	8120,6
2041	156104	147173,63	8930,37
2042	164320	154153,14	10166,72
2043	172536	161551,14	20984,86
2044	180752	168306,34	21882,66
2045	188968	176364,08	22553,67
2046	197184	181052,53	26131,47
2047	205400	188141,25	24366,75
2048	213616	188427,28	25618,72
2049	221832	196070,82	25629,18
2050	230048	203170,74	26877,26

**Table 3.** Comparison of CO<sub>2</sub> emissions before and after the implementation of the proposed measures



**Graph 2.** Expected Results

## 8. Assistance needs

To achieve the expected results in the implementation of its action plan to reduce CO<sub>2</sub> emissions from international aviation, Timor-Leste needs assistance from civil aviation stakeholders, donors, and ICAO. Support is needed in the following, but not limited, activities:

### a) Support to conduct a feasibility study on the potential SAF implementation

Sustainable Aviation Fuels (SAF) offer significant opportunities to reduce CO<sub>2</sub> emissions while strengthening energy security. For Timor-Leste, a feasibility study would assess the availability of local feedstock, production potential, and supply chain requirements, as well as policy and market readiness. This study would provide a foundation for identifying practical pathways toward SAF adoption, ensuring alignment with ICAO's global climate goals while considering Timor-Leste's national development priorities.

### b) Capacity-building activities to support the development of PBN procedures

Implementing Performance-Based Navigation (PBN) procedures is crucial for enhancing safety, efficiency, and connectivity of Timor-Leste's airspace. Capacity-building activities will provide training for air traffic controllers, procedure designers, and regulators on the design, validation, and operational use of PBN. This will enable Timor-Leste to gradually transition to a modernized air traffic management system consistent with ICAO standards, ultimately improving regional integration and flight efficiency.

### c) Training/capacity-building to develop a weight reduction procedure

Weight reduction measures in aviation directly contribute to lower fuel burn and emissions. For Timor-Leste, training will help build the technical capacity of operators and regulators to design and implement weight optimization strategies, such as revising aircraft loading procedures, minimizing unnecessary equipment, and improving operational practices. These measures will support both cost efficiency for operators and environmental sustainability objectives.

### d) Training/capacity-building for CORSIA MRV and offsetting requirements

As a newly joined ICAO Member State, Timor-Leste must gradually prepare for its participation in CORSIA. Training will build institutional and technical knowledge on Monitoring, Reporting, and Verification (MRV) of CO<sub>2</sub> emissions from international flights, and familiarize operators with offsetting requirements. This support will ensure Timor-Leste is capable of meeting ICAO's MRV obligations, safeguarding compliance, and contributing to the global aviation climate framework.

e) Support to organize/participate in workshops and related trainings

Active engagement in regional and international workshops and trainings is vital for Timor-Leste to strengthen its technical expertise and foster collaboration. Support in this area will allow Timor-Leste to host focused knowledge-sharing sessions domestically while also ensuring participation in regional events. Such activities will promote peer-to-peer learning, provide access to best practices, and accelerate Timor-Leste's integration into the global aviation community. For example, through the ICAO State Action Plan (SAP) Buddy Programme, Timor-Leste has partnered with Indonesia to receive technical guidance and jointly organize workshops on aviation environmental protection. This collaboration provides a practical model for strengthening Timor-Leste's institutional capacity while fostering regional solidarity.