Papua New Guinea State Action Plan on CO_2 Emissions Reduction from International Aviation

2nd edition

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2nd Edition | Base Year 2022

ACKNOWLEDGMENT

The Papua New Guinea State Action Plan on Carbon Dioxide Emissions Reduction from International Aviation 2nd Edition was prepared and coordinated through the Department of Transport and Civil Aviation in consultation with all aviation sub-sector agencies including the Civil Aviation Safety Authority of PNG, NiuSky Pacific Limited, National Airports Corporation, National Weather Services, Air Niugini Limited and the National Energy Authority, with technical assistance from the International Civil Aviation Organization.

We appreciate the overwhelming support of the aviation sector stakeholders who participated in the consultations and have provided data and statistics which has established the basis of the development of this plan. We are grateful for the efforts already undertaken by the government entities and the private sector in addressing environmental sustainability and carbon neutrality in their operations ensuring a greener aviation sector in PNG.

All photos in this report are courtesy of Captain Ben Samlal, unless otherwise stated.

Finally, we thank the PNGAus Partnership - Transport Sector Support Program for technical and financial assistance to guide the formulation of this Plan.

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ABBREVIATION

AIS	Aeronautical Information Services
ANG	Air Niugini
ANSP	Air Navigation Services Provider
ARFFS	Aerodrome Rescue and Fire Fighting Services
ATM	Air Traffic Management
CARs	Civil Aviation Rules
CASA	Civil Aviation Safety Authority
CCDA	Climate Change Development Authority
CCO	Continuous Climb Operation
CDO	Continuous Decent Operation
CEPA	Conservation and Environment Protection Authority
CNG	Carbon-neutral growth
CNS	Communications Navigation Surveillances
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CO_2	Carbon Dioxide
DNPM	Department of National Planning and Monitoring
DoT	Department of Transport
EBT	Environment Benefit Tool
FIR	Flight Information Region
FIS	Flight Information Services
GHG	Green House Gas
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
LTAG	Long Term Global Aspirational Goal
MET	Meteorological
NAC	National Airports Corporation
NEA	National Energy Authority
NSPL	NiuSky Pacific Limited
NWS	National Weather Service
PBN	Performance Based Navigation
PBN SID	Performance Based Navigation - Standard Instrument Departure
PBN STAR	Performance Based Navigation – Standard Terminal Arrival Route
PMIA	Port Moresby International Airport
PNG	Papua New Guinea
RNP AR APCH	Required Navigation Performance with Authorization Required Approach
RTK	Revenue Tonnage Kilometre
SAF	Sustainable Aviation Fuel
SAP	State Action Plan
SARPs	Standard and Recommended Practises
UNFCCC	United National Framework on Climate Change Convention

EXECUTIVE SUMMARY

This State Action Plan (SAP) is the 2nd Edition of the Papua New Guinea (PNG) Action Plan. It is updated and submitted to the International Civil Aviation Organization (ICAO) every three years, in line with the recommendations set forth in Resolution A37-19, and reaffirmed by Resolutions A38-18, A39-2, A40-18, and A41-21. These resolutions highlight the global aspirational goals for international aviation, namely a 2% annual fuel efficiency improvements, carbon-neutral growth from 2020 onwards, and the Long-Term Global Aspirational Goal (LTAG) of net-zero carbon emissions by 2050, adopted at the 41st ICAO Assembly.

The process of developing the SAP is a continuous work. The process and procedures to improve the process are being set in place. There is a collaborative effort from various players, and this reaffirms the commitment by the PNG transport and civil aviation industry to the environment.
In 2023, a working committee was created to initiate work on developing the initial Action Plan. The working group comprised of representatives from government and transport statutory agencies. The private sector has yet to be invited to join the working committee. This working committee became a forum to have debates and knowledge exchange which has contributed to the development of policies and guidelines to enable addressing of environment issues in the PNG aviation industry.

In the development of this Action Plan, PNG has adopted the methodology recommended by the ICAO, ensuring consistency with global best practices and transparency in reporting and planning. The Plan serves as a comprehensive framework to monitor progress, guide policy development, and support collaborative efforts across stakeholders.

The SAP outlines PNG's strategic approach and key initiatives to minimize the adverse effect of global civil aviation on the environment. It reflects PNG's strong commitment to managing the carbon footprint of its civil aviation sector while continuing to enhance aviation safety, operational efficiency, and sustainability.

Building on the progress achieved thus far, and through effective collaboration with other stakeholders, the annual fuel-efficient improvement before implementation of mitigation measures is 0.00% and annual fuel efficiency improvement after implementation of mitigation measures is 0.45%. This result is an achievement and sets forth Papua New Guinea's ambition to contribute meaningfully to global climate goals, in line with ICAO's aspirational goals for the international aviation sector. These include an average annual fuel efficiency improvement of 2% 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.

This Action Plan is a living document and will be periodically reviewed and updated in accordance with ICAO Assembly Resolution A41-21: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change. Papua New Guinea reaffirms its commitment to implementing ICAO's environmental protection programs and working collaboratively with all stakeholders toward a greener, more sustainable aviation future.

1. INTRODUCTION

1.1 Background and Objective

Papua New Guinea (PNG), situated in the south-west Pacific and comprising the eastern half of the island of New Guinea together with numerous smaller islands, is a developing state with a population of approximately 11 million people[1]. Around 70–80% of the population live in rural areas and rely on subsistence farming. As a result, PNG's absolute and per capita greenhouse gas (GHG) emissions remain relatively low by global standards.

However, because Papua New Guinea relies heavily on air transport for trade, tourism, health access, and regional connectivity, the aviation sector is of critical economic and social importance. Its significance is heightened by the country's mountainous terrain, widely dispersed islands, and limited ground transport infrastructure, which make aviation the most practical mode of travel and transport.

While the aviation sector is vital for economic and social development, its growth is directly linked to environmental impacts, including noise, local air quality degradation, and greenhouse gas (GHG) emissions contributing to climate change.

The International Civil Aviation Organization (ICAO) has established a global policy framework to address these impacts, built around three environmental focus areas, noise, local air quality, and climate change, and guided by the following global aspirational goals:

- 2% average annual fuel efficiency improvement through to 2050,
- Carbon-neutral growth from 2020 onwards; and
- Net-zero CO_2 emissions by 2050 (Long-Term Global Aspirational Goal, LTAG).

To achieve these goals, ICAO recommends the implementation of a basket of measures which includes aircraft technology improvements, operational enhancements, sustainable aviation fuels (SAF), and market-based measures such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

In alignment with ICAO's vision, PNG, through its aviation stakeholders, has undertaken and planned actions across these baskets of measures, including:

- Fleet renewal to introduce more fuel-efficient aircraft,
- Air traffic management and routing optimisation,
- Participation in ICAO's ACT-SAF programme to explore SAF development; and
- Voluntary engagement in CORSIA from its pilot phase.

The plan details the mitigation measures selected by the SAP working committee to support ICAO's global environmental objectives, reflecting national priorities and capacities.
The action plan outlines the current landscape of civil aviation activities in PNG and highlights the key stakeholders involved in efforts to reduce CO_2 emissions from international and domestic aviation. The objective of this SAP is to:

1. Present PNG's aviation sector profile and emissions baseline.
2. Detail the measures implemented and planned to reduce environmental impacts from international aviation.

[1] Population, total - Papua New Guinea | Data

3. Demonstrate PNG's commitment to ICAO's global environmental goals; and
4. Serve as a framework for tracking progress and mobilising technical and financial support.

Developed in accordance with ICAO Doc 9988, this SAP is a living document that will be reviewed and updated every three years to incorporate new data, technologies, and practices, ensuring PNG's continued contribution to a sustainable and environmentally responsible global aviation system. It will communicate progress toward ICAO's environmental goals and identify any capacity-building or technical assistance needs to support the implementation of these measures.

1.2 Contact Information

The focal point of the SAP for PNG is the Department of Transport (DoT), as shown in Table 1 below.

Table 1: PNG's Focal point and Contact Persons for SAP

	FOCAL POINT	**ALTERNATE**
Name of Authority	Department of Transport	
Name and Surname of Point of Contact	Mr. Kevin Luana	Mr. Terence Lames
Title of Point of Contact	Deputy Secretary, Technical Services	ICAO Liaison Officer (Air Transport Regulations Division
Email Address	kluana4@gmail.com	tlames049@gmail.com
Telephone Numbers	+675 327 9554 +675 76626258	+675 327 9554 +675 77231042, +675 70772961
Address	Airways Road, 7 Mile	
City	Port Moresby	
State/ Province	National Capital District	
Postcode/ ZIP	1121	
Country	Papua New Guinea	

2. OVERVIEW OF CIVIL AVIATION IN PAPUA NEW GUINEA

2.1 Current situation and future trend

The civil aviation industry in PNG began soon after the second world war (1942) and has since developed into a vital component of national connectivity. While relatively small in global terms, the sector is highly regulated and dynamic, adapting to the country's unique geography and transport needs.

From its early years, when DC3 aircrafts were the primary mode of air transport, the industry evolved to include Fokker F28 passenger aircraft, and the introduction of two wide-body and three narrow-body aircraft servicing international routes marking a significant step towards more modern and efficient operations. Today, PNG's aircraft registry includes approximately 211 aircraft, ranging from small commuter planes serving remote airstrips to larger jets operating on domestic and international routes.
Over time, aviation infrastructure has expanded considerably. PNG currently has 82 airports and airfields (active and inactive), including 22 national airports operated by the National Airports Corporation (NAC). There are now four designated international airports including Jacksons International Airport, Nadzab Tomodachi Airport, Kagamuga International Airport and Tokua International Airport and there are a small number of other airports that provide international services under special arrangements. The expansion of air services over the decades has been accompanied by the negotiation of new Air Services agreements increasing PNG's international connectivity.

The main stakeholders in the aviation industry are:

1) Department of Transport (DoT)
2) National Weather Services (NWS)
3) Civil Aviation Safety Authority of PNG (CASA PNG)
4) NiuSky Pacific Limited (NSPL)
5) National Airports Corporation NAC)
6) Airline Operators (e.g., Air Niugini)
7) National Energy Authority (NEA)

2.1.1 The Department of Transport

The DoT is the policy holder of Civil Aviation in PNG. As such DoT is the leader in international best practices in compliance to the ICAO Standards and Recommended Practices (SARPs). The DoT also performs administrative functions including the sponsoring to the PNG National Parliament, ratifications of aviation related treaties (bilateral and multilateral). DoT also negotiates and ratifies bilateral air service agreements for international travel. It also issues permits for international non-scheduled flights landing into PNG airports and for overflights utilizing the Port Moresby Flight Information Region (FIR).

2.1.2 Airline Operators

The ICAO and IATA recognized air operators in PNG conducting international flights either as scheduled, non-schedule, passenger and for cargo are Air Niugini (ANG), PNG Air and Hevilift. Table 2 shows the air operators and the type of operations they perform.

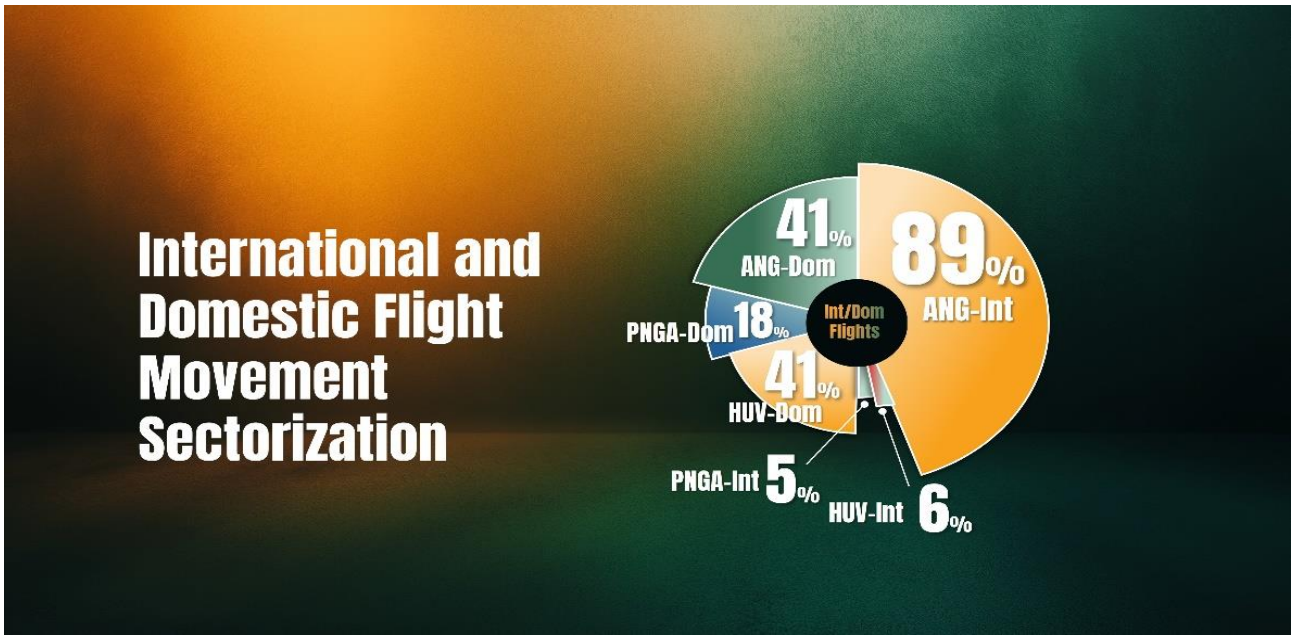
Table 2: Air Operators in PNG

Air Operators	***ICAO***	***IATA***	***Type of Operations (scheduled/non-scheduled passengers/cargo, domestic/international)***
Air Niugini	ANG	PX	Both scheduled and non-schedule – passengers/cargo at domestic and international levels
PNG Air	TOK	CG	Non-scheduled charter flight – cargo/passengers & medevac at domestic level, and international charter flights
Hevilift	HUV	IU	Charter flights – passengers/cargo at domestic level, and scheduled twice weekly international flights with seasonal approval on the way

However, as tabulated below, Air Niugini is the major service provider in PNG aviation. Air Niugini and its subsidiary, Link PNG operate regular public transportation within PNG and internationally in the Asia Pacific Region. Charter operations are limited to the domestic sector. Air Niugini's fleet is composed of 22 aircraft with an average of 11 operating daily and 11 in maintenance. The representative data for the 2024 calendar year is summarized and illustrated in Table 3 and Figure 1, provided hereunder.

Table 3: PNG airline operators providing international, domestic and cargo services

January to December 2024							
PNG Airlines Operating International and Domestic Flights							
					% Sectorization		
Airline	**International**	**Domestic**	**Total**			**Int**	**Dom**
Air Niugini (ANG)	3731	19,806	23,537		ANG	89%	41%



PNG Airlines (TOK)	201	8781	8982		PNGA	5%	18%
Hevilift Limited (HUV)	266	19,462	19,728		HUV	6%	41%
Total	**4198**	**48,049**					

Table 4: Number of Passengers (domestic and international) and Cargo (domestic and international) from 2022-2024

Year	Number of passenger (person)	Number of passenger (person)	Numbers of Air Cargo (kilograms)	Numbers of Air Cargo (kilograms)
	(Dom & Int)	(Int)	(Dom & Int)	(Int)
2022	1,180,462	174,495	15,317,292	8,351,204
2023	1,250,490	299,200	14,615,074	8,446,304
2024	1,302,360	301,340	14,047,523	8,501,345

2.1.3 Airport Operators

The National Airport Corporations (NAC) limited is an incorporated state-owned aviation enterprise established and regulated by the Civil Aviation Act 2000. NAC owns and operates all government owned airports in PNG. There are twenty-two (22) national airports in PNG

Figure 1: Graphical representation of International and Domestic Flight Movement Sectorisation

with Port Moresby's International Airport as the only designated ICAO International Airport. Mt Hagen (Kagamuga) and Nadzab Airports have attained international airport status this year 2025 whilst Tokua Airport is in working progress and expected to be attained by 2026. In addition, there are 500 plus rural airstrips on record with 170 to 200 operational airstrips depending on maintenance status.

Delivering safe and sustainable airport services ties with the National Transport Strategy. An airport should be sustainable, delivering safety and reliable services focusing on effective management of its resources with quality infrastructure and competent workforce to drive its operations. One of the core values of NAC is "environmental sustainability" by considering the values of the environment in which it operates.

The NAC also provides ground navigation aids, design, construction, and maintenance of the runways, taxiways, stop ways, runway end safety areas, access rounds, with terminal infrastructure facilitation including security (of both land and air side) and management of identified hazards.

Table 5 provides a listing of the number of the airports operated by NAC and indicates which airports provide both international and domestic services. The other airports providing international services are primarily for special services and approval is granted on a case-by-case basis.

Table 5: 22 Airports managed by NAC

Airport Operators	Airport Names and Cities	Domestic/International
National Airports Cooperation	Port Moresby International Airport	Domestic/International
National Airports Cooperation	Tari/Tari	Domestic
National Airports Cooperation	Nadzab /LAE	Domestic/International
National Airports Cooperation	Kagamuga/ Mt. Hagen	Domestic/International
National Airports Cooperation	Wapenamanda/ Wabag	Domestic
National Airports Cooperation	Goroka/Goroka	Domestic
National Airports Cooperation	Chimbu/Kundiawa	Domestic
National Airports Cooperation	Mendi/Mendi	Domestic
National Airports Cooperation	Vanimo/Vanimo	Domestic
National Airports Cooperation	Boram/Wewak	Domestic
National Airports Cooperation	Madang/Madang	Domestic
National Airports Cooperation	Girua /Popondetta	Domestic
National Airports Cooperation	Gurney/Alotau	Domestic
National Airports Cooperation	Kerema/Kerema	Domestic
National Airports Cooperation	Daru/Daru	Domestic
National Airports Cooperation	Kiuga/Tabubil	Domestic
National Airports Cooperation	Aropa/ Arawa	Domestic
National Airports Cooperation	Kieta/Buka	Domestic
National Airports Cooperation	Hoskins/Kimbe	Domestic
National Airports Cooperation	Tokua/Rabual	Domestic/International
National Airports Cooperation	Kavieng/Kavieng	Domestic
National Airports Cooperation	Momote/Lorengau	Domestic

2.1.4 Air Navigation Service Providers

The Air Navigation Services Provider (ANSP) in PNG includes Air Traffic Management (ATM) and Communications, Navigation & Surveillance (CNS). PNG's ANSP NiuSky Pacific Limited (NSPL) is an incorporated State Aviation Enterprise that works in close collaboration with the National Weather Service (NWS) as well as other aviation stakeholders as highlighted in the table below:

Table 6: Air navigation service providers

Air Navigation Service Providers	Type of Service
NiuSky Pacific Limited	Provider of Air Traffic Management and Communications, Navigations & Surveillance (CNS).
PNG National Weather Services (Department of Transport & Civil Aviation)	Provision of Meteorological (MET) Services.

ATM supports the national airports, which form the bulk of domestic operations as well as international operations within the Port Moresby FIR. NiuSky Pacific Limited provides ground, aerodrome, approach, en-route control, flight information service (FIS), aeronautical

information services (AIS), including an aviation search and rescue coordination centre for aviation search and rescue services.

NSPL firmly supports environmental initiatives to combat climate change in the international arena through its recently published corporate plan and strategic direction plan. NSPL Corporate Plan 2025 – 2027 and Strategic Direction 2025-2030 drives its objectives of combating climate change by reducing its CO_2 footprint in the international aviation space. The development of the SAP Policy correlates with the NSPL's Strategic Pillar 5: sustainability and inclusivity under the key result areas (1) environmental stewardship and climate change mitigation and (4) stakeholder collaboration for sustainability which both areas drives the company's strategic objective of sustainable and inclusive operating environment with key strategic outcomes of Integrating sustainable practices, fostering inclusivity, and contributing to the long-term wellbeing of the environment and society while supporting the growth and development of the aviation industry

2.1.4 Civil Aviation Safety and Security Regulation

The Civil Aviation Safety Authority of PNG (CASA PNG) is the regulatory authority for environmental protection in Civil Aviation. CASA PNG implements and monitors compliance with the provision of ICAO Annex 16. CASA PNG has promulgated operating rules for environmental protection in domestic and international civil aviation through the specification for aircraft design, production and airworthiness certification and aircraft operation requirements.

CASA PNG also promulgates rules and specifications for air traffic management, airport operations, and aviation meteorology so that the consequential elements of environmental protection are managed appropriately.

2.1.5 National Energy Authority

National Energy Authority (NEA) is established through enactment of NEA Act 2021. NEA is mandated with policy and planning, economic and technical regulatory functions. NEA develops renewable energy policies and sector planning aligning to the government vision and international commitment. NEA also set technical standards, guidelines and set tariffs as part of its economic regulatory roles to regulate PNG's energy sector including electricity and downstream gas.

3. BASELINE SCENARIO

3.1 Methodology and data

PNG adopted 2022 as the base year for the development of its initial SAP. The baseline data was established using available statistics on the number of aircraft operating international flights, fuel consumption, and revenue tonne kilometres (RTK). This provided a reference point against which future emissions projections and the effectiveness of mitigation measures could be assessed.

As of 2024, the baseline scenario is reviewed and updated to reflect the most recent operational data. Aviation activity levels in 2022 are retained as the reference year, however, traffic and fuel consumption data from 2024 have been incorporated to strengthen the robustness of the baseline and ensure consistency with current sectoral trends.

The updated baseline scenario takes into account:

- Passenger and cargo traffic volumes for 2024,
- Fuel uplift and consumption data reported by Air Niugini,
- CO_2 emissions estimates consistent with ICAO methodologies.

This update ensures that projections remain consistent with the actual performance of the aviation sector in PNG. It also provides a more accurate foundation for the modelling of future emissions and the assessment of the impact of measures included under the SAP.

The ICAO methodology was used utilizing Method C inputting State date. This was used in the EBT to generate the baseline scenario. The following data inputs were used to develop the baseline:

- Baseline year: 2022
- International RTK: 111,675 Tonne-Kilometres
- International fuel consumption: 27,858 Tonnes
- Number of aircraft operating international flights: 12 aircraft
- Annual RTK growth rate: 5.8 % (Average for the Asia Pacific Region)

3.2 Baseline

The table and chart below present the estimated baseline of fuel consumption and CO_2 emissions for international flights for the years 2022 to 2050.

The term “international flight” in this document follows the ICAO methodology, referring to all scheduled international flights operated by all air carriers registered in Papua New Guinea. Air Niugini is the only Airline which is running scheduled international flights.

Table 7: Baseline Scenario for International Flight (*generated by the EBT*)

Year	International RTK ('000)	International Fuel Burn (Tonnes)	Efficiency (Fuel burn/RTK)
2022	111,675.00	27,858.00	0.249
2023	118,152.15	29,473.76	0.249

2024	125,004.97	31,183.24	0.249
2025	132,225.26	32,991.87	0.249
2026	139,926.07	34,905.40	0.249
2027	148,041.78	36,929.91	0.249
2028	156,628.20	39,071.85	0.249
2029	165,712.64	41,338.01	0.249
2030	175,323.97	43,735.62	0.249
2031	85,492.76	46,272.28	0.249
2032	196,251.34	48,956.08	0.249
2033	207,633.92	51,795.53	0.249
2034	219,676.69	54,799.67	0.249
2035	232,417.94	57,978.05	0.249
2036	245,898.18	61,340.78	0.249
2037	260,160.27	64,898.54	0.249
2038	275,249.57	68,662.66	0.249
2039	291,214.04	72,645.09	0.249
2040	308,104.46	76,858.51	0.249
2041	325,974.51	81,316.30	0.249
2042	344,881.04	86,032.65	0.249
2043	364,884.14	91,022.54	0.249
2044	386,047.42	96,301.85	0.249
2045	408,438.17	101,887.36	0.249
2046	432,127.58	107,796.82	0.249
2047	457,190.98	114,049.04	0.249
2048	483,708.06	120,663.88	0.249
2049	511,763.12	127,662.39	0.249
2050	541,445.39	135,066.81	0.249

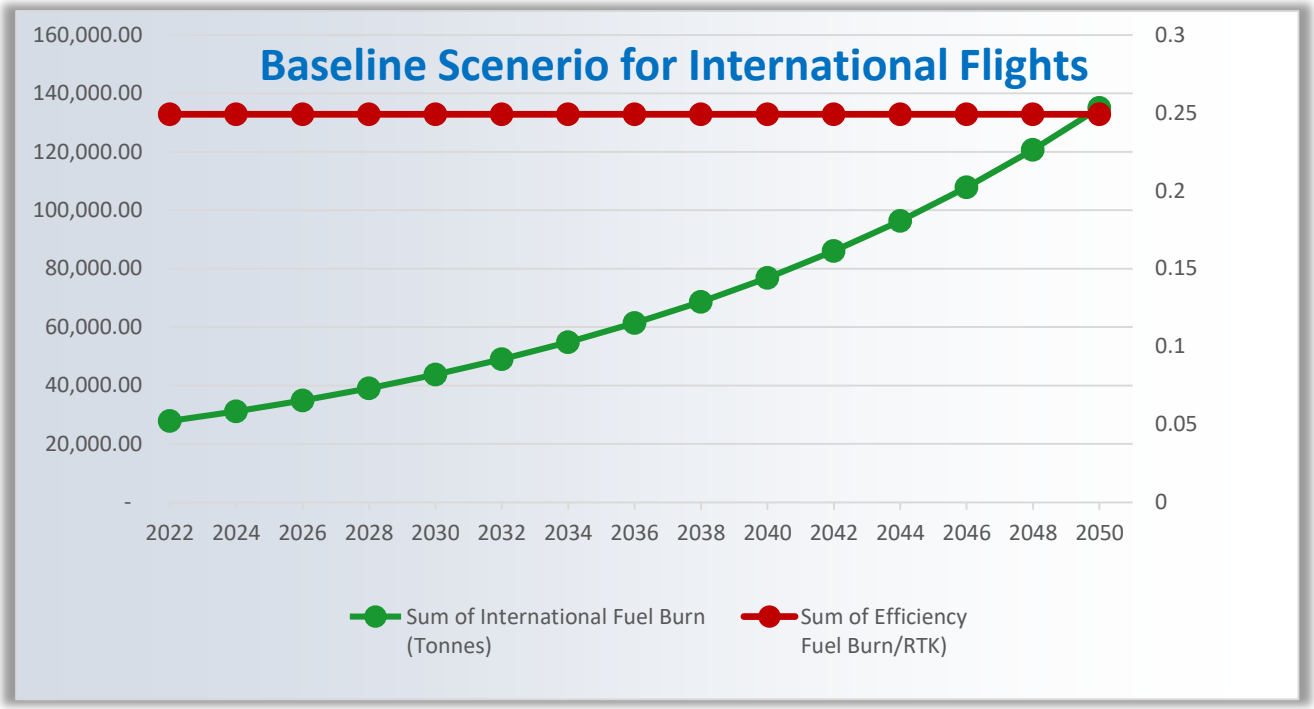


Figure 2: Baseline Scenario for International Flight (generated by the EBT)

The table and the graph above show the baseline data projections from the reference year 2022 to 2050 as the terminal year. The result represents the baseline scenario for international flights in terms of the RTK and the fuel burn. It can be deduced that the fuel consumption will be around 43,735.62 tons in 2030 and around 135, 066.81 tons in 2050. This is about 0.25% of fuel consumption.

The estimated fuel consumption will have reached around 135,066.81 tonnes by 2050 correlated by annual fuel efficiency constant at 0.25. An annual average tonnage increase of 3,753.43 (3.6 %) from the reference year is calculable. (NOTE: The average is derived using 2022, 2036, 2043 and 2050 as data-set-years).

4. MITIGATION MEASURES

Four groups of emissions mitigation measures have been implemented by the PNG aviation stakeholders, in line with ICAO's framework: aircraft technology improvements, operational improvements, more efficient operations, sustainable aviation fuels (SAF), and market-based measures.

4.1 Aircraft Technology Improvement

MEASURE N.1	
Category	Air Technology Improvement
Measure	Re-fleeting of aircraft
Action	The Airline is introducing three new aircraft types including 3 A220-300 aircrafts, 8 A220-100 aircrafts and 3 A220 - 300 aircrafts.
Start Date	August 2025
Date of Full implementation	November 2030
Indicator	Air Niugini to progressively introduce the three new aircraft types which will aid in reducing fuel burn by 25% compared to Average Fokker and Boeing currently in use.
Implemented by	Air Niugini
Economic Cost	K5B investment by the government of Papua New Guinea
Currency for financial assistance	PGK
Reference to existing Legislation	Civil Aviation Act 2000 (as amended), Civil Aviation Rules (CARs), Public Finances Management Act 1995 and the Companies Act (1997)
If new legislation is proposed	TBD
Compliance to the legislation: Voluntary, Mandatory, N/A	Mandatory
Assistance needed	Technology, Finance, Technical support, Education support on CORSIA report, Research support for applicable green activities.
List of Stakeholders involved	Implemented by Air Niugini and supported by DoT, PNG NSPL, NAC & CASA PNG

4.2 Sustainable Aviation Fuel

MEASURE N.2	
Category	Sustainable Aviation Fuels (SAF)

Measure	Feasibility study on the viability on the use of SAF and the possibility of PNG to produce and supply SAF feedstock
Description	1. Conduct a Feasibility Study to ascertain the viability of the use of SAF in the PNG Aviation Industry and the possibility of PNG to produce and supply SAF feedstock, including the production of SAF in the future. 2. Establish a Policy Framework that will drive PNG's efforts to produce SAF feedstock, SAF use, and SAF production in the future. 3. Identify potential SAF developers throughout the region as well as international developers and establish bilateral arrangements towards seeking technical assistance and support towards the development and distribution of SAF.
Action	PNG's support towards the production, distribution and use of SAF in the Asia Pacific
Start Date	2024
Date of Full implementation	Ongoing aligned with ICAO SARPs Annex 16 Volume IV
Indicator	Percentage of CO2 reduced after the introduction of SAF against the baseline.
Implemented by	CASA and DoT
Economic Cost	Operational costs are on-going costs to CASA PNG. No additional cost.
Currency for financial assistance	NA
Reference to existing Legislation	Civil Aviation Rule Parts 21, 91, and Advisory Circular 91-15
If new legislation is proposed	NA
Compliance to the legislation: Voluntary Mandatory or N/A	Voluntary at this stage. Upon completion of the feasibility study and once the policy framework is established then the necessary legislation will be created to enforce the use of SAF, which will then become mandatory.
Assistance needed	Capacity Building is needed to train the respective stakeholders on what SAF is and ICAO requirements for implementation. Technical expertise and financial support in conducting the feasibility study and the development of the SAF Policy Framework in alignment with ICAO's Framework is needed.
List of Stakeholders involved	CASA PNG, DoT, Air Niugini, Airline Industry, CCDA, Department of Agriculture, Ministry of Oil Palm, NEA, Department of Foreign Affairs, Department of Commerce and Industry, NAQIA, OSS, OFLC, National Petroleum Authority.

4.3 Operational Improvements

MEASURE N.3	
Category	Operational Improvements
Measure	More efficient ATM planning, ground operations, terminal operations, en-route operations, airspace design and usage and aircraft air navigation capabilities
Description	Measures to improve fuel efficient departure and approach procedures: PBN SID/STAR
Action	NSPL will commence implementation of Port Moresby (Jacksons) Aerodrome SIDs/STARs Procedures
Start Date	November 2025
Date of Full Implementation	March 2026
Indicator	It is estimated that about 140 tonnes of CO2 emission will be saved annually, upon full implementation of this measure.
Implemented by	PNG NSPL
Economic Cost	ANG to bear the cost of Aircraft Equipage and Crew Training for PBN Procedures. NSPL to bear the cost of associated ATM system upgrades and ATC/support personnel training.
Currency for financial assistance	USD
Reference to existing Legislation	Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CARs)
If new legislation is proposed	NA
Compliance to the legislation: Voluntary, Mandatory, N/A	Mandatory
Assistance needed	Yes. Technology, Technical support, Education, Research & Finance support
List of Stakeholders involved	PNG NSPL, Air Niugini, NWS, NAC, CASA PNG & DoT

MEASURE N.4	
Category	Operational Improvements
Measure	More efficient ATM planning, ground operations, terminal operations, en-route operations, airspace design and usage, and aircraft air navigation capabilities.
Description	Implementation of RNP AR APCH procedures for reducing approach minima and the possibilities of missed approach/diversion
Action	NSPL will introduce the RNP AR APCH procedures to Gurney International Airport and then eventually to other selected airports nationwide, including Port Moresby (Jacksons).
Start Date	September 2025
Date of Full Implementation	December 2027

Indicator	It is estimated that about 3 tonnes of $C0_2$ emission will be saved annually, upon full implementation at Port Moresby aerodrome.
Implemented by	PNG NSPL
Economic Cost	ANG to bear the cost of Aircraft Equipage and Crew Training for RNP AR Procedures
Currency for financial support	USD
Reference to existing Legislation	Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CARs)
If new legislation is proposed	NA
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Yes. Technology, Technical support, Education, Research & Finance support
List of Stakeholders involved	PNG NSPL, Air Niugini, NWS, NAC, CASA PNG & DoT

MEASURE N.5	
Category	Operational Improvement
Measure	Taxiway Construction for two airports: New - Kiunga Airport and Maintenance of existing – Aropa, Hoskins, Gurney and Wewak Airports
Description	Construction of new taxiway and maintenance of existing taxiway
Action	Implementation of works on these associated taxiways
Start Date	2023
Date of Full implementation	2028
Indicator	% volume of emissions reduction linked to minimized use of Jet A1 aviation fuel.
Implemented by	NAC
Economic Cost	To be determined
Currency for financial assistance	USD
Reference to existing Legislation	1. MTDP IV 2. Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	N/A
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Training requirements on report and calculation of emissions.
List of Stakeholders involved	NAC, CASA, Air Niugini, PNG Air & NPSL, DNPM, Department of Treasury, DOT

MEASURE N. 6	
Category	Operational Improvement
Measure	Construction of runway for Wewak Airport
Description	Construction of 200m meter extension to the existing runway to allow for reduced thrust take off, which burns less fuels and reduces nitrogen and carbon dioxide.
Action	Implementation of 200m runway extension project
Start Date	2026
Date of Full implementation	2028
Indicator	% volume of emissions reduction linked to minimized use of Jet A1 aviation fuel.
Implemented by	NAC
Economic Cost	To be determined
Currency for financial assistance	USD
Reference to existing Legislation	1. MTDP IV 2. Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	N/A
Compliance to the legislation Voluntary Mandatory N/A	Mandatory
Assistance needed	Training requirements on report and calculation of emissions.
List of Stakeholders involved	NAC, CASA, Air Niugini, PNG Air & NPSL, DNPM, Department of Treasury, DOT

MEASURE N.7	
Category	Operational Improvement
Measure	Installation of building management system at PMIA, Mt Hagen and Tokua Airports: 1. Schedules operation of air condition units 2. Schedule operation of lighting
Description	Installation of building management system to control airport terminal load which includes the schedules control of lighting, air conditioning and other building loads.
Action	Implementation of woks on these associated Airports Terminal Buildings
Start Date	2028
Date of Full implementation	2030
Indicator	% volume of emissions reduction linked to minimized use of diesel fuel.
Implemented by	NAC
Economic Cost	3 million

Currency for financial assistance	USD
Reference to existing Legislation	Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	N/A
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Training requirements on report and calculation of emissions.
List of Stakeholders involved	NAC & national airline operators

MEASURE N. 8	
Category	Enhancing weather forecasting services
Measure	1. Supply and installation of Automated Weather Operating System (AWOS) at Buka, Gurney and Vanimo Airports. 2. Supply and installation of Weather & Climate Modelling HPC, IT services, GTS Link restoration and Fiber Extension at PMIA
Description	On time delivery of Significant Weather Conditions (Turbulence, Jet Streams, Wind shear, Thunderstorms, Cyclones, Volcanic Ash, Wind Vectors) in the Port Moresby FIR. Timely delivery of TAFs, ARFORs, SIGMETs for domestic use is another consideration.
Action	Implementation of woks on weather service improvement
Start Date	2026
Date of Full implementation	2028
Indicator	% volume of emissions reduction linked to minimized use of Jet A1 aviation fuel linked to the high-quality forecasts on upper-air temperature, humidity, winds, and weather extreme events.
Implemented by	NAC
Economic Cost	To be determined
Currency for financial assistance	USD
Reference to existing Legislation	3. MTDP IV 4. Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	N/A
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Training requirements on report and calculation of emissions.
List of Stakeholders involved	NAC, CASA, Air Niugini, PNG Air & NPSL, DNPM, Department of Treasury, DOT, PNGNWS

4.4 Airport Improvements

MEASURE N.9	
Category	Airfield Improvements
Measure	Implementation of electrical operating ground vehicles for Port Moresby International Airport (PMIA).
Description	Usage of hybrid 4x4 vehicles at PMIA as safety operation vehicles
Measure	Feasibility study into the usage of hybrid 4x4 vehicles at PMIA
Action	Support for feasibility study
Start Date	2026
Date of Full implementation	2027
Indicator	% volume of emissions reduction linked to minimized use of diesel fuel vehicles.
Implemented by	NAC
Economic Cost	To be determined
Currency for financial assistance	USD
Reference to existing Legislation	1. National Transport Strategy 2. MTTP III 3. Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	Electric Vehicle Policy
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Not applicable
List of Stakeholders involved	NAC, CASA, Air Niugini, PNG Air & NSPL

MEASURE N.10	
Measure	Regulatory Measures
Description	1. Aircraft Airworthiness Certification Standards - Enforcement of Civil Aviation Rule Part 21 2. Aircraft Operating Requirements - Enforcement of Civil Aviation Rule Part 91 through Advisory Circular 91-15 on CORSIA implementation.
Measure	Regulatory Measures to implement ICAO Annex 16
Action	Activity has completed and will be updated as and when required.
Start Date	2024
Date of Full implementation	Ongoing aligned with ICAO SARPs Annex 16 Volume IV.
Indicator	Percentage of reduction in the volume emission reduction linked to reduced fuel burn.
Implemented by	CASA, DoT, Air Niugini and the Airline Industry.

Economic Cost	Operational costs are on-going costs to CASA PNG. No additional cost.
Currency for financial assistance	NA
Reference to existing Legislation	Civil Aviation Rule Parts 21, 91, and Advisory Circular 91-15
If new legislation is proposed	NA
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Capacity Building is needed to train the respective stakeholders on what SAF is and ICAO requirements for implementation.
List of Stakeholders involved	CASA PNG, DoT, Air Niugini and the Airline Industry

MEASURE N.11	
Category	Reduced Energy Demand and Preferred Cleaner Energy Sources
Measure	Solar Power at gate (pilot activity in Port Moresby)
Description	Port Moresby Jackson International Airport to introduce Solar Power for use by its services (air conditioning & lighting) as well as gate to gate power provision.
Measure	Conversion of airport infrastructure and ground support equipment to solar and minimize use of diesel-generated power.
Action	NAC Monitor its Energy use for comparison purposes. Extending this project to the other 22 regional airports would be useful.
Start Date	2023
Date of Full implementation	Ongoing process after the implementation in a pilot airport.
Indicator	% volume of emissions reduction linked to minimized use of diesel generated power.
Implemented by	NAC
Economic Cost	The proposed project is at the Concept Stage. Fully costed option to be included in the next submission to UNDP GEF and GCF.
Currency for financial assistance	USD
Reference to existing Legislation	Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	Nil
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Technical support & Research support- feasibility study on use of solar

List of Stakeholders involved	NAC, PNG NSPL, Air Niugini & CASA PNG, UNDP, CEPA, CCDA, DoT
Works progress update	This activity has not progress. However, it is consolidated as part of solar PV system installation works.

MEASURE N. 12	
Category	Reduced Energy Demand and Preferred Cleaner Energy Sources
Measure	Install Solar Photovoltaic (PV) system for 21 national airports
Description	Installation of back up Solar PV system as primary power source. All national airport facilities to be powered by Solar PV systems by the end of 2030
Action	NAC to implement installation of new Solar PV system
Start Date	2026
Date of Full implementation	2030
Indicator	% volume of emissions reduction linked to minimized use of diesel generated power.
Implemented by	NAC with financial support from donor funding agency
Economic Cost	3 million (estimate)
Currency for financial assistance	USD
Reference to existing Legislation	1. Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR) 2. National Energy Authority Act 2021 3. National Enenergy Policy 2017 – 2027
If new legislation is proposed	NIL
Compliance to the legislation: Voluntary Mandatory or N/A	Mandatory
Assistance needed	Technical support & Research support- feasibility study on use of solar
List of Stakeholders involved	NAC, NEA, CEPA, DOT, CASA, Air Niugini, PNG Air, CCDA, TSSP, ADB & NPSL

MEASURE N.13	
Category	Airfield Improvements
Measure	Implementation of LED Airfield Ground Lighting for Port Moresby International Airport (PMIA) and Tokua Airport.
Description	Tokua Airport and PMIA AGL lighting system to be converted from Halogaen to LED by 2028. Installation AGL LED lights.
Action	NAC to implement installation of new AGL LED Lights
Start Date	2026
Date of Full implementation	2028
Indicator	% volume of emissions reduction linked to minimized use of diesel generated power.
Implemented by	NAC

Economic Cost	15 million (estimate)
Currency for financial assistance	USD
Reference to existing Legislation	Civil Aviation Act 2000 (as amended) and Civil Aviation Rules (CAR)
If new legislation is proposed	NIL
Compliance to the legislation: Voluntary, Mandatory or N/A	Mandatory
Assistance needed	Training requirements on report and calculation of emissions.
List of Stakeholders involved	NAC, CASA, Air Niugini, PNG Air & NPSL

5. EXPECTED RESULTS

With the adoption of the mitigation measures outlined above, including aircraft technology upgrades, operational improvements, sustainable aviation fuels, and CORSIA compliance, PNG anticipates significant reductions in fuel consumption and CO_2 emissions. These measures advance ICAO's global climate goals, enhance national aviation efficiency, reduce operational costs, and strengthen capacity for effective environmental management. The estimated fuel and emissions savings for the identified intervention are presented in the table below.

Table 8: Expected Results: Fuel Savings (as generated by the EBT)

Year	**Annual Fuel burn before implementation of mitigation actions** (Tonnes)	**Annual Fuel burn after implementation of mitigation actions** (Tonnes)	**Annual Fuel savings** (Tonnes)	**Change Fuel savings** (%)
2022	27,858.00	27,415.66	442.34	-1.59
2023	29,473.76	28,962.75	511.02	-1.73
2024	31,183.24	25,281.62	5,901.62	-18.93
2025	32,991.87	17,824.55	15,167.32	-45.97
2026	34,905.40	17,007.08	17,898.32	-51.28
2027	36,929.91	19,015.59	17,914.32	-48.51
2028	39,071.85	21,125.53	17,946.32	-45.93
2029	41,338.01	23,327.69	18,010.32	-43.57
2030	43,735.62	25,597.30	18,138.32	-41.47
2031	46,272.28	28,389.97	17,882.32	-38.65
2032	48,956.08	31,073.76	17,882.32	-36.53
2033	51,795.53	33,913.21	17,882.32	-34.52
2034	54,799.67	36,917.35	17,882.32	-32.63
2035	57,978.05	40,095.73	17,882.32	-30.84
2036	61,340.78	43,458.46	17,882.32	-29.15
2037	64,898.54	47,016.22	17,882.32	-27.55
2038	68,662.66	50,780.34	17,882.32	-26.04
2039	72,645.09	54,762.77	17,882.32	-24.62
2040	76,858.51	58,976.19	17,882.32	-23.27
2041	81,316.30	63,433.98	17,882.32	-21.99
2042	86,032.65	68,150.33	17,882.32	-20.79
2043	91,022.54	73,140.22	17,882.32	-19.65
2044	96,301.85	78,419.53	17,882.32	-18.57
2045	101,887.36	84,005.04	17,882.32	-17.55
2046	107,796.82	89,914.50	17,882.32	-16.59

2047	114,049.04	96,166.72	17,882.32	-15.68
2048	120,663.88	102,781.56	17,882.32	-14.82
2049	127,662.39	109,780.07	17,882.32	-14.01
2050	135,066.81	117,184.49	17,882.32	-13.24

Annual Fuel efficiency improvement **before** implementation of mitigation actions:	**0.00**%
Annual Fuel efficiency improvement **after** implementation of mitigation actions:	**0.45**%

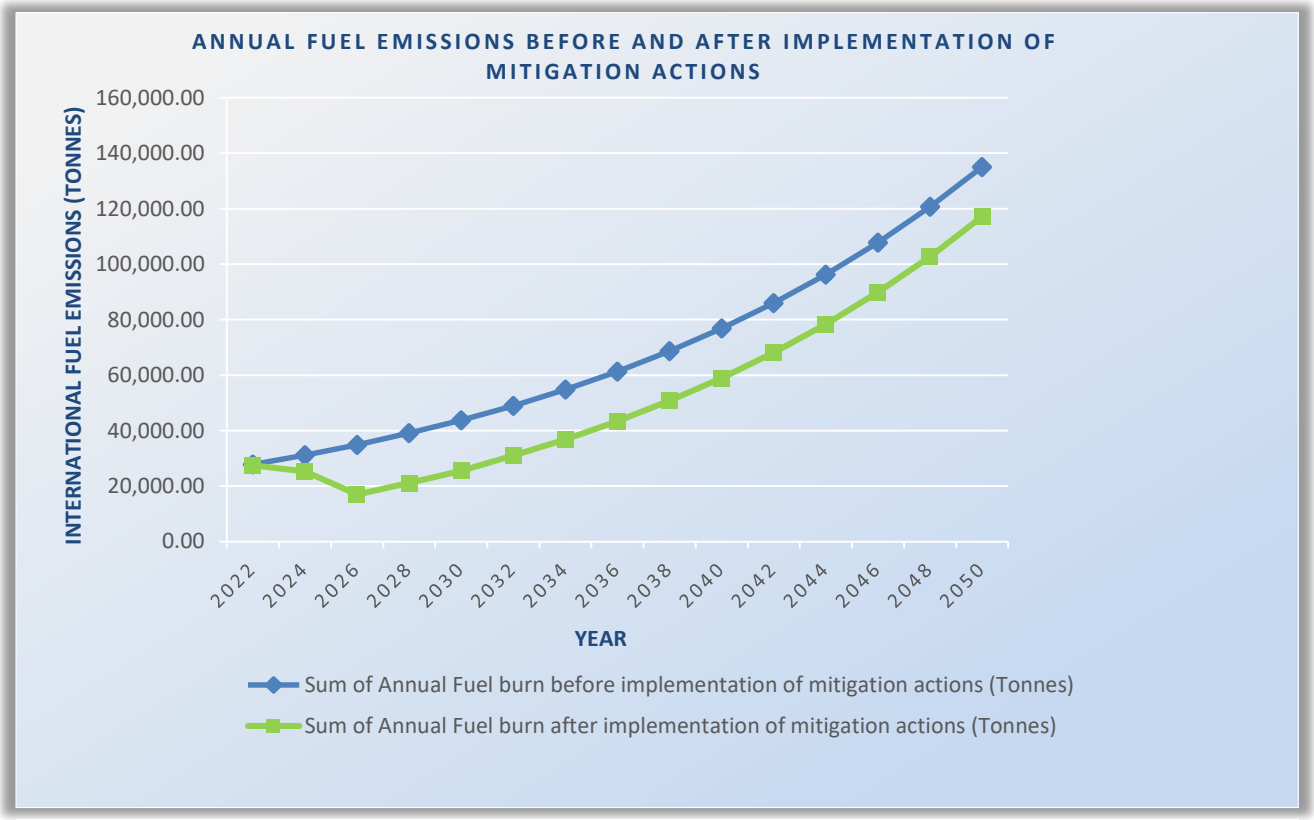


Figure 3: Graph of International Fuel Burn before and after implementation of Mitigation actions

Table 8 is a presentation on the expected results of fuel savings for the year 2024. As can be deduced from the table, by year 2050, the annual fuel burn before mitigation measures are implemented is 135,066.81 tonnes while the annual fuel burn after mitigation measures are implemented is 117,184.49 tonnes. This gives us an annual fuel savings of 17,882.32 tonnes with change fuel savings of -13.24%. Through the data analysis on the EBT, it gives a 0.45% annual fuel efficiency improvement after implementation of mitigations actions. This is an increase of efficiency of 55% from the base year of 2022.

Table 9: Expected Results: CO2 Savings (*generated by EBT*)

Year	**Annual C02 emissions before implementation of mitigation actions** (Tonnes)	**Annual CO2 emissions after implementation of mitigation actions** (Tonnes)	**Annual Fuel savings** (Tonnes)	**Change Fuel savings** (%)

2022	88,031.28	86,633.49	1,397.79	-1.59
2023	93,137.09	91,522.27	1,614.82	-1.73
2024	98,539.05	77,103.93	21,435.12	-21.75
2025	104,254.31	53,539.58	50,714.73	-48.65
2026	110,301.06	47,113.37	63,187.69	-57.29
2027	116,698.52	53,460.27	63,238.25	-54.19
2028	123,467.04	60,127.67	63,339.37	-51.30
2029	130,628.12	67,086.52	63,541.61	-48.64
2030	138,204.56	74,258.47	63,946.09	-46.27
2031	146,220.42	83,083.29	63,137.13	-43.18
2032	154,701.20	91,564.08	63,137.13	-40.81
2033	163,673.87	100,536.75	63,137.13	-38.57
2034	173,166.96	110,029.83	63,137.13	-36.46
2035	183,210.64	120,073.51	63,137.13	-34.46
2036	193,836.86	130,699.73	63,137.13	-32.57
2037	205,079.40	141,942.27	63,137.13	-30.79
2038	216,974.00	153,836.87	63,137.13	-29.10
2039	229,558.49	166,421.37	63,137.13	-27.50
2040	242,872.89	179,735.76	63,137.13	-26.00
2041	256,959.51	193,822.39	63,137.13	-24.57
2042	271,863.17	208,726.04	63,137.13	-23.22
2043	287,631.23	224,494.10	63,137.13	-21.95
2044	304,313.84	241,176.71	63,137.13	-20.75
2045	321,964.04	258,826.92	63,137.13	-19.61
2046	340,637.96	277,500.83	63,137.13	-18.53
2047	360,394.96	297,257.83	63,137.13	-17.52
2048	381,297.87	318,160.74	63,137.13	-16.65
2049	403,413.14	340,276.02	63,137.13	-15.65
2050	426,811.11	363,673.98	63,137.13	-14.79

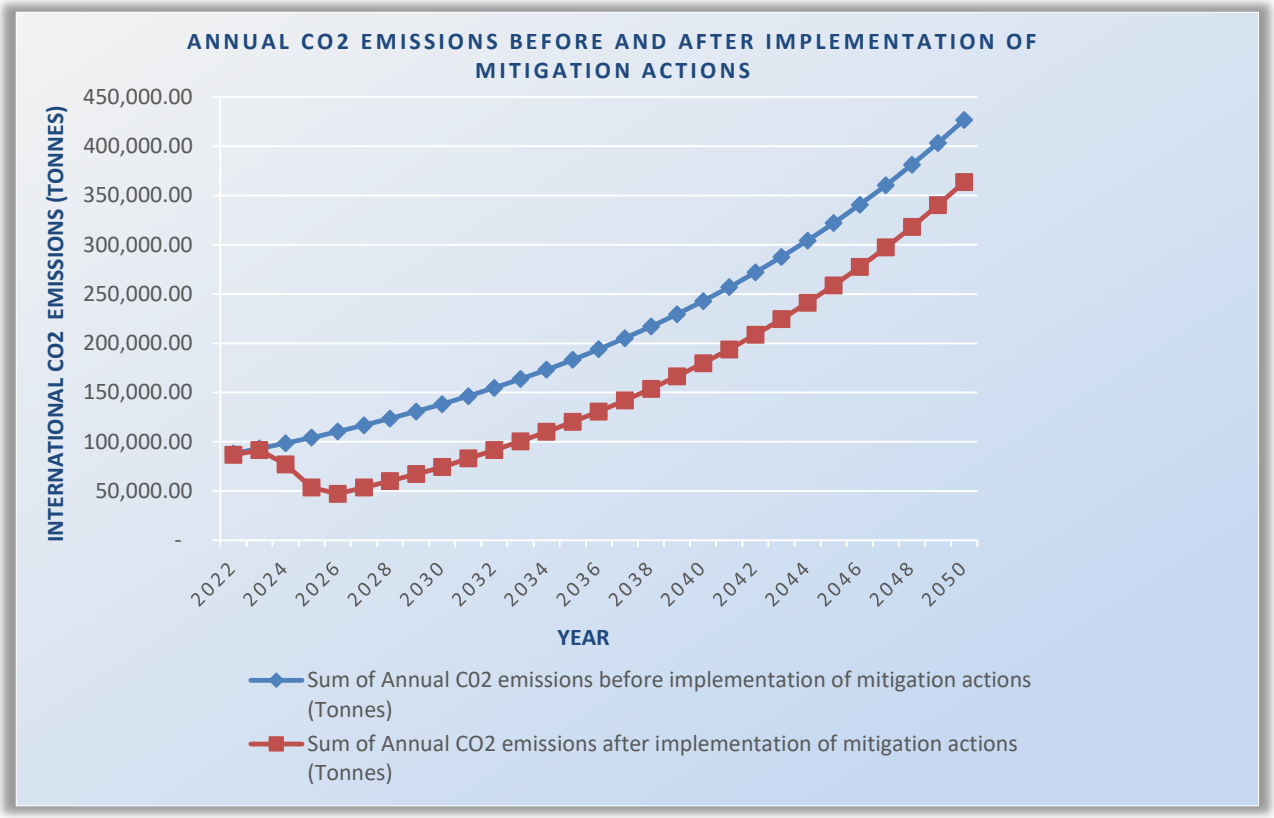


Figure 4: Graph of CO2 emissions before vs after implementation of mitigation actions

Table 9 presents the expected results on the expected CO_2 savings for the year 2024. As can be seen from the table, by year 2050, without any implementation of mitigation measures the annual CO_2 emissions is 428,811.11 tonnes. After implementation of mitigation measures the annual CO_2 emissions is expected to be 363,673.98 tonnes. Figure 3 above presents a graphical comparison of CO_2 emissions before and after the implementation of the proposed measures. It illustrates that by 2050, the potential CO_2 emissions reduction could reach approximately 363,509.66 tonnes of CO_2, corresponding to an estimated -14.79% improvement in fuel efficiency. This is a 54% increase in CO2 fuel emissions savings.

Improvements in fuel burn and CO_2 emissions are being achieved through the adoption of more efficient aircraft technologies, optimized flight operations, and the concerted agreement to gradually introduce SAF, supported by airport-level initiatives such as the electrification of ground equipment. PNG is actively pursuing new technologies and enhancing operational systems to address aviation-related emissions. Stronger coordination across the sector has enabled a wider range of measures to be identified and incorporated into this updated SAP, while also improving data availability for more accurate analysis and targeted action. The effective implementation of these measures remains an ongoing responsibility of the relevant agencies. Collectively, these efforts together with compliance under CORSIA are contributing to measurable reductions in fuel use and CO_2 emissions.

6. ASSISTANCE NEEDS

Papua New Guinea still has significant room for improvement in maximizing its efforts to reduce CO_2 emissions from the aviation sector. To successfully implement its SAP and meet ICAO environmental and operational standards, the PNG requires targeted financial, technical, and capacity-building support across multiple priority areas. These requests are designed to strengthen institutional systems, enhance technical expertise, and enable the adoption of sustainable and efficient aviation practices. The key areas relevant to PNG's Action Plan which outlines specific areas where assistance is needed to ensure effective implementation and alignment with global aviation sustainability goals include:

Table 10: Assistance Needs and Description

Assistance Needs		Description
☒	Increasing awareness on aviation environmental protection and ICAO aspirational goals through conducting workshops and seminars	1. Training and knowledge-sharing initiatives to enhance the understanding of sustainable practices, emissions reduction strategies, and global aviation standards among policymakers, airport operators, and airline personnel. 2. Development of tailored training materials, facilitate workshops, and promote knowledge exchange to strengthen national capacity in implementing environmentally responsible aviation practices.
☒	Providing technical assistance to States to help them to strengthen their capacity to implement mitigation measures and monitor the implementation progress, including through the development of guidance materials, trainings on the development of SAP, and use of ICAO tools	1. Provision of support to undertake CORSIA reporting obligations, including technical guidance, hands-on assistance, and capacity development to strengthen institutional systems. This support will ensure the accurate collection and verification of emissions data, enhance national readiness, and facilitate the timely submission of reports in line with ICAO requirements. 2. Training on reporting and calculating emissions, including building the skills of relevant staff to understand ICAO methodologies, apply standardized tools for data collection, and ensure accuracy and consistency in national reporting obligations. 3. Awareness-raising and capacity-building on Sustainable Aviation Fuel (SAF), encompassing the promotion of technical knowledge on SAF development pathways, exchange of experiences and best practices in its deployment, and dissemination of ICAO guidance and requirements to facilitate effective implementation by States. 4. Capacity-building through training programs for air traffic controllers, airport operators, and relevant stakeholders to strengthen technical competencies in system management and operation.
☒	Encouraging collaboration with other ICAO Member States and the exchange of information and sharing of best practices for action plan development and mitigation measure implementation	1. Learning exchange on the development of green technology for aviation around the world. 2. Technical assistance is also requested to align national initiatives with ICAO standards, facilitate technology transfer, and promote regional cooperation for SAF development and deployment.

☒	Providing guidance to States on accessing financial instruments for the implementation of mitigation measures including innovative mitigation measures and projects for emission reductions from international aviation	1. Financial support to upgrade airport infrastructure with climate-resilient and energy-efficient technologies that improve operational efficiency while reducing emissions. 2. Technical assistance to adopt advanced air traffic management solutions, optimize ground operations, and ensure alignment with ICAO standards and global best practices.
☒	Facilitating partnerships, alliances and cooperation between States and all relevant stakeholders for the discovery of the potential of States on the development and implementation of mitigation measures which include but are not limited to feasibility studies, pilot projects, capacity development on environmental data management, etc.	1. Technical and research support to conduct a comprehensive feasibility study on the application of solar energy within the aviation sector, particularly for airport operations and ground facilities. 2. Capacity-building is sought to strengthen local expertise in renewable energy planning, installation, and maintenance. Technical guidance and knowledge exchange with ICAO and international partners will be essential to ensure that the study adopts global best practices, aligns with ICAO's environmental goals, and provides a practical roadmap for transitioning to low-carbon, resilient energy solutions in the aviation sector.
☒	Supporting the development of projects and activities such as feasibility studies, policy and regulatory	1. Technical and financial support to undertake a feasibility study on the introduction of hybrid 4x4 vehicles at Port Moresby International Airport (PMIA). The study will assess operational suitability, cost-effectiveness, emissions reduction potential, and infrastructure requirements, providing a pathway to transition airport ground transport to cleaner and more efficient technologies.
☐	Facilitate access to financing through collaboration with financial institutions	1. Financial support to explore and develop pathways for the production and use of SAF, including feasibility studies, pilot projects, and investments in enabling infrastructure. 2. Financial assistance is needed to assess infrastructure requirements, investment costs, and potential return on investment for integrating solar technologies.
☐	*Others: Please explain in detail*	N/A

PAPUA NEW GUINEA

50 Years of
Independence