Indonesia's Action Plan to Reduce CO2 Emissions from International Aviation

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This document presents Indonesia's Action Plan as part of its continued commitment to supporting global efforts led by the International Civil Aviation Organization (ICAO) to reduce greenhouse gas emissions from international aviation. It demonstrates Indonesia's determination to contribute to ICAO's Long-Term Global Aspirational Goal (LTAG) of achieving net-zero carbon emissions from international aviation.

The Action Plan aligns Indonesia's climate goals with the country's growing air transport needs and national development priorities, ensuring that aviation can continue to grow sustainably.

This fourth edition reflects the latest update to Indonesia's Action Plan following its third submission in 2021.

Directorate General of Civil Aviation
Ministry of Transportation of the Republic of Indonesia
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1. INTRODUCTION AND BACKGROUND

Since 2015, Indonesia has demonstrated strong commitment to global climate action through the submission of its INDC and subsequent Nationally Determined Contributions (NDCs) under the Paris Agreement. Indonesia's initial commitment targeted a 29% emissions reduction through national efforts and up to 41% with international support. These targets were later strengthened in the Updated and Enhanced NDCs to 31.89% (unconditional) and 43.20% (conditional). The Second NDC adopts an emissions-level approach, reflecting improved methodologies and Indonesia's increased ambition in line with Decision 1/CP.21.

To support the achievement of its 2030 NDC targets and advance the transition to a low-carbon, climate-resilient economy, Indonesia has aligned its climate policies with key national development plans, including the RPJMN 2025–2029, Vision 2045, and Asta Cita. The Enhanced NDC further strengthens mitigation and adaptation commitments and fully incorporates the Paris Agreement Rulebook.

Indonesia has also established a long-term framework through the Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050), which outlines pathways to achieve net-zero emissions by 2060 or earlier. This strategy complements Indonesia's short- and medium-term commitments under the NDC framework.

To reinforce the national regulatory basis for climate action, Indonesia issued Presidential Regulation No. 110 of 2025 on the Implementation of Carbon Economic Value Instruments and National GHG Emission Control, replacing Presidential Regulation No. 98 of 2021. This regulation establishes an integrated framework for carbon pricing instruments and national emissions control to help meet NDC objectives.

In the transportation sector, climate mitigation efforts have been strengthened through Ministerial Decree No. KM 8 of 2023 on Climate Change Mitigation Actions in Transportation. This regulation sets out a comprehensive mitigation framework across all transport modes. For aviation, it identifies 11 mitigation measures focused on operational efficiency, cleaner technologies, Sustainable Aviation Fuels (SAF), and improved air traffic management.

Under the National Action Plan for GHG Emission Reduction, the Government of Indonesia and national aviation stakeholders continue to work collaboratively to reduce emissions from both domestic and international aviation. This updated State Action Plan outlines Indonesia's strategic approach and concrete actions to reduce CO_2 emissions from international aviation while maintaining high standards of safety, operational efficiency, and sectoral sustainability.

The Action Plan follows ICAO-recommended methodologies to ensure alignment with global best practices and transparent planning and reporting. It provides Indonesia's main national framework guiding aviation climate policy, tracking progress, and strengthening cooperation across government and industry. Key mitigation measures include:

- Operational improvements and optimized air traffic management

• Development and deployment of Sustainable Aviation Fuels (SAF)
• Aircraft fleet modernization with more efficient technologies
• Regulatory and policy measures supporting CORSIA implementation
• Continuous enhancement of emissions inventories and projections

Through this Action Plan, Indonesia reaffirms its support for ICAO's global aspirational goals, including achieving a 2% annual fuel efficiency improvement through 2050, carbon-neutral growth, the Long-Term Global Aspirational Goal (LTAG) of net-zero carbon emissions by 2050, and the collective goal of reducing CO_2 emissions from international aviation by 5% by 2030 through the use of SAF, LCAF, and other cleaner energy sources.

This State Action Plan is a living document and will be updated periodically in accordance with ICAO Assembly Resolution A42-21 on Climate Change. Finalized in December 2025, it replaces Indonesia's 2021 State Action Plan and reaffirms the country's continued commitment to ICAO's environmental agenda and to global efforts toward a more sustainable international aviation sector.

A. Indonesia Profile and Future Transportations Development Focus

Indonesia is the world's largest archipelagic country, located between 11° South and 6° North latitude and 95° to 141° East longitude. It consists of 17,508 islands, around 6,000 of which are inhabited. Based on the 2025 national census, Indonesia's population is approximately 286.7 million.

In 2024, Indonesia's GDP per capita was about USD 4,960. With this strong economic base, Indonesia remains one of the world's largest economies and the largest in Southeast Asia. According to Statistics Indonesia, the economy continued to grow steadily in 2025, with year-on-year growth of 5.12% in the second quarter and 5.04% in the third quarter.

As an archipelagic nation, aviation plays a vital role in connecting Indonesia's vast territory and supporting national and international economic activity. Connectivity development focuses on three main areas: intra-corridor connectivity, inter-corridor connectivity, and international connectivity.

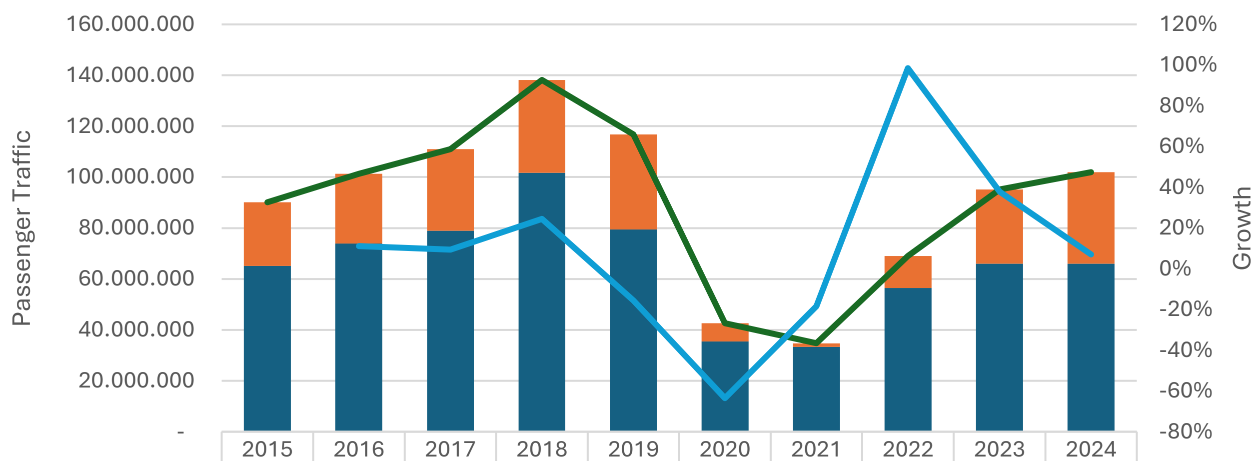
Air transport enables mobility for business, tourism, and social activities, supports national logistics and government operations, and plays a critical role in disaster response. However, for aviation to remain sustainable, its economic and social benefits must be balanced with careful management of its environmental impacts.

B. Statistic and Growth Trends of Aviation Sector in Indonesia

Indonesia is an important and rapidly growing air transport market. Before the COVID-19 pandemic, the aviation sector experienced strong expansion, driven by rising demand for air travel. This growth supported the expansion of airlines, aircraft fleets, route networks, and the overall aviation industry.

Air transport connectivity has increased significantly in recent years. In 2024, the Directorate General of Civil Aviation (DGCA) of Indonesia issued flight permits for 312 domestic routes connecting 118 cities, served by 14 airlines. For international services, permits were issued for 128 routes connecting 17 Indonesian cities with 62 cities abroad, operated by 7 national airlines and 55 foreign passenger airlines.

Passenger traffic grew by an average of 11% per year from 2015 to 2018. It then declined during 2019–2021 due to the COVID-19 pandemic, before recovering strongly in 2022 and 2023 and stabilizing in 2024. Over the 2015–2024 period, the domestic market consistently dominated, accounting for about 70% of total passenger traffic. In non-pandemic years, international traffic represented around 30% and showed rapid growth, although its share dropped significantly during the pandemic.



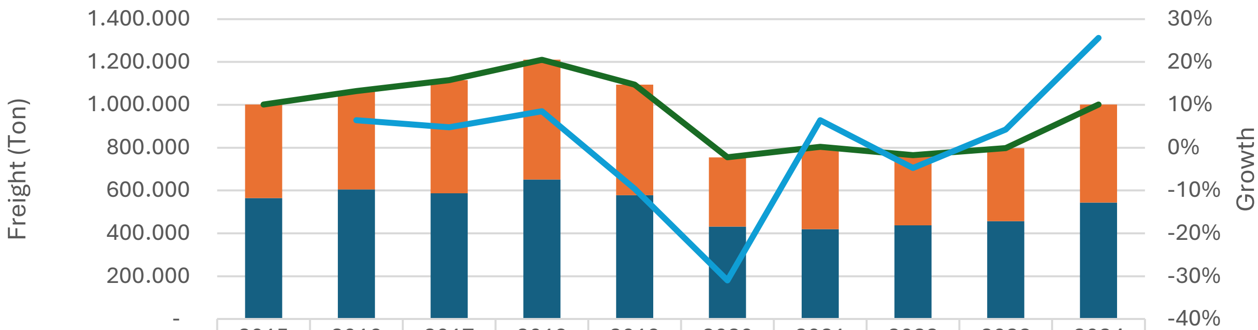
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
International	24.897	27.460	31.953	36.430	37.291	7.189.	1.397.	12.591	29.189	35.970
Domestic	65.171	73.913	78.998	101.74	79.466	35.393	33.364	56.415	65.944	65.946
Total	90.068	101.37	110.95	138.17	116.75	42.583	34.762	69.006	95.134	101.91
Growth (%)		11%	9%	25%	-16%	-64%	-18%	99%	38%	7%

Figure 1 Graphic of Passenger Traffic

Air freight activity in Indonesia has shown an overall upward trend over the past decade, with steady growth before the COVID-19 pandemic and a gradual recovery afterward. During the period 2015 – 2018, air freight traffic increased by an average of about 7% per year.

From 2015 to 2018, total air freight volume grew from approximately 1.0 million tons to a peak of 1.21 million tons, driven by both domestic and international markets. Domestic freight consistently accounted for the larger share, while international freight also expanded, reaching its highest level in 2018 at around 559 thousand tons. However, freight traffic declined sharply in 2019 and 2020, falling by about 10% and 31% year-on-year, respectively, due to the impact of the COVID-19 pandemic.

Recovery began in 2021 with a 6% increase, although 2022 recorded a slight decline of around 5%. In 2023, freight volumes resumed growth, and by 2024 total traffic reached approximately 1.002 million tons, supported by a strong year-on-year increase of 26%, the highest growth rate in the past decade. While domestic freight remains the dominant segment, international freight has demonstrated a faster pace of recovery in recent years and is approaching pre-pandemic levels.



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
International	436.84	460.34	528.61	559.21	516.63	324.44	384.02	328.72	340.98	459.061
Domestic	564.04	604.34	587.01	651.13	577.80	430.75	419.51	436.82	456.72	543.041
Total	1.000.	1.064.	1.115.	1.210.	1.094.	755.19	803.53	765.54	797.70	1.002.
Growth (%)		6%	5%	8%	-10%	-31%	6%	-5%	4%	26%

Figure 2 Graphic of Air Freight Traffic

The rapid growth of air traffic has increased the demand for safe and efficient air navigation services. In response, and in line with Government Regulation No. 77 of 2012, the Directorate General of Civil Aviation (DGCA) established a Single Air Navigation Service Provider (Single ANSP), separated from the DGCA's regulatory function. This reform was aimed at improving the safety, efficiency, and capacity of Indonesia's air traffic system. As a result, the DGCA can focus more effectively on its role as the regulator, while air navigation services are delivered in a more efficient and professional manner. In parallel, Indonesia is implementing Performance-Based Navigation (PBN) in accordance with its national PBN implementation roadmap.

C. National and Air Transport Sector Action Plans on Mitigation of GHG

The energy requirement for flight activities during 2021–2024 is illustrated by the volume of aviation fuel distributed by the national fuel supplier, as presented in the graphic below.

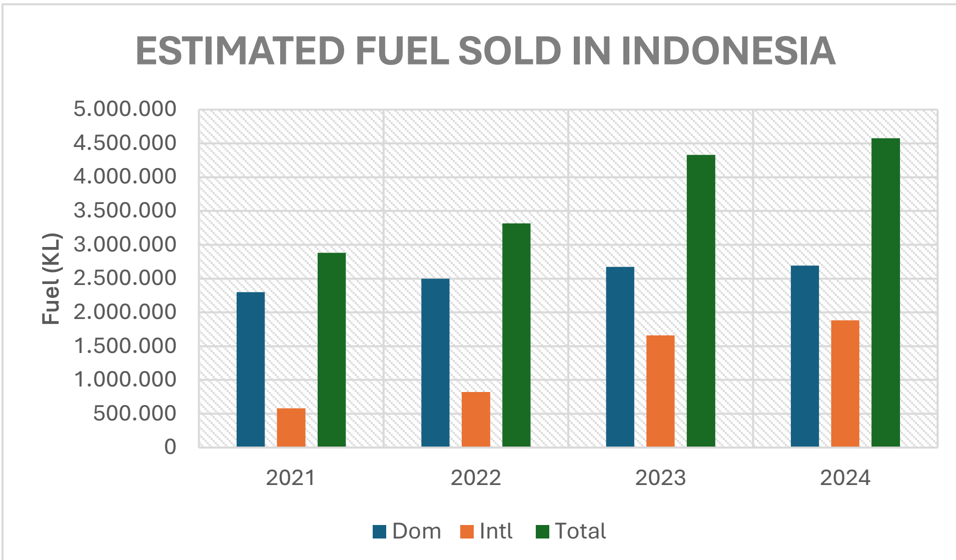


Figure 3 Graphic of Estimated Fuel Sold in Indonesia

As mentioned in the introduction, the goal is to reduce GHG emissions 31.89% (equivalent to 915 million tones CO2) or 43.20% (equivalent to 1,240 million tones CO_2) with contribution of the international support up to 2030. With the baseline and assumption used for projection and policy scenario 2020-2030, the projected BAU and emission reduction for both unconditional (CM1) and conditional (CM2) reduction, as mentioned earlier, are as in the Table below.

Table 1 National GHG Reduction Measures and Target from Each Sector Category

Sector	GHG Emission Level 2010* (MTon CO2-eq)	GHG Emission Level 2030 MTon CO_2-eq			GHG Emission Reduction MTon CO_2.eq		GHG Emission Reduction % of Total BaU		Annual Average Growth BAU (2010-2030)	Average Growth 2000-2012
		BaU	CM1	CM2	CM1	CM2	CM1	CM2		
1. Energy*	453.2	1,669	1,311	1,223	358	446	12.5%	15.5%	6.7%	4.50%
2. Waste	88	296	256	253	40	43.5	1.4%	1.5%	6.3%	4.00%
3. IPPU	36	69.6	63	61	7	9	0.2%	0.3%	3.4%	0.10%
4. Agriculture	110.5	119.66	110	108	10	12	0.3%	0.4%	0.4%	1.30%
5. Forestry and Other Land Uses (FOLU)**	647	714	214	-15	500	729	17.4%	25.4%	0.5%	2.70%
TOTAL	**1,334**	**2,869**	**1,953**	**1,632**	**915**	**1,240**	**31.89%**	**43.20%**	**3.9%**	**3.20%**

Notes: **CM1**= Counter Measure 1 (*unconditional mitigation scenario*)
CM2= Counter Measure 2 (*conditional mitigation scenario*)
*) Including fugitive.
**) Including emission from estate and timber plantations.

The national measures will be implemented gradually making them compatible with the level of air transport growth and employment absorption and thus can create dynamic air transport activities and have a positive contribution to the national economy, social development and in an environmentally friendly manner.

The success of the programs depends on the commitment of all stakeholders in facilitating and contributing their support either in management side or human resources, technology, and knowhow.

Framed on that policy framework, the Directorate General of Civil aviation (DGCA) has expressed the commitment for the reduction of GHG emissions in accordance with ICAO and IATA global policy by developing "The Indonesia Action Plan on Mitigation of Climate Change and Reduction of Green House Gas Emissions for Aviation" (RAN-GRK sub-sector Aviation) which have three focuses: Green Flight, Green Corridors and Green/Eco Airports, through six (6) pillars of national basket of measures as follows:

1. Update the policy and regulations in order to support the aviation industry sustainable growth and in line with the environmental climate change program (Regulatory Framework).
2. Renew the national fleets by the next generation of aircraft and engine technology that better fuels efficiency, low carbon emissions and lower noise impact. (Technology Improvement)
3. Develop and improve the aviation infrastructure and facilities that comply with environmental requirements and eco-airport.
4. Enhance air traffic management and operations through the continued and expanded implementation of Performance-Based Navigation (PBN), including further optimization of airspace and route structures supported by seamless navigation infrastructure.
5. Establish renewable energy supply (solar energy) for airport facilities and bio fuels for aircraft and ground service equipment in order to reduce fossil-based energy used.

6. Develop the system to support the ICAO policy on the Market-based Measures (MBMs) known as Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

2. BASELINE SCENARIO

A. Methodology and Data

The calculation method used to determine the baseline scenario is in accordance with the ICAO Doc 9988 "Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities – Towards LTAG Implementation -" Fourth Edition, Chapter 3. Based on the available data, the method B (fleet size of more than ten aircraft and data available for at least two years) was chosen by following the steps.

- Collect historical annual data from 2015-2020 for RTK and flight information consisting of: airport pair or flight distance, number of flights, and type of aircraft of transport category.
- Generate calculation of the annual CO_2 emission for each past year by using the ICAO Calculator.
- Calculate the annual fuel consumption (in volume tonnes) for each past year by converting the CO_2 emission using data of:
  - Emission factor of jet fuel: 3.157 kg CO_2/kg.
  - 1 ton = 1000 kg.
- Calculate the fuel efficiency for each past year by dividing the fuel consumption by the RTK.
- Estimate the fuel consumption using ICAO EBT tool.

B. Baseline Scenario

Estimated baseline of fuel consumption and CO_2 emissions for international, domestic, and total flight within Indonesia from 2015-2050 are given in the following tables and graphs.

For the definition of international flight used in this document is refer to the ICAO methodology (all international flights operated by all air carriers registered in Indonesia).

Table 2 Baseline Scenario for International Flight

INTERNATIONAL FLIGHT			
Year	**RTK (Ton kilometers)**	**Fuel Burn (Tonnes)**	**Efficiency**
2015	2.568.591	935.870	0,364
2016	3.124.132	1.033.346	0,331
2017	3.723.871	1.187.433	0,319
2018	4.176.193	1.311.339	0,314

INTERNATIONAL FLIGHT			
Year	RTK (Ton kilometers)	Fuel Burn (Tonnes)	Efficiency
2019	3.553.734	1.129.108	0,318
2020	856.771	323.451	0,378
2021	1.060.683	352.144	0,332
2022	1.560.683	518.142	0,332
2023	2.060.683	684.141	0,332
2024	4.711.002	1.356.327	0,288
2025	4.984.240	1.420.431	0,285
2026	5.273.326	1.488.749	0,282
2027	5.579.179	1.561.406	0,28
2028	5.902.771	1.638.557	0,278
2029	6.245.132	1.720.384	0,275
2030	6.607.349	1.807.094	0,273
2031	6.990.575	1.898.913	0,272
2032	7.396.029	1.996.090	0,27
2033	7.824.999	2.098.893	0,268
2034	8.278.848	2.207.610	0,267
2035	8.759.022	2.322.550	0,265
2036	9.267.045	2.444.042	0,264
2037	9.804.534	2.572.435	0,262
2038	10.373.196	2.708.102	0,261
2039	10.974.842	2.851.437	0,26
2040	11.611.383	3.002.859	0,259
2041	12.284.843	3.162.811	0,257
2042	12.997.364	3.331.763	0,256
2043	13.751.211	3.510.212	0,255

INTERNATIONAL FLIGHT			
Year	RTK (Ton kilometers)	Fuel Burn (Tonnes)	Efficiency
2044	14.548.781	3.698.684	0,254
2045	15.392.610	3.897.734	0,253
2046	16.285.382	4.107.952	0,252
2047	17.229.934	4.329.959	0,251
2048	18.229.270	4.564.413	0,25
2049	19.286.568	4.812.010	0,25
2050	20.405.189	5.073.484	0,249

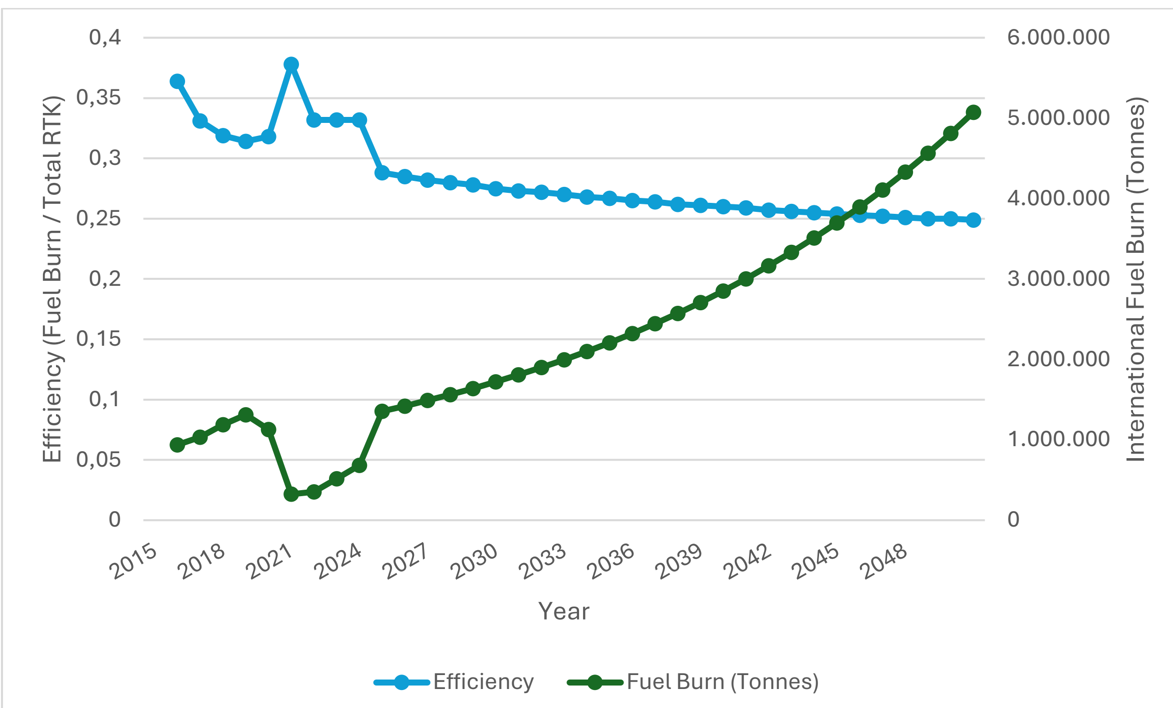


Figure 4 Graph of Baseline Scenario for International Flight

Table 3 Baseline Scenario for Domestic Flight

DOMESTIC FLIGHT			
Year	**RTK (Ton kilometers)**	**Fuel Burn (Tonnes)**	**Efficiency**
2015	5.936.263	2.594.955	0,437
2016	6.497.360	2.975.010	0,458
2017	6.931.705	3.004.106	0,433
2018	7.791.888	3.365.963	0,432
2019	6.340.008	2.752.645	0,434
2020	2.946.331	1.605.294	0,545
2021	3.256.600	1.433.218	0,440
2022	3.856.600	1.697.275	0,440
2023	4.456.600	1.961.333	0,440
2024	8.404.622	3.507.147	0,417
2025	8.892.090	3.684.002	0,414
2026	9.407.831	3.869.775	0,411
2027	9.953.485	4.064.917	0,408
2028	10.530.788	4.269.899	0,405
2029	11.141.573	4.485.217	0,403
2030	11.787.785	4.711.394	0,400
2031	12.471.476	4.948.975	0,397
2032	13.194.822	5.198.538	0,394
2033	13.960.121	5.460.685	0,391
2034	14.769.808	5.736.051	0,388
2035	15.626.457	6.025.304	0,386
2036	16.532.792	6.329.142	0,383
2037	17.491.694	6.648.302	0,380
2038	18.506.212	6.983.557	0,377

DOMESTIC FLIGHT			
Year	RTK (Ton kilometers)	Fuel Burn (Tonnes)	Efficiency
2039	19.579.572	7.335.717	0,375
2040	20.715.188	7.705.636	0,372
2041	21.916.669	8.094.209	0,369
2042	23.187.835	8.502.376	0,367
2043	24.532.730	8.931.126	0,364
2044	25.955.628	9.381.496	0,361
2045	27.461.055	9.854.578	0,359
2046	29.053.796	10.351.516	0,356
2047	30.738.916	10.873.512	0,354
2048	32.521.773	11.421.832	0,351
2049	34.408.036	11.997.801	0,349
2050	36.403.702	12.602.815	0,346

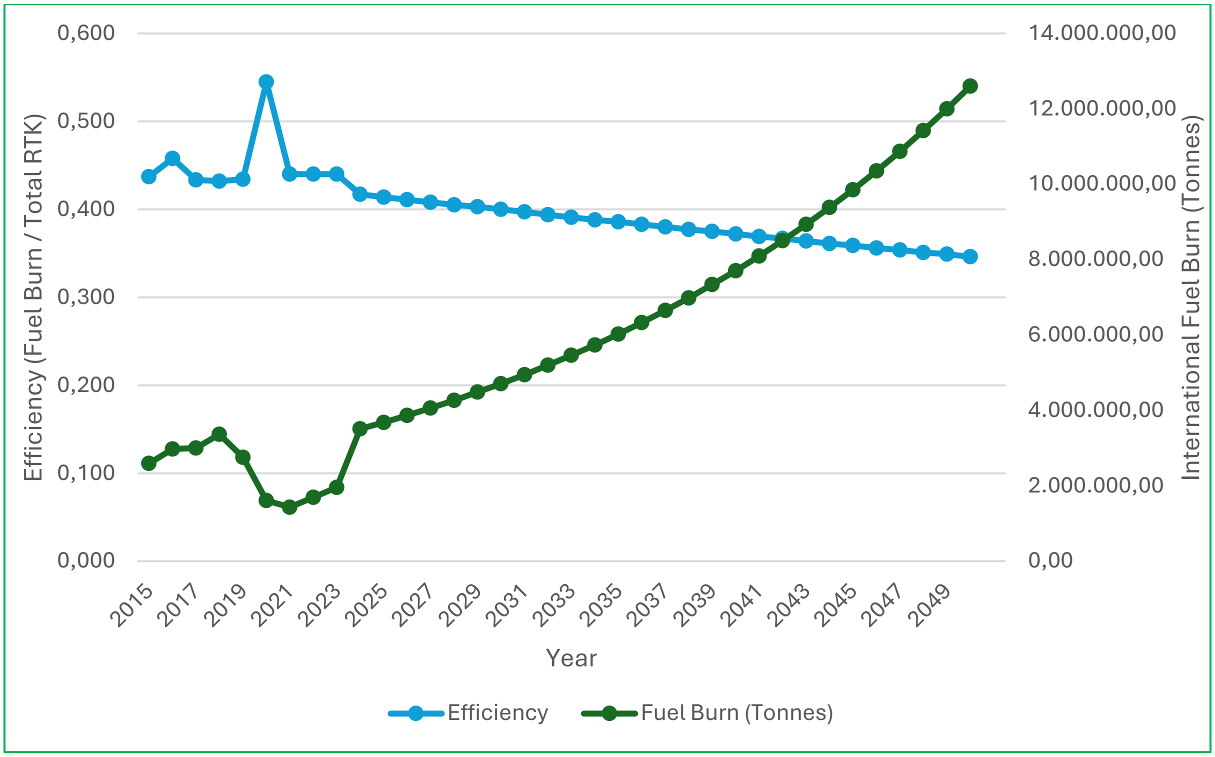


Figure 5 Graph of Baseline Scenario for Domestic Flight

Table 4 Baseline Scenario for International and Domestic Flight

TOTAL (INTL+ DOM FLIGHT)			
Year	**RTK (Ton kilometers)**	**Fuel Burn (Tonnes)**	**Efficiency**
2015	8.504.854	3.530.826	0,415
2016	9.621.492	4.008.356	0,417
2017	10.655.576	4.191.539	0,393
2018	11.968.081	4.677.302	0,391
2019	9.893.743	3.881.753	0,392
2020	3.803.102	1.928.745	0,507
2021	4.317.283	1.785.362	0,414
2022	5.417.283	2.215.417	0,409
2023	6.517.283	2.645.474	0,406
2024	13.115.624	4.863.474	0,371

TOTAL (INTL+ DOM FLIGHT)			
Year	RTK (Ton kilometers)	Fuel Burn (Tonnes)	Efficiency
2025	13.876.330	5.104.433	0,368
2026	14.681.157	5.358.525	0,365
2027	15.532.664	5.626.323	0,362
2028	16.433.559	5.908.456	0,360
2029	17.386.705	6.205.602	0,357
2030	18.395.134	6.518.488	0,354
2031	19.462.052	6.847.889	0,352
2032	20.590.851	7.194.628	0,349
2033	21.785.120	7.559.578	0,347
2034	23.048.657	7.943.662	0,345
2035	24.385.480	8.347.854	0,342
2036	25.799.837	8.773.184	0,340
2037	27.296.228	9.220.738	0,338
2038	28.879.409	9.691.659	0,336
2039	30.554.415	10.187.155	0,333
2040	32.326.571	10.708.495	0,331
2041	34.201.512	11.257.020	0,329
2042	36.185.200	11.834.140	0,327
2043	38.283.941	12.441.339	0,325
2044	40.504.410	13.080.181	0,323
2045	42.853.666	13.752.313	0,321
2046	45.339.178	14.459.468	0,319
2047	47.968.851	15.203.472	0,317
2048	50.751.044	15.986.246	0,315
2049	53.694.604	16.809.812	0,313

TOTAL (INTL+ DOM FLIGHT)			
Year	**RTK (Ton kilometers)**	**Fuel Burn (Tonnes)**	**Efficiency**
2050	56.808.892	17.676.300	0,311

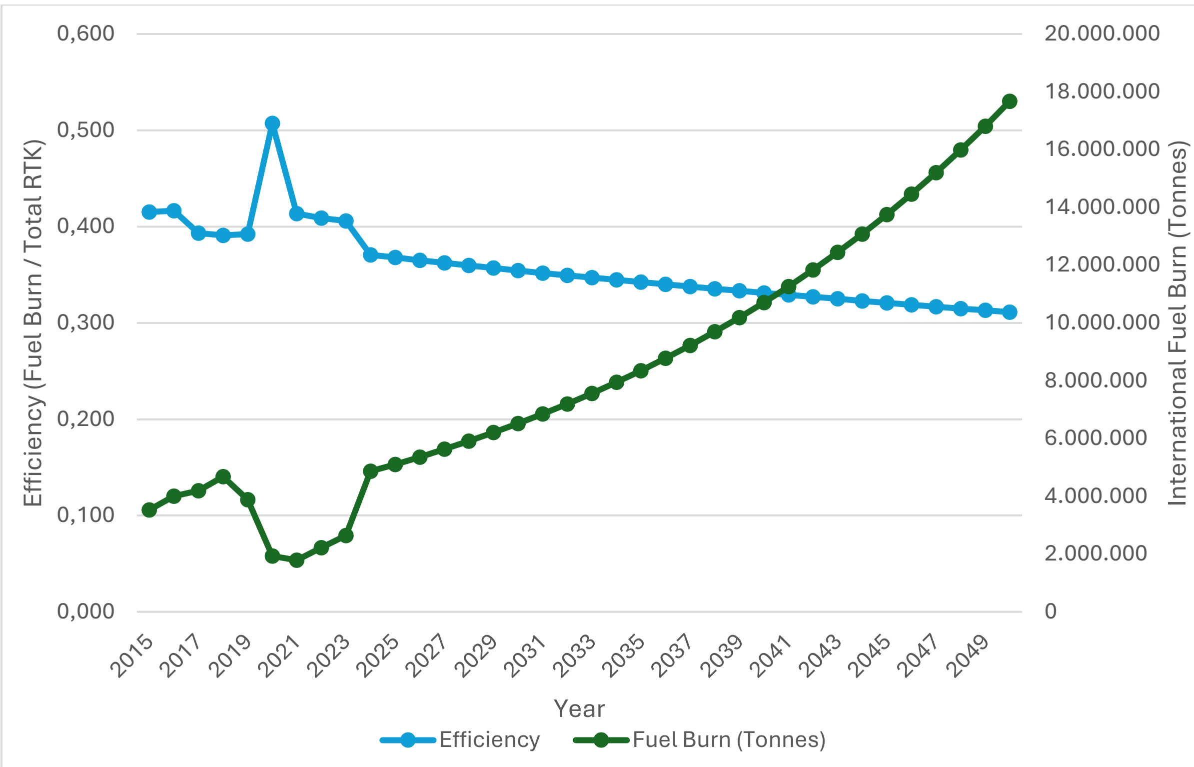


Figure 6 Graph of Baseline Scenario for International and Domestic Flight

3. MEASURES TO MITIGATE CO_2 EMISSIONS

As elaborated in the previous editions, the Indonesia's measures to mitigate CO_2 emissions in the aviation sector are grouped into two categories: **Main Programs** and **Supporting Programs**.

Main Programs

Aligned with ICAO's *Basket of Measures* and include:

a) Technology and Standards

- Aircraft fleet renewal

b) Operational Improvements

- Improved aircraft operations and maintenance
- Enhanced air traffic management and operations

c) Sustainable Aviation Fuels (SAF)

d) Market-Based Measures through CORSIA

e) Additional Measures

- Use of renewable energy at airports
- Development of eco-airports
- Energy efficiency in air navigation facilities and ground-based operations

Supporting Programs

Supporting actions that enable and strengthen implementation include:

1. Development of regulations and policies
2. Establishment of emissions databases and inventories
3. Strengthening international cooperation
4. Development of environmental units within the DGCA of Indonesia
5. Cost–benefit analysis of emission reduction measures

A. Actions (Main Program)

a) Technology and Standards

1) Aircraft Fleet Renewal

Indonesia's aircraft fleet grew by an average of 3% per year from 2012 to 2020, and by 12.39% per year from 2015 to 2024, mostly with new-technology aircraft. Fleet renewal was carried out steadily, reducing older aircraft by 10% in 2012–2013 and by 15% in 2014–2019. By 2020, about 95% of the transport aircraft fleet had been replaced with newer, more fuel-efficient aircraft.

To reduce carbon emissions and maintenance costs, national airlines have continued to modernize their fleets. On average, around 110 aircraft per year were registered in 2015–2020, and about 89 aircraft per year in 2015–2024, with 40–50% being brand-new. The average fleet age of Indonesian flag carriers was about 9 years in 2020 and increased to around 16 years by 2024.

To support this modernization, the Ministry of Transportation issued Regulation KM No. 115 of 2020. This regulation removes fixed age limits for aircraft already in operation, as long as they remain airworthy and properly maintained, while setting a maximum age of 20 years for passenger aircraft at first registration in Indonesia. This ensures safety while supporting fleet renewal.

Successful implementation also requires up-to-date knowledge of new aircraft, engine, and propeller technologies, along with continuous training and capacity building for airlines, maintenance organizations, and regulators, especially within the DGCA.

b) Operational Improvements

1) Aircraft Operational and Maintenance Improvement

This action focuses on applying best operational and maintenance practices for transport-category aircraft to improve efficiency and reduce fuel consumption and spare-part use. These initiatives are generally proposed and implemented by air operators, based on their own operational experience. Major Indonesian airlines—Garuda Indonesia, Lion Air, Batik Air, and Indonesia AirAsia—have been actively enhancing their operational procedures since 2016.

Examples of implemented efficiency measures include:

- Single-engine taxi (departure and/or arrival)
- Reduced landing flaps
- Idle reverse thrust on landing
- Fuel tankering
- Optimized pilot extra fuel
- APU reduction during taxi-out and taxi-in
- Reduced acceleration altitude

- Continuous descent operations
- Optimum climb (Opticlimb)
- PACKs OFF during take-off
- Water management
- Use of closest alternate airports
- Optimized center of gravity
- Increased use of ground power units (GPU)
- Reduction of unnecessary extra weight
- Optimized cost index
- Direct routing and optimum flight levels
- Reduction of contingency fuel from 10% to 6% for international flights

To sustain these improvements, continuous learning on aircraft technology and operational capabilities is essential. Capacity building is also needed for airline personnel, MRO staff, and regulators—especially the DGCA's Directorate of Aircraft Airworthiness and Operation (DAAO)—to ensure safe and effective implementation.

2) Air Traffic Management and Operations Improvement

Indonesia continues to enhance operational efficiency in air navigation services through the implementation of Air Traffic Management and operational improvements aimed at reducing fuel burn and associated CO_2 emissions. These measures include the progressive implementation of Performance-Based Navigation (PBN), the application of Continuous Descent and Continuous Climb Operations (CDO/CCO), the use of User Preferred Routes (UPR), the application of Air Traffic Flow Management (ATFM) measures, and surface movement optimization through A-SMGCS. Collectively, these initiatives contribute to improved traffic predictability, reduced delays and airborne holding, and more efficient use of airspace, while maintaining safety as the highest priority.

The impact of these operational improvements is monitored and assessed using available operational and traffic data within the air navigation service framework. A consistent and transparent approach is applied to estimate fuel burn and CO_2 emission reductions, aligned with relevant ICAO guidance and national regulatory frameworks. Indonesia will progressively refine its monitoring and assessment methodology as data availability and analytical capabilities improve, while ensuring consistency, traceability, and readiness for future review and reporting processes.

2.1 Indonesia PBN Implementation Progress

Indonesia has improved its air traffic management through the implementation of Performance-Based Navigation (PBN), including SID/STAR (RNAV 1 / RNP 1), Approach (RNP APCH, Advanced RNP, and RNP 0.3), and en-route operations (RNP 2 and RNAV 2). PBN enables more flexible and efficient flight paths, reducing congestion, improving fuel efficiency, lowering emissions and aircraft noise, enhancing safety, increasing airspace capacity, and improving access to challenging airports.

Indonesia has completed its PBN Plan up to 2024 in line with relevant ICAO mandates. The next phase, as outlined in the PBN Plan through 2029, emphasizes continued and expanded PBN implementation across airspace and terminal areas.

PBN Implementation Status

Currently, the number of Indonesian airports that already fully or partially implemented PBN flight procedures are as follows:

Table 5 Status of PBN Implementation at Airports in Indonesia

Airports	PBN	QTY
International Airport (with instrument runway)	PBN IAP	32 of 32 airports (2 airports with RNP AR)
	PBN SID/STAR	29 of 32 airports
Domestic Airport	PBN IAP	105 of 129 airports
	PBN SID/STAR	26 of 129 airports
Remote Airport	PBN IAP	21 airports

The table above summarizes the number of airports with implemented PBN procedures, while the detailed list of airports where PBN procedures were established during the 2024–2025 period is provided in the Appendix.

To support the previous PBN implementation plan, Indonesia has established some PBN cooperation projects as follows:

1. Cooperation with NAVBLUE to develop PBN procedures in airports which are not equipped with Instrument Flight Procedure as follows:
    - In 2014: 3 airports (Pattimura Airport – Ambon, Husein Sastranegara Airport – Bandung, Sam Ratulangi Airport – Manado).
    - In 2019: 2 airports (Haji Hasan Aroeboesman Airport - Ende and Torea Airport – Fakfak).
    - In 2020: 2 airports (Gewayantana Airport - Larantuka and Soa Airport – Bajawa).
    - In 2024: 1 airport ((Sultan Babullah Airport – Ternate).
2. EU South-East Asia Aviation Partnership Project – Design of RNP APCH Procedures for airports in Atambua, Bajawa, and Larantuka in 2020.
3. Cooperation with EASA for PBN implementation including assistance in New Staff Instruction on PBN and inspector training for RNP AR Approval in 2021.

Indonesia has been conducting socialization and training of PBN implementation for ATS personnel. In the first semester of 2021, there are PBN training at 9 airports.

Further details on PBN implementation status in domestic en route operations are included in the Appendix.

New PBN Implementation plan until 2024

The Indonesia PBN implementation plan until 2024 are as follows:

Table 6 PBN Implementation Plan

Airport / Route		Status	Target Year
International Airport IAP	Raja Haji Fisabilillah, Tanjung Pinang	Coordination with adjacent ATS authority	2021
	Hang Nadim, Batam	Coordination with adjacent ATS authority	2021
	Supadio, Pontianak (Rwy 33)	Design process	2022
International Airport SID/STAR	Raja Haji Fisabilillah, Tanjung Pinang	Coordination with adjacent ATS authority	2021
	Hang Nadim, Batam	Coordination with adjacent ATS authority	2021
	Halim Perdanakusuma, Jakarta	Design process	2021
	H.A.S Hanandjoeddin, Tanjung Pandan	Design process	2021
	Sam Ratulangi, Manado	Plan	2022
	Supadio, Pontianak	Plan	2022
	Minangkabau, Padang	Plan	2023
	Zainuddin Abdul Madjid, Lombok	Plan	2023
	El Tari, Kupang	Plan	2023
	Juwata, Tarakan	Plan	2024
	Sentani, Jayapura	Plan	2024
	Frans Kaisiepo, Biak	Plan	2024
	Adi Sumarmo, Solo	Plan	2024
	Sultan Syarif Kasim II, Pekanbaru	Plan	2024
Domestic Airport RNP AR	Sultan Babullah, Ternate	Design process	2022

Domestic Enroute RNAV 2	Cluster 2: Semarang – Surabaya – Kupang	Design process	2021
	Cluster 3: Surabaya – Papua	Plan	2022
	Cluster 3: Jakarta – Manado & Semarang – Surabaya – Balikpapan	Plan	2023
Lower ATS Domestic Enroute RNP2	Balikpapan - Tarakan	Plan	2022
	Kupang - Bali	Plan	2023
	Luwuk – Gorontalo - Palu	Plan	2024

*The plan may still be changed according to the needs or technical considerations of flight operations

For International ATS route, Indonesia currently is in process of coordination with related countries.

2.2 Indonesia Air Traffic Flow Management (ATFM) Implementation Progress

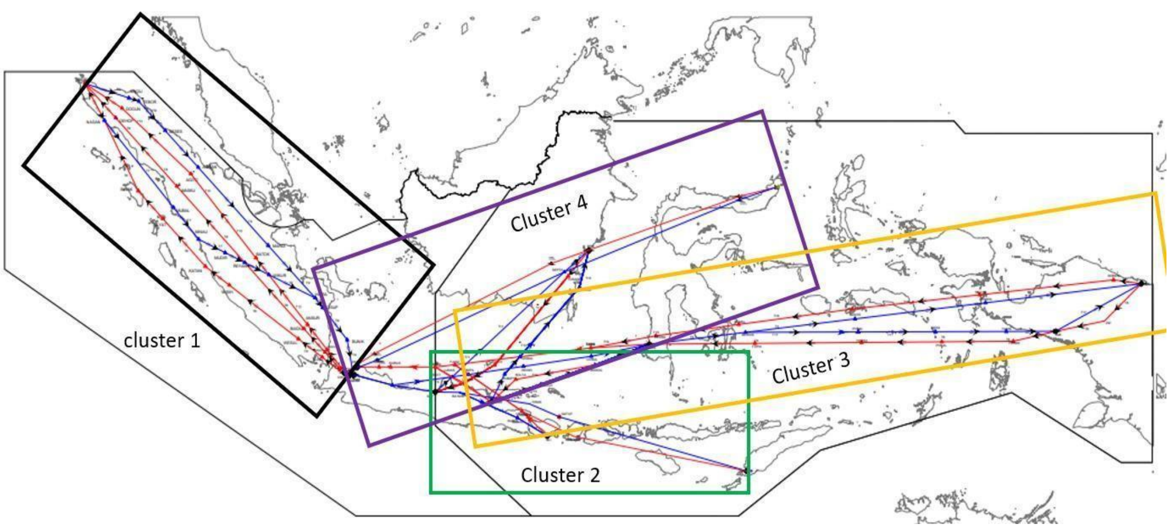


Figure 7 Design of PBN Domestic Enroute RNAV 2

Air Traffic Flow Management (ATFM) increases air traffic management efficiency and effectiveness, and contributes to aviation safety, efficiency, cost-effectiveness, and environmental sustainability of an ATM system.

In the implementation of ATFM Concepts, Indonesia has conducted as follows:

- **At the regional level**, Indonesia has participated in the Distributed Multi-Nodal ATFM Network Project as Node Level 2 in August 2015 by involving 3 (three) airports (Soekarno-Hatta Airport of Jakarta, Juanda Airport of Surabaya, and I Gusti Ngurah Rai Airport of Denpasar) by ensuring the compliance of tactical ATFM measures disseminate by Node Level 3 during periods of constraints.
- **At the National level**, Indonesia has implementing partial ATFM since Q4 2015, in which ATM planning phase conducted by AirNav Indonesia periodically, the strategic phase conducted by Indonesia Airport Slot Management (IASM), pre-tactical conducted by AirNav by using Chronos system. The Chronos system is also able to facilitate tactical slot issuance for delay, postpone, and non-regular flight.
- From Q2 year 2020 Indonesia is working on integration and data sharing between AirNav Indonesia and Angkasa Pura II in order to enable the ATFM and A-CDM operation in Soekarno-Hatta International Airport of Jakarta and working together to determine variable taxi time (VTT). The next stage of the program is upgrading the Airport Operation Control System in I Gusti Ngurah Rai International Airport of Denpasar, Bali to enable integration and data sharing with relevant ATFM & A-CDM stakeholders as well as generated operational milestones. The final achievement of the program is to conduct ATFM & A-CDM operational city pair between Soekarno-Hatta International Airport of Jakarta and I Gusti Ngurah Rai International Airport of Denpasar, Bali. The success of this program will be continued by expanding the city pairs network to Juanda International Airport of Surabaya.

c) Sustainable Aviation Fuels

The development and use of Sustainable Aviation Fuel (SAF) in Indonesia is regulated under the Ministry of Energy and Mineral Resources (MEMR) Decree No. 4 of 2025, which strengthens the national framework for SAF production, certification, and distribution.

A key milestone occurred in October 2023, when Garuda Indonesia conducted a successful demonstration flight using a 2.4% domestically produced SAF blend, confirming the fuel's readiness for commercial operations.

Indonesia has also advanced SAF development at the global level:

- **September 2024:** Publication of the national SAF Roadmap outlining strategies for SAF development through 2060.

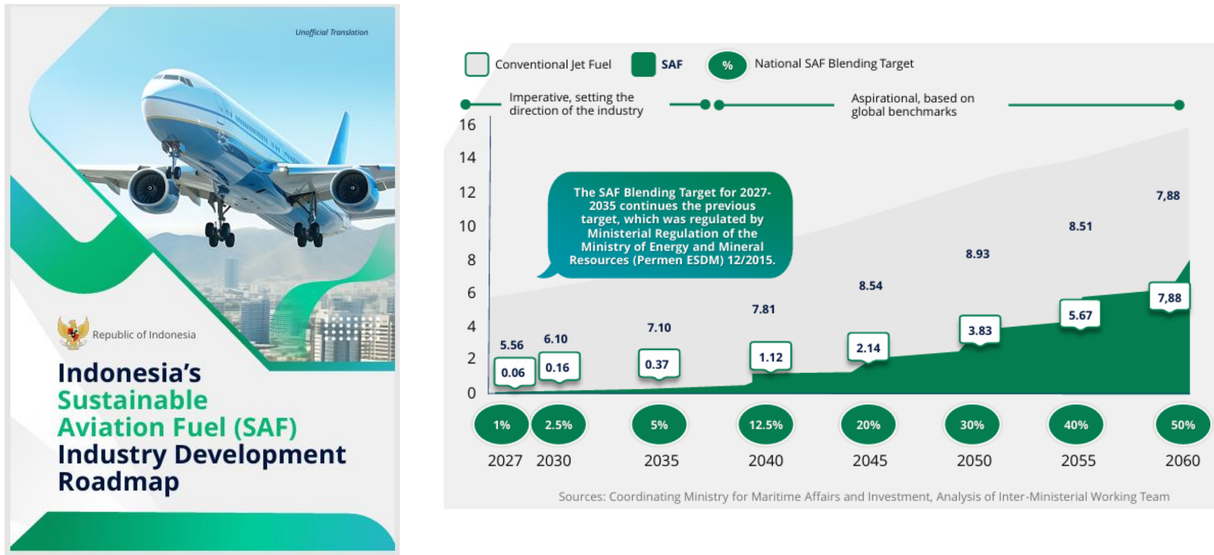


Figure 8 Indonesia SAF Roadmap - Portal DKPPU

- **January 2025:** Submission of a CORSIA default LCA proposal for Palm Oil Mill Effluent (POME), developed with industry partners including Tripatra Engineering.
- **August 2025:** The first locally produced SAF (by Indonesia national oil company, Pertamina), made from used cooking oil, certified under CORSIA framework, has sold and utilized by our national airline — which marking the beginning of SAF commercialization in Indonesia. The first 32 kiloliters supported Pelita Air Service's A320 flights on the Jakarta–Bali route.
- **November 2025:** ICAO CAEP approval of the proposed CORSIA default LCA value for POME.

To enhance national coordination, **the National SAF Team** was established in November 2025 under the Coordinating Ministry for Infrastructure and Regional Development, tasked with guiding SAF policy, feedstock planning, and industry readiness.

Further work is underway to improve production capacity, feedstock management, incentives, emissions accounting, and stakeholder capabilities. Indonesia remains committed to scaling up SAF to support its national net-zero target by 2060 and ICAO's Long-Term Global Aspirational Goal of net-zero emissions from international aviation by 2050.

d) Market-Based Measures By CORSIA

Indonesia, through the Directorate General of Civil Aviation (DGCA), officially committed to voluntarily join the CORSIA Pilot Phase in 2021. Since then, DGCA has remained actively engaged in ICAO's technical discussions through CAEP and has participated in numerous related events organized by ICAO and other international partners.

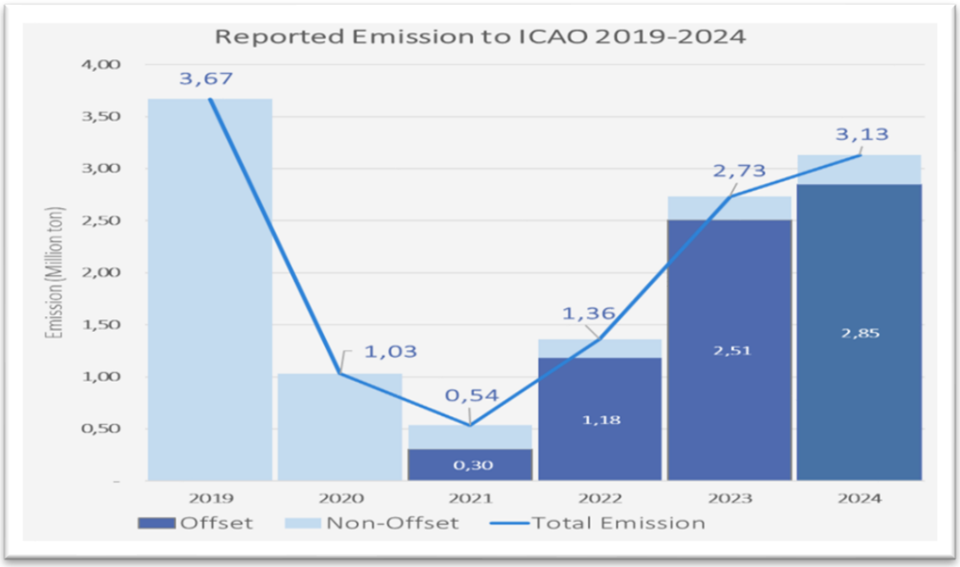


Figure 9 Reported Emission to ICAO 2019-2024

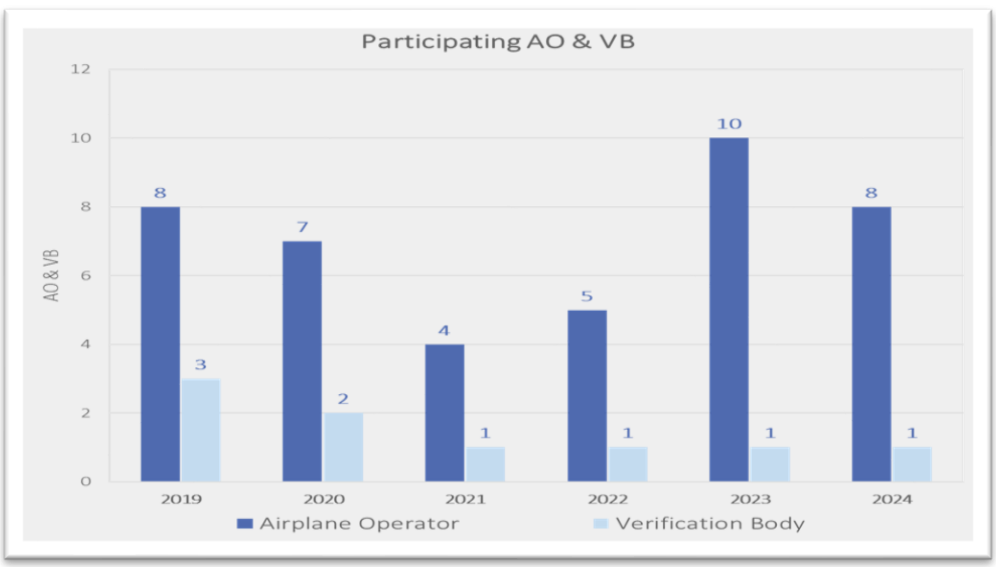


Figure 10 Participating Airplane Operator and Verification Body 2019-2024

Indonesia continues to strengthen its implementation of CORSIA through:

- Staying updated with ICAO standards and decisions;
- Building technical knowledge on MRV, sustainability criteria, and emissions accounting;
- Providing training for airlines, verifiers, and regulators;
- Enhancing systems for managing CORSIA-Eligible Emissions Units;
- Preparing for CORSIA offsetting requirements.

DGCA works closely with the Ministry of Environment, the National Accreditation Body (KAN), carbon project developers, and other relevant national stakeholders to support the smooth, credible, and effective implementation of CORSIA in Indonesia. In particular, DGCA is actively engaging with the Ministry of Environment to facilitate the development of CORSIA-eligible emissions units (CEUs), ensuring their sufficient availability for offsetting needs and full alignment with Article 6 of the Paris Agreement.

e) Additional Measure

2) Implementation of energy efficiency program at the airport

Currently, the renewable energy program at the airport has been implemented primarily through the installation of solar panel systems and the use of solar-powered lighting, as shown in the table below:

Table 7 Energy Efficiency Program in Indonesia's Airports – Cumulative Data Until 2024

Description	Solar-cell system	Solar-Powered lighting	Usage of Light Emitting Diode (LED)
Number of airports installed	54 Airports	106 Airports + 3 DGCA regional office	18 Airports
Total CO_2e saving	27.048 ton CO2e	1.991 ton CO2e	28.837 ton CO2e

By 2024, solar-cell systems will have been installed at 57 airports. Additionally, a total of 106 airports and 3 DGCA regional offices have adopted solar-powered lighting for access roads and car parks, generating significant power. Moreover, 18 airports have been documented to have implemented the use of light-emitting diode (LED) lighting.

3) Eco-airport continuous implementation

In addition to sustaining mitigation efforts through the use of solar PV, solar-powered streetlights, and LED installations, the Eco Airport program also encourages airports to report their electricity and fuel consumption related to operational activities.

Since 2022, the Directorate General of Civil Aviation (DGCA) and its 10 Regional Offices have been responsible for mapping and inventorying airport carbon footprints. As of the end of 2024, 158 airports have successfully implemented this initiative. The details are as follows:

Table 8 Progress of Carbon Footprint Data in Indonesia's Airports

Year	Carbon Footprint (Kg CO_2)
2022	429,205,059.44
2023	542,950,623.97
2024	651,523,256.18

A total of 158 airports provided data, revealing GHG emissions of 429,205,059.44 kgCO2 in 2022, 542,950,623.97 kgCO2 in 2023, and 678,728,392.80 kgCO2 in 2024. These data will inform the development of a Roadmap for reducing GHG emissions in the transportation sector, particularly in air transportation, which is currently undergoing finalization.

To enhance the Eco-Airport program, the Directorate General of Civil Aviation (DGCA) stipulated two regulations in 2017, namely the Ministry of Transport Decree No. 54/2017 on Waste Management from Airport and Aircraft Operations and DGCA Decree No. INST 011/2017 on Actions to Reduce Airport Greenhouse Gas Emissions. These regulations mandate airport operators to calculate airport emissions, manage airport waste, reduce emissions, and report their actions to the Minister of Transport through the DGCA.

To implement this program, it is important to learn the latest technology and best practices in eco-airport technology and methods. Additionally, airport providers and authorities (DGCA), require technical knowledge, training, and capacity building to build, operate, and maintain eco-airport.

The 251 existing airports, comprising those under DGCA and Angkasa Pura Indonesia, which account for the largest number of passengers, aircraft movements, and emission production (around 80%), have implemented several programs:

- Use of LED lighting in airport facilities and equipment, gradually implemented in all airports.
- Utilization of renewable energy through the operation of solar-powered street lights.
- Implementation of Rapid Exit Taxiways (RET).
- Green Building implementation.
- Solar PV implementation.
- Enhanced Operational Waste Management.
- Environmental Management System ISO 14001:2015 certification.
- Energy Management System ISO 50001:2015 certification

Indonesia airports endeavor to implement efficiency improvement initiatives and comply with other programs, ensuring strict adherence to aviation safety standards.

4) Energy Efficiency in Air Navigation Facilities & Ground-Based Operations

There has been a proposal to assess energy requirements to support air navigation operations; however, the process of collecting actual energy consumption data from operational sites is still ongoing and has yet to be completed. This situation has limited the optimal implementation of mitigation measures related to energy conservation.

As the national air navigation service provider, AirNav Indonesia reaffirms its commitment to ensuring accurate energy planning and enhancing operational efficiency. In this regard, AirNav Indonesia will undertake a comprehensive energy audit to identify the root causes of data discrepancies and to develop appropriate, measurable, and sustainable mitigation measures. These actions are expected to strengthen ongoing efforts to improve energy efficiency across all aspects of air navigation operations, thereby contributing to more reliable, effective, and environmentally sustainable services.

To further advance these objectives, AirNav Indonesia has identified three key focus areas under its Green Engineering program:

1. Human resource development – enhancing personnel awareness, understanding, and competency in green engineering and sustainable operational practices.

2. Procurement and infrastructure development – prioritizing the acquisition of new facilities and equipment that promote energy efficiency and support sustainable operations.

3. Energy performance assessment – conducting audits of existing facilities to evaluate current performance and identify opportunities for improvement.

Beginning in 2026, AirNav Indonesia will implement a phased energy audit program across its branch offices. The results of this audit will serve as a foundation for formulating targeted strategies to reduce energy consumption, optimize operational performance, and align with national and international commitments on environmental sustainability.

B. Action Support

1) *Rule making*

As the coordinator for the demand side under the National SAF Team, DGCA plays a central role in advancing SAF policies and their implementation in Indonesia. DGCA leads and coordinates the rule-making process to enable the uptake of SAF by aircraft operators, in parallel with the implementation of other aviation decarbonization measures, including the use of biodiesel for ground support equipment (GSE), the integration of renewable energy at airports, PBN, and the eco-airport program. These efforts are aligned with and contribute to the implementation of Indonesia's National Roadmap on the Carbon Emissions Reduction Program for the aviation sector (2025–2029), ensuring a coherent, demand-driven framework to support aviation emissions reductions.

2) *Development of the system database/inventory*

DGCA Indonesia is upgrading its Environmental Management System (EMS) into a modern, next-generation platform. This new system will streamline and strengthen the monitoring, reporting, and verification (MRV) process through an integrated data ecosystem.

In addition to using existing air transport reports from operators (Modified Form C and Form M), the enhanced EMS now includes alternative data sources such as real-time flight data via API and bulk historical data imports (CSV). These new data inputs allow DGCA to set more accurate baselines, perform cross-checks, and compare operator-reported data with independent sources.

The EMS is also being developed to support efforts to reduce CO_2 emissions in line with ICAO Doc 9988, which highlights measures such as aircraft technology improvements, sustainable aviation fuels, better air traffic management, efficient operations, market-based measures, airport enhancements, and regulatory actions.

The figure below illustrates the MRV process within the EMS.

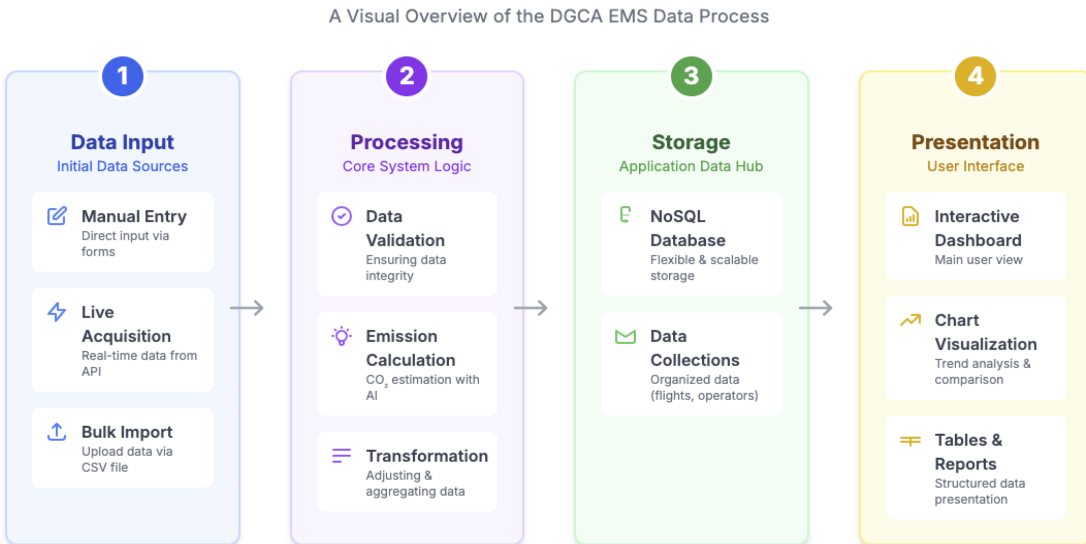


Figure 11 EMS Workflow

3) International Cooperation

As an ICAO member, Indonesia is committed to complying with ICAO regulations and policies, including those on environmental protection. Indonesia also recognizes the value of international cooperation and actively works with other States and global aviation organizations to strengthen its contributions to environmental initiatives.

To support this commitment, DGCA Indonesia collaborates with various international aviation organizations to explore and develop opportunities for further cooperation. DGCA also serves as a member of ICAO's Committee on Aviation Environmental Protection (CAEP) and contributes experts to its working groups.

4) Development of environmental unit within the DGCA Indonesia organization

In 2025, the Directorate of Airworthiness and Aircraft Operations in DGCA Indonesia established a dedicated Environmental Unit to accelerate the country's progress on SAF and the CORSIA scheme. This unit brings together the resources and expertise (from airworthiness and aircraft operations areas) needed to focus on these priorities, ensuring Indonesia can move faster in reducing aviation emissions and meeting international commitments. With a clear mandate and dedicated team, the Environmental Unit strengthens collaboration with industry, research institutions, and international partners.

4. EXPECTED RESULTS

By Implementing the measures to mitigate CO2 emissions mentioned in the Chapter 3 such as aircraft fleet renewal, aircraft operational improvement, airspace system management improvement, alternative fuel / bioavtur development and implementation for international flight and with the addition of the Eco-Airport program for the program in the domestic flight, it is estimated that the emission caused by flight activity will be as follows:

Table 9 Emission Expected Result for International Flight

INTERNATIONAL				
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 (%)
2024	1.356.327,39	1.103.707,39	252.620,00	0,186
2025	1.420.430,87	1.165.179,87	255.251,00	0,180
2026	1.488.749,29	1.230.735,74	258.013,55	0,173
2027	1.561.406,23	1.300.492,01	260.914,23	0,167
2028	1.638.557,18	1.374.597,25	263.959,94	0,161
2029	1.720.384,39	1.453.226,46	267.157,94	0,155
2030	1.807.093,73	1.536.577,89	270.515,83	0,150
2031	1.898.912,75	1.621.345,34	277.567,42	0,146
2032	1.996.089,65	1.710.765,49	285.324,16	0,143
2033	2.098.892,67	1.805.036,10	293.856,57	0,140
2034	2.207.610,02	1.904.367,79	303.242,23	0,137
2035	2.322.550,07	2.008.983,62	313.566,45	0,135
2036	2.444.041,71	2.319.118,61	124.923,10	0,051
2037	2.572.434,98	2.435.019,57	137.415,41	0,053
2038	2.708.101,84	2.556.944,89	151.156,95	0,056
2039	2.851.437,02	2.685.164,37	166.272,64	0,058
2040	3.002.859,02	2.819.959,12	182.899,91	0,061
2041	3.162.811,28	2.952.476,39	210.334,90	0,067
2042	3.331.763,35	3.089.878,22	241.885,13	0,073
2043	3.510.212,21	3.232.044,31	278.167,90	0,079
2044	3.698.683,75	3.378.790,66	319.893,08	0,086
2045	3.897.734,24	3.529.857,20	367.877,05	0,094
2046	4.107.952,01	3.684.893,41	423.058,60	0,103
2047	4.329.959,16	3.843.441,76	486.517,39	0,112
2048	4.564.413,39	4.004.918,39	559.495,00	0,123
2049	4.812.010,04	4.168.590,78	643.419,25	0,134
2050	5.073.484,07	4.333.551,93	739.932,14	0,146

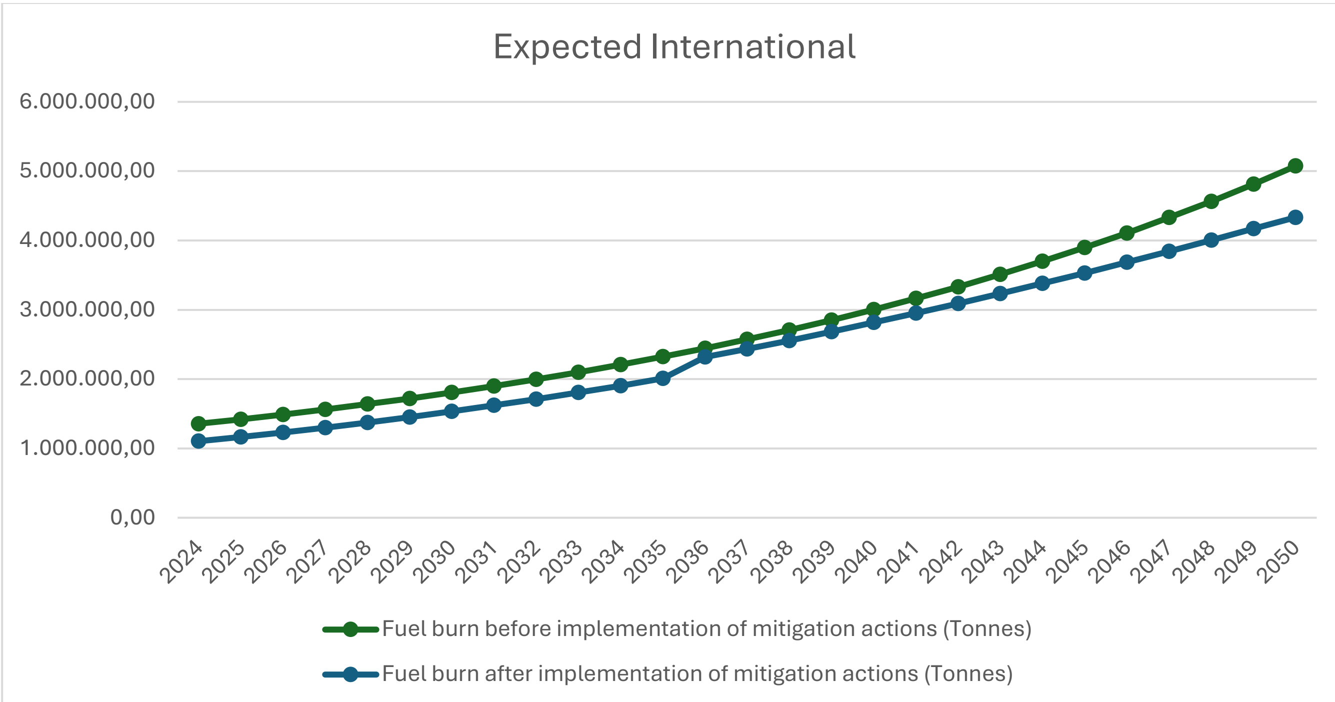


Figure 12 Graph for Expected Scenario International Fuels Burn

Table 10 Emission Expected Result for Domestic Flight

DOMESTIC				
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 (%)
2024	1.481.215,11	1.228.595,11	135.030,00	0,171
2025	1.555.908,46	1.300.657,46	141.781,50	0,164
2026	1.634.368,37	1.376.354,82	148.870,58	0,158
2027	1.716.784,79	1.455.870,57	156.314,10	0,152
2028	1.803.357,23	1.539.397,30	164.129,81	0,146
2029	1.894.295,27	1.627.137,33	172.336,30	0,141
2030	1.989.819,04	1.719.303,21	180.953,11	0,136
2031	2.090.159,80	1.812.592,38	199.048,43	0,133
2032	2.195.560,45	1.910.236,29	218.953,27	0,130
2033	2.306.276,15	2.012.419,57	240.848,60	0,127
2034	2.422.574,91	2.119.332,68	264.933,45	0,125
2035	2.544.738,28	2.231.171,83	291.426,80	0,123
2036	2.673.062,00	2.548.138,90	320.569,48	0,047

DOMESTIC				
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 (%)
2037	2.807.856,70	2.670.441,29	352.626,43	0,049
2038	2.949.448,71	2.798.291,76	387.889,07	0,051
2039	3.098.180,79	2.931.908,14	426.677,98	0,054
2040	3.254.412,99	3.071.513,08	469.345,78	0,056
2041	3.418.523,52	3.208.188,63	539.747,64	0,062
2042	3.590.909,67	3.349.024,54	620.709,79	0,067
2043	3.771.988,75	3.493.820,85	713.816,26	0,074
2044	3.962.199,12	3.642.306,04	820.888,70	0,081
2045	4.162.001,24	3.794.124,19	944.022,00	0,088
2046	4.371.878,80	3.948.820,20	1.085.625,30	0,097
2047	4.592.339,87	4.105.822,47	1.248.469,09	0,106
2048	4.823.918,15	4.264.423,14	1.435.739,46	0,116
2049	5.067.174,24	4.423.754,99	1.651.100,38	0,127
2050	5.322.697,03	4.582.764,88	1.898.765,43	0,139

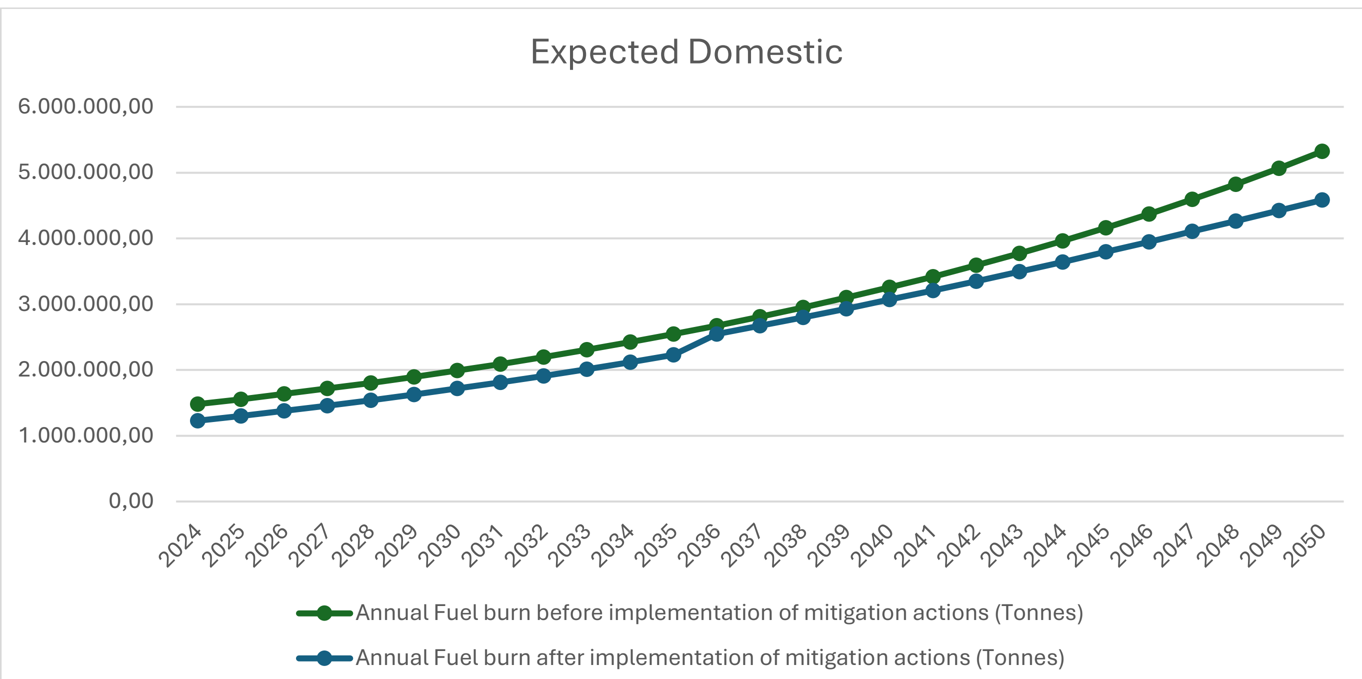


Figure 13 Graph for Expected Scenario Domestic Fuels Burn

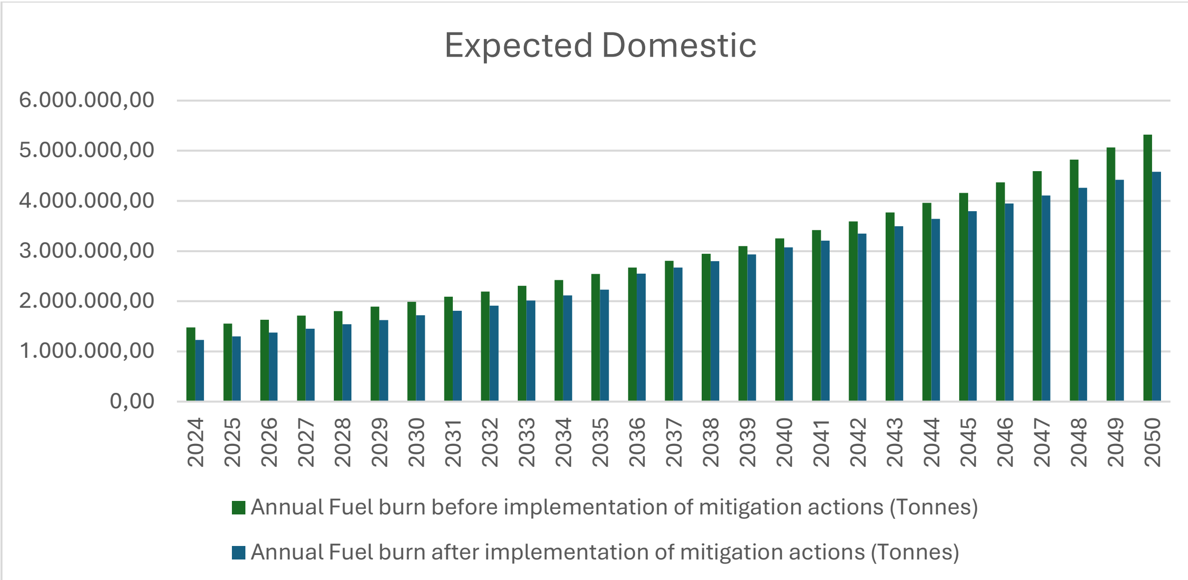


Figure 14 Detail for Expected Scenario Domestic Fuels Burn

Table 11 Emission Expected Result for Total Flight

TOTAL INTERNATIONAL + DOMESTIC				
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 (%)
2024	2.837.542,50	2.332.302,50	392.900,00	0,138
2025	2.976.339,33	2.465.837,33	402.545,00	0,135
2026	3.123.117,66	2.607.090,56	412.672,25	0,132
2027	3.278.191,03	2.756.362,57	423.305,86	0,129
2028	3.441.914,42	2.913.994,54	434.471,16	0,126
2029	3.614.679,66	3.080.363,79	446.194,71	0,123
2030	3.796.912,77	3.255.881,10	458.504,45	0,121
2031	3.989.072,55	3.433.937,72	484.354,89	0,121
2032	4.191.650,10	3.621.001,78	512.790,38	0,122
2033	4.405.168,82	3.817.455,67	544.069,42	0,124
2034	4.630.184,94	4.023.700,48	578.476,36	0,125
2035	4.867.288,35	4.240.155,45	616.324,00	0,127
2036	5.117.103,71	4.867.257,51	457.956,40	0,089
2037	5.380.291,68	5.105.460,87	503.752,04	0,094
2038	5.657.550,55	5.355.236,65	554.127,24	0,098
2039	5.949.617,80	5.617.072,52	609.539,97	0,102
2040	6.257.272,01	5.891.472,19	670.493,97	0,107
2041	6.581.334,81	6.160.665,02	771.068,06	0,117

TOTAL INTERNATIONAL + DOMESTIC				
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 (%)
2042	6.922.673,02	6.438.902,76	886.728,27	0,128
2043	7.282.200,96	6.725.865,16	1.019.737,51	0,140
2044	7.660.882,87	7.021.096,70	1.172.698,14	0,153
2045	8.059.735,48	7.323.981,39	1.348.602,86	0,167
2046	8.479.830,81	7.633.713,61	1.550.893,29	0,183
2047	8.922.299,03	7.949.264,24	1.783.527,28	0,200
2048	9.388.331,54	8.269.341,53	2.051.056,37	0,218
2049	9.879.184,28	8.592.345,77	2.358.714,83	0,239
2050	10.396.181,10	8.916.316,81	2.712.522,05	0,261

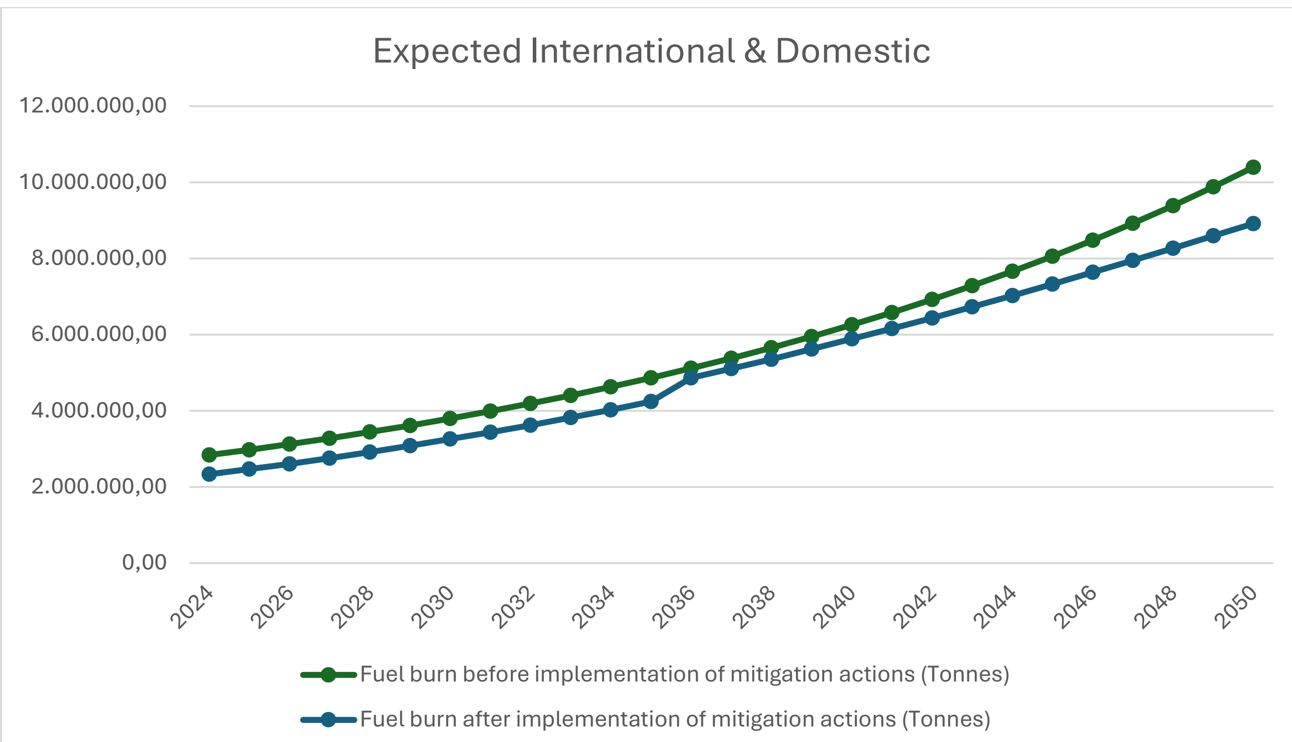


Figure 15 Graph for Expected Scenario International & Domestic Fuels Burn

5. ASSISTANCE NEEDS

Indonesia has advanced its CO_2 mitigation efforts through developed SAF roadmap, updated SAF regulations (2025 MEMR Decree), approval of the POME default LCA value by ICAO CAEP (November 2025), commercial deployment of UCO-based SAF (August 2025), and the establishment of a national SAF Team. To sustain momentum and ensure effective implementation, Indonesia requires targeted support in the following areas:

1. Sustainable Aviation Fuel (SAF)

Indonesia's SAF progress needs to be matched with strengthened technical and institutional capacity. Support is required to:

- Build technical capacity for certification, quality control, and blending processes for domestic fuel producers.
- Establish investment frameworks and financial mechanisms to accelerate commercial production and reduce SAF price gaps.
- SAF affordability and incentive design: policy and fiscal advisory support to design effective incentives (e.g., producer/consumer support, tax-credit equivalents, subsidies) that can reduce the SAF price premium and enable airlines to comply with mandates without undermining competitiveness.

2. CORSIA Implementation

As Indonesia prepares for the offsetting phase, assistance is needed to:

- Strengthen operator readiness through updated MRV training and guidance on eligible emissions units.
- Enhance DGCA oversight capabilities for verification, sustainability assessment, and enforcement.
- Improve digital systems for tracking emissions, offsets, and CORSIA-eligible fuels.
- Capacity building for Indonesian project developers to issue CORSIA-eligible units: targeted technical guidance on meeting ICAO CORSIA Emissions Unit Eligibility Criteria and aligning projects with ICAO-approved eligible programmes.
- Technical guidance and support for Indonesia to develop its own ICAO-approved eligible programme.
- National enabling ecosystem for CORSIA EEU pipeline development: assistance to identify high-potential project types/sectors, remove bottlenecks, and build a predictable pipeline of eligible issuance for Phase 1 (2024–2026) and beyond.

3. Technology and Operational Improvements

To achieve deeper emission reductions beyond SAF and CORSIA, Indonesia needs support to:

- Implement advanced PBN procedures and airspace modernization projects identified in national ATM plans.
- Expand training on aircraft operational efficiency, including fuel management, ground operations, and maintenance optimization.
- Improve modeling tools and data systems for emissions forecasting and performance monitoring.

4. Policy, Regulation, and Interagency Coordination

To ensure long-term alignment across government and industry, assistance is required to:

- Further develop cross-ministerial policies and regulatory frameworks supporting SAF commercialization.
- Strengthen the capacity and functions of the recently formed National SAF Team to coordinate feedstock development, investment, certification, and distribution.
- Integrate aviation mitigation measures into national climate planning, including NDC updates and sectoral GHG strategies.

5. International and Regional Cooperation

To accelerate technology transfer and expand SAF supply chains, Indonesia seeks support to:

- Participate in Asia-Pacific regional SAF initiatives, joint LCA efforts, and feedstock/technology demonstration projects.
- Strengthen cooperation with States and industry partners on SAF market access, including harmonized standards and certification processes.
- Engage in international training and exchange programs focused on SAF, CORSIA, and emissions reduction technologies.

6. CONTACT INFORMATION

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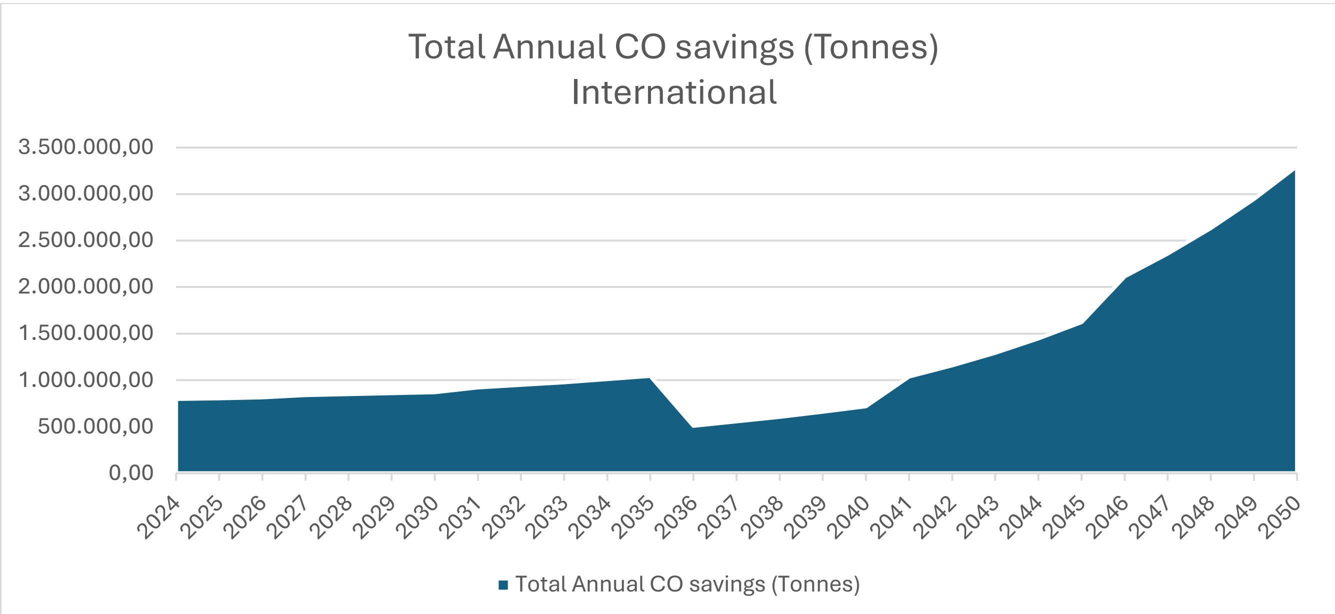
— END OF ACTION PLAN —

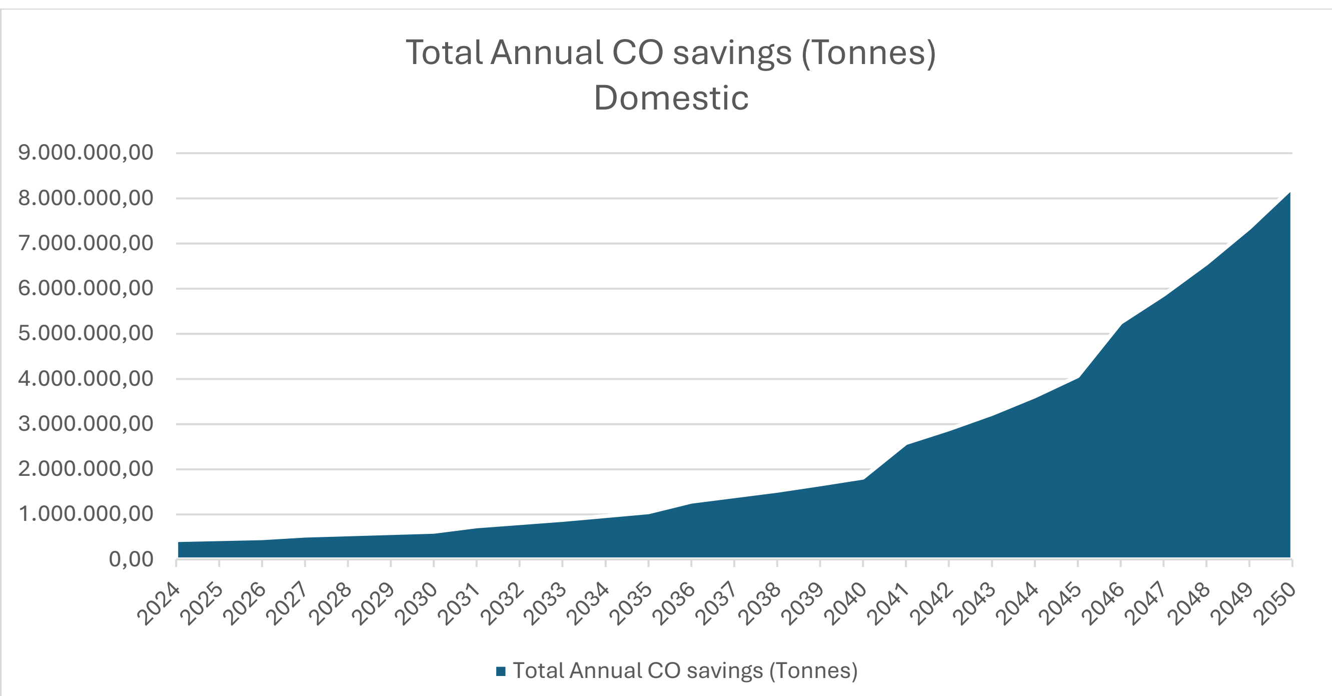
APPENDIX

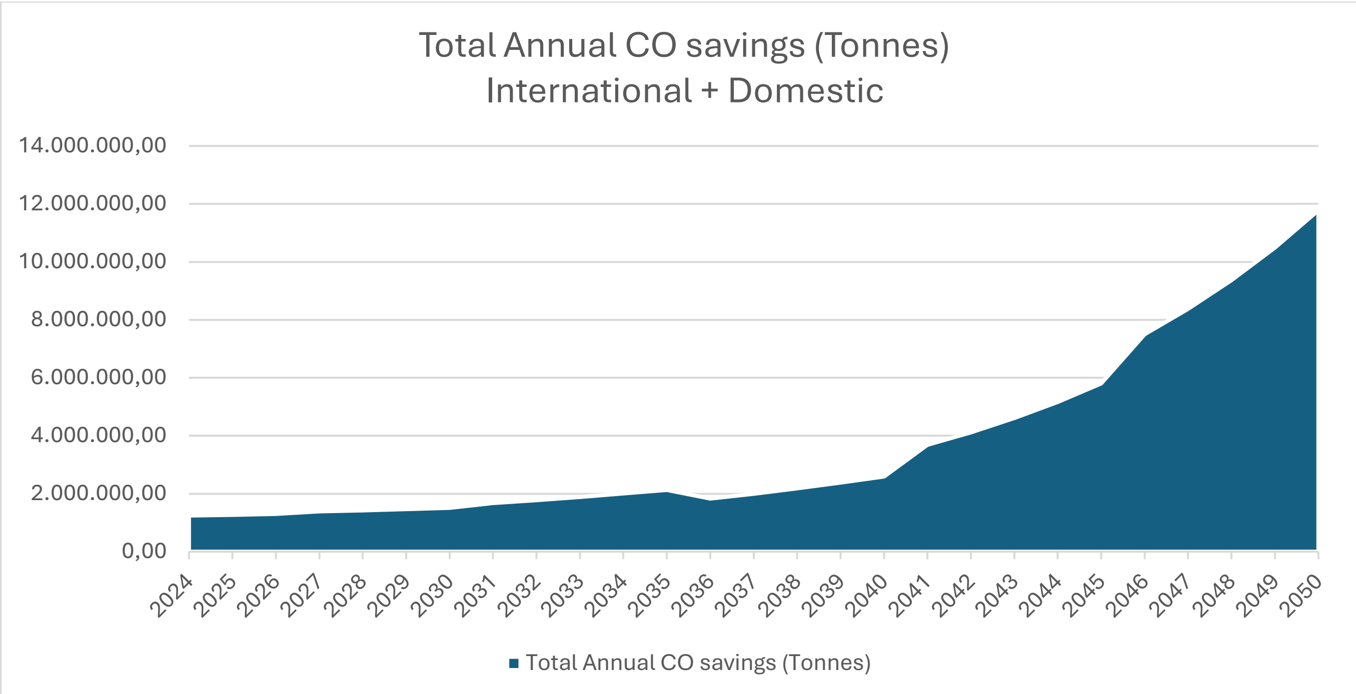
CO_2 SAVINGS PROGRAM

INDONESIA NATIONAL PLAN ACTION

CUMULATIVE 2050







Total Annual CO savings (Tonnes)
International + Domestic
14.000.000,00
12.000.000,00
10.000.000,00
8.000.000,00
6.000.000,00
4.000.000,00
2.000.000,00
0,00
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2044
2045
2046
2047
2048
2049
2050
Total Annual CO savings (Tonnes)

List of Airports with PBN Implementation during the 2024–2025 period

Airport / Route		Status	Year
International Airport IAP	Raja Haji Fisabilillah, Tanjung Pinang	Established	2025
	Hang Nadim, Batam	Established	2025
	Supadio, Pontianak (Rwy 33)	Established	2025
International Airport SID/STAR	Raja Haji Fisabilillah, Tanjung Pinang	Established	2025
	Hang Nadim, Batam	Established	2025
	Halim Perdanakusuma, Jakarta	Established	2024
	H.A.S Hanandjoeddin, Tanjung Pandan	Established	2025
	Sam Ratulangi, Manado	Established	2023
	Supadio, Pontianak	Established	2025
	Minangkabau, Padang	Established	2025
	Zainuddin Abdul Madjid, Lombok	Established	2024
	El Tari, Kupang	Established	2025
	Juwata, Tarakan	Established	2024
	Frans Kaisiepo, Biak	Established	2025
	Sultan Syarif Kasim II, Pekanbaru	Established	2024
Domestic Airport RNP AR	Sultan Babullah, Ternate	Established	2024