



**Asia-Pacific  
Economic Cooperation**

---

**2013/TPTWG38/AEG/002**

## **Indonesia Green Aviation Initiatives for Sustainable Development Air Transportation**

Purpose: Information  
Submitted by: AEG Chair (United States)



**Aviation Experts Group Meeting  
Bali, Indonesia  
2-4 July 2013**

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



**Indonesia Green Aviation Initiatives for Sustainable Development Air Transportation**

**Development National Strategy and Implementation Measures on Mitigation of Climate Change and GHG Emissions**


By

**Arfiyanti Samad**  
Secretary of Directorate General of Civil Aviation  
APEC-Transportation Working Group-38  
Bali , 1-4 July 2013



1

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



**OUTLINES**

- Indonesia Government Commitment on Climate Change
- DGCA Organization Role & Function on Environmental
- Sustainable Development Concept
- Sustainable Development of Air Transport
- Mandate ICAO Assembly 37
- Indonesia and Air Transportation Profile
- Indonesia Green Aviation Initiatives
- 6 Pillars Policy & Strategy and Basket of Measures
- Roadmap Indonesia Green Aviation Initiatives
- Resume Implementation Measures Q2-2013
- Implementation Measures Achievements
- Resume

7/30/2014

2

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION

## Indonesia Government Commitment on Mitigation Climate Change and Emission Green House Gas Reduction

Indonesia, as announced by the President of the Republic of Indonesia on the G-20 Summit in Pittsburgh 2009 and COP-15 meeting in Copenhagen, is aiming to reduce 26% of CO<sub>2</sub> from business as usual by 2020 and 41% with the international support.

Presidential Decree number 61 /2011 on National Action Plan for GHG Emission Reduction

Presidential Decree number 71 /2011 on Implementation of The Greenhouse Gas Inventory

Sectors	Emission Reduction Plan (Giga ton CO <sub>2</sub> e)		Responsibility Agency
	26%	15% (total 41%)	
Forestry and Peat	0.672	0.367	Ministry of Forestry, Ministry of Agriculture, Ministry of Environment, Ministry of Public Works,
Waste	0.048	0.030	Ministry of Public Works, Ministry of Environment
Agriculture	0.008	0.003	Ministry of Agriculture, Ministry of Environment
Industry	0.001	0.004	Ministry of Industry
Energy and Transportation	0.038	0.018	Ministry of Transportation, Ministry of Energy and Mining, Ministry of Public Works
	0.767	0.422	

Source: President Decree No 61 /2011 and Attachment

7/30/2014 3

Table 1 : Sector Obligation for Mitigation of GHG

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION

## DGCA Organization Role and Function of Environmental Protection

Director General of Civil Aviation

Secretary of Directorate General of Civil Aviation

↕

Working Group for Mitigation of Climate Change and Greenhouse Gas in Air Transportation  
DG Decree 58/2012

Directorate of Air Transport

Directorate of Airports

Directorate of Aviation Security

Directorate of Air Navigation Annex -11, 15

Directorate of Airworthiness and Flight Operations

Sub Directorate of Airport Systems and Environment Annex 14, 16

Sub Directorate of Engineering Annex 6, 8, 16 & 34

7/30/2014 4

**MINISTRY OF TRANSPORTATION**  
**DIRECTORATE GENERAL OF CIVIL AVIATION**

**3S+1C**

**Sustainable Development** is defined as balancing the fulfillment of human needs with the protection of the natural environment. A common definition of sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The field of sustainable development can be conceptually broken into three constituent parts: **environmental protection, economic sustainability, and social justice.**

The diagram shows three overlapping circles: **ENVIRONMENT** (green), **SOCIETY** (blue), and **ECONOMY** (orange). The center where all three overlap is labeled **ME**. Text within the circles includes: "Long-term environmental practices" (Environment), "A better quality of life for all members of society" (Society), and "Economic development combined with sustainable transport systems bringing solid economic growth" (Economy). External boxes provide further details: "Liveable cities and communities" (top), "Business practices with low environmental impact" (left), and "Social inclusion bringing economic prosperity" (right).

**Figure 1: The Concept of Sustainable Development**

1) Source: Adapted from Ralph Hall, Introducing the Concept of Sustainable Transport to the U.S. DOT through the Reauthorization of TEA-21 7/30/2014

**MINISTRY OF TRANSPORTATION**  
**DIRECTORATE GENERAL OF CIVIL AVIATION**

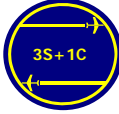
**3S+1C**

**Vicious Cycle Development (Less sustainable) vs Virtuous Cycle Development (Sustainable)**

The diagram compares two cycles. On the left, the **Vicious Cycle** is shown with red arrows: "Increase Traffic (Passenger & Cargo)" leads to "Infrastructures Development Road / Route Airport/Space", which leads to "Urban Sprawl / Land Used Management", which leads to "Need More Fleet", which leads to "Economic Growth", which then loops back to "Increase Traffic". A red box labeled "Economic and Project Based Solution Approach" points to this cycle. On the right, the **Virtuous Cycle** is shown with green arrows: "High Energy Efficiency Technology & Operational Improvement" leads to "Low Fossil Fuel Dependency Alternative Fuels & Renewable Energy", which leads to "Economic, Market and Energy Security, Price Fuel Control", which leads to "Protect Community & Green Environment Reducing GHG & Pollutants", which leads to "Resilience & Sustainable Growth Connectivity Improvement", which then loops back to "High Energy Efficiency...". A green box labeled "Technology & Environmental Sustainable Based Solution Approach" points to this cycle. A large green arrow labeled "Transformation" points from the Vicious Cycle to the Virtuous Cycle.

7/30/2014

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Sustainable Development Air Transport

**ENVIRONMENTAL PROTECTION**

**ECONOMIC**

**SOCIAL JUSTICE**

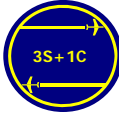
- Low emission & pollutant
- Low noise-heat-vibration
- Energy Conservation
- Conserved biodiversity
- Less impact to human life
- Low Carbon Footprint

- ❑ Economic viable
- ❑ Technical feasibility
- ❑ Highest efficiency
- ❑ Green economic support
- ❑ High climate resilient
- ❑ Safety and security

- Equity
- Accessibility
- Connectivity
- Affordability
- Generic replication
- community based concept
- Etc.

7/30/2014
7

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## MANDATE ICAO ASSEMBLY 37 ICAO on International Aviation and Climate Change

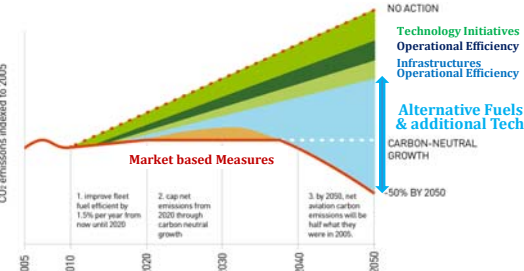


Figure 5 : ICAO Scenario on Reduction Carbon Emissions 2011- 2030, 4<sup>TH</sup> Pillars + Global MBM

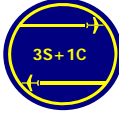
Fuel Efficiency Program Initiatives	Percentage Fuel Efficiency	Remarks
Aircraft Technology Improvement	20% - 25%	Lift/Drag Weight Configuration
Engine Technology Improvement	15% - 20%	Specific Fuel Consumption
ATM/PBN Improvement	5% - 10%	ATM/PBN Operational

Table 2 : Contribution Fuel Efficiency Initiatives  
Source: Sustainable Aviation Progress Report ICAO/ATAG

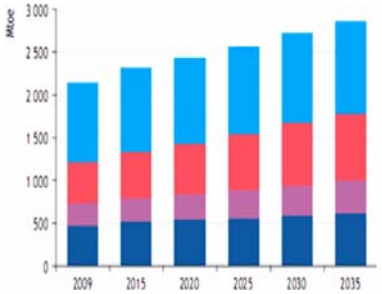
1. Achieve a global 2% annual fuel efficiency improvement up to 2050;
2. Further explore the feasibility of more ambitious goals, including carbon neutral growth by 2020 and 50% emissions reductions by 2050
3. Develop a global CO2 Standard for aircraft;
4. Facilitate the development and deployment of sustainable alternative fuels for aviation;
5. Facilitate the implementation of operational changes and the improvement of air traffic management and airport systems;
6. Develop the system of Market based Measures

8

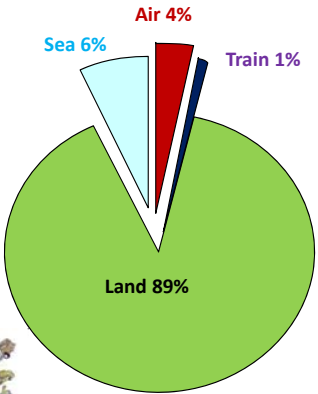
**MINISTRY OF TRANSPORTATION**  
 DIRECTORATE GENERAL OF CIVIL AVIATION




## Global Energy Transportation Outlook 2010



**Figure 6 - Transport Oil Consumption By Type**  
 Sources : International Energy Agency 2010

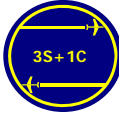


**Figure 7 : Indonesia Transportation Emissions Contribution**  
 Sources : Mc.Kinsey, 2007



7/30/2014 9

**MINISTRY OF TRANSPORTATION**  
 DIRECTORATE GENERAL OF CIVIL AVIATION



### Indonesia 2012 and Future 2030 Profile

16 <sup>th</sup> largest economy in the world	➔	9 <sup>th</sup> largest
55 million skilled workers	➔	113 million
45 million members of the consuming class	➔	135 million
GDP US\$928.274 billion	➔	US\$ 6.685 trillion
per capita GDP US\$3,592	➔	US\$22,276

➔

Growth Tension to Air Transport

### Indonesia Air Transportation 2012 - 2020 Profile

442	➔	973
Transport Category Aircraft		
3,7 M Kilo It	➔	7.9 M kilo It
Fuel Consumptions		
62 million	➔	170 million
Passenger		
8.9 Mton CO <sub>2</sub>	➔	20.5 Mton CO <sub>2</sub>
Emissions		

Sources : Central Bureau Statistic, IMF, McKinsey Global Institute, BPPT, Bappenas Source : Air Transportation Working Group

10

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Indonesia Green Aviation Initiatives

**3<sup>rd</sup> Main Pillars Soft System Sustainable Development:**

- **Strengthen the Organization (Role, Function and Responsibility)**
- **Improvement of Legal Frameworks and Regulations, Procedures, Guidelines, Management Tools**
- **Enhancement Human Resources Capacity**

**3<sup>rd</sup> Main Elements :**


- ❑ **Green Flight**
- ❑ **Green Corridor/Air Space**
- ❑ **Green /Eco- Airport**





11


**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Basket of Measures

1. Measures on improvement Organization, Policy and Rule Making & Capacity Building of Human Resource of Stake Holders
2. Airlines Operator Carbon Emissions Reduction Measures
3. Air Navigation Services and Traffic Management Measures
4. Airport Operator (Eco Airport) Carbon Emissions Reduction Measures
5. Energy Fossil Conservation through Alternative Energy (Aviation Bio-fuels, Bio Diesel, Solar-Wind-Hybrid- Water-based Energy) Used Measures
6. Market-based Measures

**6<sup>TH</sup> Pillars POLICY and STRATEGY on MITIGATION of GHG EMISSIONS**



7/30/2014
12


**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



**INDONESIA GREEN AVIATION INITIATIVES  
and Roadmap 2012 - 2020**

7/30/2014
13

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION




**Implementation Measures Achievement**

- State Action Plans and National Action Plan (RAN-GRK) Air Transportation, Ministry Decree No. 201/2013
- Capacity Building , workshop-training, seminar, symposium, forum group discussion on national and international level
- Continuous Active Participation on Global Forum UNFCCC, Montreal Protocol COP/MOP, ICAO CAEP, Regional EST
- Pre implementation period 2013-2016 for alternative fuels and renewable energy program (study, R & D, national and international collaboration)
- Registry NAMAs for Alternative Fuels and Renewable Energy for 2013 and seeking for International Financial Support
- Continuous implementation measures on aircraft regeneration, Operational Efficiency, Eco-Airport, ATM/PBN, and
- Develop Data-base, Inventory GHG system , as well as MRV system.

7/30/2014
14



**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION

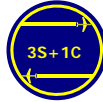


## Resume Implementation Measures Q2-2013

No	Program	Quantity/ Location	Potential Emission Reduction (Million Ton CO2)	Remark
1	Aircraft Regeneration	• 261 New Technology Aircraft	2.4	Garuda Indonesia, Citilink Lion Group, Indonesia Air Asia Sriwijaya Air, Mandala, etc
2	Operational Efficiency	• 2 Airlines	0.3	PT. Garuda Indonesia PT. Indonesia Air Asia
3	Airport Renewable Energy  Eco-Airport Council Green Building	• 1 Airport • 6 Small Airport  • 15 Airport • JAATS	-	Raden Inten Airport of 160 KW, solar panel (2011), DGCA  Airport Operators DGCA
4	ATM and PBN (up to 2012)	• 23 RNAV routes / RNP 10 • 1 STAR – SID • 10 RNP Approach • 2 RNP-AR	-	DGCA
5	Alternative Fuels and Renewable Energy	1 Initial Study / Research NAMAs Registry	-	On Going DGCA

7/30/2014
15

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Resume Green Flight Program Q2- 2013

Table 3. : Aircraft Regeneration

DATA	2008	2009	2010	2011	2012
AIRBUS A320	14	22	24	30	45
AIRBUS A330	6	12	13	15	17
BOEING 737-800	4	19	42	51	72
BOEING 737-900ER	17	30	43	55	67
ATR-42	11	12	14	14	13
ATR-72	3	6	13	19	24
<b>Total</b>	<b>54</b>	<b>101</b>	<b>149</b>	<b>184</b>	<b>238</b>

**Achievement up to Q2-2013 :**  
**261 New Technology Aircraft**  
**(10% up to 15% per year replace conventional technology aircraft)**

**2 Airlines Implement the Operational Efficiency Program**  
**2.7 Million Ton Carbon Reduction**

Table 4 : Carbon Emissions Reduction of Aircraft Regeneration and Operational Efficiency

Program Operational Efficiency	Fuels Saving ( Mil. litre)	CO2 (Mil. ton)	Nox (Mil. ton)
2007	12.7	0.0315	0.210
2008	16.4	0.0408	0.272
2009	21.2	0.0525	0.351
2010	21.7	0.0538	0.359
2011	22.0	0.0546	0.365
2012	24.2	0.0605	
<b>Total</b>	<b>93.993.138</b>	<b>0.3013</b>	<b>1.558</b>
<b>Aircraft Regeneration 2009 - 2012</b>		<b>2.3955</b>	
<b>Total Emissions Reduction up to 2012</b>		<b>2.6968</b>	

**Operational Efficiency Implementation**

- Potable Water Management
- Optimum Centre of Gravity
- Nearest Alternate
- Cost Index
- ATC Coordination (Direct Routes & Optimum Flight Level)
- Pilot Flight Technique
- Maintenance Program

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Improvement Eco-Airport Initiatives

**The Objectives :**

- To establish airports to have global environment point of view;
- To conduct airport operations that are integrated with its environment;
- To operate airports that consider *sustainable development*;

**8 Environmental Factors**

1. Atmosphere
2. Energy
3. Noise/Vibration
4. Water
5. Soil
6. Waste
7. Natural Environment
8. Others

**ACHIEVEMENT : 15 ECO AIRPORT COUNCIL  
40 AIRPORT WITH EIA Program**

**Regulation and Standard Practices:**

- Civil Aviation Law No. 1 year 2009
- Governmental Decree No. PP 27 year 1999 concerning Environment Analysis
- E.M Annex 16 : Environmental Protection,
- DCCA Blue Print Year of 2005 - 2024,
- Director General Decree No. SEEP/124/VI/2009 concerning Eco Airport implementation

The Airport Authority has responsibility to form and organize **The Eco Airport Council** consists of all legal body or people who relate with environmental activity within the airport

The Eco Airport Council has task to develop and establish **The Airport Environment Plan** to be implemented in each airport

Airports have to implement **The Plan** and produce **The Airport Environment Report**

**The Airport Environment Audit** done by The Eco Airport Council

**TOWARDS IMPROVEMENT  
ECO AIRPORT  
IMPLEMENTATION**

➔

ECO airport beyond the compliance / proactive comply with regulation polluter pays principle

7/30/2014 17

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## GREEN BUILDING INITIATIVES




**JAATS HEAD QUATER OFFICE  
( Jakarta Automatic Air Traffic System )**

1. Design and Specifications
2. Materials (Roof, etc)
3. Heat Protection System
4. Water Recycling System
5. Lighting System
6. Air Conditioning System



8

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



## Improvement Eco-Airport Initiatives

Figure 10 : LED Taxiway and Runway Installments




**Figure 9 : Airport Operation Renewable Energy Initiative**

**7 Airports and airfields used the Photo Voltaic**

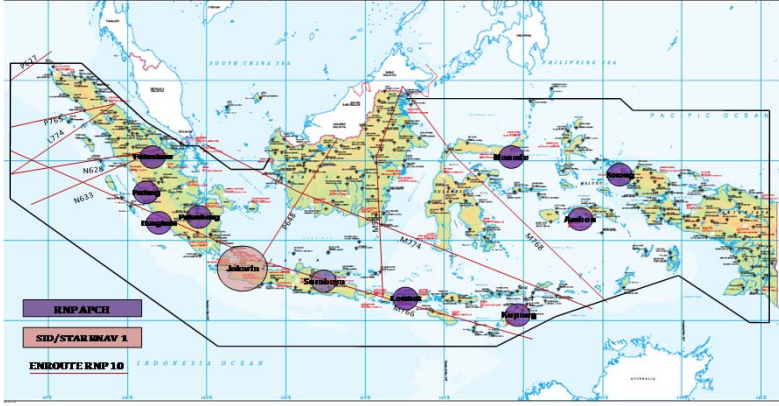
1. Radin Inten II - Lampung
2. Merdei - Kab. Manokwari - Papua Barat
3. Rampi - Kab. Masamba - Sulawesi Selatan
4. Ilaga - Kab. Puncak - Papua
5. Yufai Semarang - Long Apung - Kalimantan Tengah
6. Batom - Pegunungan Bintang - Papua
7. Banda Naira - Pulau Banda - Maluku

19

**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION

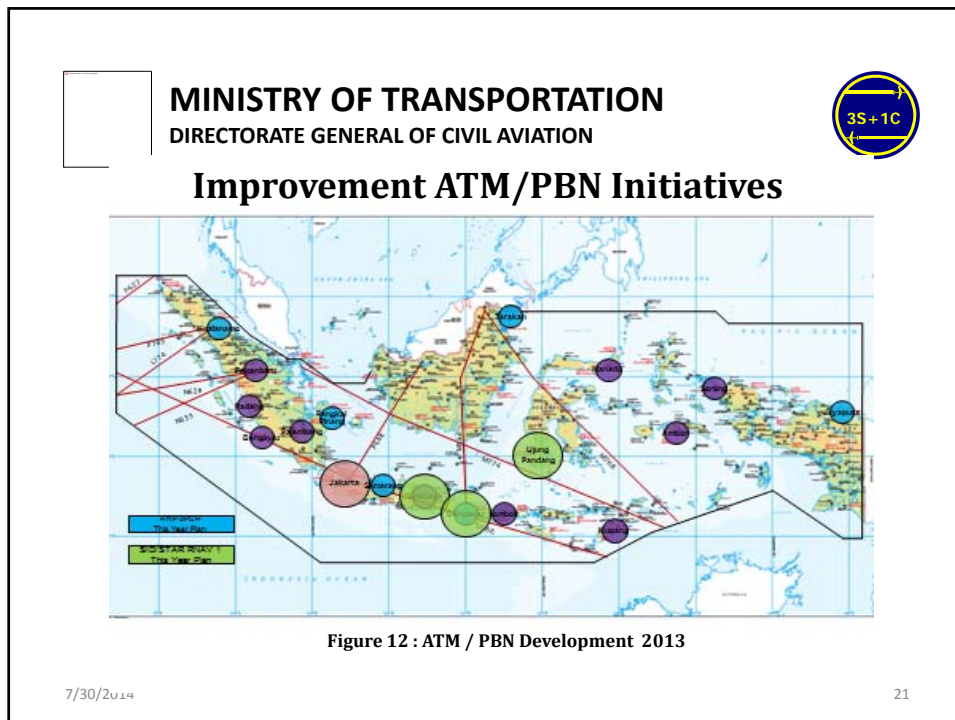


## Improvement ATM/PBN Initiatives



**Figure 11 : ATM / PBN Development Achievement**

7/3
20



**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



### Resume

1. Indonesian DGCA has established the system and task force which is in line with the National, ICAO and UNFCC , in order to implement the mitigation programs of climate change and reducing the aviation's GHG emissions up to 2020.
2. Indonesian green aviation initiatives consist of GREEN FLIGHT, GREEN CORRIDOR/AIR SPACE and GREEN/ ECO-AIRPORT.
3. Continuous implementation measures on aircraft regeneration, Operational Efficiency, Eco-Airport, ATM/PBN, and develop data-base, Inventory GHG system , as well as MRV system, and
4. International collaboration to research and development for alternative fuels and renewable energy program.



**MINISTRY OF TRANSPORTATION**  
DIRECTORATE GENERAL OF CIVIL AVIATION



**Thanks You**

**Green Solutions for  
a Brighter Future**

[arfiyantisamad@dephub.go.id](mailto:arfiyantisamad@dephub.go.id)

7/30/2014

23