



Assistance for Action

Aviation and Climate Change Seminar

23 - 24 October 2012

ICAO Headquarters, Montréal, Canada



INDONESIA ROADMAP 2012-2020 on Aviation Emissions Reduction of GHG and Capacity Building Programs

By
DIRECTORATE GENERAL OF CIVIL AVIATION

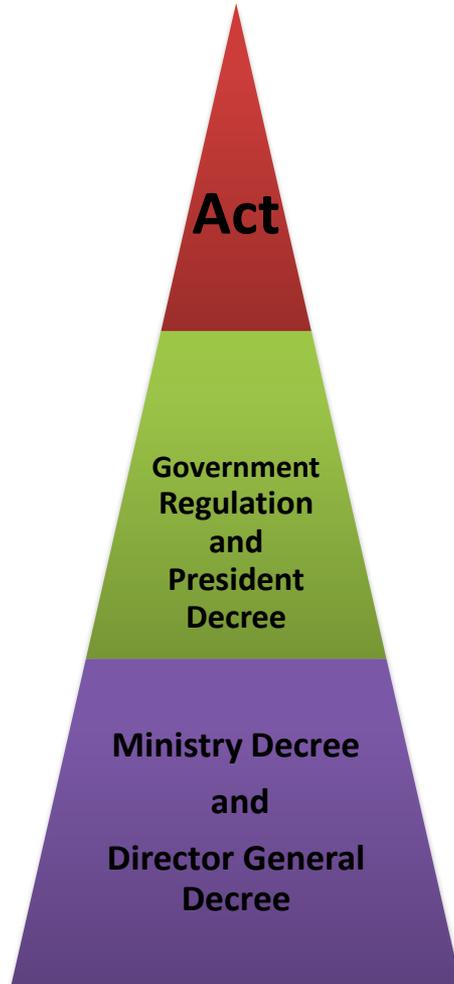


Outline

- **Legal References**
- **Aviation Carbon Emission Contributors**
- **Indonesia DGCA Organization on Environmental Matters**
- **Indonesia Aviation Policy & Strategy on Mitigation of GHG**
- **Basket of Measures**
- **National Action Plan (Roadmap) on Mitigation of Green House Gas**
- **Carbon Emissions and Potential Reduction**
- **Progress of Capacity Building Programs and Future Plan**
- **Summary**



Legal References



- 1. Indonesian Aviation Act, No. 1/ 2009**
 - 2. Indonesian Environmental Act, No. 32/2009**
- 1. Govt. Regulation. No. 27/2012, Environmental Certification,**
 - 2. Govt. Regulation. No. 40/2012, Airport Development and Environmental Conservation.**
 - 3. Govt. Regulation No. 41/1999, Air Pollution Control**
 - 4. Govt. Regulation No. 70/2006, Energy Conservation**
 - 5. President Decree No. 61/2011, National Action Plan on Reduction of GHG**
 - 6. President Decree No. 71/2011, National Implementation on Inventory of GHG**
- 1. Ministry Decree No. 909/2011, Ministry of Transportation Working Group for Mitigation of Climate Change and GHG Emissions**
 - 2. DG Decree No. No. 58/2012, Working Group for Mitigation of Climate Change and GHG Emissions in Air Transportation**
 - 3. 37th ICAO Assembly 2010, Indonesia Action Plan on Aviation and Climate Change.**

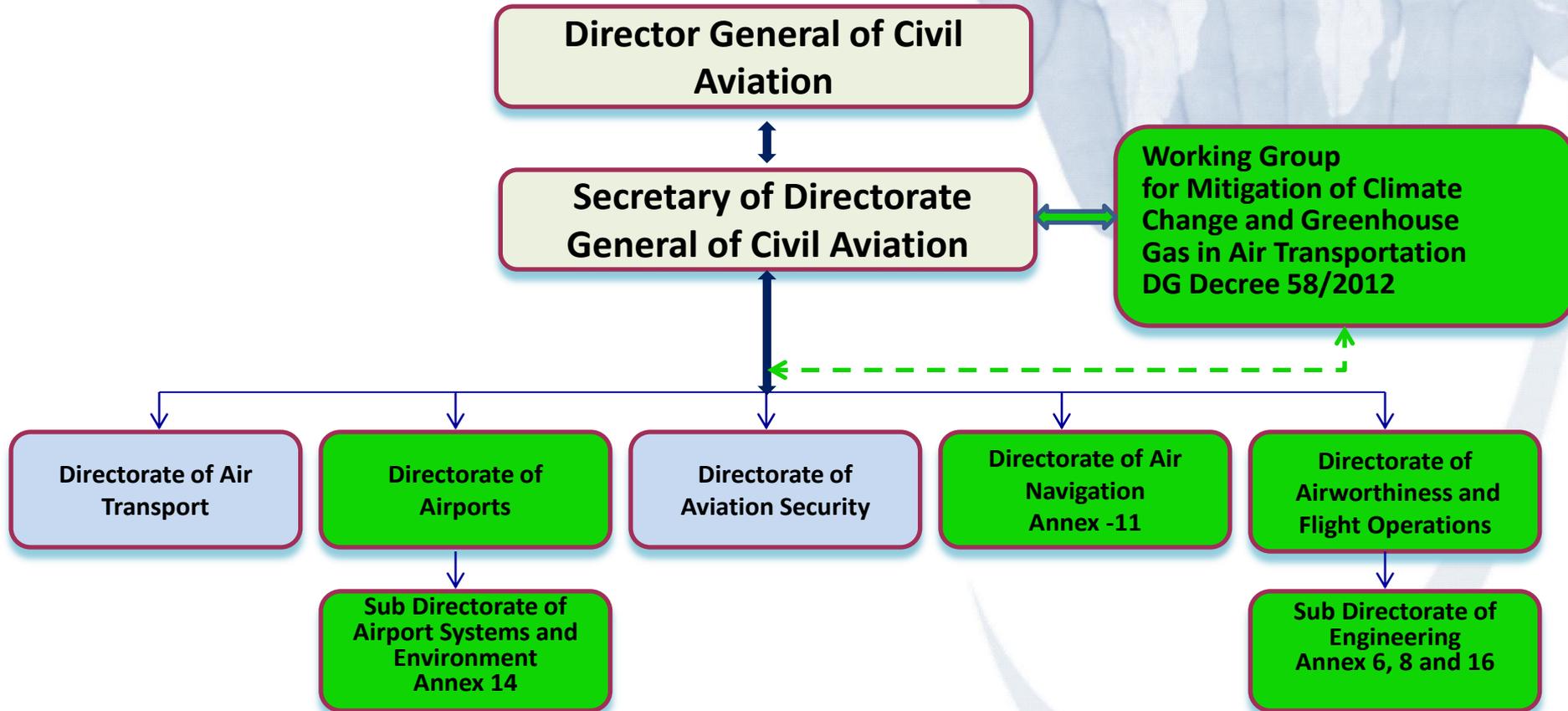


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Environmental Protection Function of DGCA Organization (No. KM. 60 Year 2010)



Aviation Carbon Emissions Contributors

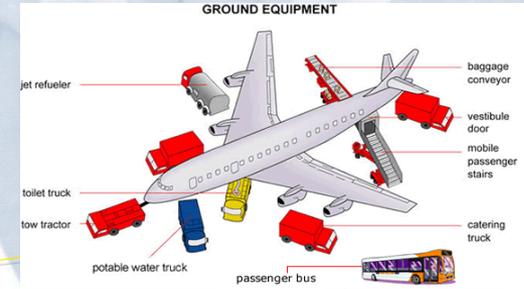
Aircraft Operations



Air Navigation and Air Traffic Management



Airport Operations





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Indonesia's Policy and Strategy on Mitigation of Aviation GHG Emissions



POLICY, STRATEGY, PROCEDURE AND CAPACITY BUILDING



MARKET BASED MEASURES

AIRCRAFT AND AIRPORT FACILITIES OPERATIONAL EFFICIENCY



ENHANCED ECO AIRPORT IMPLEMENTATION



ATM IMPROVEMENT AND PBN IMPLEMENTATION IN AIR NAVIGATION SERVICES

AIRCRAFT AND INFRASTRUCTURE MODERNIZATION





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The National Action Plan (Roadmap) on Carbon Emissions Reduction

	PROGRAMS	Mid-Term (RPJM)			Long-Term (RPJP)					
		2012	2013	2014	2015	2106	2017	2018	2019	2020
Legal & Cap Building	Develop Policy & Regulations	Establish policy, strategy, system, procedures, and regulations								
	Develop System, Data Base, Capacity Building	Establish the data base, methodology, analysis and calculation of emissions, perform capacity building of stake holders and dissemination of relevant information								
Aircraft & Operational	Fleet Regeneration	Replace 10% by 2012-2013 of domestic fleet		Replace dom. fleets with next generation technology by 15% between 2014-2017, and 5% int'l fleet						
	Aviation Bio Fuel	Research & Development		Testing	2% biofuel in 2016-2017		Biofuel used by 3% in 2018-2020.			
	Improved Operational & Maintenance Procedures						Implementation of new efficient operational and maintenance procedures by 2016			
Navigation & Air Traffic Management	Implementation of Procedures STAR-SID of Climb / Descent	Develop at 9 airports		Develop STAR-SID PBN at 24 International airports						
	Implementation of Direct Routes, RNAV5, RNP10	Develop new routes with shorter distance								
	Implementation of RNP Approach (RNP 0.3, 0.1)	Restructure the ATS routes based on PBN of domestic and int'l routes		9 airports		Develop RNP approach at 11 major airports				
Eco Airport & Equipments	Renewable Energy for Electrical Power	Research & Development		10 airports: partial supply of 7.5 MW by renewable energy						
	Airport Green Plantations						50 airports: access road & open area lighting replaced by solar energy			
	Modernization of GSE and Mobile Vehicles	Research & Development		Partial use of 10% biodiesel for GSE and mobile vehicles						
	Improvement of the lighting system by using LED						Install LED light technology (1000) at each airport and runway on 30 airports			

ROADMAP



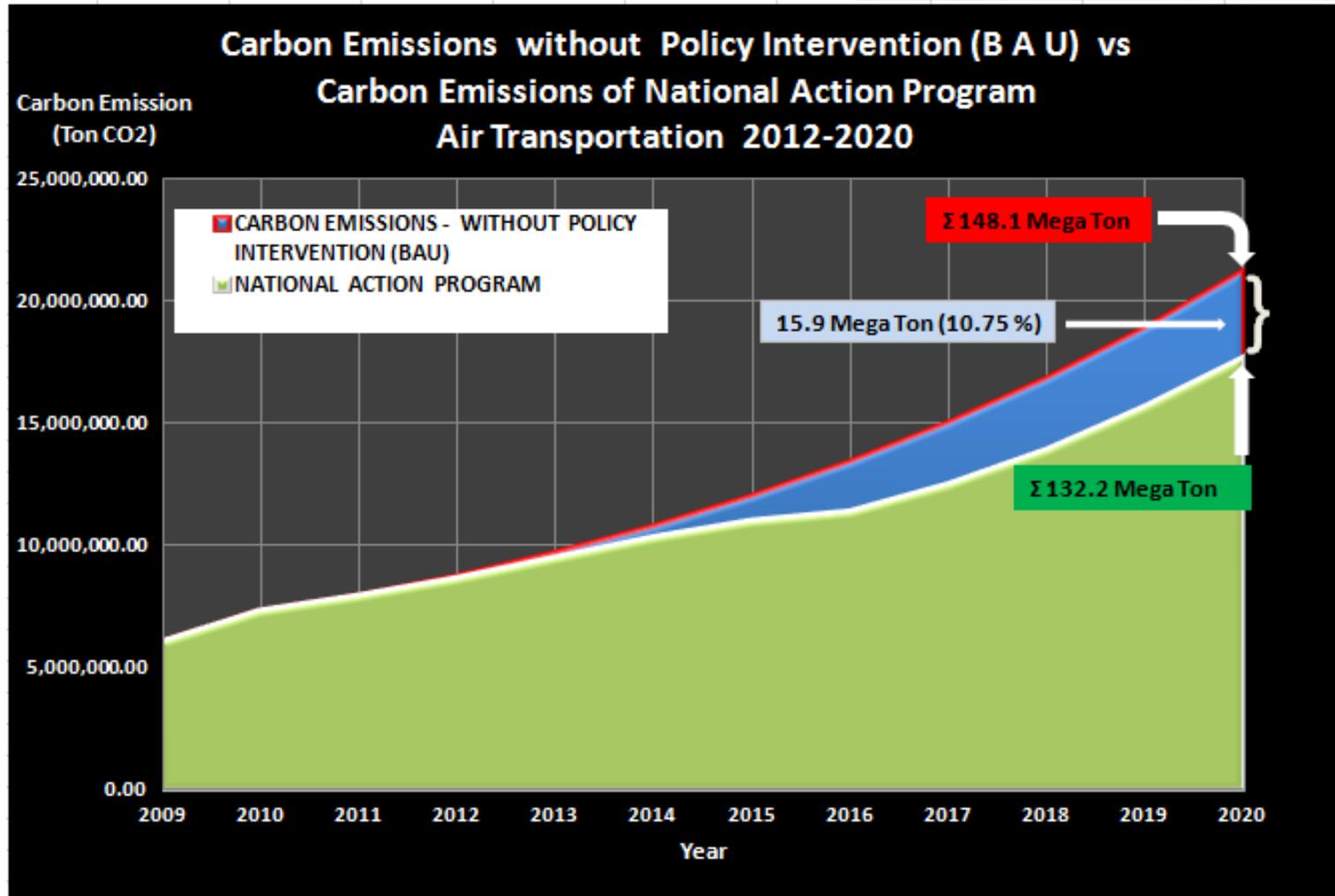
Basket of Measures

- 1. Measures regarding Policy, Rule-Making & Capacity Building of Human Resources of Stake Holders**
- 2. Airline Operator Carbon Emission Reduction Measures**
- 3. Air Navigation Services and Air Traffic Management Measures**
- 4. Airport Operator (Eco Airport) Carbon Emission Reduction Measures**
- 5. Fossil Energy Conservation Measures through Alternative Energy (Aviation Bio-fuels, Bio Diesel, Solar / Wind / Hybrid / Water-based Energy)**
- 6. Market-based Measures**



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Summary of Carbon Emissions and Potential Reduction Under the National Action Program

- **Total carbon emissions without policy intervention (BAU)
up to 2020** = **148.163 MT CO₂**
- **Total carbon emission reduction due to Aircraft Regeneration,
up to 2020** = **4.478 MT CO₂**
- **Total carbon emission reduction due to Operational
& Maintenance Efficiency up to 2020** = **2.978 MT CO₂**
- **Total carbon emission reduction due to Aviation Bio fuel and
GSE Bio diesel up to 2020** = **2.726 MT CO₂**
- **Total carbon emission reduction effected by Eco-airport
(LED, Renewable energy, Plantation) up to 2020** = **3.238 MT CO₂**
- **Total carbon emission reduction by improving the ATM,
Air navigation system and PBN implementation up to 2020** = **2.519 MT CO₂**
- **Total carbon emission reduction up to 2020** = **15.939 MT CO₂**
- **Percentage carbon emissions reduction from BAU** = **10.75 %**

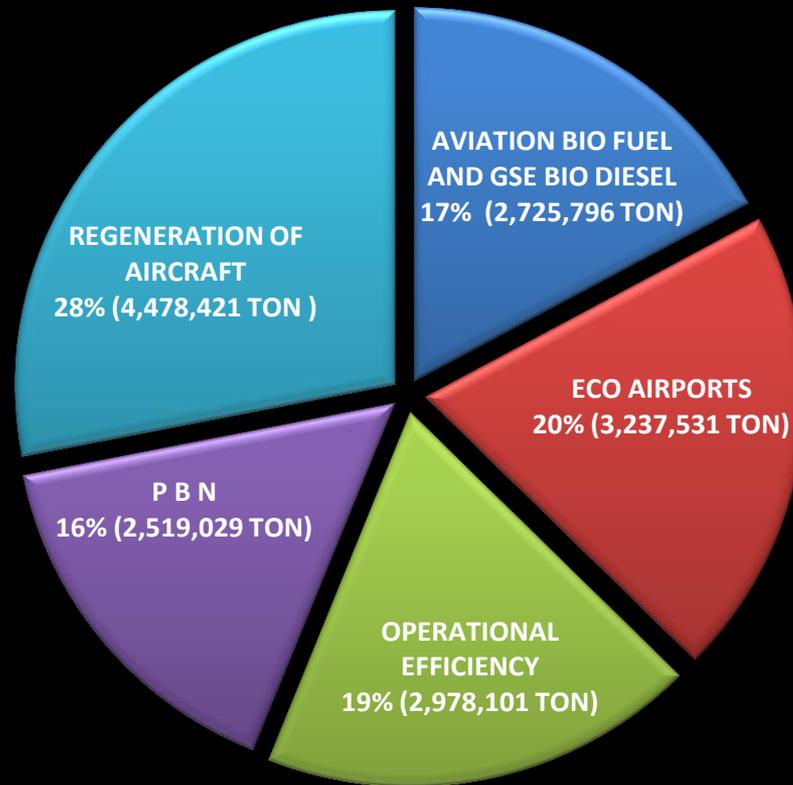


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CARBON (CO₂) EMISSION REDUCTION INDONESIAN NATIONAL ACTION PROGRAM





Summary: Carbon Emissions and Potential Reduction - International Flights

- **Total carbon emissions of int'l flights without policy intervention (BAU) up to 2020** = **44.773 MT CO₂**
- **Total carbon emission reduction due to Aircraft Regeneration, up to 2020** = **0.523 MT CO₂**
- **Total carbon emission reduction due to Operational & Maintenance Efficiency up to 2020** = **1.232 MT CO₂**
- **Total carbon emission reduction due to Aviation Bio fuel up to 2020** = **1.148 MT CO₂**
- **Total carbon emission reduction by improving the ATM, navigation system and PBN implementation up to 2020** = **0.23 9 MT CO₂**
- **Total carbon emission reduction up to 2020** = **3.142 MTCO₂**
- **Percentage carbon emissions reduction from BAU** = **7.02 %**



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Implementation Progress and Emission Reduction - Period 2009-2011

No	Program	Quantity/ Location	Emission Reduction (Ton CO2)	Remark
1	Aircraft Modernization	<ul style="list-style-type: none"> • 129 New Aircraft 	1.395.481	PT. Garuda Indonesia PT. Lion Air / Wing air PT. Indonesia Air Asia
2	Operational Efficiency	<ul style="list-style-type: none"> • 2 Airlines 	161.365	PT. Garuda Indonesia PT. Indonesia Air Asia
3	Airport Renewable Energy	<ul style="list-style-type: none"> • 1 Airport 	-	Raden Inten Airport of 160 KW, solar panel (2011)
4	ATM and PBN (up to Oct 2012)	<ul style="list-style-type: none"> • 23 RNAV routes / RNP 10 • 1 STAR – SID • 5 RNP Approach • 2 RNP-AR 	-	-



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TIMELINE PROGRAM and ACTIVITIES

IMPLEMENTATION OF AVIATION BIOFUEL & BIO DIESEL

PROGRAM	2012				2013				2014				2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
PRELIMINARY PROGRAM																				
1. Draft budget for 2013	Apr																			
2. Familiarization and FGD NAP (CAPACITY BUILDING)		Jul			Mar															
3. Informal meeting for MOU and Working Group (WG)			Jul Aug	Oct																
4. Legal review on MOU/WG draft				Oct- Nov																
5. Finalization of MOU draft				Nov																
6. Program Launching of Aviation Biofuel and Bio Diesel				Nov																
7. Seminar on International Aviation Biofuel & Renewable Energy at Airports					Apr															
IMPLEMENTATION PREPARATION																				
1. Develop draft regulation																				
2. Enhance HR Capacity Building																				
3. DGCA project study on aviation Biofuel																				
4. Research & Development Project by ESDM & Pertamina																				
5. Refinery Aviation Biofuel at Demo plant Scale																				
6. Laboratory Test																				
7. Engine Test Cell																				
8. Certification of Aviation Biofuel																				



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TIMELINE PROGRAM and ACTIVITIES

IMPLEMENTATION OF AVIATION BIOFUEL & BIO DIESEL

PROGRAM	2012				2013				2014				2015				2016			
	Q1	Q2	Q3	Q4																
GROUND AND FLIGHT TESTING																				
1. Rule making (SOP) for Ground and Flight Testing																				
2. Airlines, Aircraft & Flight Test Crews Assignment																				
3. Flight Test Crews Training																				
4. Coordination with Aircraft and Engine Manufacturers																				
5. Ground Testing at Engine Test Cell and Aircraft																				
6. Flight Testing																				
7. Flight Test Certification																				
8. Establish Implementation Regulation on Aviation Biofuel																				
9. Establish SOP Manual on Airlines, Providers, etc																				
10. Training of Flight Crew, Technicians, Providers, and others																				
IMPLEMENTATION OF AVIATION BIOFUEL 2% AND 3%																				
1. Establish Regulation on Implementation of Aviation Biofuel of 2% mixing																				
2. Distribution of 2% Biofuel																				
MONITORING-EVALUATION-VERIFICATION AND REPORTING																				
1. Monitoring																				
2. Reporting																				
3. Evaluation- Verification																				



Capacity Building Program

- 1. The DGCA Indonesia has been involved in Capacity Building for the Climate Change and GHG Mitigation Program, focused on :**
 - **policy and regulatory framework,**
 - **national action plan and appropriate national mitigation action,**
 - **technical guidelines on determination and calculation of emissions and potential reduction, etc.**
- 2. The capacity building program and activities have been developed since 2011, with information and assistance at the national and international level through :**
 - **seminars, conferences, job training, workshops, forum group discussions and familiarization sessions, etc;**
 - **multilateral entities such as ICAO (HQ and Regional Office), UNFCCC, UNEP, World Bank,**
 - **national government bodies : Ministry of Transportation, Ministry of Environment, National Development Planning Agency, National Council on Climate Change, etc,**
 - **international entities and NGO's such as : USAID, GEF, JICA, GIZ, SIDA, etc**
- 3. The capacity building encompasses all air transportation stakeholders (regulators, operators, associations, university, etc)**
- 4. The future program of Capacity Building focuses on the Regulatory System and Procedure, Aviation Biofuel and Airport Renewable Energy, Operational Efficiencies, Measures-Reporting and Verification (MRV), Inventory of GHG, etc.**



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Capacity Building with Involvement of Public and Private Sector





Capacity Building with Involvement of Public and Private Sector

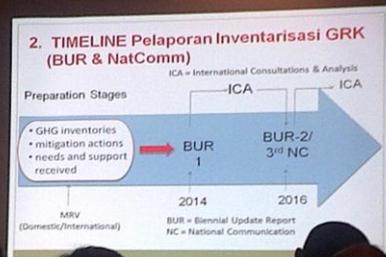
Climate Change Financing

- Mobilizing concessional (grant and non-grant) resources**
 - Internal funds: Climate Change Fund, Clean Energy Financing Partnership Facility, others with bilaterals
 - External funds: CIF, GEF, looking ahead to GCF
- Maximizing market mechanisms**
 - Carbon Market Program: Technical Support Facility and upfront carbon finance—Asia Pacific Carbon Fund and Future Carbon Fund
 - Supporting new ones like Renewable Energy Credits in India
- Catalyzing private capital**
 - Direct project finance (lending, guarantees, syndications) and equity investment
 - Innovative financing mechanisms

ADB

2. TIMELINE Pelaporan Inventarisasi GRK (BUR & NatComm)

ICA = International Consultations & Analysis



Preparation Stages

- GHG inventories
- mitigation actions
- needs and support received

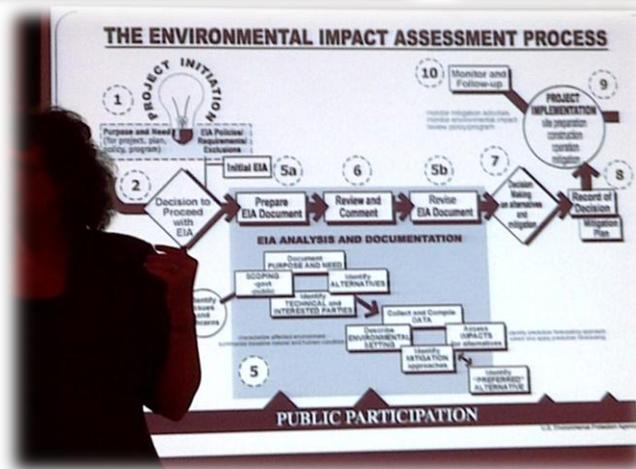
ICA

2014: BUR 1
2016: BUR-2/3rd NC

ICA = International Consultations & Analysis

MIV (Domestic/International)

BUR = Biennial Update Report
NC = National Communication



JATROPHA and CAMELINA Jet Fuel

- A Boeing 747 with 400 passengers consumes on average 10 000 l per hour of flight. At 5000 h per year, total annual fuel consumption is 50 million litres.
- As one ha of Jatropha with intercrop Camelina plantation in Indonesia yields on average 3 MT, i.e. 3276 L per annum, 15 262 ha of plantation are needed to power one 747 jet continuously for one year.
- According to recent data from IATA, the airline industry will be required to adopt a mandatory blend of 5% within 3-5 years from now.
- On this 5% blend basis, 755 ha of Jatropha intercrop with Camelina plantation would meet the renewable fuel needs of one Boeing 747 during one full year of operation and save in the same time 23 405 trees (37 Ha of Forest) in Java-Indonesia.
- The yield of 10 000 ha plantation can keep a fleet of 13 Boeing 747 in the air for one year on a B5 blend and save in the same time save 210 000 trees (496 hectare forest) in Java-Indonesia.

IATA



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Capacity Building on Climate Change and Green House Gas Emission Reduction in the Air Transportation Sector 2011-2012

No	Subject	Host	Participants
1	National Appropriate Mitigation Action (NAMAs) Workshop	<ul style="list-style-type: none"> GIZ (Gesellschaft für Internationale Zusammenarbeit) – Indonesia, Oct 2011 UNFCCC Workshop, Durban (2011), Bonn (2012), Bangkok (2012) 	National International
2	NAMAs, MRV of Local Government Action Plan of GHG Workshop	<ul style="list-style-type: none"> European Union and National Development Planning Agency of the Republic of Indonesia, Jakarta (2012) 	National
3	Forum Group Discussion on Policy of Climate Change and Green House Gas Emission Reduction in the Transportation Sector	<ul style="list-style-type: none"> Center of Study for Partnerships and Transportation Services – Ministry of Transportation (2012) 	National
4	Forum Group Discussion and Familiarization of National Action Plan for Green House Gas Reduction in the Air Transportation Sector	<ul style="list-style-type: none"> Directorate General of Civil Aviation-DGCA -Ministry Of Transportation, Jakarta (2012) 	National
5	Workshop and Discussion of General Guidelines of Action Plan for Green House Gas Reduction and Technical Guidance Action Plan for Local Government	<ul style="list-style-type: none"> National Development Planning Agency, MOE and Ministry of Internal Affairs, Jakarta (2012) 	National



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Capacity Building on Climate Change and Green House Gas Emission Reduction in the Air Transportation Sector 2011-2012

No	Subject	Host	Participants
6	ICAO Hands-on Training Workshop for State Action Plan on CO2 Emission Reduction Activities	<ul style="list-style-type: none"> ICAO ATB and ICAO Regional Office ASPAC, Bangkok (2011) 	International
7	Workshop on IPCC Guide Lines (Inventory and Measurement Reporting and Verification)	<ul style="list-style-type: none"> GIZ (Gesellschaft für Internationale Zusammenarbeit) – Indonesia (2012) IPCC Workshop 	National International
8	International Workshop on Strengthening Public Participation and Environmental Impact Assessment in Indonesia	<ul style="list-style-type: none"> USAID, EACEN and Ministry of Environment of Indonesia, Jakarta, 2012 	International
9	New Market Mechanism	<ul style="list-style-type: none"> UNFCCC Workshop 	International
10	Workshop on PMR Carbon Market	<ul style="list-style-type: none"> World Bank (Indonesia) and Indonesia / National Council on Climate Change 	National
11	Workshop on Bilateral Offset Credit Mechanism	<ul style="list-style-type: none"> JICA and Indonesia/National Council on Climate Change 	National
12	Asia Pacific Roundtable for Sustainable Consumption and Production (APRSCP) and Workshop Towards More Efficient and Low Emissions in Transportation	<ul style="list-style-type: none"> Ministry of Environment of Republic of Indonesia, Jakarta (2011) 	National



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Capacity Building on Climate Change and Green House Gas Emission Reduction in the Air Transportation Sector 2011-2012

No	Subject	Host	Participants
13	<i>World Energy Outlook 2011</i> and Panel Discussion on Energy Security	• Ministry of Energy and Mineral Resources, Jakarta, 2011	National and International
14	Global Environmental Fund (GEF) Workshop	• UNEP and Ministry of Environment of Republic Indonesia, Jakarta (2011)	National
15	Mitigation Action Implementation Network , 2 nd Asia Regional Dialogue on Development of NAMAs	• Center for Clean Air Policy and Vietnam Ministry of Natural Resources and Environment (2012)	International
16	Bio fuel in Aviation Workshop	• UNFCCC-IICAO-ATA, Durban (2011)	International
17	Technical Workshop on Cost Benefit Analysis of Fuel Quantity and Fuel Economy Initiative in Indonesia	• Ministry of Environment of Republic of Indonesia, UNEP, US-EPA, Global Fuel Economy Initiative , Jakarta (2012)	International
18	Bio Energy Forum	• Ministry of Energy and Mineral Resources, Jakarta, (2012)	National
19	Capacity Building of Climate Change Mitigation Action in Energy Sector	• National Development Planning Agency of Republic of Indonesia, Jakarta (2012)	National
20	Aviation Seminar on Climate Change	• DGCA – Indonesia, Civil Aviation Transformation Team, Jakarta (2010)	International



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Program Planning of Capacity Building on Climate Change and Green House Gas Emission Reduction in the Air Transportation Sector 2013-2014

No	Subject	Host	L evel of Participants
1	Aviation and Climate Change Seminar	ICAO	International
2	UNFCCC COP/CMP Conference	UNFCCC COP/CM	International
3	UNFCCC SABSTA/SBI Meeting	UNFCCC SABSTA/SBI	International
4	UNFCCC Technology and Capacity Building	UNFCCC	International
5	UNEP COP/MOP Conference	UNEP COP/MO	International
6	EU-Emissions Trading Scheme	EU	International
7	ICAO (CAEP-HLM-ENV) Conference, Seminar & Workshop	ICAO	International
8	ICAO and FAA (Aviation-BIOFUEL) Canada/USA	ICAO	International
9	APEC (Environmental Working Group)	APEC	International
10	Comparative study for implementation of the inventory, mitigation, eco-airport and AMAN-DMAN-PBN at Incheon International Airport (South Korea) and Arlanda International Airport (Sweden)	Ministry of Transportation	International
11	Aviation and the Environment Course	IATA	International
12	Fuel Efficiency and Conservation	IATA	International
13	Carbon Trading for Aviation	IATA	International
14	Aircraft Operations Awareness for Emissions Verifiers	IATA	International
15	Bio jet Fuel Workshop	IATA	International
16	Forum Group Discussion and Familiarization of National Action Plan for Green House Gas Reduction in the Air Transport Sector	Directorate General of Civil Aviation- Ministry Of Transportation	National
17	International Seminar on Aviation Bio fuel	Ministry of Transportation	International



DGCA Indonesia - ICAO Cooperation

Indonesia' s National Action Plan and Roadmap - developed with intensive assistance and support from ICAO's Environmental Branch and Action Plan Team

- ICAO assistance and support were provided particularly on the following subjects :**
 - **Indonesia Seminar on Aviation and Climate Change**
 - **Developing the emission calculations using the ICAO Calculator**
 - **Developing the emission inventory data base**

- appropriate communication channels were used as follows :**
 - **Periodic teleconferences (monthly and up to weekly basis).**
 - **Update progress thru email communication.**
 - **via the Alternate Representative of Indonesia to ICAO.**
 - **workshop/side event at the ICAO/UNFCCC conference.**

- DGCA Indonesia highlights that the ICAO assistance has provided major benefits for Indonesia during the development and implementation of the National Action Plan on Climate Change.**



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Summary

1. DGCA Indonesia has established a system and organization which is in line with national, ICAO and UNFCCC guidelines in order to implement climate change mitigation programs for reducing aviation GHG emissions up to 2020.
2. National Action Plan and Roadmap on Climate Change (Potential National Appropriate Mitigation Plans /NAMAs) were developed in detail and are pending approval at the level of Presidential Decree in 2012.
3. Total carbon emissions from international and domestic flights without any policy and program intervention (BAU) up to 2020 are estimated at **148.164 MTon CO₂** .
4. Total Carbon emissions reduction from international and domestic flights through the National Action Plan up to 2020 are estimated at **15.954 MTon CO₂ (10.89 %)** .
5. DGCA Indonesia has continuously developed a series of programs and measures for capacity building on climate change and mitigation of Green House Gas emissions including matters related to the issue of environmental sustainable transportation for all stake holders in aviation industry.



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Thank You

**Green Solutions for
a Brighter Future**