ICAO ENVIRONMENT

ICAO Environmental Symposium 2019

DESTINATION GREEN: THE NEXT CHAPTER

CAPACITY BUILDING FOR CO_2 MITIGATION FROM INTERNATIONAL AVIATION

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Programme Coordinator

AGENDA

01 Project **OVERVIEW**

02 Project **OUTCOMES**

03 **Pilot PROJECTS**

04 **Looking forward**

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01 Project **OVERVIEW**

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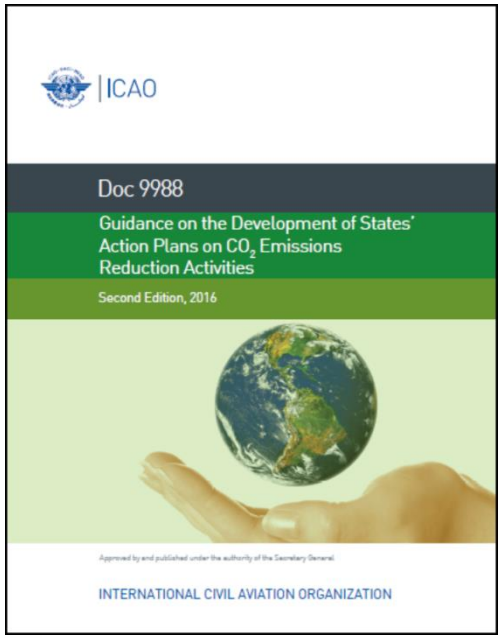
03 **Pilot PROJECTS**

04 **Looking forward**

STATES' ACTION PLANS INITIATIVE

2010



2013

ICAO / EU PARTNERSHIP

ENVIRONMENTAL PROTECTION

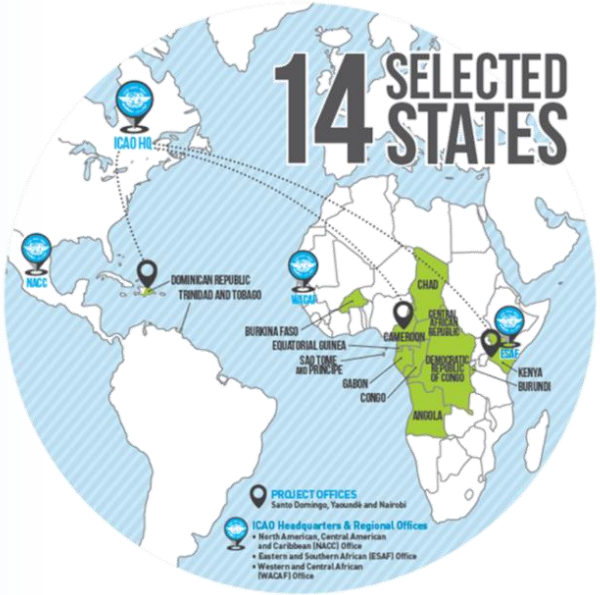
ICAO

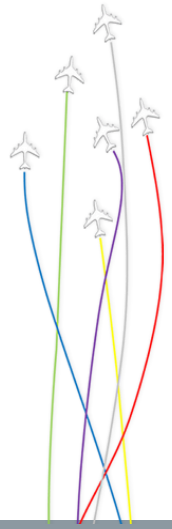
European Union

6.5 € MILLION BUDGET

CAPACITY BUILDING FOR CO_2 MITIGATION FROM INTERNATIONAL AVIATION

No Country Left-Behind





2014 - 2019

OBJECTIVE 1

ACTION PLANS DEVELOPMENT:

Improved capacity of the National Civil Aviation authorities to develop an Action Plan on CO_2 emissions reduction from international aviation in accordance with ICAO recommendations

OBJECTIVE 2

AVIATION ENVIRONMENTAL SYSTEMS (AES):

Efficient CO_2 emissions monitoring system for international aviation developed in each selected Member State

OBJECTIVE 3

IMPLEMENTATION OF MITIGATION MEASURES:

Priority mitigation measures identified, evaluated and partly implemented

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CAPACITY BUILDING
STATES' ACTION PLANS TO REDUCE CO_2 EMISSIONS

OBJECTIVE 1

ACTION PLANS DEVELOPMENT:

Improved capacity of the National Civil Aviation authorities to develop an Action Plan on CO_2 emissions reduction from international aviation in accordance with ICAO recommendations

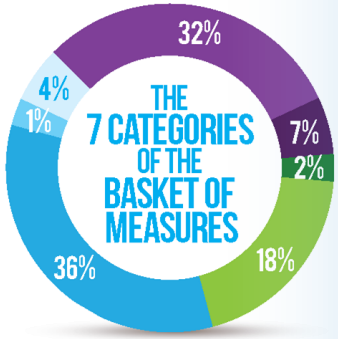
NATIONAL ACTION PLAN TEAMS

- Civil Aviation Authorities
- Ministry of Environment
- Ministry of Transport
- Air Navigation Services
- Airlines
- Airports
- Ground Handling
- Fuel suppliers

14 ACTION PLANS
DEVELOPED & SUBMITTED BY THE SELECTED STATES

THE 218 MITIGATION MEASURES ARE DISTRIBUTED IN:

CAT 1	Aircraft related technology
CAT 2	Alternative fuels
CAT 3	Improved Air Traffic Management
CAT 4	More efficient operations
CAT 5	Economic/market based measures
CAT 6	Regulatory measures
CAT 7	Airports improvements



THE AVIATION ENVIRONMENTAL SYSTEM

OBJECTIVE 2

AVIATION ENVIRONMENTAL SYSTEMS (AES):

Efficient CO_2 emissions monitoring system for international aviation developed in each selected Member State

THE AVIATION ENVIRONMENTAL SYSTEM

MONITORING, REPORTING AND VERIFICATION OF CO_2 EMISSIONS FROM AVIATION

1. A stand-alone application with a database back-end installed at the Civil Aviation Authority (CAA)
2. Facilitates the data collection and monitoring of CO_2 emissions from international aviation at the State level
3. Automatizes the data reporting to ICAO

Aviation Environmental System | AES

Annual and Monthly CO_2 Reports

MONTHLY AVIATION CO_2 REPORT

Feb-18

Dominican Republic

State-level report · 5 reporting airline(s)

ICAO definition for international flights

KEY METRICS FOR INTERNATIONAL AVIATION

FLIGHTS	RTK (tkm)	FUEL BURN (L)	CO2 EMISSIONS (t)	FUEL EFFICIENCY (L/tkm)
523	433,949	551,512	1,393	2.813

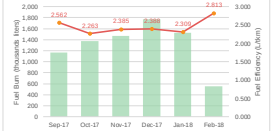
TRENDS

MONTH-TO-MONTH	Feb-18	Jan-18	% CHANGE	6 MONTHS TREND
RTK (tkm)	433,949	2,121,882	↓ -80%	
FUEL BURN (L)	551,512	1,527,272	↓ -64%	
CO2 EMISSIONS (kg)	1,393	3,860	↓ -64%	
FUEL EFFICIENCY (L/tkm)	2.813	2.309	↑ 22%	

YEAR-TO-YEAR	Feb-18	Feb-17	% CHANGE	1 YEAR TREND
RTK (tkm)	433,949	2,204,416	↓ -80%	
FUEL BURN (L)	551,512	2,238,844	↓ -75%	
CO2 EMISSIONS (T)	1,393	5,659	↓ -75%	
FUEL EFFICIENCY (L/tkm)	2.813	2.292	↑ 23%	

Revenue Tonnes Kilometers (RTK)

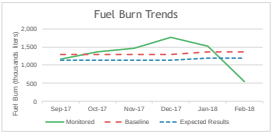
Fuel Burn and Efficiency



Efficiency of Mostly Used Aircrafts

	Aircrafts	Flights	Fuel Efficiency (L/tkm)
1	JS32	184	1.253
2	B190	90	2.402
3	SF34	63	2.599
4	JS31	52	1.303
5	C560	27	5.651

Fuel Burn Trends



Most Fuel Efficient Routes

	Routes*	Flights	Fuel Efficiency (L/tkm)
1		4	0.02
2	MUHG-MUVR	4	0.389
3	MDLR-TBPB	2	0.677
4	MDSD-TAPA	6	0.731
5	WMKE-TAPA	2	0.78

* Only routes with at least 2 flights were considered.

Least Fuel Efficient Routes

	Routes*	Flights	Fuel Efficiency (L/tkm)
1	SVMI-MDJB	3	14.424
2	TDPD-MDSD	2	9.089
3	TBPB-MDJB	2	8.349
4	KPBI-TAPA	2	7.224
5	MKJP-MDJB	2	6.091

* Only routes with at least 2 flights were considered.

Routes with Highest Load Factors**

	Routes*	Flights	Load Factor
1	MDSD-TDPD	2	0.974
2	MDJB-TNCM	2	0.967
3	MDSD-TNCM	14	0.955
4	MDSD-TAPA	6	0.877
5	MDSD-TQPF	9	0.865

* Only routes with at least 2 flights were considered.

** Only flights with at least 1 passenger were considered.

Routes with Lowest Load Factors**

	Routes*	Flights	Load Factor
1	TDPD-MDSD	2	0.132
2	TBPB-MDJB	2	0.222
3	MKJP-MDJB	2	0.278
4	MDJB-WMKE	2	0.278
5	SVMI-MDJB	3	0.281

* Only routes with at least 2 flights were considered.

** Only flights with at least 1 passenger were considered.

ANNUAL AVIATION CO_2 REPORT

2017

Kenya

State-level report · 1 reporting airline(s)

ICAO definition for international flights

MONTHLY REPORTS SUBMITTED

✓ Jan ✓ Feb ✓ Mar ✓ Apr ✓ May ✓ Jun ✓ Jul ✓ Aug ✓ Sep ✓ Oct ✓ Nov ✓ Dec

100% of the year covered

KEY METRICS FOR INTERNATIONAL AVIATION

FLIGHTS	RTK (tkm)	FUEL BURN (L)	CO2 EMISSIONS (t)	FUEL EFFICIENCY (L/tkm)
31,694	1,005,964,260	344,557,408	871,041	0.796

TRENDS

YEAR-TO-YEAR	2016	2017	TREND	% CHANGE
RTK (tkm)	931,600,992	1,005,964,260	↑	8%
FUEL BURN (L)	355,584,946	344,557,408	↓	-3%
CO2 EMISSIONS (T)	898,919	871,041	↓	-3%
FUEL EFFICIENCY (L/tkm)	2.403	0.796	↓	-67%

Revenue Tonnes Kilometers (RTK)

Fuel Burn and Efficiency

Fuel Burn Trends

Most Fuel Efficient Aircraft

	Aircraft	Number of flights*	Fuel efficiency (L/tkm)
1	788	4126	0.299
2	738	7163	0.691
3	E90	18848	0.85
4	73W	1256	1.33
5	73F	301	4.533

* Only aircraft with at least 2 flights were considered.

Least Fuel Efficient Aircraft

	Aircraft	Number of flights*	Fuel efficiency (L/tkm)
1	73F	301	4.533
2	73W	1256	1.33
3	E90	18848	0.85
4	738	7163	0.691
5	788	4126	0.299

* Only aircraft with at least 2 flights were considered.

PILOT MITIGATION MEASURES

OBJECTIVE 3

IMPLEMENTATION OF MITIGATION MEASURES:

Priority mitigation measures identified, evaluated and partly implemented

PILOT MITIGATION MEASURES

TO BE IMPLEMENTED WITH PROJECT FUNDING

The pilot mitigation measures, which will be completed by 2018, will showcase concrete actions that may be replicated by other Member States to contribute to the achievement of ICAO's aspirational goals for CO_2 emissions reduction from international aviation.

SOLAR PANELS
Provides clean power to the airport grid

GATE ELECTRIFICATION SYSTEM
Provides ground power and pre-conditioned air to the aircraft at the gate

- **CAMEROON** — DOUALA INTERNATIONAL AIRPORT
- **KENYA** — MOMBASA INTERNATIONAL AIRPORT

CO_2 REDUCTION **2408** TONNES/YEAR

IMPLEMENTATION OF CCO/CDO
Continuous Climb Operations (CCO) / Continuous Descent Operations (CDO)

- **BURKINA FASO**
- **GABON**

CO_2 REDUCTION **1266** TONNES/YEAR

FEASIBILITY STUDIES

TO BE DEVELOPED WITH PROJECT FUNDING

The feasibility studies will provide the governments of the selected States decision-making tools that may unveil new opportunities to get to the edge of innovations for a sustainable aviation sector.

FEASIBILITY STUDY
on the use of renewable energy to power airport operations

- **TRINIDAD & TOBAGO**

FEASIBILITY STUDY
on the development of sustainable alternative fuels

- **DOMINICAN REPUBLIC**
- **TRINIDAD & TOBAGO**
- **BURKINA FASO**
- **KENYA**

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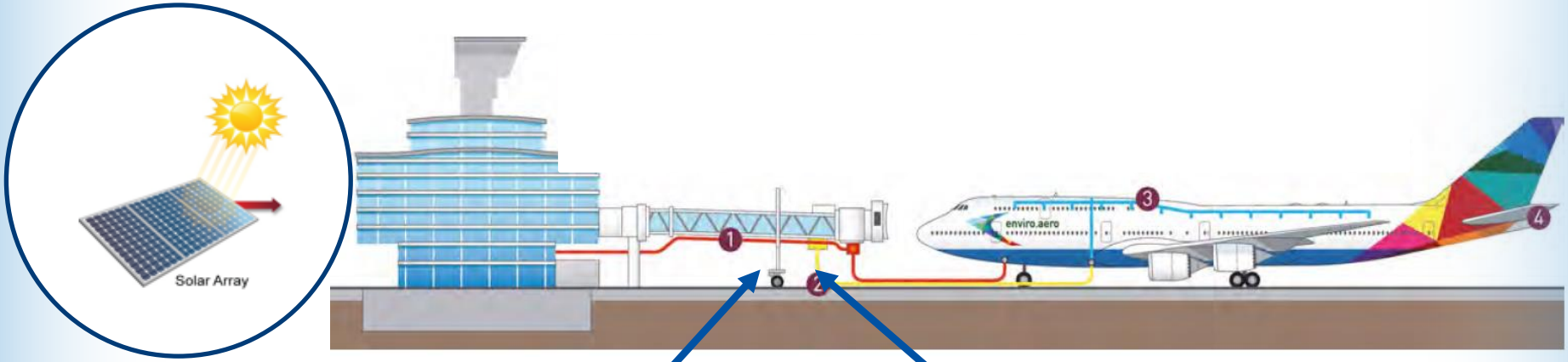
SOLAR-AT-GATE CONCEPT

SOLAR FACILITY + AIRPORT GATE EQUIPMENT



Preconditioned Air Unit

Ground Power Unit

CAMEROON

DOUALA INTERNATIONAL AIRPORT

- **Modules:** 3,692 solar panels
- **Capacity:** 1,25MW
- **Airport Gate Equipment:** Pre-conditioned Air Unit (PCA) and 400 Hz Ground Power Unit (GPU)
- **Benefits:**
  Reduction of 2,600 tonnes of CO_2 per year
- **Up to 14 flights per day**

KENYA

MOI INTERNATIONAL AIRPORT

- **Modules:** 1,524 solar panels
- **Capacity:** 502 kWp
- **Airport Gate Equipment:** Pre-conditioned Air Unit (PCA) and 400 Hz Ground Power Unit (GPU)
- **Benefits:**
  Reduction of 1,300 tonnes of CO_2 per year
  Up to 7 flights per day

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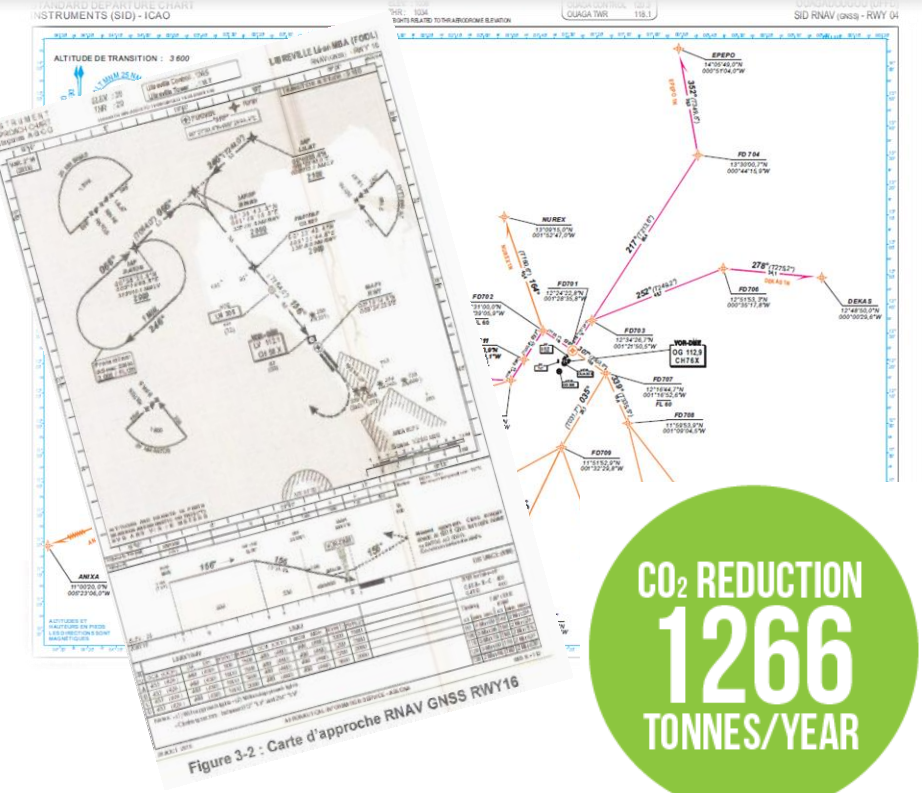


CO_2 REDUCTION
1266
TONNES/YEAR

OPERATIONAL MEASURES

CONTINUOUS CLIMB AND DESCENT OPERATIONS (CCO/CDO PROCEDURES)

NEW DEPARTURE AND ARRIVAL PROCEDURES

1. Ouagadougou International Airport
2. Libreville MBA International Airport

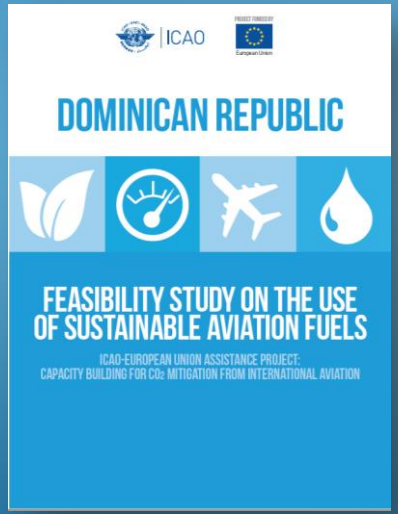
In cooperation with

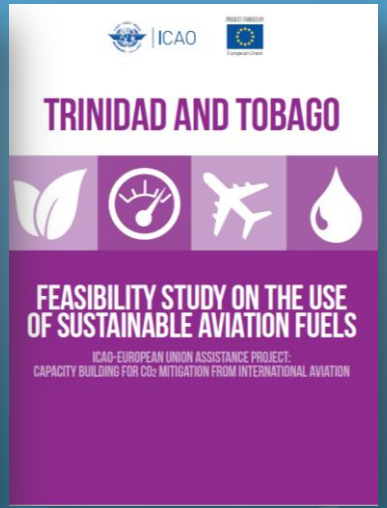
ASECNA

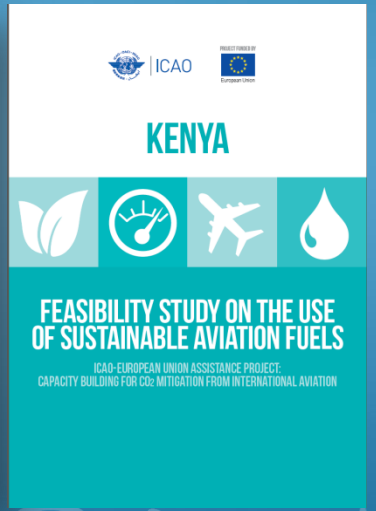
FIVE FEASIBILITY STUDIES

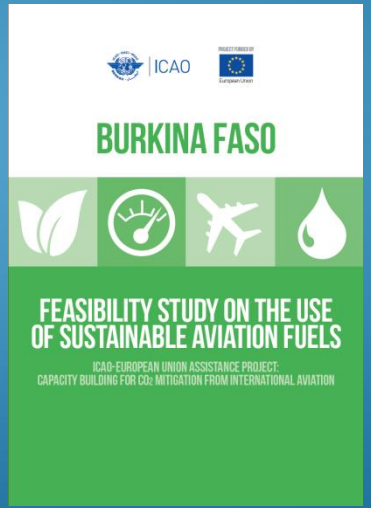
SUSTAINABLE AVIATION FUELS

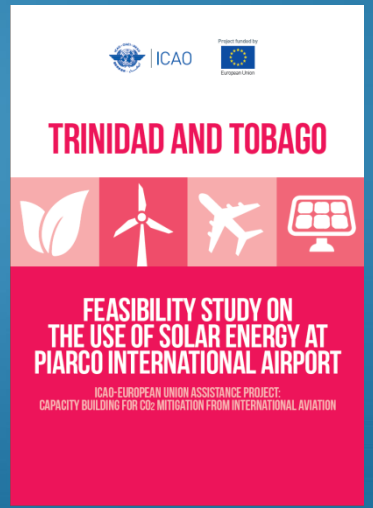
SOLAR ENERGY AT AIRPORTS











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A WINDOW FOR A GREENER FUTURE

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