AVIATION BENEFITS BEYOND BORDERS

Providing employment, trade links, tourism and support for sustainable development through air travel

Paul Steele

Executive Director, ATAG

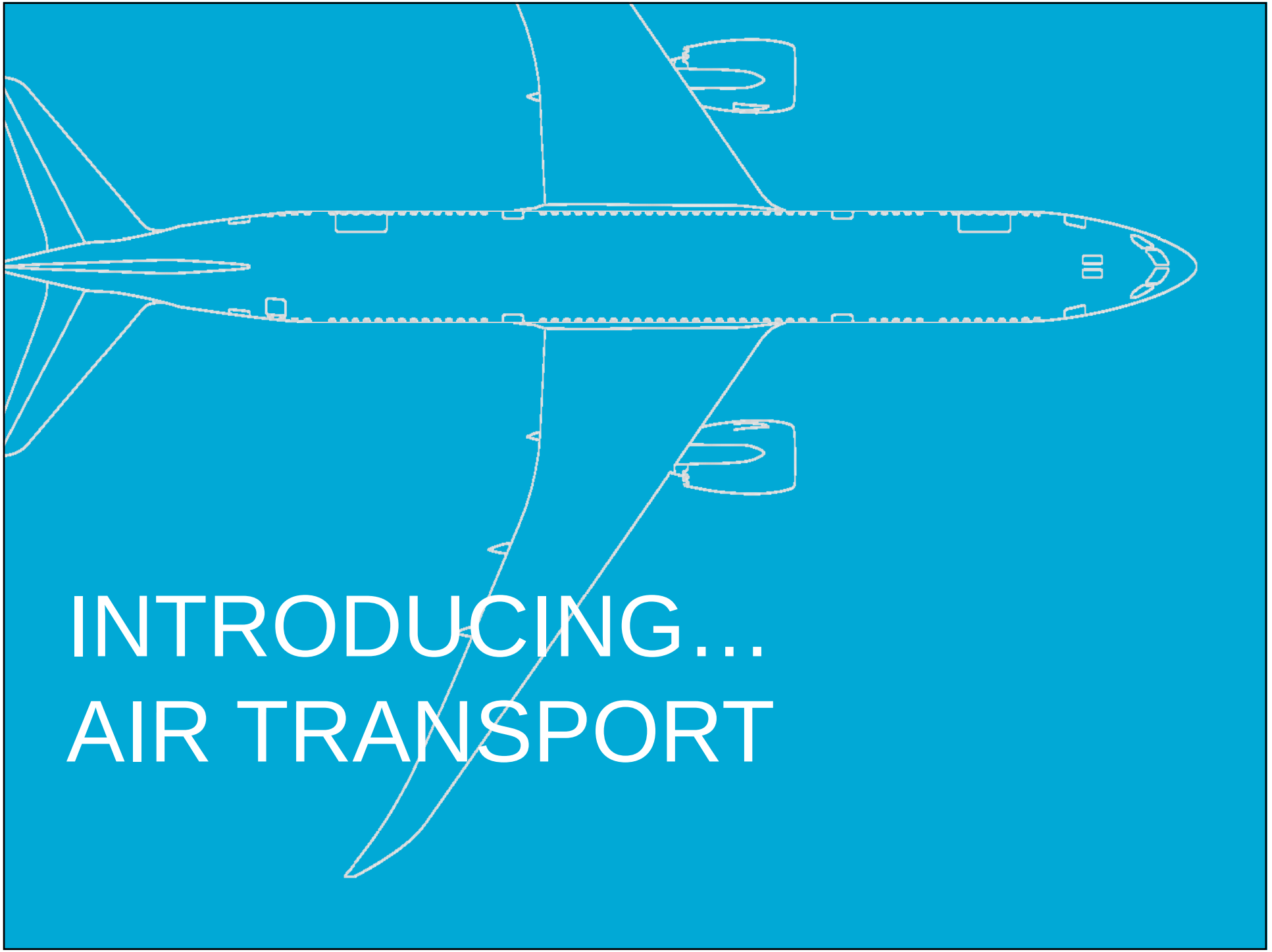
18 October, 2012

ATAG
AIR TRANSPORT ACTION GROUP

INTRODUCING ATAG

Commercial aviation, speaking with one voice

- Founded in 1990
- Only global representative of whole aviation sector
- Plays an important coordinating role
- Hosts the global Aviation & Environment Summit
- Focus on sustainable development of aviation – economic, social and environmental aspects
- Funding and Board members:


INTRODUCING...
AIR TRANSPORT

SCOPE OF OUR INDUSTRY

3,846

Airports

1,568

Airlines

192

ANSPs

23,844

Aircraft in service

ACTIVITY IN 2010 *(2011)*

2.7 billion

Passengers (2011: 2.8bn)

4.8 trillion

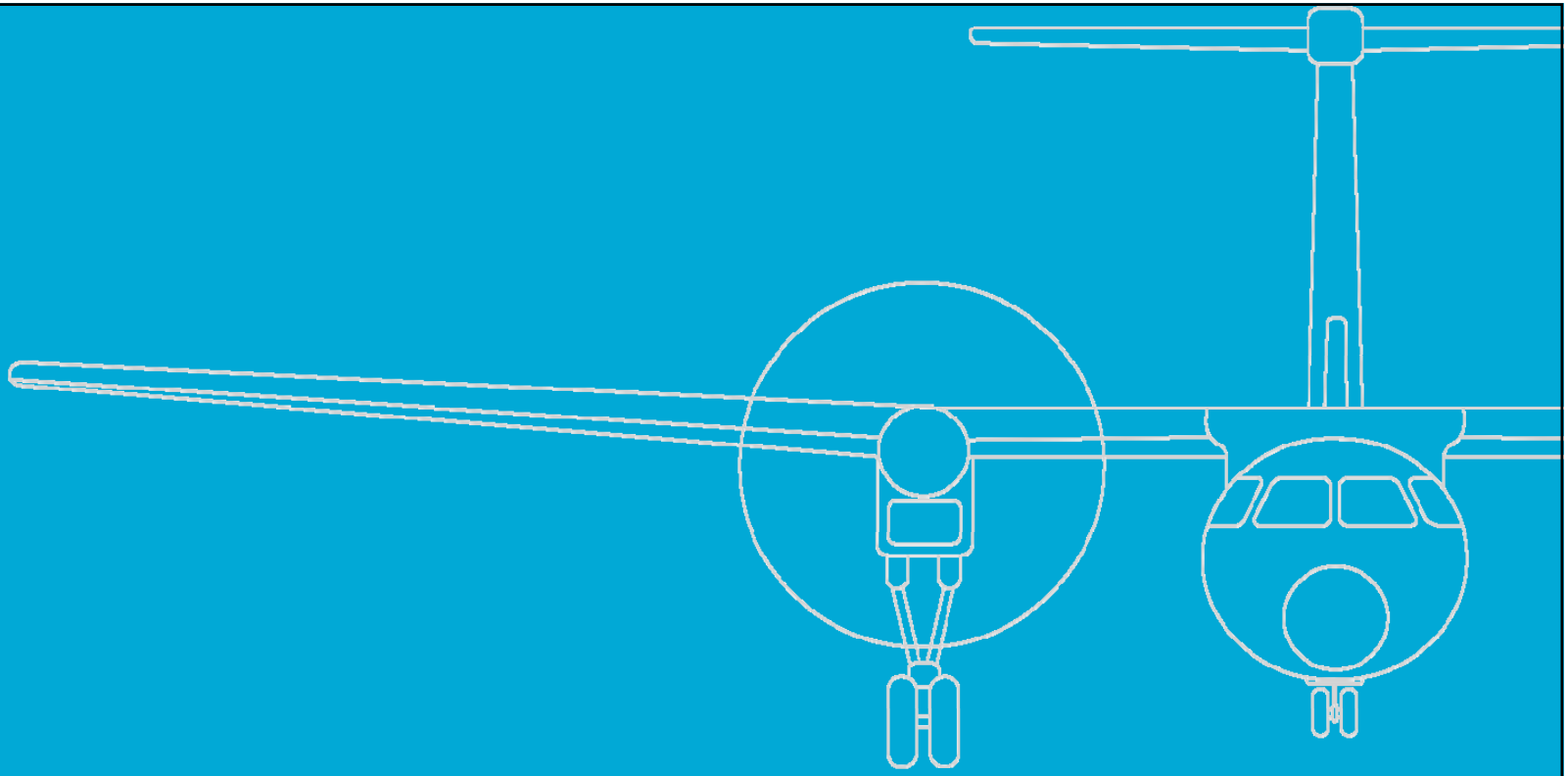
Passenger kilometres flown (2011: 5.1 trillion)

34,756

City-pair routes

26,717,000

Aircraft movements



SUSTAINABLE DEVELOPMENT

THE WORD OF THE YEAR

SUSTAINABLE DEVELOPMENT

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

- From *Our Common Future* (the Brundtland Report)

SUSTAINABLE DEVELOPMENT

Economy

Society

Environment

AVIATION: AN ECONOMIC ENGINE

$2.2 trillion

Aviation's global economic impact (including direct, indirect, induced and tourism catalytic)

3.5%

Proportion of global gross domestic product

56.6 million

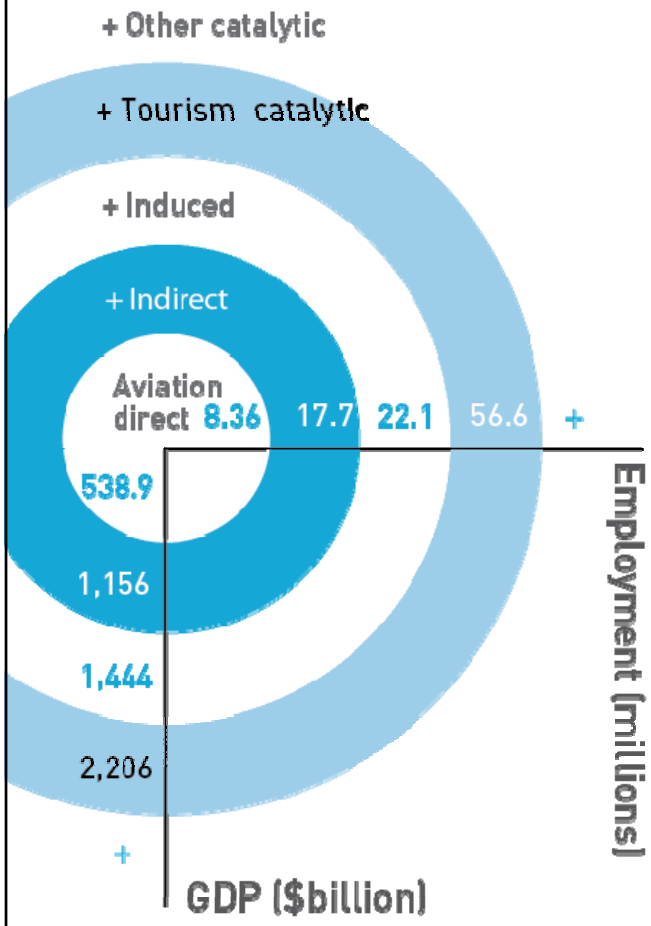
People employed worldwide by aviation and related tourism

19th

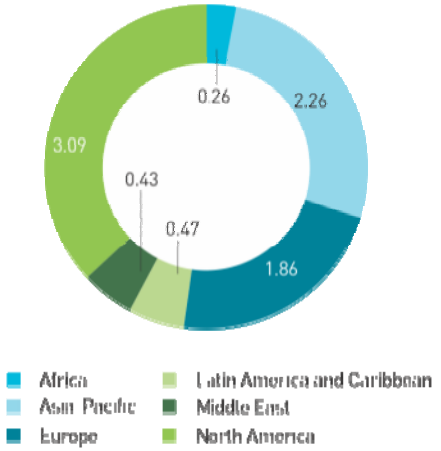
If aviation were a country, it would rank 19th in terms of the size of economy

AVIATION: 56.6 MILLION JOBS

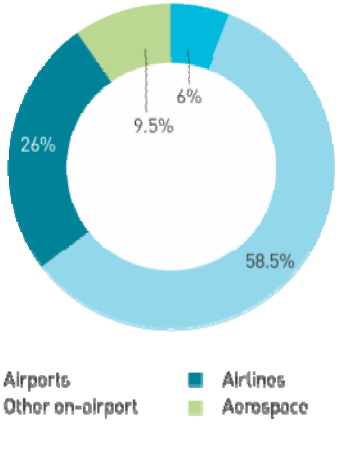
Aviation's global employment and GDP impact



Direct employment by air transport by region, millions, 2010



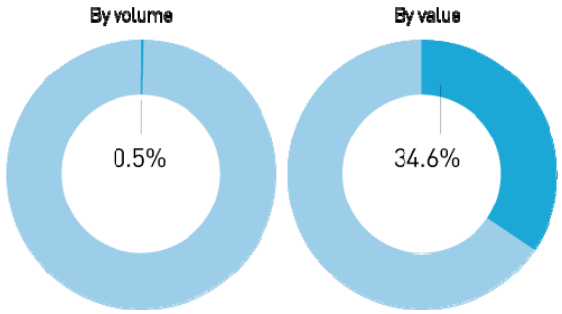
Direct employment by air transport globally, 2010



AVIATION: WORLD TRADE

35%

Of the value of world trade shipments travel by air, compared to 0.5% by volume.



Proportion of world trade sent by air, 2010

$5.3 trillion

Value of cargo handled by air in 2010

AVIATION: TOURISM

34.5 million

Jobs in tourism supported by air transport.

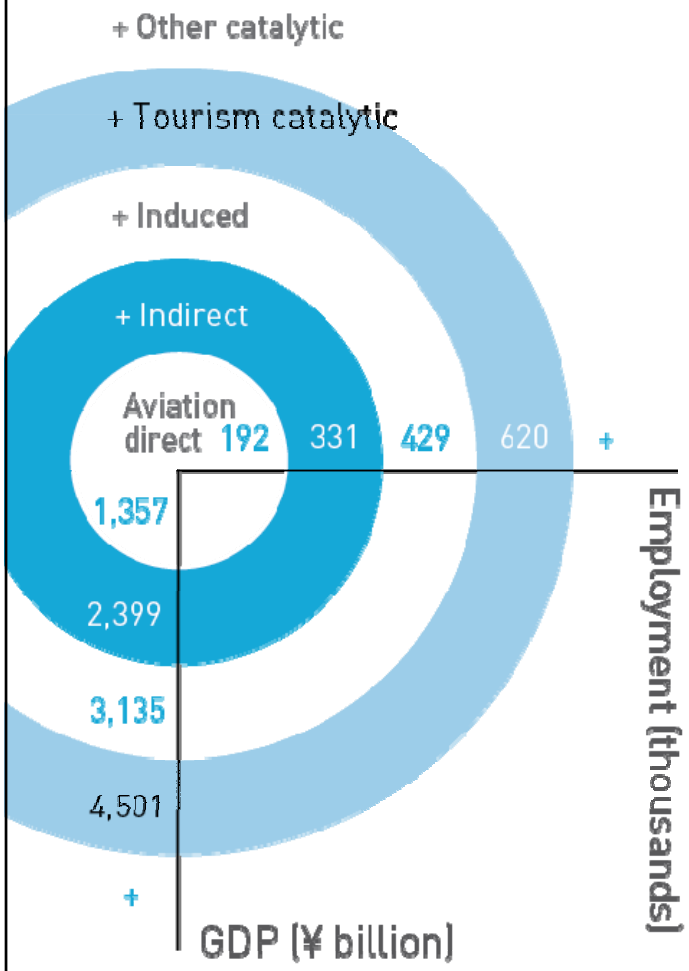
51%

Of international tourists travel by air.

$762 billion

Contribution to world GDP of air transport related tourism

JAPAN



1.0%

Proportion of Japanese gross domestic product

¥1,026bn

Tax from aviation-related activities (not including tourism)

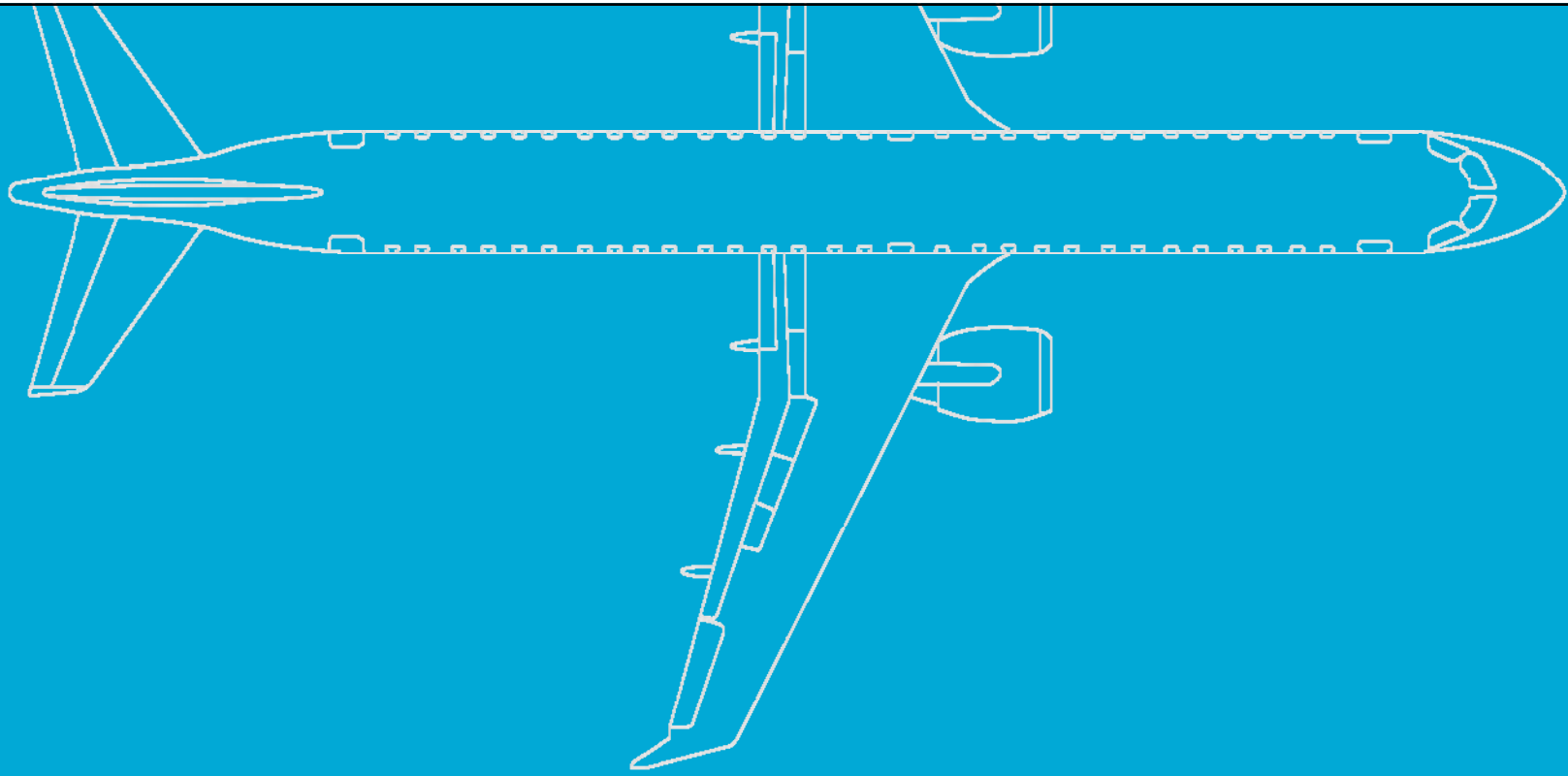
270 routes

80 to cities of 10m+ people

114m passengers

3.3 million tonnes freight

34.6% of Japanese export goods by value



THE ENVIRONMENTAL CHALLENGE

AVIATION: ENVIRONMENTAL RESPONSIBILITY

676

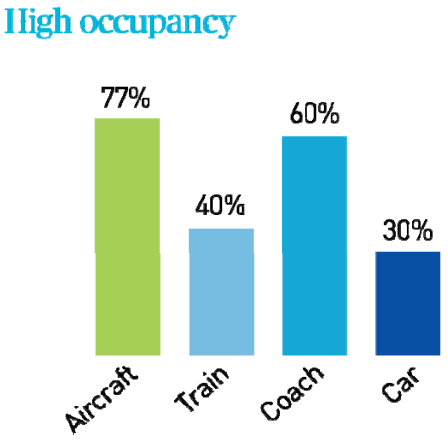
Million tonnes of CO_2 emitted by air travel last year

2%

Of global CO_2 emissions

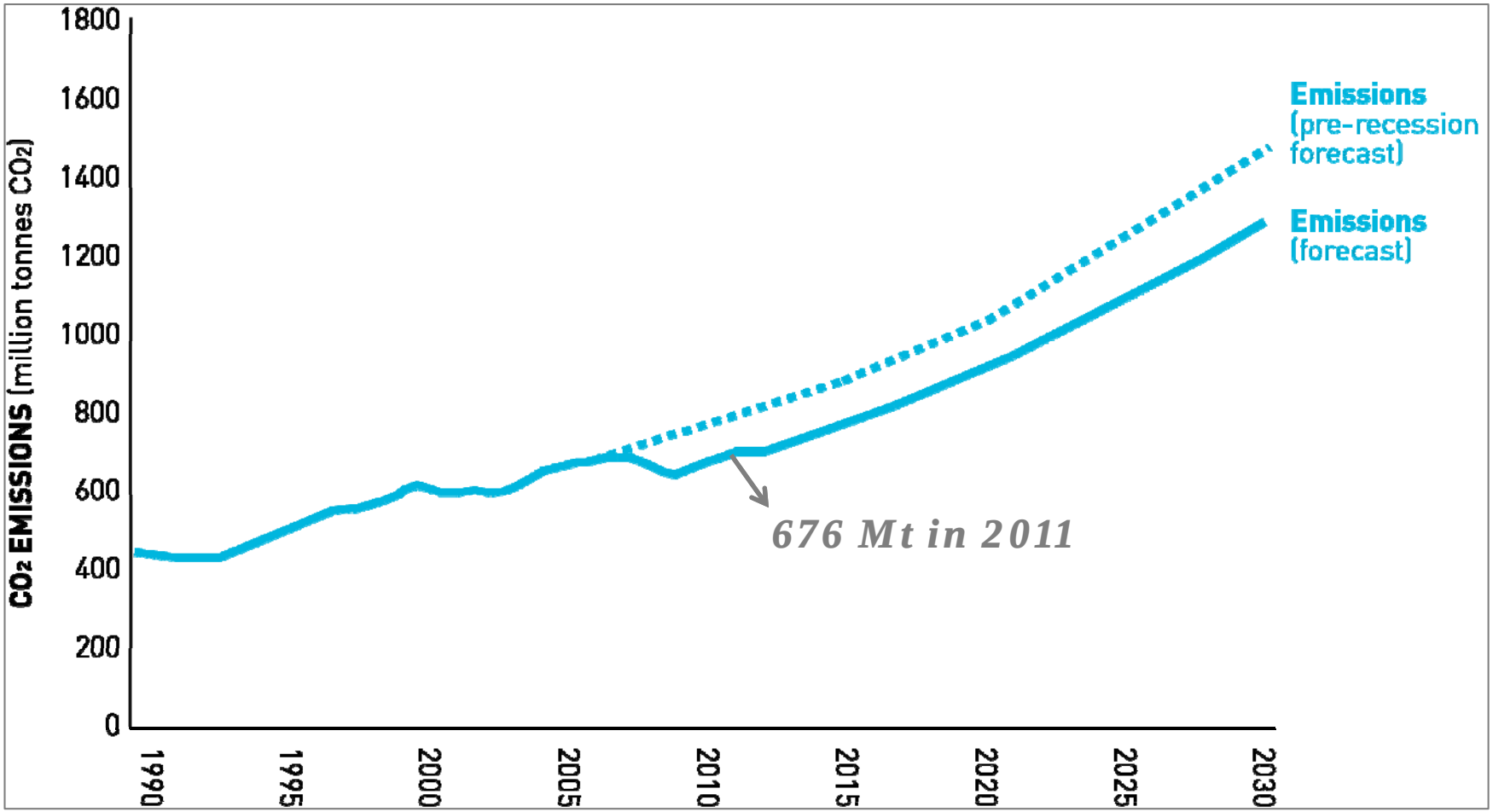
70%

Aviation emissions per passenger kilometre are over 70% less than in the 1960s



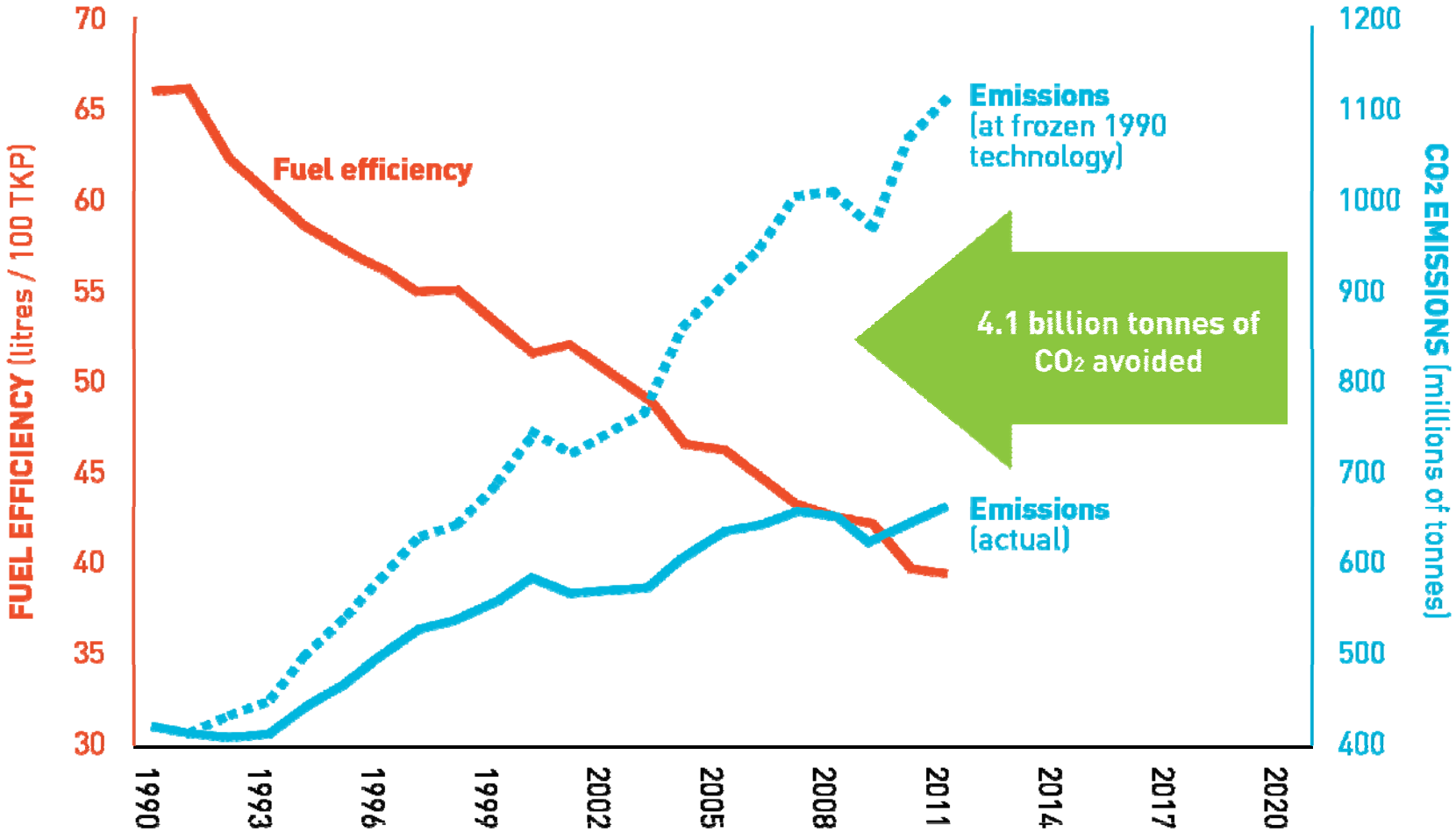
AVIATION: EMISSIONS CHALLENGE

Emissions from aviation, and forecast



AVIATION: IMPRESSIVE PROGRESS SO FAR

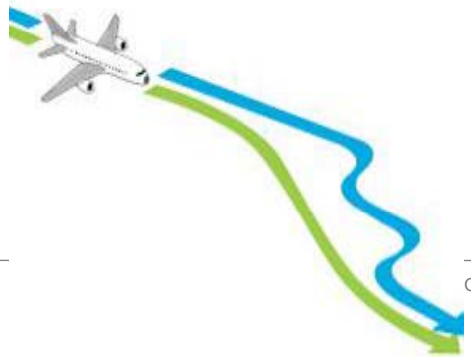
CO2 from commercial airline fuel burn, emissions and efficiency



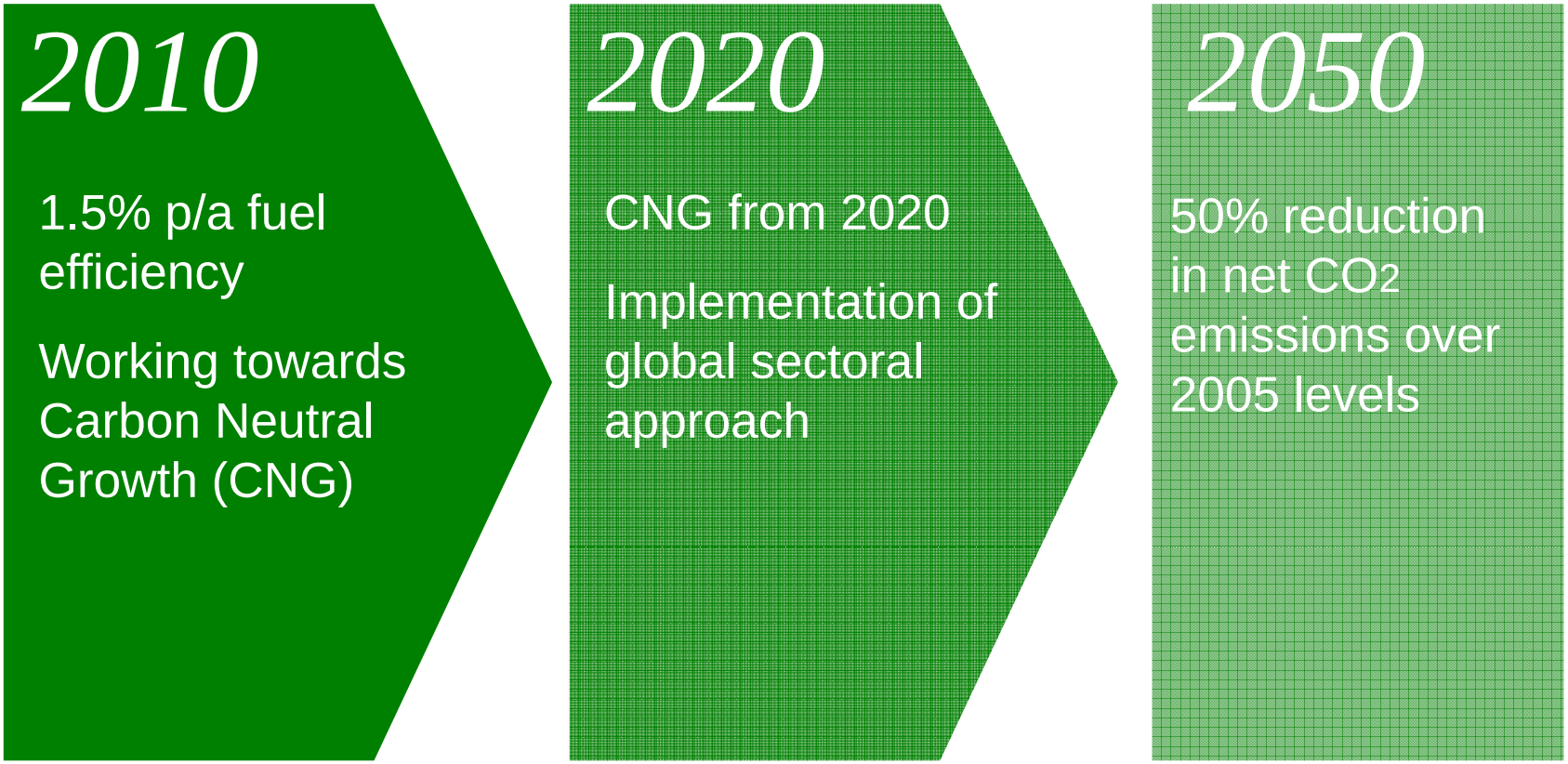
DECLARATION

THE FOUR-PILLAR STRATEGY

1) **Invest in new technology**
   - Including sustainable aviation **biofuels**
2) **Fly using more efficient operations**
3) **Build and use efficient infrastructure**
4) **Use effective economic measures**

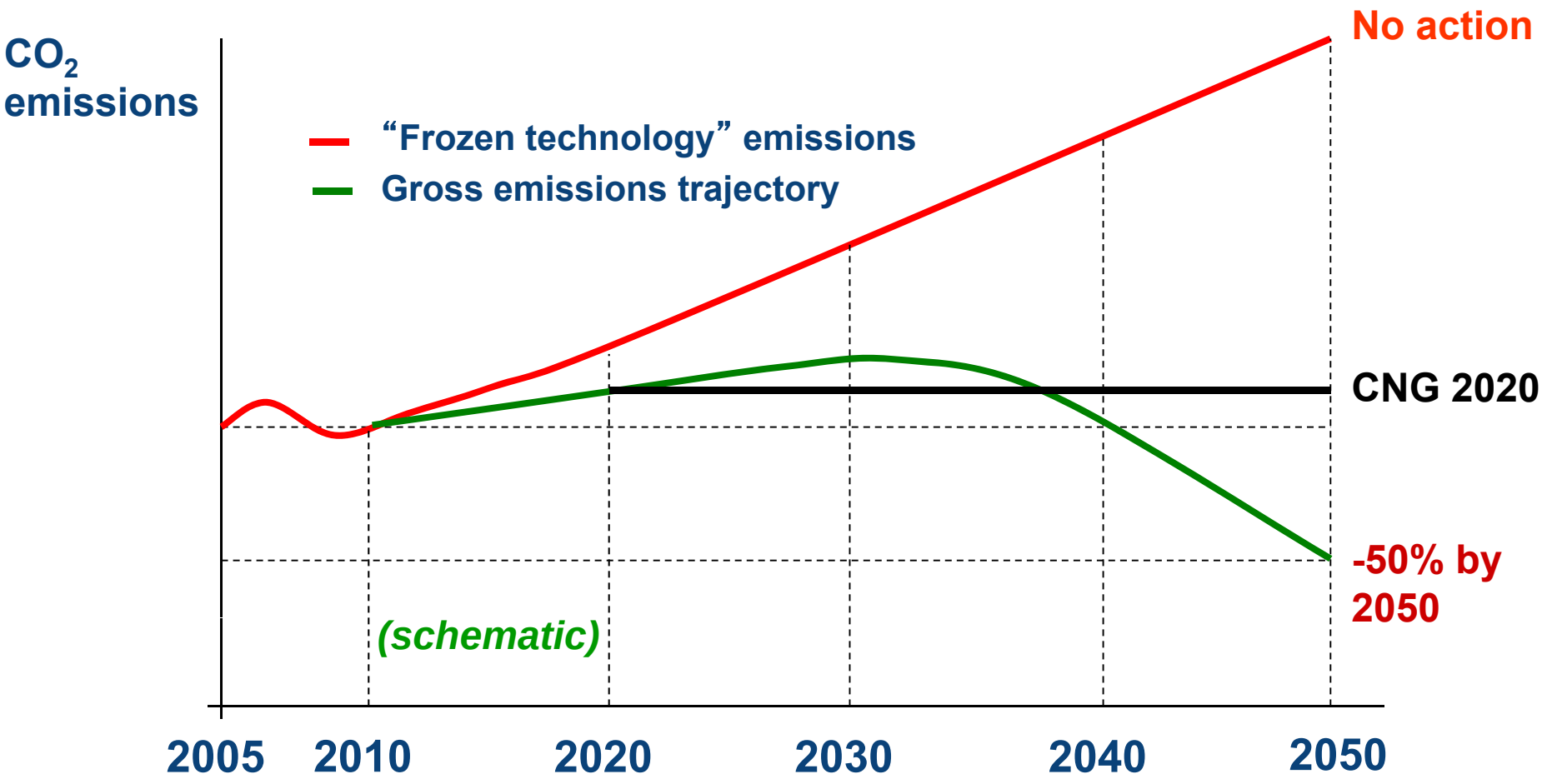


GLOBAL INDUSTRY TARGETS

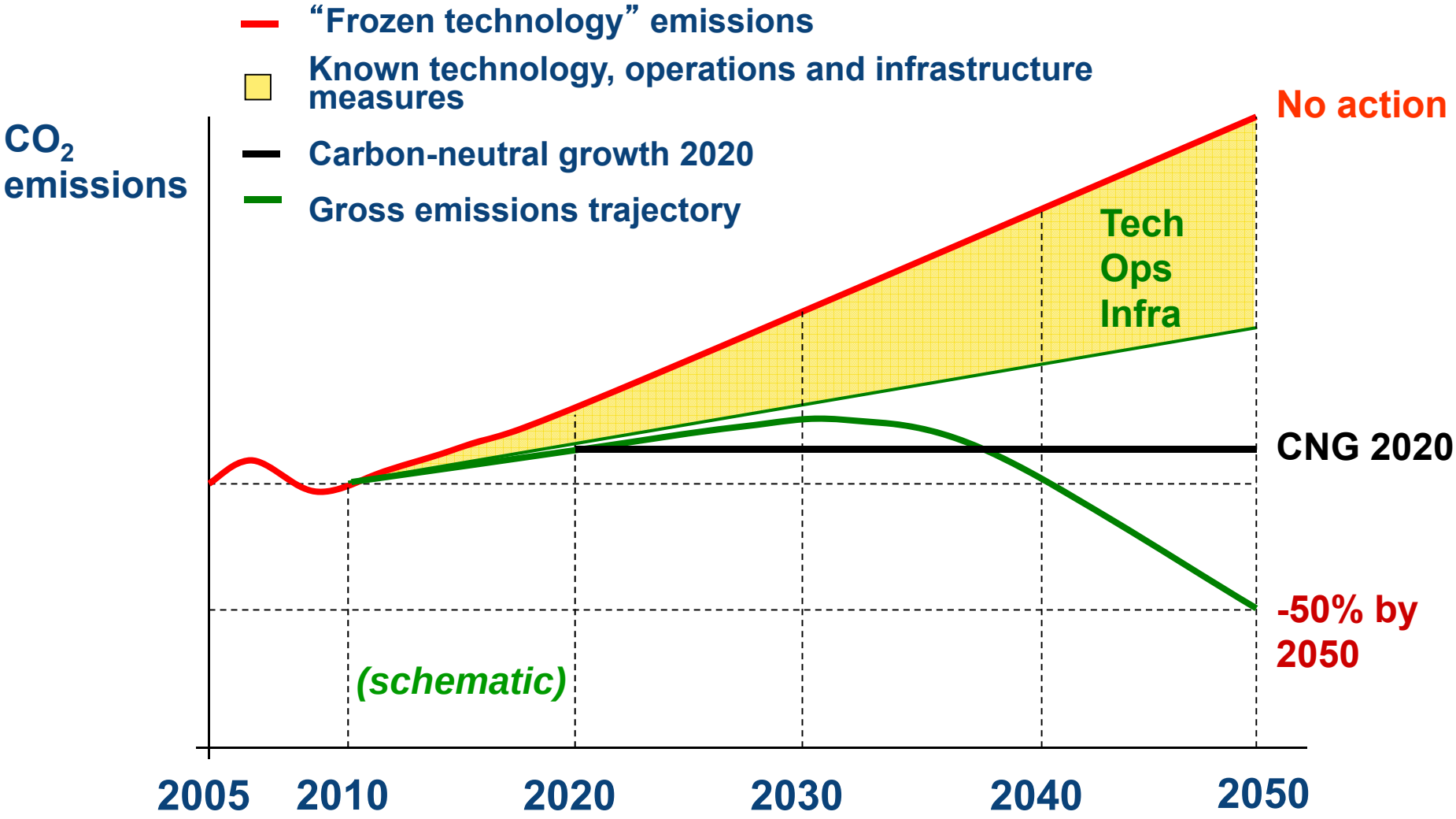


- Goals are at the **global** level – not States or operators
- Goals do **not** mean slowing down the growth of aviation

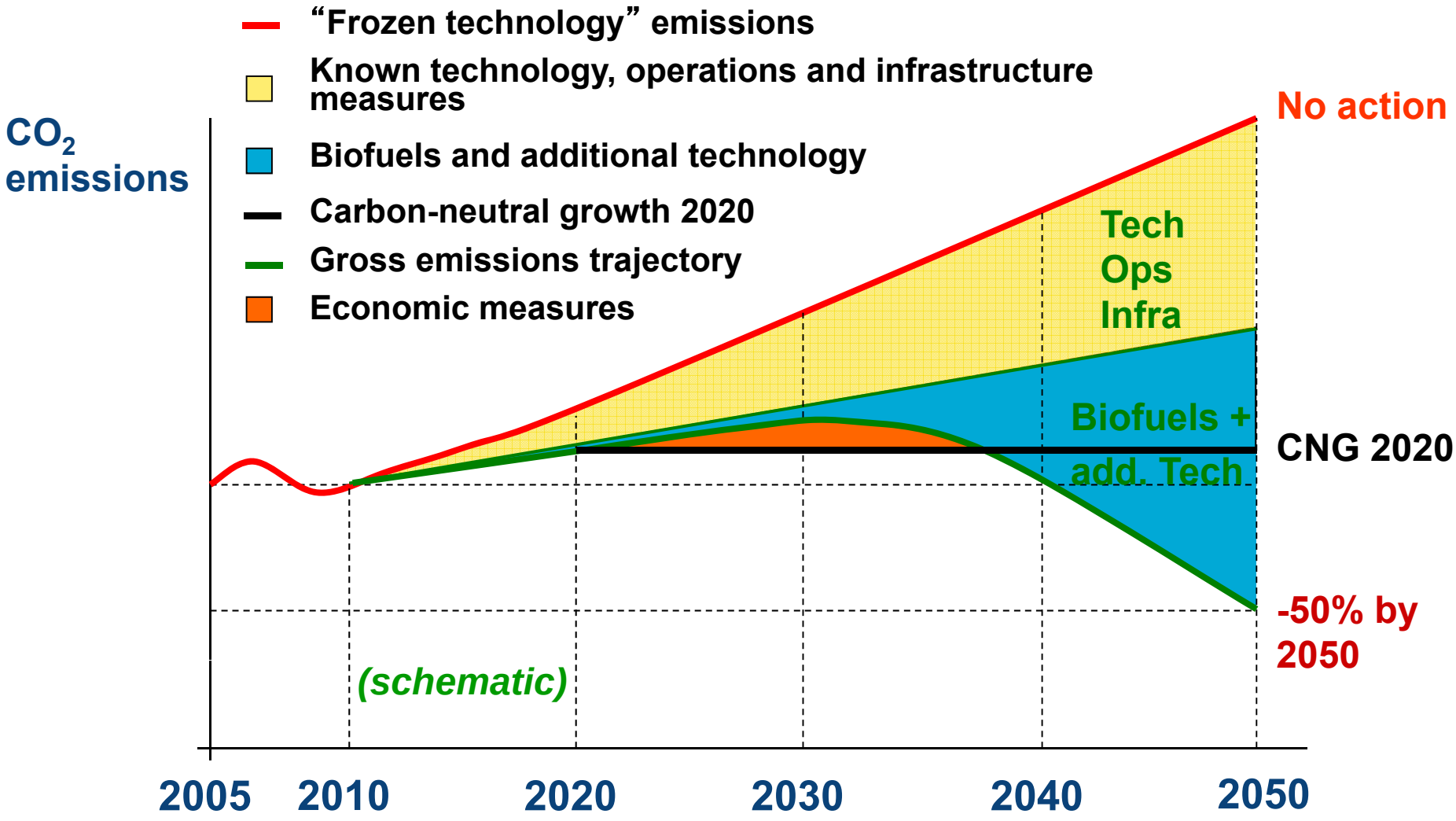
Emissions reduction roadmap

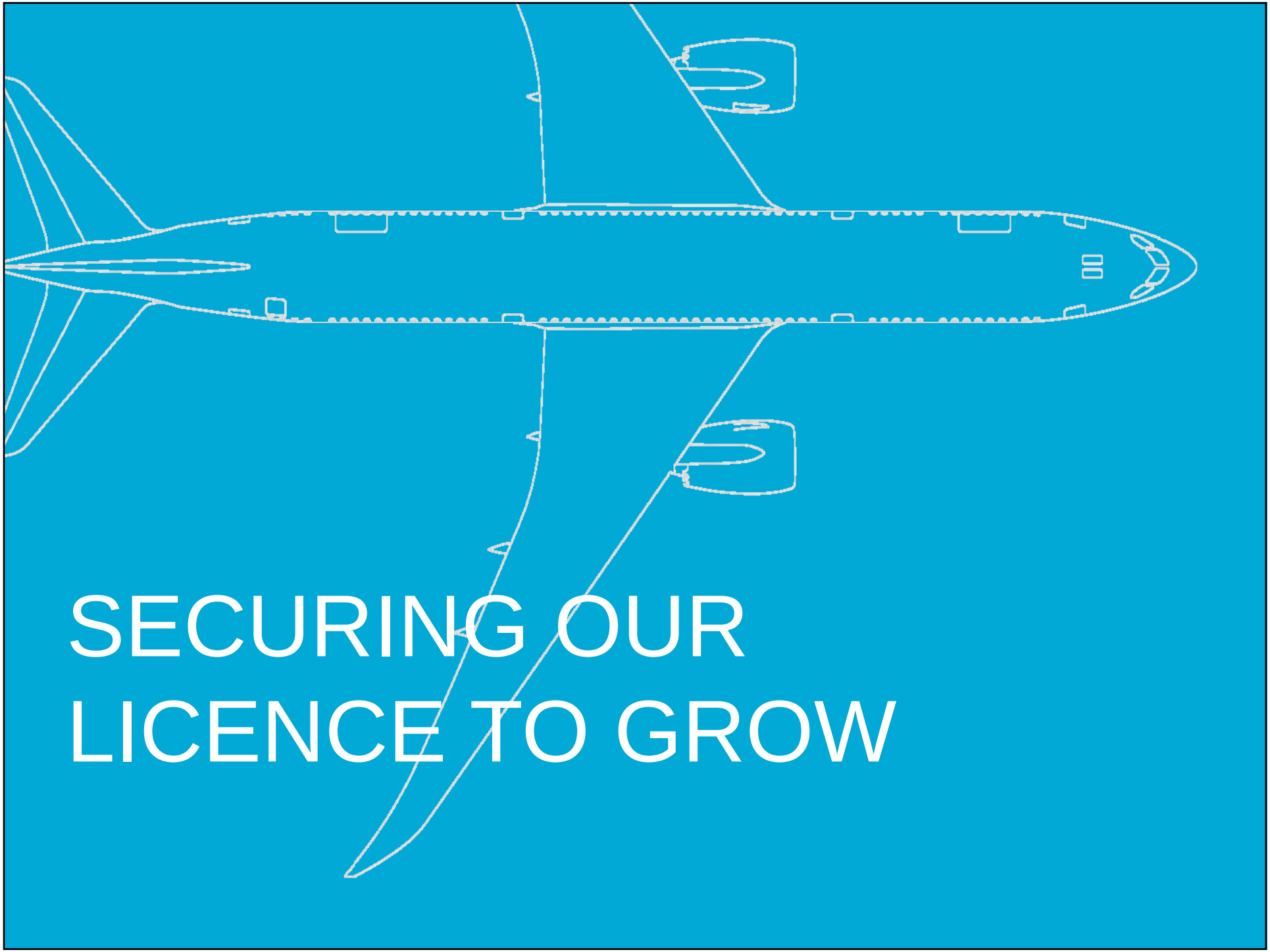


Emissions reduction roadmap



Emissions reduction roadmap

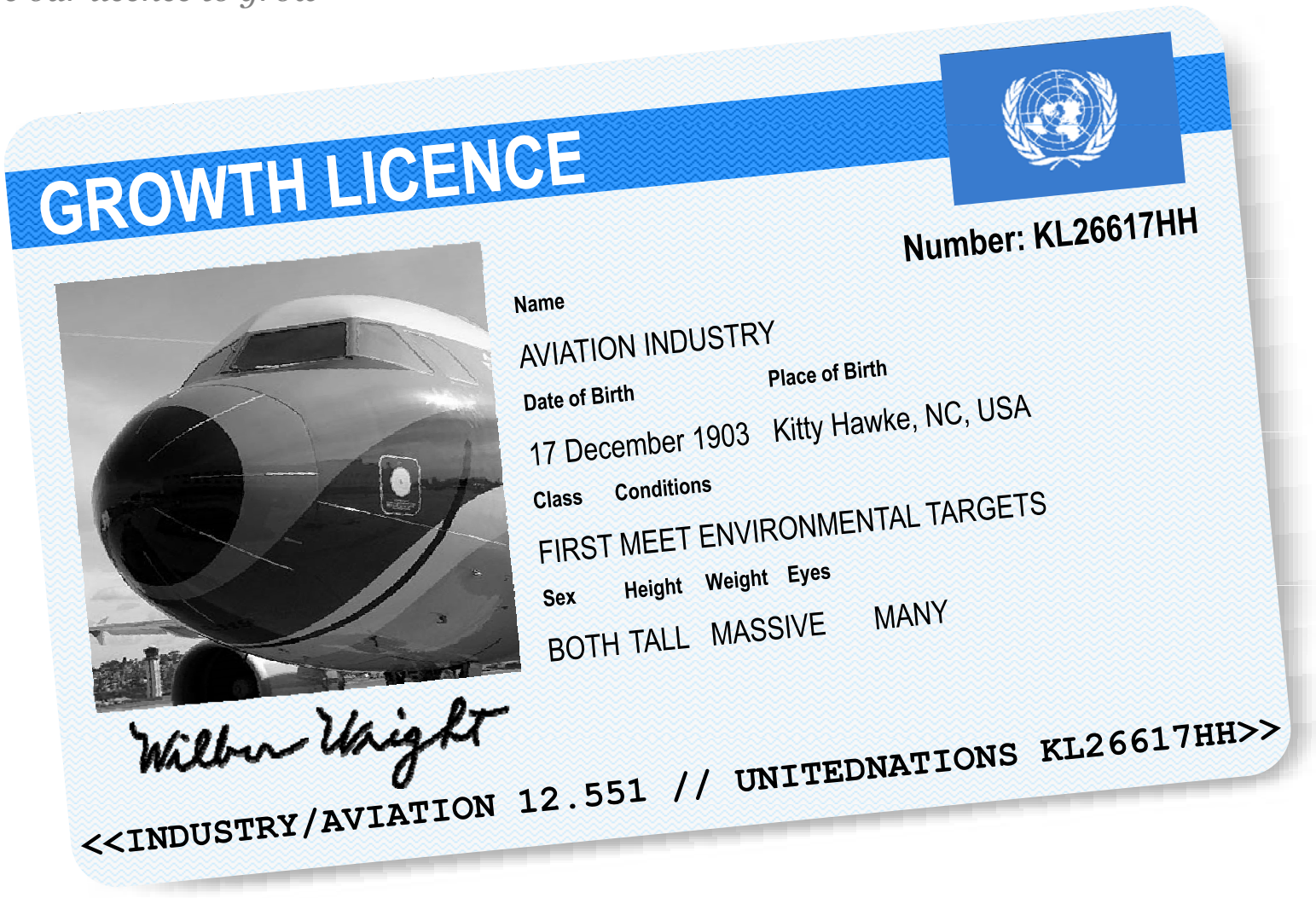




SECURING OUR LICENCE TO GROW

THREE IMPERATIVES

To ensure our licence to grow



THREE IMPERATIVES

To ensure our licence to grow

1

Demonstrate that we can ***deliver on our targets***

THREE IMPERATIVES

To ensure our licence to grow

1 *Demonstrate that we can* ***deliver on our targets***

2 *Make* ***sustainable biofuels a success*** *for aviation*

THREE IMPERATIVES

To ensure our licence to grow

1 *Demonstrate that we can* ***deliver on our targets***

2 *Make* ***sustainable biofuels a success*** *for aviation*

3 *Convince policymakers that* ***a global approach is the only way forward***

THREE IMPERATIVES

To ensure our licence to grow

1

Demonstrate that we can ***deliver on our targets***

NEW AIRCRAFT

A380

20% more efficient than a 747-400

Less than 3 litres of fuel per 100 pax/ km

NEW AIRCRAFT

787

30% more efficient than a 767

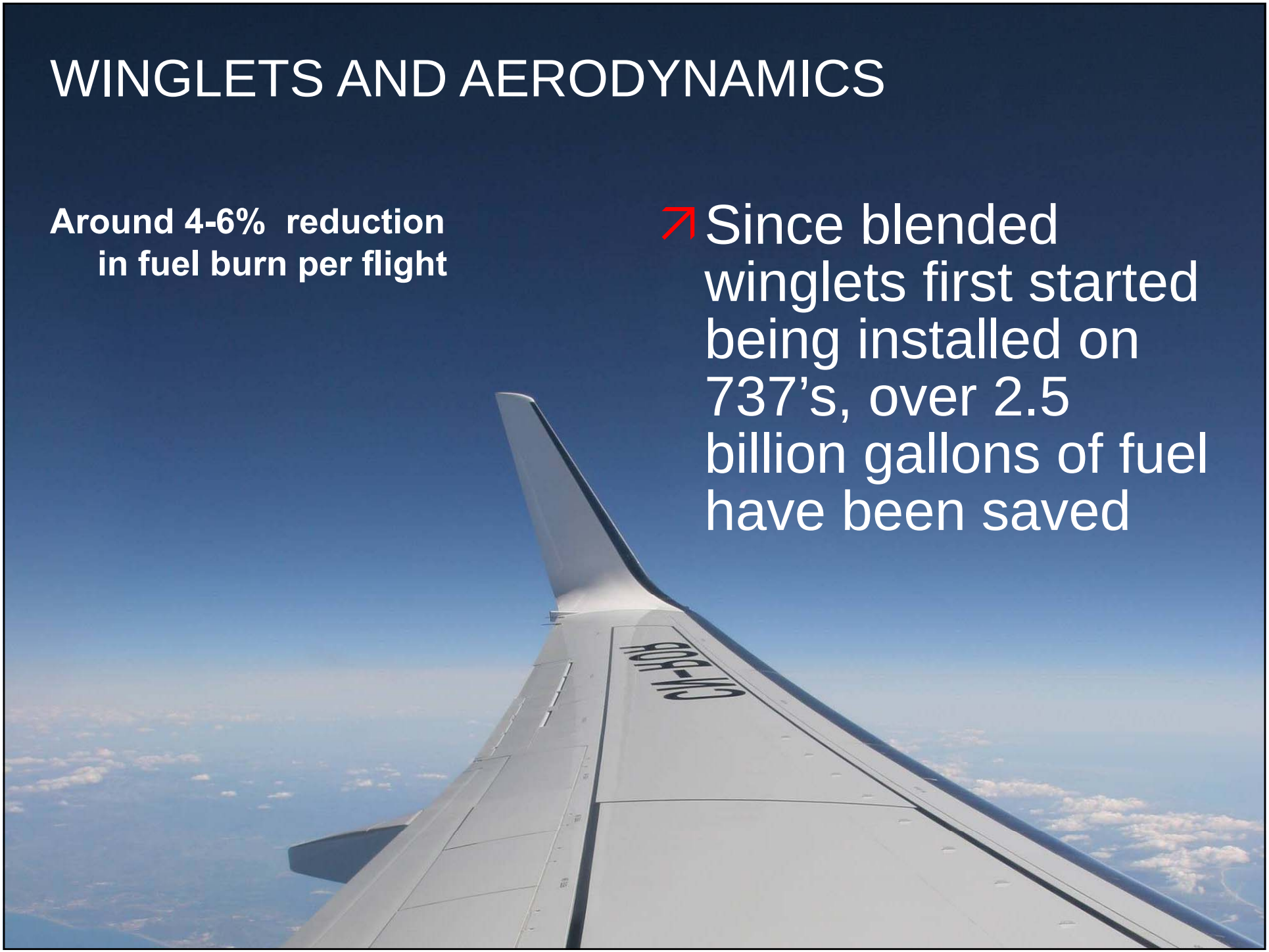
Use of composite materials and latest generation engines

New aircraft

WINGLETS AND AERODYNAMICS

Around 4-6% reduction in fuel burn per flight

↗ Since blended winglets first started being installed on 737's, over 2.5 billion gallons of fuel have been saved



New engines offer ever-lower fuel burn and emissions

» CFM's LEAP, entry into service 2016, will cut fuel consumption by 15% over the engine it replaces

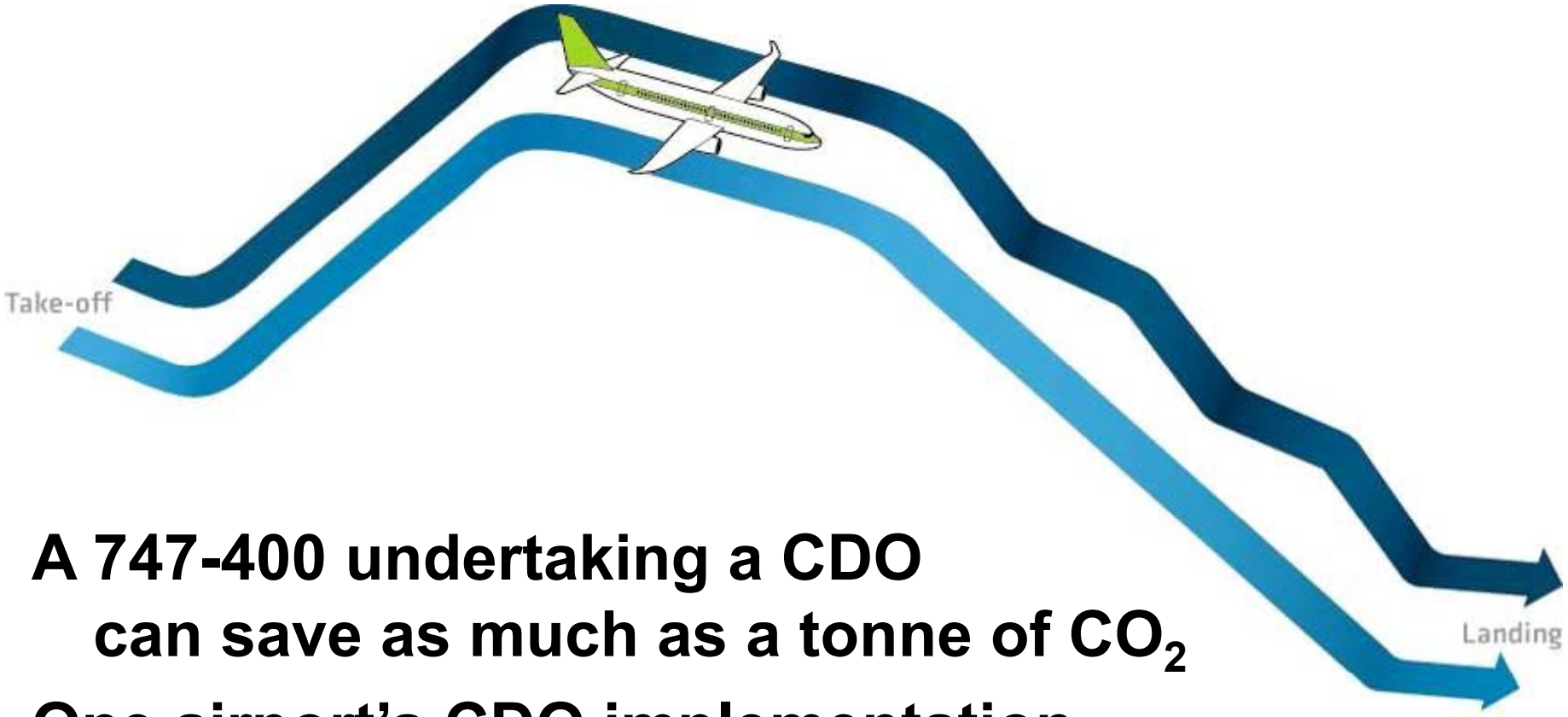
» Pratt & Whitney's PurePower reduces emissions by 15-20% over the engine it replaces

» Rolls-Royce's Trent XWB shows a 16% increase in efficiency over the first Trent engine in 1996

» By 2025 open rotor engines by GE Aviation, Snecma and Rolls-Royce could offer 20-25% fuel efficiency improvement

Lower emissions through new engine design

CONTINUOUS DESCENT OPERATIONS



A 747-400 undertaking a CDO can save as much as a tonne of CO_2

One airport's CDO implementation has reduced CO_2 emissions by 32,000 tonnes a year

More green landings in Brussels

» Brussels Airlines, Belgocontrol, Brussels Airport and SESAR

» Continuous descent operations at Brussels Airport

» 3,000 flights over a 10 month period

» A320 saves on average 50kgs of fuel and 160kgs of CO2 per landing

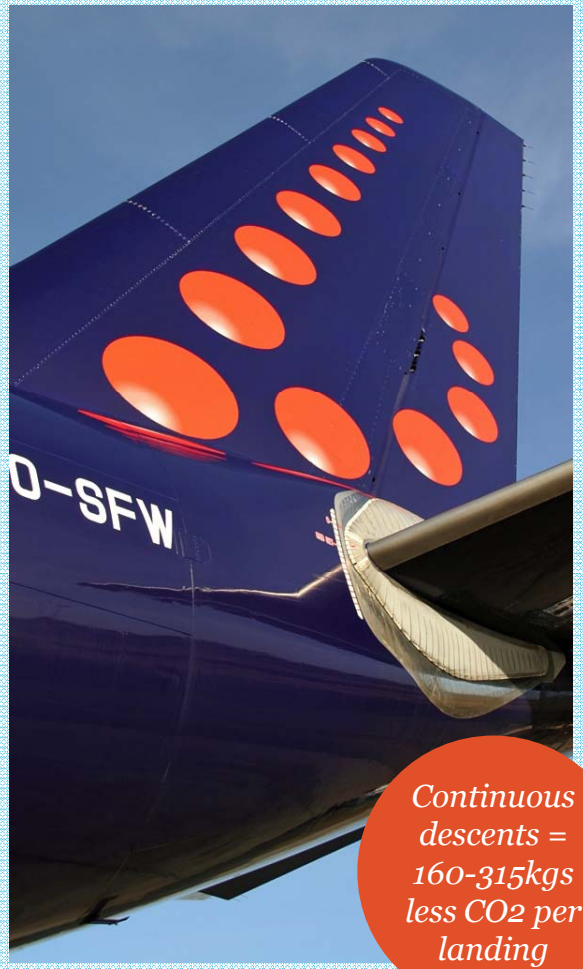
» A330 saves 100kgs of fuel and 315kgs of CO2

» Noise also decreases

» Currently, 9% of flights at BRU use CDO

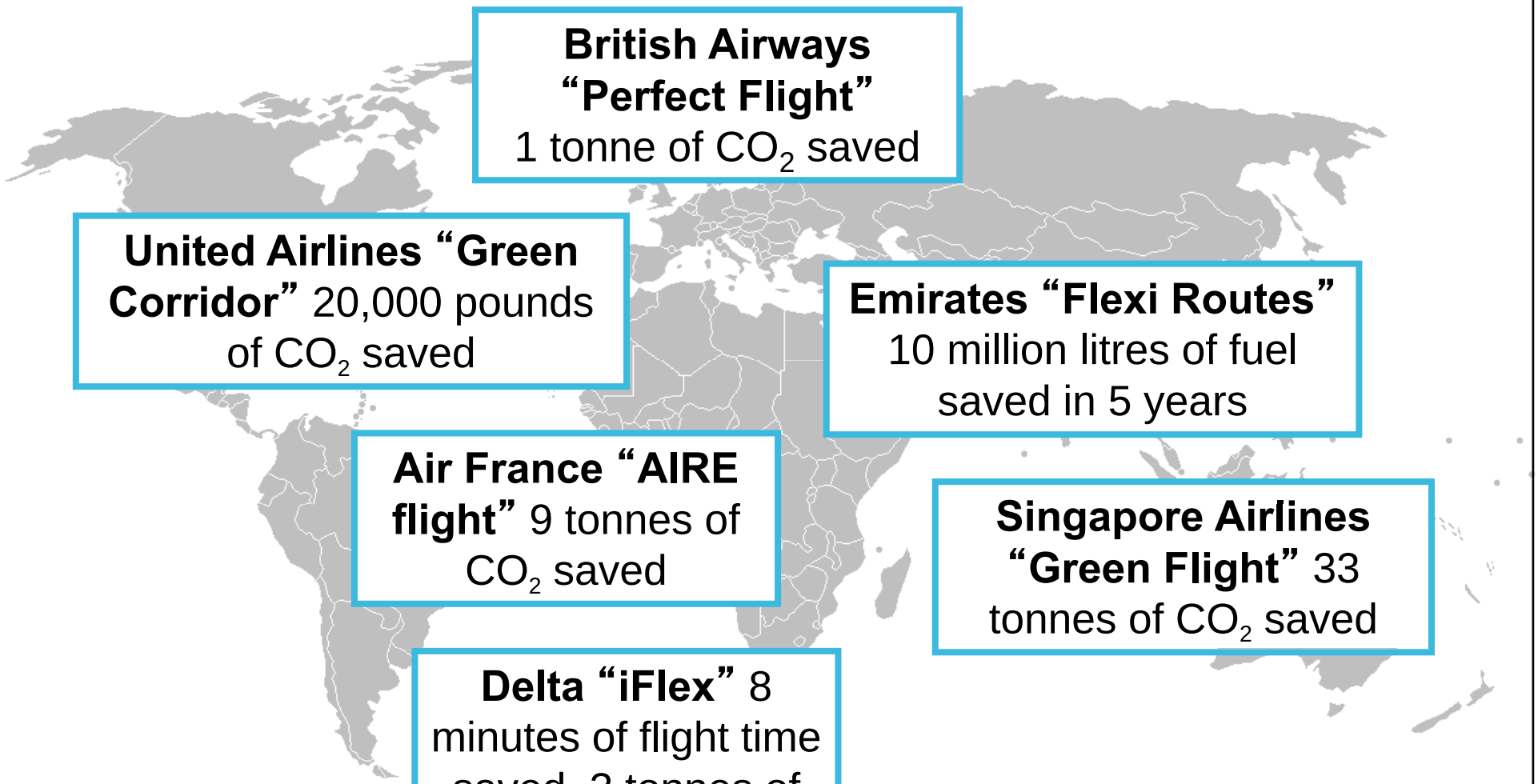
» Partners working to increase this

» Challenge remains doing so in Europe's congested airspace – AMS, FRA, LHR, LGW, CGD all close



Continuous descents = 160-315kgs less CO2 per landing

FLEXIBLE ROUTING



British Airways "Perfect Flight" 1 tonne of CO_2 saved

United Airlines "Green Corridor" 20,000 pounds of CO_2 saved

Emirates "Flexi Routes" 10 million litres of fuel saved in 5 years

Air France "AIRE flight" 9 tonnes of CO_2 saved

Singapore Airlines "Green Flight" 33 tonnes of CO_2 saved

Delta "iFlex" 8 minutes of flight time saved, 3 tonnes of CO_2

LIGHTWEIGHTING

Putting the food trolleys on a diet

Nearly 30,000 tonnes CO2 saved annually

» Lufthansa is introducing new composite, light-weight food service trolleys on its European fleet

» New trolley is a third lighter than previous version

» Will reduce emissions by 28,350 tonnes of CO2 annually

» LH is also introducing new cargo and luggage containers made from light but durable plastic

» Containers will save 6.867 tonnes of CO2 per year

» Also, 32,000 new slim-line and light-weight seats on the short- and medium-haul fleet will save 300kgs per aircraft

Looking everywhere for fuel saving opportunities

» Honeywell and Safran will jointly develop new electric taxiing systems for aircraft

» Will allow aircraft to taxi without engine power

» Potentially save airlines 4% of fuel use (and CO2 emissions)

4% reduction in fuel burn

Engine washing proving its worth

» Pratt & Whitney's EcoPower programme washes engines to increase efficiency

» Hawaiian Airlines, one of the airline customers, has reduced CO2 emissions by 22,000 tonnes over the last six years by regularly cleaning its engines

» Equivalent to removing 700 cars from the road

» Process recycles the water in a closed-loop process

THREE IMPERATIVES

To ensure our licence to grow

2

*Make **sustainable biofuels** **a success** for aviation*

FUEL FOR THOUGHT: A QUICK WIN

10% of fuel	*Total transport fuel use in 2008 was over 2 billion tonnes. Of that, commercial aviation used 215 million tonnes of Jet A-1.*
Largest operating cost	*Last year, airlines spent $178 billion on jet fuel, or 30% of operating costs. In 2003, it was 14%.*
Distribution points	*There are 161,768 gas stations in the USA alone, but only 190 airports control 80% of the world's passengers.*

Bio-fuelling the future of flight

» From dream to certification in four short years

» Cross-industry collaborative action

» 1,500+ passenger flights performed

» Two pathways certified and three more under development

» Sustainable feedstocks are possible

» Value-chain projects being advanced

» Commercialisation the major issue remaining

The big prize – up to 80% reduction in CO_2

PASSENGER FLIGHTS ARE TAKING PLACE

Over 1,500 passenger flights have taken place since certification was granted in 2011

AIRFRANCE
KLM
QANTAS
Thomson Airways
IBERIA
ANA
UNITED
AEROMEXICO.
LAN
Alaska Airlines
porter
FINNAIR
interjet
Lufthansa
GOL
Linhas aéreas inteligentes
AIR CANADA

BIOFUEL FLIGHTS TO RIO+20

A great demonstration getting from Montreal to Rio de Janeiro on sustainable aviation biofuel, with partners from across the industry working together to present the future of sustainable air travel

AIRBUS AN EADS COMPANY

porter

GOL Linhas aéreas inteligentes

BOEING

AIR CANADA

SkyNRG

BOMBARDIER

KLM

Aeropuertos y Servicios Auxiliares

EMBRAER

AEROMEXICO Mexico's Global Airline

AICM Grupo Aeroportuario de la Ciudad de México

AÉROPORTS DE MONTRÉAL

NAV CANADA

Amsterdam Airport Schiphol

FEDERAL AVIATION ADMINISTRATION

INFRAERO AEROPORTOS

AIR CANADA FLIGHT AC991

Toronto to Mexico City, 18 June 2012.

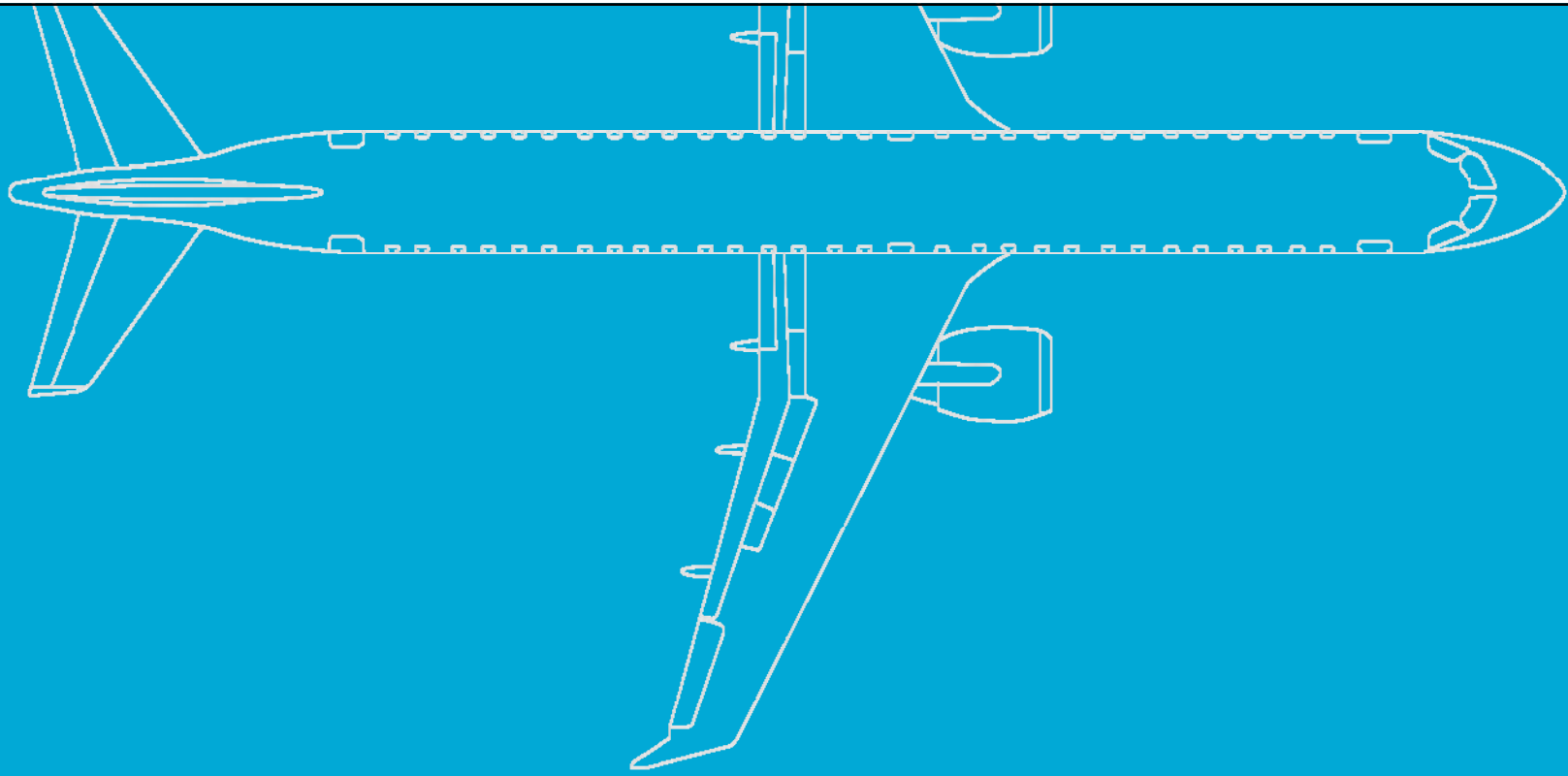
THREE IMPERATIVES

To ensure our licence to grow

3

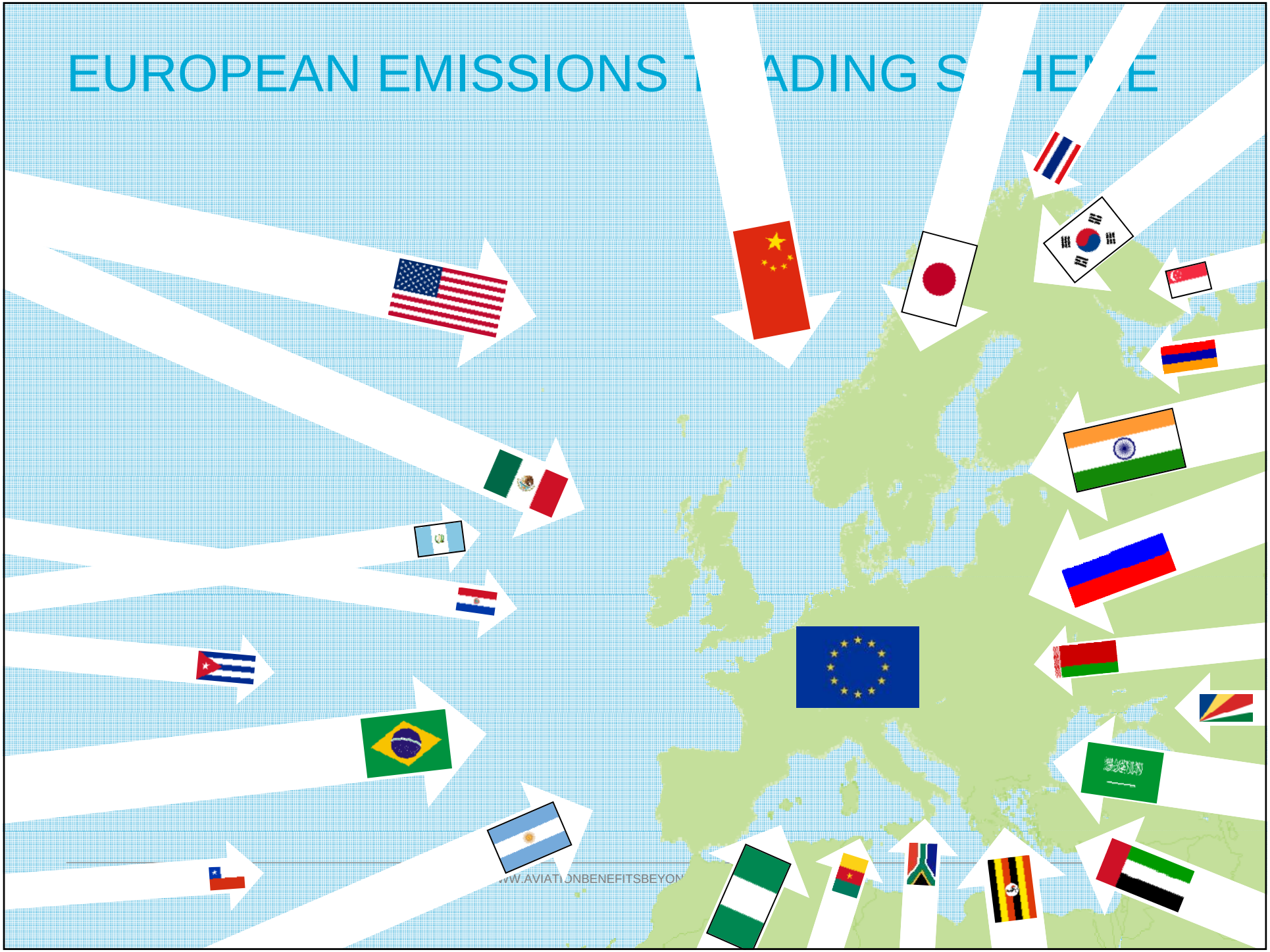
Convince policymakers that
a global approach is the only way forward

- ICAO is working on MBM framework and MBM global measure



THE POLITICAL CHALLENGE

AVIATION: AN EASY SOURCE OF FINANCE


EUROPEAN EMISSIONS T ADING S HE E
WWW.AVIATIONBENEFITSBEYON

CLIMATE FUNDING

$27 billion

Bill Gates' suggestion

$6 billion

High Level Advisory Group on Climate Change

$12 billion

G20 suggestion

ICAO IN THE SPOTLIGHT

2010 37th Assembly Resolution

CO2 Standard for new aircraft

Goals development

Framework for market-based-measures (MBMs)

Proposals for single global MBM:

1. Global offsetting scheme
2. Global offsetting scheme + revenues
3. Global emissions trading scheme

THREE IMPERATIVES

To ensure our licence to grow

1 *Demonstrate that we can* ***deliver on our targets***

2 *Make* ***sustainable biofuels a success*** *for aviation*

3 *Convince policymakers that* ***a global approach is the only way forward***


BEYOND TODAY

OUR CLIMATE ACTION

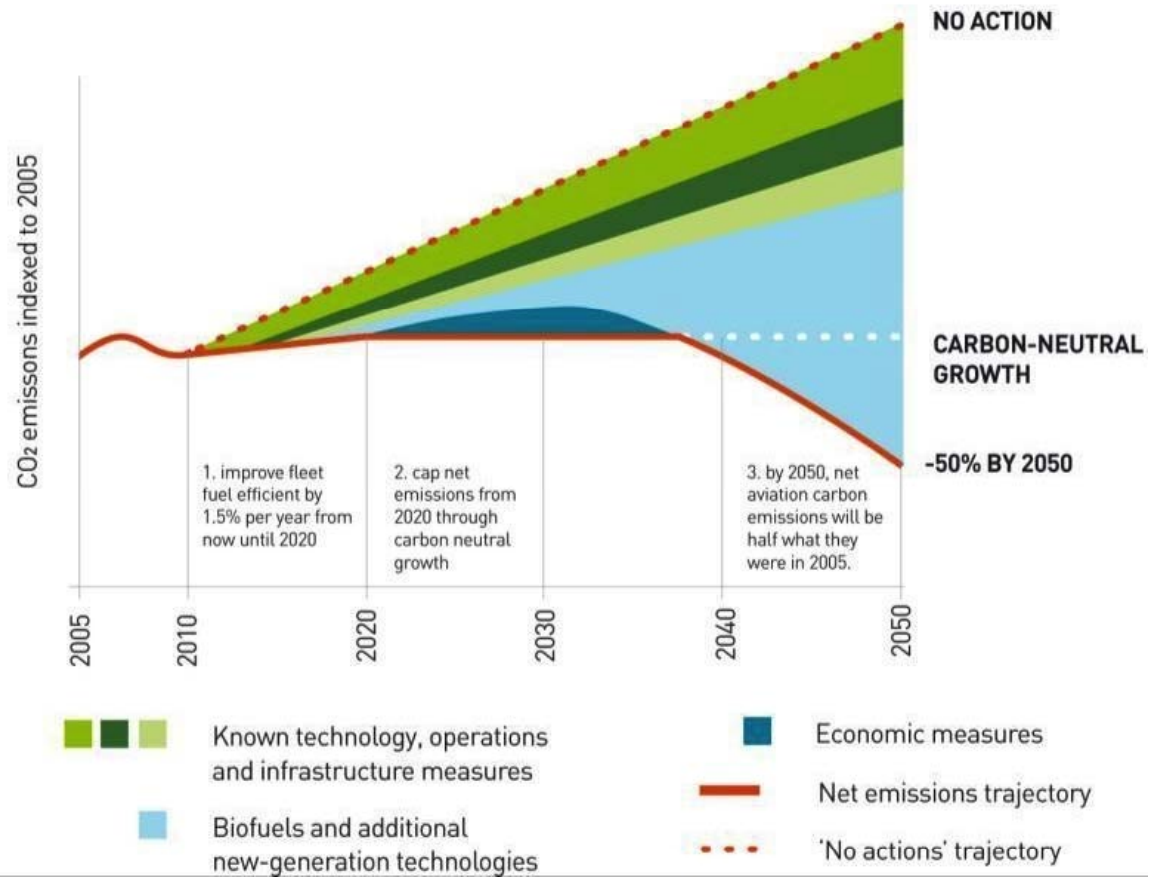
Targets

1. Improve fleet fuel efficiency by 1.5% annually from 2009 to 2020
2. Cap net CO2 emissions through carbon-neutral growth
3. Reduce net CO2 emissions by 50% below 2005 levels by 2050

The four pillars

» Technology (incl. biofuels)
» Operations
» Infrastructure
» Economic measures

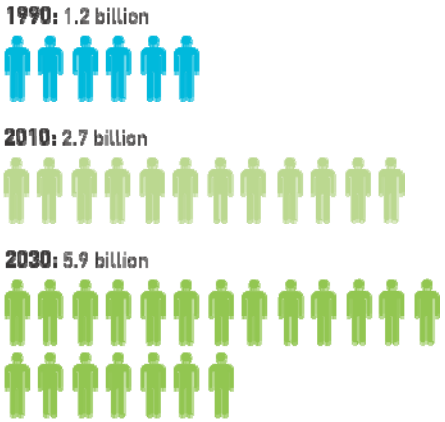
Aviation CO2 emissions roadmap



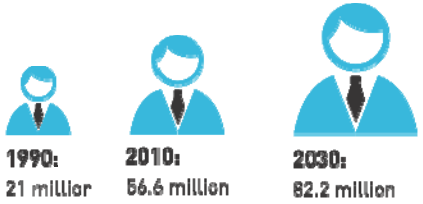
BEYOND TODAY

A comparison of aviation's global reach in 1990 and 2010 and forecast to 2030

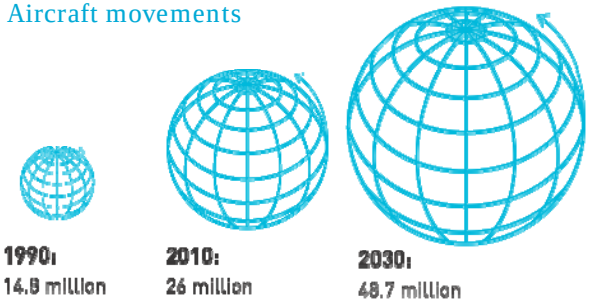
Passengers



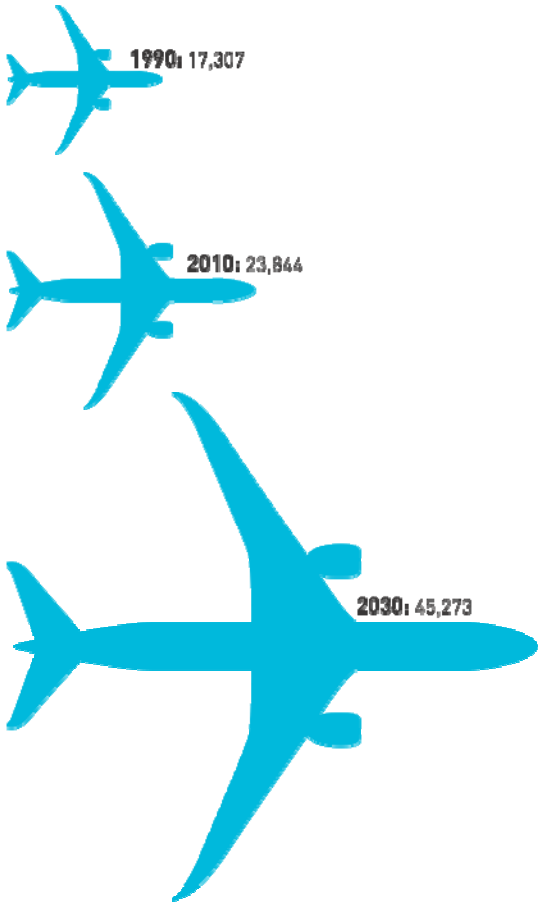
Jobs supported



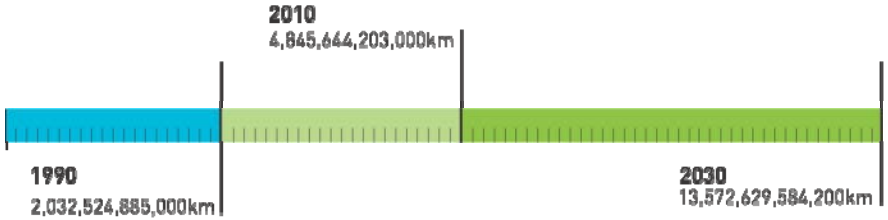
Aircraft movements



Aircraft in service

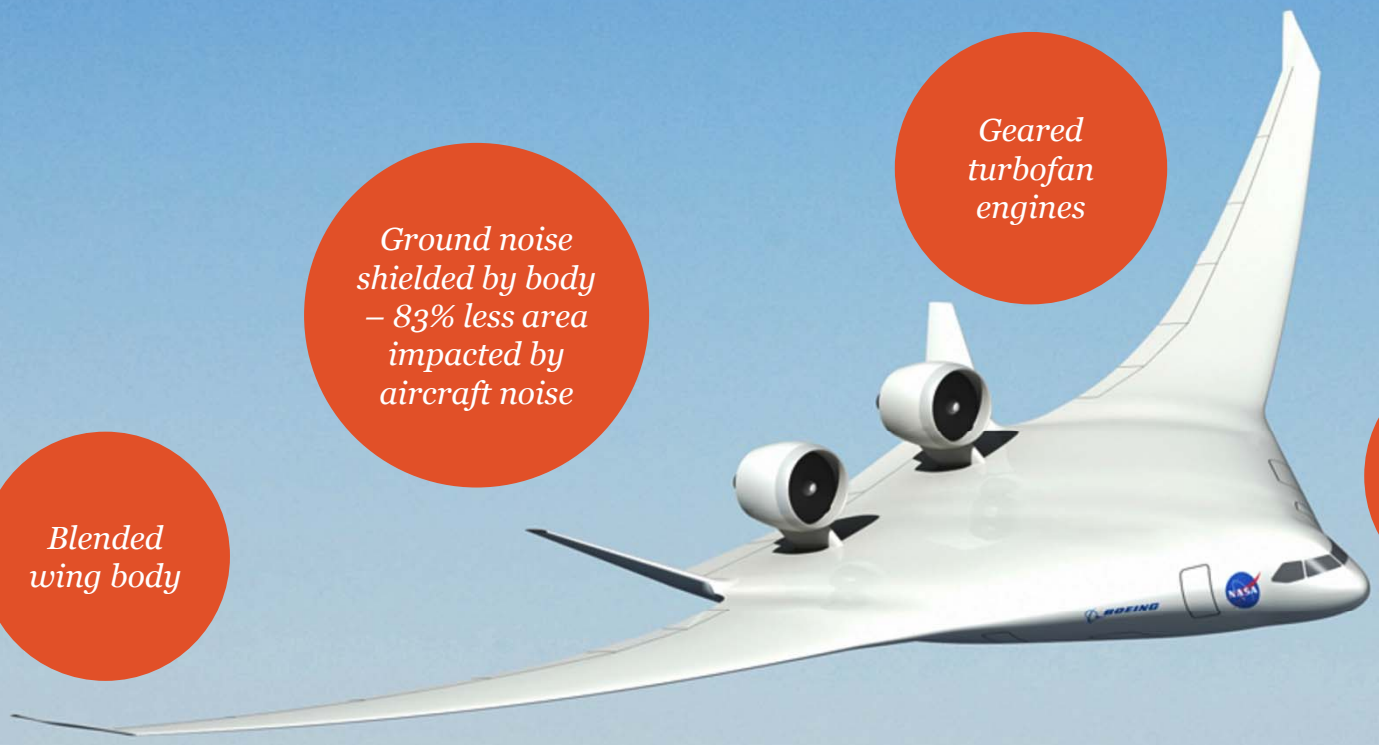


Passenger kilometres flown



TECHNOLOGY **R**EVOLUTION

The strides in aircraft technology. Available today... and ***tomorrow***



Geared turbofan engines

Ground noise shielded by body – 83% less area impacted by aircraft noise

Blended wing body

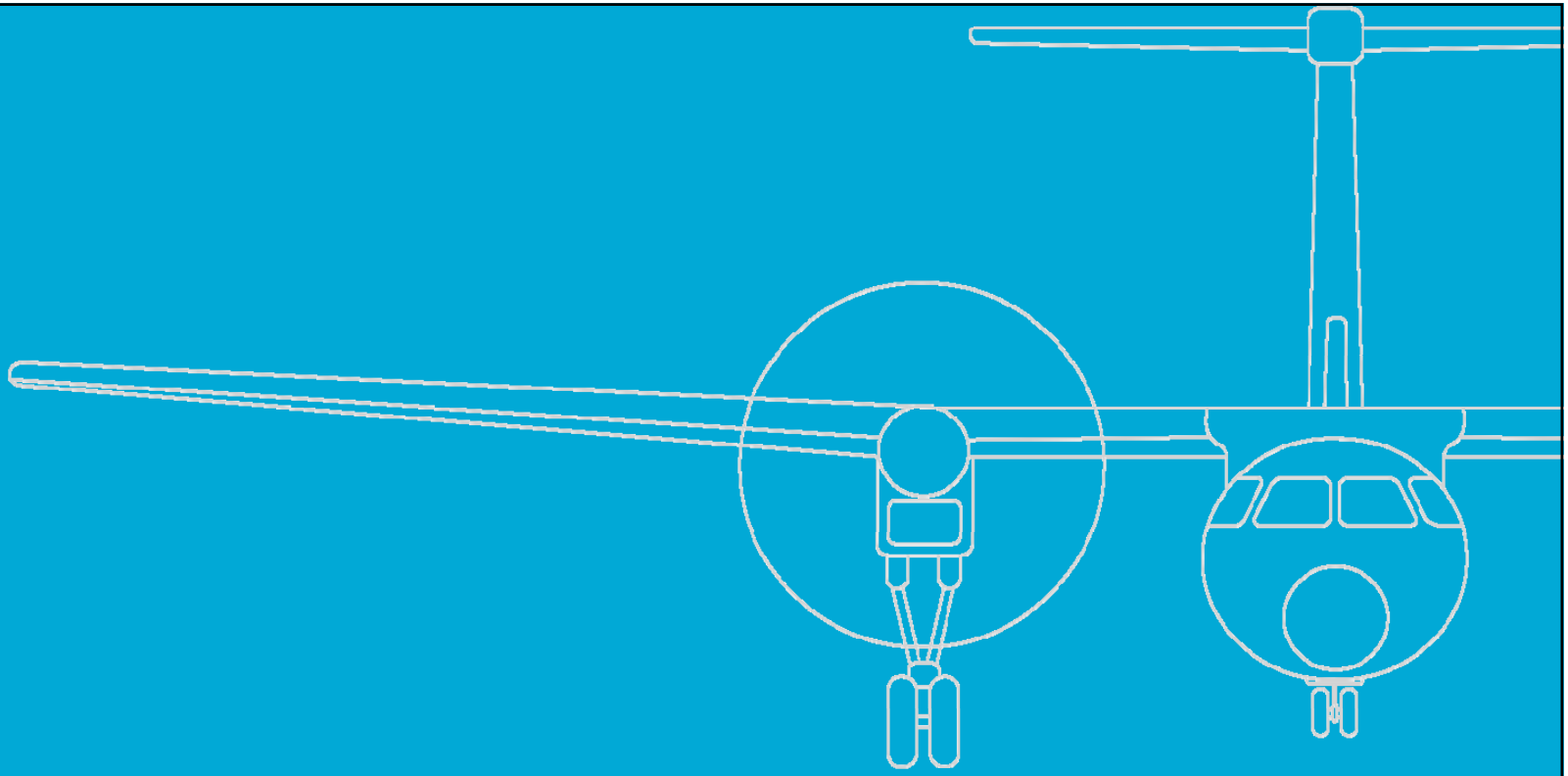
Light-weight, composite structure

50% improvement

in fuel burn and CO_2 emissions

Vision for aircraft of 2025. Boeing team working on NASA contest


TECHNOLOGY REVOLUTION
The strides in aircraft technology. Available today... and tomorrow
Switches to electric power for cruise and glide
Hybrid technology aircraft
Battery power charged at gate and in flight
Large wing surface to assist lift generation
Uses jet fuel (biofuel by 2030) for take-off and high-power
70% improvement
in fuel burn, 2030 timeframe?



FOSTERING RESEARCH AND DEVELOPMENT

CleanSky

European Commission + industry + research institutions

2008 - 2017.

Public private partnership between the European Commission and the aeronautical industry, was set up to bring significant step changes regarding the environmental impact of aviation.

$2 billion, split between European Commission and industry.

Technologies include:

- SMART fixed wing aircraft
- Green regional aircraft
- Green rotorcraft
- Sustainable and green engines
- Systems for green operations
- Eco-design

LoI signed for CleanSky II - $4.7 billion over 7 years, jointly invested by industry and European Commission

$2 billion

CLEEN

FAA + industry + research institutions

Five-year programme from 2012 – 2017.

To develop technologies that will reduce noise, emissions, and fuel burn and enable the aviation industry to expedite integration of these technologies into aircraft.

$125 million from US Government, to be matched by industry.

Technologies include:

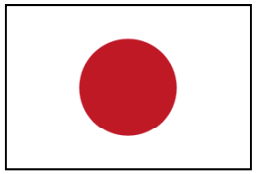
- sustainable alternative jet fuels;
- lighter, more efficient gas turbine engine components;
- noise-reducing engine nozzles;
- advanced wing trailing edges;
- optimised flight trajectories using onboard flight management systems; and
- open rotor and geared turbofan engines.

FEDERAL AVIATION ADMINISTRATION

C L E E N

$250 million

Aviation Program Group



Japanese Government + universities + industry + CAA

Ongoing.

To support the development of environmentally-friendly technologies for use in aircraft systems.

Workstreams include:

- Environmentally compatible airframe technology
- Environmentally compatible engine technology
- Air traffic management project
- Operations and safety technology

Japan Aerospace Exploration Agency

OUR INDUSTRY HAS GREAT STORIES TO TELL

Airlines

Continental Airlines eco-skies
COMMITMENT TO THE ENVIRONMENT

one destination

Pure Sky
sky friendly energy

Sustainable Aviation Fuel Users Group

change is in the air!

JAL participates in Team -6% with our Eco-Sky project.
Let's stop global warming together
Team-6%

Airports

airport carbon accreditation
MAPPING | REDUCTION | OPTIMISATION | NEUTRALITY

HeathrowAirthought
Together towards sustainability

lift
getting to work differently

HKIA Carbon Reduction

for a greener gander airport.

ANSPs

AIRE

SESAR
JOINT UNDERTAKING

aspire ASIA & SOUTH PACIFIC
INITIATIVE TO REDUCE EMISSIONS

NextGen NOW
National Alliance to Advance NextGen

noracon

Manufacturers

CLEANSKY
Joint Technology Initiative for Aeronautics & Air Transport
www.cleansky.eu

AFRA
Aircraft Fleet Recycling Association

ACARE

SUSTAINABLE AVIATION