



ICAO

UNITING AVIATION



Current and Future Aircraft Technologies

Nelson Salgado, Vice-President of Institutional Relations and Sustainability

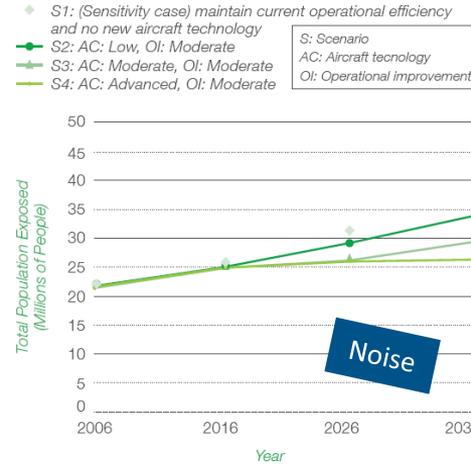
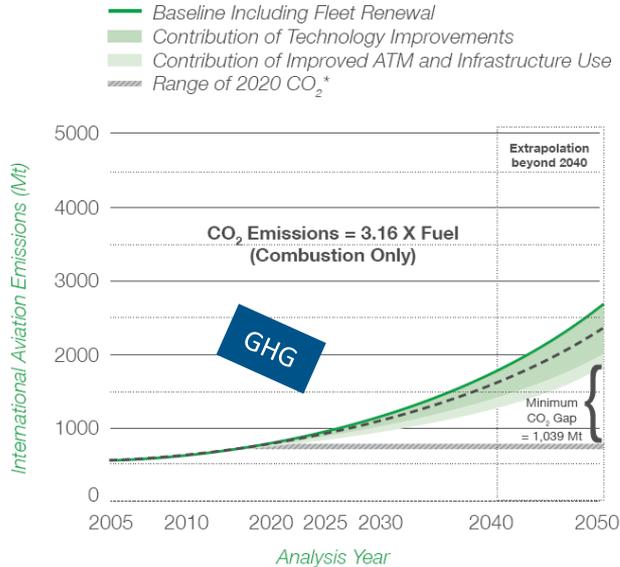


ICAO HQ, Montréal, Canada

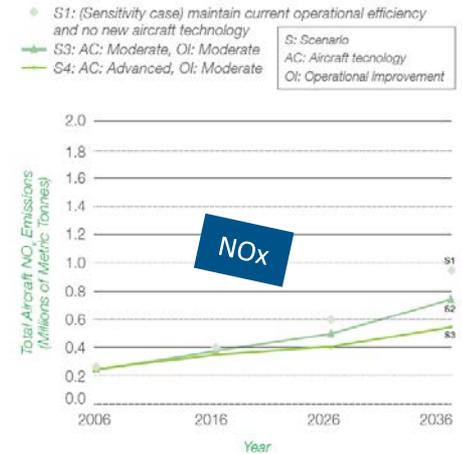
9 – 10 SEPTEMBER 2014



Our challenges



Total Global Population Exposed to Aircraft Noise Above 55 DNL

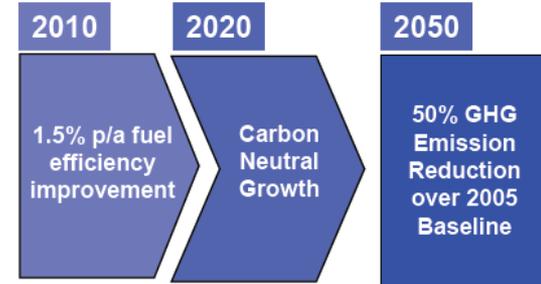
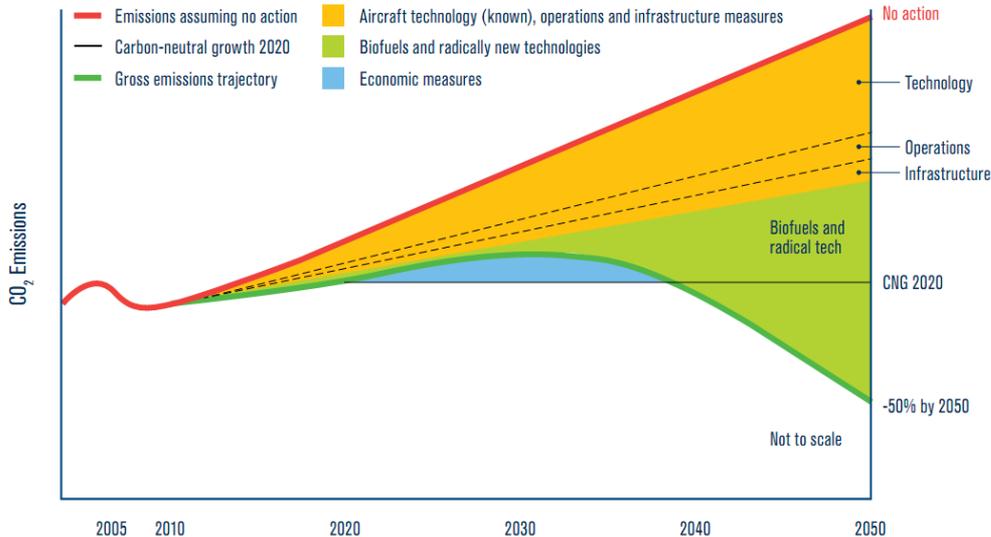


Total Global Aircraft NO_x below 3,000 feet AGL

Source: ICAO Environmental Report 2013 - Environmental Trends in Aviation to 2050



Industry Targets

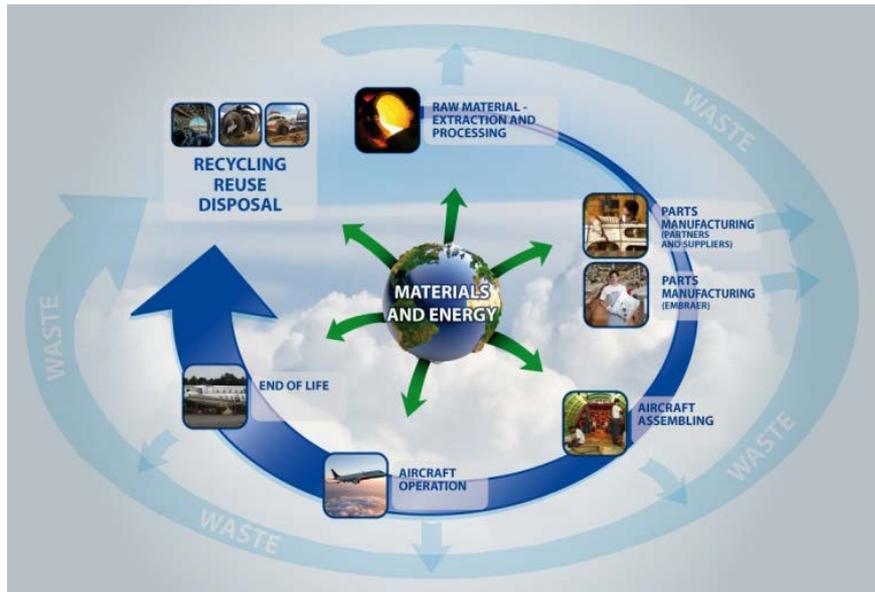


Carbon Neutral Growth (CNG) Means:

- **Capping Net Emissions at 2020 Levels**
- **Using a combination of the “four pillars”**
 - **Technology (inc. biofuels)**
 - **Operational Efficiencies**
 - **Infrastructure Improvements**
 - **Economic Measures**



Embraer is committed to minimize the environmental impacts of our products during the complete life cycle



Environmentally Sustainable
Integrated Product Development

DIPAS brings environmental requirements to product requirements through all the supply chain (contract enforced)

built with environmentally-friendly, REACH*-compliant materials

*REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals



New generation aircraft and future design concepts

A generational step led by new technology, not just a re-engine

- New Higher Aspect Ratio Wing
- New High By-Pass Ratio Engines
- 4th Generation Full Fly-by-Wire
- Improved Avionics
- Improved Systems Reliability and DMC
- New Interior
- e-Enabled

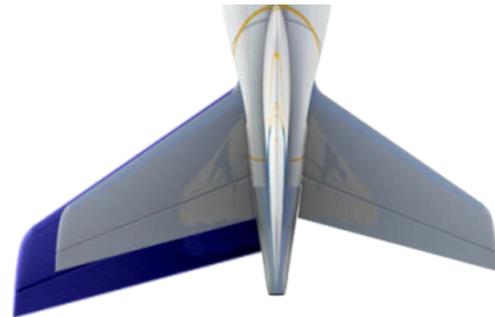




New generation aircraft and future design concepts

Fuel burn and weight savings:

- Horizontal stabilizer of a Closed Loop Fly-by-Wire aircraft: reduced in size, resulting in lower weights and drags



Conventional Aircraft

Closed Loop Fly-by-Wire Aircraft

1.5% reduction in Fuel Burn

E-Jets E2



More composite materials

E-Jets E2 Composite Rudder



LEGACY 500 Composite Empennage





New generation aircraft and future design concepts



Noise

stage 4 minus 15 dB
margin to future regulations



NO_x

CAEP/8 minus 35%



CO₂

Double digit reduction
~3,600 tonnes per aircraft/year



Fuel Burn

Double digit improvement



New generation aircraft and future design concepts

FULL FLY BY WIRE
1.5%

WING AND AERODYNAMICS
IMPROVEMENTS

3.5%

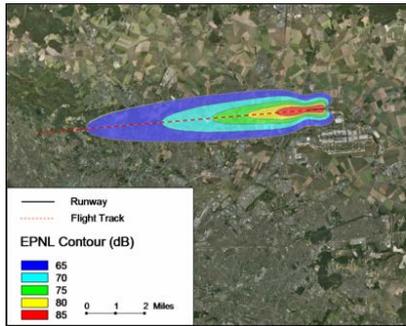
ENGINE
11%

E190-E2 Fuel Burn Efficiency: 16%

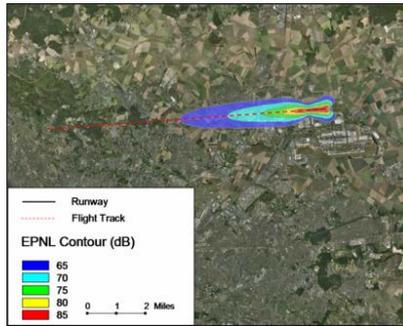


New generation aircraft and future design concepts

Paris
(Charles de
Gaulle)

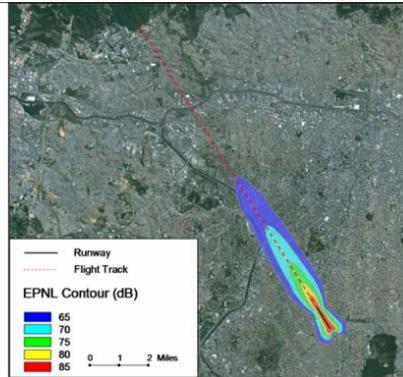
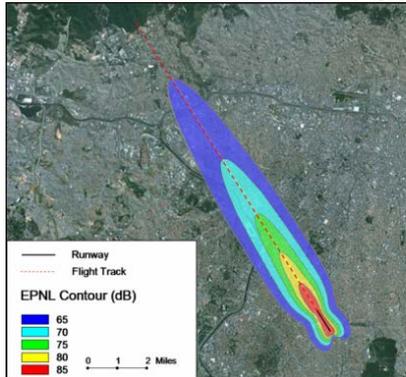


E190



E190-E2

São Paulo
(Congonhas
airport)



- Opportunity for additional 2-3% reduction in aircraft cash operating cost via lower noise fees, direct flight tracks and curfew extensions

- 65% Reduction in Noise Contour



Future green aviation technologies



Green and efficient propulsion

- Ultra high bypass ratio engines
- More electric aircraft

Aerodynamic improvements

- Laminar flow control
- New aircraft configurations





Future green aviation technologies



Lightweight aerostructures

- Long, thin and precise surfaces
- 2nd generation composites
- Advanced manufacturing



Aircraft Health Management

- Accelerated diagnosis
- Systems Prognostics
- Structural health monitoring



Future green aviation technologies



Advanced ATM

- Reduced vertical distance
- Highly efficient pathways
- Communication aircraft-aircraft



Fleet Management System

- Advanced decision making system
- Spare parts management



Future green aviation technologies: Biofuels



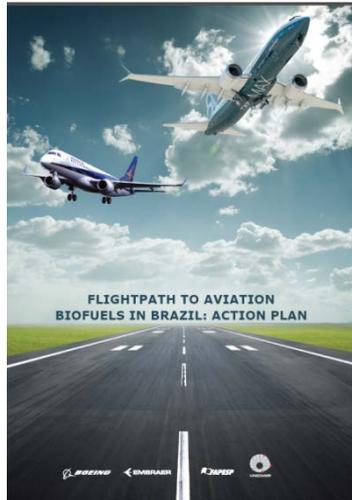
- Engine: CF34-8E fueled with biofuel
- Biomass: Cameline (50% “drop-in” blend)
- Prototype flight: Aug-Sep, 2011



- Engine: CF34-10E fueled with biofuel
- Biomass: Sugarcane (50% “potential drop in” blend). Not ethanol, but biokerosene
- Demo flight: Jun 2012 (in “Rio +20 UN Conference”)



Future green aviation technologies: Biofuels



- EC FP7 collaborative project, aimed to produce sustainable renewable aviation fuel and **to test its use in existing logistic systems and in normal flight operations** in Europe;
- Nov/2012 to Out/2015;
- KLM Cityhopper's E190 revenue flights forecasted for 2015 using HEFA biojet fuel.



Sustainable Aviation Fuel Users Group

SAFUG associates represent approximately 32% of commercial aviation fuel demand

“Jet fuel plant sources should be developed in a manner which is non-competitive with food and where biodiversity impacts are minimized; in addition, the cultivation of those plant sources should not jeopardize drinking water supplies.”





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Thank you!