The Boeing Company

Innovative Solutions

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Life Cycle Environmental Footprint Reduction

Life Cycle Environmental Footprint Reduction

- **Minimizing manufacturing waste**
- **Conserving energy and water**
- **Reducing emissions**

- **Stewardship, conservation and life cycle strategies**

Boeing's 2012 Environmental Targets

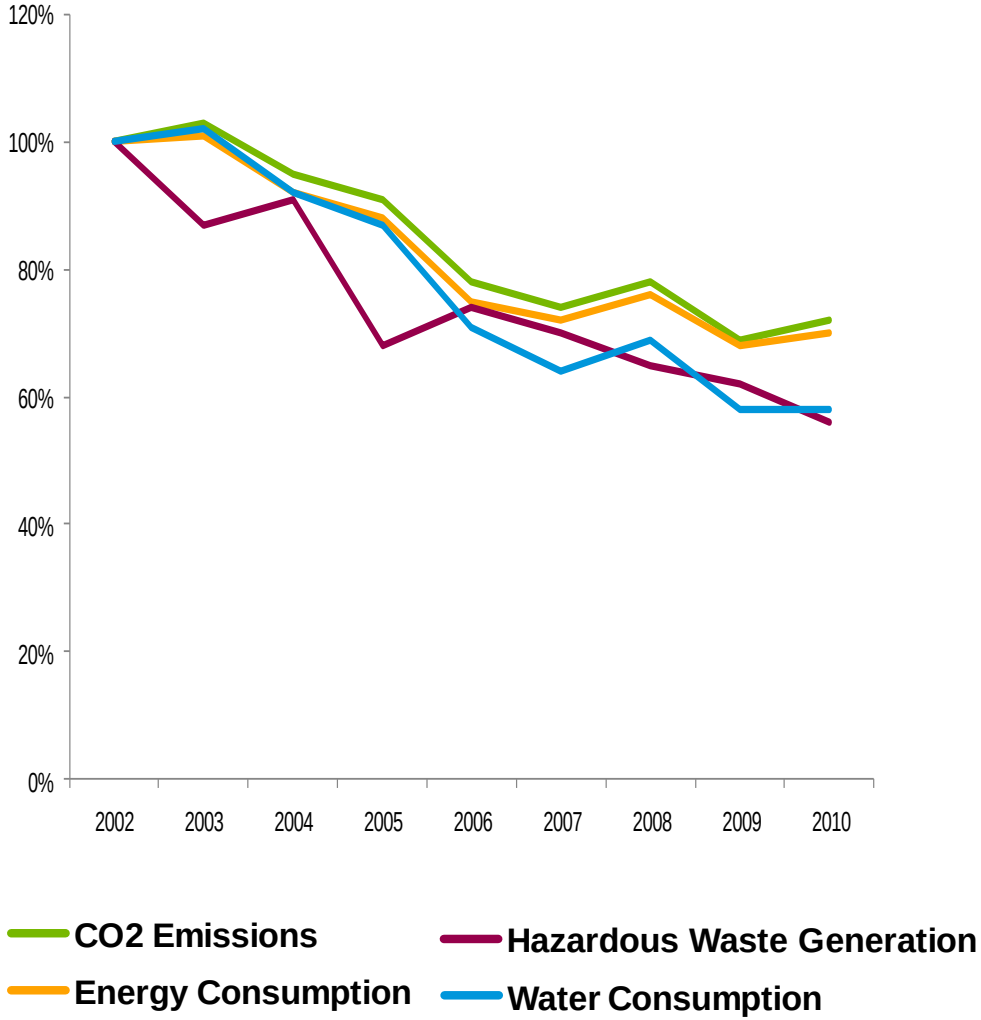
- Energy consumption*
- Water consumption*
- Greenhouse gas emissions*
- Hazardous waste*
- Solid waste diverted from landfills

25%
Improvement Over 5 Years

*Revenue-adjusted basis

Making Steady Progress

Smaller Environmental Footprint*



***U.S. facilities on revenue-adjusted basis**

Cleaner Operations

Zero Waste to Landfill at 4 Sites

- Huntsville
- Philadelphia
- Salt Lake City
- South Carolina

100% renewable energy at Boeing South Carolina

- 10-acre solar roof
- Biomass for remaining energy needs

All major sites ISO-14001 certified

Boeing: A 2010 US EPA ENERGY STAR partner of the year

International Aerospace Environment Group Commitment to improved environmental performance

- Industry leaders working together for a standardized approach
  - Minimize environmental impacts
  - Reduce Cost
- Launched June 2011
- First priority: chemical reporting

Life Cycle Environmental Footprint Reduction

- Reducing emissions
- Minimizing noise
- Reducing fuel consumption

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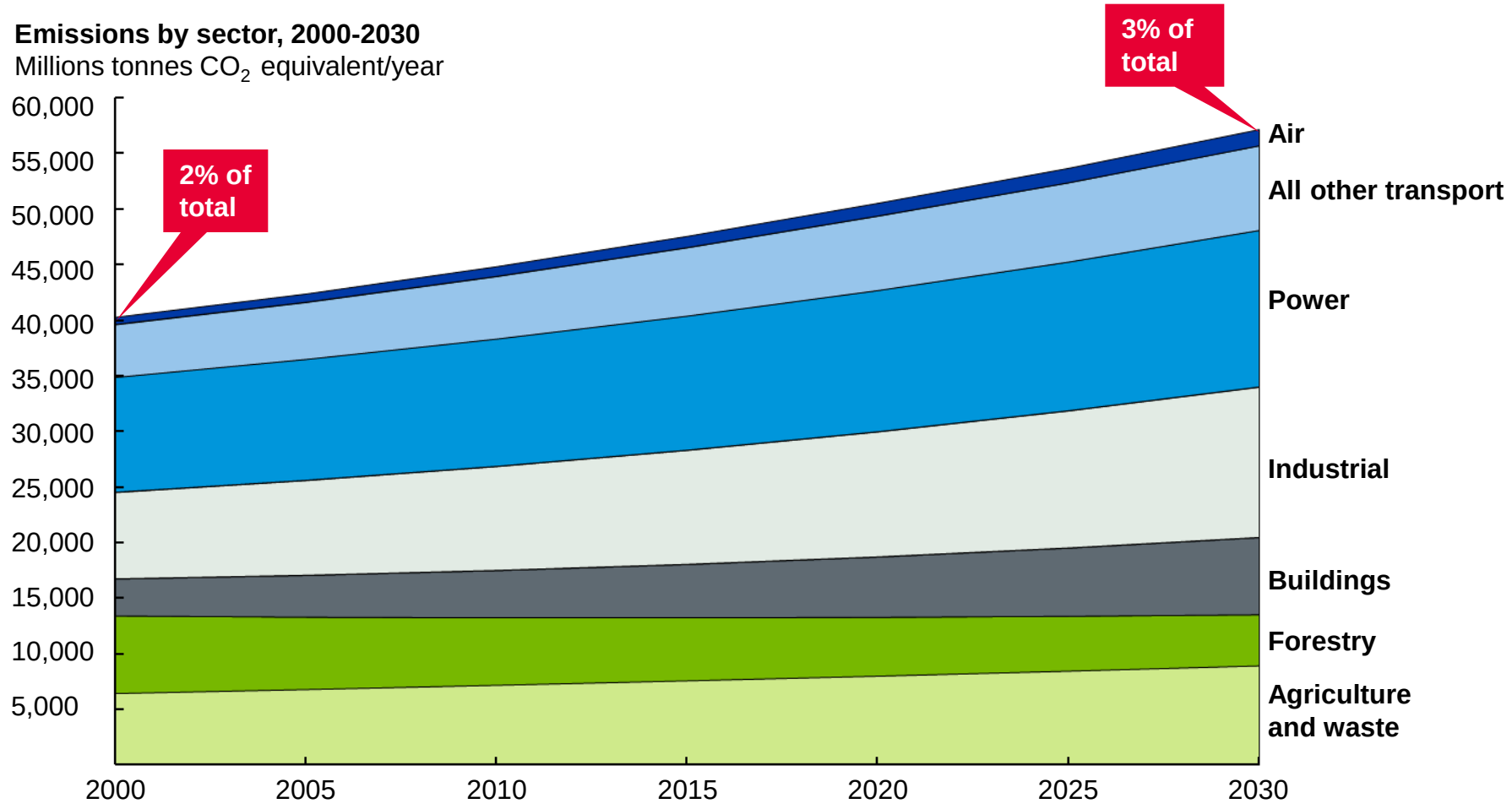
- Remarketing
- Reclaiming materials
- Recycling

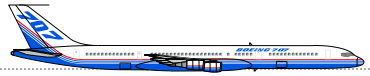
Aviation: 2% of Global CO_2 Emissions and Growing



Source: WBCSD Mobility 2030 model; IPCC

Track Record of Significant Progress

Product Performance



Early Jet Airplanes

MORE FUEL

Relative fuel use

LESS FUEL

EVEN LESS

HIGHER DECIBELS

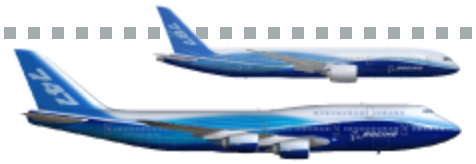
Noise dB

LOWER DECIBELS

EVEN LOWER

90% Reduction in Noise Footprint

70% Fuel Improvement and Reduced CO_2



New Generation Jet Airplanes

1950s → 1990s

Noise footprint based on 85 dBa.

787 and 747-8

Cleaner, Quieter and More Efficient

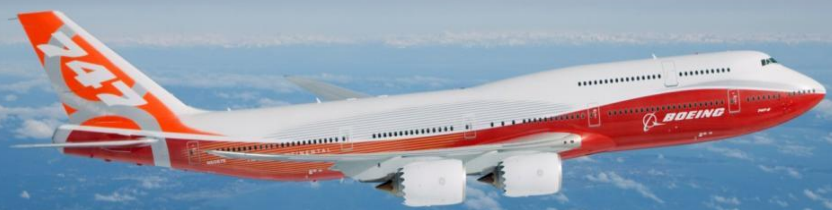
The 787 is designed to deliver:

- **20%*** Reduction in fuel and CO_2
- **28%** Below 2008 industry limits for NOx
- **60%*** Smaller noise footprint

*Relative to the 767

The 747-8 is designed to deliver:

- **16%*** Reduction in fuel and CO_2
- **28%** Below 2008 industry limits for NOx
- **30%*** Smaller noise footprint



*Relative to the 747-400

Modernizing Air Traffic Management to Reduce Fuel Consumption and Emissions

Boeing demonstrated improvements in U.S. Europe and Australia

Collaborating to research and develop Next-Gen air traffic system

- **Airbus**
- **Cessna**
- **Honeywell**
- **Lockheed-Martin**

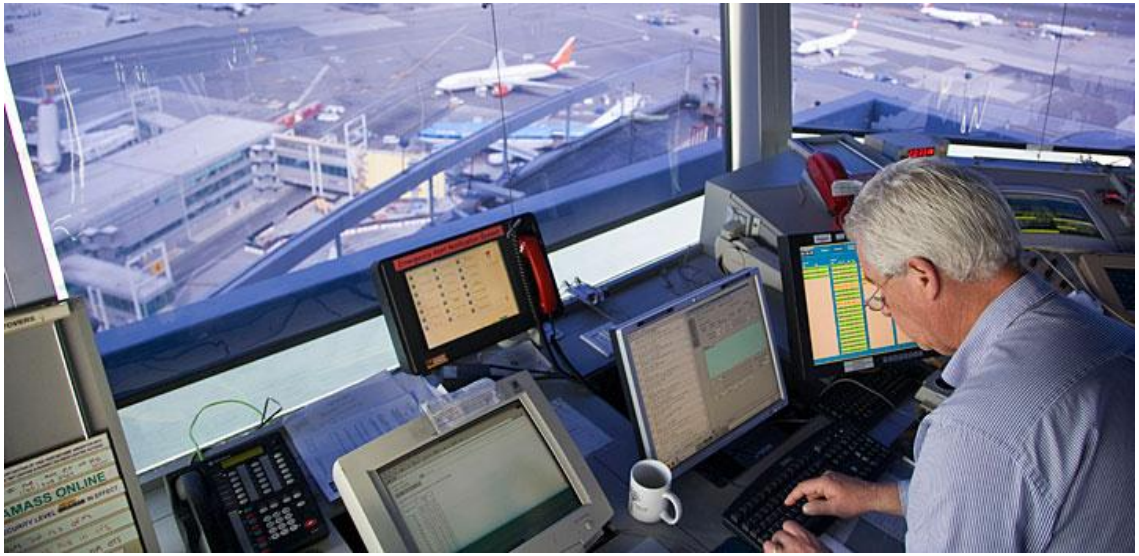


PHOTO: U.S. Federal Aviation Administration

Reducing Flights 1 Minute = 4.8M Tons Less CO_2 Annually

Boeing Sustainable Biofuels Test Flights

Virgin Atlantic
Feb 2008 **Coconut/Babassu**

Japan Airlines
Jan 2009 **Camelina, Jatropha, Algae**

Dutch AH-64 Apache
June 2010 **Algae and Cooking Oil**

Air New Zealand
Dec 2008 **Jatropha**

US Navy F/A-18
Apr 2010 **Camelina**

US Air Force C-17
Aug 2010 **Animal fats and plant oils**

Continental
Jan 2009 **Algae and Jatropha**

Boeing 747-8 Freighter
June 2011 **Camelina**

Sustainable Aviation Biofuels

Approved for commercial aviation

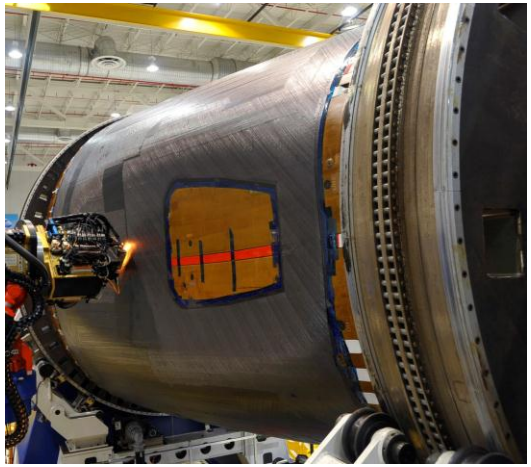
- 50-50 Jet A/biofuel blend approved by ASTM International in July

KLM and Lufthansa operating sustainable biofuel flights

Potential for 50% Co2 reduction over lifecycle

Sustainable: Don't Compete with Food for Land or Water

Cradle-to-Cradle Approach



Boeing exploring new markets for recycled aerospace components

- Increases residual value for airlines
- Expands market for AFRA/ASA

Recycled carbon fiber (cured and uncured)

- Interior components
- Non-structural applications
- Aerospace tooling

Recycled aircraft carpeting

- Reduces waste to landfill
- Reduces airline maintenance cost, increases value of used aerospace components

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For Today and the Future

Vulture / SolarEagle

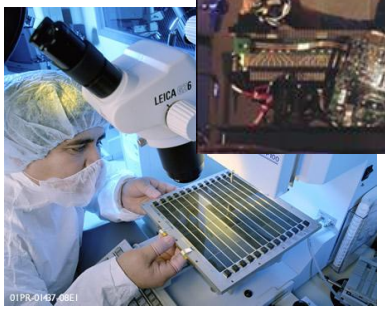
X-48

Phantom Eye

ecoDemonstrator

Smart grid and energy security

Photovoltaic solar cells



Fuel cell technology


BOEING