



# Aviation and Sustainable Biofuel



**Al Bryant**  
**Vice President and General Manager**  
**Boeing Research & Technology Brazil**

June 28, 2013

# A New Vision for Aviation



## Sustainable Aviation Biofuel

is the fuel of choice, is widely available and may be used for every flight around the world

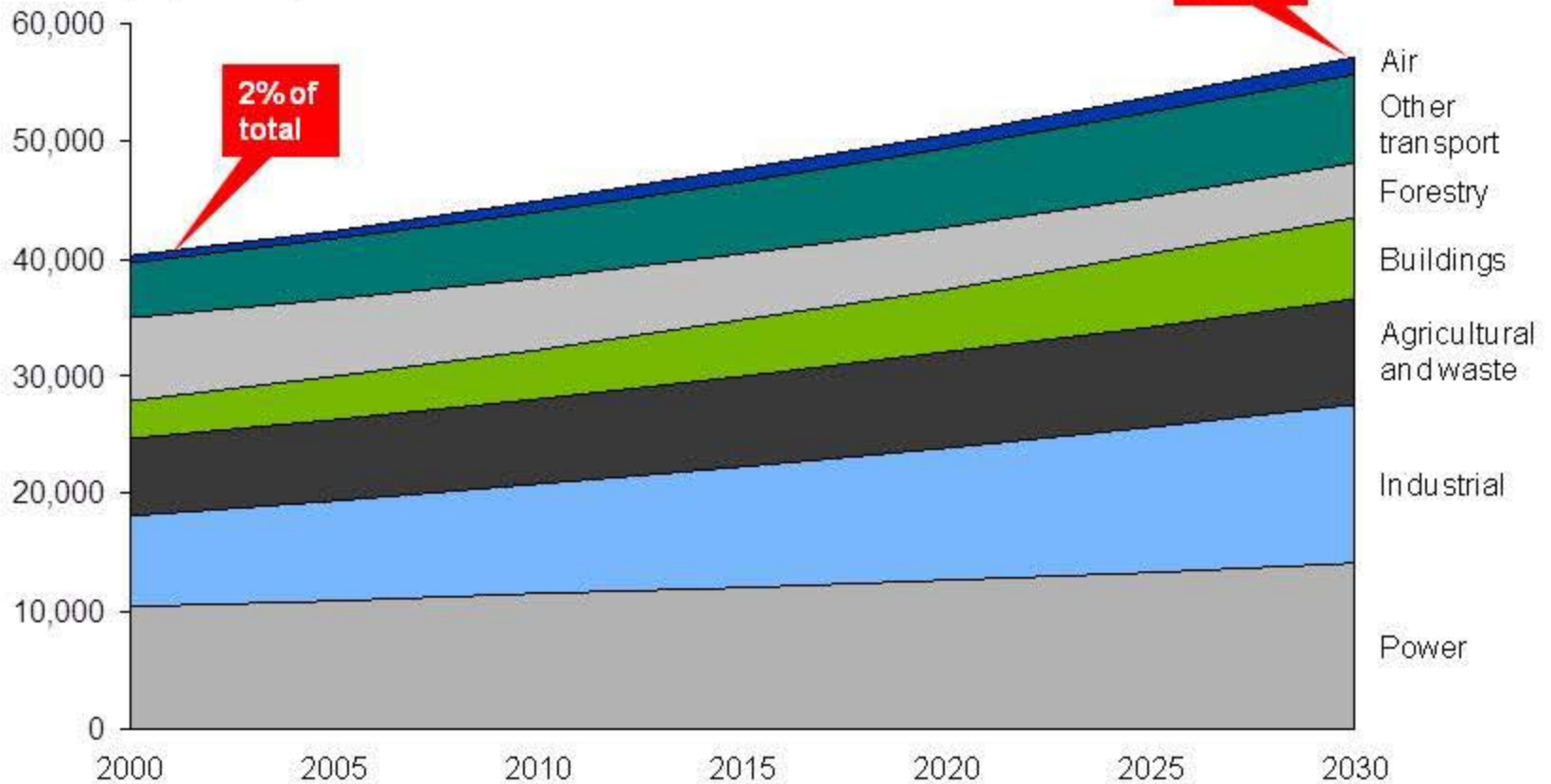


# Global CO2 Emissions



## Emissions by sector, 2000-2030

Millions tons CO<sub>2</sub> equivalent/year

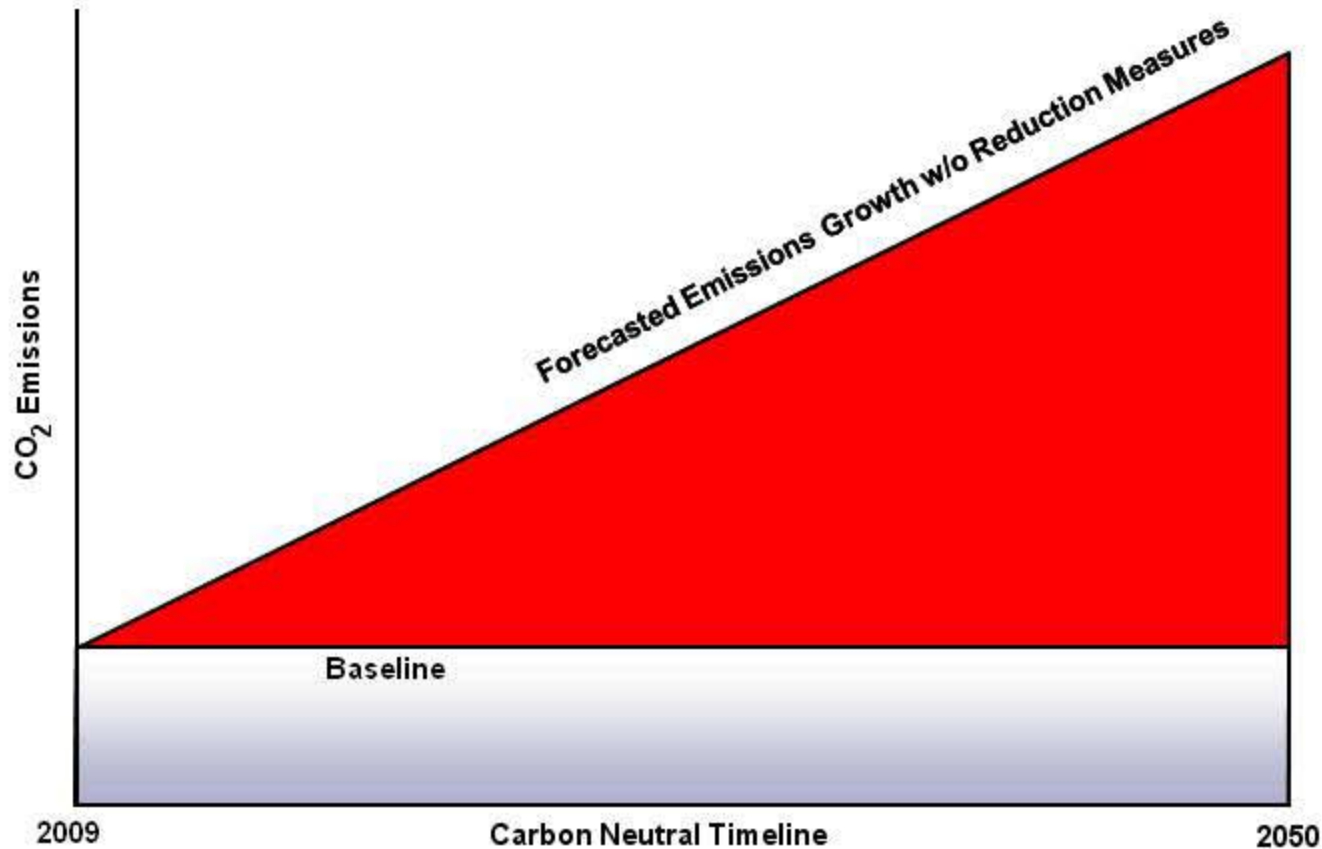


**Small but growing share of emissions**

Source: IPCC

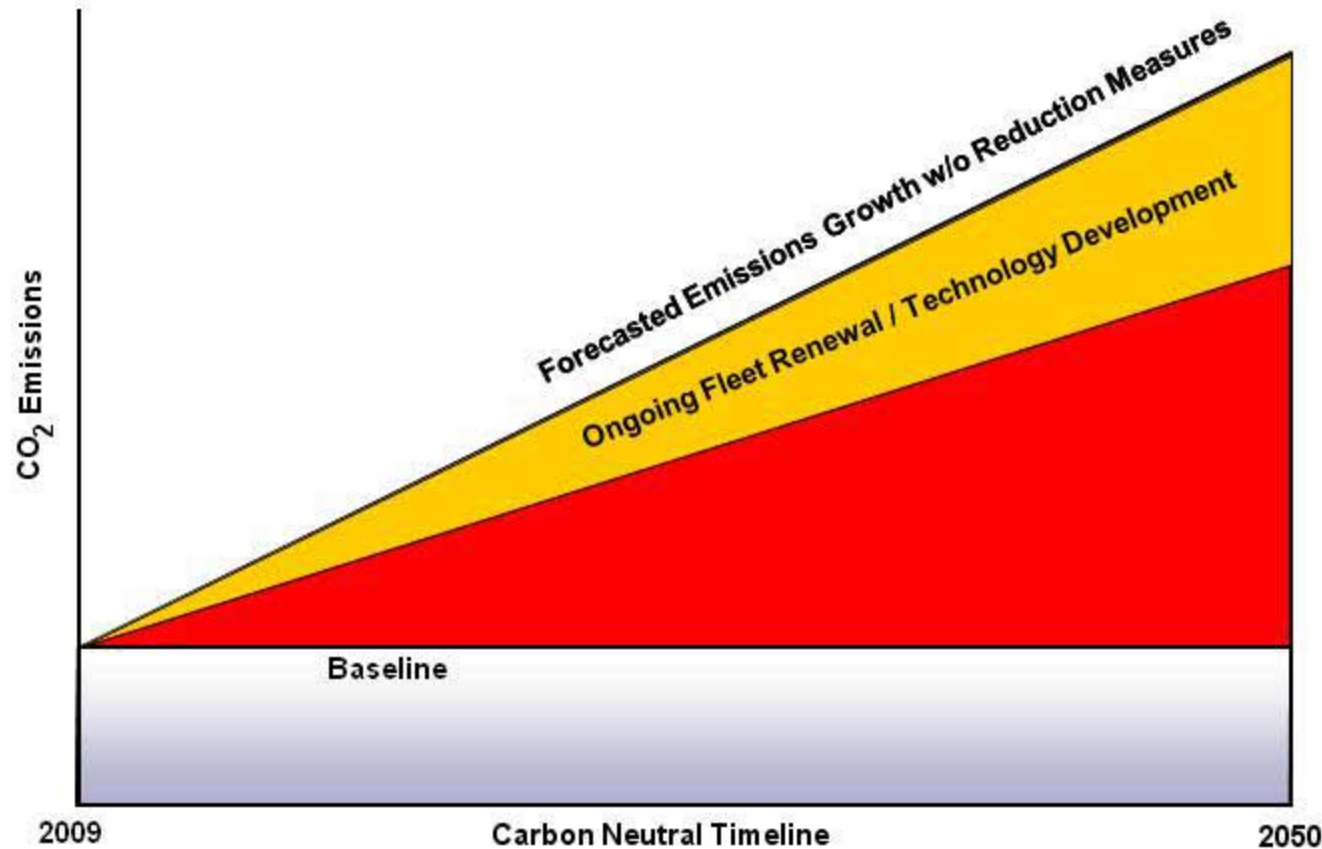
# Projected impact from aviation on the environment if we do nothing

---



*Presented to ICAO GIACC/3 February 2009 by Paul Steele on behalf of ACI, CANSO, IATA and ICCAIA*

# More efficient airplanes will help

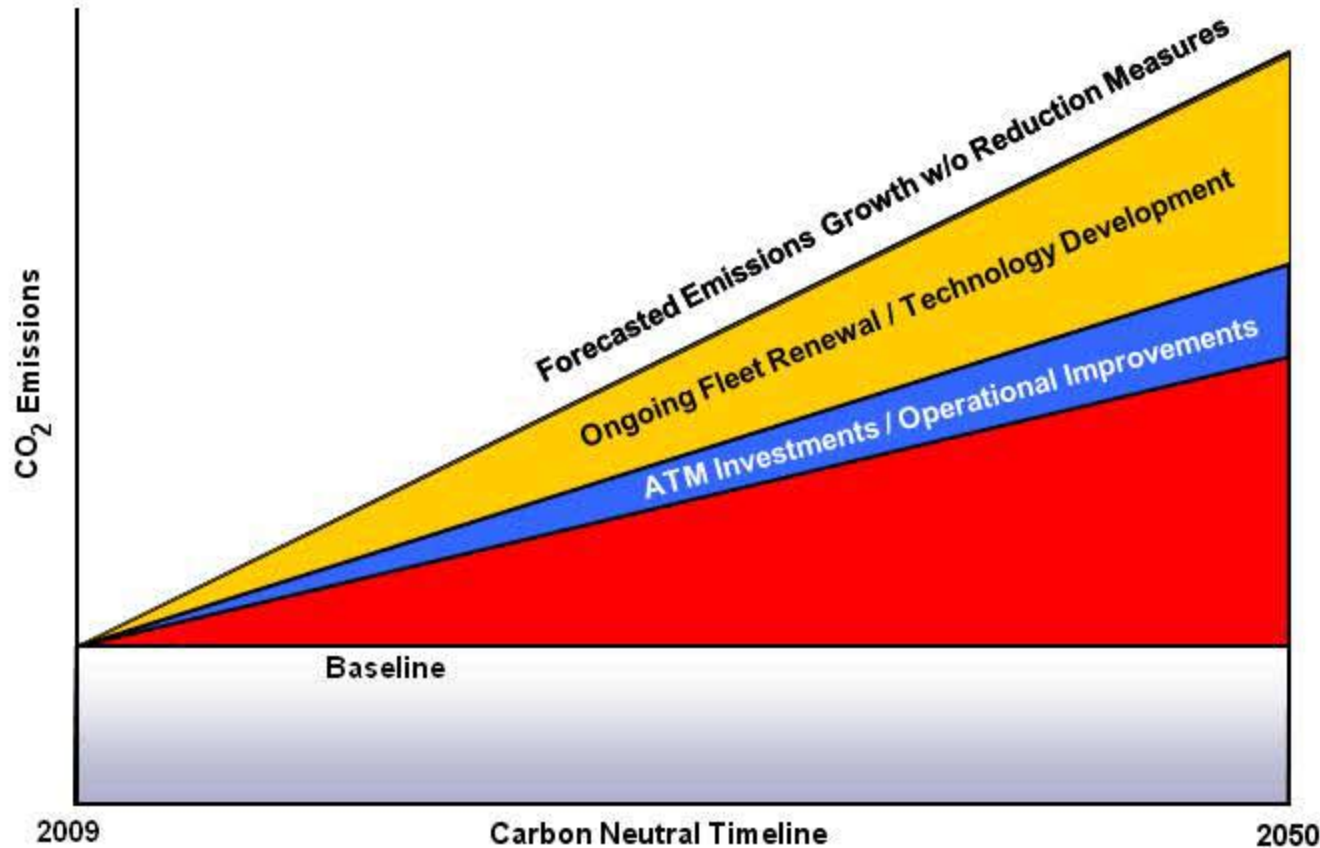


## Using less fuel

- Efficient airplanes

*Presented to ICAO GIACC/3 February 2009 by Paul Steele on behalf of ACI, CANSO, IATA and ICCAIA*

# Improving how we operate will help

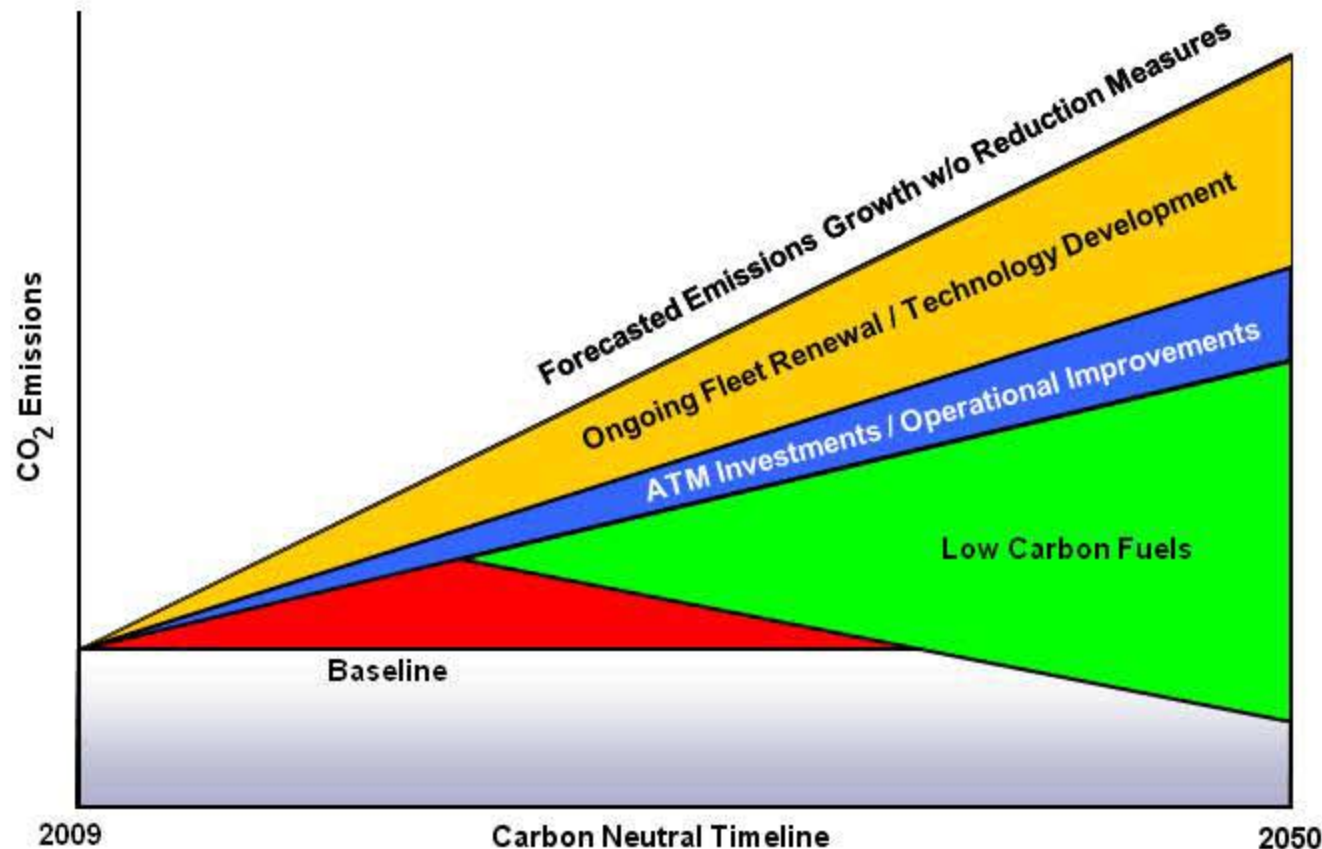


## Using less fuel

- Efficient airplanes
- Operational efficiency

*Presented to ICAO GIACC/3 February 2009 by Paul Steele on behalf of ACI, CANSO, IATA and ICCAIA*

# Low carbon fuels are essential



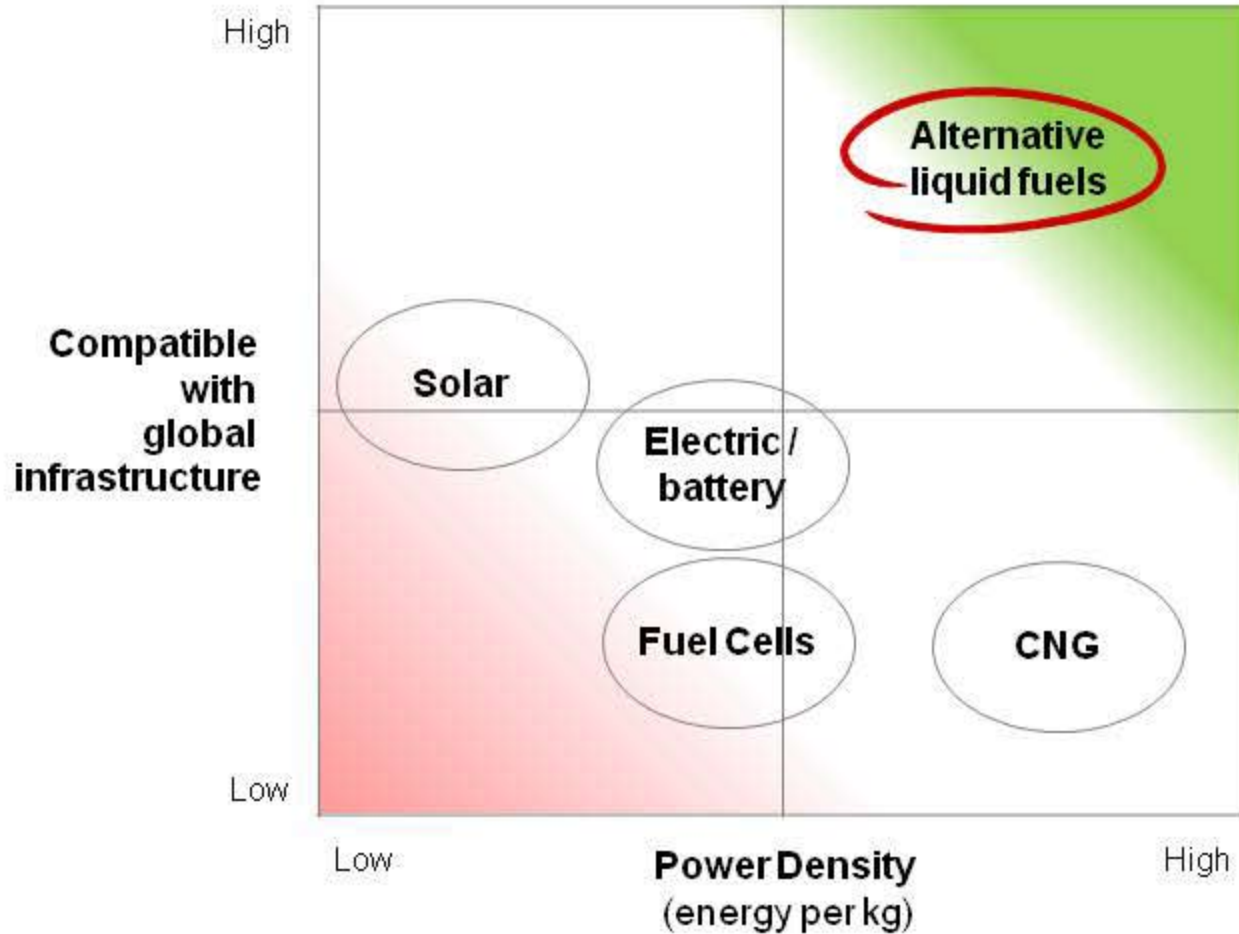
## Using less fuel

- Efficient airplanes
- Operational efficiency

## Changing the fuel

Presented to ICAO GIACC/3 February 2009 by Paul Steele on behalf of ACI, CANSO, IATA and ICCAIA

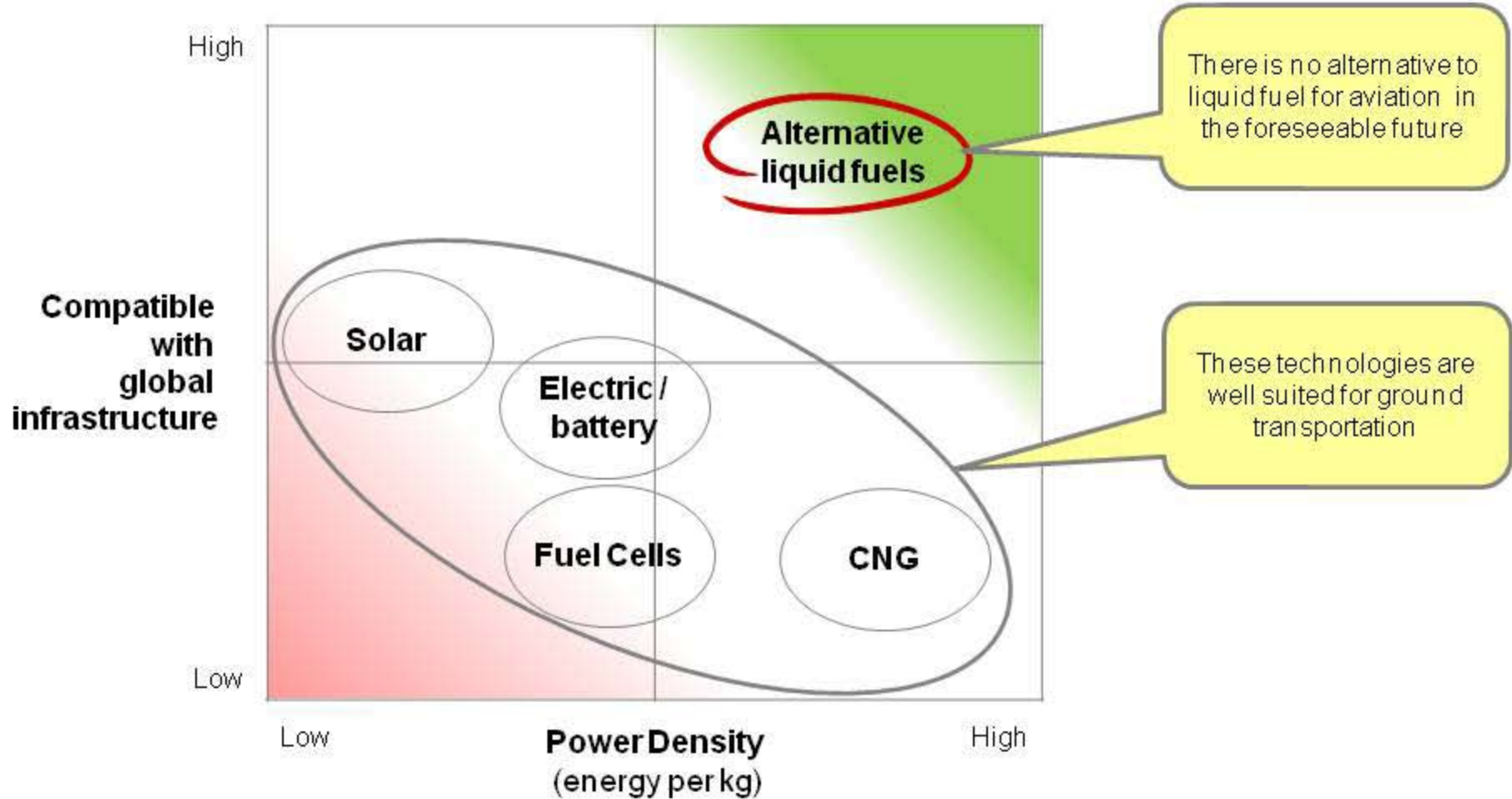
# Clean Energy Options for Aviation



**Liquid fuels only realistic near term option**



# Make Decisions Today based on Applicability for Future



**Liquid fuels only realistic near term option**

# Alternative Liquid Fuels



## Example Fuels

### Traditional Fossil



- Petro jet-A
- Diesel

### Alternative Fossil Fuels



- Coal to liquid
- Gas to liquid

### 1<sup>st</sup> Generation Biofuel



- Ethanol
- Biodiesel

### Advanced Biofuel



- “Drop-in” Sustainable aviation fuel
- Renewable diesel

**Boeing focused on advanced biofuel**

# Boeing Supports “Drop-In” Fuels



- Meets fuel performance requirements
- Requires NO change to airplanes or engines
- Requires NO change to infrastructure
- Can be mixed or alternated with today’s Jet-A fuel
- International Standards



A new way of making the same fuel

# State of Aviation Biofuel Industry



## ✔ Technically viable



Technically proven

ASTM approved

Safe

## ✔ In demand



Airline support

In commercial use

Defense Support

## ✘ Sufficient supply



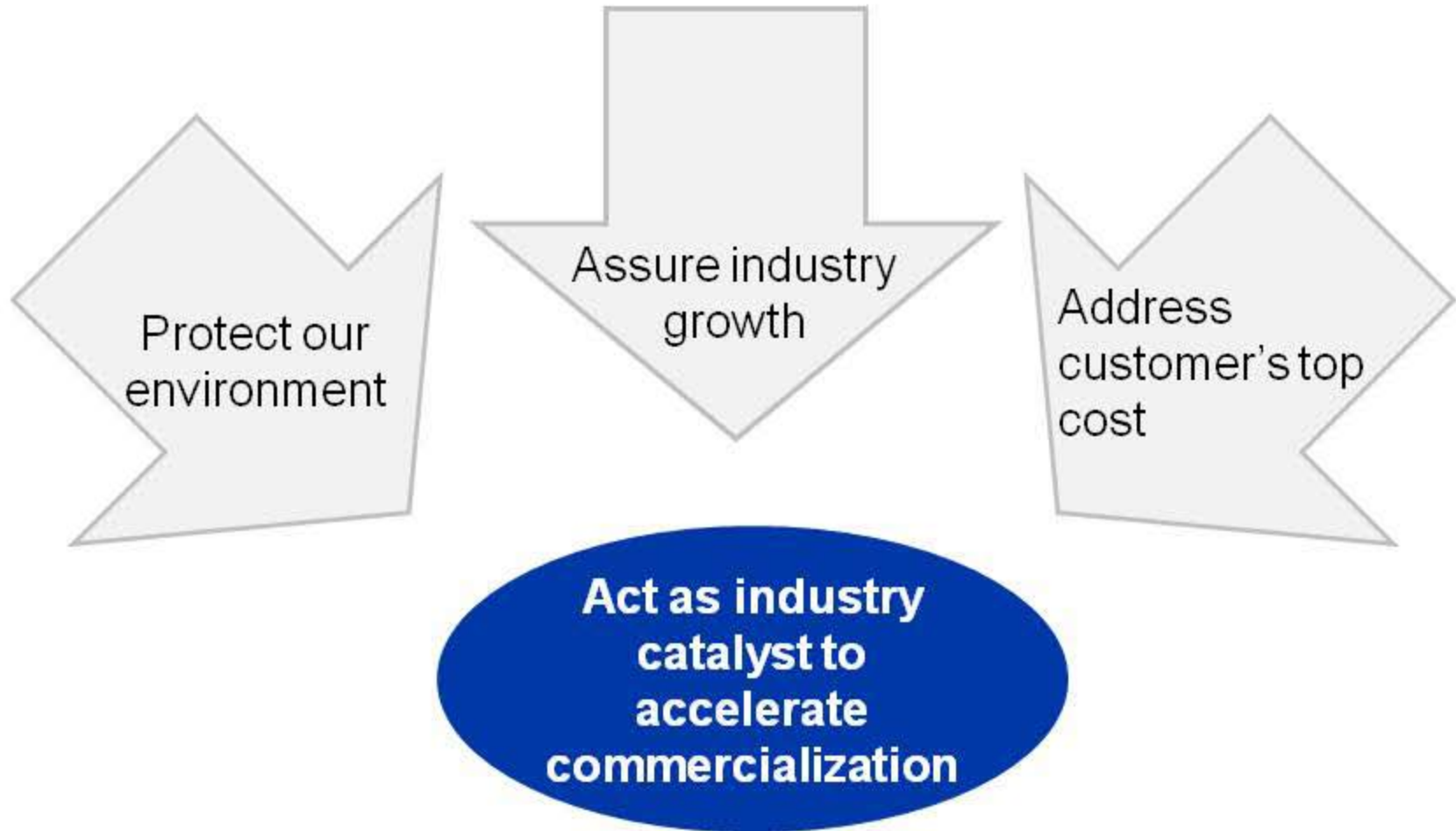
Refinery capacity small but increasing

Limited sustainable feedstock

Finance community increasing comfort

**Supply is the main challenge**

# Boeing Role in Making Biofuel a Reality



**We are Committed to a Better Future**

