Industry Under Threat

- Despite a strong track record:
  - Best performance on fuel efficiency
  - Best performance on noise
  - Removal of Soot and Sulphur

- Perceptions of Aviation are:
  - Heavy polluter
  - Emissions growing fast
  - Only one energy source: kerosene
  - Industry has nowhere to go

- Intuitive Policy Response
  - Limit demand / growth
  - Apply taxation
  - Use revenues to fund emissions reductions in other sectors
Our Vision

- Is for carbon neutral growth
- Leading to a zero carbon emissions future
Carbon Neutral Growth

Traffic growth (5% pa)

Emissions growth (2-3% pa)

Technology

Operations

Infrastructure

Economic instruments

Time

Traffic growth (5% pa)

Emissions growth (2-3% pa)

Technology

Operations

Infrastructure

Economic instruments

Time
IATA Four Pillar Strategy

- **Technology**
  - Invest in New Technology

- **Operations**
  - Fly More Efficiently

- **Infrastructure**
  - Build & Use Efficient Infrastructure

- **Economic instruments**
  - Use Effective Economic Measures
Pillar 1: Technology

- Engines (Geared Turbofan, Open Rotor)
- Structure and materials (Composites, alloys)
- Aerodynamic design (Laminar flow, winglets, active load alleviation)
- Systems (APU, Avionics)
- ATM technology (e.g. Continuous descent arrival)
Pillar 2: Operations Achievements
(65 Airlines supported in 2008)

OPERATIONS: Reported CO2 savings (Thousand tonnes)

<table>
<thead>
<tr>
<th>Region</th>
<th>CO2 Saved (Thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFI</td>
<td>87</td>
</tr>
<tr>
<td>ASIA</td>
<td>2,235</td>
</tr>
<tr>
<td>EUR</td>
<td>571</td>
</tr>
<tr>
<td>LATAM</td>
<td>107</td>
</tr>
<tr>
<td>MENA</td>
<td>575</td>
</tr>
<tr>
<td>NAM</td>
<td>3,077</td>
</tr>
<tr>
<td>Total</td>
<td>6,653</td>
</tr>
</tbody>
</table>
Pillar 3: Infrastructure Achievements
(210 Routes and 80 Airport (arrival/dept) improvements)

Savings in CO2 (Thousand tonnes)

<table>
<thead>
<tr>
<th>Region</th>
<th>CO2 (Thousand tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFI</td>
<td>92</td>
</tr>
<tr>
<td>ASPAC</td>
<td>499</td>
</tr>
<tr>
<td>EUR</td>
<td>494</td>
</tr>
<tr>
<td>LATAM/CAR</td>
<td>66</td>
</tr>
<tr>
<td>MENA</td>
<td>148</td>
</tr>
<tr>
<td>NASIA</td>
<td>434</td>
</tr>
<tr>
<td>NAT/NAM</td>
<td>770</td>
</tr>
<tr>
<td>Total</td>
<td>2,503</td>
</tr>
</tbody>
</table>
CO₂ Emissions Forecast To Grow

CO₂ emissions from commercial airlines fuel burn

- Based on ICAO FESG forecast
  - 0.7gT
  - 1.3gT
  - 1.4gT

- Based on global downturn forecast

3 Key Drivers of Emissions Reductions

- Ongoing Fleet Renewal
- Investments & Improvements in ATM
- Low Carbon Fuels for Aviation
3 Key Drivers of Emissions Reductions

- Ongoing Fleet Renewal / Technology Development
- ATM Investments / Improvements
- Low Carbon Fuels

Forecasted Emissions Growth w/o Reduction Measures
Types of Alternative Fuels

Alternative Fuels can be divided into 3 categories:

1. Traditional Jet Fuel (i.e. kerosene)
   - Crude Oil
   - Tar sands or oil shale
   - Natural gas condensates

2. Fischer Tropsch synthetic fuel
   - Coal to Liquid (CTL)
   - Gas to Liquid (GTL)
   - Biomass to Liquid (BTL)

3. Biofuels derived from biomass
   - Food crops (1st generation)
   - Nature by-products /waste (2nd generation)
   - Additional grown biomass (e.g. algae, jatropha, camelina)
Carbon Lifecycle Analysis
Which Fuels Are Low Carbon?
The promise of biofuels

- Can be grown with polluted or waste water
- Can be grown in poor soils
- High energy yield
- New livelihood opportunity for developing countries
- Reduce dependency on imported oil
Biofuels Sustainability Parameters

IATA parameters for sustainable aviation biofuels:

- Offer net carbon reductions over their lifecycle
- Do not compete with freshwater needs
- Do not compete with food production
- Do not cause deforestation or biodiversity loss
## Biofuels Experience So Far

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Aircraft</th>
<th>Partners</th>
<th>Date</th>
<th>Biofuel</th>
<th>Blend</th>
</tr>
</thead>
<tbody>
<tr>
<td>virgin atlantic</td>
<td>B747-400</td>
<td>Boeing, GE Aviation</td>
<td>23 Feb 08</td>
<td>Coconut &amp; Babassu</td>
<td>20% one engine</td>
</tr>
<tr>
<td>AIR NEW ZEALAND</td>
<td>B747-400</td>
<td>Boeing, Rolls-Royce</td>
<td>30 Dec 08</td>
<td>Jatropha</td>
<td>50% one engine</td>
</tr>
<tr>
<td>Continental Airlines</td>
<td>B737-800</td>
<td>Boeing, GE Aviation, CFM, Honeywell UOP</td>
<td>7 Jan 09</td>
<td>Algae with Jatropha</td>
<td>50% one engine</td>
</tr>
<tr>
<td>JAL</td>
<td>B747-300</td>
<td>Boeing, Pratt &amp; Whitney, Honeywell UOP</td>
<td>30 Jan 09</td>
<td>Camelina, Jatropha and Algae blend</td>
<td>50% one engine</td>
</tr>
<tr>
<td>jetBlue</td>
<td>TBA</td>
<td>Airbus, IAE, Honeywell UOP</td>
<td>TBA</td>
<td>TBA</td>
<td>TBA</td>
</tr>
</tbody>
</table>
The Way Forward

Short-term priorities and current actions:

- **Testing**  
  First aircraft tests completed
- **Specification**  
  Agreement with ASTM (Dec 09)
- **Certification**  
- **Production**  
  Process known and tested
- **Blending with Jet A**  
  In evaluation
- **Logistic & Distribution**  
  Depending on blending capability
The Way Forward - Challenges

- **Certification**
  - How quickly can we get biofuels certified?

- **Scalability**
  - How quickly can we get to commercial viability?\(^1\)
  - Optimistic Scenario: 2015
  - Pessimistic Scenario 2021

- **Uncertainties**
  - Cost
  - Impact of oil price vs. carbon pricing

\(^1\) Defined as the threshold that biofuels represent at least 1% of total fleet fuel use.
The Way Forward – Role of States

- **Certification**
  - Support / accelerate certification efforts

- **Research**
  - Invest in R&D to explore / exploit biofuels development

- **Legal / Fiscal Frameworks**
  - Investment incentives
  - Favourable tax regimes
  - Low carbon recognition under ETS & similar schemes
Alternative Fuel Strategy Elements

Certification

Renewable Fuel label

Commercial Viability

Research and Development

Industry Awareness

Development to Deployment
Carbon Neutral Growth

Traffic growth (5% pa)
Emissions growth (2-3% pa)
Technology
Operations
Infrastructure
Alternative Fuels
Conclusions

- Aviation is perceived negatively with respect to climate change
- Alternative low-carbon energy sources are needed & available
- Complements work on technology, infrastructure and operations
- Bio-jet fuel looks the most promising
- Technologically proven
- Needs concerted stakeholder effort to certify, scale-up and commercialise
The Future’s Bright
The Future’s Green!
Why We Need Alternative Fuels

Paul Steele

Director Aviation Environment, IATA
Executive Director, ATAG