Sustainability: Boeing Commercial Aviation
Port of Seattle; August 2023

Rae Lutters
ecoDemonstrator Program Manager, Chief Engineer
The Boeing Company
BOEING’S SUSTAINABILITY GOALS

- Employee Safety & Well-being
- Global Aerospace Safety
- Equity, Diversity & Inclusion
- Sustainable Operations
- Innovation & Clean Technology
- Community Engagement
Aviation contributes 2.6% of total global emissions

Source: 2018, World Resources Institute
OUR STRATEGY TO DECARBONIZE AVIATION

Fleet renewal

Operational efficiency

Renewable energy

Advanced technology
Advancing Technology, Lowering Environmental Impact

<table>
<thead>
<tr>
<th></th>
<th>737 MAX</th>
<th>787</th>
<th>777X</th>
<th>777-8F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduction in Fuel</strong></td>
<td>20%</td>
<td>25%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>and CO₂ Reduction</strong></td>
<td>Reduction</td>
<td>Reduction</td>
<td>Reduction</td>
<td>Reduction</td>
</tr>
<tr>
<td><strong>Noise Footprint</strong></td>
<td>50%</td>
<td>50%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>Smaller</td>
<td>Smaller</td>
<td>Smaller</td>
<td>Smaller</td>
</tr>
</tbody>
</table>

- Compared to original Next-Generation 737
- Compared to 767-300ER
- Compared to 777-300ER
- Compared to 747-400F
ZERO CLIMATE IMPACT

Zero-impact: Full lifecycle accounting

1. Indirect
   - Extraction
   - Logistics
   - Production
   - Distribution
   - Storage

2. Direct
   - Inflight
   - On-ground

Total lifecycle emissions

CH₄  H₂O  CO₂  NOₓ

Aviation-induced cloudiness

Total climate effects
An Enduring Mission

Innovate
Learn by doing, discover quickly

Collaborate
With airlines, government, suppliers, academia, industry

Accelerate
Speed path to products, services and production
Accelerating Innovation

250+ technologies tested with focus in:

- Sustainable Aviation Fuel
- Advanced Aerodynamics
- Reduction in Fuel Usage
- Customer Support
- Recycled Materials
- Operational Efficiency
- Replacement of Hazardous Materials
- Community Noise

1/3 of technologies now implemented on products and services
2021 Boeing ecoDemonstrator 737-9
- CFM LEAP-1B
- 100% Paraffinic SAF Ground Test and Flight Demonstration
- 4 SAF blends tested
- 1 successful 100% SAF demo flight
2022 Boeing ecoDemonstrator

4 Fuels Tested
- Locally sourced Jet-A
- Low Sulfur Jet-A
- 50% Lower Sulfur Jet-A & 50% Paraffinic SAF
- 100% Paraffinic SAF