Sustainable Taxiing at Schiphol Airport

Trial results and perspective

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Background

Dutch sector program ‘Slim én Duurzaam’ (Smart and Sustainable)
Signed by, amongst others, KLM, LVNL, Schiphol
Primary goal: to reduce CO₂ emissions from Dutch civil aviation originating in the Netherlands by 35% by 2030
In 2030, all Royal Schiphol Group airport ground operations will be climate neutral
A potential important way to achieve this is by sustainable taxiing aircraft
## Sustainable Taxiing solutions

<table>
<thead>
<tr>
<th></th>
<th>Wheeltug</th>
<th>Safran-Airbus</th>
<th>Single engine taxiing</th>
<th>Aircraft Towin g System</th>
<th>Taxibot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Aircraft Based</td>
<td>Aircraft Based</td>
<td>Aircraft Based</td>
<td>Airport Based</td>
<td>Airport Based</td>
</tr>
<tr>
<td><strong>Certification</strong></td>
<td>No, 2021</td>
<td>No, 2022</td>
<td>Aircraft/airline specific</td>
<td>Concept</td>
<td><strong>Yes (B737, A320)</strong></td>
</tr>
<tr>
<td><strong>Implementatio n</strong></td>
<td>Nose gear</td>
<td>Main gear</td>
<td>Engine</td>
<td>Rail system</td>
<td>Human-controlled truck</td>
</tr>
<tr>
<td><strong>Additional Weight</strong></td>
<td>Est. 160kg</td>
<td>Est. 350kg</td>
<td>0 kg</td>
<td>0 kg</td>
<td>0 kg</td>
</tr>
<tr>
<td><strong>Fuel consumption</strong></td>
<td>Est. 0,3kg/min. (APU)</td>
<td>Est. 0,3kg/min. (APU)</td>
<td>Est. 7,5 kg/min (jet engine)</td>
<td>Est. 0,3kg/min. (APU)</td>
<td>Est. 0,5kg/min. (Diesel)</td>
</tr>
<tr>
<td><strong>Zero emission possible</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Pilot Results

Mission figures
170 missions / >25 test days
8 ‘live’ flights
3 Airlines, 2 handlers,
   LVNL, Schiphol, Smart Airport Systems

Potential annual savings
50-70% Fuel
124.700 ton CO₂ / 647.800kg NOₓ
Noise and (ultra) fine particles reduction
€ 25 million fuel costs
ATC and sustainable taxiing

Observations
- Shift from focus on uncoupling in apron bay towards new position
- Taxiway blockages while uncoupling on taxiways
- Right of way tow-taxi challenges

Potential mitigations
- Infrastructural: build out-of-flow uncoupling positions
- Procedural: Change way of working ground controller
- Technical: decrease uncoupling times
Need for balancing sustainability, safety and capacity: From vision to implementation
Collaboration in greener aircraft taxiing

How can we help each other?

The need for standardization (opposed to Schiphol-specific solution)
  • Training needs (current pilot CBT is airport specific)
  • Rules and regulations
  • Standard operating procedures

Demand for knowledge and expertise by other airports and ANSPs

Knowledge and expertise of other airports and ANSPs can be used at Schiphol