CLIP-AIR PROJECT

a new concept for multimodal transport based on a modular airplane

http://clipair.epfl.ch/

C. Leonardi

ICAO HQ, Montreal, Canada

9 – 10 SEPTEMBER 2014
80,000 fly every day
8 million people fly each day
2.9 billion passengers flew in 2012
really more innovative?
Clip-Air Concept

What is it?
The Clip-Air Project

Modularity and flexibility
The Clip-Air Project

Modularity and flexibility

Fuelling Aviation with Green Technology, ICAO HQ, Montreal, Canada, 9 and 10 September 2014
Modularity and flexibility
Multimodal Transport
Multimodal Transport
ENERGY
New Energy = New Architecture

The liquid Hydrogen tank should ideally be spherical or cylindrical (at -253°C).

- Cylindrical tank
- A tank can be detached and reattached
- The tank can be filled outside of the airport
- Tank volume corresponding to the operations/missions (capsule size)
<table>
<thead>
<tr>
<th></th>
<th>Clip-Air</th>
<th>Standard Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microalgae/ Jatropha</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Solar cells on the wing</strong></td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td><strong>LNG (liquefied natural gas)</strong></td>
<td>✓</td>
<td>Subject to important change</td>
</tr>
<tr>
<td>predominately methane CH₄</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LH₂ (liquid hydrogen)</strong></td>
<td>✓</td>
<td>Subject to important change</td>
</tr>
<tr>
<td><strong>Jet-A (standard aviation fuel)</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Gas, biomass, coal (Fischer-Tropsch)</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

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Transportation Research
Overview of research projects

Dr. Michaël Thémans, Vice-Presidency for Innovation & Technology Transfer
Executive Director of the Transportation Center
5 EPFL’s schools are involved in the Transportation Center:

- ENAC School of Architecture, Civil and Environmental Engineering
- STI School of Engineering
- I & C School of computer & communication sciences
- CDM College of Management of Technology
- SB School of basic sciences
- EPFL Middle East
To design the project

TRACE / Transp-OR / ICOM / LIV / ENAC / EPFL

Clip-Air projects at EPFL
To design the project

Clip-Air projects at EPFL
To design the project

Clip-Air projects at EPFL
Clip-Air Strategy 2015-2022  2050
Clip-Air Strategy 2025 - 2030

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Conclusion

The Clip-Air concept opens the door to a wide range of new research opportunities.

The presented analysis is a promising step towards the new flexibility concepts without being confined in the boundaries of the existing systems.