Bron: rapport: **HYDROGEN-POWERED AVIATION**

22/06/2020

A new independent study, commissioned by Clean Sky 2 and Fuel Cells & Hydrogen 2 Joint Undertakings on hydrogen’s potential for use in aviation, was presented at an online event on 22 June which featured Adina-Ioana Vălean**, the European Commissioner for Transport,** and Patrick Child, **Deputy Director-General of the Directorate-General for Research and Innovation at the European Commission**, as keynote speakers, in addition to leading industry representatives Stéphane Cueille (CTO, Safran), Glen Llewellyn (VP Zero Emissions Technology, **Airbus**), David Burns (VP Global Business Development, Linde), Per Ekdunge (Executive Vice-President, PowerCell) and Rolf Henke (Member of the Executive Board, German Aerospace Centre - DLR).

 Zie vetgedrukte opmerking

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Long-range segment (325 PAX, 10,000-kilometer range)

 Block energy increases of 42 percent but with potentially 40 to 50 percent less climate impact.

The aircraft is powered by H2 turbines because fuel cells with their correlated cooling requirements would be too heavy.

The energy requirements are higher than those in a conventional kerosene aircraft because the weight of the hydrogen tanks must be carried over the long flight.

Even though more energy is needed for the flight, this concept still provides a significant climate impact reduction.

Feasible segment and time to market within 20 to 25 years.

An evolutionary tube and wing aircraft design ensures faster commercialization. The fuselage is extended by about 30 percent to integrate the two LH2 tanks behind and in front of the passenger cabin.

 However, several other obstacles must be overcome. Liquid hydrogen storage tanks with a gravimetric index of 38 percent or higher must be developed, tested, and certified.

The LH2 tanks must be integrated into the airframe. A system to safely and reliably distribute LH2 from the back and front of the fuselage to the two wing-mounted engines must also be developed. CASK increases by 40 to 50 percent.

The energy costs increase significantly for this concept due to the higher block energy requirement.

The longer fuselage and the tank weight of approximately 50 tons increase costs as well. Compared to synfuel aircraft, the H2 long-range aircraft would be 0 to 10 percent more expensive.

In the long term, **only** **a huge breakthrough** in LH2 tank development **or a revolutionary long-range aircraft design could lead to a very competitive aircraft design.**

(wensgedachten: als die doorbraak in ontwikkelding al zou kunnen gaan bestaan en ook nog ontwikkeld wordt en de infrastructuur enz. enz. … jammer genoeg zijn dergelijke doorbraken niet te voorspellen, noch te plannen, anders hadden we bijvoorbeeld al lang kernfusie gehad., energie zonder het bijproduct straling.)

Such a revolutionary design could further improve energy by another 15 to 25 percent but would require longer time to market and higher development risks for aircraft manufacturers.

From a technology point of view, the application of a blended-wing-body with partially distributed propulsion could be a pathway toward this, but further analysis is required.