FUTURE CHALLENGES FOR A SUSTAINABLE AVIATION

FUELLING THE QUEST FOR A « LICENCE TO GROW »

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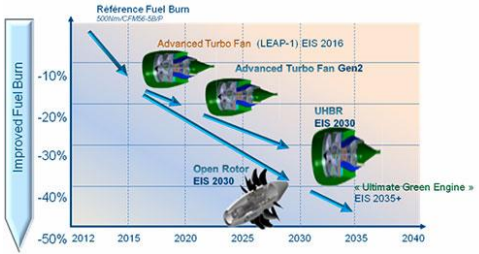
workshop Paris – December 2017

SAFRAN

How to reach these targets
Combination of all potential optimization ways

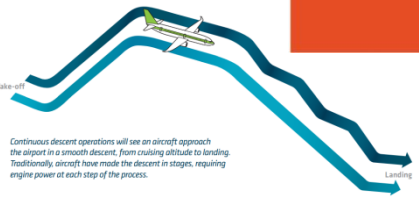


Invest in new
TECHNOLOGY
(including sustainable aviation biofuels)

Fly using more efficient
OPERATIONS

Build and use efficient
INFRASTRUCTURE

Use effective, global,
MARKET-BASED MEASURES



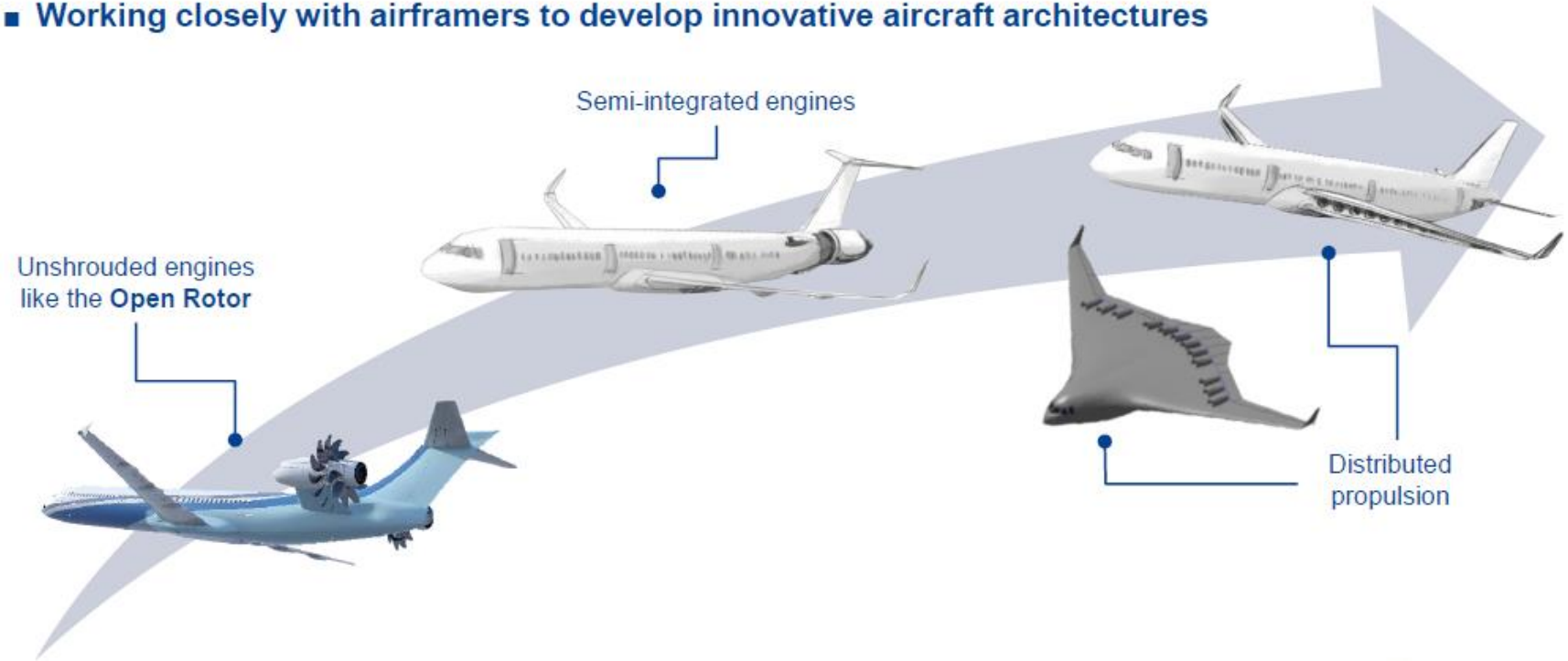
CORSIA

New generation of engines…

Fuel and CO_2	NOx	Noise
15% better vs. previous generation	**Up to 50%** lower vs. CAEP 6 standard	**Chapter 14** compliant

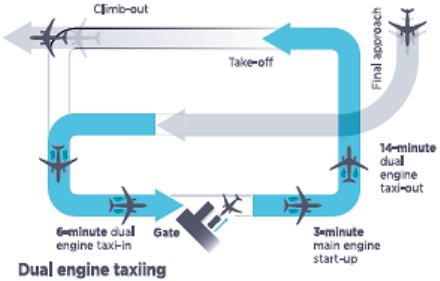
… With new generation of aircrafts architectures …

- **Working closely with airframers to develop innovative aircraft architectures**



… And new generation of operations …

Electric Taxi

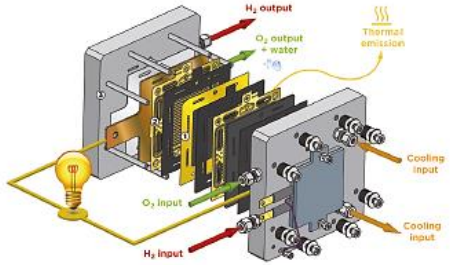


EIS 2021 on retrofit and new A320 family

- 4 % FB

High-T PEM Fuel Cell

- Electricity generator using hydrogen and oxygen
- Zero emissions, zero pollution (no CO_2, NOx or particles)



-80% NOx

-60% Electric Taxiing

-20% Fuel Cells

-80% CO_2

-55% Electric Taxiing

-25% Fuel Cells

Ground Phase

- 6 % Fuel Burn

Overall 800 NM mission

… And a new type of fuel !

- **Sustainable alternative fuels have to play a major role in the reduction of aviation environnemental footprint**
  - > Through their global LCA
  - > They can also have additional benefits that have to be assessed in terms of local air quality (particle emissions, CO, HC…) due to their potentially special chemical composition (no sulfur, most of the time low aromatic content)
- **Nevertheless, the deployment of such fuels have to be made taking into account the key-word of all aviation development : SAFETY !**
- **For this, a specific certification protocole has been set in the frame of ASTM**