



ICAO | UNITING AVIATION



# Environmental improvements, today and tomorrow

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Fuelling Aviation with Green Technology



# Challenges

Flying **Safely and Simply**



Flying **Economically & Efficiently**



Flying **Green**





## Challenge #3 – Flying Green



### Environmental R&T targets

Advisory Council for Aeronautic Research in Europe



#### Vision 2020\*

-50% CO<sub>2</sub>

-80% NO<sub>x</sub>

-50% noise

#### FlightPath 2050\*

-75% CO<sub>2</sub>

-90% NO<sub>x</sub>

-65% noise



\* Compared to best in-service technology in 2000



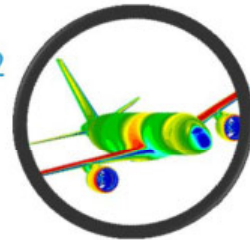
# Technologies & Future Trends





# A350 XWB

**Advanced high speed aerodynamic**  
Reduced fuel burn & CO2 emissions

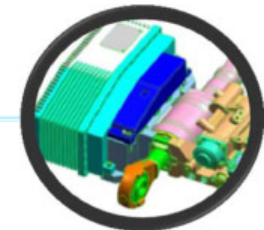


**Advanced materials**  
**4-panel intelligent structural concept**  
53% composite materials

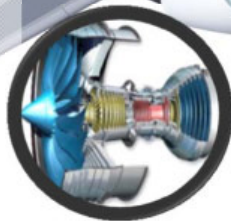


**XL Cabin**  
Latest generation IFE and connectivity

**Simple, robust systems**  
Interchangeable screen displays  
Integrated Modular Avionics



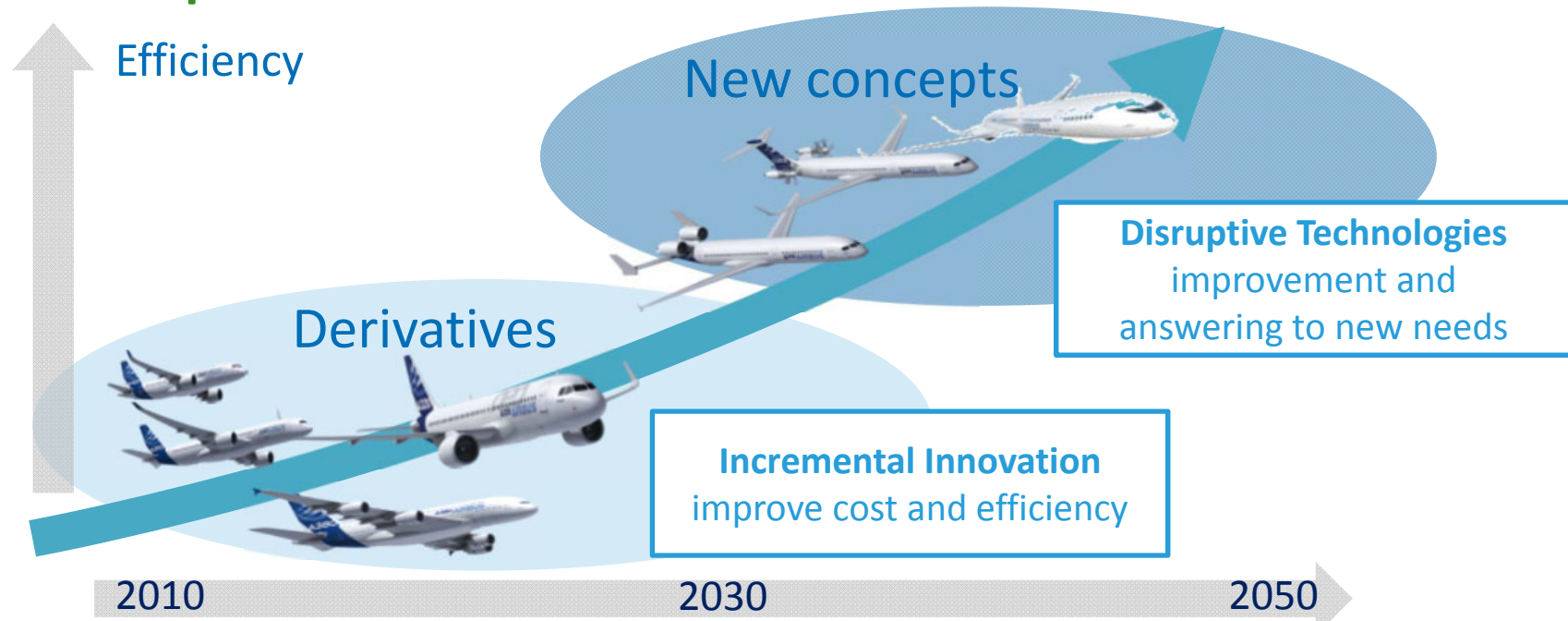
**Latest generation engine technology**  
Lowest SFC & CO2 emissions  
Reduced NOx, HC, CO & smoke emissions



**> 25% fuel burn advantage vs. previous generation**



# AIRBUS product vision



> **Balance between shorter-term and longer-term activities**



# AIRBUS Research & Technology – main streams (1/3)



## New engines

Advanced turbofan



CROR



Incorporated engines  
Hybrid propulsion



## Aerodynamic efficiency

Sharklet



Laminar Flow

Riblets



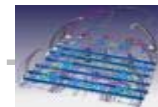
Future concepts



## Capabilities



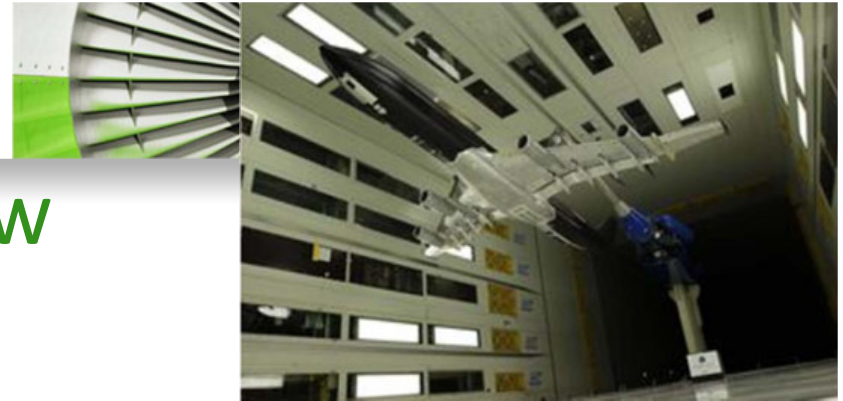
Improved Testing



Virtual design

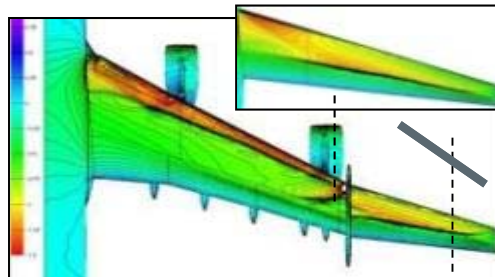
2010

2050

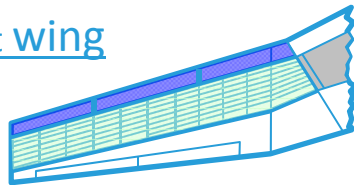


# Techno focus – Laminar Flow

## > BLADE demonstrator



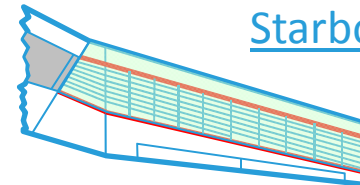
Port wing



Metallic LE and CFRP / metallic box



Starboard wing



Extended CFRP cover







# AIRBUS Research & Technology – main streams (2/3)



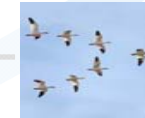
## More efficient operation



Future ATM



Innovative cockpit



Formation flight

Plane-to-ground interface

## Avionic & Systems



E-Taxi  
More electrical aircraft



Modular avionics 2<sup>nd</sup>

## Alternative Energy

Biofuels



Fuel cell  
Scalable energy systems

Energy harvesting



2010

2050



# Techno focus – Fuel Cell

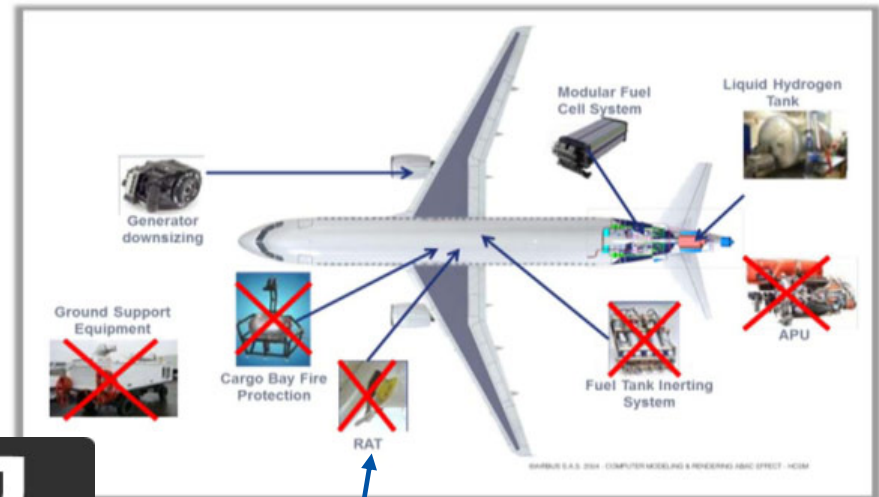
## > Demonstration steps



**2008:** First Functional integration of a fuel cell system. Flight test on A320.



**2012:** Full scale Cooling Center demonstrator integrated in a A320 tailcone

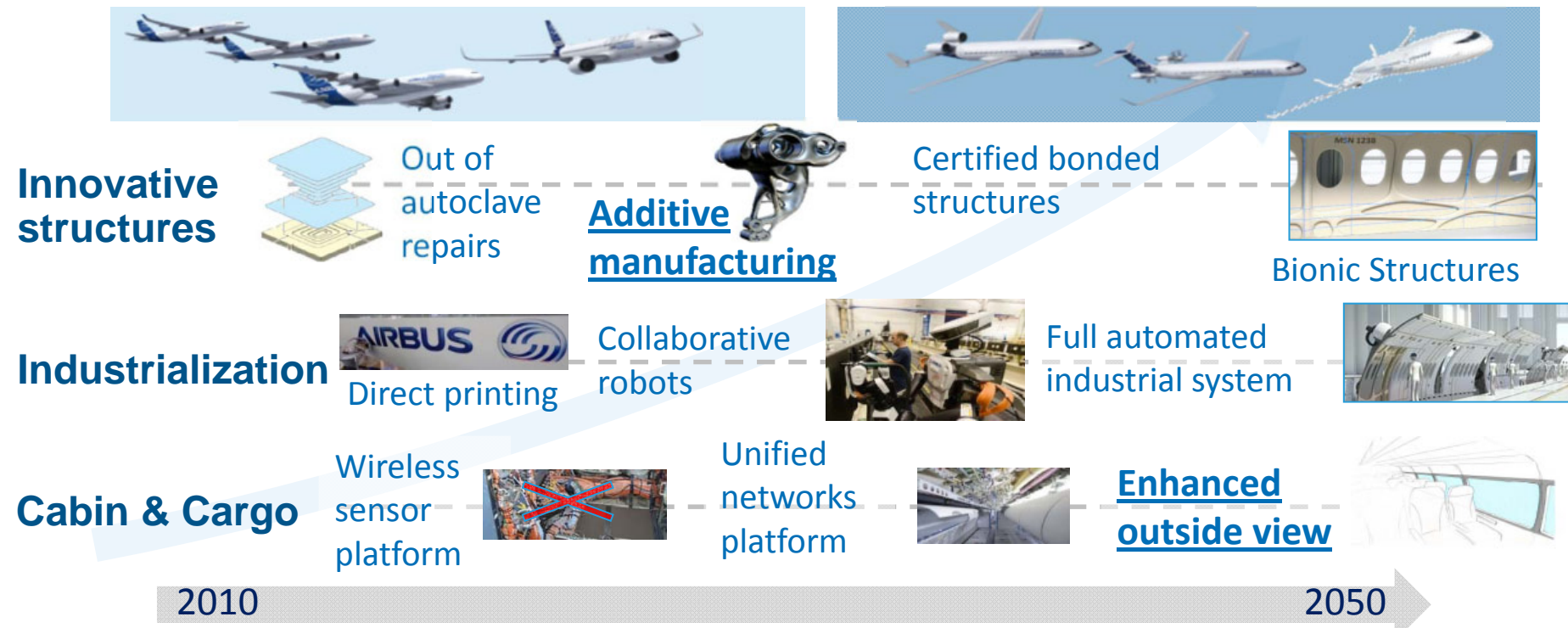


**Next:** First application for emergency power system





# AIRBUS Research & Technology – main streams (3/3)





# Techno focus – Additive Layer Manufacturing



Material  
-90%

Weight  
-30%

Cost  
-30%



> New design flying on the **A350 XWB**

> Spare part for the **A310**



# Techno focus – Enhanced cabin outside view



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# Conclusion



## Conclusion

- Setting goals and working in collaboration is key to achieving sustainable aviation
- New technologies are driven by the market and by environmental concerns. Invent the future, every day!

Airbus invests 2 billion € in R&D every year. This is our contribution, and all stakeholders have their role to play to make the ambitions a reality