

# HIKARI

## High speed Key technologies for future Air transport Research & Innovation Cooperation scheme

Coordinator: FR-Airbus Group

Project Participants: FR-ESA, FR-MBDA, FR-Airbus Defence and Space, FR-ONERA, DE-DLR, IT-CIRA, FR-Airbus Group, UK-OE, NL-NLR, FR-CNRS, BE-EASN-TIS, JP-JAXA, JP-Utokyo

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### Are hypersonic planes the aircrafts of the future?



Traffic Flows, city centres in each traffic region and ERFs - Source: Airbus



### Lunch in Tokyo, breakfast in Paris...same day...in that order!

#### Is it possible?

The HIKARI project has brought together all the hypersonic initiatives in Europe and Japan to drive the convergence of their concepts and roadmaps. Thanks to the expertise of its 16 partners from industry, research centers and academia, HIKARI has shown how the Europe-Japan partnership could allow achieving such high ambitions as defining the design guidelines and technology roadmaps towards future high speed air transport. This fruitful outcome allows considering a natural next step for this cooperation, in

order to jointly design the most promising high speed aircraft meeting the HIKARI guidelines, and to prepare the joint flight demonstrations recommended by the HIKARI roadmap.

Hence, when overlooking passenger transport at the horizon of 2040 - 2050, a high speed transport design capable of sufficient performance levels to capture a reasonable market share (>15% of the premium traffic) and to sustain stable operations seems to be feasible.

#### Is it worth the effort?

**The Topic:** In order to prove the adequacy between High Speed Transport (HST) and societal and market needs, HIKARI performed a market analysis to define the frame for the possible profitable development of a future high-speed aircraft.

**The Result:** The market analysis and high level technical trades have shown that the most promising vehicle to address high speed passenger transport would be a ~14000km range ~Mach 5 aircraft, with high performance levels to ensure affordable ticket prices.

The share of premium traffic could exceed 15% and allow sustainable operations of a worldwide fleet of more than 200 aircrafts by 2040+. To accompany the market growth and master the risk associated with such a development, an incremental approach is recommended, starting first with a smaller size vehicle (<100 passengers) and progressively moving towards larger aircraft.

#### Can it be green?

**The Topic:** The aim of this research axis was to analyse the impact of high speed emissions on the atmosphere and on the long term effects on the climate, while taking into account production and distribution issues as a function of the type of fuel.

**The Result:** Technology wise, the hydrogen fuel, though providing excellent range and cooling capacity, might not be the only alternative to consider, for other fuels (bio liquid

hydrocarbons) might provide better overall climate/performance characteristics. Hence, the use of hydrogen is not an obvious greener solution than hydrocarbon fuels, and the latter are still good candidates for the high altitude / high speed application. An investigation of alternative designs using other fuels (e.g. LNG) is thus recommended.