

Adapting to Survive: Aviation in a Low Carbon World

Why we need a Clean Aviation Partnership in Horizon Europe

Keynote Address
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Clean Sky 2 JU



Clean Sky 2: Tackling Key Environmental Challenges

Environmental Objectives*

-CO₂ TO -20%
TO -30%

-NO_x TO -20%
TO -30%

TO -20%
TO -30%

* vs today's best aircraft



1477 participations (over 800 unique entities)

334
INDUSTRY MEMBERS

420
SMES

373
RESEARCH CENTRES

350
UNIVERSITIES

28
COUNTRIES

110
REGIONS

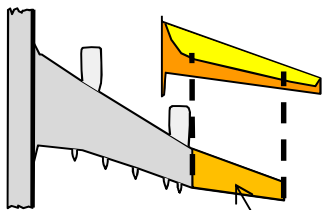
>466
GRANTS



...while building industrial leadership and ensuring mobility



Swedish contributions shaping the future of aviation



Swedish
Know-How



Important gains, but we know this is not enough

CS2 Environmental Objectives^{1,2}



TO -20%
TO -30%



TO -20%
TO -30%



TO -20%
TO -30%

1 vs. today's best aircraft



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11



ATAGX AIR TRANSPORT ACTION GROUP



Our vision: Climate neutral Europe by 2050

#EU2050 #COP24

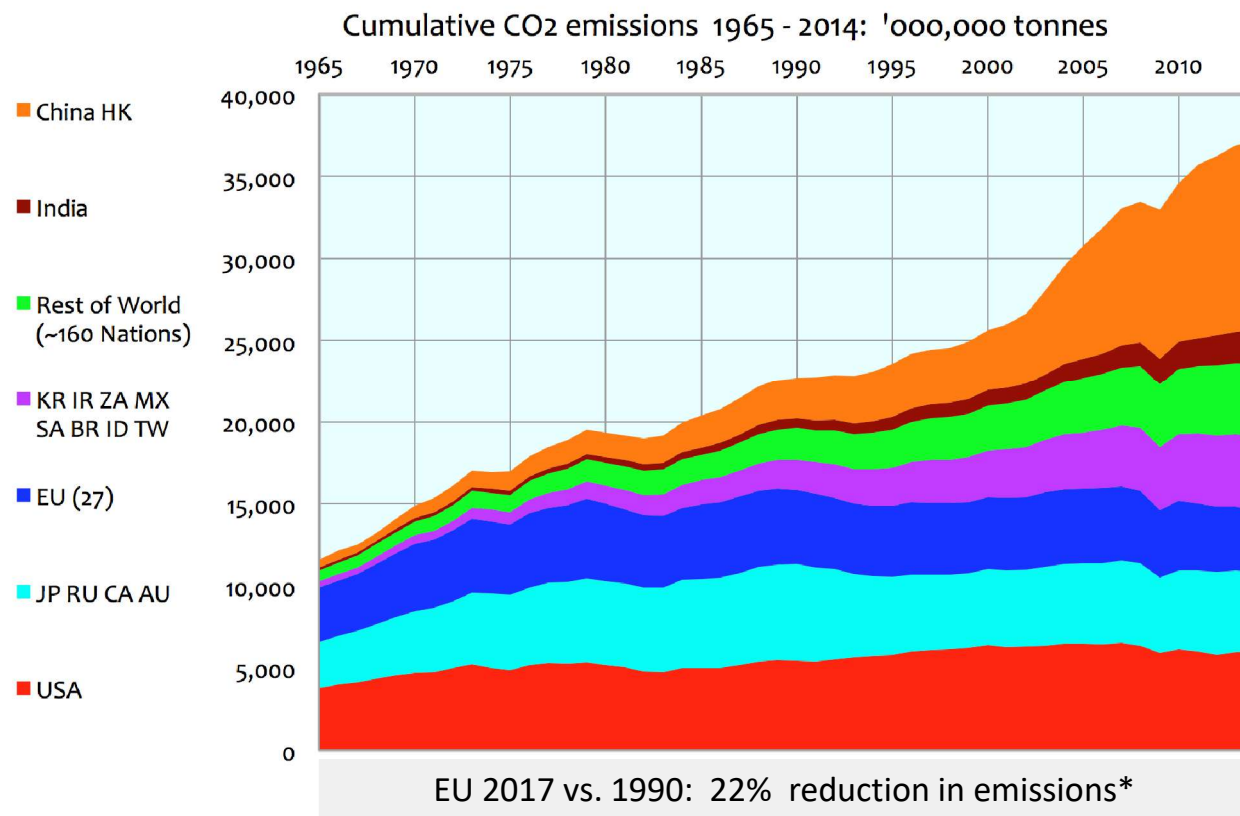
icct
THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION



2....while building industrial leadership and ensuring mobility

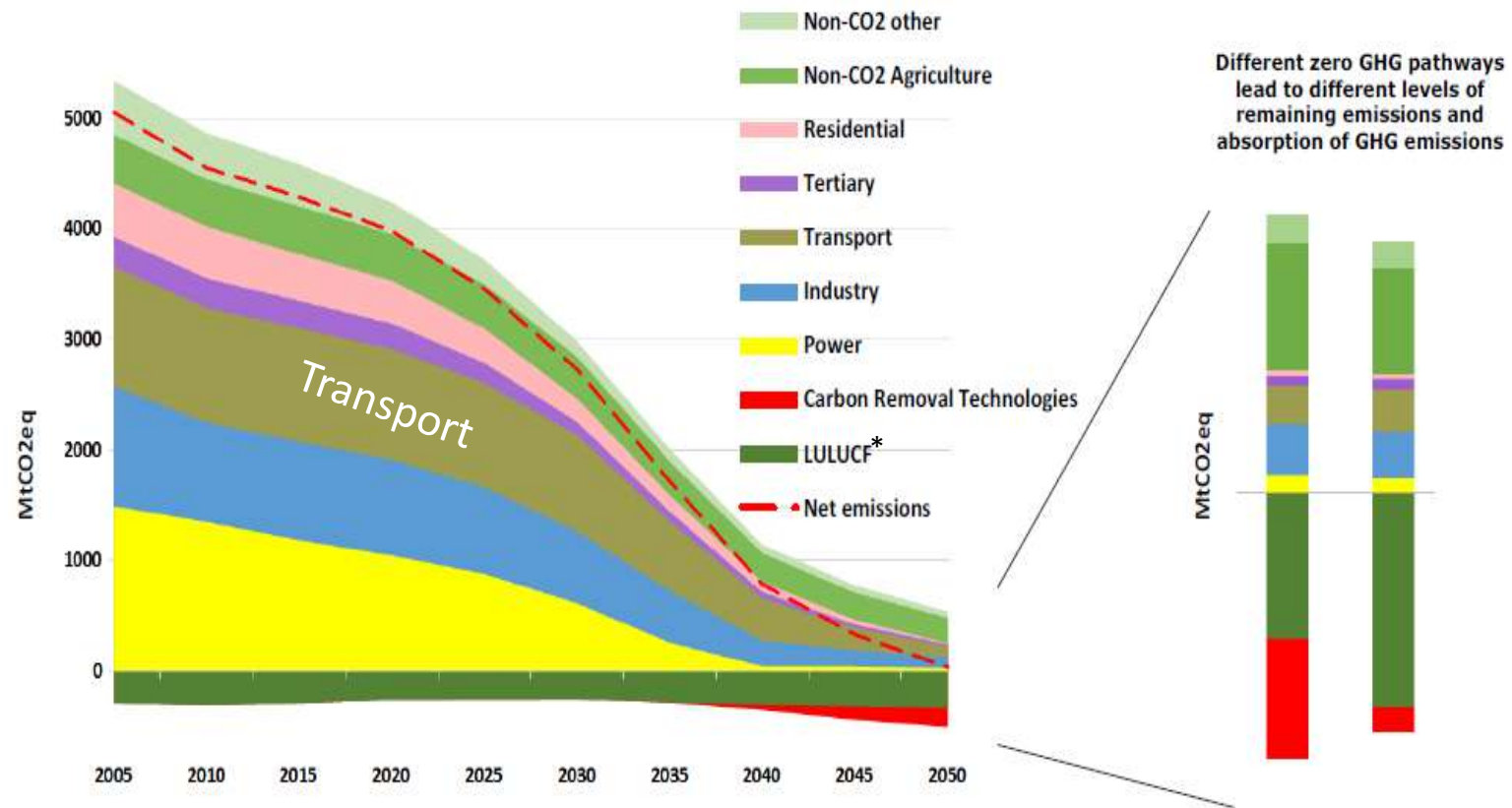


Global CO2 emissions 1965 - 2017



* Figure excludes maritime and aviation; EU aviation emissions triples in this period....

Europe's GHG Emissions Challenge (1.5° scenario)

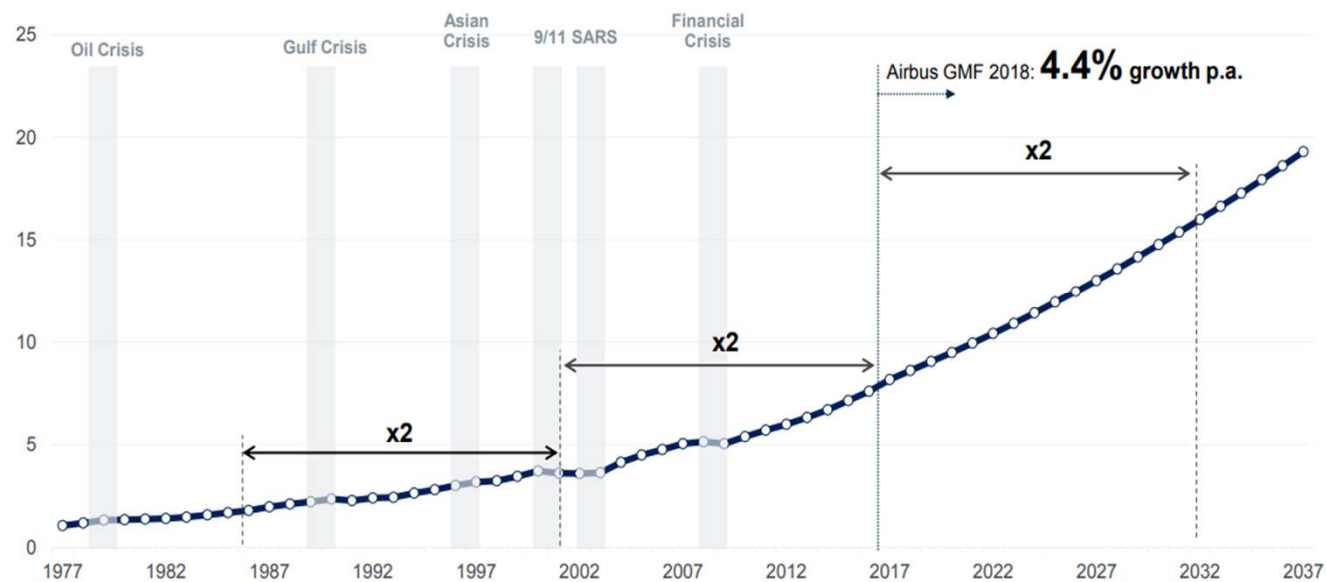


*LULUCF : Land use, land use change and forestry



Aviation is widely expected to continue growing

World annual traffic (trillion RPKs)



5

RPK = Revenue Passenger Kilometre
Source: ICAO, Airbus GMF 2018



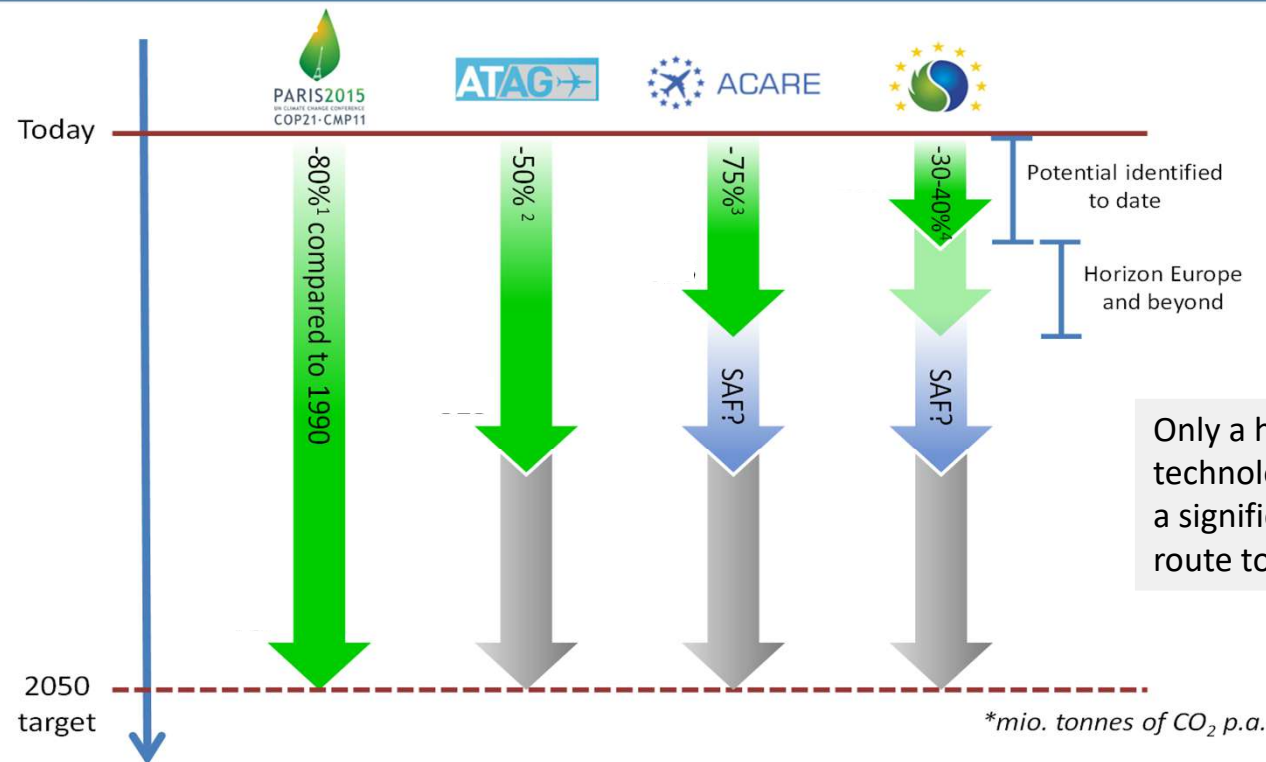
* Courtesy Airbus: GMF 2018 - 2037

AIRBUS



7

Schematic of the different CO₂ reduction targets by 2050



¹ to limit global warming to below 2°C; no specific aviation target; pro-rata 80% reduction of CO₂ emissions

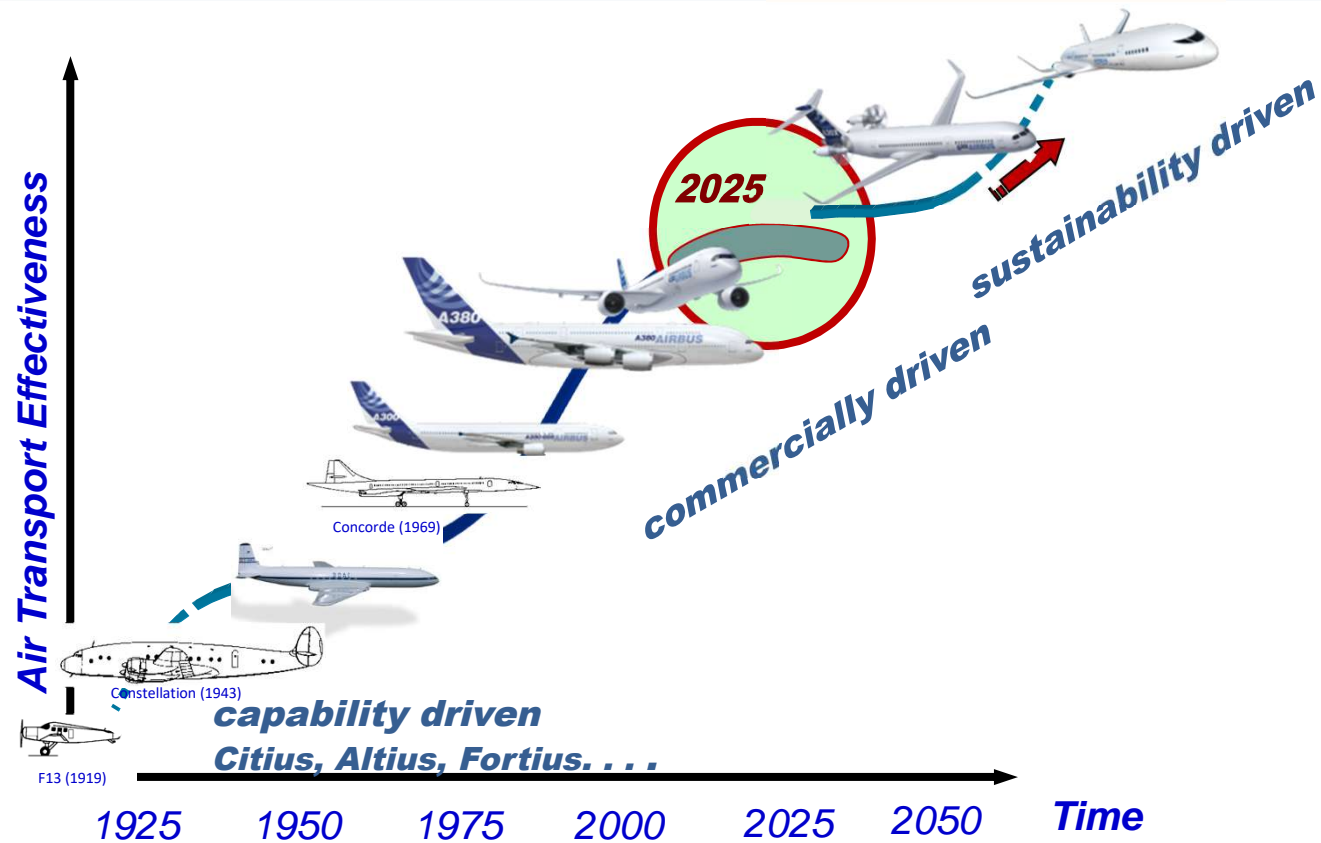
² compared to 2005; including reduction enabled by Sustainable Aviation Fuel (SAF)

³ compared to 2000; reduction per passenger-kilometre; assuming air traffic in 2050 = approx. 5-times 2005 level; excluding SAF

⁴ compared to 2000; combined CS1 and CS2 efforts

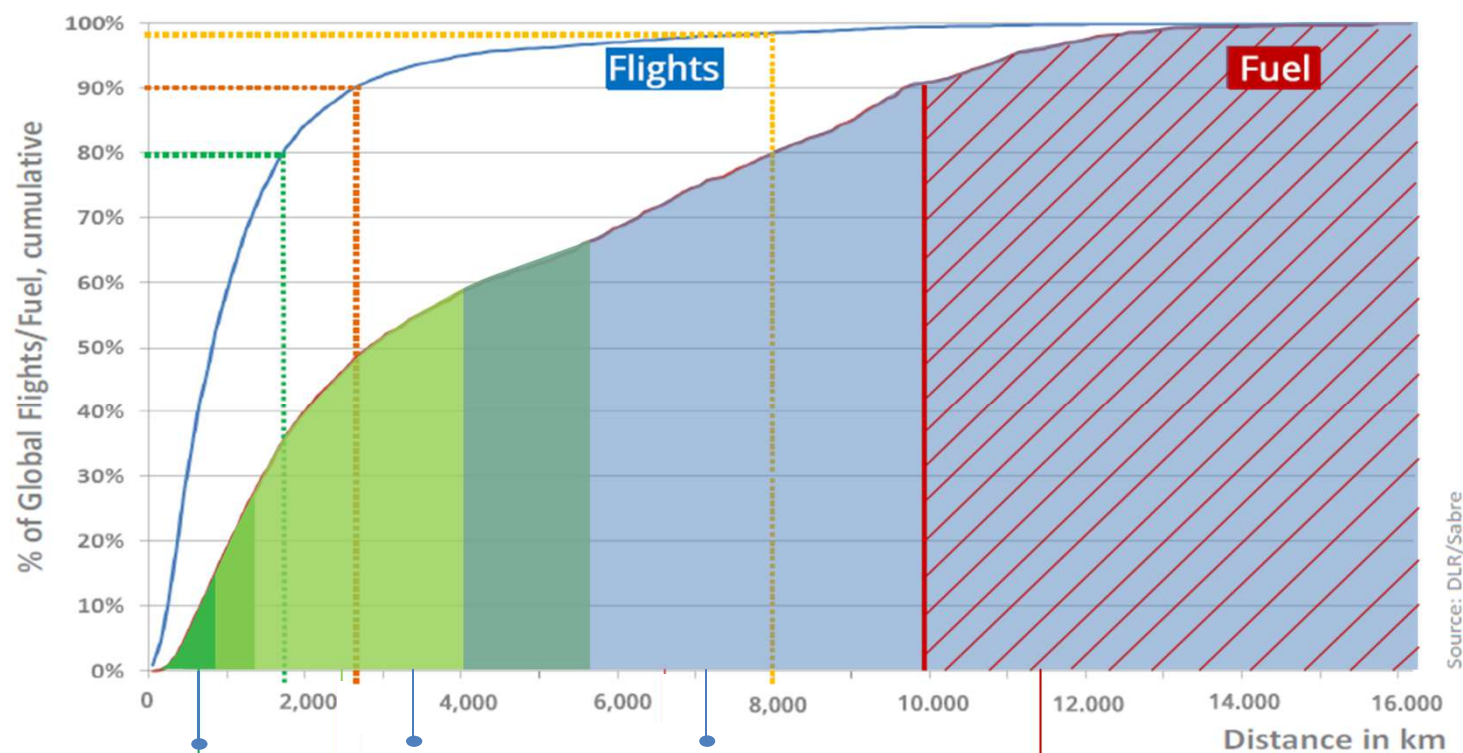


Innovation drivers have changed and need to change further



Different approaches likely needed

90% of flights: < 3000km, = 50% of fuel used
 10% of flights: > 3000km, = 50% of fuel used
 1% of flights: > 8000km, = 20% of fuel used



Source: DLR/Sabre

FULL ELECTRIC
(BATTERIES OR FUEL
CELL POWERED)

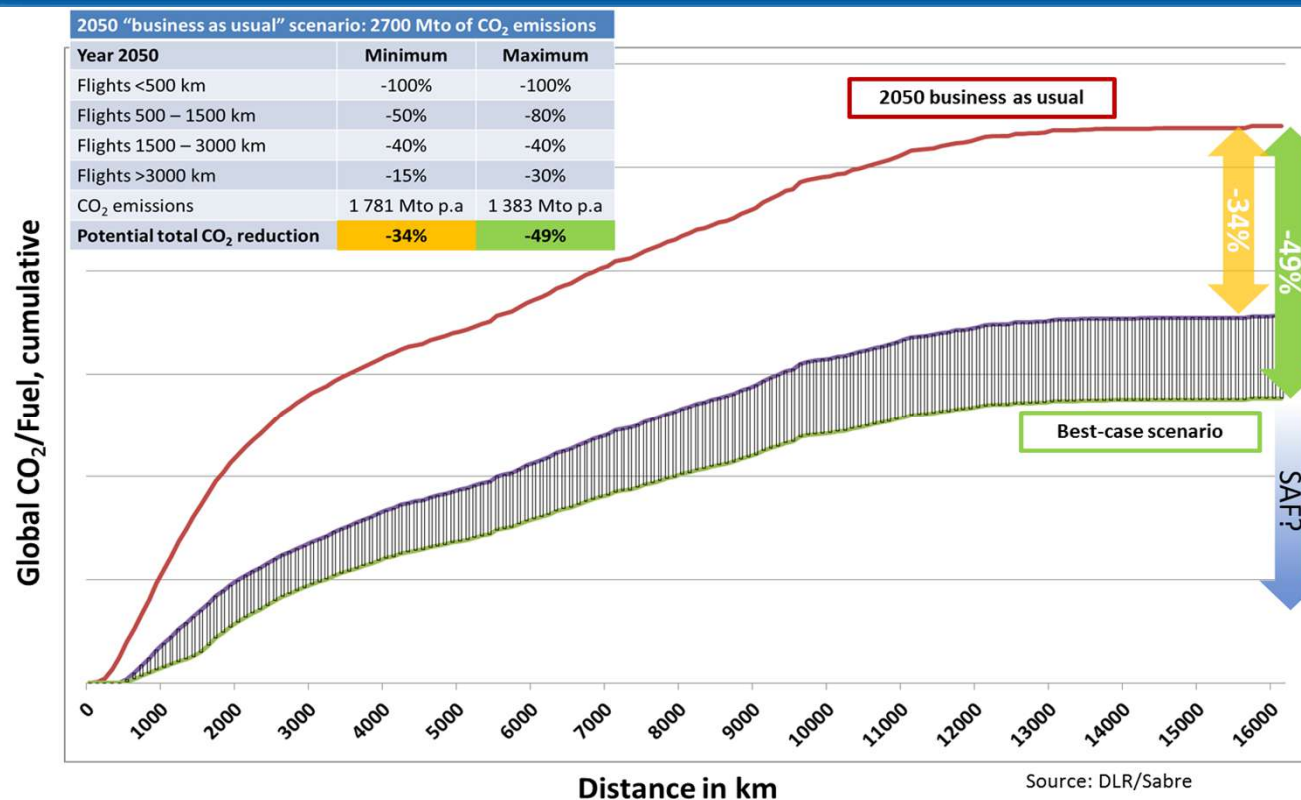
HYBRID PROPULSION:
FUEL CELLS / BATTERIES;
ADVANCED (E.G. DEP)
CONFIGURATIONS

ADVANCED GAS-
TURBINES AND A/C
CONFIGURATIONS + SAF

ALTERNATIVE OPERATIONS
(STOP-OVERS / REFUELING
ETC.)



Potential technology based CO₂ savings in 2050 (excl SAF)



CO₂ reduction potential through technologies up to 50%



Clean Aviation iPPP: The Way Forward

- Aggressive decarbonisation is the *Grand Challenge* facing the sector
- Shared & joint technology / research roadmap bringing all actors together
- Low TRL *technology push* and high TRL *technology pull* in one programme
- Rapidly maturing, demonstrating and de-risking disruptive architectures
- Teaming with the EU brings research and policy together → **impact**
- Impact will assure European Leadership in aviation



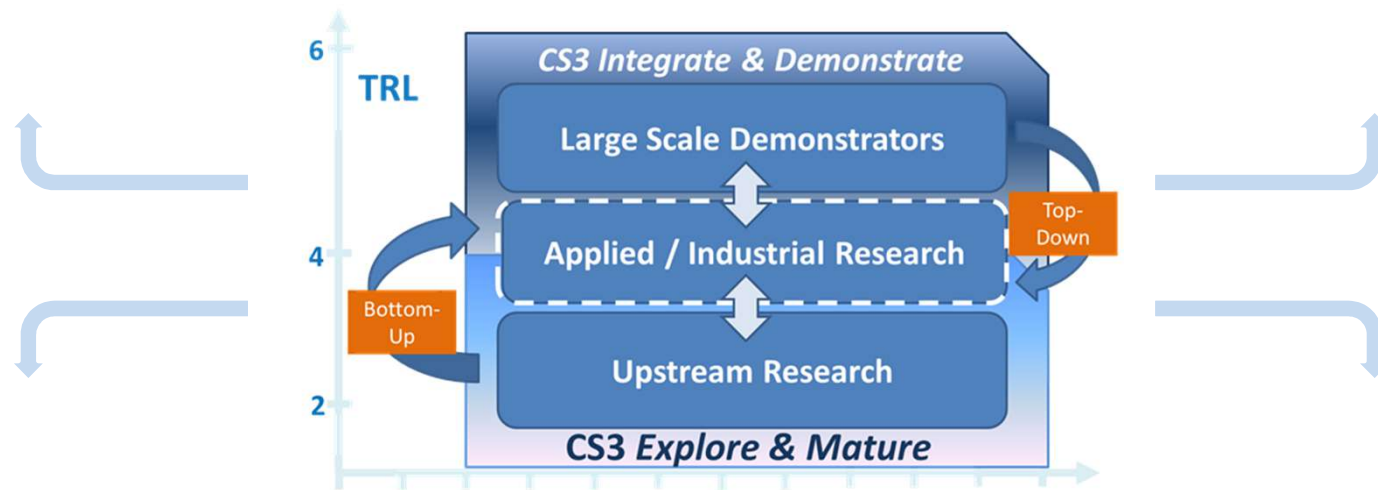
Getting the balance right in bottom-up v. top-down

Full electric

Hybrid electric

Advanced a/c configuration & ultra efficient gas turbine

Sustainable alternative fuels enabled aircraft



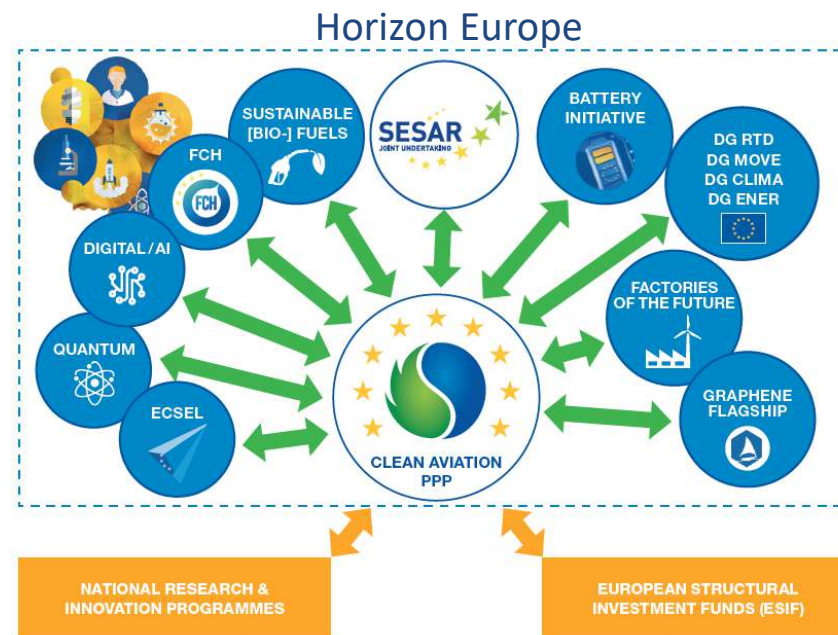
- Technologies and architectures towards zero-carbon aviation
- Methods and tools to ensure and accelerate the technology transition
- Creating the conditions for success (safety, security, mobility scenarios, climate science etc.)



CS working with Regions and Member States on synergies



CS2 ESIF Synergies: ~ €50 Mil.
(plus projects at MS level via Members)



x10

New HE partnership synergies
ambition: ~ €3000 Mil.



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