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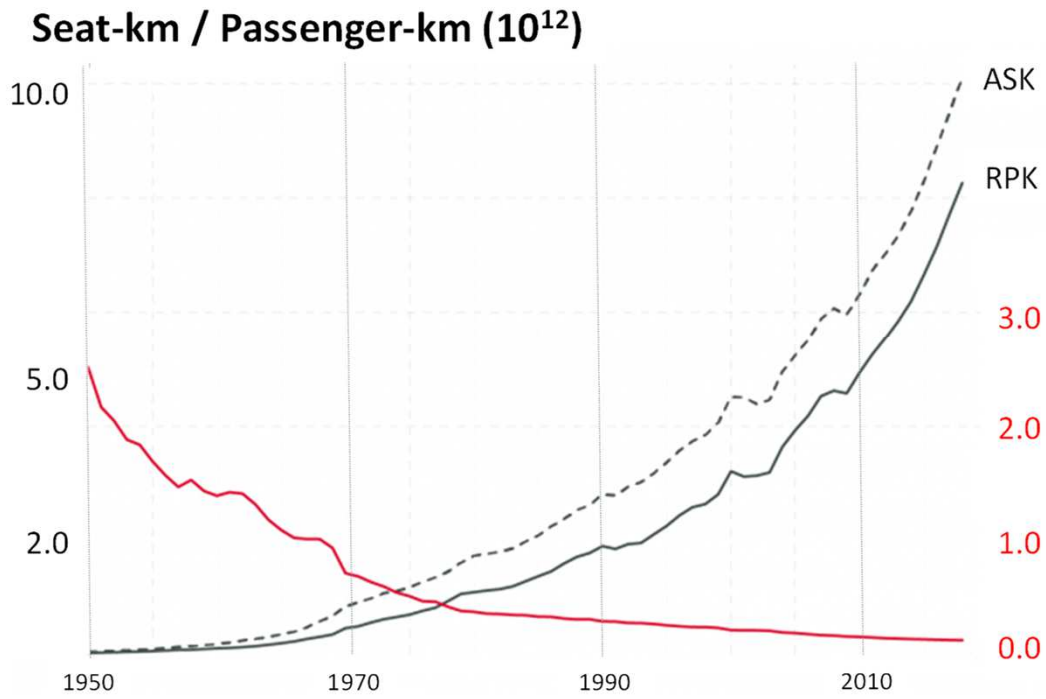
CLEAN AVIATION OVERVIEW AND CONTEXT



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THE CRUX OF THE ISSUE

Phenomenal progress in efficiency.
But growth has consistently outpaced these gains.



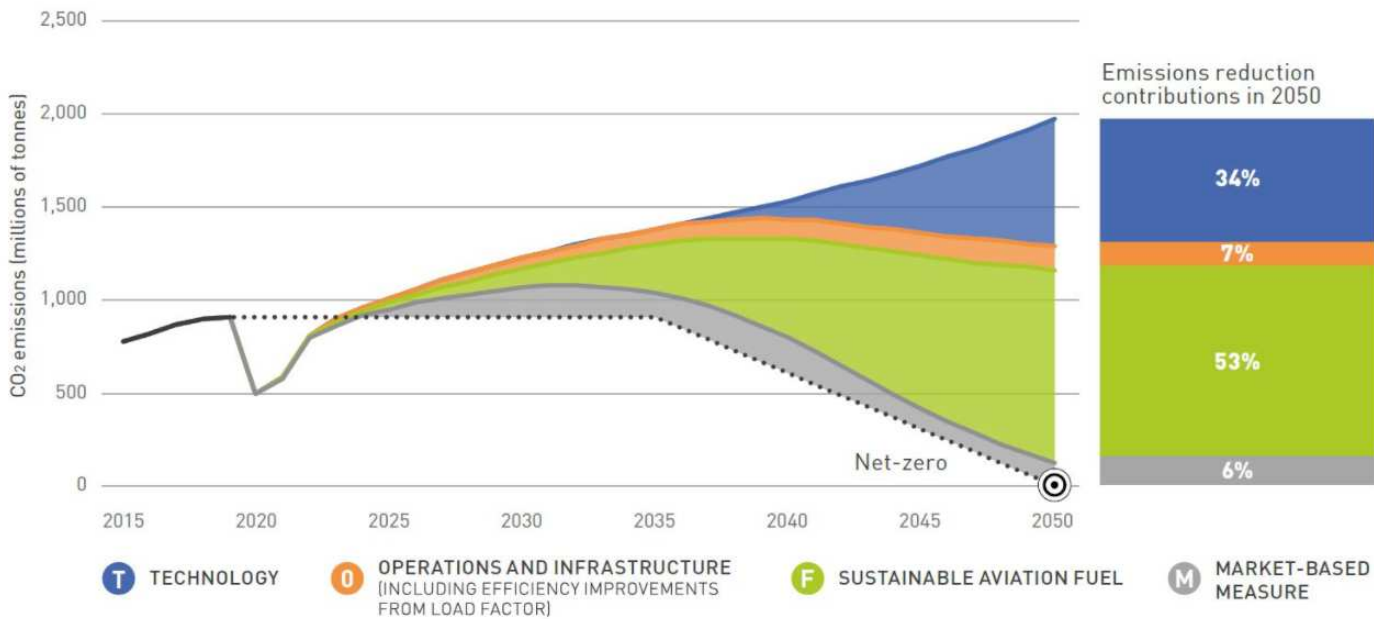
- 1989 – 2019:
- Air transport system **quadrupled**
 - Emissions **doubled**
 - Superb efficiency gains but absolute emissions growth = *exponential...*

kg CO₂ per RPK
2018: 0.125kg CO₂ per RPK

Source and copyright: OurWorldinData.org

EUROPEAN AVIATION SECTOR AND THE EUROPEAN GREEN DEAL

Committed to work towards a climate-neutral European aviation system by 2050.



Destination 2050:
A Route To Net Zero European Aviation

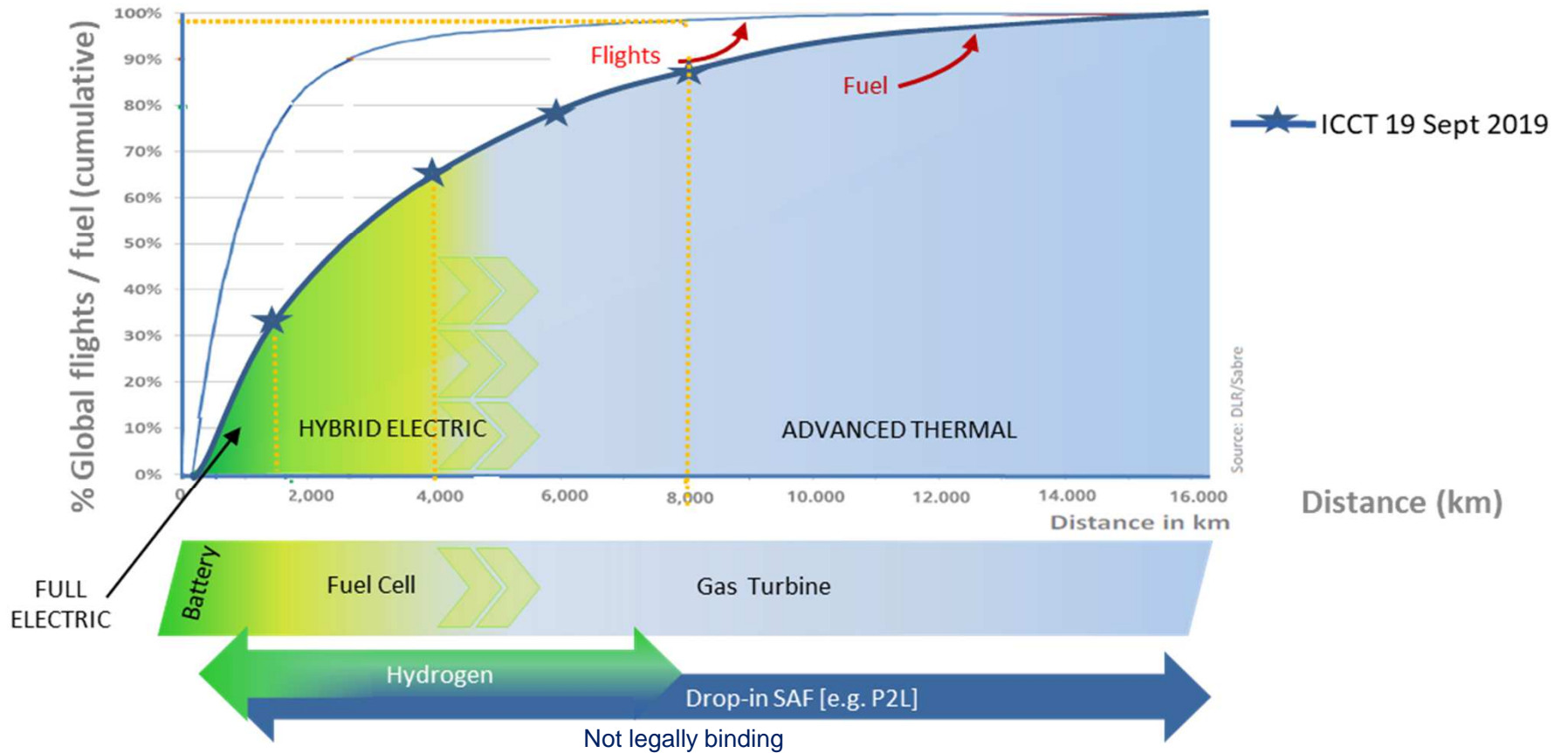
Regional:	-50%
Single Aisle (SMR)	-30%
Twin Aisle (LR)	-30%

(all figures exclude SAF effect)

Source: ATAG report 2021

MORE DIFFERENTIATION WILL PROVIDE INCREASED SCOPE FOR DISRUPTION

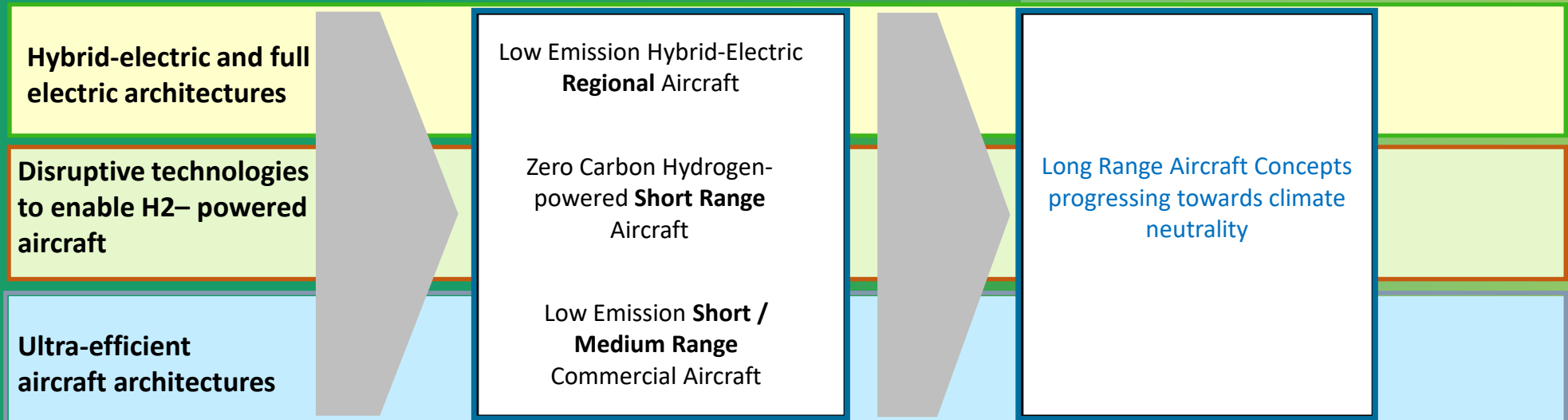
1/3 of global emissions are from flights <1500km. 2/3 of global emissions from flights <4000km.



WHAT IS CLEAN AVIATION?

- **Ambitious goals set on EU-Level (European Green Deal) iaw Paris Agreement**
 - 2030: “*cut emissions by at least 55%*”
 - 2050: “*Europe to become the world’s first climate-neutral continent*”
- **New fuel/energy options, disruptive technology and innovative aircraft architectures needed to pave the way towards climate-neutrality**
- **Clean Aviation is an *Institutionalised European Partnership [Art 187 TFEU]* that can pull together the required resources and commitments, and adequately reduce the industrial risk for transformative research and innovation**

CLEAN AVIATION – LINCHPIN IN EUROPE'S R&I FOR THE TRANSITION



Flight demonstration in Clean Aviation JU and Impact by 2035

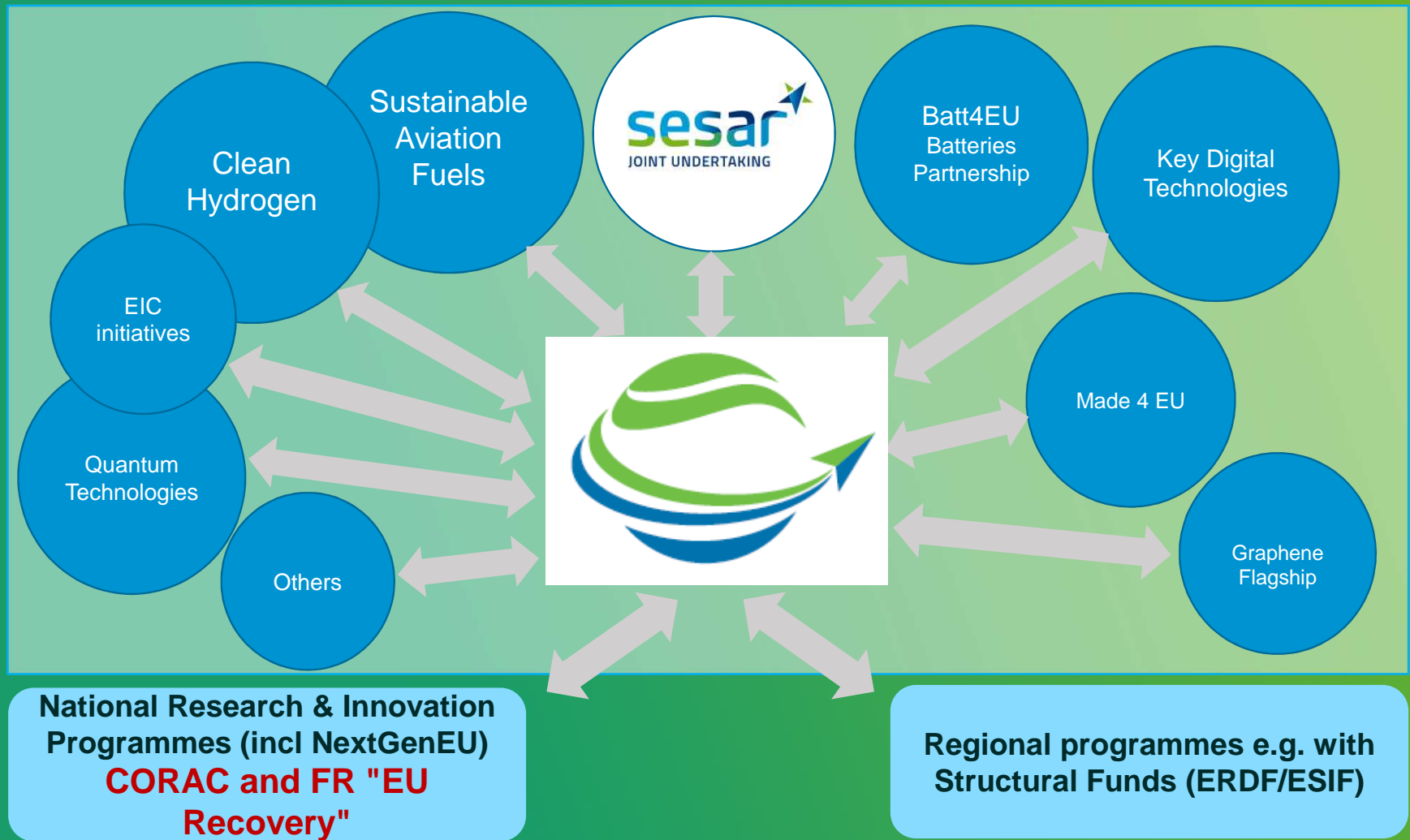
Development of disruptive technology options



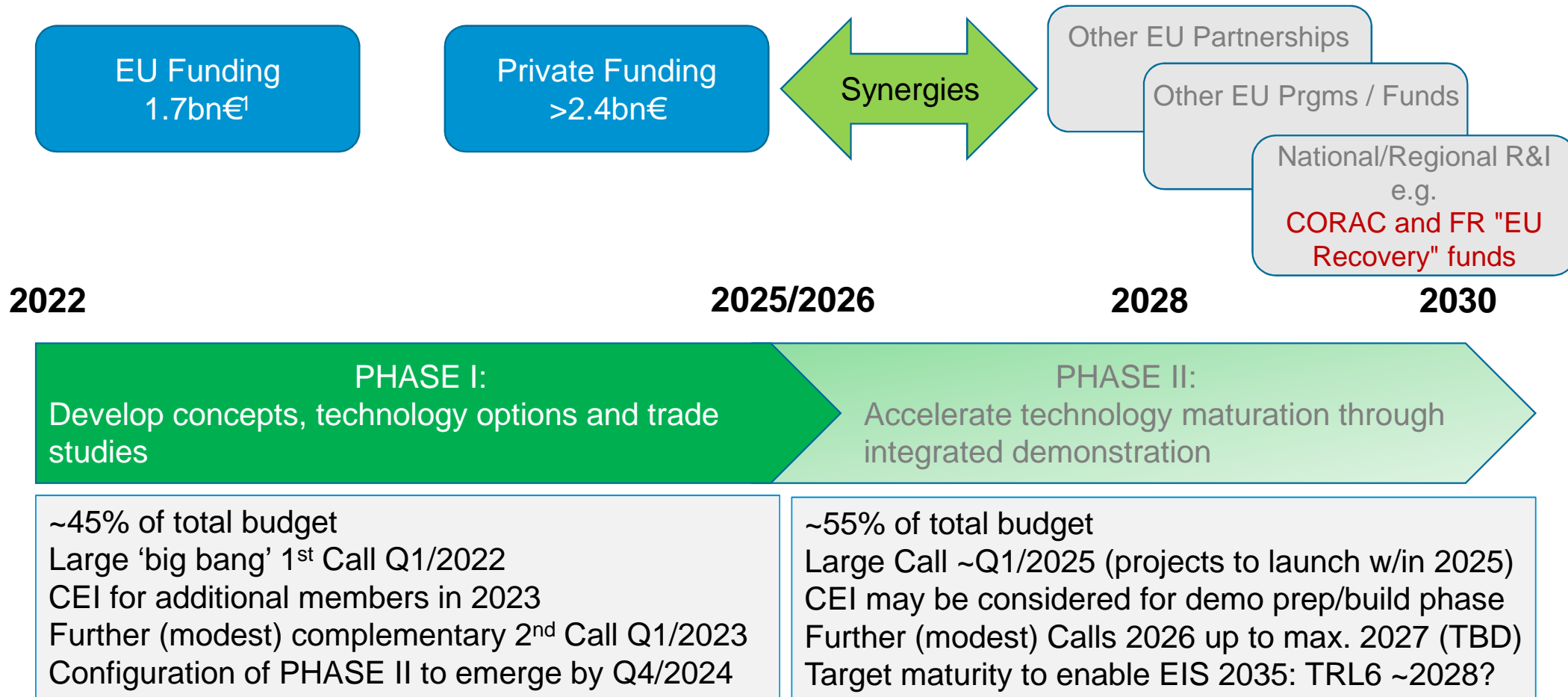
SKIP-A-GENERATION TECHNOLOGY LEAP, together with new fuels/energy

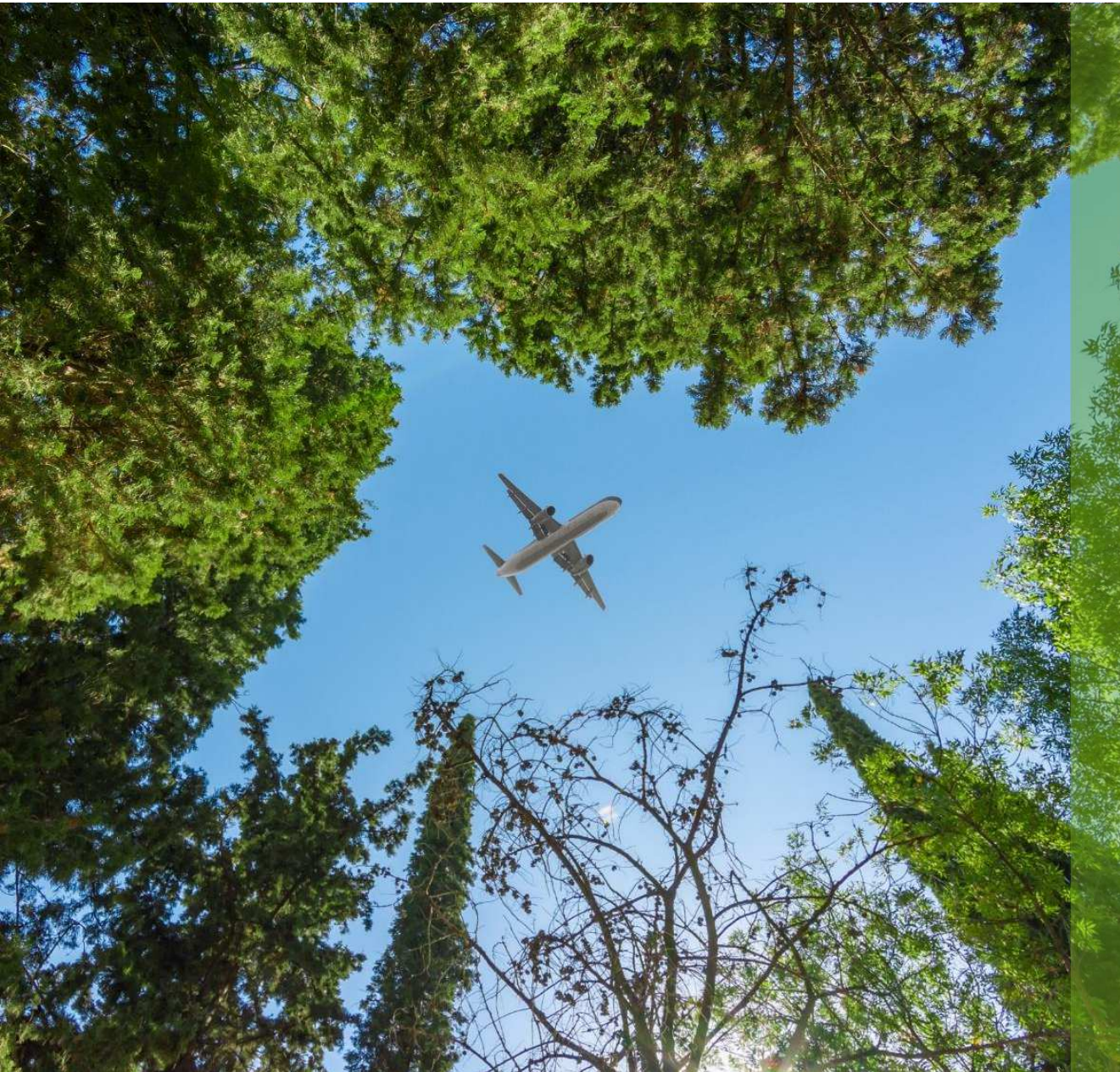
- »»»»»» **Skip-a-Generation level technology leap needed by 2030: 30-50% gains in trip energy efficiency**
- »»»»»» **Keep pushing the envelope in all ‘traditional’ aeronautical sciences**
- »»»»»» **Non-aeronautical sciences and disciplines will need to bring key enablers**
- »»»»»» **Rapid transition to SAF and adoption of new non drop-in energy sources (e.g. Hydrogen)**
- »»»»»» **Digitalisation and innovative certification for lower development cost and reduced ‘time to market’**
- »»»»»» **Revolutionised production system to meet aggressive deployment targets and contain acquisition costs**
- »»»»»» **Life-cycle aspects and recyclability cannot be forgotten**

INTEGRATED APPROACH NEEDED – INCLUDING STRONG SYNERGIES WITH NATIONAL INITIATIVES



THE PROGRAMME SETUP IN A NUTSHELL





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