

# H2 Certification Roadmap

A joint presentation by EASA, FAA, and CAA UK

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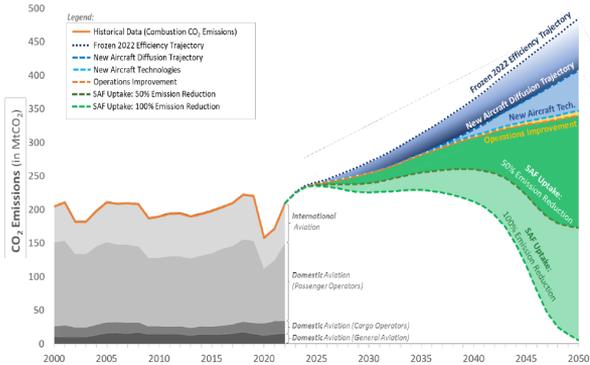
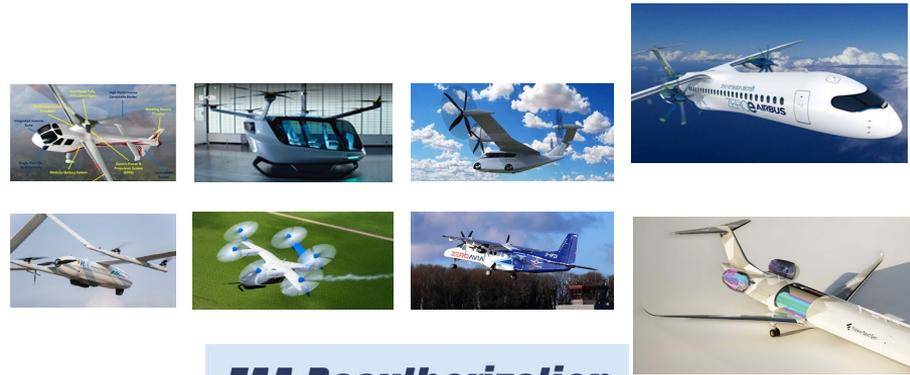
**Your safety is our mission.**

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# Why

- Understanding of the risks to aviation safety and the right pathway to certification.
- Make sure regulation is fit for purpose and reduce challenges associated with the introduction of hydrogen fuel.



US Aviation Climate Action Plan

## Make Transport Greener

A successful green transport transition will provide significant economic, social and environmental benefits: cutting climate-warming greenhouse gas emissions, reducing air and noise pollution and their negative impacts on our health, and driving innovation.

### TRANSPORT NEEDS TO CUT EMISSIONS BY 90% BY 2050

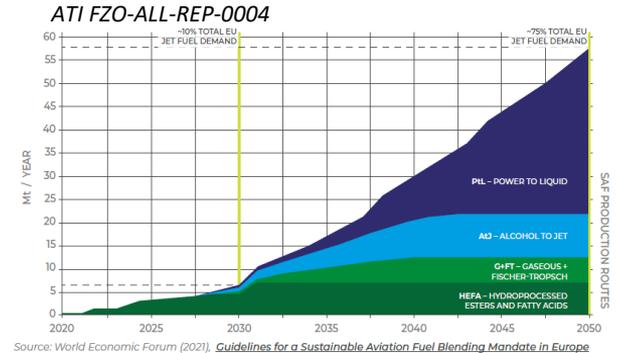
Share of total EU Greenhouse Gas (GHG) emissions, per mode



### TRANSPORT AND THE EMISSIONS TRADING SYSTEM (ETS): PUTTING A PRICE ON CARBON

- |   |   |  |
|---|---|--|
| <b>Road</b> <ul style="list-style-type: none"> <li>Extension of the ETS to road transport and building fuel: from 2026;</li> <li>Focus on aviation fuel suppliers rather than households and car drivers;</li> <li>Revenues to be channelled to support sustainable households, and investments in cleaner mobility.</li> </ul> | <b>Aviation</b> <ul style="list-style-type: none"> <li>Tighten cap on the number of allowances for only EU flights, starting from current levels, and reduced by 4% annually;</li> <li>Full phase-out of free allowances by 2026;</li> <li>Extra European flights to be subject to offsetting under the international CORSIA scheme.</li> </ul> | <b>Maritime</b> <ul style="list-style-type: none"> <li>Gradual extension of the ETS to maritime starting in 2023, with a 3-year phase in period;</li> <li>Focus on large ships (above 5000 gross tonnage) accounting for 80% of CO<sub>2</sub> emissions;</li> <li>Intra EU traffic, and 50% of extra-EU voyages covered by the scheme.</li> </ul> |
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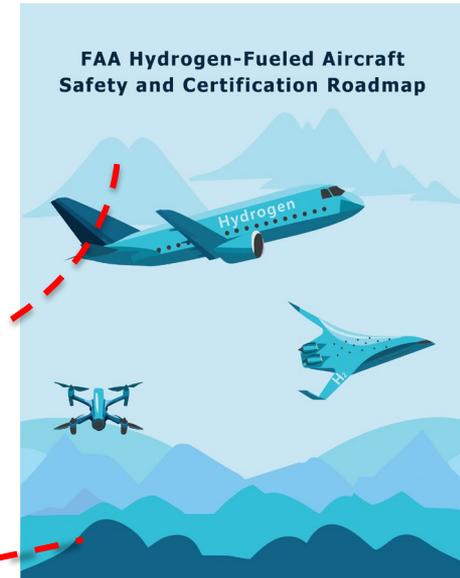
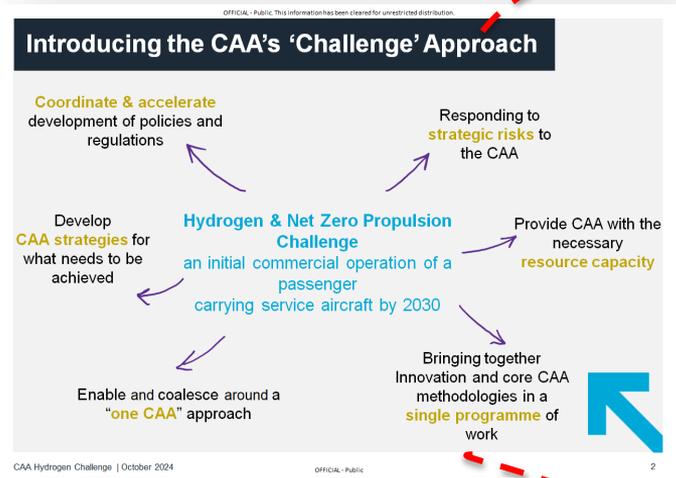
## FAA Reauthorization Act of 2024



Source: World Economic Forum (2021), Guidelines for a Sustainable Aviation Fuel Blending Mandate in Europe

# Purpose

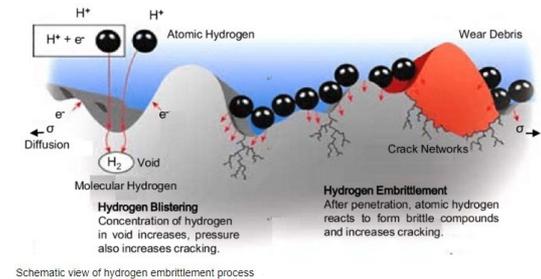
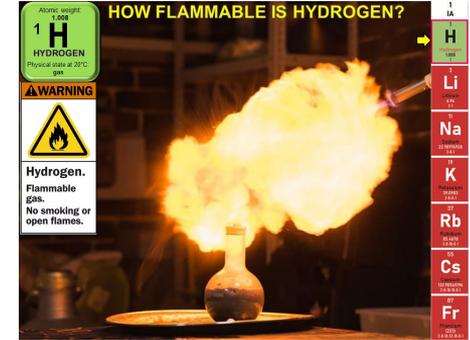
→ A plan to identify and address the regulatory issues associated with safely and efficiently incorporating hydrogen as an energy source in aircraft



# Key Hazards and Safety Research Needs

→ Examples - Depend on Technology Options

Hazards	Research needs
Fire and Explosion	<ul style="list-style-type: none"> <li>Leak detection; fuel shut-off and relight; Safe venting</li> <li>Flammability and fire under flight conditions; detonation, including within powerplant</li> <li>Cabin evacuation</li> </ul>
Crashworthiness	<ul style="list-style-type: none"> <li>Inspection and maintenance procedures</li> <li>Survivable crash conditions.</li> <li>Surrounding structure that may contribute to the rupture of the tank</li> </ul>
Material	<ul style="list-style-type: none"> <li>Embrittlement, diffusion at altitude; extreme thermal cycling; purging</li> <li>Fuel cell membrane durability</li> </ul>
Electrical/Mechanical/Other	<ul style="list-style-type: none"> <li>Lighting and electrical faults; HV management</li> <li>Thermal management system</li> <li>Tank sloshing pressure collapse</li> <li>Cryogenic system;</li> <li>LH2 to GH2 conversion</li> </ul>



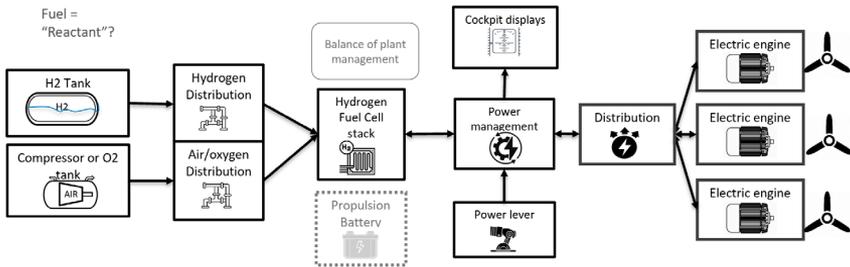
# H2 Roadmap – covering 5 streams

1. Certification process and product boundaries
2. Airworthiness standards and certification specifications
3. Capacity Building & Knowledge management
4. Communication Plan
5. International harmonization strategy

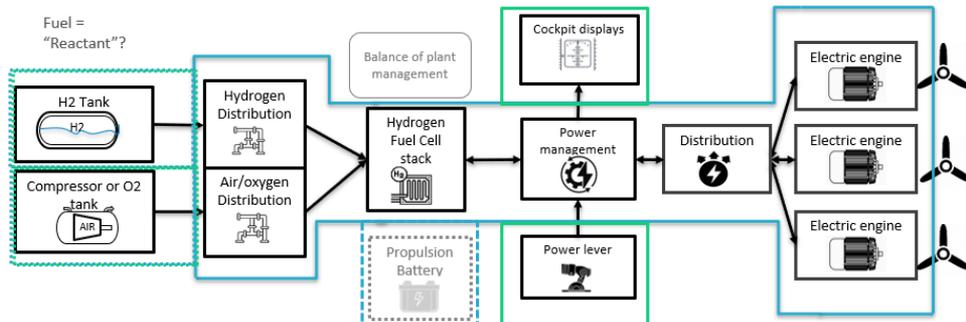




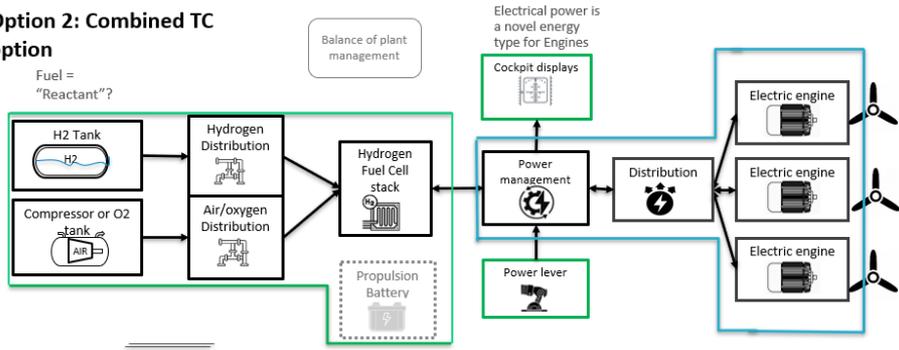
# Possible approaches? summary - WIP



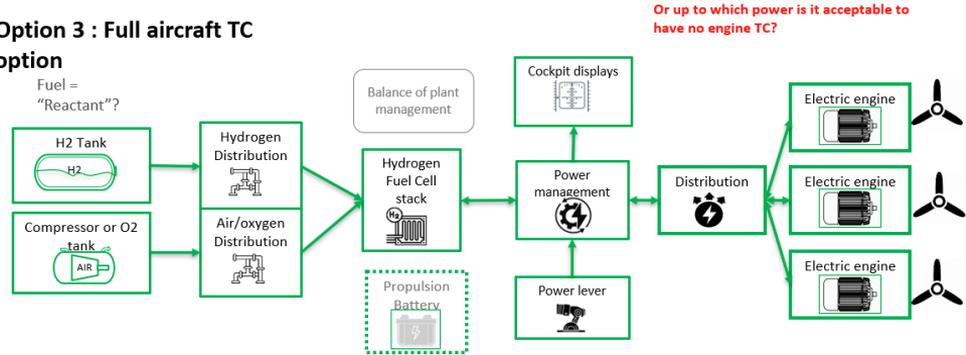
## Option 1 : Engine TC option



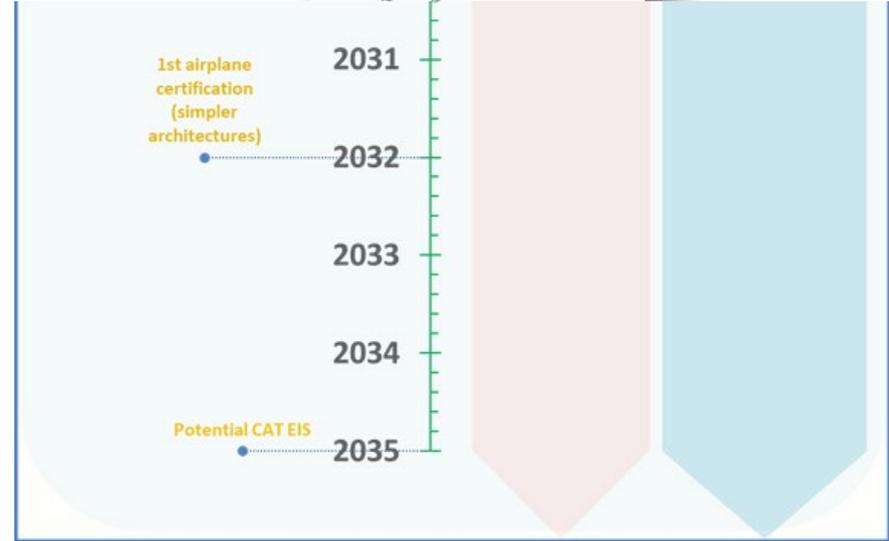
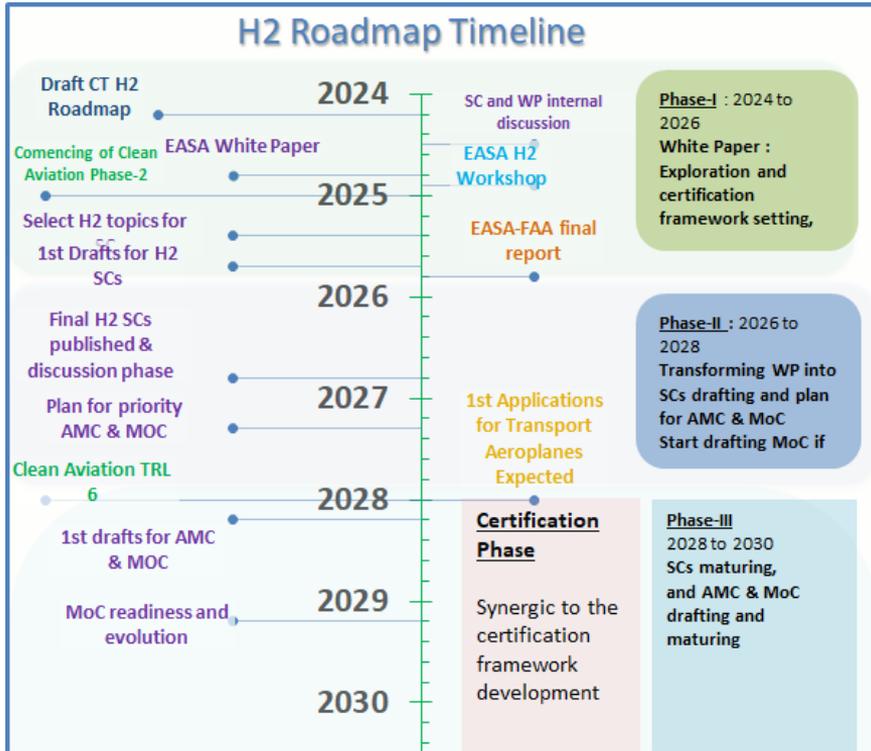
## Option 2: Combined TC option



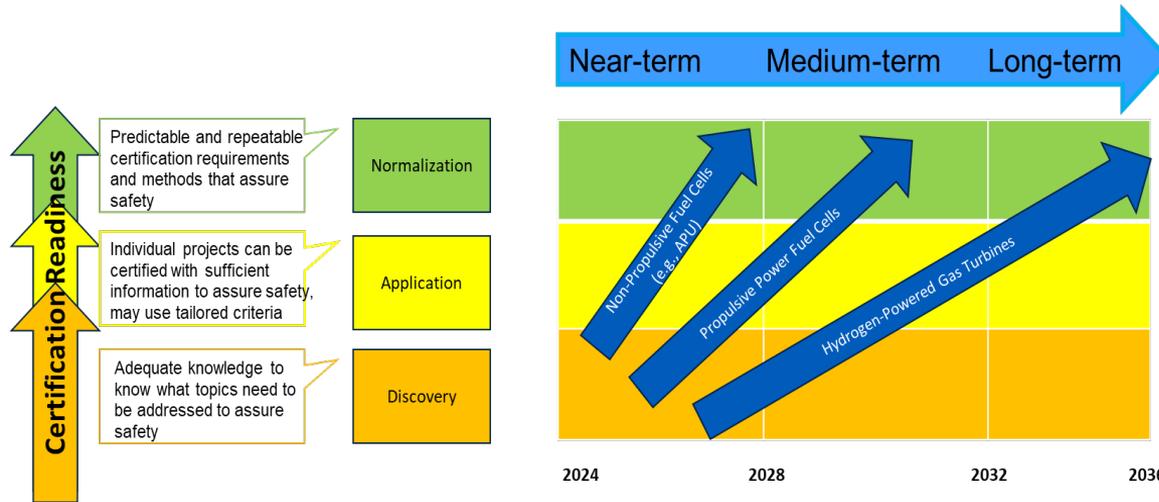
## Option 3 : Full aircraft TC option



# (EASA) H2 Roadmap – Timeline



# Road Mapping – Technology Vs Regulation Vs Certification readiness



What the new/novel technology is, how it works and what is different compared to existing technology.



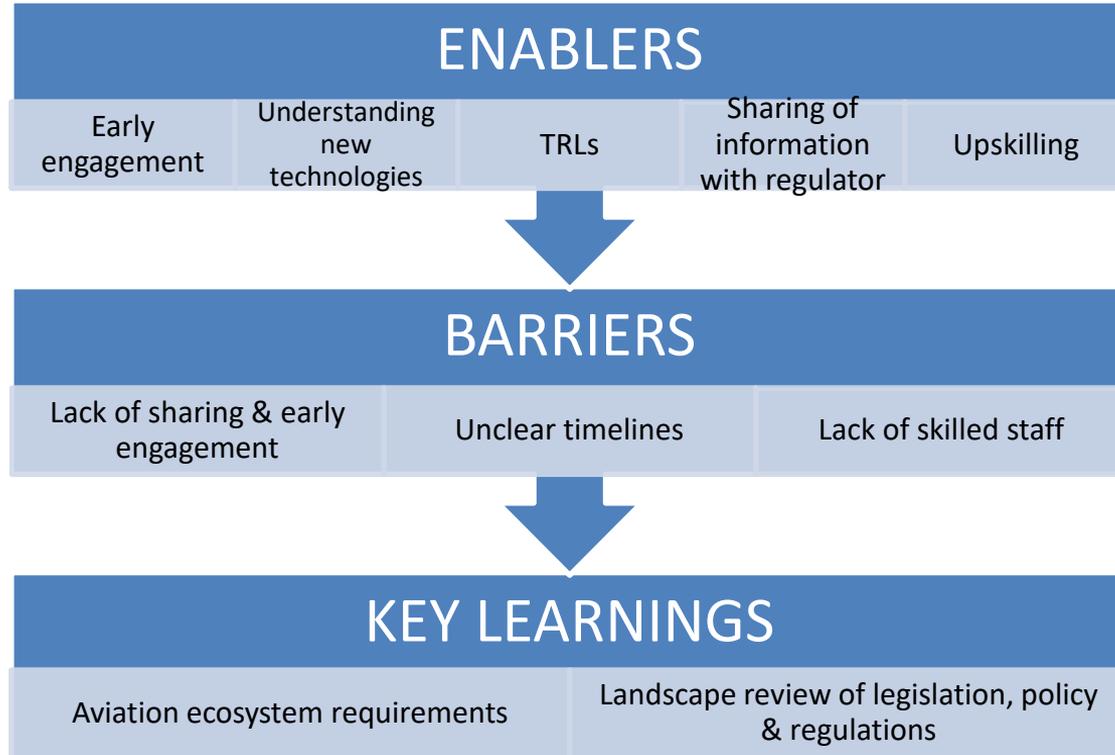
The gaps in current policy and regulation that need to be closed to enable the introduction of new technology.



The current TRL of each technology and the date it is expected to be ready to start the certification process to enable mapping against the regulation process for new policy development and delivery.

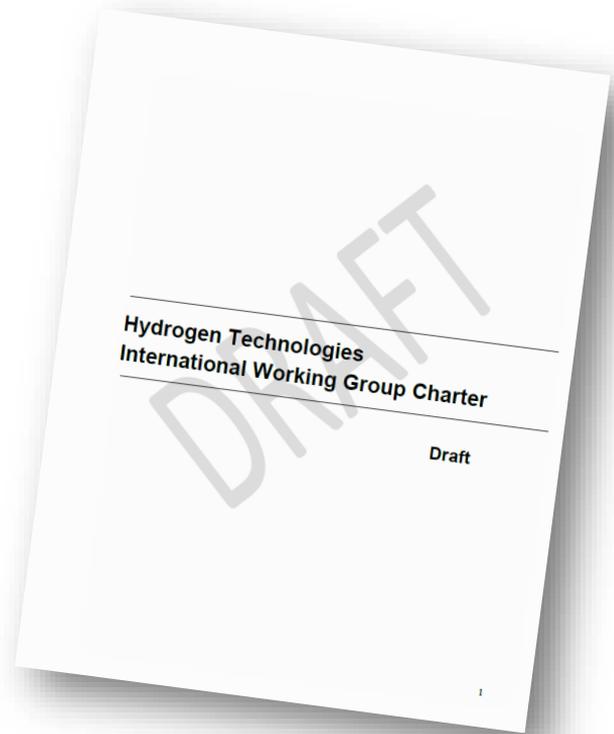


# Enablers, Barriers & Key Learnings



# Regulators Joint Working Group. Concluding remarks

- EASA-FAA COB WG on H2 launched in October'23. Extension to a EASA, FAA, CAA UK, TCCA and ANAC Working Group (Charter under review).
- Navigate the Learning curve.
  - Regulators, Industry, SDOs
- Need to increase growth of technological knowledge and understanding.
  - Calibrate expectations and timelines
- Awareness on the challenges → turning them into opportunities.





**Federal Aviation  
Administration**

