



## Key messages delivered at the Technical Workshop:

"Hydrogen-Powered Aviation Research and Innovation  
Discussing year-2024 priorities for the Clean Aviation  
and Clean Hydrogen programmes"

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## Key messages delivered at the Technical Workshop:

### ***“Hydrogen-Powered Aviation Research and Innovation Discussing year-2024 priorities for the Clean Aviation and Clean Hydrogen programmes” (Brussels, 25-26 April 2023)***

The workshop was organised to discuss the current roadmap in place across the Clean Aviation and the Clean Hydrogen (Clean H2) partnerships aiming at accelerating the introduction of hydrogen as energy carrier for aviation. The participants confirmed that hydrogen (H2) technologies are seen as potentially plausible and competitive solutions to power commercial aviation and reduce its climate impact from 2035.

In this context, synergies between the two partnerships are required to maximise the impact of the respective programmes in line with the EU Green Deal objectives and in particular to demonstrate H2-powered aircraft technologies with Entry into Service (EIS) by no later than 2035.

Synergies between the two partnerships are being developed *upstream* with strategic/programmatic alignment through a Clean Aviation-Clean H2 joint technical roadmap, and *downstream* with aligned approach during project implementation.

Discussions focused on potential gaps and barriers in the joint technical roadmap, in particular concerning *i.* aircraft architectures, *ii.* liquid H2 (LH2) fuel on board, distribution, and storage, *iii.* H2 burn gas turbines powertrain system, *iv.* H2 fuel-cell integrated powertrain system, *v.* refuelling, airport infrastructures and ground operations and *vi.* safety and certifications.

The participants presented the Clean Aviation/Clean H2 on-going projects on H2-powered technologies, pointing out to several technical challenges, and highlighting gaps and barriers of the technical roadmap at both aircraft and airport infrastructure levels.

The following key recommendations were made at the workshop:

1. Accelerate the H2 technology maturation, integration and demonstration in order to ensure 2035 EIS by increasing **focus on the “Route to TRL6”** in the demonstration phase of Clean Aviation (Phase 2).
2. **Increase alignment between the Clean Aviation partnership, the Clean H2 partnership and Horizon Europe Cluster 5 Work Programme (WP)** at the level of technical roadmap, objectives, activities, targeted maturity levels and timeline of the calls for proposals to maximise contribution of Clean H2 and HE Cluster 5 WP to the Clean Aviation demonstration phase (Phase 2).

3. Gain more understanding on the **climate impact** of H2-powered aviation emissions (non-CO2 emissions), as it is critical to decision-making process for the down-selection of the concepts to be demonstrated in Clean Aviation Phase 2.
4. **No immediate needs to launch activities on aircraft technologies in 2024** under Clean H2 and/or Clean Aviation partnerships, as the key ones are currently being performed as part of the Clean Aviation and the Clean H2 projects or will soon be launched through the Clean Aviation/Clean H2 2023 Calls for Proposals, in line with the joint technical roadmap, and respective SRIAs.
5. **Urgently initiate R&D on LH2 infrastructure at airports in the 2023-2024 timeframe**, under the Cluster 5 Work Programme 2023-2024 or under the Clean H2 partnership WP 2024. In particular the following topic areas should be addressed:
  - a. Large-scale LH2 storage tanks.
  - b. Ground-based supply system for LH2 distribution.
  - c. Technology and protocols for ground based LH2 refuelling.
  - d. New standards and safety/certification (for all items above).
  - e. LH2 demand and supply-matching models.
6. Urgently address the **lack of suitable LH2 testing infrastructures/facilities** (e.g. propulsion testing, airport infrastructure testing) for Clean Aviation Phase 2's demonstration and maturation up to TRL6. It was noted that important investments would be required to realise such testing infrastructures which are critical to the demonstration of H2 technologies in Clean Aviation Phase 2.
7. Address the **insufficient access to H2 skilled personnel** – there is a need for specific education and training.