

# HYDROGEN CHALLENGE SURVEY 2023

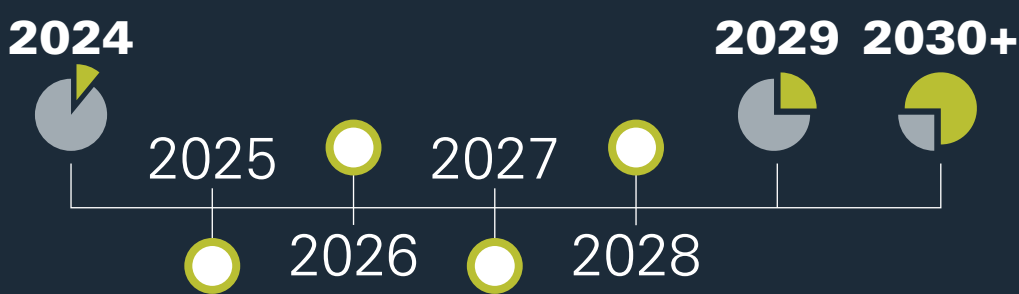


**220 RESPONSES** FROM STAKEHOLDERS INTERESTED IN THE USE OF HYDROGEN AS AN AVIATION FUEL

The vast majority of the respondents indicated that their hydrogen aviation technologies are at a Technology Readiness Level (TRL) between 1 and 3. Fewer innovations are currently at TRL 6 or higher.

While some organisations are aiming to deploy hydrogen-related innovations within the next 5 years, most of the respondents indicated that their hydrogen technologies will be deployed after 2030.

## Hydrogen Innovations Timeline



## Additional points

Ongoing academic research focuses on:

- > hydrogen's climate effects,
- > the production of green hydrogen
- > the economic viability of hydrogen as an aviation fuel.



## Several companies are developing the following innovations

- > Power plants using fuel cells and gaseous hydrogen
- > Tank solutions for the storage of Liquid Hydrogen on board the aircraft
- > Liquid hydrogen propulsion systems
- > Dual-fuel approach combining hydrogen with kerosene
- > Improvement of fuel cells

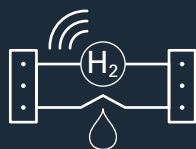
## Risks and challenges



Risks associated with extremely cold temperatures of Liquid Hydrogen and its operation in a cryogenic environment.



The large-scale storage and distribution of hydrogen on an airport environment can be challenging.

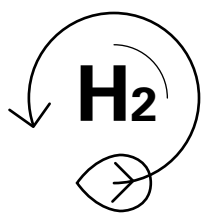


Multiple issues should be considered around storage, leak detection, fire suppression, health and safety both at airframe and operations levels.



Hydrogen's physical properties make it easier to ignite challenging fire safety systems.

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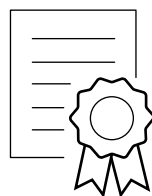
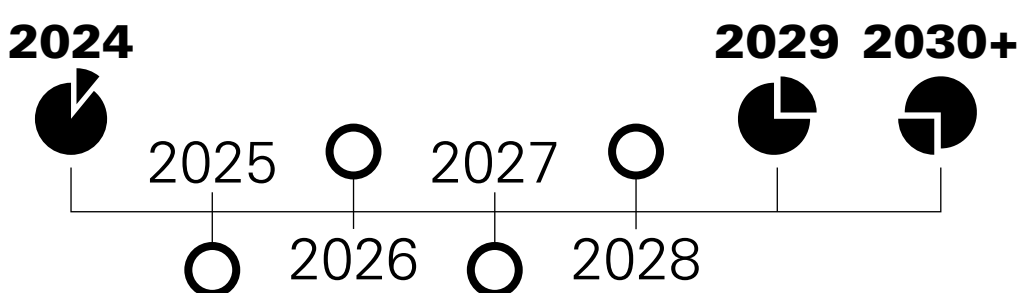


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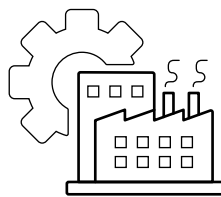
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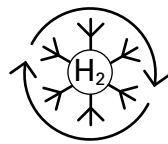
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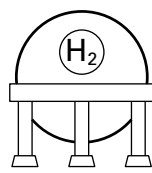
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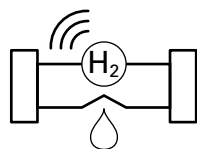
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