

# In brief

## Hydrogen for aviation



Air Liquide is applying its 50 years of expertise in the field of hydrogen to the aerospace industry and is developing more environmentally friendly solutions to reduce pollution in the air and in airports.

Hydrogen is a clean source of energy with great potential for applications in the aerospace industry.

Used in a fuel cell, hydrogen combines with oxygen from the air to produce electricity, with water as the only by-product.

### Hydrogen for propulsion

In order to reduce dependence on fossil fuels, and kerosene in particular, clean and sustainable alternative energies must be found. Several solutions are being considered for plane propulsion, depending on their size and distance: direct combustion to power the turbine, or a fuel cell to generate electricity.

### Hydrogen on board aircraft

Air Liquide is developing high-pressure storage systems for liquid and gaseous hydrogen to power fuel cells on board aircraft. The electricity produced can be used for a variety of applications, in particular when the aircraft is grounded.

### Hydrogen, for transport around airports

Air Liquide is looking to develop synergies between mobility applications through an infrastructure that will serve the entire ecosystem that is frequently deployed around airport activity zones: taxi stands, bus terminals and train stations for local or long-distance transport.

### Hydrogen for airport baggage handling

Ground logistics in airports (forklift trucks, platforms and baggage handling carts) can use hydrogen energy, which reduces pollution. Captive fleets that run on hydrogen increase productivity while reducing emissions at their place of use. Air Liquide supplies hydrogen refueling stations adapted to the needs of fleets of utility vehicles and to the specific requirements of the aerospace industry. Integrated directly on site, they can charge vehicles in less than 5 minutes.

Air Liquide has partnered with Seoul International Airport (Incheon) to accelerate the deployment of hydrogen-based mobility solutions, including the supply of buses to the airport, with two high capacity hydrogen stations, the largest to date in South Korea, which will allow to fill two buses simultaneously and several consecutively (limited waiting time, efficient management of peak hours). Incheon International Airport will replace its current shuttle buses linking Terminal 1 and Terminal 2 with hydrogen buses.

### Ambitious partnership in 2021:

- Airbus, Air Liquide and VINCI Airports have signed a partnership to promote the use of hydrogen at airports and build the European airport network to accommodate future hydrogen aircrafts. The airport of Lyon-Saint Exupéry (France) will host the first installations as early as 2023.
- Air Liquide, Airbus and Groupe ADP have signed a Memorandum of Understanding (MoU) to prepare for the arrival of hydrogen in airports by 2035. As a first step, a study involving a representative panel of around 30 airports worldwide will be launched to assess potential configurations for liquid hydrogen production, supply and distribution. Detailed scenarios and plans will then be drawn up for the two main Paris airports: Paris-Charles de Gaulle and Paris-Orly.
- In the framework of the "H2 Hub Airport" call for expressions of interest (AMI), Air Liquide's project for a high-performance hydrogen refueling truck has been selected by the jury. While waiting for the arrival of the first aircraft at the airport in 2035, the truck could be used as early as 2025 to refuel the first hydrogen stations deployed at the airport to meet the needs of the ground vehicle fleets used for the airport and the peripheral vehicle fleets.

### DID YOU KNOW ?

10,000 regional planes could be flying by 2050, consuming between 5 and 10 million tonnes per year of liquid hydrogen through a few thousand mobile stations deployed at over 100 airports.

