STEM
OPPORTUNITIES IN AVIATION & AEROSPACE

UK Civil Aviation Authority

Hydrogen Helen

The reason why you should invest in me and hydrogen is because hydrogen comes in many different colors, but the opportunity for green hydrogen enables the End to End production of hydrogen to reduce carbon emissions not just in flight but in production.

When hydrogen burns it produces oxygen and water which allows for a significant reduction in carbon dioxide emissions, which are created in flight which we know as CO_2. There are two options to using hydrogen to power flight and this is with a hydrogen fuel cell or by burning hydrogen directly in a combustion engine.

In the UK, we currently have one aircraft flying as a test flight with a hydrogen fuel cell power train. This proves that hydrogen flight is possible. Hydrogen comes in two formats either as a gaseous hydrogen which we know as GH2, which is its natural state at ambient temperature, or as a liquid hydrogen known as LH2 two which requires the hydrogen to be stored at minus 253 degrees. This creates its own additional challenges, but enables us to fit hydrogen into longer haul aircraft flight with the opportunity to introduce hydrogen as an aviation fuel.

This gives the aerospace industry the opportunity to either retrofit existing aircraft with hydrogen technologies as they are today, or the opportunity to create a new design of aircraft that will be built to fit with hydrogen technologies. This is something you could be involved in in the future.

Apart from the aircraft is important to understand how hydrogen which airports and how aircraft can be refueled. Due to this three options of hydrogen airports have been identified. Option one is tanking. This is a production of hydrogen off site and brought to the airport by rotor to be stored ready for use on an aircraft. The second option is to run a gaseous pipeline to the airport with liquefaction taking place on site which turns it into liquid hydrogen, and then to be stored and ready for use in the aircraft. Our third option is creating hydrogen on site at airports. This can be done through wind energy and wind turbines having a wind farm that it would then be electrolyzed and liquefied on site and stored as liquid hydrogen. When you have hydrogen at airports this can also be used for other equipment. It can be used for ground surfacing equipment such as buses, aircraft, push back tugs and baggage tractors. This enables the ground operations to also be zero emissions.