

Hydrogen Powered Aircraft



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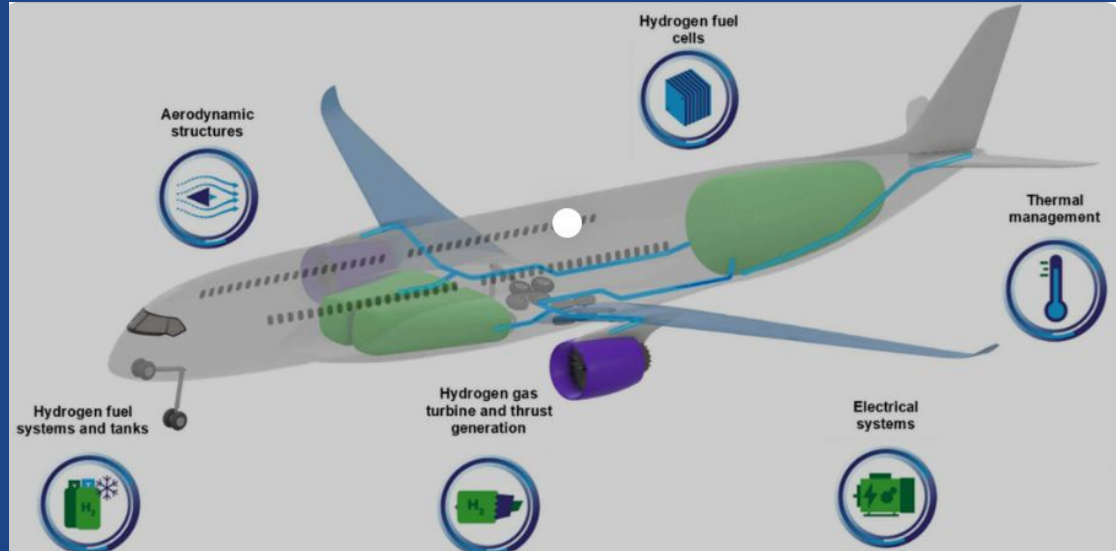
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Overview

- Pushes for reduction in Airline emissions
- Aviation creates 3% of global emissions, 12% of transport emissions
- Hydrogen can reduce carbon emissions by 90%



FlyZero Technology: Fuel Cell Electric Propulsion

Why Hydrogen?

- Multiple technologies in development
- Proven Technology with Flying Prototypes
- Best suited to aviation vs other renewables
- Easiest to retrofit



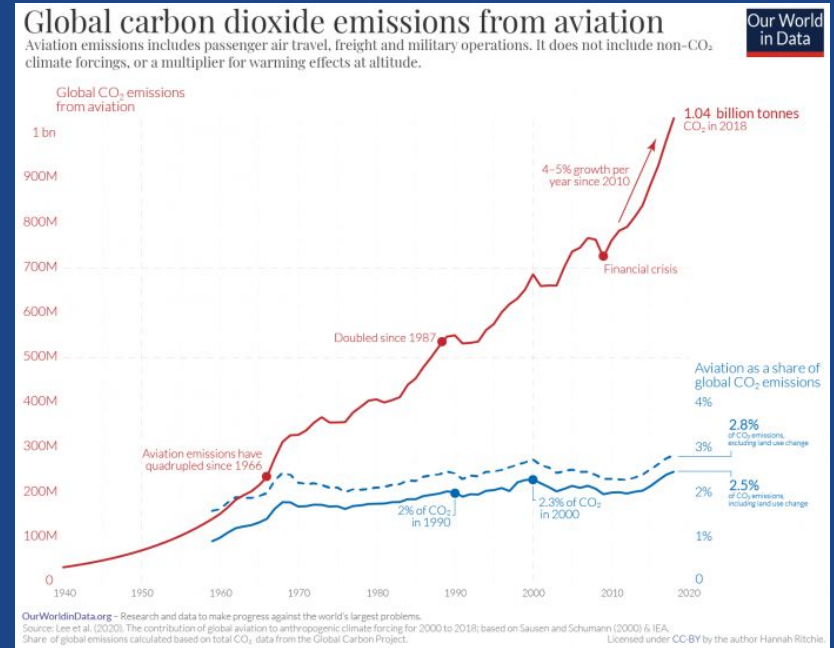
Prototype Hydrogen Engine



*ZeroAvia Hydrogen Powered Aircraft
Taking Off*

Strengths

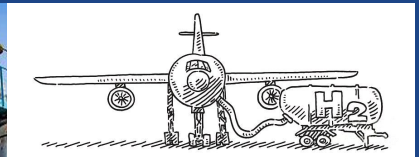
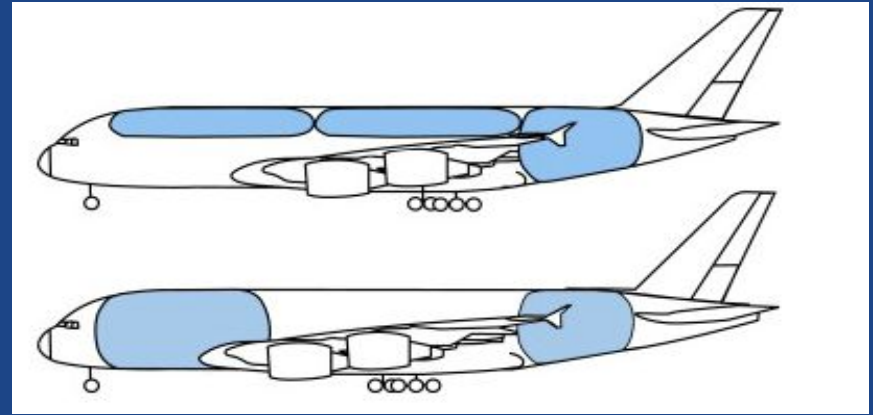
- Eliminates up to 90% of airline carbon emissions
- Less noise, contrail formation than jet-a (fossil fuel) aircraft
- Creates economic growth in both aviation and clean energy sectors



*Emissions Data from Aircraft in
Modern Era*

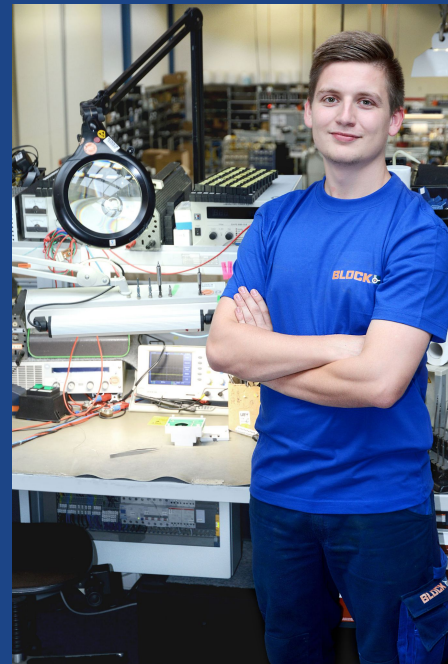
Weaknesses

- Hydrogen fuel requires more space than jet fuel.
- Top tanks vs bottom tanks
 - Top tank
 - 28.1% more heavier
 - Aft centre of gravity
 - 12.7 % More energy use
 - Bottom Tank
 - Accessibility
 - Reduced seating
- Infrastructure
 - Large scale adoption



Opportunities

- Creation of jobs
 - Fuel Cell Engineer
 - Mechatronics Engineer
 - Systems Engineer
- Environmental Aspect
 - Sustainability Engineer
- Infrastructure
 - Fuel production plants
 - Refueling stations



Threats

- Extraction of raw materials for batteries - damage environment
 - Toxic chemical leaks from lithium mines- harms water life
- Storing on aircraft - dangerous
 - Flammable
 - Ignites easily
- Zero Fuel Weight



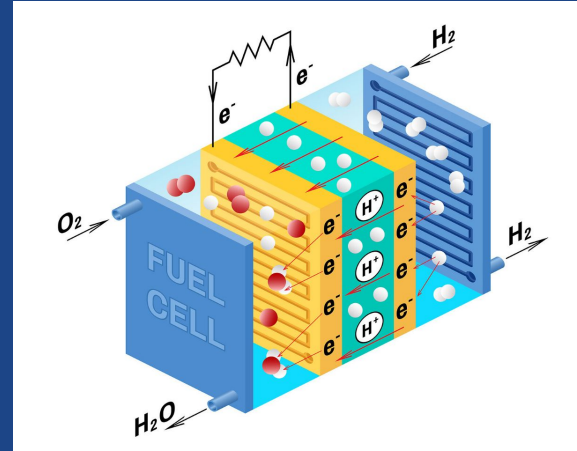
Economic Feasibility

Positive:

- Reliability, lower maintenance costs
- Capital costs can be reduced by 80%

Negative:

- Regular Jet Fuel Price: \$0.72/kg
- Levelized cost of hydrogen: \$6.95/kg
- Energy from hydrogen: 2.8 times greater
 - \$2.70 - same amount of energy



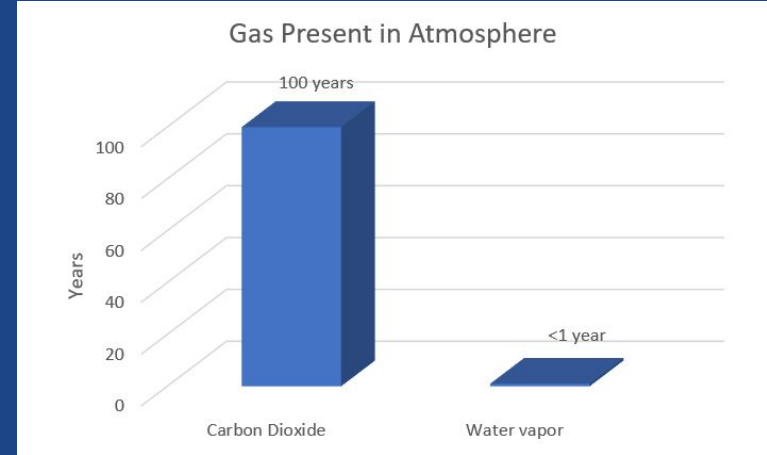
Sustainability

Positive:

- Reduction in global warming
- Reduction of carbon emissions
 - 2% to 2.5 %
- Infinite supply

Negative:

- CO_2 and H_2O - contributing to global warming



Conclusion

- Hydrogen technology can reduce carbon emissions by 90%
- Creation of jobs in engineering and sustainability.
- Hydrogen fuel is bountiful in supply.
- Need of new infrastructure
- Hydrogen fuel is highly flammable.
- Hydrogen fuel is 6.23 \$/kg more expensive than jet fuel.



ANY
QUESTIONS
?

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