



# SUBMISSION TO AVIATION GREEN PAPER

**White Graphene Ltd**

**November 2023**

The manufacture of low cost, green hydrogen is often cited as a critical component of a future for clean aviation. Whilst Australia is making significant and laudable investment in the production of green hydrogen, White Graphene Ltd is concerned that the lack of commensurate focus on safe and economically viable storage and transport of hydrogen will impact the overall viability of hydrogen as a fuel, especially for the aviation sector.

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## Introduction

White Graphene Ltd welcomes to the opportunity to provide a submission on the Aviation Green Paper of September 2023 to help inform the Aviation White Paper.

White graphene is a novel 2D nanomaterial also called Boron Nitride Nanosheets or BNNS. White Graphene Ltd is the first company globally to produce this material in kilogram quantities. Our Manufacturing and jobs are located in Geelong, commercialising sovereign IP from Deakin University.

White graphene is valuable for hydrogen industry with the material impermeable to hydrogen allowing it to be part of a coating in pipes to greatly reduce maintenance costs caused by hydrogen leakage. White graphene also has a range of other novel properties of interest to the coatings, composites and lubricant industries. We are also working with Boeing on applications of our materials in space.

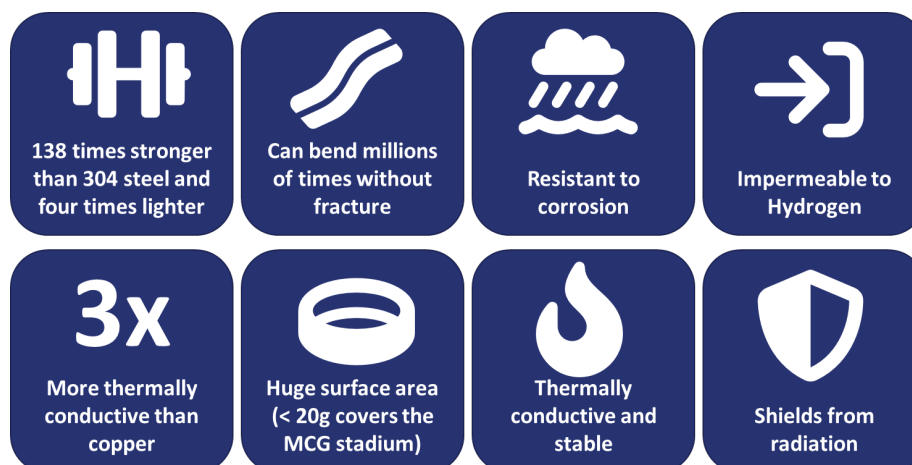


Figure 1: Novel properties of white graphene

We have developed our understanding of the use of white graphene in the hydrogen industry that has led insights into the potential for the use of hydrogen as an aviation fuel. We note that Sections 5.3 of the Green Paper that discuss the path to net zero and the role that hydrogen can play. Our submission will focus on the questions posed on this topic.

## Recommendations

### Green paper Section 5.3

*The Australian Government sees new propulsion technologies as an opportunity to decarbonise the aviation sector in the longer term. New propulsion technologies may provide a pathway for decarbonising the general and regional aviation sectors.*

- *How can policy and regulatory settings support research and development and subsequent investment in emerging low and zero emission technologies and related infrastructure?*
- *What information and guidance is needed to support regional aviation's net zero transition in the context of these emerging technologies?*

White Graphene Ltd fully agrees the new propulsion technologies are an opportunity to decarbonise the aviation sector in the long-term.

We believe that emerging battery technologies such as lithium sulphur will have a critical role to play in the growth of eAviation and regional aviation. For longer flights and heavier vehicles, we believe that hydrogen offers unique potential once it can be manufactured in a clean, low-cost way.

We are encouraged by the investment from the Commonwealth and States into the nascent hydrogen industry through mechanisms such as ARENA and we share the vision for the potential of hydrogen as a high energy and clean fuel for a range of transportation applications once the cost the manufacture has reduced.

However, there is a unique characteristics of hydrogen gas that make it very hard to store and transport – it will permeate most materials and causes embrittlement damage to steel containment vessels. We believe that the industry is underestimating the impact this will have on the viability of hydrogen as a fuel, especially for the aviation sector.

The boron nitride nanosheets produced by White Graphene are able to reduce or eliminate hydrogen leakage when incorporated into a polymer coating and whilst we will continue to develop and commercialise this technology, we would recommend the Federal Government to consider this issue and look to support local industry to solve it through a collaborative research and commercialisation effort.

Based on our preliminary analysis, a 1-2mm polymer coating dosed with white graphene inside a hydrogen pipe or storage vessel can reduce the loss of hydrogen by at least 60%. This is important given researchers have suggested this can lead to up to a 68% increase in the cost of pipes to carry hydrogen over natural gas<sup>1</sup>, primarily as a result of increased monitoring and maintenance.

### Contact

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<sup>1</sup> <https://www.sciencedirect.com/science/article/abs/pii/S036031991501575X?via%3Dihub>