

Sustainability and space: Beyond space debris

Purpose statement

1. This briefing is based on the context for the portfolios of Minister for Space and Minister of Science, Innovation and Technology. It provides recommendations that will strengthen New Zealand's strong 'green' brand and maximise future economic benefits from the aerospace economy.
2. New Zealand's aerospace economy is growing rapidly. Long term economic benefits for New Zealand may be jeopardised unless sustainability issues are proactively addressed.

Recommendations

3. An independent analysis of New Zealand's aerospace market is needed. This will establish the latest economic contribution of the aerospace sector to the country. Additionally, this analysis will help the Minister for Space to gauge how well New Zealand is capitalising on the global space economy.
4. Establish bilateral agreements that can standardise practices for emissions accounting of space missions, and aerospace-enabled data usage. This will enable a better understanding of the trade-offs associated with specific space activities.
5. Use bilateral agreements to share methodologies and supply chain data to accurately determine emissions associated with aerospace activities, helping to quantify and mitigate environmental impacts.
6. Identify critical elements within the aerospace sector's supply chain to enhance oversight and sustainability. This will build the resilience of New Zealand's aerospace sector to climate-related disruptions.
7. Implement comprehensive reporting standards across the supply chain. This will increase transparency and potentially reduce regulatory costs in the long term as the international market shifts towards more environmentally friendly products.

Background

8. As of 2023, the global space industry is valued at approximately \$546 billion USD, with nearly 80% of this revenue derived from commercial activities.¹ Satellite data, including telecommunications, geospatial imagery, and remote sensing, accounts for almost half of this revenue.² Space debris is recognised as an urgent sustainability issue as it threatens current and future space infrastructure.
9. This perspective of space sustainability overlooks critical issues that could jeopardise the return on current economic investments.

Analysis

10. Rocket launch emissions are predicted to undo decades of ozone recovery³.
11. The number of rocket launches are expected to double by 2026, and there are no environmental standards in place⁴.
12. Untraceable supply chains hinder the accurate assessment of the environmental impact at various stages, including manufacturing, launching, and end-of-life disposal.⁵
13. The majority of businesses that make up the supply chain are not incentivised, resourced, or have the capacity to collect required information.

Advice

14. New Zealand can model international best practices for environmental reporting measures for the space sector. Life Cycle Assessment guidelines developed by the European Space Agency provide the necessary framework.
15. Bilateral agreements can facilitate sharing of mutually beneficial data among international space agencies and industry partners to quantify and manage the impacts of space activities.

Risks

16. If the technology for removing space debris works well, it might help reduce some space traffic issues in the short term. However, this approach has its limits and doesn't address other long term risks.
17. These risks include emissions from the entire supply chain, potential disruptions in supply chains and Earth observation data due to extreme weather in space and on Earth, and other similar threats.
18. There is a risk that future international market conditions could mandate environmental reporting throughout the supply chain. This requirement would likely lead to increased costs by necessitating the adoption of standardised environmental reporting measures.
19. The space industry faces the risk of losing public support as people become more aware of climate issues. This could challenge the industry's social license to operate if it does not address environmental concerns.

¹(Space Foundation, 2023).

² (Organisation for Economic Co-operation and Development (OECD), 2022; Space Foundation, 2022, 2023).

³ <https://www.tandfonline.com/doi/full/10.1080/03036758.2022.2152467>

⁴ <https://spacenews.com/faa-forecasts-surgin-commercial-launch-activity/>

⁵ <https://www.sciencedirect.com/science/article/pii/S027311723000959>