

## Sustainability and aerospace: Beyond space debris

### Purpose statement

1. New Zealand's aerospace economy is growing rapidly. Long term economic benefits for New Zealand may be jeopardised unless sustainability issues are proactively addressed.
2. This briefing makes recommendations for the Minister for Space and Minister for the Environment that will strengthen New Zealand's strong 'clean green' brand and maximise future economic benefits from the aerospace economy.

### Recommendations

3. We recommend that the Ministry for Business, Innovation and Employment:
  - 3.1. Establish standardised practices to account for aerospace emissions. In future, the aerospace supply chain in New Zealand may be held accountable by the EU Corporate Sustainability Reporting Directive as set by the NZ EU Free Trade Agreement.
  - 3.2. Implement comprehensive reporting standards across the supply chain. This will increase transparency and may reduce regulatory costs in the long term as the international space market shifts towards more environmentally friendly options.
  - 3.3. To share methodologies between EU and New Zealand on collecting supply chain data to accurately determine emissions associated with aerospace activities, helping to quantify and mitigate environmental impacts.
4. We recommend that the Ministry for the Environment:
  - 4.1. Identify critical elements within the aerospace sector's supply chain to enhance emissions reporting and accountability. This will build the resilience of New Zealand's aerospace sector to climate-related disruptions.
  - 4.2. Establish a methodology for monitoring and evaluation of emissions data that aligns with existing guidelines and best practices.

### Background

4. As of 2023, the global space industry is valued at approximately \$546 billion USD, with nearly 80% of this revenue derived from commercial activities.<sup>1</sup> Satellite data, including telecommunications, geospatial imagery, and remote sensing, accounts for almost half of this revenue.<sup>1,2,3</sup> Space debris is recognised as an urgent sustainability issue as it threatens current and future space infrastructure.

---

<sup>1</sup> Space Foundation (2023), [spacefoundation.org/wp-content/uploads/2024/03/SpaceFoundation\\_2023-Annual-Final-Web.pdf](https://spacefoundation.org/wp-content/uploads/2024/03/SpaceFoundation_2023-Annual-Final-Web.pdf)

<sup>2</sup> Space Foundation (2022), [spacefoundation.org/wp-content/uploads/2023/06/SpaceFoundation\\_2022-Annual-Report\\_Final\\_web.pdf](https://spacefoundation.org/wp-content/uploads/2023/06/SpaceFoundation_2022-Annual-Report_Final_web.pdf)

<sup>3</sup> OECD (2022), [doi.org/10.1787/16543990-en](https://doi.org/10.1787/16543990-en)

5. This perspective of space sustainability overlooks critical issues that could jeopardise the return on current economic investments.<sup>4</sup>

### Analysis

6. Rocket launch emissions are predicted to undo decades of ozone recovery.<sup>5</sup>
7. The number of rocket launches are expected to double by 2026, and there are no environmental standards in place.<sup>6,7</sup>
8. Lack of regulations and untraceable supply chains hinder the accurate assessment of emissions at various stages, including manufacturing, launching, and end-of-life disposal.<sup>8</sup>
9. Most businesses that make up the supply chain are not incentivised, resourced, nor have the capacity to collect required information. We can learn from mature industries (e.g. mining, steel, food) that currently face significant challenges due to rapidly evolving standards and reporting requirements.<sup>9</sup>

### Advice

10. 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.
11. Bilateral agreements with the EU and the US can facilitate sharing of mutually beneficial data among international space agencies and industry partners to quantify and manage the impacts of aerospace activities.

### Risks

12. If the technology for removing space debris works well, it may help reduce some space traffic issues in the short term. However, this approach has its limits and does not address other long-term risks.
13. These risks include emissions from the entire supply chain, potential disruptions in supply chains due to extreme weather on Earth.
14. 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.
15. The space industry faces the risk of losing public support as people become more aware of climate and pollution issues. This could challenge the industry's social license to operate if it does not address environmental concerns.

---

<sup>4</sup> Varughese et al. (2023), [doi.org/10.1016/j.actaastro.2023.07.009](https://doi.org/10.1016/j.actaastro.2023.07.009)

<sup>5</sup> Brown et al. (2023), [doi.org/10.1080/03036758.2022.2152467](https://doi.org/10.1080/03036758.2022.2152467)

<sup>6</sup> Foust (2023), [spacenews.com/faa-forecasts-surgings-commercial-launch-activity/](https://spacenews.com/faa-forecasts-surgings-commercial-launch-activity/)

<sup>7</sup> Ross and Jones (2022), [doi.org/10.1016/j.jsse.2022.04.004](https://doi.org/10.1016/j.jsse.2022.04.004)

<sup>8</sup> Dhopade et al. (2023), [doi.org/10.1016/j.asr.2023.01.055](https://doi.org/10.1016/j.asr.2023.01.055)

<sup>9</sup> World Economic Forum (2023), [www3.weforum.org/docs/WEF\\_Emissions\\_Measurement\\_in\\_Supply\\_Chains\\_2023.pdf](https://www3.weforum.org/docs/WEF_Emissions_Measurement_in_Supply_Chains_2023.pdf)