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Author: Ms. Ana Paula Nunes United Kingdom, ana.castro@spaceforge.co.uk

Mr. Andrew Bacon Space Forge Ltd, United Kingdom, andrew.bacon@spaceforge.co.uk

THE CONCEPT OF A REUSABLE SMALL SATELLITE FOR A CARBON NEGATIVE FUTURE

## Abstract

The microgravity manufacture and its innovative prospects open up several new markets that haven't been accessible to date. sector is more than just the exchange of goods and services. As some see it as a marketplace, it can be described as an innovation ecosystem. Traditional platforms such as the International Space Station (ISS), and suborbital launchers provide access to microgravity, but this can involve complex political and economical constraints that limit the feasibility of contaminant-free research. Having an unlimited and human-free platform in space can allow for next-generation markets to take place, such as in-orbit manufacturing for super materials that are needed in order to reach a carbon negative future. Using space, and more specifically its microgravity environment, to produce high-performance materials that are nearly impossible to manufacture on Earth's conditions can improve the energy efficiency of critical systems back on our planet, consequently reducing the carbon footprint of specific industries. However, another challenge of accessing this environment is also the method to retrieve and recover these platforms. A reusable small satellite as a concept for microgravity utilisation would encompass all the stages necessary to explore the benefits of the ecosystem: from payload development to post-mission recovery and transportation systems, resulting in a comprehensive end-to-end service for in-orbit manufacturing and return to Earth. This article will explore the benefits of such service and how it can help humanity reach a carbon negative future.