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Emerging Space Ventures, including Space Logistics and Space Safety for Sustainability (9-D6.2)

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THE FIRST REUSABLE SATELLITE TRANSPORTATION SYSTEM

**Abstract**

Outpost has designed the world's first reusable satellites that will return to Earth after mission completion and then refurbished for the next mission. Our satellite will reduce future space debris, contribute to the long term sustainability of human life in space, and eliminate the "one mission for one goal" problem. It is a flexible system intended for long term use, giving many customer types the ability to utilize the same platform for multiple missions including: Earth observation, communication, research, atmospheric sensing, and point to point delivery of payloads and more. Our reusable satellite will be introduced to the space market on its inaugural demo flight in Q4-2022.

There are many cost-effective, low-impact transportation uses for our satellite. Some examples are:

**Space Tug** - Deliver satellites to their final orbit.

**TRL-8 Validation** - Take new hardware to space and bring it back down again for testing.

**Space Pharmaceuticals and Resources** - Deliver goods from space (either mined or made) to Earth.

**Data Transfer** -Transfer from space to ground physical hard drives containing petabytes of data, within a day.

Over the last 5-10 years, 3 big technological advancements have made it possible to make the enterprise-class satellite returnable to Earth, and thus reusable:

**Deployable heat shields** - Heat shield systems need to be large and provide thermal dissipation capabilities to protect the rest of the spacecraft. NASA has developed and flight-proven inflatable heat shield technology for the size and weight class of our satellite.

**Deployable wings** - Material advances from the paragliding industry have enabled high glide ratio (10:1) deployable wings that circumvent the need for rigid aero-surfaces akin to the traditional space shuttle designs. The Outpost team has pioneered the use of autonomous paragliders at high altitudes.

**Safe reusable propellant/propulsion** - New green propulsion system using "Acsent" propellant enables safe reflight capabilities. This new propellant AF-M315E was demonstrated in 2020 and is also known as hydroxylammonium nitrate (NH<sub>3</sub>OHNO<sub>3</sub>) a fuel/oxidizer blend. Preliminary data indicates that it offers nearly 50% higher performance for a given propellant tank volume compared to a conventional monopropellant hydrazine system.

We believe that our multi-use satellite will be the default expectation of the market over the coming years, and the current single-use satellite approach will disappear as the market is educated about this step-change in improvement in satellite mission operations.