

SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FAR FUTURE (D4)  
 Contribution of Space Activities to Solving Global Societal Challenges (4)

Author: Mr. David Vaccaro  
 Futron Corporation, United States

Mr. Ian Christensen  
 Futron Corporation, United States

Mr. Dustin Kaiser  
 Futron Corporation, United States

Mr. Joseph Fuller  
 Futron Corporation, United States

Mr. Jay Gullish  
 Futron Corporation, United States

ENDING SCARCITY BY FULFILLING OUR DESTINY: HOW SPACE RESOURCE EXTRACTION  
 CAN MEET GLOBAL SOCIETAL CHALLENGES

**Abstract**

Planet Earth is a closed system. Although our beautiful world seems vast, in a cosmic sense it is microscopic. This pale blue dot is the source of all societal wealth and comfort. Yet it is finite. Its resources are not inexhaustible. Its capacity to support life is not indestructible. Its potential for damage from human overuse or conflict is not unimaginable. And its defenses against cosmic threats are far from invulnerable.

**Limits Within, Dangers Without**

The limits of planet earth in meeting the resource needs of our global society are becoming steadily more evident. In just over a century, the global population has quadrupled. During the same period, our natural resource consumption has increased immeasurably. These changes have precipitated a massive escalation in the extraction of natural resources from our planet. We are using up metals and minerals that cannot be replaced, and managing renewable resources like forests and croplands dubiously. If the Earth is susceptible to resource scarcity caused by humans, it is subject to even more cataclysmic risks from space. The February 15, 2013 Russian meteor impact was a reminder of our planet's vulnerability to dangers that arrive from the cosmos without warning. A larger impact could easily cause another extinction event – and next time, Homo sapiens could be among the species killed off.

**Seeking Space Resources Solves Both Problems**

In the closed system that is planet Earth, therefore, humanity faces the endogenous problems of finite resources at the same time it is imperiled by the exogenous hazard of a devastating meteorite impact. Long term, one solution to both these problems is to establish an alternative presence in space, motivated by space resource extraction. Space resource extraction – for instance, through asteroid mining – would simultaneously create a backup human presence in case of disaster, and provide virtually infinite resources to sustain ever-growing human consumption patterns. There are materials enough in the Kuiper asteroid belt alone to sustain our species indefinitely.

**How to Get There?**

The challenge is to extract, transport, and use those resources in an economical way. This paper will examine this question, connecting it to theme of broader societal benefits that can derive from space resource extraction. Three societal benefit categories will be examined:

- Pure scientific advancement;

- Infrastructure and technology development; and
- Far future possibilities, including terraforming and long-term societal organizing principle scenarios