

# The New Space Economy

by George Sowers

We are here to talk about the new space economy. But at this point in time we are stuck in the old space economy which I characterize by big government programs, a few big contractors, little competition and no growth. In contrast, the new space economy will have a mix of government and commercial programs, a diversity of contractors, strong competition and exponential growth. But we will remain stuck in the old space economy unless we fundamentally change the way we as a nation approach the space program. Such a new approach was proposed by President Obama in his speech of April 15. The president outlined a bold vision for sustainable space exploration, harnessing the energy and creativity of the private sector and setting forth measured steps to establishing a permanent human presence beyond earth and creating a robust and vibrant new space economy.

I am certainly not a spokesman for the administration, but let me briefly describe the President's plan as I see it and how it enables the new space economy. I view the plan as four overlapping phases.

First is reconstituting a U.S. capability to deliver humans to low earth orbit (LEO), post shuttle retirement. The president proposes to accomplish this by directing NASA to purchase crew transportation services from the private sector. This seems to be the part of the plan drawing the most fire. I've heard comments like "the private sector is not ready to do this", and "the private sector doesn't have the capability", and even that "this would jeopardize our national security."

So let me remind you of a few facts. First, the national security space community elected more than a decade ago to purchase all of its space transportation services from the private sector, specifically the Atlas and Delta rockets provided by ULA. The satellites that provide essential capabilities, like communications and navigation, to our men and women on the battlefield are launched by the private sector. Our most exquisite and expensive intelligence satellites that provide crucial information to our decision makers in Washington are launched by the private sector. And when you hear the Air Force talk about national security space the first

thing they do is laud the tremendous success record they've enjoyed with their launch program (62 consecutive successes) at half the cost.

Second, the NASA science community has been purchasing their launch services from the private sector for more than two decades. They've also enjoyed a tremendous success record. And this includes one-of-a-kind space probes like the Pluto mission which underwent a very rigorous nuclear safety certification process because of the nuclear power source on board.

The overarching goal of privatizing crew transportation is to lower the cost of exploration by minimizing the cost to get humans to LEO, while maintaining the highest level of safety. Government investment to develop crew transportation systems will lower barriers to entry for truly commercial space ventures like the Bigelow space station, a strong first step in creating the new space economy.

The second phase of the plan is making long overdue investments in critical technologies for sustainable exploration. Foremost among these, in my mind, is the capability to store and transfer cryogenic propellants in orbit. Mastering these skills provides a tremendous amplification of the performance of Earth to LEO transportation systems, dramatically reducing and potentially eliminating the need for large heavy lift launch vehicles to perform beyond LEO missions. The huge investment required to develop a large heavy lift vehicle combined with the enormous fixed costs to simply maintain the capability and its infrastructure make heavy lift a serious barrier to sustained exploration. Enormous rockets require enormous factories to build them; they need enormous transportation systems to get the hardware to the launch site; they need enormous launch sites manned by an enormous standing army. This was the lesson of Apollo, the lesson of the shuttle and we were headed down the same disastrous path with Constellation.

On orbit propellant depots remove this significant barrier. The technology for tankers and depots is already fairly mature. A straightforward development path leads to fielded capability well before the end of the decade. Again, one benefit of government investment in depots is the market created for the delivery of propellant, another step on the way to the new space economy.

Other technology investments are aimed at methods and capabilities for long-term human missions beyond Earth orbit, including in-space habitation, in-space propulsion, and automated rendezvous and docking.

The key here is a paradigm shift in the way to accomplish beyond LEO exploration. The old way was big-bang type missions where everything was launched from the ground on one gargantuan rocket. The new approach is to establish in-space infrastructure and the skills to effectively utilize it.

Which brings me to the third phase of the administration's plan: the intermediate destinations. Robotic exploration missions will complement a series of human missions of increasing difficulty to Lagrange points, lunar and asteroid flybys, Martian flybys, and eventually lunar and asteroid landings. The point of these missions is to learn to walk before we run, to perfect our technologies and techniques in steps, and to construct a robust space transportation system and in-space infrastructure, not tied to a single mission or point solution, but designed to be flexible and extensible to a variety of missions.

Fourth is human exploration of Mars. As stated by the Augustine committee, the point of the space program is to establish a permanent human presence beyond Earth, to include the establishment of colonies. Mars is the obvious first choice for a self-sustaining permanent colony with its huge land mass, natural resources and atmosphere.

Underpinning the entire plan is the realization that lowering the cost to deliver people, cargo and propellant to LEO is essential. By establishing new markets for human transportation and propellant, as well as potentially enabling adjacent commercial markets, the Administration's plan has the potential to increase launch rates well beyond those ever experienced. By enabling true competition, this approach promises to fundamentally change the economics of space exploration, moving the industry into a regime of production and launch efficiencies that will dramatically lower costs. This will result in a robust and vibrant industrial base and dramatically increase the pace of innovation. A virtuous circle will be established that will enable even more commercial space business, including perhaps space solar power, an inexhaustible, completely green solution to our long term energy needs.

At this point, we will have created the new space economy, dominated by robust true commercial businesses, creating thousands of new jobs, experiencing exponential growth—but jump-started by a bold new government plan for space.

Thank you and I look forward to your questions.