

NASA's Space Launch System: Affordability for Sustainability

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Abstract

The National Aeronautics and Space Administration's (NASA) Space Launch System (SLS) Program, managed at the Marshall Space Flight Center, is charged with delivering a new capability for human exploration beyond Earth orbit in an austere economic climate. But the SLS value is clear and codified in United States (U.S.) budget law. The SLS Program knows that affordability is the key to sustainability and will provide an overview of initiatives designed to fit within the funding guidelines by using existing engine assets and hardware now in testing to meet a first launch by 2017 within the projected budget. It also has a long-range plan to keep the budget flat, yet evolve the 70-tonne (t) initial lift capability to 130-t lift capability after the first two flights. To achieve the evolved configuration, advanced technologies must offer appropriate return on investment to be selected through the competitive process. For context, the SLS will be larger than the Saturn V that took 12 men on 6 trips for a total of 11 days on the lunar surface some 40 years ago. Astronauts train for long-duration voyages on platforms such as the International Space Station, but have not had transportation to go beyond Earth orbit in modern times, until now. To arrive at the launch vehicle concept, the SLS Program conducted internal engineering and business studies that have been externally validated by industry and reviewed by independent assessment panels. In parallel with SLS concept studies, NASA is now refining its mission manifest, guided by U.S. space policy and the Global Exploration Roadmap, which reflects the mutual goals of a dozen member nations. This mission planning will converge with a flexible heavy-lift rocket that can carry international crews and the air, water, food, and equipment they need for extended trips to asteroids and Mars. In addition, the SLS capability will accommodate very large science instruments and other payloads, using a series of modular fairings and adapters to configure the rocket for the mission. The SLS affordability plan includes streamlining interfaces, applying risk-based insight into contracted work, centralizing systems engineering and integration, and nurturing a learning culture where the question "Why?" is often asked and the answer "Because we've always done it that way" is rarely heard. The SLS Program will deliver affordable space transportation solutions for the Orion Multi-Purpose Cargo Vehicle's first autonomous certification flight in 2017, followed by a crewed flight in 2021. As this briefing will show, the SLS will offer a global infrastructure asset for robotic and human scouts of all nations.