

SPACE SYSTEMS SYMPOSIUM (D1)  
Space Systems Architectures (4)

Author: Mr. Joshua Freeh  
NASA Glenn Research Center, United States

Mrs. Laura Burke  
United States

Mr. Waldy Sjauw  
NASA Glenn Research Center, United States

Ms. Melissa McGuire  
NASA Glenn Research Center, United States

Mr. Bryan Smith  
NASA Glenn Research Center, United States

## COMPARISON OF SOLAR ELECTRIC AND CHEMICAL PROPULSION ARCHITECTURES

**Abstract**

Solar Electric Propulsion (SEP) offers fuel efficiency and mission robustness for spacecraft. The combination of solar power and electric propulsion engines is used for missions ranging from geostationary stationkeeping to deep space science because of these benefits. Both solar power and electric propulsion technologies have progressed to the point where higher electric power systems can be considered, making substantial cargo missions and potentially human missions viable. This paper evaluates and compares representative lunar and Mars mission architectures using SEP and chemical propulsion subsystems and the combination of both. The potential benefits and limitations are discussed along with technology gaps that need to be resolved for such missions to become possible. The connection to NASA's human architecture and technology development efforts will be discussed.