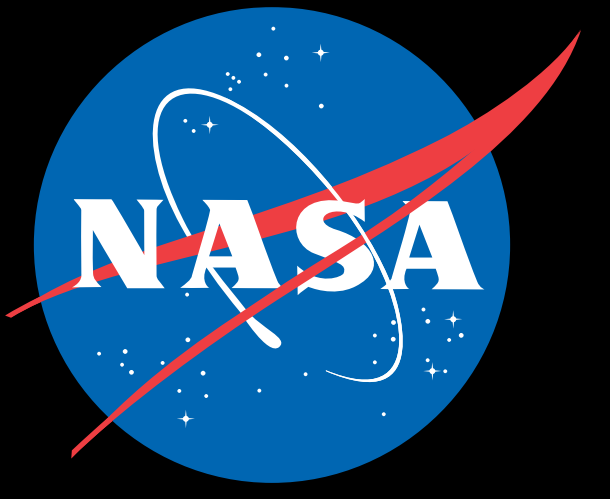




Space Technology Mission Directorate Game Changing Development Program Advanced Alkaline Fuel Cell (AARC) ACO

Project Overview

NASA needs energy storage for lunar applications where night lasts up to 354 hours. Reversible fuel cell systems are potentially well-suited for long-duration storage but must have high reliability to last the long (>4-5 years) maintenance cycle. Moving parts (compressors and blowers) are the primary limitation for high reliability fuel cell systems. Further, H₂ and O₂ have numerous ISRU applications, including propellant, life support, and chemical processes.

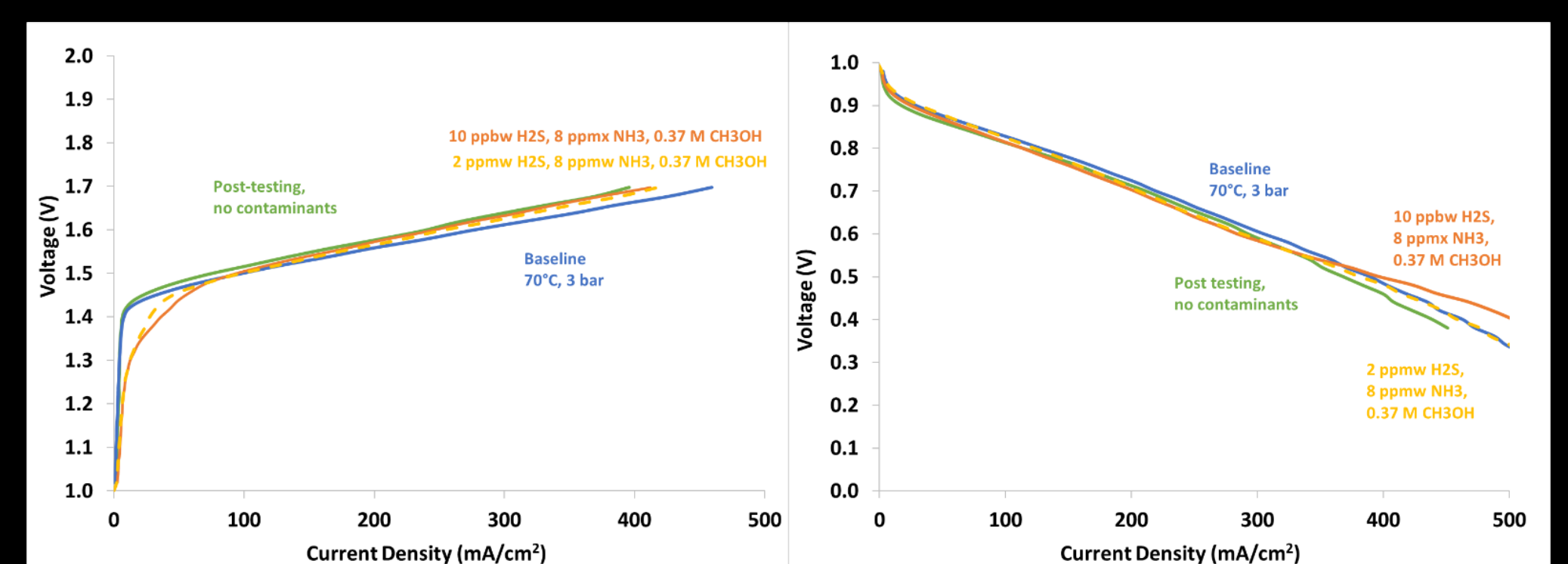
Technical Approach

The project is developing a unitized reversible fuel cell system based on a unique cell design. The mostly passive system will have no moving parts except for an electrolyte circulation pump. This project is focused on cell design and its ability to process various water contaminants likely to be discovered in ISRU water. Local water increases the launch-mass system energy density to >1,000 Wh/kg and enables the system to be used for ISRU applications.

Additional Information

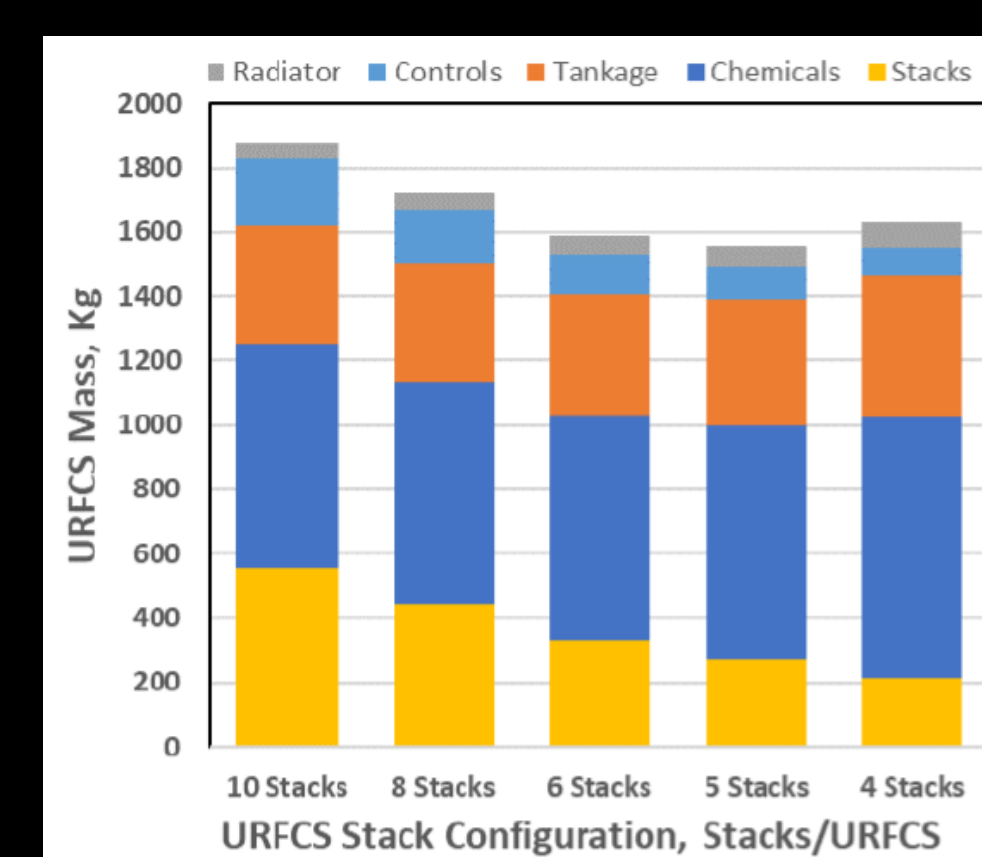
Lunar Contaminant Testing:

- Initial testing suggests potential to operate using lunar water with an H₂S sorbent bed



Lunar Trade Study:

- Depending on storage duration (i.e., location) and assumptions, specific energy ranged from 640 to 814 W·h/kg



Contributing Partners and/or Infusion Plans

- BRACES-TP (related GCD project to develop a prototype system)
- NASA Glenn Research Center
- NASA Johnson Space Center
- Power to Hydrogen, LLC
- Shell GameChanger