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DEVELOPMENT OF AN ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR
DEEP SPACE AND COMMERCIAL VEHICLES**Abstract**

Compared to the Environmental Control and Life Support System (ECLSS) used on the International Space Station (ISS) and on short-duration vehicles like Orion and Commercial Crew vehicles, long-duration missions to deep space, the Moon, Mars, and beyond require higher performance, reliability, and resiliency while still meeting mission volume, mass, power, cooling and crew-time constraints. Honeywell, Paragon, Precision Combustion, and Giner have joined forces to conceptualize an Exploration ECLSS that provides the needed capabilities for deep space life support and sustained commercial human space use. Key ECLSS subsystems include Honeywell's Carbon Dioxide Removal by Ionic Liquid Sorbent (CDRILS) system, Precision Combustion's Sabatier Reactor, Giner's Oxygen Generation Assembly, Honeywell's Methane Pyrolysis Assembly, Paragon's Urine Processor Assembly, and Paragon's Brine Processor Assembly. This paper describes the team's ECLSS architecture, identifies capability and reliability gaps closed from the ISS ECLSS, the benefits of closely coupling some subsystems, and explores how the ECLSS subsystems may be selectively integrated to meet the needs of various missions.