

ISRU Advanced Alkaline Electrolyzer (AAE) BAA

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Technology Goal/Objective: Develop and Test a Contaminant-Tolerant Water Electrolyzer for ISRU Applications

Teledyne Energy Systems, Inc. (TESI) will develop and test an alkaline water electrolyzer to address the production of oxygen and fuel from ice mined on the Moon or Mars. Based on a TESI commercial product, this electrolysis system includes features that minimalizes ISRU water feedstock processing (clean-up) requirements. When supplied by 6.5 ± 0.2 kW electrical power, the target production rate is $1.1 \text{ kg O}_2 / \text{hr}$ resulting in 5.6 to $6.1 \text{ W}/(\text{kg O}_2/\text{hr})$. In parallel, the stack will demonstrate sustained electrolysis system operation without performance degradation on maximum level of NASA-identified contaminants found in ISRU water feedstock.

Technical Approach

- Modify existing COTS product to tolerate likely ISRU contaminants
- Demonstrate operation of single-cell on pure water and NASA-specified ISRU water
- Demonstrate multi-cell stack and system performance on pure water and on NASA-specified ISRU water
- JPL tests stack and system performance with stack in vacuum chamber (BAA Option 1)

Task Status

- Single-cell testing on pure water and NASA-specified ISRU water completed; Optimum operating point identified and resilience to NASA-specified contaminants demonstrated
- Multi-cell stack and system design reviews completed; hardware fabrication is in process

