National Defense Center for Energy and Environment

SULFUR TOLERANT SOLID OXIDE FUEL CELL (SOFC)

PROJECT OVERVIEW

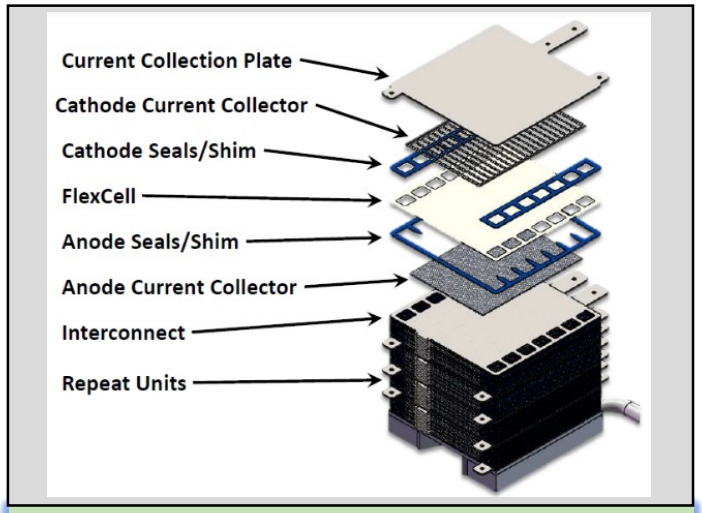
Power and energy provided by fuel cells offer higher efficiency compared to current combustion/turbine engines, translating to reduced fuel consumption and noise. The downside is the fuel cells run on pure hydrogen gas, a logistical challenge, as well as the sulfur in JP-8 fuel which is converted to hydrogen, is a poison to the catalysts in the hydrogen producing reformers and fuel cells. The objective is to develop sulfur-tolerant solid oxide fuel cell (SOFC) stacks, without the need for a sulfur removal subsystem which is ready for testing, demonstration, and integration with a JP-8 reformer. The product will be integrated into a standalone generator, a vehicle auxiliary power unit, or provide propulsion for a manned/unmanned vehicle.

BENEFITS

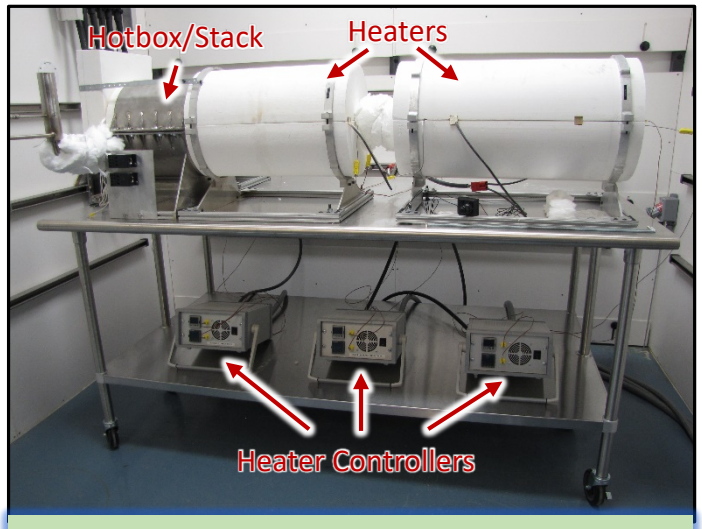
Stakeholders/Beneficiaries include USSOCOM, Army Ground Vehicle Robotics, and Air Force Unmanned Aerial Vehicles (UAV). All applications will benefit from electrical power generation that is quieter, longer lasting, and more fuel efficient than traditional sources. A successful outcome to this NDCEE project will result in the SOFC generating up to 5-kW of power, for a mission duration limited only by the amount of JP-8 fuel the Special Forces operator, robotic vehicle, or UAV can carry.

PATH FORWARD

The completion of this project promotes the following technical areas for future activities. On-site stack testing and characterization capabilities at TARDEC's Ground Systems Power and Energy Laboratory are increased. Improved operating capabilities of sulfur tolerant SOFCs promote increased ground vehicle range, autonomy and power generation for external devices. Finally, development of sulfur tolerant SOFCs grants unmanned and manned aerial vehicles increased range and additional power for increased electronic capabilities in commercial and military applications.



Expanded View of SOFC Stack



SOFC Stack Testing Apparatus

DoD Executive Agent

Office of the Assistant Secretary of the Army for Installations, Energy, and Environment

FOR FURTHER INFORMATION

National Defense Center for Energy and Environment
http://www.denix.osd.mil/ndcee/home

U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC)
http://www.army.mil/tardec