

Lockheed Martin Fuel Cell Gensets and APUs

Generator sets (gensets) used by the U.S. Army in Iraq and Afghanistan are the largest consumers of fuel in the battlefield. Delivering this fuel (JP-8) to soldiers in forward areas is very expensive and dangerous. Operational costs of delivering the fuel ranges from tens to hundreds of dollars per gallon; and the convoys transporting the fuel are some of the most exposed soldiers in the field.



Solid Oxide Fuel Cell (SOFC) technology developed by Lockheed Martin collaborator Technology Management Inc. (TMI) is an alternative means of generating electrical power from JP-8 fuel and includes the following key benefits:

- Significantly more fuel efficient than conventional gensets – will reduce genset fuel usage by one third to one half.
- Sulfur tolerant – TMI has the only fuel cell system technology that can run on the Department of Defense's standard JP-8 fuel without complex, inefficient, and logistically difficult desulfurization processes used by other SOFC providers.
- Quiet – SOFC gensets are much quieter than the gensets currently used by the Armed Forces.
- Cleaner – SOFC gensets have a smaller carbon footprint, and reduced emissions, compared with current day conventional gensets.

The Department of Defense owns more than 100,000 gensets. The U.S. Army alone has 85,000, which require more than 300 million gallons of JP-8 fuel per year to operate. Since the end of World War II, the use of fuels has risen 175 percent to 22 gallons per soldier per day, according to a recent study by Deloitte Consulting. And that percentage is predicted to increase. The long fuel convoys required to deliver the fuel are especially vulnerable to attack. Operating more efficient gensets will save significant operational costs and save soldiers' lives.



1 kilowatt SOFC genset operating at Lockheed Martin, running on DoD standard JP-8 fuel



USMC MGen Mattis:

"Free us from the tether of fuel"

In addition to tactical gensets, the Lockheed Martin / TMI SOFC technology is directly applicable to Army combat and non-combat vehicle Auxiliary Power Units (APUs). These SOFC-based APUs enable vehicles to operate onboard electronics when stationary, significantly decreasing fuel usage.

Why The Lockheed Martin Team?

TMI has built multiple 1 kW-scale laboratory gensets. These are complete systems, with fuel in and 110V 60Hz AC electrical power out. They have recently demonstrated more than 600 hours complete system operation on standard JP-8 fuel, with sulfur, including 475 hours continuous operation in August-September 2009 under the Ohio Third Frontier program with Lockheed Martin.

Lockheed Martin is now working with TMI to improve the overall system performance, packaging and ruggedness, to transition the technology from the lab to the front lines, meeting the 'MIL Standards' to survive in the harsh battlefield environment.

Lockheed Martin is investing internal R&D funds to mature this technology, and is also working with TMI to seek out additional external funds to accelerate maturation of this technology.



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