



Expeditionary Energy Program Portable Fuel Cell Power Systems for the Dismounted Soldier



OBJECTIVE:

- A self-contained, soldier portable, power system operating on methanol or other liquid fuel in the power range of 100 to 200 Watts.

PAYOFF:

- Reduced weight and volume over batteries
- Recharges multiple batteries
- Capable of directly powering equipment
- Provides quick cost recovery over disposal batteries
- Negligible signatures
- Environmentally benign

TECHNICAL APPROACH:

- Reformer prototypes developed by PNWD for Army
- High performance fuel cell stacks
- Lightweight, small volume, high energy density
- COTS components
- Universal battery charging capability
- “Plug and play” operation

PERFORMERS: Battelle Pacific Northwest Division; MTS Technologies, Inc.; Office of Naval Research (ONR-353) Science & Technology-USMC Logistics

SCHEDULE:

Tasks	Yr 1	Yr 2	Yr 3	
Select Design Point	◆◆			
Integrate Thermal Components	◆◆◆			
Device and Component Lifetime Testing	◆	◆◆◆◆◆◆◆◆◆◆	◆	
Component Specification/Acquisition	◆◆◆			
Manufacturing Study	◆◆◆			
Design and Fabricate Demo Unit	◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Ruggedization			◆◆◆◆◆◆◆◆◆◆	
Design for Manufacturing Assessment		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Systemization/Packaging		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Improved Controls		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Fuel Cell and BOP Tech. Assessment		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Demonstration, TRL = ◆		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
Summary Report		◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆	
FY	2003	2004	2005	2006
Total Cost by FY (\$1000s)	495	950	1000	350



Portable Fuel Cell Power Systems for the Dismounted Soldier



1. The problem:

- Power requirements for the dismounted Soldier are increasing as more electronic systems come online.
- Batteries lack the necessary energy density to meet future power needs and more batteries add to the soldier's weight burden.
- Fuel cell power systems are the solution to the problem.

2. Major barriers:

- Fuel cell stacks require hydrogen, which must either be stored and carried or produced in situ from liquid fuels.
- Availability of a suitable fuel processor; small, lightweight, efficient, and robust, has been the principal barrier to viable fuel cell power systems.

3. How to overcome:

- Microchannel reactors and advanced catalysts combine to provide a small, efficient fuel processor for fuel cell applications.

4. What is the capability you are developing and where is it described?

- A self-contained, portable power system operating on methanol or other liquid fuel. Power ~100-200 W.

5. What is the product of this ATD? (Include M&S)

- TRL 7 demonstration of power system.

6. Quantitative Metrics: (Including Affordability)

- Current achievable capability: TRL4
- Minimum acceptable capability: TRL 7
- Initial capital cost, but ultimately much less expensive than batteries, since the only consumable is fuel/water.

7. What is the Warfighter Payoff?

- Soldier-portable, reliable, lightweight and quiet power system for field use.
- Lighter and more energy dense than equivalent batteries.

8. Transition Milestones:

- System functional demonstration, TRL 5, 1st year.
- Integrated system demonstration, TRL 6, 2nd year.
- Optimized/ruggedized field trial unit, TRL 7, 3rd year.

9. Endorsements:

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10. How are you leveraging non-Naval funding?

- Project builds on three years (\$2.1M) of Army-funded research.
- Leverages another \$405K of Army funds.