

— Press Release —

Fuelcell Propulsion Institute
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Fuelcell Locomotive for Military and Commercial Railways

An international consortium is developing the world's largest fuelcell vehicle, a 109 metric-ton, 1 MW locomotive. The five-year project, which commenced 27 May 2003, will develop and demonstrate the first fuelcell-powered locomotive for military and commercial railway applications. Fuelcells are solid-state devices that directly convert the energy of a fuel into electric power. Based on electrochemistry rather than combustion, they are efficient, quiet, and have zero emissions.

The project was conceived, organized, and is led by Vehicle Projects LLC of Denver, USA, and is funded and administered by the US Army Tank-automotive and Armaments Command (TACOM), National Automotive Center (NAC), Warren (MI), USA, via prime contractor Jacobs Engineering Group Inc, Pasadena, USA. Vehicle Projects previously developed and demonstrated a fuelcell mine locomotive and is also developing a 23 metric-ton, 100 kW fuelcell-battery hybrid mine loader (see www.fuelcellpropulsion.org), both projects supported by the US Department of Energy and Natural Resources Canada.

Objectives of the project are to (1) develop the fuelcell locomotive by retrofitting an Army diesel-electric locomotive with a fuelcell powerplant, (2) demonstrate the locomotive in an Army non-tactical application, and (3) facilitate commercialization of fuelcell power for rail transportation. The US Department of Defense has an exemplary track record in "dual-use" technology development – technology that has led to both military and commercial applications, e.g., the Internet and GPS. This project can similarly lead to important dual-use applications of fuelcell vehicles. Potential commercialization paths and follow-on demonstration projects include subway utility locomotives, switchers, commuter rail, subway trains, light rail, heavy freight, and high-speed rail.

The project consists of four phases: (1) feasibility and conceptual design, (2) powerplant fabrication, (3) integration of the locomotive vehicle, and (4) demonstration in a non-tactical Army application. Phase 1, currently under contract, includes (a) comparison of the cost-benefit, performance, safety, and marketability of fuelcell locomotives with diesel-electric and electric (trolley) locomotives, (b) determination of the best fuelcell-locomotive fuel, along with fuel production methods and the potential for renewable fuel, (c) determination of the best fuelcell type, and (d) conceptual design of controls, sensors, packaging, and refueling. Available funding for Phase 1 is US\$1 million, which covers all oversight, management, and execution costs. Estimated total cost of the five-year project is US\$12 million.



1 MW Army fuelcell locomotive to be derived from diesel-electric locomotive (shown)

Phase 1 involves approximately 20 project participants. Technical analysis is being performed under management of Vehicle Projects LLC by AeroVironment Inc, Monrovia (CA), USA (powerplant design); Defense NTG & Rail Equipment Center, Hill Air Force Base (UT), USA (locomotive packaging and integration); Southwest Research Institute, San Antonio, USA (fuel identity and production); Transportation Technology Center, Inc (TTCI), Pueblo (CO), USA (applications, fuel-storage, and locomotive performance); Volpe National Transportation Systems Center, Research Special Program Administration, US Department of Transportation, Cambridge, USA (safety, economics, and marketability); and Westinghouse Savannah River Company (pending), Aiken (SC), USA (hydrogen fuel and primary energy). Commercialization guidance is provided by prospective end-users of fuelcell locomotives: BNSF Railway Company, Ft. Worth, USA (heavy freight applications); New York City Transit, New York City, USA (subway transit applications); Regional Transportation District – Denver, Denver, USA (commuter and light rail applications); and Tube Lines/London Underground (pending), London, UK (subway transit applications). Expertise in specific fuels and fuelcell types is provided by several companies or trade associations, including the Fertilizer Institute, Washington (DC), USA (liquid ammonia as fuel); HERA Hydrogen Storage Systems Inc, Montreal, Canada (metal-hydride storage); Intelligent Energy, London, UK (PEM fuelcells), Methanol Institute, Washington (DC), USA (methanol as fuel); Nuvera Fuel Cells Europe, Milan, Italy (PEM fuelcells); and Nuvera Fuel Cells, Cambridge, USA (hydrocarbons as fuel). Stakeholder education is provided by the nonprofit Fuelcell Propulsion Institute, Denver, USA; nonprofit WestStart, Pasadena, USA; and by Madison Government Affairs, Washington (DC), USA.

By advancing the commercialization of fuelcell vehicles, major benefits of the project include increased energy efficiency of the transportation sector, increased national energy security by reducing dependency on imported oil, improved environmental quality, and positioning the project partners into leadership roles in advanced rail transportation.

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