

Ongoing Success Stories in the Transportation Sector

Because the transportation sector is 97% dependent on oil, an important focus of the Office of Conservation and Renewable Energy is to reduce oil use in vehicles. This is a formidable but important task; transportation systems in this country used 10.7 million barrels of oil per day in 1988, accounting for 27% of all energy and 63% of the oil used in the United States. By reducing oil consumption, the nation should realize numerous economic and environmental benefits.

Toward this end, DOE conducts R&D programs designed to improve energy efficiency and enhance the flexibility of fuel-use options in transportation-related technologies. Accordingly, DOE focuses on the development of electric and hybrid vehicles; research on advanced engine systems, such as the automotive gas turbine and heavy duty (low heat-rejection) diesel engines; application of advanced materials (e.g., ceramic engines and parts); and development of alternative motor fuels. In addition, DOE publishes the Gas Mileage Guide and conducts a variety of other technology transfer and assessment activities.

Electric Vehicle Site Operations Program

DOE supports a wide range of research on electric vehicles in conjunction with academic institutions, other Federal agencies, and the private sector. This research is consistent with directives contained in the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976. The DOE Electric Vehicle Site Operations Program provides a means of testing and evaluating the effectiveness of new electric vehicle technology, primarily in the areas of advanced systems, subsystems, and components.

Numerous technological developments have occurred since DOE-sponsored research activities began. Since its inception, this program has evaluated more than 20 electric vehicle types and 16 specific product improvements. The results of testing indicate that research objectives are being met and often

exceeded. Electric vehicle energy consumption has been reduced by more than 50%, reliability levels have increased by 78%, maintenance costs have been reduced by 60%, and overall life-cycle costs have been reduced by 67%. The Electric Vehicle Site Operations Program provides potential private sector investors with design validation and unbiased information on specific applications for these vehicles.

Dual-Shaft, Advanced Alternating-Current Propulsion System

Market studies have determined that commercial vans could be the first market niche for electric vehicles. DOE's Dual-Shaft Electric Propulsion System Technology Development Program responded to this opportunity by successfully developing an electric propulsion system for a lightweight van. The major emphasis of this program was to advance existing battery and power train technologies through integrated development of a nickel/iron battery, an alternating-current motor and controls, and an automatic two-speed transaxle. The program involved an industrial research team made up of Eaton Corporation's Corporate R&D, the prime contractor, responsible for power train technologies and propulsion system integration; Eagle-Picher Industries, responsible for battery technology; and ASC, Inc., responsible for vehicle modification.

Program participants designed, built, and tested three advanced, proof-of-concept propulsion systems, which were installed in Chrysler T-115 minivans. The first of these vehicles was evaluated on the testbed; the other two were delivered to DOE as demonstration vehicles for further evaluation. The program achieved all of its objectives, with the exception of anticipated battery life. Vehicle performance goals for acceleration, gradability, top speed, range, and energy efficiency were reached or surpassed.

The program has provided industry with an advanced propulsion system technology for electric