

New Super-Efficient Plug-in Hybrid Unveiled

May 18 2006

"Trinity," a highly fuel-efficient plug-in hybrid vehicle, was unveiled today by engineering students at the University of California, Davis. The vehicle is the team's entry in the national Challenge X competition, sponsored by General Motors Corp. and the U.S. Department of Energy. Field trials for the competition will take place in Phoenix next month.

Trinity is a 2006 model Chevy Equinox SUV powered by electric motors and a small internal combustion engine that can run on gasoline or ethanol. The electric motors and batteries provide power for driving at low speeds and for a range of up to 40 miles, and the gas engine supplies additional power for longer journeys and highway driving.

"This is a car that is completely sustainable with no oil at all," said Andy Frank, professor of mechanical and aeronautical engineering at UC Davis, who advises the team. Trinity does all the things a conventional model of the vehicle can do with higher performance, Frank said.

Unlike hybrids currently on the market such as the Toyota Prius, Trinity's batteries can be recharged from a domestic power supply, allowing the vehicle to be powered by cheap off-peak electricity. This reduces fuel consumption and emissions and allows the vehicle to run exclusively on electric power for most short trips around town.

Computer models run by the team show that Trinity's average gas consumption in everyday use could reach about 200 miles per gallon, assuming an all-electric range of 40 miles, said graduate student Peter

English, outreach coordinator for the team.

As part of the project, team members have been teaching classes on hybrids at Vaca Pena Middle School in Vacaville and Little Oak Rural School in Oregon House, east of Yuba City. The school students have been working on controls for electric motors and aim to move on to building hybrid go-karts and eventually a hybrid car, English said.

Frank sees plug-in hybrids as a way to integrate transportation energy use with stationary energy systems for homes and businesses. Solar panels on home rooftops could be used to charge vehicle batteries for driving. While parked and plugged in, vehicles could feed stored energy back to the home or to the electricity grid.

Trinity also carries a small on-board fuel cell to provide auxiliary power for air conditioning, entertainment systems and other services.

Trinity is the latest refinement in a series of award-winning plug-in hybrids built by Frank and his students. Others include "Sequoia," a Chevy Suburban, and "Yosemite," a Ford Explorer. The group has also built high mileage versions of the Mercury Sable and other cars.

The original unmodified vehicle was donated by General Motors and supplied locally by Hanlees Chevrolet of Davis for the competition.

Challenge X is a three-year national competition sponsored by General Motors, the U.S. Department of Energy (DOE) and other partners. Engineering students from 17 universities across North America are challenged to re-engineer a mid-size SUV to achieve better fuel economy and lower emissions. The program provides the opportunity for engineering schools to participate in real-world research and math-intensive development with leading-edge automotive propulsion, fuels, materials and emissions-control technologies.

In the first year (2004-5), teams worked on vehicle design using the same techniques and software as auto industry designers. Over the past year, they have worked on putting their designs together in an actual vehicle, which will compete in field tests this June. In the final year (2006-7), they will refine their vehicles leading up to the final competition.

Source: UC Davis

Citation: New Super-Efficient Plug-in Hybrid Unveiled (2006, May 18) retrieved 20 March 2024 from <https://phys.org/news/2006-05-super-efficient-plug-in-hybrid-unveiled.html>

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