



Fuel cell sets 3,836 km/l record ; Gasoline wins climate prize

NOGARO, France -- Hydrogen-powered cars were most efficient on the road during a record-breaking weekend at the Shell Eco-marathon, but two gasoline-powered cars had their revenge by using less overall energy when considering the materials used to make the car and the fuel.

The first ever Climate Award was given to the Lycee Professionel des Metiers de l'Automobile of Nord-Pas-de-Calais, France, after it tied with the Instituto Superior Politecnico of Portugal for overall efficiency. Although two hydrogen vehicles with better mileage were in the category, the energy used in making the cars and the fuel meant less total carbon dioxide was sent to the atmosphere by the gasoline cars.

Student engineers set new efficiency records for hydrogen on the former Grand Prix test tract here. The results mirror the experience of the transportation industry: internal combustion engines have achieved fabulous efficiency after 100 years of development, and gasoline engines achieved 7 of the top 10 spots, but fuel cells, which make electricity from hydrogen, are one of the possible paths for the future.

"Fuel cells are very efficient in extracting energy from hydrogen, and electric motors are more efficient than internal combustion engines," said Shell's Jean-Nicolas Desprez, who measured the 1.75 grams of hydrogen used by the record-breaking PAC II prototype to travel 25.272 km. Based on calculations of latent energy in different fuels, the PAC II, made by the Ecole Polytechnique Federale in Zurich, Switzerland, achieved a new world record of 3,836 km/l. The previous record was 3,794 km/l, held by LPTI La Joliverie, a high school in St. Sebastian-sur-Loire, France, that specializes in internal combustion engines.

A general movement toward fuel cell development was apparent at the Shell Eco-marathon. Six of the 200 vehicles entered this year used fuel cells, up from one two years ago and three in 2004. Hydrogen entries from the Universite de Liege in Belgium ranked 8th in its second year of prototype competition with 2,136 km/l, The team from ESSTIN in France placed 10th in its first fuel cell year, VSB – Technicka University of the Czech Republic achieved 946 km/l, and the novice University of Denmark team won the Urban Concept class for four-wheeled, upright vehicles with 671 km/l, more than double last year's mark set by a gasoline entry.

Winners of two other classes of fuel, diesel and LPG, said they will consider a switch to hydrogen next year.

Fachhochschule of Offenberg, Germany, won the diesel category with 1,807 km/l, good for 11th place overall. Diesel engines are heavy and bulky for small race vehicles, said team director Ulrich Hochberg, but they are very efficient in larger vehicles like trucks and ships. Next year, he said, the school may develop a fuel cell and design a new car around it for 2007.

The LPG prototype of Association Team Callo in Redon, France, finished 12th with 1,804 km/l, and team leader Guy Divet believes liquefied natural gas is the best choice for reducing pollution in the near future because it contains more energy than gasoline and can be injected more precisely. Nonetheless, he said, next year his school also will consider a hydrogen car.

La Joliverie, whose Microjoule is the world champion of gasoline vehicles, will stick with gasoline because that is what its students study, but it is talking about a joint venture with the Ecole

Polytechnique of Nantes to create a Polyjoule using La Joliverie's knowledge of the chassis and bodywork and the Nantiens' fuel cell motor.

While leading teams that hope to set new world records may switch to hydrogen, gasoline will continue to dominate the Shell Eco-marathon for the same reason it prevails in the marketplace: cost. A gasoline lawnmower engine can cost less than 100 euros, while fuel cells cost about 3,000 euros.

And teams will continue to explore solar power, diesel, biofuels, hybrid drives and other yet undiscovered methods of going around a race track.

"What is important to Shell is that students spend their school year thinking about how to use less energy," said Serge Giacomo, Shell's head of external affairs. "It doesn't matter what fuel they use."

Class leaders (km/l equivalent)

Overall: ETH Zurich (CH), 3,836; Univ. Paul Sabatier (FR), 2,560; Lycee La Joliverie (FR), 2,385

Hydrogen: ETH Zurich (CH), 3,836; Universite de Liege (BE), 2,136 ; ESSTIN (FR), 1,894.

Gasoline: Univ. Paul Sabatier (FR), 2,560; Lycee La Joliverie (FR), 2,385 ; Tampere University of Technology (FI), 2,303.

Diesel: Fachhochschule Offenberg (DE), 1,807 ; IUT Valenciennes (FR), 1,568 ; Association Optima (FR), 1,390.

LPG: Association Team Callo (FR), 1,804 ; IFMA Clermont-Ferrand (FR), 754 ; Ecole Centrale de Nantes (FR), 709.

Urban Concepts: Technical University of Denmark (fuel cell) (DK) 671; Lycee Louis Delage (FR) 425; Faculdade de Engenharia da Universidade Porto (PT) 241.

Special awards

Climate: Lycee Professionel des Metiers de l'Automobile (FR)

Bosch Technical Innovation prize: ETH Zurich (CH) ; Technical University of Denmark (DK) ; ESTACA Paris (FR)

Design: Externato Secundario de Solto (PT) ; Lycee Professionel de La Rochette (FR); Faculte Polytechnique de Mons (BE)

Eco-conception: Universite de Liege (BE)

Autosur Safety prize: IUT de Lorient (FR); IUT GMP Poitiers (FR); ESSTIN (FR)

Adia Educational entertainment: IFTS de Charleville Mezieres (FR)

For more information : www.shell.com/eco-marathon

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