



Global Leader
Green Racing



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americanlemans.com



THE MICHELIN® GREEN X® CHALLENGE

AMERICAN LE MANS SERIES

The Green Challenge™ Story....

- 2005** – The U.S. Environmental Protection Agency and U.S. Department of Energy approach SAE International about using motorsports to progressively promote their alternative energy issues. SAE International recommends the American Le Mans Series.
- 2006** – Audi unveils its revolutionary R10 TDI clean diesel race car, winning at the Mobil 1 Twelve Hours of Sebring, the 24 Hours of Le Mans and Petit Le Mans in its inaugural year.
- 2007** – The American Le Mans Series goes all-green, introducing an ethanol blend (E10) with which all cars will compete except the Audi, competing with zero sulfur-free clean diesel.
- 2008** – The EPA and DOE in conjunction with SAE International declare the American Le Mans Series the only series to meet the green racing criteria and announce their intent to launch a Green Challenge award at Petit Le Mans. Corvette Racing, one of four cars using the newly introduced cellulosic E85 ethanol, wins the world debut of the Green Challenge. Penske Racing's Porsche RS Spyder with an innovative fuel efficient direct fuel injection wins the prototype class running E10.
- Corsa Motorsports, in conjunction with ZYTEK, announces plans to run a gas-electric hybrid.
- 2009** – Michelin announces sponsorship of Green Challenge, renaming the award MICHELIN Green® X® Challenge.

MICHELIN® Green X® Challenge

Michelin has long been committed to better mobility, meaning mobility that is “sustainable for the planet and society over the long term.” As a proud sponsor and integral partner in the American Le Mans Series, Michelin is furthering its commitment to environmental sustainability by sponsoring the **MICHELIN® Green X® Challenge** for 2009.

Through the **MICHELIN® Green X® Challenge**, all teams competing in the American Le Mans Series will also participate in the Challenge that will measure and reward teams for achieving the highest performance on the race circuit with the greatest fuel-efficiency and the least environmental impact*.

Today, Michelin displays a “Green X®” label on the sidewalls of its energy efficient tires, signaling to consumers a level of increased fuel-efficiency and reduced CO2 emissions.

MICHELIN® green energy saving tires include a variety of passenger car, light truck and commercial truck tires that are optimized for fuel economy by reducing their rolling resistance and weight without compromising other key performance factors such as traction, grip and tread wear.

www.michelinman.com

**as determined in the protocols established by the EPA, DOE and SAE International*



CHANGING THE PARADIGM OF MOTORSPORTS

“Motorsports has always enjoyed the distinction of being at the forefront of advanced automotive engineering and has been a primary catalyst for moving new technologies to the showroom floor. The leadership role the American Le Mans Series has taken by embracing open and diverse alternative fuel technology platforms has not only set the bar for automotive racing, but it has helped redefine the future of the transportation sector.”

- Andy Karsner, Assistant Secretary of Energy Efficiency and Renewable Energy, United States Department of Energy (2008)

A week before Petit Le Mans last October – the American Le Mans Series signature race of 1,000 miles – gas lines in Atlanta were more than an hour in length and regular gas was more than \$4.00 per gallon. The roller coaster ride of energy prices has made it all too clear that alternative energy sources and fuels are critical. In Europe, more than half of the automobiles operate on alternative fuels. Not only is fuel efficiency important, but reducing carbon emissions has become reality as the planet reacts negatively to an increase in greenhouse gases.

The American Le Mans Series is the only major racing series in the world where all its cars race on rules written for alternative “street legal” fuels and energy sources: cellulosic E85, E10, clean sulfur-free diesel and a gas-electric hybrid. It is the series where automobile manufacturers come to develop technologies for future consumer cars. And while the American Le Mans Series will not proclaim to have a solution for the volatility of energy prices, it will profess to providing a platform by which the auto industry can develop a diversity of alternatives and fuel efficiencies.

“We have always claimed to be the most relevant racing series on the planet,” said Scott Atherton, President/CEO of the American Le Mans Series. “Now we can play an even more relevant role through working with manufacturers on innovative and diverse alternative fuel solutions and technologies. Through that process, we are effectively putting the auto back into auto racing and taking the sport from a form that all too often is primarily entertainment-focused to one that is relevant and issue-focused. We are working with car companies on solutions that matter.”

IN THEIR OWN WORDS: *THE MICHELIN® GREEN X® CHALLENGE*

"From my perspective, winning the Green Challenge is the team's most significant achievement to date.... Corvette Racing's success in the Green Challenge proved the validity of cellulosic E85 as a good choice for those of you who drive some of the 3 million GM flex-fuel vehicles on the road today. There is no silver bullet to our nation's energy challenges, but nothing has done as much as ethanol to offset oil demand. It's a practical solution being implemented today while we continue to develop promising new technologies for tomorrow. In the race to protect and preserve the environment, there is no finish line."

-Tom Wallace, Global Vehicle Chief Engineer for Performance Vehicles/Corvette/GM

"Automobile racing spurs innovation in safety, performance and now clean technologies. Racing is the ultimate test track. If clean efficient technologies can survive the extreme driving of the American Le Mans Series, then they can certainly work for the morning commute. The American Le Mans Series' Green Challenge is a pioneering effort to help move green technology from the track to the street."

-Margo Oge, Director of Transportation and Air Quality, U.S. Environmental Protection Agency

We applaud the efforts of the American Le Mans Series for providing a platform like the MICHELIN® Green X® Challenge to showcase a variety of environmental technologies in racing. Michelin has always transferred technology from the track into winning performance for everyday consumers. Nowhere is that more evident than in the MICHELIN® Green X® Challenge. Stretching fuel in competition wins races. Lowering fuel consumption for consumers stretches wallets at a time when saving money and saving the planet are both top concerns. Sponsoring this key environmental competition is a natural fit for Michelin and together with our partners, we can help encourage teams and manufacturers to demonstrate a cleaner, more fuel-efficient way to race, while maintaining performance and the spirit of competition."

-Scott Clark, COO, Michelin Americas Small Tires

"Honda has long enjoyed a reputation in the marketplace as an environmentally conscious company and, under its Acura brand, is fully supportive of and enthused about the Green Challenge. Honda and Acura have always competed in racing for the primary purposes of developing our people and advancing the technology of the sport. The diverse technology platform embraced by the American Le Mans Series is what led us to launch our inaugural Series effort in 2007."

-John Mendel, Senior Vice President/American Honda Motor Company, Inc.

"From both the perspective of performance and publicity, the transition to renewable fuels in racing has been an unqualified success. Ethanol has passed the test with flying colors in the most demanding environments in motorsports. The message that we are sending to consumers is a powerful one – performance and environmental responsibility can coexist."

-Bobby Rahal, Team/Owner Rahal-Letterman Racing (former Indy 500 champion)

MICHELIN® GREEN X® CHALLENGE GLOSSARY

Bio-diesel - the name of a clean burning alternative fuel, produced from domestic, renewable resources. Bio-diesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a bio-diesel blend. Bio-diesel is better for the environment because it is made from renewable resources and has lower emissions compared to petroleum diesel. Since it is made in the USA from renewable resources such as soybeans, its use decreases our dependence on foreign oil and contributes to our own economy.

Cellulosic Ethanol - a biofuel produced from wood, grasses, or the non-edible parts of plants.

Clean Diesel: synonymous with ultra-low sulfur diesel (ULSD) with reduced particulates; generic for the better-filtered (and more refined) diesel fuel.

Gas-to-Liquid (GTL) - a process that can produce a high-quality diesel fuel from natural gas, coal and biomass resources. Shell refers to the GTL process as a middle distillate synthesis (MDS). In all cases the middle distillate produced from this process can be blended with today's diesel fuel.

Green Achievement Score – (G.A.S.) score derived during a competition for each race car from more than 30 pieces of data that calculates energy used, greenhouse gases emitted and petroleum fuels displaced.

Greenhouse Gases - the gases present in the atmosphere which reduce the loss of heat into space and therefore contribute to

global temperatures through the greenhouse effect. An excess of greenhouse gases such as carbon dioxide can raise the temperature of a planet to dangerous levels.

Greenhouse Gas Factor – wraps together the petroleum displacement coefficient and the greenhouse gas coefficient from the Green Challenge formula to create a calculation that results in relating the race car's total well-to-wheel greenhouse gas emissions.

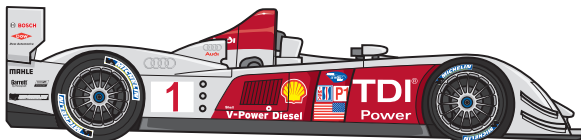
GREET – (Greenhouse gases, Regulated Emissions and Energy use in Transportation) model developed by Argonne National Laboratory to fully evaluate energy and emission impacts of advanced vehicle technologies and new transportation fuels, the fuel cycle from well to wheels and the vehicle cycle through material recovery and vehicle disposal.

Hybrid - a vehicle that combines a conventional propulsion system with an on-board rechargeable energy storage system (RESS) to achieve better fuel economy than a conventional vehicle without being hampered by range from a charging unit like a battery electric vehicle (BEV).

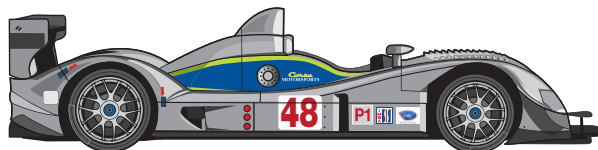
Well-to-Wheel - a life cycle assessment (LCA, also known as life cycle analysis, ecobalance, and cradle-to-grave analysis) is the investigation and valuation of the environmental impacts of a given product or service caused or necessitated by its existence from origination to consumption.

Unmatched: Alternative Fuels with Relevancy

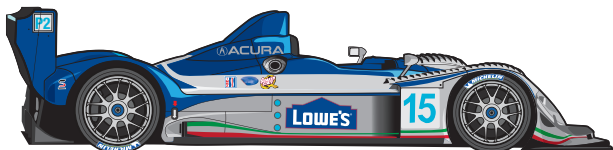
The American Le Mans Series is the only major racing series in the world whose rules allow all race cars to be powered by multiple street legal alternative fuels. Street legal refers to the fact that the fuel used to race is virtually the same as that sold at the consumers' fuel station.



Audi's R10 TDI and new R15 TDI sport prototype (2009 Mobil 1 Twelve Hours of Sebring debut) race on **clean sulfur-free diesel**. It has won the 24 Hours of Le Mans – the world's most famous race – the last three years on TDI diesel power.



The Zytek Group, one of the world's leaders in hybrid development, has announced that it intends to unveil a **gas-electric hybrid** in the American Le Mans Series. Among Zytek's hybrid partners are Mercedes Benz, Peugeot and Chevrolet.



The Lowe's-Fernandez Acura ARX-01B is powered by an **E10 ethanol-gasoline** mix.



Corvette Racing won the inaugural "Green Challenge™" last year at Petit Le Mans racing a **cellulosic E85** (up to 85 percent ethanol) blend. Cellulosic ethanol is made of such materials as wood waste, citrus rinds or switchgrass.

THE WORLD DEBUT OF THE *GREEN CHALLENGE*™

The inaugural Green Challenge was filled with all the pomp, circumstance and drama deserving of a world debut. A high ranking official from the U.S. Environmental Protection Agency waved the ceremonial green flag. (Nip Tuck's John Hensley) A television star instructed the drivers to start their engines. The world's most famous endurance race team (Audi) started from two laps behind the rest of the field after crashing on the warm-up lap only to overtake the race leader in dramatic fashion late in the race. And two sports car stalwarts – Corvette and Porsche – one racing a cellulosic E85 ethanol blend and another racing on E10 and using innovative direct fuel injection – walked away with uniquely designed trophies symbolic of the challenges that being green represents.



The EPA's Margo T. Oge waves the ceremonial green flag



A record crowd of more than 113,000 turned out at Petit Le Mans for the inaugural Green Challenge.

THE WORLD DEBUT OF THE **GREEN CHALLENGE™**



Prototype champion Penske Racing No. 6



GT champion Corvette Racing No. 3

Top Scores

Prototype	Score	GT	Score
Penske Racing No. 6	30.690	Corvette Racing No. 3	20.391
Sascha Maassen, Emmanuel Collard, Pat Long		Johnny O'Connell, Jan Magnussen, Ron Fellows	
Penske Racing No. 5	31.222	Drayson Barwell No. 007	20.479
Audi Sport N.A. No. 1	31.319	Corvette Racing No. 4	20.652
Dyson Racing No. 20	31.562	Flying Lizard No. 45	25.227
Audi Sport N.A. No. 2	32.070	Farnbacher Loles No. 87	25.821

KEY **MICHELIN® GREEN X® CHALLENGE** FORMULAS:

To develop the formula, Argonne National Laboratory and the American Le Mans Series created “normalizing factors” for each variable so they could accurately compare the environmental performance of each car in the race. The normalizing factors took into consideration such things as average speed, distance covered and car weight. These calculations were compared with previous races to check their validity. In some cases, the cars that win the race will also get the best score, but that will not always be the case.

Energy Used

Performance Efficiency Coefficient:

PEC = Total normalized observed fuel
consumed during race divided
by 1 million

PEC = $\frac{\text{Total BTU's consumed}}{1,000,000}$

GHG Emitted

Greenhouse Gas Coefficient:

GGC = 3X (Upstream CO2 + Downstream CO2)

Upstream CO2 = Total energy consumed X GREET upstream factor

Downstream CO2 = Total energy consumed X Carbon in the fuel used

Petroleum Fuels Displaced

Petroleum Displacement Coefficient

PDC = Y x (Upstream petroleum energy + Downstream petroleum energy)
(Well to Tank – WTT) (Tank to Wheels – TTW)

Shell GTL = 86%

IMSA E10 = 91%

IMSA E85R = 34%

All upstream factors taken from the GREET model supplied by Argonne National Laboratory

All formulas subject to adjustment

A MICHELIN® GREEN X® CHALLENGE CALCULATION

The following is a hypothetical calculation of the criteria used for winning the **MICHELIN® Green X® Challenge**:

	WTW (Well-to-Wheel) GHG's (Greenhouse Gases)	WTW Petroleum	Efficiency Quotient	Green Achievement Score
Car A	4.116	5.260	7.891	17.267
Car B	4.155	5.309	7.957	17.421
Car C	6.107	5.389	10.062	21.558
Car D	5.034	5.582	10.954	21.570

The above calculation is the result of more than 30 separate pieces of data gathered to create performance adjusted scores for well-to-wheel greenhouse gases, well-to-wheel petroleum usage and an efficiency quotient in order to achieve a final score.

THE MICHELIN® GREEN X® CHALLENGE... THE CRITERIA

The American Le Mans Series, in concert with the **U.S. Environmental Protection Agency, the U.S. Department of Energy and SAE International**, announced in January 2008 at the North American International Auto Show the creation of the first ever **Green Challenge**, an on-track competition between some of the most sophisticated and technically advanced race cars in the world. The inaugural **Green Challenge** debuted at **Petit Le Mans, October 4, 2008** – the American Le Mans Series' signature event.

Members of the DOE, EPA, and SAE comprised the Green Racing Work Group. The GRWG in conjunction with **Argonne National Laboratory** was commissioned with the task of creating the rules, regulations and technical specifications of competition in which all race cars will be measured on **performance, fuel efficiency and environmental impact**.

The result is a system by which cars will be ranked according to:

- Amount of energy used
- Greenhouse gases (GHG) emitted
- Amount of petroleum displaced



THE MICHELIN® GREEN X® CHALLENGE... SCORING

The **MICHELIN® Green X® Challenge** measures and rewards teams that achieve **high performance** on the race track **with the greatest fuel efficiency**. But it is not simply a performance-fuel efficiency run.

Winning teams will have achieved the best greenhouse gas reduction based not only on performance and fuel efficiency but on the total **greenhouse gas life cycle** of the fuel type with which they choose to compete. Measurements of efficiency and greenhouse gas reduction are combined in a “greenhouse gas factor” resulting in a green achievement score.

Race cars that go the farthest, the fastest with the smallest environmental footprint for the energy used will get the lowest green achievement score. This score differs from other scores in racing in that the lowest number wins.

Teams will be awarded the same number of points for the season-long **MICHELIN® Green X® Challenge** Championship in 2009 as those earned by the race winners in the overall American Le Mans Series Championship. All teams qualify for the **MICHELIN® Green X® Challenge** and receive points for their greenhouse achievement score for each race based on the Series’ race point structure (see below).

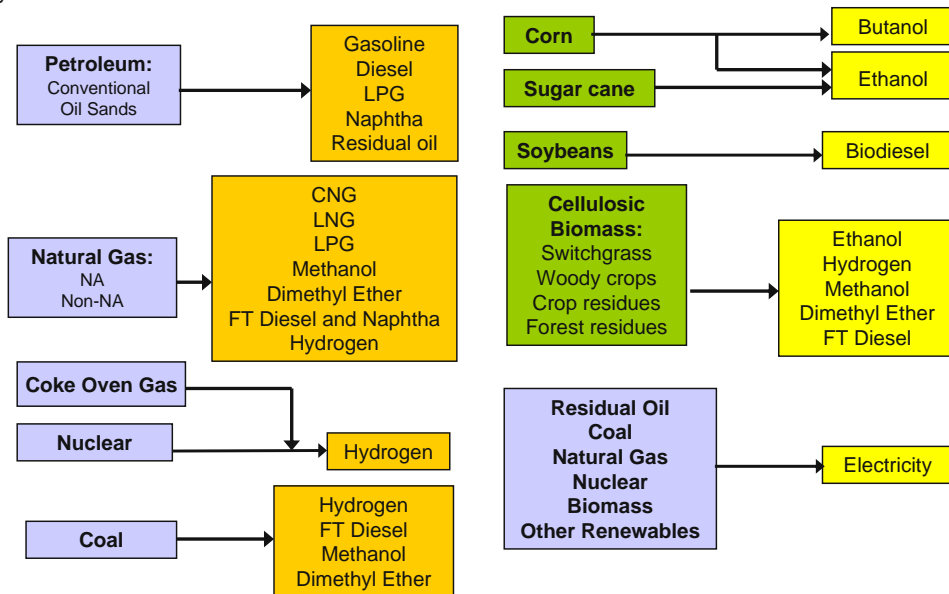
The twist, however, for winning the **MICHELIN® Green X® Challenge** Championship is that each American Le Mans Series team starts the season with the maximum number of points available for all the scheduled races (i.e. - 230 maximum in 2009). When teams win **MICHELIN® Green X® Challenge** Championship points, they are deducted from this total. As a result, the points decline for successful teams over the course of the season with the lowest total at season’s end resulting in a **MICHELIN® Green X® Challenge** championship for one prototype and one GT team.

Points for less than 4 hours:	20-16-13-10-8-6-4-3-2-1	(6 races in '09)
Points for 4 to less than 8 hours:	25-21-18-15-13-11-9-8-7-6	(2 races in '09)
Points for 8 hours or more:	30-26-23-20-18-16-14-13-12-11	(2 races in '09)

GREET COVERS ALL MAJOR VEHICLE FUEL SYSTEMS!

GREET includes more than 100 fuel production pathways and more than 70 vehicle/fuel systems. These vehicle/fuel systems cover all major vehicle technologies in the market and R&D arena:

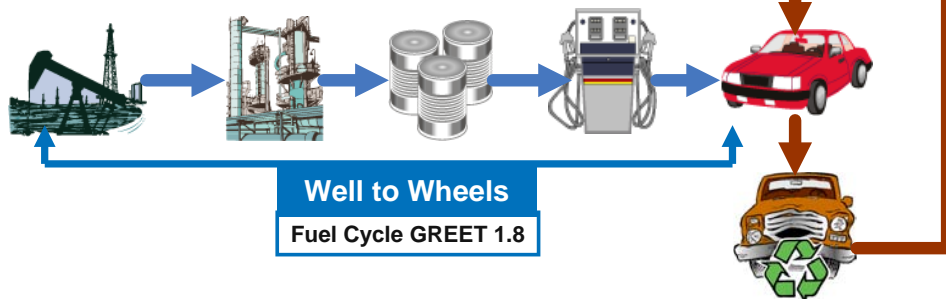
- Conventional spark-ignition engines
- Direct-injection, spark-ignition engines
- Direct-injection, compression-ignition engines
- Grid-independent hybrid electric vehicles
- Grid-connected (or plug-in) hybrid electric vehicles
- Battery-powered electric vehicles
- Fuel-cell vehicles



HOW DOES GREET WORK?

To fully evaluate energy and emission impacts of advanced vehicle technologies and new transportation fuels, the fuel cycle from well to wheels and the vehicle cycle through material recovery and vehicle disposal need to be considered. Sponsored by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE), Argonne has developed a full life-cycle model called GREET (Greenhouse gases, Regulated Emissions, and Energy use in Transportation). It allows researchers and analysts to evaluate various vehicle and fuel combinations on a full fuel-cycle/vehicle-cycle basis.

- Developed at Argonne since 1995 with the support of DOE and others (EPA, USDA, IL DCEO, GM, BP, Chevron, Exxon Mobil, Shell)
- More than 100 fuel production pathways from various feedstocks
- More than 75 vehicle/fuel systems
- At present, there are more than 3,500 registered GREET users worldwide



2009 AMERICAN LE MANS SERIES SCHEDULE

1	2	3	4	5	6	7	8	9	10
SEBRING INTERNATIONAL RACEWAY	ST. PETERSBURG	LONG BEACH	MILLER MOTORSPORTS PARK	LIME ROCK PARK	MID-OHIO SPORTS CAR COURSE	ROAD AMERICA	MOSPORT INTERNATIONAL RACEWAY	ROAD ATLANTA	MAZDA RACEWAY LAGUNA SECA
MARCH 21 Sebring, FL	APRIL 4 St. Petersburg, FL	APRIL 18 Long Beach, CA	MAY 17 Salt Lake City, UT	JULY 18 Lakeville, CT	AUGUST 8 Lexington, OH	AUGUST 16 Elkhart Lake, WI	AUGUST 30 Bowmanville, Ontario, Canada	SEPTEMBER 26 Braselton, GA	OCTOBER 10 Salinas, CA
									

