Green Racing: Accelerating the Use of Advanced Technologies & Renewable Fuels, Developing Market Acceptance

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U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

OVERVIEW

Use rapid pace of motorsports to develop, demonstrate, and promote advanced vehicle technologies and renewable fuels

Timeline

Start – Oct FY 2009

Est. Complete: Open

Barriers

Overcoming technology misconceptions

Linkage to OEM technologies

Return Racing to Relevance

Budget

Total project funding:
DOE - $400K

Partners

EPA + SAE International
American Le Mans Series
Michelin
Circle Track Magazine
Indy Racing League

Relevance: The Green Racing Initiative Touches All Aspects of DOE's Vehicle Technologies Program

Incorporates leading-edge examples of these VT technologies:

- Advanced SI and CI engines
- Energy Storage
- Advanced electric propulsion systems
- Lightweight materials
- Advanced renewable fuels
- Waste heat recovery systems
- Aerodynamics

Relevance: DOE Vehicle Technologies Program

- Reaches tens of millions of racing fans with extreme-duty validations of advanced vehicle technologies
- Highly collaborative partnerships with U.S. EPA, SAE International, and multiple racing sanctioning bodies
- Involvement of 9 major OEMs and four major tire manufacturers

Approach – *Accelerate Development of Advanced Vehicle Technologies and Promote their Acceptance*

- Develop advanced engine, HEV powertrain technology
- Advance energy storage technology
- Promote and advance use of biofuels
- Prove feasibility of advanced technologies to public
- Communicate national energy policy objectives
- Demonstrate reduced petroleum use/GHGs with no loss of performance
- Enhance DOE image

Technical Accomplishments & Progress

- Green Racing Protocols Technical Standard – SAE J 2880™ –published October 2008 after 2 years of development
- First ***Green Challenge*** awards to Porsche & GM October 2008
- Multi-phase stock car project with ***Circle Track*** started May 2009
  - Completed engine testing and benchmarking
  - Completed multi-phase publications on results
- First season-long ***Green Challenge*** awards to Honda and Porsche October 2009

Technical Accomplishments Broaden Scope of Program

- First GT car to race and win on cellulosic E85 October 2008
- Meeting in DC with all major US racing sanctioning bodies April 2009
- First HEV Le Mans Prototype raced June 2009
- Stock car engine operational on E85 July 2009; first benchmark testing completed November 2009
- HEV technology template for racing developed August 2009
- First use of bio-butanol in racing September 2009
- First Prototype to race on cellulosic E85 March 2010

Circle Track Project Presents Significant Potential for Renewable Fuels and Advanced Technology Use

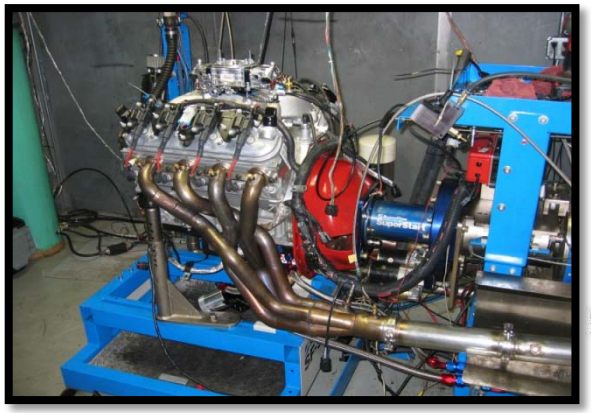
Transition American circle track racing to domestically-produced renewable fuels with much lower carbon footprint, dramatically reduced GHG and criteria emissions with no performance loss

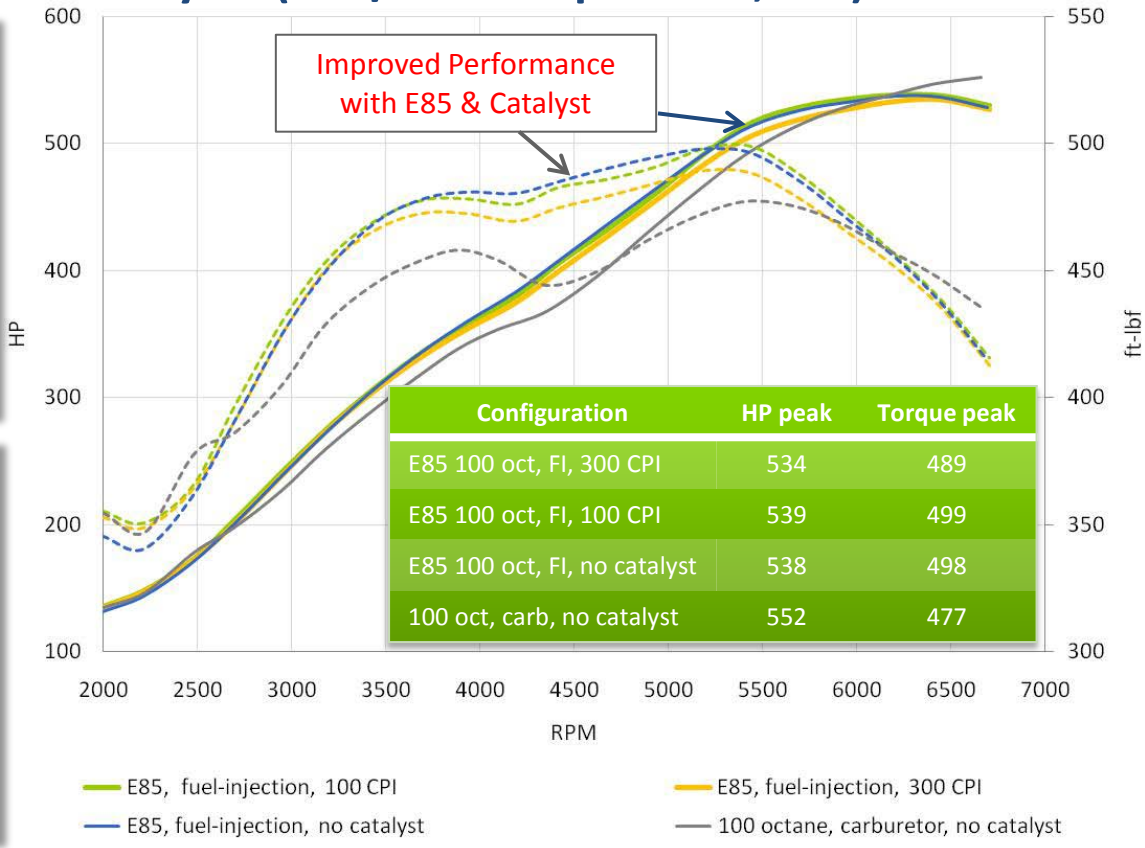
- Target market: 400,000 Circle Track racers at 11,000 national race tracks with cost-effective utilization of engine, fuel, and catalyst technologies
- Generate increased acceptance of sustainable domestic fuels and cutting edge technologies through circle track racing's large fan base
- Gain support for U.S. DOE's mission of renewable fuel usage by using grass roots stock car racing as outreach and educational platform
- Makes the racing track the proving ground for street vehicle technologies

Circle Track E85 Engine Testing Results Show Benefits

Superior performance with renewable fuels, fuel injection, and catalysts

- Fuel injected CT-525 LS3 race engine compared against current carbureted base race engine
- E85 compared to E10 ALMS race fuel
- Catalysts compared without catalysts (100/300 cell per inch, CPI)





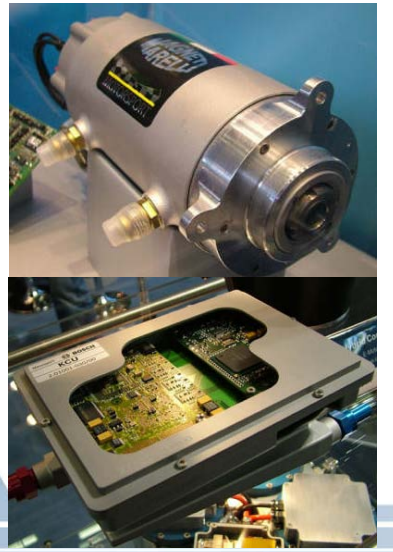
Configuration	HP peak	Torque peak
E85 100 oct, FI, 300 CPI	534	489
E85 100 oct, FI, 100 CPI	539	499
E85 100 oct, FI, no catalyst	538	498
100 oct, carb, no catalyst	552	477

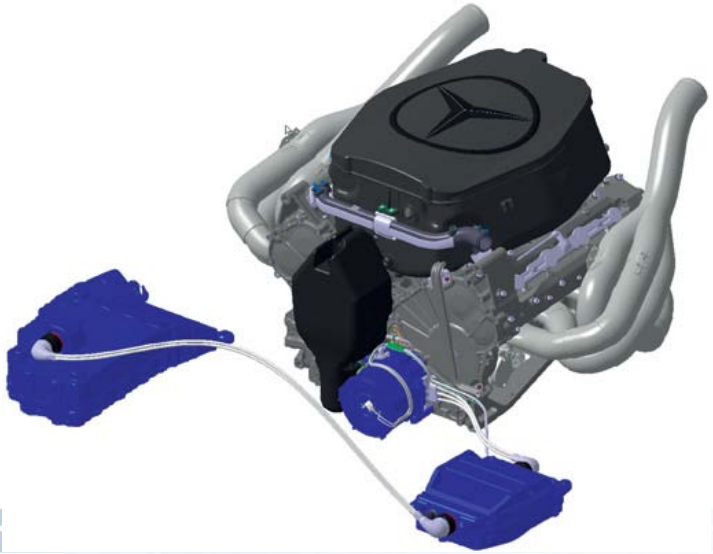
Extensive Collaboration a Green Racing Hallmark

- Strong partnership forged with EPA and SAE International
- Major OEMs involved in Green Racing Initiative
  - General Motors
  - Ford
  - BMW
  - Mazda
  - Porsche
  - Ferrari
  - Jaguar
  - Peugeot
  - Audi
- American Le Mans Series
- Indy Racing League
- Sports Car Club of America
- *Circle Track* Magazine
- Clean Cities Program
- EcoCAR Challenge

Proposed Future Activities Expand Impact and Content of Green Racing

- Support OEM technology development objectives
- Develop Green Race Series with Indy Racing League
- Optimize E85 stock car engine for power, low cost
- Bring Green Racing to stock car series across the nation
- Open racing to HEV technology in multiple classes
- Develop HEV test bed with Panoz Motorsports, Clemson
- Integrate Green Racing in multiple sanctioning bodies





Publications

Series of publications in *Circle Track* Magazine highlighting work

- **November 2008 – Green Racing, What is that and is it possible?**
- **May 2009 – Turn Five – Looking Ahead**
- **January 2010 – Back to the Future**
- **February 2010 – Back to the Future Part 2**
- **February 2010 – Takin' the Green: Bio-butanol: The Next Methanol?**
- **April 2010 – Project G.R.E.E.N. Behind the Scenes**
- **May 2010 – Project G.R.E.E.N. Dynoing our CT525**
- **June 2010 – Takin' the Green: I Need Fuel!**

Summary: Green Racing Extends, Leverages, and Popularizes Vehicle Technologies Programs

Innovative program harnesses rapid rate of development in racing for the entire range advanced vehicle technologies

- **Speeds up testing and validation of DOE-developed technologies**
- **Proves advantages and readiness of technologies**
- **Builds acceptance and demand for advanced technologies**
- **Enabling racing to once again be the cradle of future production vehicle technologies**