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Argonne, DOE, and Industry are ...

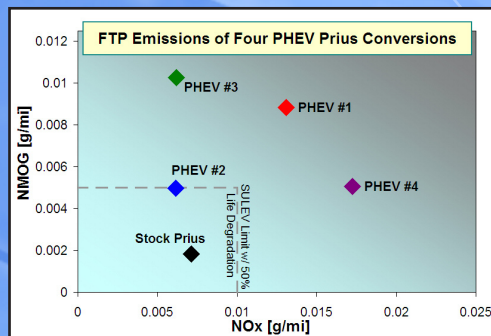# Pioneering Future PHEV Technologies and Research Protocols

Argonne Has Lead Role in DOE's PHEV Technology Evaluation Effort

Argonne National Laboratory has the lead role in the U.S. Department of Energy (DOE) Vehicle Technology Program's efforts to evaluate plug-in hybrid electric vehicles (PHEVs) and PHEV technology using the nation's best vehicle technology evaluation tools and expertise. These are:

- Lithium Battery Modeling
- Lithium Battery Research & Development
- Advanced Battery Testing
- Vehicle Modeling & Simulation (PSAT)
- Vehicle Control
- Component Evaluation in Vehicle System Context (HIL and RCP)
- Vehicle Benchmarking
- Vehicle Test Procedure (SAE J1711)
- Economic Analysis
- Energy & Emissions Lifecycle Analysis (GREET)

Downloadable Dynamometer Database

Over 4,800 hours of robust, repeatable advanced vehicle test data are available to the public through Argonne's Downloadable Dynamometer Database, and more data are being added every day. Link to the database from Argonne's transportation research site at www.transportation.anl.gov.

FTP Emissions of Four PHEV Prius Conversions

(NMOG [g/mi] vs NOx [g/mi]: PHEV #3, PHEV #1, PHEV #2, PHEV #4, Stock Prius; SULEV Limit w/ 50% Life Degradation)

Argonne and DOE Team with Industry to Overcome Technical Barriers and Set Protocols

Argonne's technical expertise and top-of-the-line research facilities and equipment make Argonne a valuable partner to both well-established and up-and-coming players in the automotive industry. These include General Motors, Ford, A123 Systems, Continental Automotive, Maxwell Technologies, and EnerDel.

Developing SAE PHEV Fuel Economy Test Procedures

Argonne's engineers are chairing the Society of Automotive Engineers SAE J1711 committee dedicated to determining test procedures for quantifying PHEV fuel and electrical energy consumption.

A123 Systems Advanced Battery Testing

A123 has enlisted Argonne's help in testing and calibrating its new PHEV Toyota Prius aftermarket retrofit battery module based upon its lithium-ion batteries.

PHEV Market Potential Analysis with EPRI

Argonne and the Electric Power Research Institute have determined in their analysis that ≈32 km is estimated to be the most effective PHEV range for reducing oil use, if only one type of PHEV were to be produced.

EnerDel's Advanced Li-ion Batteries

Argonne is working with EnerDel to develop more stable advanced Li-ion battery technologies for use in HEV and PHEV applications.

International Collegiate Vehicle Engineering Competitions

Since 1987, Argonne has organized and operated more than two-dozen competitions sponsored by the U.S. Department of Energy that have challenged thousands of students to learn real-world engineering skills while they design and build advanced vehicles.

Assess Control Strategies to Maximize Fuel Displacement

Using Global Optimization, the PSAT simulation results suggest that, when driving longer than the All-Electric Range, more fuel is displaced using a blended strategy than one based on Electric Vehicle mode followed by Charge Sustaining.

Argonne Helps to Define Future PHEV Research Needs

Argonne's comprehensive research approach to developing technologies for HEVs and PHEVs gives the Laboratory's internationally recognized team of advanced vehicle experts a unique vision into the research that will be required to bring affordable PHEVs into the marketplace and onto the road. These include:

- Flex-fuel PHEVs
- Diesel PHEVs
- Battery Recycling
- Route-based Control
- Active Combination of Batteries and Ultra-capacitors
- Motor Hardware-in-the-Loop
- Cold Weather Impact on Subsystems
- Greenhouse Gas Impacts of HEVs and PHEVs
- Vehicle-to-Grid

For more information:

Argonne National Laboratory Transportation
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www.transportation.anl.gov/phev

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is clean, abundant, reliable, and affordable