

PLUG-INS: The Future for Hybrid Electric Vehicles?

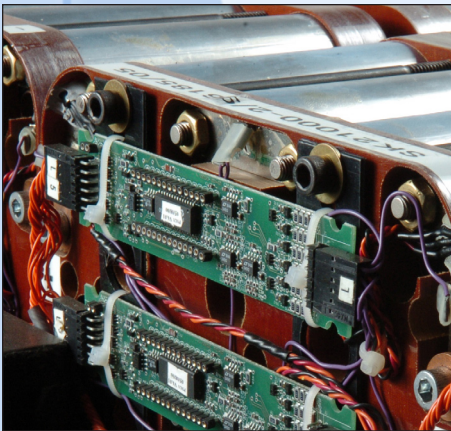


Argonne National Laboratory, in partnership with Idaho National Laboratory, leads the U.S. Department of Energy's plug-in hybrid electric vehicle systems research.

Plug-ins: The Future for Hybrid Electric Vehicles?

The U.S. Department of Energy's (DOE's) FreedomCAR and Vehicle Technologies (FCVT) Program is actively evaluating plug-in hybrid electric vehicle (PHEV) technology and researching the most critical technical barriers to commercializing PHEVs.

Argonne National Laboratory, working together with Idaho National Laboratory, leads DOE's efforts to evaluate PHEVs and PHEV technology with the nation's best vehicle technology evaluation tools and expertise. These two national laboratories are Centers for Excellence that combine state-of-the-art facilities; world-class expertise; long-term collaborative relationships with other DOE national laboratories, industry, and academia; and unparalleled reputations for delivering consistent, unbiased technical evaluation results.



Battery Testing and Evaluation

Battery testing and evaluation capabilities include:

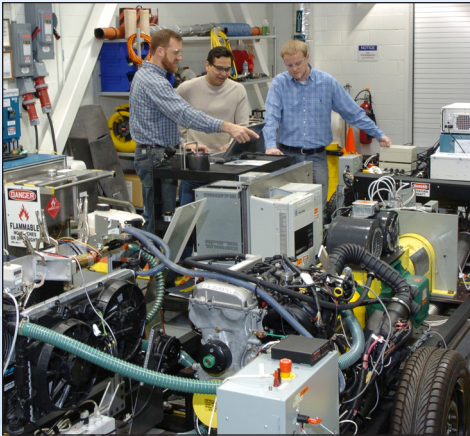
- Evaluation of advanced lithium-polymer, lithium-ion, nickel-metal hydride, and lead-acid cells
- Testing for small cells to full-size (500-volt, 500-ampere) batteries
- Testing to any profile over a wide range of temperatures
- Ability to conduct over 120 separate tests simultaneously
- Documentation of measurement and uncertainty principles for process and data quality
- Development of advanced analysis procedures for battery and capacitor scaling, thermal management, capacity, and power fade
- Using hybrid electric vehicles in fleets to evaluate the batteries' "end-of-life"
- Performance and life testing of batteries supplied by manufacturers for use in hybrid vehicles as well as electric-only vehicles
- Hardware-in-the-loop evaluation of advanced batteries for plug-in vehicle application (Battery HIL)



Vehicle Simulation Software

Argonne's award-winning Powertrain System Analysis Toolkit (PSAT), the primary vehicle modeling software used by the DOE's FreedomCAR and Vehicle Technologies Program, allows:

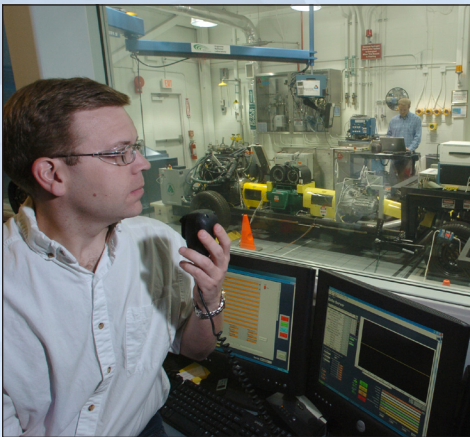
- Accurate simulation of advanced vehicle fuel economy and performance
- Implementation of detailed component models
- Development of realistic control strategies for testing on a bench or in a vehicle



Mobile Advanced Technology Testbed (MATT)

MATT is a wheeled test bed outfitted with scalable engine components, custom instrumentation, and flexible transmission technology to allow testing of PHEV systems. When used with Argonne's award-winning Powertrain System Analysis Toolkit (PSAT and PSAT-PRO) and hardware-in-the loop (HIL) techniques, MATT allows researchers to:

- Add, rearrange, and interconnect systems and components
- Equip selected systems and components with instrumentation
- Simulate real-world vehicle operation
- Identify which combination of components will result in a vehicle that best meets efficiency, emissions, performance, and cost targets



Advanced Vehicle Testing

Argonne's capabilities for state-of-the-art testing of hybrids, diesels, and hydrogen vehicles include:

- Four-wheel-drive chassis dynamometer
- Experience with testing and analysis of several PHEVs, including a highly instrumented Prius
- Custom data acquisition/control system for advanced vehicles
- Most comprehensive database of advanced vehicles anywhere
- Pioneering in-vehicle engine torque instrumentation



Technology Viability Assessment

Argonne National Laboratory and Idaho National Laboratory are working collaboratively with the Electric Power Research Institute (EPRI) to:

- Deploy vehicles for accelerated in-use fleet testing
- Perform beginning- and end-of-life vehicle dynamometer testing
- Develop on-board data acquisition systems for collecting in-fleet HEV and PHEV performance data
- Characterize in-use fuel usage issues such as air conditioning, cold weather, hot weather, and real-world driving styles

Argonne's PHEV test data are based on consistent, unbiased technical evaluation results.

A Winning Combination

The Argonne National Laboratory — Idaho National Laboratory Joint Vehicle Research Partnership

Argonne National Laboratory and Idaho National Laboratory are collaborating to provide a comprehensive research approach to developing technologies needed for hybrid and plug-in hybrid vehicles. The combination of facilities, expertise, reputation, and locations ensure the most comprehensive, accurate, convenient, and unbiased technology evaluation available.

For more information:

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