

## Vehicle & Systems Simulation & Testing Lee Slezak



## Vehicle & Systems Simulation & Testing Missions

Focus Area activities provide direct and indirect support for evolution of high efficiency vehicles as real world product offerings



## Recovery Act: Transportation Electrification Initiative

### Largest U.S. Electric Vehicle & Infrastructure Deployment Ever

- Approximately \$400 million in federal funding to:
  - Automotive and Charging Industry
  - Educational Institutions
- Deploys over 20,000 charging stations to support 13,000 plug-in vehicles
  - Approximately 10,000 EVSEs and over 6100 vehicles as of April 30, 2012
- Collection of detailed data:
  - 113,000 PEV test miles, 4,430 charge events per day
  - LDV: <u>http://avt.inl.gov/</u>
  - M/HD: <u>www.nrel.gov/vehiclesandfuels/fleettest/</u>



U.S. DEPARTMENT OF

ENERGY

Number of vehicles:		100	Number	lumber of vehicle days driven:		3.59
Reporting period:	10/1/2011 to 12/31/2011		Number of operating cities:		g cities:	4
The Fleet Test and Evaluatic (NREL) is evaluating and do medium-duty trucks across t electric medium-duty trucks. Project Vehicle Specificat	cumenting the the nation Thro The trucks will	performance of elect	h Electric V	-in hybrid i lehicles wil	electric drive syst build and deploy	erne in
Curb Weight	9.700-10.200 pounds		Electric Top Speed		50 mph	
Overall Length	208-308 inches		Battery Capacity		80 or 120 kWh	
Overall Width	87 inches		Battery Voltage		~ 350 V	
Overall Height	94-99 inches		Charping Standards		SAE J1772	
Peak Motor Power	134 KW		Transmission		Single Speed Reduction Ge	
Motor Location	Front, Behind Cab		Drive		Rear Wheel Drive	
Advertised Range <sup>2</sup>	Up to 150 miles		Drag Coefficient		-0.5	
Seating	3		Wheelbase		153-220 in.	
Payload	12,324-16,200	pounds				
Trip Data Overall Gasoine Esuivaient Fu		18.9 mppe	_			
Overall AC Electrical Energy Consumption		2 155 3 White	Distance 1		Traveled by Driving	lpeed
Overal DC Electrical Energy Consumption		1.765.5 White	Ê 20			
Driving DC Electrical Energy Consumption <sup>4</sup>		1,631.7 White	E 15		- Contraction	
Total Number of Charges	or a constant	8,255.0	P 15			
Total Charge Energy Delivered		242 158 8 1025	£ 10	-		
Total Distance Traveled		112,303.4 miles	1 1 4			
City   Highway Distance <sup>5</sup>	87.01	2.6   25.290.8 miles	5			
City   Highway Distance <sup>1</sup>	67.0	77.5122.5 %	0 0			-
Route Information				0 6 40 45	න ක් ක ක ක Speed (mph)	99
Average Distance Traveled Per Day		31.2 miles			ivalent Fuel Econor	
Average Distance Traveled Per	Median Daily Driving Appressiveness <sup>6</sup>					
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		1.3 [0-10]	¥ 19		_	- Out

**Energy Efficiency &** 

**Renewable Energy** 



# Vehicle & Systems Simulation & Testing Accomplishments

- Initiated data collection on thousands of vehicles and EVSEs deployed through Transportation Electrification:
  - 867,000 PHEV/EV charging events on 6,995 EVSE have used 6,500 MWh
  - 113,000 PHEV/EV miles and 4,430 charging events documented *per day*
- Expanded Advanced Vehicle Testing Activity (AVTA):
  - Shifted focus from HEV to PHEV/EV
  - 35.1 million PHEV/EV test miles accumulated on 7,952 Light Duty vehicles representing 91 different models to date
  - 3.4 million test miles accumulated on 95 different MD/HD HEV vehicles since 2006
  - Began testing under extreme thermal conditions
  - Evaluated EVSE hardware
- Deployed commercialized version of Autonomie vehicle modeling & simulation platform
  - Developed through CRADA between Argonne National Lab and General Motors
  - Distributed through LMS









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## Vehicle & Systems Simulation & Testing R&D Paths



### FY 2012 Emphasis

- Support Electric Drive Vehicle (EDV) Market Transformation
  - Fund industry wireless charging RD&D
    - 。 DE-FOA-0000667, "Wireless Charging for Electric Vehicles"
    - Issued 04/05/2012; Closes 05/31/2012
  - Fund Zero Emission Cargo Transport RD&D
    - 。 DE-FOA-0000669, "Zero Emission Cargo Transport Demonstration"
    - Issued 03/20/2012; Closed 05/15/2012
  - Expand Evaluations for EDV AVTE & Transportation Electrification Recovery Act
  - Enhance component/system capabilities
    - Common platform for on-road evaluations
    - Climate extremes testing
    - HIL Studies of Advanced Powertrains
  - Expand EDV Codes & Standards to address key vehicle/infrastructure concerns
- Validate and enhance Autonomie models and capability



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