

Smith Newton Vehicle Performance Evaluation

The Fleet Test and Evaluation Team at the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) is evaluating and documenting the performance of electric and plug-in hybrid electric drive systems in medium-duty trucks across the nation. Through this project, Smith Electric Vehicles will build and deploy 500 all-electric medium-duty trucks. The trucks will be deployed in diverse climates across the country.

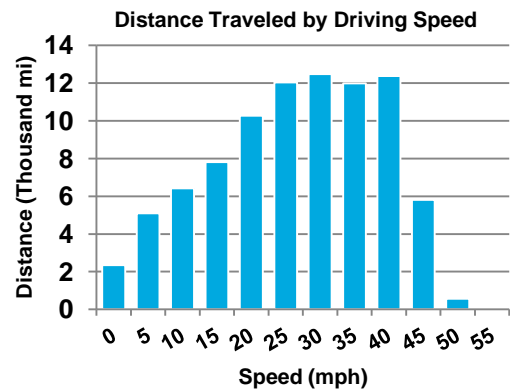
Number of vehicles:	140	Number of vehicle days driven:	2,795
Reporting period:	1/1/2012 to 3/31/2012	Number of operating cities:	64

Project Vehicle Specifications¹

Curb Weight	9,700-10,200 pounds	Electric Top Speed	50 mph
Overall Length	268-368 inches	Battery Capacity	80 or 120 kWh
Overall Width	87 inches	Battery Voltage	~ 350 V
Overall Height	94-99 inches	Charging Standards	SAE J1772
Peak Motor Power	134 kW	Transmission	Single Speed Reduction Gear
Motor Location	Front, Behind Cab	Drive	Rear Wheel Drive
Advertised Range ²	Up to 150 miles	Drag Coefficient	~0.5
Seating	3	Wheelbase	153-220 in.
Payload	12,324-16,200 pounds		

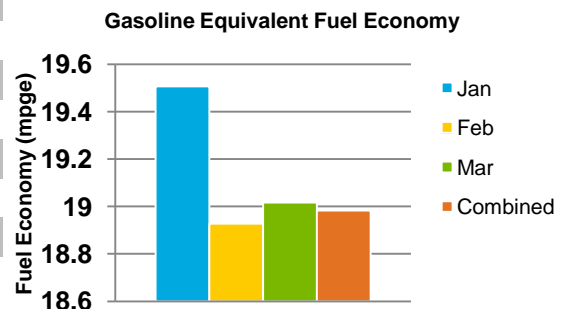
Trip Data

Overall Gasoline Equivalent Fuel Economy ³	19.0 mpg
Overall DC Electrical Energy Charged	2,212.8 Wh/mi
Overall DC Electrical Energy Discharged	1,775.3 Wh/mi
Driving DC Electrical Energy Consumption ⁴	1,640.5 Wh/mi
Total Number of Charges	6,660.0
Total Charge Energy Delivered	188,782.9 kWh
Total Distance Traveled	85,314.4 miles
City Highway Distance ⁵	68,474.8 18,803.0 miles
City Highway Distance ⁵	80.3 22.0 %

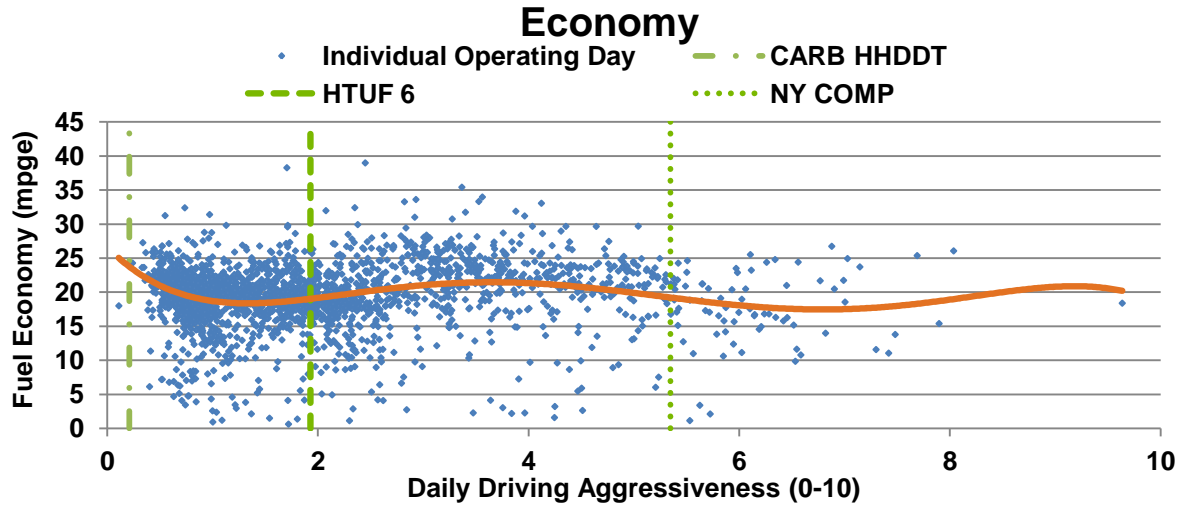


Route Information

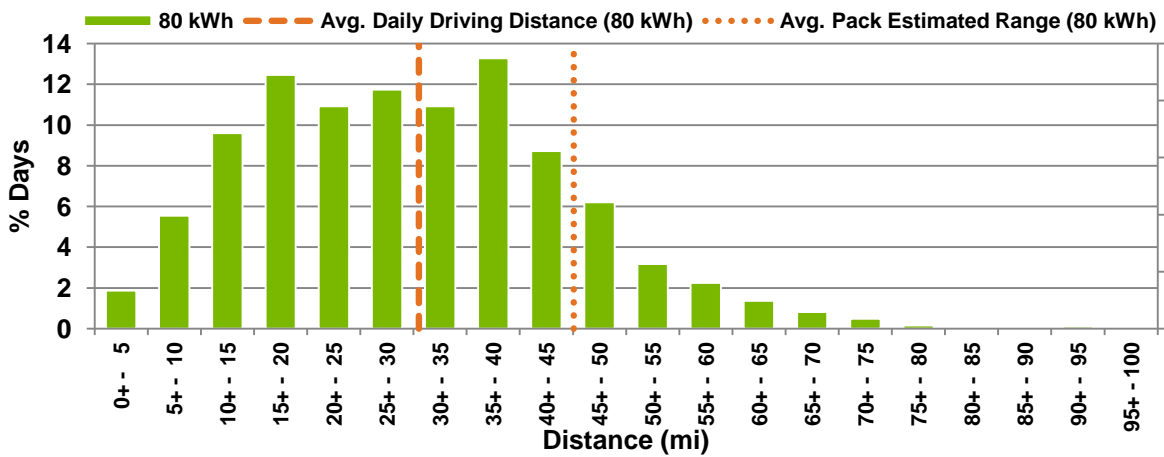
Average Distance Traveled Per Day	30.5 miles
Median Daily Driving Aggressiveness ⁶	1.4 [0-10]
Average Number of Stops Per Day Per Mile	65.5 2.6
Average Brake (Regen) Events	11.9 per mile
Average Maximum Acceleration	0.4 g
Average Daily Maximum Driving Speed	46.7 mph
Average Daily Driving Speed	20.5 mph



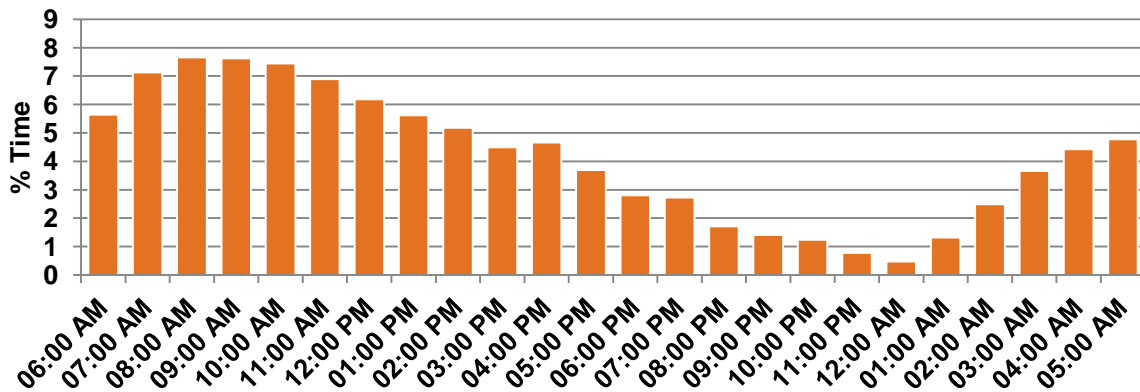
Effect of Daily Driving Aggressiveness on Fuel Economy



Daily Driving Distance⁷

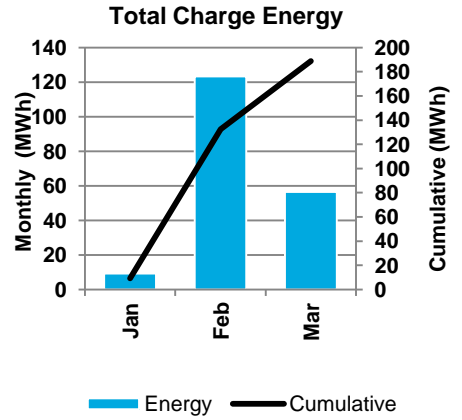


Time of Day When Driving

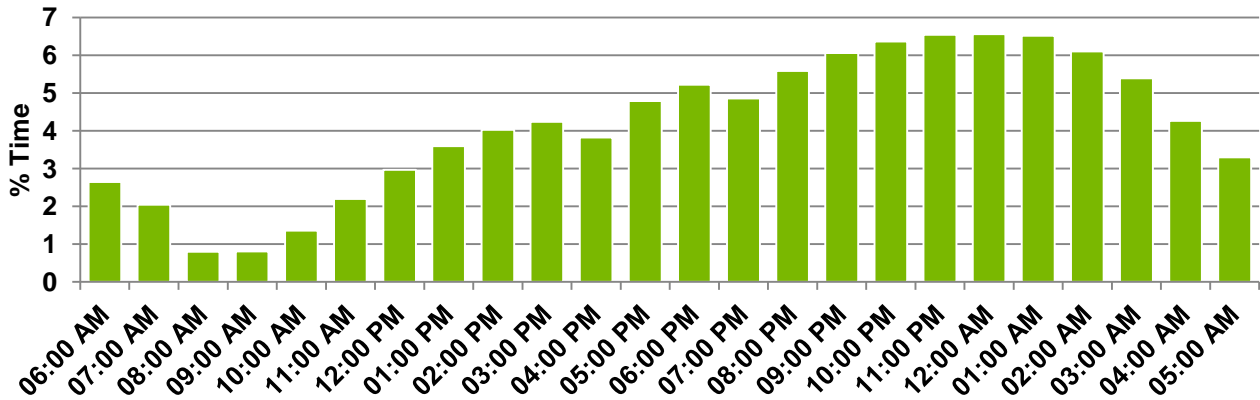


Plug-in Charging

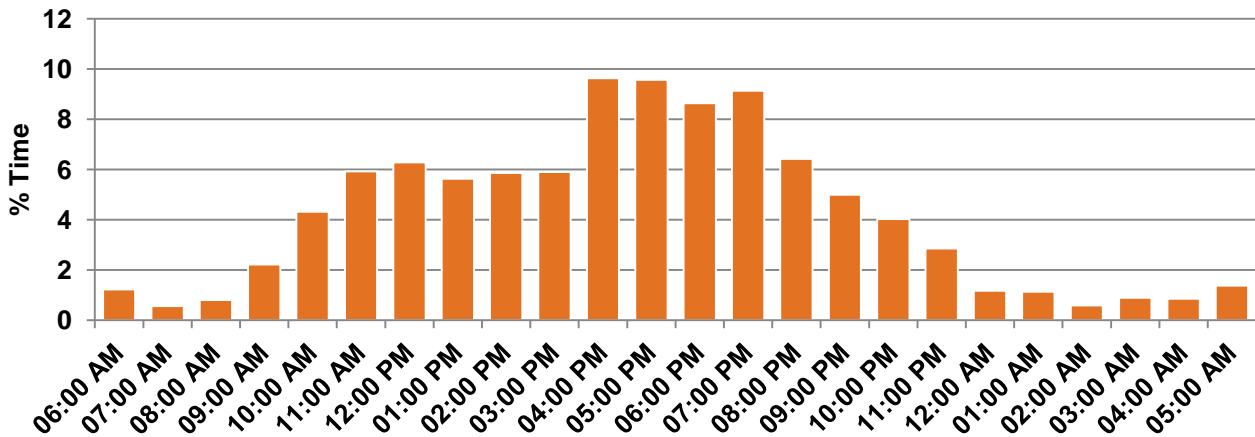
Average Fleet Charging Frequency	2,220.0 charge events per month
Average Fleet Charge Energy per Month	62,927.6 kWh/month
Average Vehicle Charging Frequency	2.4 per day each
Average Vehicle Charge Energy per Day	65.5 kWh/day
Average Energy Delivered per Charge	28.4 kWh
Average Duration of Charge Event	7.5 hr
Average Distance Between Charges	12.8 miles



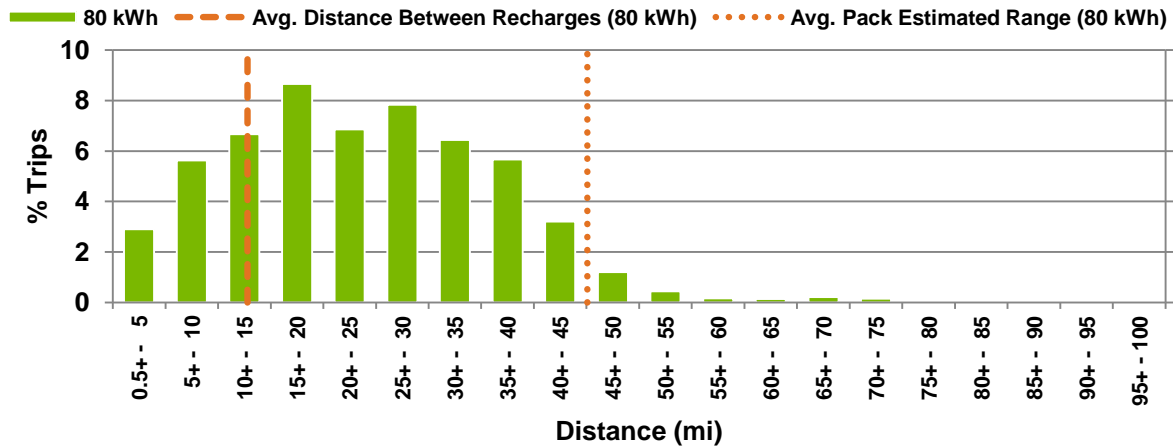
Time of Day When Charging



Time of Day When Plugging In



Distance Between Recharges^{7,8}



1. Vehicle specifications provided by Smith Electric Vehicles.
2. Actual electric range will vary based on drive cycle and vehicle configuration.
3. Miles per gallon gasoline equivalent (mpge) is calculated assuming U.S. Environmental Protection Agency standard energy density of 33.7 kWh per gallon of gasoline.
4. Total in-motion energy consumption averaged per mile.
5. City and highway distance classification is distinguished by a 35-mph trip speed limit. Trips classified as "highway" achieved a maximum driving speed in excess of 35 mph while trips classified as "city" do not.
6. Daily driving aggressiveness is kinetic intensity scaled by a factor of two. Kinetic intensity measures hybrid advantage. For more information on kinetic intensity please refer to the SAE paper in which it is defined (O'Keefe, M., Simpson, A., Kelly, K., and Pedersen, D., "Duty Cycle Characterization and Evaluation Towards Heavy Hybrid Vehicle Applications," SAE Technical Paper 2007-01-0302, 2007, doi:10.4271/2007-01-0302).
7. Average pack estimated range calculated based on battery energy storage capacity (80 or 120 kWh) and average overall DC electrical energy consumption. Data is being collected for both 80 and 120 kWh battery capacity vehicle configurations. Previous data collected from 120 kWh configurations are unusable.
8. All recharges occurring with less than 0.5 mile traveled were excluded from the chart for visual clarity.



Energy Efficiency & Renewable Energy

For more information, visit: vehicles.energy.gov

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