AVTA HEV, NEV, BEV and HICEV Demonstrations and Testing (DOE FY10 Merit Review)

P.I. - James Francfort
Idaho National Laboratory – Advanced Vehicle Testing Activity (AVTA)
June 9, 2010

Project ID # VSS021
INL/CON-10-18510

Overview

Timeline

- **The AVTA is an ongoing, annually funded DOE activity, designed to test and validate emerging technologies in whole-vehicle systems**

Barriers

- **Barriers addressed**
  - Document HEV battery performance at end of life
  - Document real-world HEV fuel use
  - Document HEV life cycle costs
  - Document HICE and NEV performances

Budget

- **FY09 project funding**
  - $1,300k DOE share
  - $1,600K Partners' share
- **Funding for FY10**
  - $1,500k DOE share

Partners

- **Idaho National Laboratory - lead**
- **eTec conducts the AVTA with INL**
- **NETL, ORNL, ANL, NREL, EPA (Federal)**
- **OEMs via USABC/VSATT and other Technical Teams**
- **U.S. and Canadian governments, and private fleets**

AVTA Description

- **Advanced Vehicle Testing Activity (AVTA) is part of DOE's Vehicle Technologies Program. Conducted by:**
  - **Idaho National Laboratory (INL)**
    - **Program execution per DOE direction (Lee Slezak), engineering, data analysis, and reporting / presentations**
  - **Electric Transportation Engineering Corporation (eTec)**
    - **Private company in Phoenix, AZ. Vehicle operations and testing, engineering, access to numerous testing facilities / test tracks in Arizona. Flexibility / cost share**
  - **National Energy Technology Laboratory (NETL)**
    - **Executes eTec contract**
  - **Argonne National Laboratory**
    - **Provide AVTA dynamometer testing support**

AVTA Description – cont'd

- AVTA tests light-duty whole vehicle systems and fueling infrastructures that employ / support:
  - 100% Electric and dual-fuel electric drive systems
  - Advanced energy storage systems
  - Some ICE 100% Hydrogen and HCNG blended fuels
  - Advanced control systems (i.e., start/stop HEVs)
- Provide benchmarked vehicle data to R&D programs, modelers, OEMs, battery manufacturers, and target/goal setters (DOE)
- Assist early adaptor fleet managers and the general public in making informed vehicle purchase, deployment and operating decisions. Presentations to industry groups, including via DOE's Clean Cities Coalitions
- DOE's only light-duty vehicle testing activity of new technologies deployed in whole-vehicle systems operated in real-world fleet environments

AVTA Testing by Technology

- Plug-in hybrid electric vehicles (PHEVs)
  - 12 models, 259 vehicles, 1.5 million test miles
- Hybrid electric vehicles (HEVs)
  - 18 models, 47 vehicles, 5 million test miles
- Neighborhood electric vehicles (NEVs)
  - 23 models, 200,000 test miles

- Hydrogen internal combustion engine (ICE) vehicles
  - 7 models, 500,000 test miles
- Full-size battery electric vehicles (BEVs)
  - 41 EV models, 5+ million test miles

- Urban electric vehicles (UEVs)
  - 3 models, 1 million test miles
- 13 million test miles have been accumulated on 1,600 electric drive vehicles representing 97 different electric drive models

AVTA Vehicle Testing Approach

- Depending on vehicle technology and capabilities, vehicles are tested via:
  - Closed test tracks: highly repeatable
  - Dynamometer testing: highly repeatable
  - Laboratory testing (batteries): highly repeatable
  - Accelerated testing, using dedicated drivers and other methods to accumulate miles and cycles
  - Fleet testing, uses unstructured vehicle utilization
  - Different testing methods are used to balance testing control/repeatability, sample size, costs, and cost-share opportunities
- Publish testing results in relevant ways to accurately
  - Document real-world petroleum reduction potentials
  - Document fuel and infrastructure use
  - Document life-cycle risks and costs

FY09 HEV Testing Accomplishments

- Completed baseline performance testing on 18 HEV models to date (4 tested during FY09)
- HEV accelerated testing places 320,000 total test miles on a minimum of 2 HEVs per model in <3 years
  - During FY09, 557,000 accelerated test miles were accumulated on 8 models and 16 HEVs
  - At end of FY09, 4.7 million accelerated test miles have been accumulated on 18 models and 47 HEVs
  - Fleet testing includes documenting miles driven, gasoline use, maintenance, and repairs
  - Above plus registration, insurance, and depreciation costs captured to determine life-cycle costs
  - Non-DOE fleets provide drivers and fuel at no cost to DOE – $700k FY09 savings to DOE
  - Fleet gets free vehicle and maintenance paid in exchange

AVTA HEV Testing

- **18 HEV models and 47 HEVs tested to date:**

Year / Model	# Vehicles	Testing Status
2001 Honda Insight	6	Completed
2002 Gen I Toyota Prius	6	Completed
2003 Gen I Honda Civic	4	Completed
2004 Chevrolet Silverado (2- & 4-WD)	2	Completed
2004 Gen II Toyota Prius	2	Completed
2005 Ford Escape (front & 4-WD)	2	Completed
2005 Honda Accord	2	Completed
2006 Lexus RX 400h (front & 2 AWD)	3	Completed
2006 Toyota Highlander (AWD)	2	Completed
2006 Gen II Honda Civic	2	Completed

AVTA HEV Testing

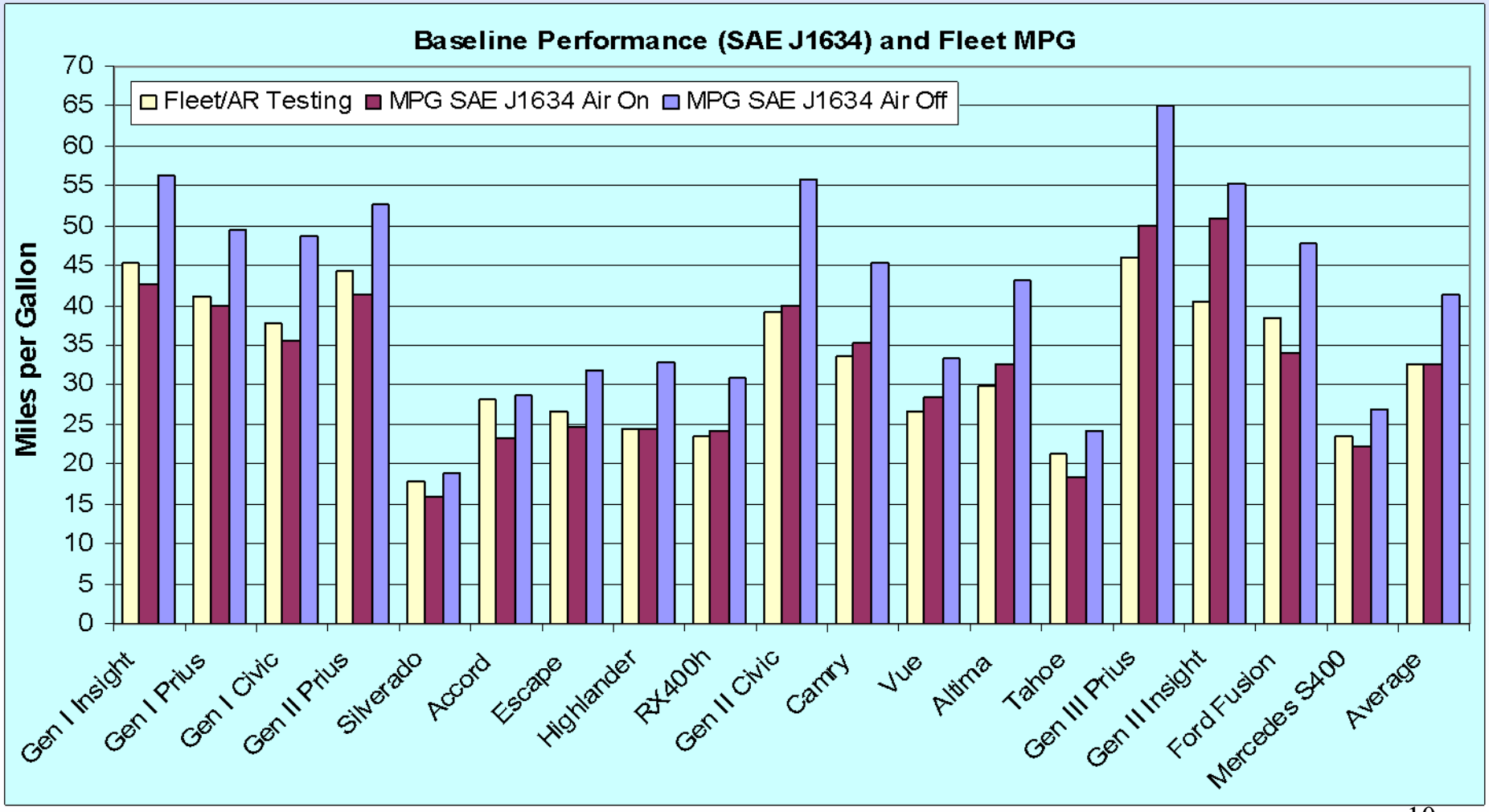
- 18 HEV models and 47 HEVs tested to date (cont'd):

Year / Model	# Vehicles	Testing Status
2007 Saturn Vue	2	Completed (FY10)
2007 Toyota Camry	2	Completed
2008 Nissan Altima	2	Completed
2008 GM 2-mode Tahoes	2	Ongoing
2010 Ford Fusion	2	Ongoing
2010 Gen III Toyota Prius	2	Ongoing
2010 Gen II Honda Insight	2	Ongoing
2010 Mercedes Benz S400	2	Ongoing
Total tested or in testing	47 to date	

- Used HEVs are sold at 160,000 miles to the EPA, other DOE laboratories, and the public in the attempt to establish market rates for life cycle analysis
- In the future, HEVs may be sold to universities

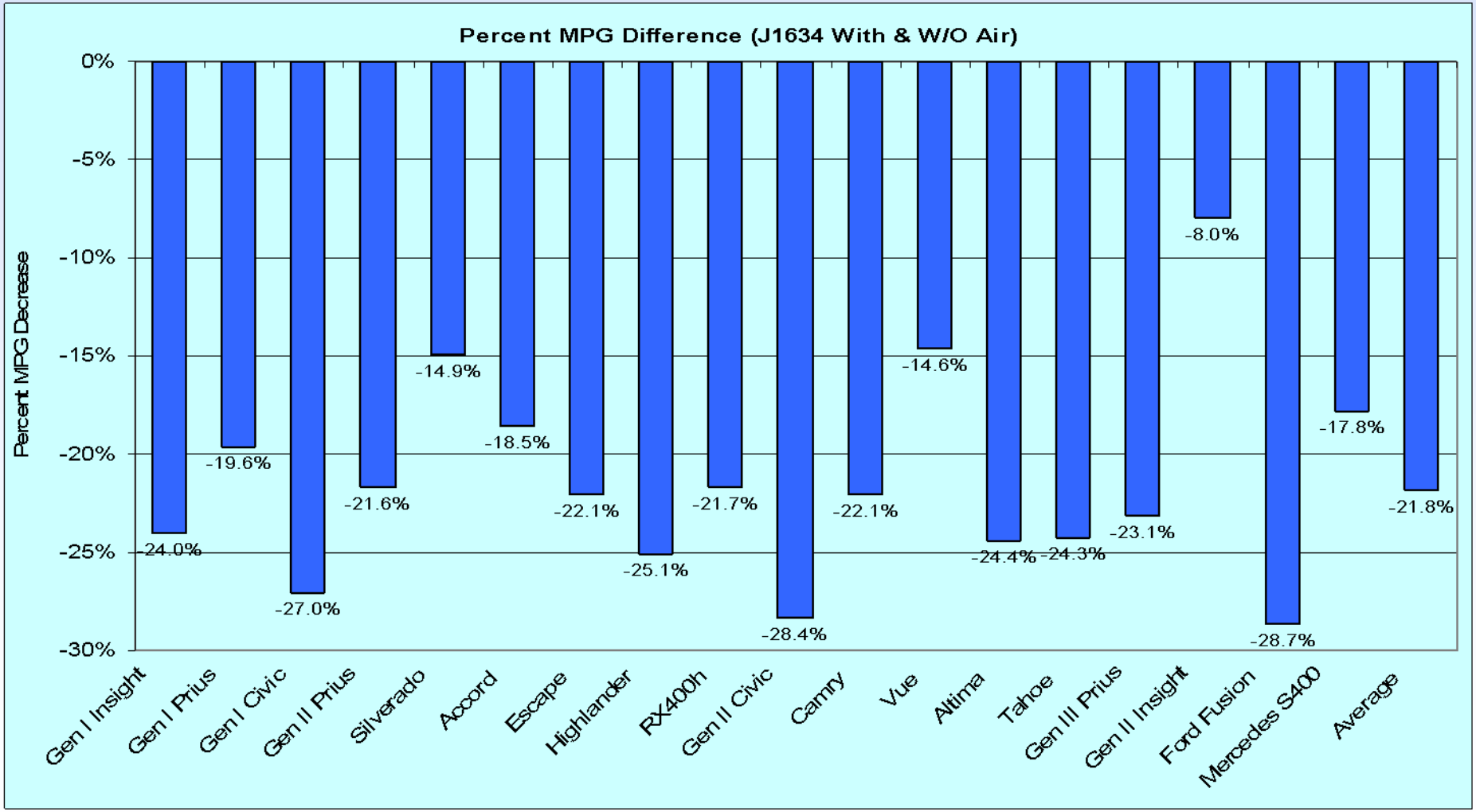
AVTA HEV Testing

- **Baseline performance testing includes test track and dynamometer testing with air conditioning on and off**



AVTA HEV Testing

- **Air conditioning use impacts during dynamometer testing**



AVTA HEV Testing – Maintenance Fact Sheet

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

HEV Fleet Testing

Advanced Vehicle Testing Activity

Maintenance Sheet for 2007 Nissan Altima

VIN # 1N4CL21E27C177982

Date	Mileage	Description	Cost
1/31/2008	4,856	Changed oil	$25.45
2/18/2008	9,817	Changed oil	$35.84
4/8/2008	18,289	Changed oil and filter	$27.85
5/27/2008	30,947	Changed oil and filter	$30.24
7/7/2008	39,387	Changed oil and filter	$32.58
8/5/2008	48,243	Changed oil and filter, replaced air filter and cabin air filter, exchanged coolant, filled air conditioning coolant, and rotated tires	$259.08
8/22/2008	52,506	Changed oil and filter	$28.08
9/9/2008	58,349	Changed oil and filter	$28.31
9/25/2008	63,648	Changed oil and filter, exchanged coolant, replaced cabin air filter, and purchased tire life preventative maintenance package	$444.64
10/13/2008	66,826	Changed oil and filter	$28.08
11/3/2008	72,156	Changed oil and replaced, balanced, and aligned two front tires	$207.32
11/7/2008	73,172	Changed oil and filter	$28.08
12/4/2008	79,464	Changed oil and filter and rotated tires	$35.10
1/14/2009	91,050	Changed oil and filter	$28.08
2/11/2009	99,340	Changed oil and air filters and balanced two tires	$268.34
3/25/2009	111,501	Changed oil and filter, replaced alternator belt and replaced wiper blades	$125.56
4/17/2009	117,676	Changed oil and filter, replaced front and back brake pads and shoes, and turned rear rotors	$414.26
5/1/2009	122,141	Changed oil and filter and replaced air filter	$48.56
6/1/2009	133,892	Changed oil and filter and installed and balanced two tires	$321.34
6/19/2009	142,317	Changed oil and filter	$28.21
7/20/2009	154,225	Changed oil and filter	$28.21
7/24/2009	154,986	Installed and balanced two tires	$229.10

FREEDOMCAR & VEHICLE TECHNOLOGIES PROGRAM

HEV Fleet Testing

Advanced Vehicle Testing Activities

2005
Honda Accord
VIN #
JHMCN36495C000657

FreedomCAR & Fuel Partnership

A Strong Energy Portfolio for a Strong America
Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

Fleet Performance

Description:
This vehicle is operated throughout the valley of Phoenix, Arizona by JP Morgan Chase Bank of Arizona's courier fleet. It is operated six days a week, transferring documents between branches and a central processing center on city streets and urban freeways as well as intrastate courier routes.

Major Operations & Maintenance Events:
Repaired electrical door lock @ 79,722
Cost: $321.17

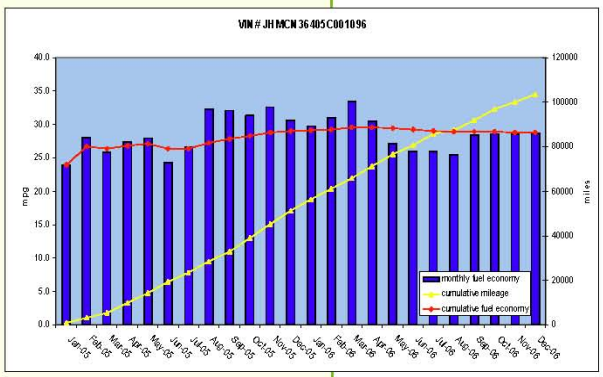
Operating Cost:
Purchase Cost: $32,945 (12/04)*
Kelly Used Vehicle Price: $16,935 (1/07)
Sale Price: In Operation
Maintenance Cost: $0.038/mile
Operating Cost: $0.13/mile
Total Ownership Cost: $0.32/mile

Operating Performance:
Total miles driven: 103,646
Cumulative MPG: 29.5

Vehicle Specifications

Engine: I-VTEC V6
Electric Motor: 11.9 kW
Battery: Nickel metal hydride
Seatbelt Positions: Five
Payload: 952 lbs
Features: Front wheel drive, regenerative braking

See HEVAmerica Baseline Performance Fact Sheet for more information.



** Purchase includes dealer price with options plus taxes. It does not include title, license, registration, extended warranty or delivery fee costs. Gas figured at $2.45/gallon.*

For more information contact:
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

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

HEV Fleet Testing Operating Cost Fact Sheets

- **Total ownership cost in $ per mile includes:**
  - **Purchase cost**
  - **Final sale price or Kelly blue book if still in operations**
  - **Maintenance costs**
  - **Operating costs (fuel, registration, insurance, etc.)**
- **Includes description of use and any major M&O events**

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy VEHICLE TECHNOLOGIES PROGRAM

HEV Fleet Testing

2006 Toyota Highlander Hybrid

Final Fleet Testing Results

Operating Statistics

Number of Vehicles Tested: 2

Distance Driven[1]: 297,852 mi

Average Trip Distance[2]: 13.8 mi

Stop Time with Engine Idling[2]: 23%

Trip Type City/Highway[2]: 74%/26%

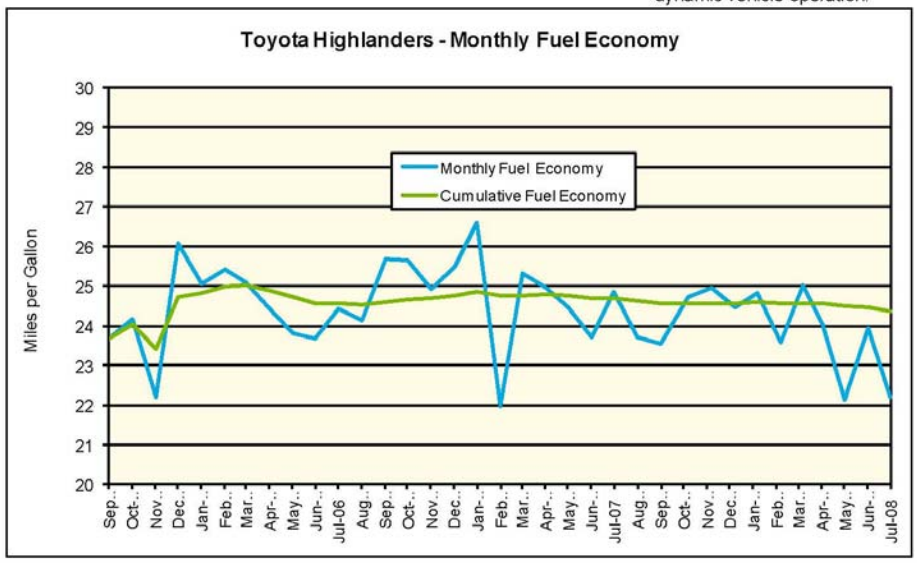
Operating Performance

Cumulative MPG[1]: 24.4

See HEV America Baseline Performance and Fleet Testing Fuel Economy fact sheets for more information on vehicle specifications and fuel usage reporting, available at http://avt.inl.gov/

Test Notes

1. Calculated over the life of the vehicle based on odometer reading and fuel logs. More information available in Fleet Testing Fuel Economy sheet.
2. Calculated from electronic data logged over a subset of total miles traveled equal to 118,838 miles.
3. Fuel economy calculated for this figure using mass air flow over dynamic vehicle operation.



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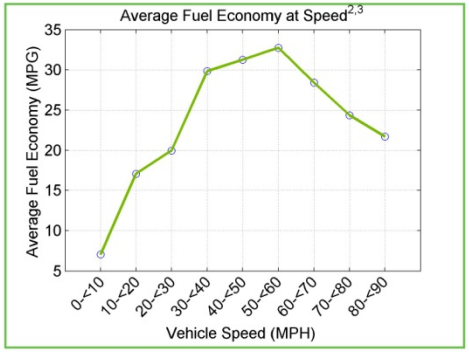
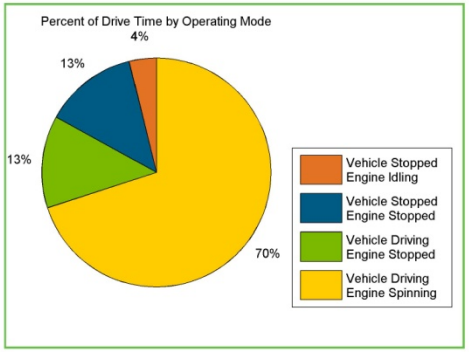
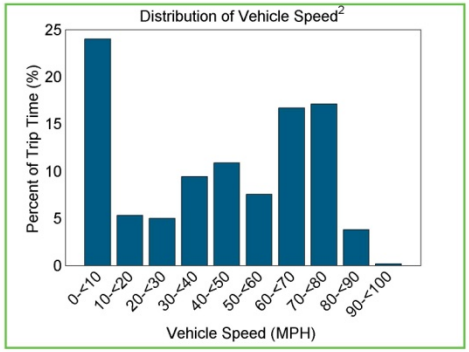
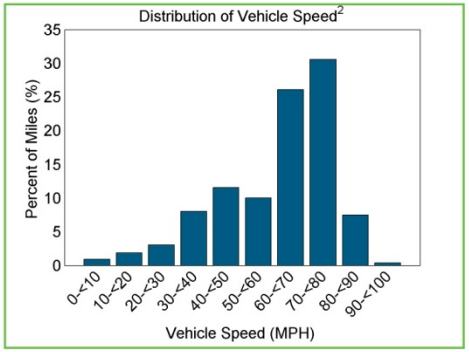
Final HEV Fleet Testing Results Fact Sheets

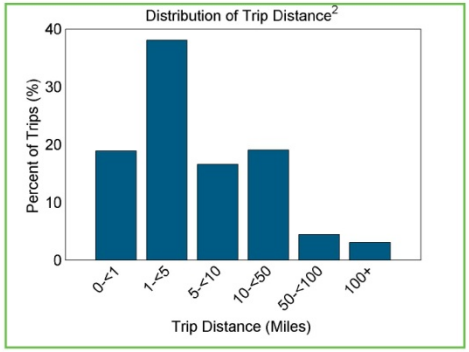
- Total miles
- Average trip distance
- Engine idling time
- City / highway trip type
- Cumulative and monthly mpg

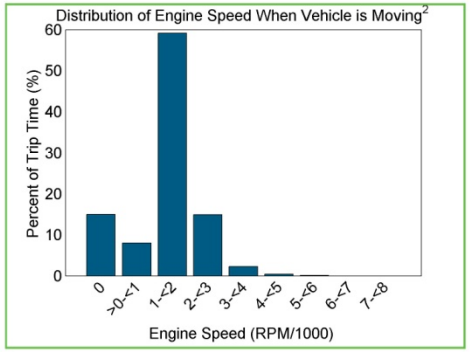












Final HEV Fleet Testing Results Fact Sheets – cont'd

- Average mpg at various speeds
- Percent of drive time in operating modes
- Distribution of vehicle speed by trip time and miles
- Distribution of trip distances
- Distribution of engine speed when driving

AVTA HEV Battery Testing

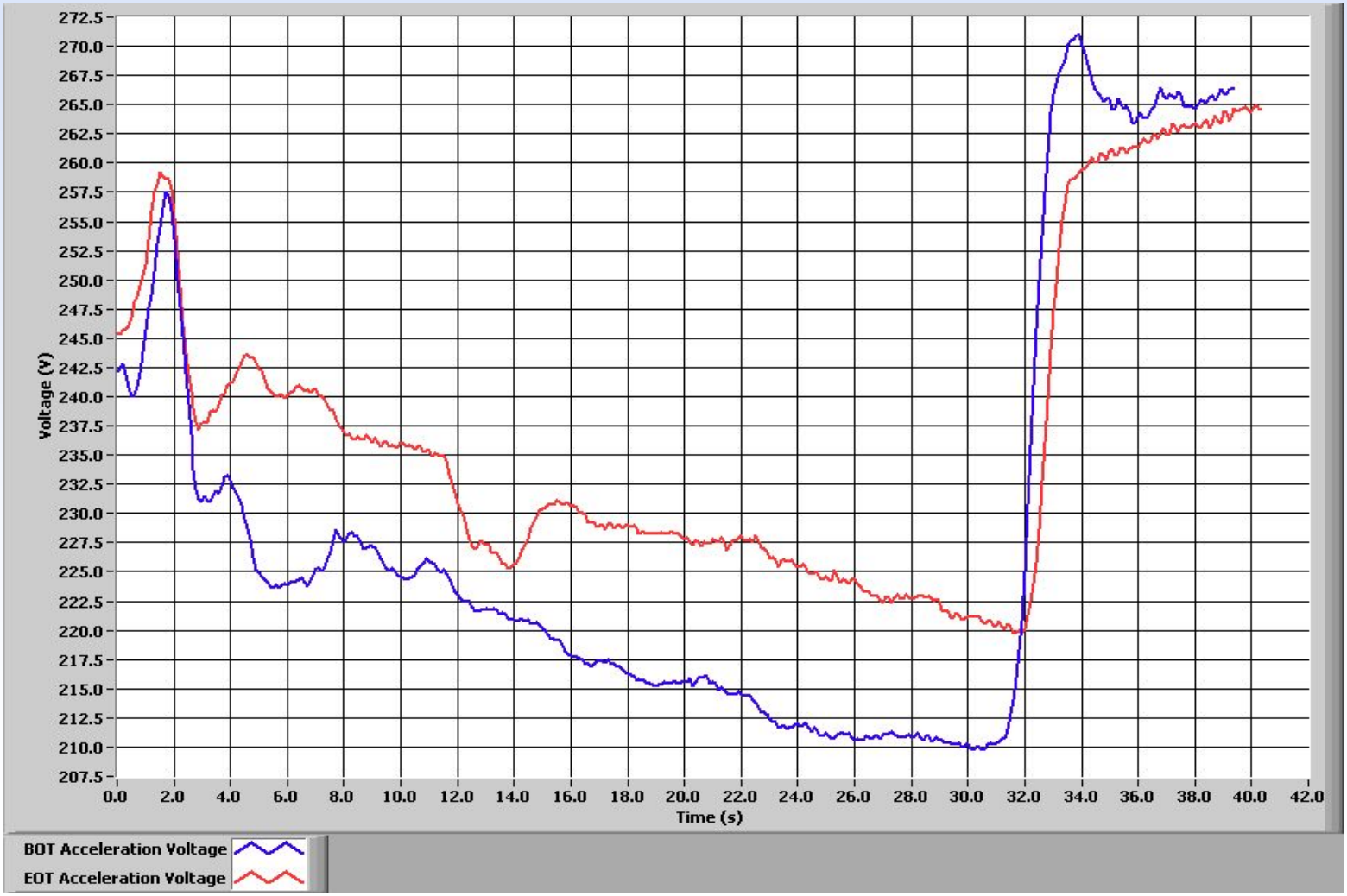
- Published 9 HEV battery testing reports during FY09, with 24 published to date
- Conducted 15 HEV battery pack tests during FY09
- Original 10 HEV models' batteries only tested at 160,000 miles
- Eight newest HEV models' batteries tested when new and at 160,000 miles
- Ten newest HEV models have been or will also be reaccelerated tested and their batteries documented when new and at 160,000 miles
- Test results document energy and power performance to DOE targets, and any degradation when the batteries are new and at 160,000 miles

AVTA HEV Battery Testing - Altima

- **Power versus Time during acceleration tests when new (656 miles) and at 161,000 miles**

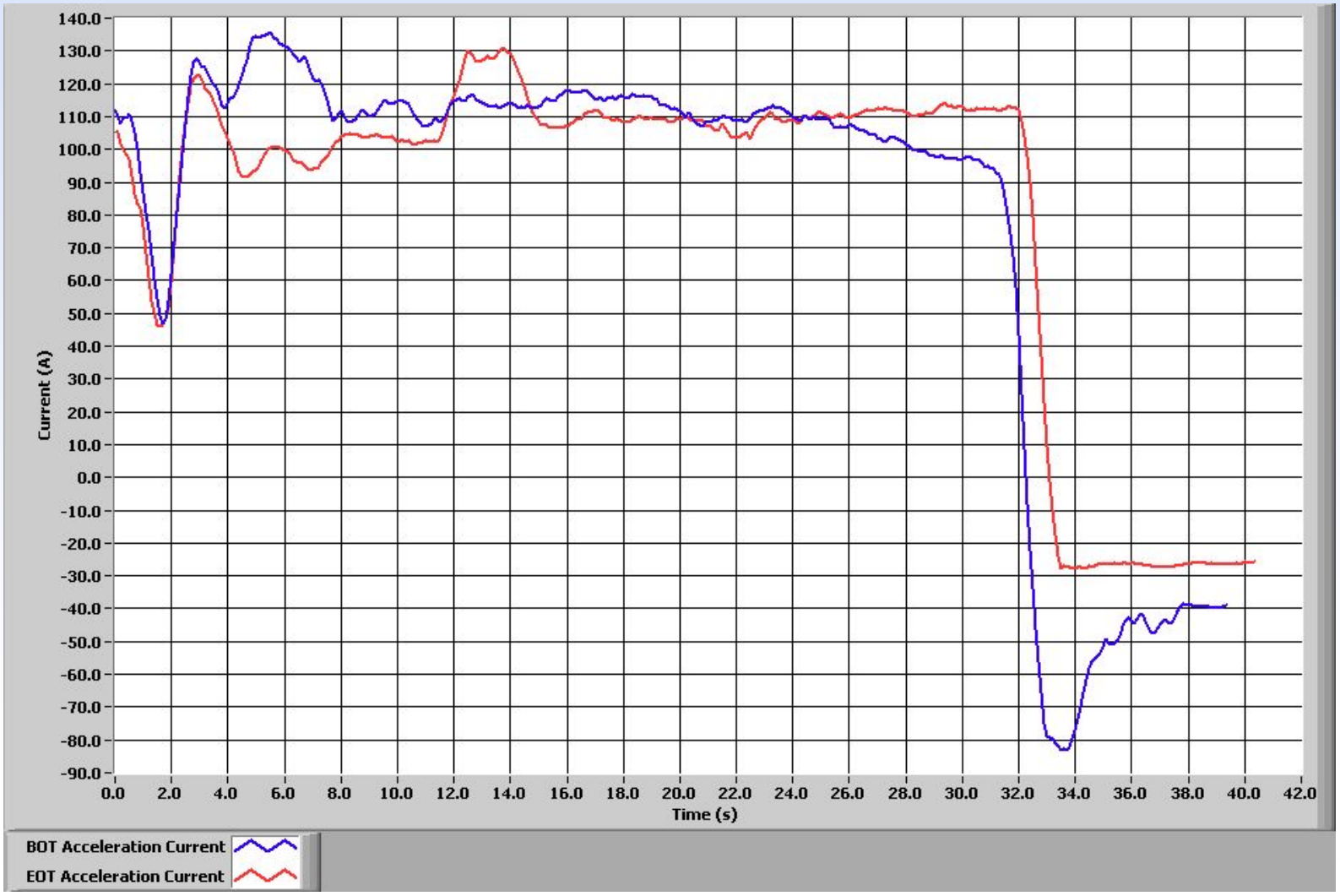
AVTA HEV Battery Testing – Altima cont'd

- **Voltage versus Time during acceleration tests when new (656 miles) and at 161,000 miles**



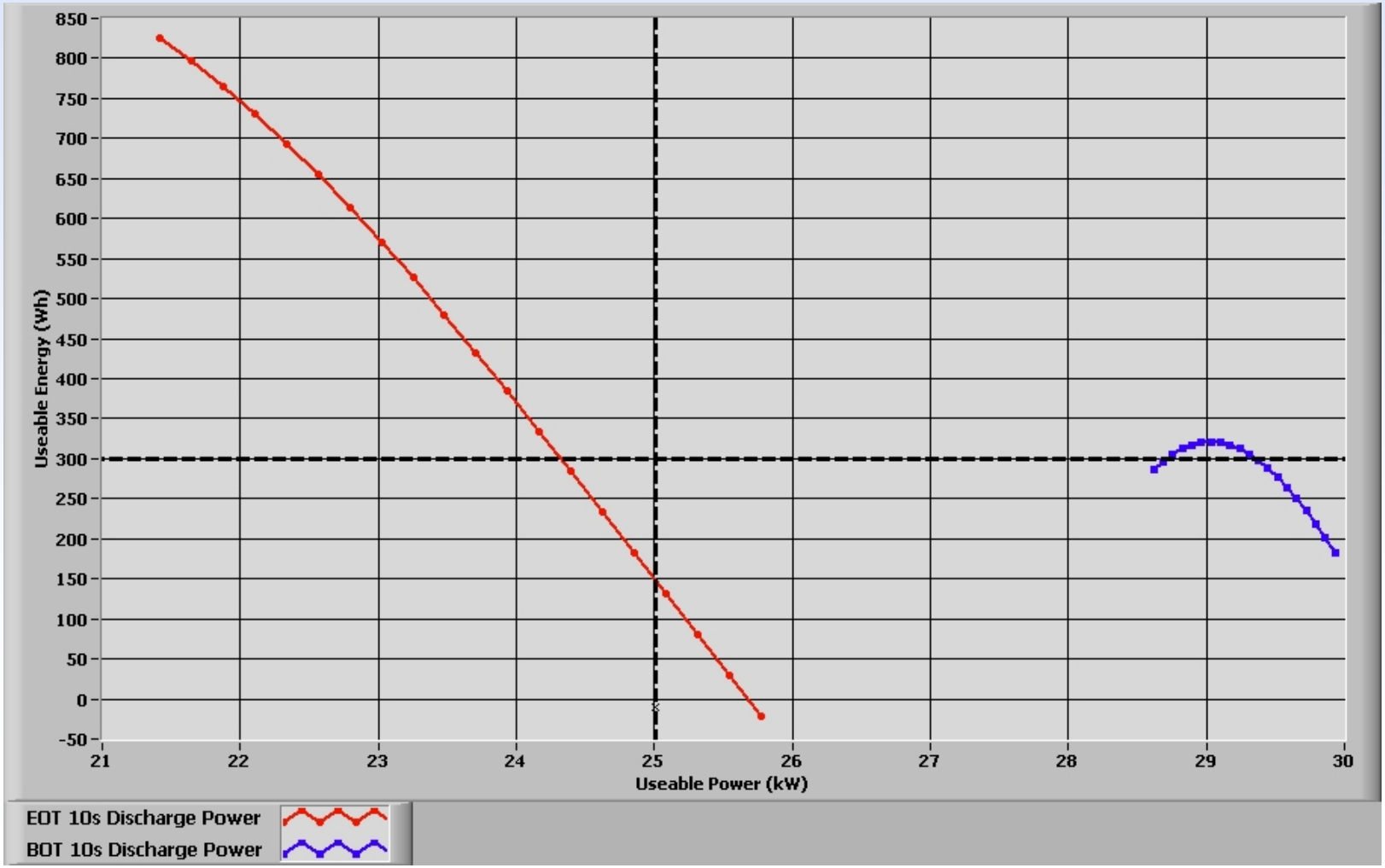
AVTA HEV Battery Testing – Altima cont'd

- **Current versus Time during acceleration tests when new (656 miles) and at 161,000 miles**



AVTA HEV Battery Testing – Altima cont'd

- **Usable Energy testing results compared to DOE Usable Energy and Power targets during HPPC test when new (656 miles) and at 161,000 miles**



AVTA HEV Battery Reports

- **Characterize test vehicle battery performance by using**
  - On-road testing by ETEC
  - Vehicle dynamometer testing at ANL
  - Lab testing by ETEC at Beginning (BOT) and End of accelerated Testing (EOT)
- **Benchmark the battery's energy and power capabilities during**
  - Normal driving conditions
  - Wide-open throttle conditions
  - Controlled-environment capacity and hybrid pulse power testing
- **Side-by-side analyses of vehicle and battery performance enables**
  - Determination of battery capabilities vs. vehicle demands
  - Confirmation of laboratory data vs. field data and vehicle performance
  - Confirmation of manufacturer's specs
  - Confirmation of U.S. DOE Electrochemical Energy Storage (ECES) technical targets, procedures and results
  - Value added vehicle systems analysis and ECES technical support

All testing was done in accordance with FreedomCAR Battery Test Manual for Power-Assist Hybrid Electric Vehicles and AVTA procedures.

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Energy Efficiency and Renewable Energy
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Vehicle Technologies Program

HEV Fleet Testing

Advanced Vehicle Testing Activity

2005 Chevrolet Silverado 1500HD Hydrogen ICE[1] Conversion

North American Fleet Testing Results to Date June, 2009

A Strong Energy Portfolio for a Strong America
Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

Fleet Performance

Operating Statistics[2]:
Vehicles in Fleet: 12
Total Miles: 55,255
Total Number of Trips: 9271
Average Trip Distance (miles): 6.0
Percent Idle Time: 16%[3]
Percent Air Conditioner Run Time: 8.5%[3]

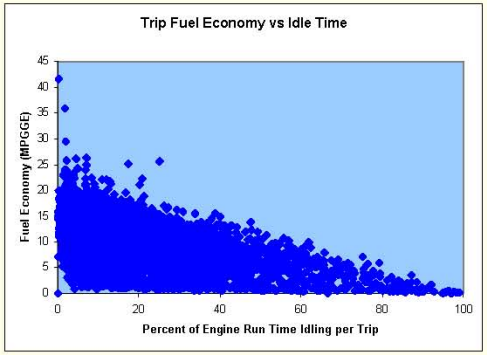
Operating Performance[2]:
Cumulative MPGGE[4]: 13.2
Total Fuel Consumed (kg H_2): 4229
Total Engine Run Time (hours): 2339
Total Engine Idle Time (hours): 385

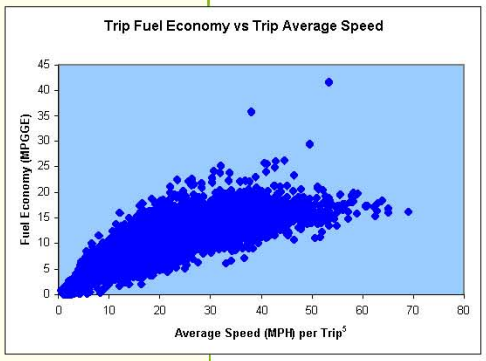
Vehicle Specifications

Engine: 6.0L V8
Fuel Capacity: 10.5 GGE
Nominal Tank Pressure: 5000 psi
Seatbelt Positions: Five
Payload: 2775 lbs
Features: 4 Speed Automatic Transmission

See HICEV America Baseline Performance Fact Sheet for more information.

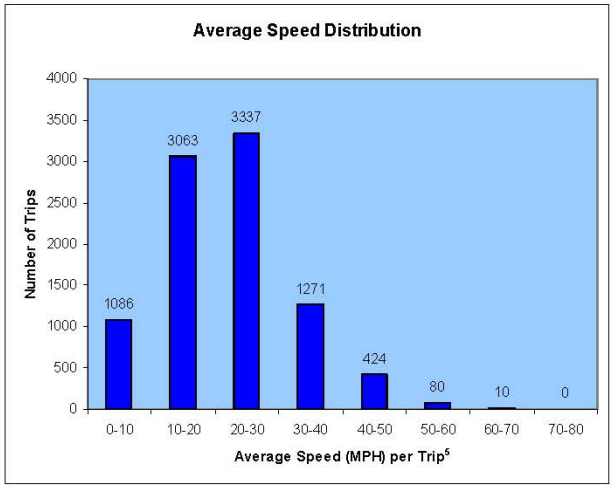
For more information contact:
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

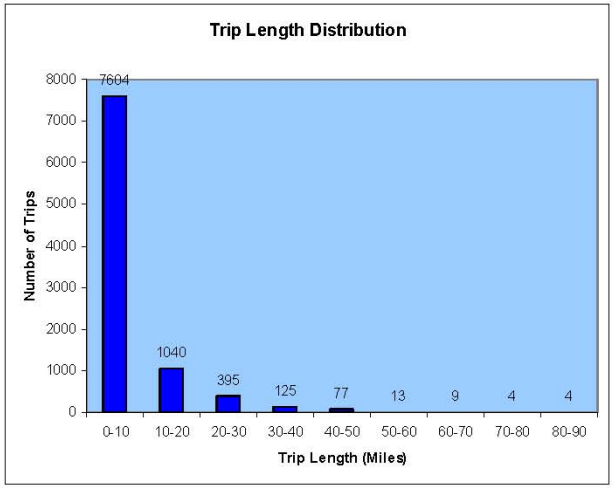




Hydrogen ICE Fact Sheet

- Twelve 2005 Chevrolet Silverado 1500HD pickups
- Operating in Canada and the U.S.
- 10.5 GGE ~100% H2 onboard storage
- Onboard data logger generated results
  - 13.2 MPGGE on H2
  - 6.0 mile average trip distance
  - 16% average idle time
  - 8.5% A/C run time





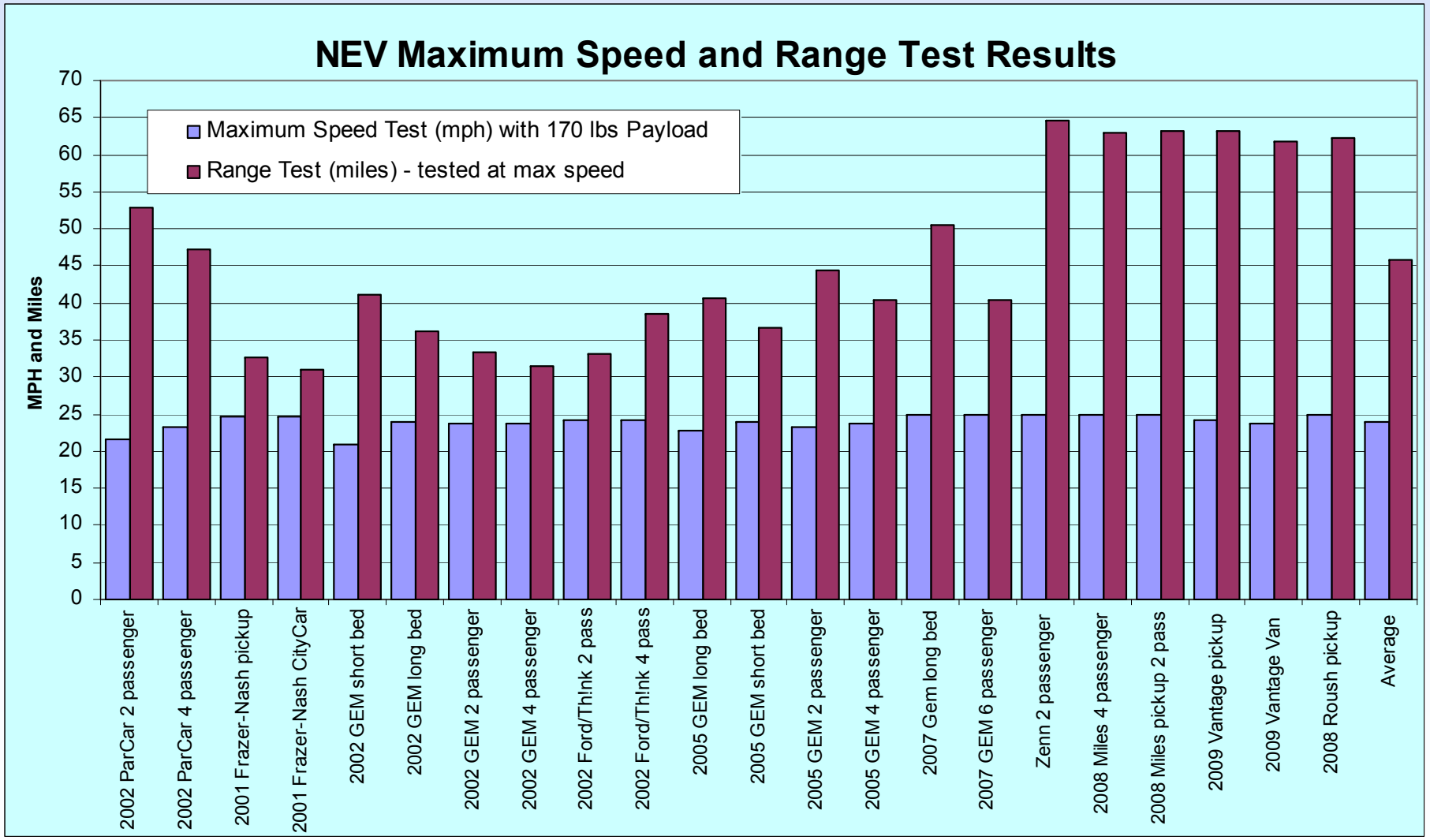
Notes:

1. Internal Combustion Engine
2. Data presented represents all electronically logged data, which is a subset of the overall fleet mileage
3. Percentage of total engine run hours
4. Miles per gallon gasoline equivalent (1 GGE = 1.012 kg H_2)
5. Average speed of vehicle when moving, idle time not included in calculation

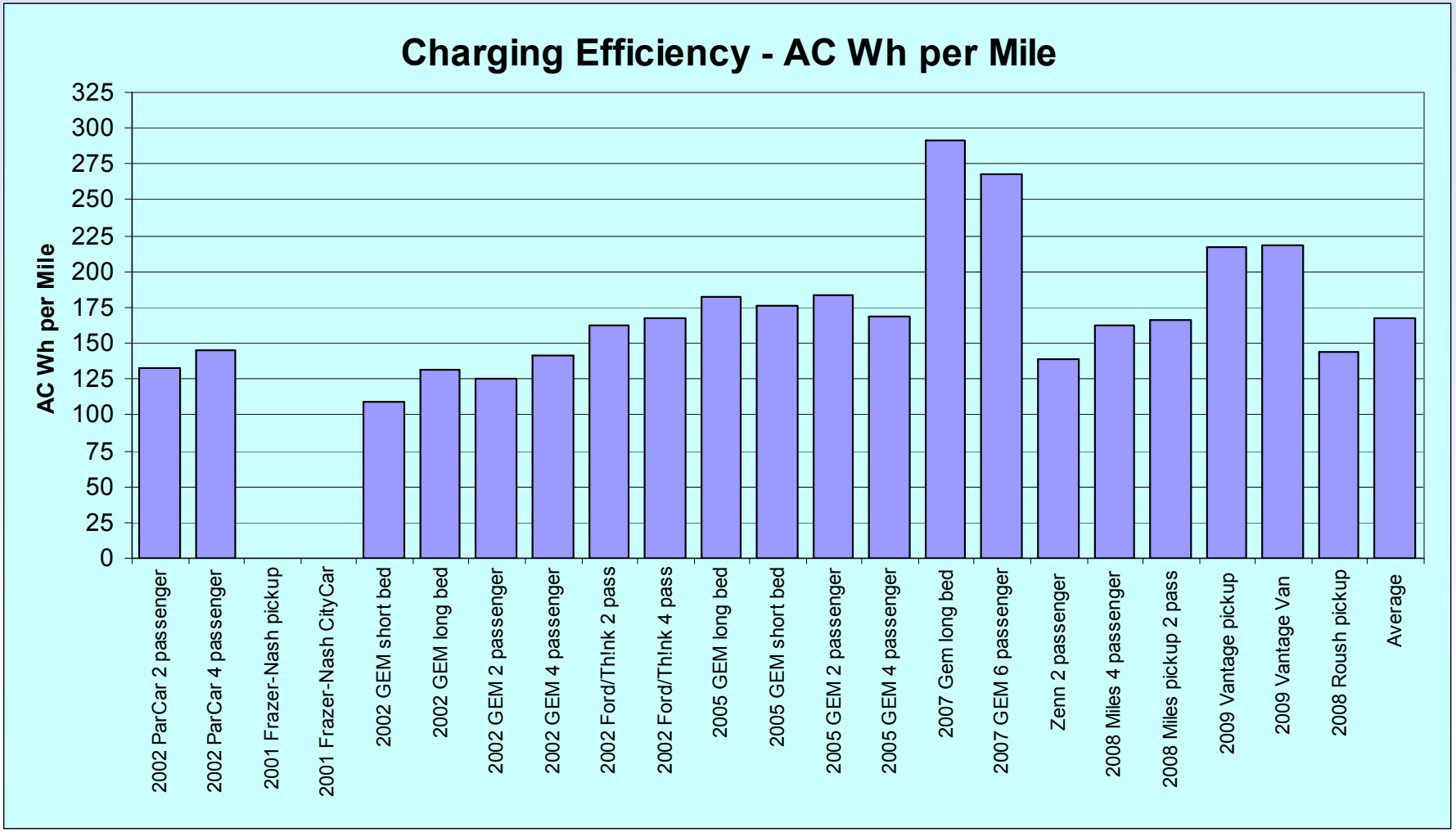
Hydrogen ICE Fact Sheet – cont'd

- Onboard data logger:
  - Average speed distribution
  - Average trip length distribution
- Very low cost data monitoring activity
- DOE only paid for data loggers
- Partners paid FY09 all vehicle and operating costs, of ~$900k

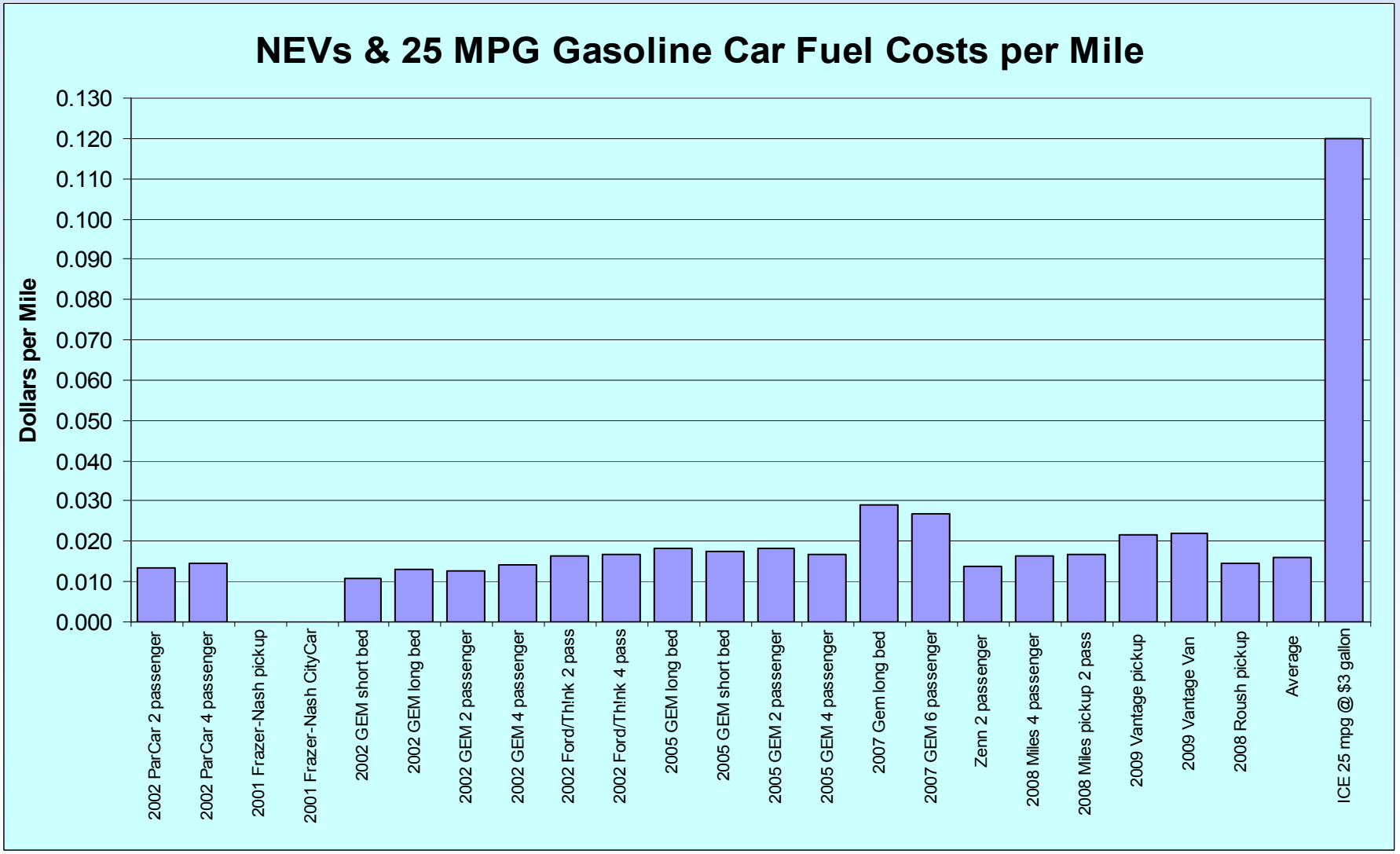
AVTA NEV Testing



AVTA NEV Testing – cont'd

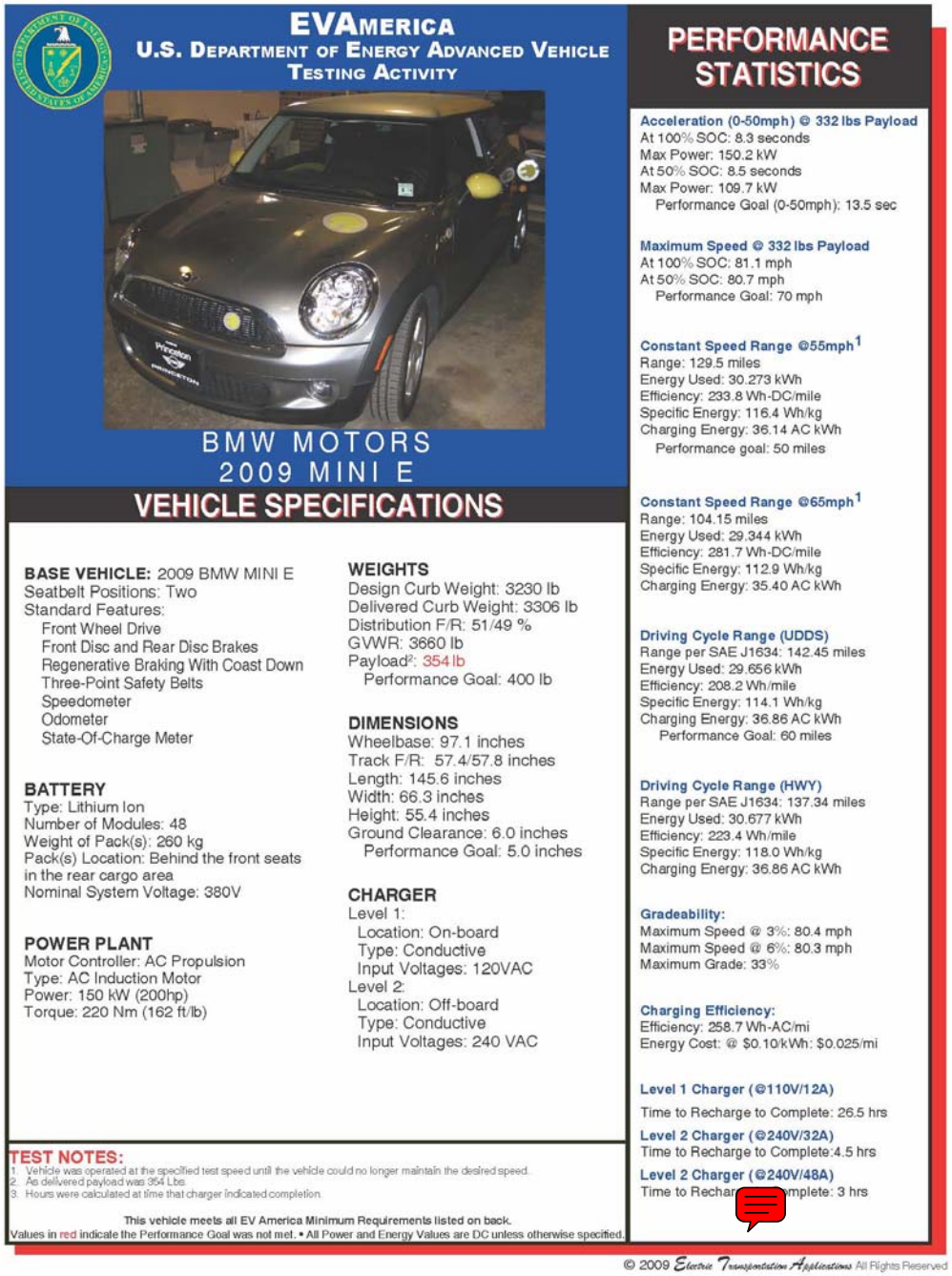


AVTA NEV Testing – cont'd



AVTA NEV Testing – cont'd

- Three NEVs tested in FY09
  - Vantage Pickup EVX1000
  - Vantage Van EVC1000
  - Roush Pickup Truck
- 22 NEVs tested to date, including: 10 GEMs, 2 Miles, 1 Zenn, 2 Th!nk, 2 Frazer Nash, and 2 ParCar NEVs
- California Air Resource Board requires all NEVs to be successfully tested by the AVTA in order to be eligible for
  - CARB incremental funding
  - Partial ZEV credits



EVAMERICA
U.S. DEPARTMENT OF ENERGY ADVANCED VEHICLE TESTING ACTIVITY

BMW MOTORS
2009 MINI E

VEHICLE SPECIFICATIONS

BASE VEHICLE: 2009 BMW MINI E
Seatbelt Positions: Two
Standard Features:
Front Wheel Drive
Front Disc and Rear Disc Brakes
Regenerative Braking With Coast Down
Three-Point Safety Belts
Speedometer
Odometer
State-Of-Charge Meter

BATTERY
Type: Lithium Ion
Number of Modules: 48
Weight of Pack(s): 260 kg
Pack(s) Location: Behind the front seats in the rear cargo area
Nominal System Voltage: 380V

POWER PLANT
Motor Controller: AC Propulsion
Type: AC Induction Motor
Power: 150 kW (200hp)
Torque: 220 Nm (162 ft/lb)

WEIGHTS
Design Curb Weight: 3230 lb
Delivered Curb Weight: 3306 lb
Distribution F/R: 51/49 %
GVWR: 3660 lb
Payload[2]: 354 lb
Performance Goal: 400 lb

DIMENSIONS
Wheelbase: 97.1 inches
Track F/R: 57.4/57.8 inches
Length: 145.6 inches
Width: 66.3 inches
Height: 55.4 inches
Ground Clearance: 6.0 inches
Performance Goal: 5.0 inches

CHARGER
Level 1:
Location: On-board
Type: Conductive
Input Voltages: 120VAC
Level 2:
Location: Off-board
Type: Conductive
Input Voltages: 240 VAC

PERFORMANCE STATISTICS

Acceleration (0-50mph) @ 332 lbs Payload
At 100% SOC: 8.3 seconds
Max Power: 150.2 kW
At 50% SOC: 8.5 seconds
Max Power: 109.7 kW
Performance Goal (0-50mph): 13.5 sec

Maximum Speed @ 332 lbs Payload
At 100% SOC: 81.1 mph
At 50% SOC: 80.7 mph
Performance Goal: 70 mph

Constant Speed Range @55mph[1]
Range: 129.5 miles
Energy Used: 30.273 kWh
Efficiency: 233.8 Wh-DC/mile
Specific Energy: 116.4 Wh/kg
Charging Energy: 36.14 AC kWh
Performance goal: 50 miles

Constant Speed Range @65mph[1]
Range: 104.15 miles
Energy Used: 29.344 kWh
Efficiency: 281.7 Wh-DC/mile
Specific Energy: 112.9 Wh/kg
Charging Energy: 35.40 AC kWh

Driving Cycle Range (UDDS)
Range per SAE J1634: 142.45 miles
Energy Used: 29.656 kWh
Efficiency: 208.2 Wh/mile
Specific Energy: 114.1 Wh/kg
Charging Energy: 36.86 AC kWh
Performance Goal: 60 miles

Driving Cycle Range (HWY)
Range per SAE J1634: 137.34 miles
Energy Used: 30.677 kWh
Efficiency: 223.4 Wh/mile
Specific Energy: 118.0 Wh/kg
Charging Energy: 36.86 AC kWh

Gradeability:
Maximum Speed @ 3%: 80.4 mph
Maximum Speed @ 6%: 80.3 mph
Maximum Grade: 33%

Charging Efficiency:
Efficiency: 258.7 Wh-AC/mi
Energy Cost: @ $0.10/kWh: $0.025/mi

Level 1 Charger (@110V/12A)
Time to Recharge to Complete: 26.5 hrs

Level 2 Charger (@240V/32A)
Time to Recharge to Complete:4.5 hrs

Level 2 Charger (@240V/48A)
Time to Recharge to Complete: 3 hrs

TEST NOTES:
1. Vehicle was operated at the specified test speed until the vehicle could no longer maintain the desired speed.
2. As delivered payload was 354 Lbs.
3. Hours were calculated at time that charger indicated completion.

This vehicle meets all EV America Minimum Requirements listed on back.
Values in red indicate the Performance Goal was not met. • All Power and Energy Values are DC unless otherwise specified.

AVTA BEV Testing

- During FY09, AVTA initiated testing of the first BEV from an OEM in 10 years
- Additional FY10 BEVs: Tesla and THINK
- Also FY10 test 5 USPS LLV conversions
- FY11 will include: Leaf, iMiEV, Transit, Focus, THINK, BMW, BYD E6
- FY11 will also include EREV Volt and PHEV Toyota Prius

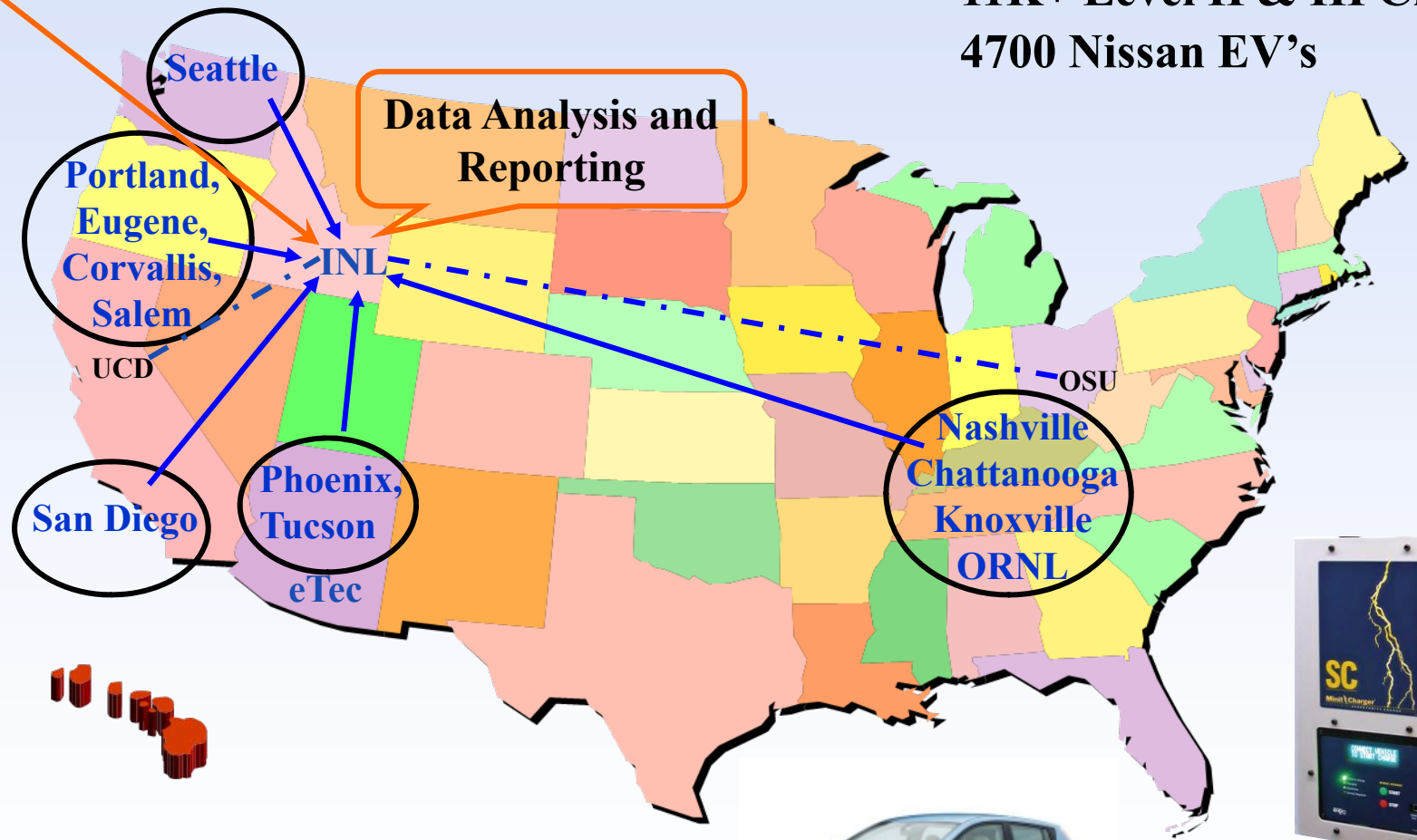
eTec/Nissan/INL BEV Infrastructure Project

- Awarded FY09, deployment later CY10
- INL is a principle participant with eTec in the deployment of 4,700 battery electric Nissan Leaf vehicles in 5 states:
  - Oregon, Washington, California, Arizona and Tennessee
- Charging and vehicle data will be collected via data streams from eTec charging infrastructure and Nissan
- INL will analyze and report on:
  - Charging infrastructure utilization for ~11,000 Level II EVSE units, ~260 Level III chargers, and 4,700 Leafs
  - Driver / vehicle charging patterns and trends
- Please see eTec's *Electric Drive Vehicle Demonstration and Vehicle Infrastructure Evaluation* poster for additional information

eTec/Nissan/INL BEV Infrastructure Project

eTec/Nissan/Regional Partners

11K+ Level II & III Chargers
4700 Nissan EV's



Battery – 24+ kWh Li-ion,
Projected 100 Mile Range

Fleet Data Collection \ Reporting Processes

- Maintaining / enhancing automated data warehousing, analysis, and reporting process for fleet data
- Accommodates 4 different data transfer methods from a multitude of vehicle / data logger combinations:
  - 9 PHEV, 8 HEV and 1 HICE models
  - 4 data logger manufacturers \ designs (3 PHEVs)
- Reporting formats include 71 metrics describing energy use, driving patterns, and charging patterns
- Developed quality assurance \ exploratory analysis tools both for raw data and reports
- Created flexible automated report generation processes for individual and multiple vehicle reports

FY09 Milestones

- Completed baseline performance testing on 18 HEV models to date (4 tested during FY09)
- During FY09, 557,000 accelerated test miles were accumulated on 8 models and 16 HEVs
- At end of FY09, 4.7 million accelerated test miles have been accumulated on 18 models and 47 HEVs
- Published 12 HEV battery testing reports during FY09, with 24 published to date
- Conducted 15 HEV battery pack tests during FY09
- Initiated testing of first BEV recently available from an OEM
- Awarded eTec/Nissan/INL BEV infrastructure project
- Tested 3 new NEVs in support of CARB
- Automated HICE data logger reporting process and reported on results

Future Testing Activities

- Continue to focus on testing electric drive vehicle technologies and sub-systems that:
  - Incorporate advanced electric drive systems and electric storage (battery) technologies
  - Support DOE's goal of ensuring the continued supply of secure energy sources
  - Can be tested in a lower-cost manner that accurately portrays real world performance
  - Can be tested in a manner that leverages non-DOE cost share
- Continue to supply testing results to modelers at other DOE laboratories and OEMs
- Continue to build data analysis and dissemination tools
- In CRADA and NDA negotiations with several OEMs for additional data collection
- Continue role as DOE's sole independent tester of light-duty whole-vehicle technologies in field applications

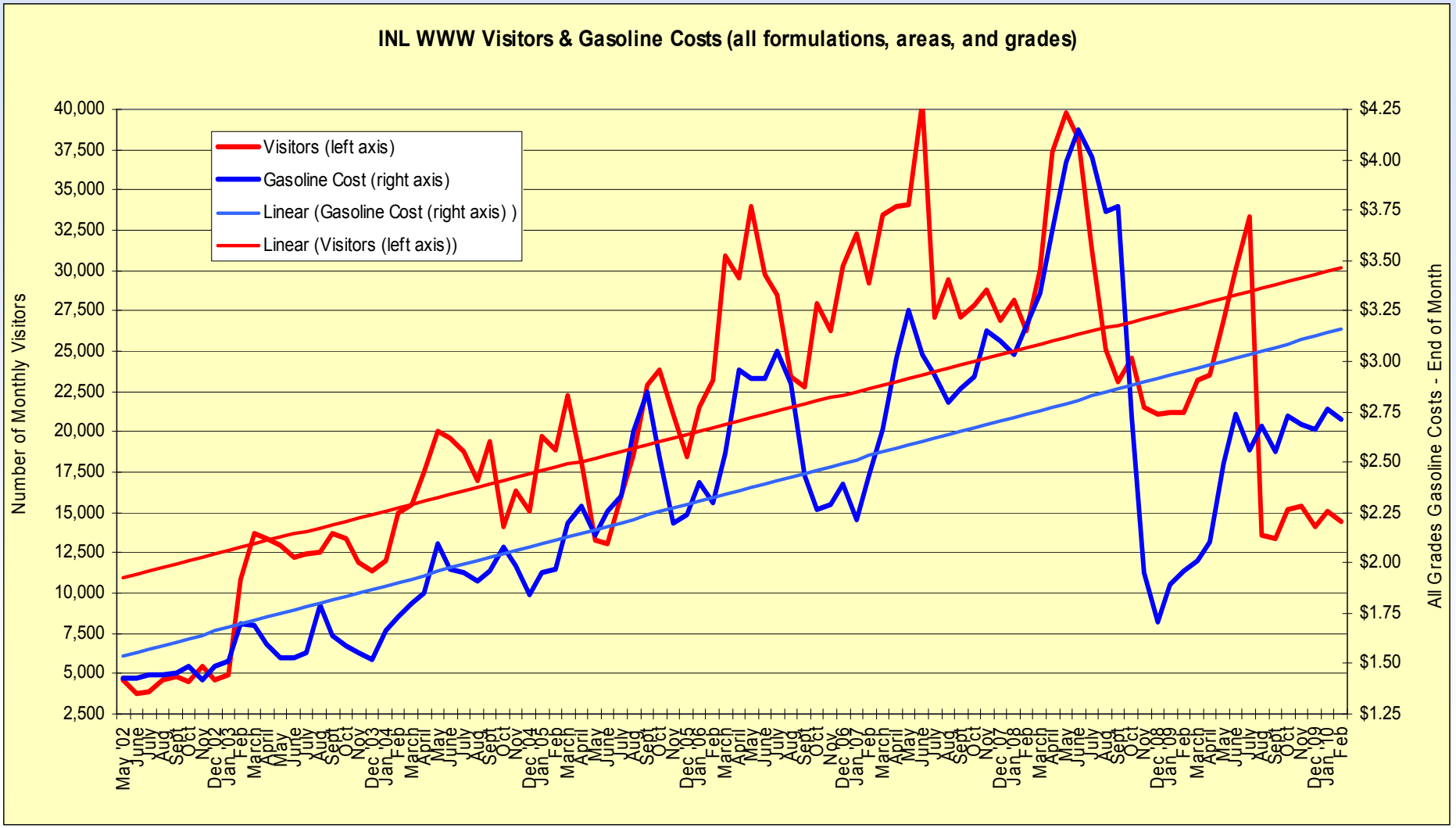
Summary

- **Before a vehicle testing regime or demonstration is initiated, the AVTA identifies and determines the technical and economic values of testing partnerships to ensure that the maximum value to DOE and taxpayers are achieved**
- **AVTA is a very low-cost project for the number of test miles and data accumulated, and the number of reports published, as all funding is highly leveraged via testing partnerships to provide maximum benefits to DOE and taxpayers**
- **Every testing regime has at least 20% cost share, and most testing cost-share is much higher**
- **Taxpayers receive independent information on emerging technologies and the associated amounts of petroleum used or avoided**

Summary – cont'd

- The AVTA will continue to coordinate vehicle selection, testing and publishing activities with other DOE labs and OEMs, including:
  - ANL
  - ORNL
  - NERL
  - Several OEMs and battery manufacturers via VSATT and other DOE / USCAR technical teams such as the Electrochemical Energy Storage Tech Team
- Continue to explore additional electric drive vehicle data collection and demonstration projects that:
  - Provide access to new vehicles and technologies
  - Provide operating environment diversity
  - Provide high value to DOE

AVTA Summary – WWW Visitors



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Additional Information

http://avt.inl.gov
or
http://www1.eere.energy.gov/vehiclesandfuels/avta/

INL/CON-10-18510