

U.S. Department of Energy FreedomCAR & Vehicle Technologies Program

Advanced Vehicle Testing Activity – *Hybrid Electric Vehicle and Idle Reduction Technology Activities*

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Presentation Outline

- **AVTA Goal**
- **AVTA Testing Partners**
- **Hybrid Electric Vehicle Testing (Performance)**
- **Hybrid Electric Vehicle Policy Support**
- **Hybrid Electric Vehicle Provisions in pending Energy Bill**
- **State and Local Idle Reduction Activities**
- **State and Local Idle Reduction Regulations**
- **DOE Idle Reduction Demonstration Project**

AVTA Goal

- **Benchmark and validate the performance of light-, medium-, and heavy-duty vehicles that feature one or more advanced technologies, including:**
 - **ICE's burning advanced fuels, such as 100% hydrogen and hydrogen/CNG-blended fuels**
 - **Hybrid electric, pure electric, and hydraulic drive systems**
 - **Advanced batteries and engines**
 - **Advanced climate control, power electronic, and other ancillary systems**

AVTA Testing Partners

- **Qualified Vehicle Testers (50 – 50 cost share)**
 - **Electric Transportation Applications (lead)**
 - **Arizona Public Service (APS)**
 - **Bank One**
 - **Ford Motor Company**
 - **Luke AFB**
 - **New York Power Authority**
 - **Red Cross**
 - **Southern California Edison**
 - **Salt River Project**
 - **Cities of Palm Springs, Palm Valley, Phoenix, Vacaville, and San Diego**

Hybrid Electric Vehicle Testing

- **Honda Insight**
- **Honda Civic**
- **MY '02 & '03 Toyota Prius**
- **MY '04 Toyota Prius**
- **Fleet and accelerated reliability testing (900,000+ miles)**
 - **Bank One, Red Cross, Arizona Public Service, ETA**
 - **Fuel use, maintenance, repairs, driver experience**
- **Baseline Performance testing (dynamometers and closed test tracks)**
 - **Fuel economy, acceleration, max speed, braking, & handling**

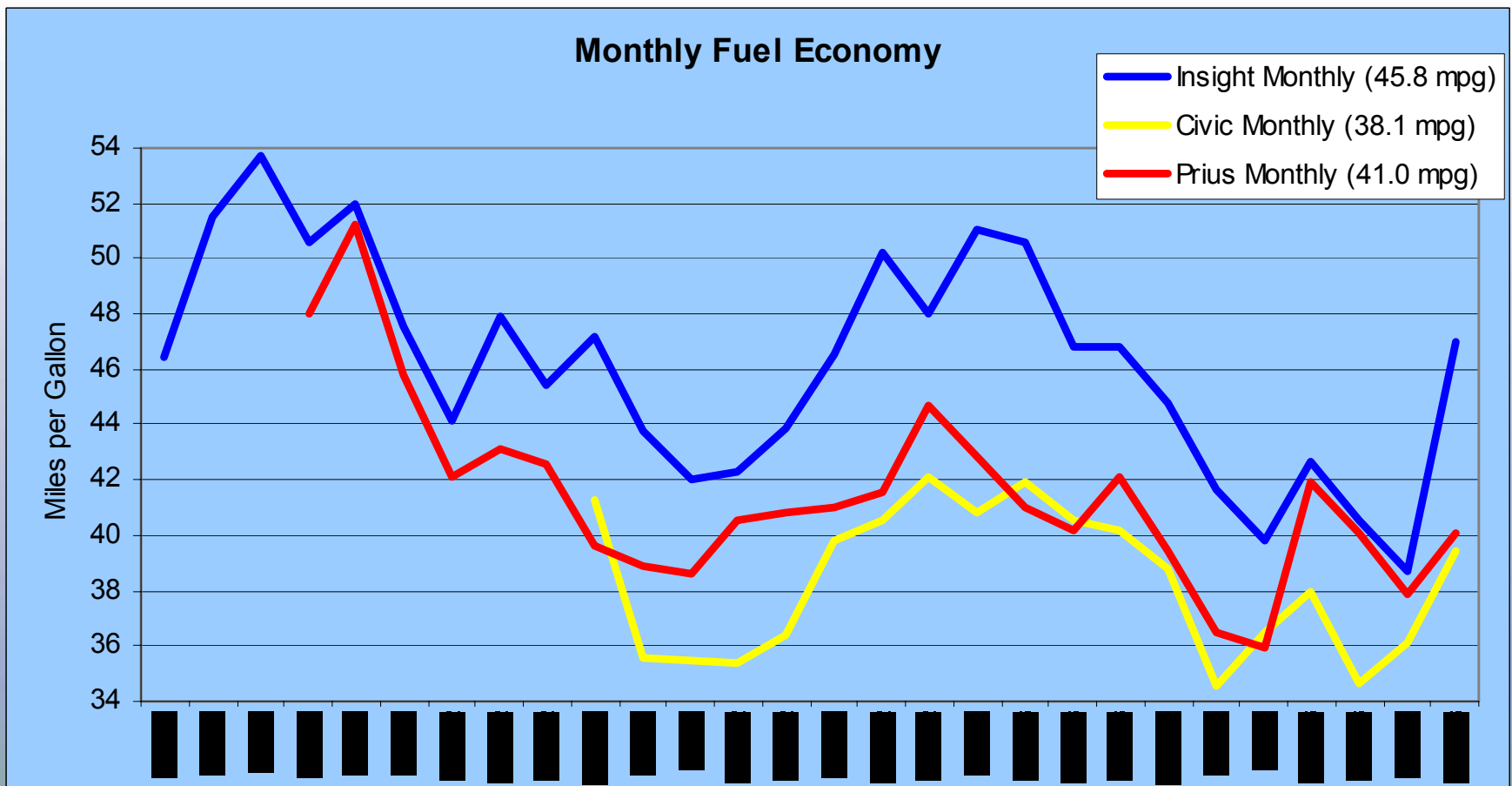
Hybrid Electric Vehicle Testing

- **Fleet and accelerated reliability testing**
 - **6 Honda Insights (302,000 miles) ~45.8 mpg**
 - **4 Honda Civics (248,000 miles) ~38.1 mpg**
 - **6 Model year 02 & 03 Toyota Prius (344,000 miles) ~41.0 mpg**



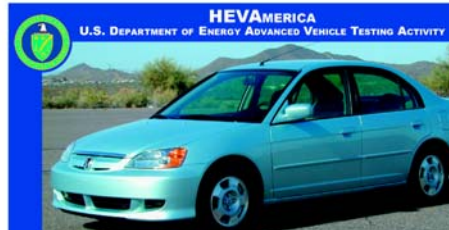
Hybrid Electric Vehicle Testing

- Fleet and accelerated reliability testing



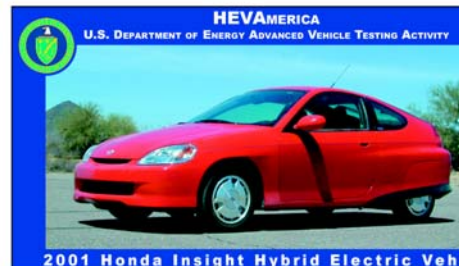
Hybrid Electric Vehicle Testing

• Baseline Performance testing



2003 Honda Civic Hybrid Electric Vehicle

VEHICLE SPECIFICATIONS		PERFORMANCE STATISTICS
VEHICLE FEATURES Base Vehicle: 2003 Honda Civic VIN: JHMC666035000815 Seatbelt Positions: Five Standard Features: - CARB Certified as aULEV - AM/FM Stereo Cassette - Front Wheel Drive - CVT Transmission - Front Disc/Rear Drum Brakes - Regenerative Braking - Air Bags - Anti-Lock Brakes - Power Windows - Power Locks/Keyless Entry - Keyless Entry - Air Conditioning - Heater/Windshield Defroster - Rear Window Defroster - State-Of-Charge Meter - Low Rolling Resistance Tires		
WEIGHTS Design Curb Weight: 2732 lbs Delivered Curb Weight: 2717 lbs Distribution F/R: 58/42 % GVWR: 3620 lbs GAWR F/R: 1855/1845 lbs Payload: 882 lbs Performance Goal: 400 lbs		
DIMENSIONS Wheelbase: 103.1 inches Track F/R: 57.9/57.9 inches Length: 174.8 inches Width: 67.5 inches Height: 55.6 inches Ground Clearance: 4.7 inches Performance Goal: 5.0 inches		
TIRES Tire Mfg: Dunlop Tire Model: SP70 FE Tire Size: 185/70R14 Tire Pressure F/R: 30/30 psi Spare Installed: Yes		
BATTERY Manufacturer: Panasonic EV Energy Type: Nickel Metal Hydride (NiMH) Number of Cells: 120 Cylindrical Cell Weight: 0.183 kg Weight of Pack(s): 22 kg Pack(s) Location: Rear Nominal Cell Voltage: 1.2 VDC Nominal System Voltage: 144 VDC Normal Peak Capacity (C/2): 6.0 Ah Electric Motor: 10 kW		
TEST NOTES: 1. Energy transfer display 2. Vehicle not equipped with a battery only mode 3. Average battery discharge over 54.6 mile drive cycle 4. Value calculated based on fuel economy and fuel tank size 5. Air Conditioning on maximum with full battery 6. Air Conditioning on maximum with full battery		
PERFORMANCE STATISTICS Acceleration 0-50 mph At 100% SOC: 11.7 seconds At 50% SOC: N/A Performance Goal: 13.5 s Maximum Speed At 1/4 Mile: 68.0 mph In 1 Mile: 93.7 mph Performance Goal: 70 mph Driving Cycle Range w/o Accessories Average Electric Power: 6.0 kW DC Energy Consumption: 48.8 Cycle Fuel Economy: 48.8 Driving Range: 644 miles Driving Cycle Range w/Accessories Average Electric Power: 6.0 kW DC Energy Consumption: 48.8 Cycle Fuel Economy: 48.8 Driving Range: 470 miles Braking From 60 mph Controlled Dry: 158.4 feet Controlled Wet: 154.7 feet Panic Wet: 160.6 feet Handling Average Time: 56.7 seconds Average Dodge Neon Time: 54.6 seconds Gradeability (Calculated) Maximum Speed @ 3%: 72.4 mph Maximum Speed @ 6%: 88.4 mph Maximum Grade: 37.4%		



2001 Honda Insight Hybrid Electric Vehicle

VEHICLE SPECIFICATIONS		PERFORMANCE STATISTICS
VEHICLE FEATURES Design Vehicle: 2001 Honda Insight VIN: JHMCZE14711002465 Seatbelt Positions: Two Standard Features: - CARB Certified as aULEV - AM/FM Stereo Cassette - Front Wheel Drive - CVT Transmission - Front Disc/Rear Drum Brakes - Regenerative Braking - Air Bags - Anti-Lock Brakes - Power Windows - Power Locks/Keyless Entry - Air Conditioning - Heater/Windshield Defroster - Rear Window Defroster - State-Of-Charge Meter - Low Rolling Resistance Tires		
WEIGHTS Design Curb Weight: 1967 lbs Delivered Curb Weight: 1959 lbs Distribution F/R: 61/39 % GVWR: 2280 lbs GAWR F/R: 1355/1035 lbs Payload: 411 lbs Performance Goal: 400 lbs		
DIMENSIONS Wheelbase: 94.5 inches Track F/R: 56.5/52.2 inches Length: 155.1 inches Width: 66.7 inches Height: 51.5 inches Ground Clearance: 4.6 inches Performance Goal: 5.0 inches		
TIRES Tire Mfg: Bridgestone Tire Model: Potenza Tire Size: 165/65R14 Tire Pressure F/R: 38/35 psi Spare Installed: Yes		
ENGINE Model: VTEC-E Output: 48 kW @ 5700 rpm Configuration: In-Line 3-Cylinder Displacement: 1.0 L Fuel Tank Capacity: 10.5 Gallons Fuel Type: Unleaded Gasoline		
TEST NOTES: 1. Energy transfer display 2. Vehicle not equipped with a battery only mode 3. Average battery discharge over 14.6 mile drive cycle 4. Value calculated based on fuel economy and fuel tank size 5. Air Conditioning on maximum with full battery 6. Air Conditioning on maximum with full battery		
PERFORMANCE STATISTICS Acceleration 0-50 mph At 100% SOC: 11.3 seconds At 50% SOC: N/A Performance Goal: 13.5 s Maximum Speed At 1/4 Mile: 68.4 mph In 1 Mile: 95.2 mph Performance Goal: 70 mph Driving Cycle Range w/o Accessories Average Electric Power: 0.7 kW DC Energy Consumption: 42.7 Cycle Fuel Economy: 56.2 Driving Range: 590 miles Driving Cycle Range w/Accessories Average Electric Power: 1.3 kW DC Energy Consumption: 42.7 Cycle Fuel Economy: 44.8 miles Braking From 60 mph Controlled Dry: 169.3 feet Controlled Wet: 157.6 feet Panic Wet: 167.4 feet Handling Average Time: 61.2 seconds Average Dodge Neon Time: 54.6 seconds Gradeability (Calculate) Maximum Speed @ 3%: 81 Maximum Speed @ 6%: 72 Maximum Grade: 34.7 %		

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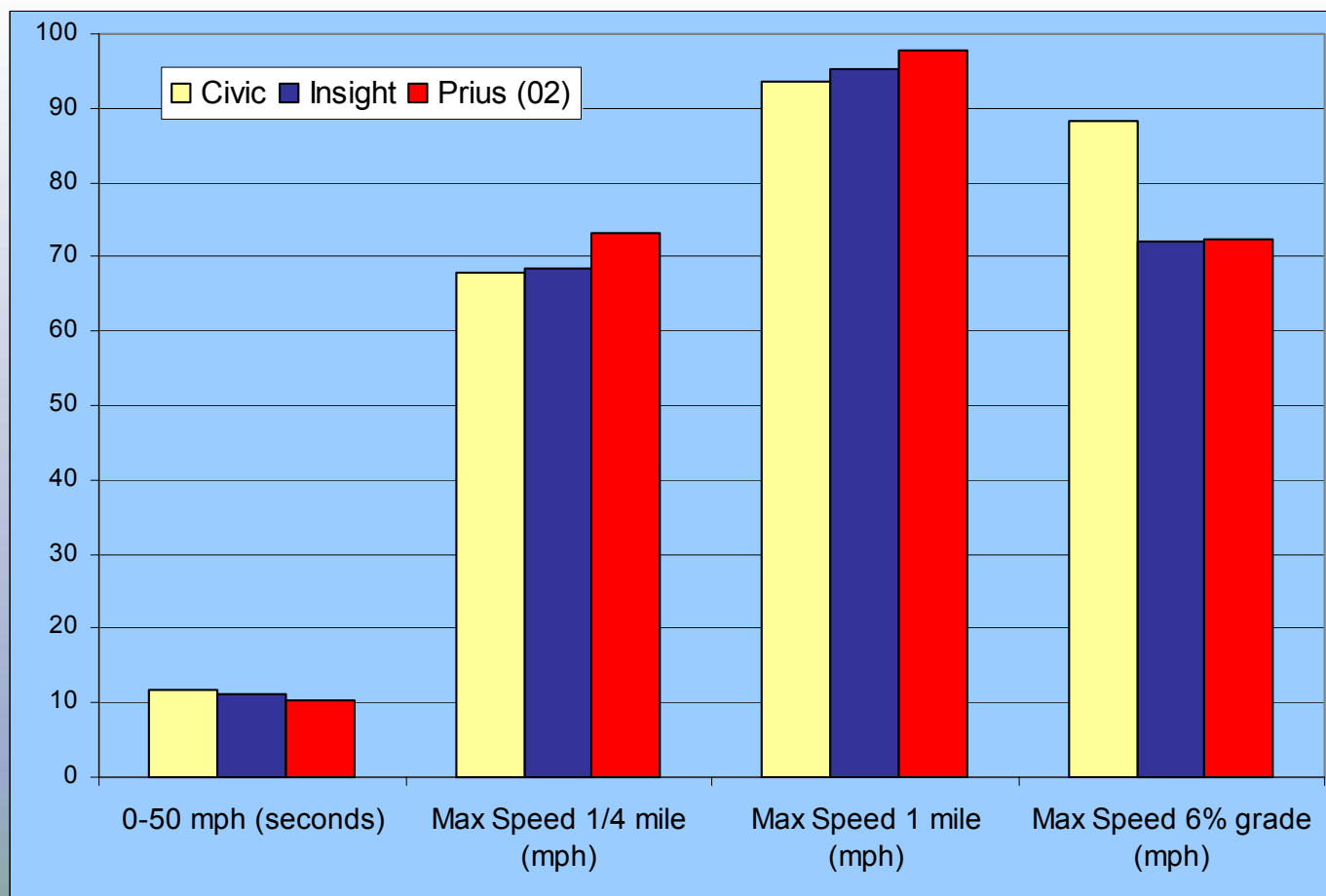
2002 Toyota Prius Hybrid Electric Vehicle

VEHICLE SPECIFICATIONS		PERFORMANCE STATISTICS
VEHICLE FEATURES Base Vehicle: 2002 Toyota Prius VIN: J3ZBK18U820042105 Seatbelt Positions: Five Standard Features: - CARB Certified as aULEV - AM/FM Stereo Cassette - Front Wheel Drive - CVT Transmission - Front Disc/Rear Drum Brakes - Regenerative Braking - Air Bags - Anti-Lock Brakes - Power Windows - Power Locks/Keyless Entry - Air Conditioning - Heater/Windshield Defroster - Rear Window Defroster - State-Of-Charge Meter - Low Rolling Resistance Tires		
WEIGHTS Design Curb Weight: 2765 lbs Delivered Curb Weight: 2790 lbs Distribution F/R: 60/40 % GVWR: 3615 lbs GAWR F/R: 1970/1685 lbs Payload: 865 lbs Performance Goal: 400 lbs		
DIMENSIONS Wheelbase: 100.4 inches Track F/R: 58.1/58.3 inches Length: 169.6 inches Width: 66.7 inches Height: 57.2 inches Ground Clearance: 4.4 inches Performance Goal: 5.0 inches		
TIRES Tire Mfg: Bridgestone Tire Model: Potenza Tire Size: P175/65R14 Tire Pressure F/R: 35/33 psi Spare Installed: Yes		
BATTERY Manufacturer: Panasonic EV Energy Type: Nickel Metal Hydride (NiMH) Number of Modules: 38 Prismatic Module Weight: 1.02 kg Weight of Pack(s): 39 kg Pack(s) Location: Behind Rear Seat Nominal Module Voltage: 7.2 VDC Nominal System Voltage: 274 VDC Nominal Peak Capacity (C/2): 6.5 Ah Electric Motor: 33 kW		
TEST NOTES: 1. Energy transfer and consumption display 2. Vehicle not equipped with a battery only mode 3. Average battery discharge over 54.6 mile drive cycle 4. Value calculated based on fuel economy and fuel tank size 5. Air Conditioning on maximum with full battery 6. Air Conditioning on maximum with full battery		
PERFORMANCE STATISTICS Acceleration 0-50 mph At 100% SOC: 10.4 seconds At 50% SOC: N/A Performance Goal: 13.5 seconds Maximum Speed At 1/4 Mile: 73.3 mph In 1 Mile: 97.9 mph Performance Goal: 70 mph in one mile Driving Cycle Range w/o Accessories Average Electric Power: 2.00 kW Cycle Fuel Economy: 49.5 mpg Driving Range: 588 miles Driving Cycle Range w/Accessories Average Electric Power: 1.84 kW Cycle Fuel Economy: 39.8 mpg Driving Range: 473 miles Braking From 60 mph Controlled Dry: 153.6 feet Controlled Wet: 172.7 feet Panic Wet: 182.2 feet Handling Average Time: 57.8 seconds Average Dodge Neon Time: 54.6 seconds Gradeability (Calculated) Maximum Speed @ 3%: 88.6 mph Maximum Speed @ 6%: 72.4 mph Maximum Grade: 36.1%		

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Hybrid Electric Vehicle Testing

- Baseline Performance testing results



Hybrid Electric Vehicle Testing

- **Baseline Performance testing results (SAE J1634)**

