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
  - Cites of Palm Springs, Palm Valley, Phoenix, Vacaville, and San Diego

Hybrid Electric Vehicle Testing

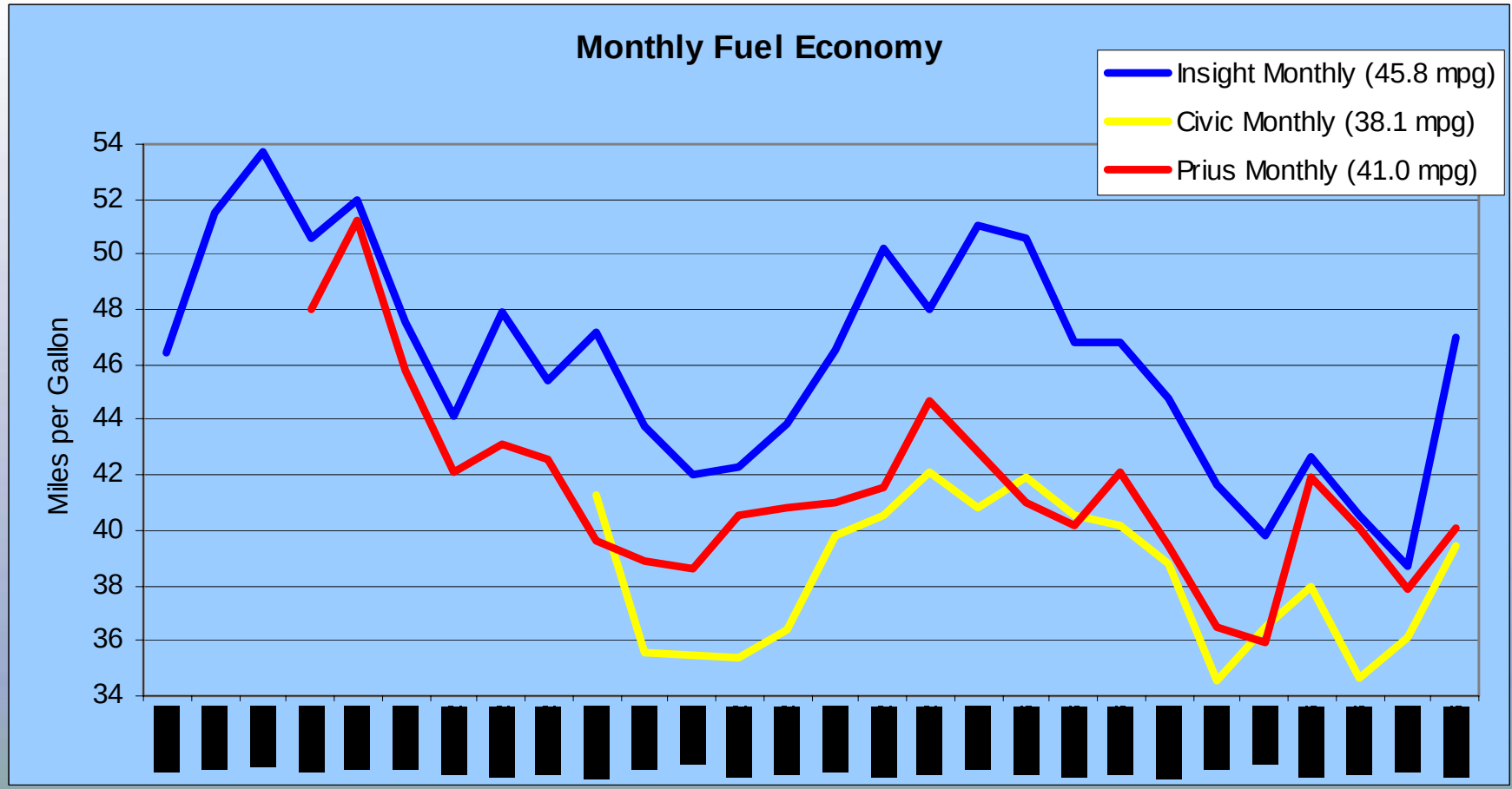
- Honda Insight
- Honda Civic
- MY ’02 & ’03 Toyota Prius
- MY ’04 Toyota Prius
- Fleet and accelerated reliability testing (900,000+ miles)
  - Bank One, Red Cross, Arizona Public Service, ETA
  - Fuel use, maintenance, repairs, driver experience
- Baseline Performance testing (dynamometers and closed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

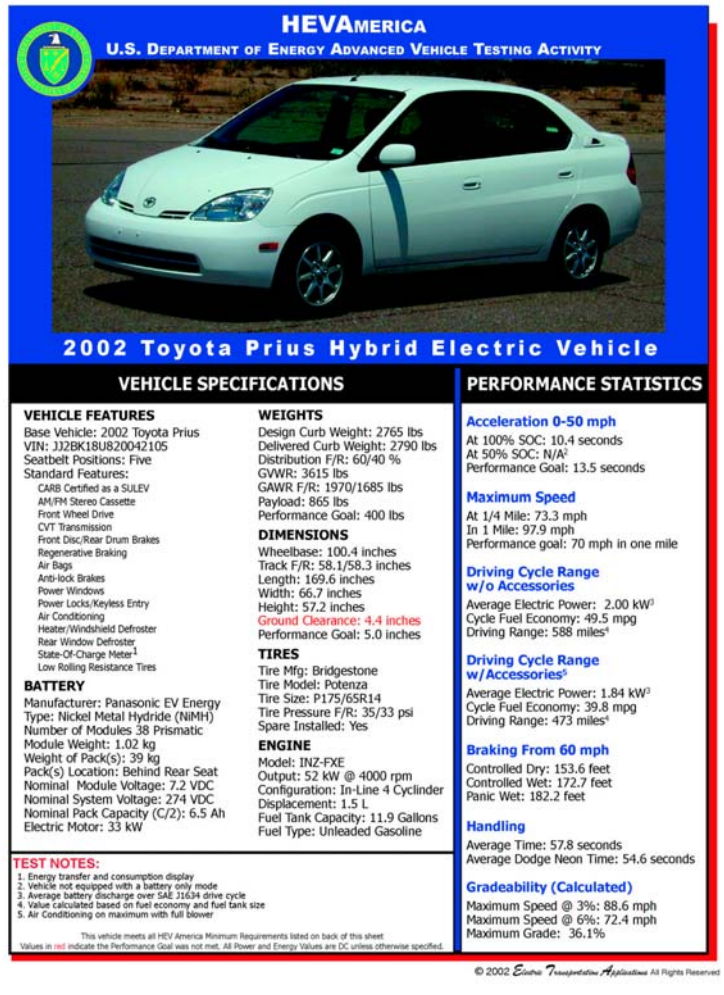
Hybrid Electric Vehicle Testing

- **Fleet and accelerated reliability testing**



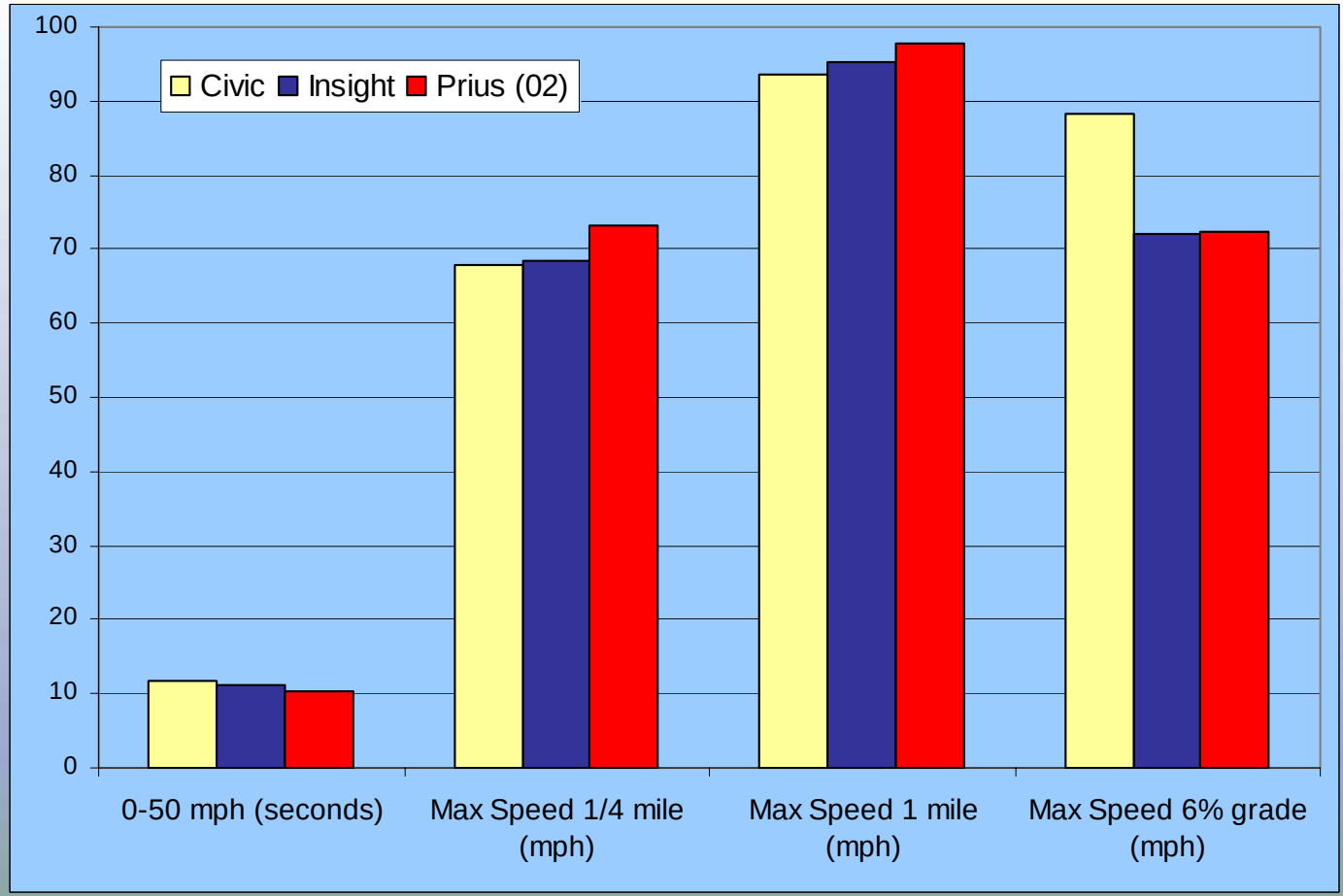
Hybrid Electric Vehicle Testing

- **Baseline Performance testing**



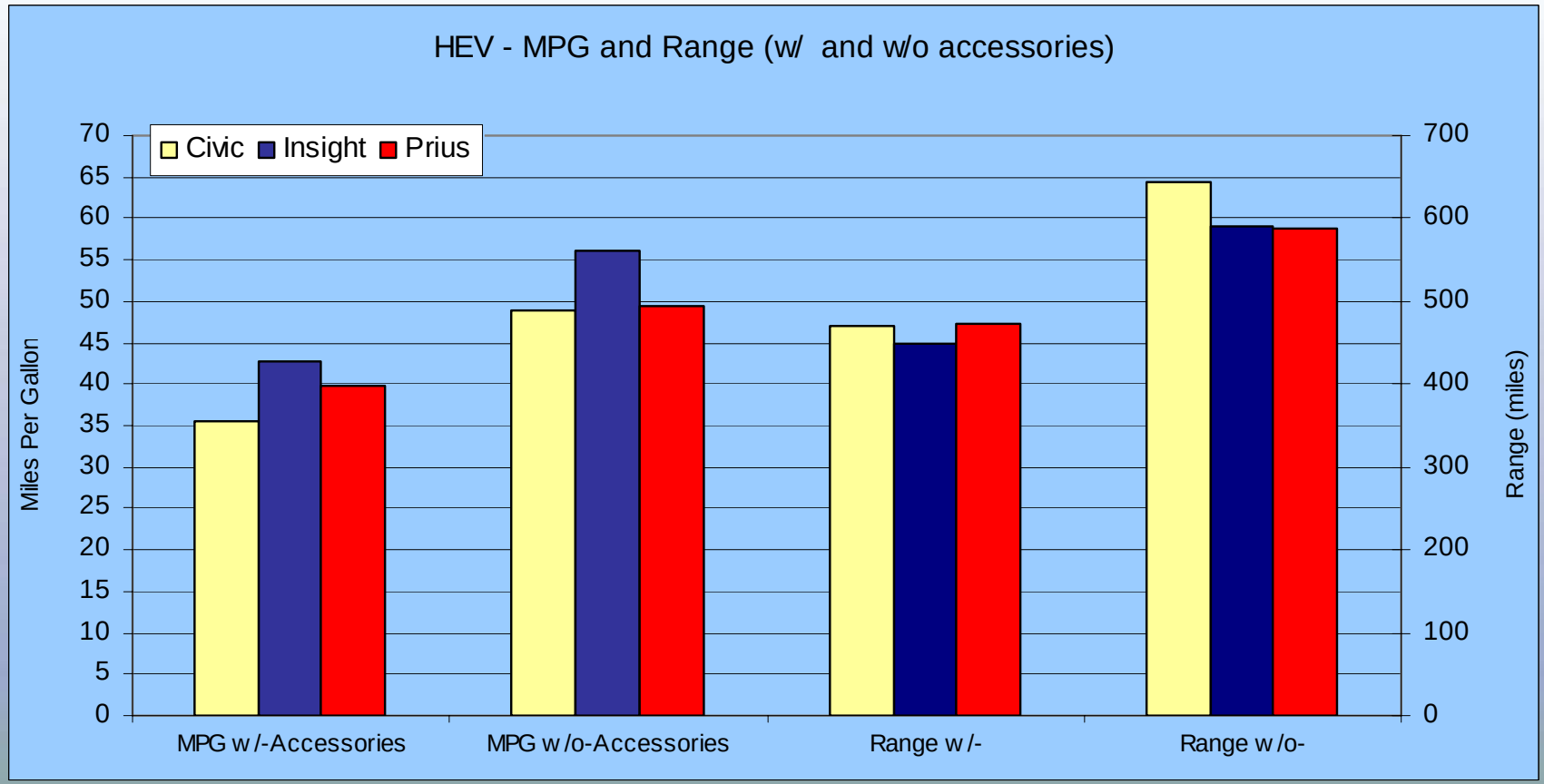
Hybrid Electric Vehicle Testing

- **Baseline Performance testing results**



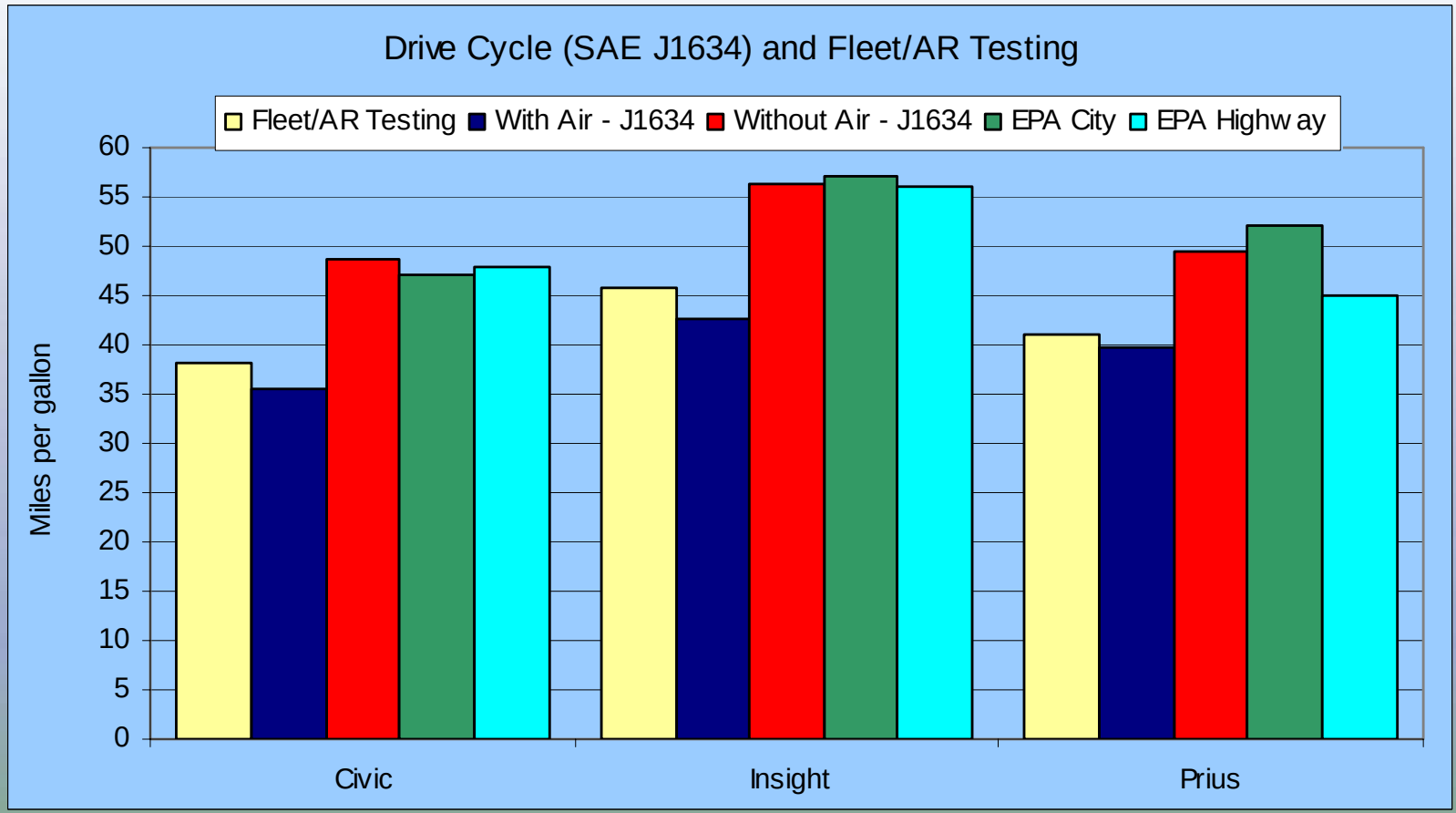
Hybrid Electric Vehicle Testing

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



Hybrid Electric Vehicle Testing

- **Baseline Performance, fleet and accelerated reliability, and EPA testing results**



Hybrid Electric Vehicle Testing

- 2004 HEV candidate test vehicles
  - MY 04 Toyota Prius (started testing)
  - General Motors Sierra pickup
  - Toyota Highlander SUV
  - Lexus RX400 SUV
  - Honda Accord
  - Ford Escape SUV

Hybrid Electric Vehicle Policy Support

- **$1,500 Federal income tax deduction**
- **HOV lane access (VA, CO, FL, AZ, GA)**
- **Exemption from emissions testing (MD)**
- **Government purchases (NY, CA)**
- **State tax incentives/rebates (CA, OK, OR)**
- **VA Legislature introduced Bill in Jan ’04 exempting HEVs from emissions testing**
- **Maryland General Assembly introduced bill in Jan ’04 allowing HEVs in HOV lanes with single occupants**

Source: Electric Drive Transportation Association

HEV Provisions in Pending Energy Bill

- **HEVs allowed as compliance option (except Federal Fleets) for EPAct – up to 1 credit based on fuel efficiency and battery pack maximum power**
- **Allow HEVs (as defined by states) with single occupant in HOV lanes**
- **$250 to $1,000 tax credit for HEVs <8,500 lbs GVW based on rechargeable energy storage system maximum power**
- **$500 to $3,000 tax credit for HEVs meeting vehicle mileage performance (125-250% increase in MY ’00 city fuel economy)**

Source: Electric Drive Transportation Association

State/Local Idle Reduction Activities - NY

- NY State Energy Research and Development Authority (NYSERDA) working to accelerate development and commercialization of Truck Stop Electrification (TSE) equipment, systems design, and services
- NY State Thruway Authority, in partnership with NYSERDA and Niagra Mohawk Power Co., share financing of a two-year $500,000 TSE program for the installation of up to 44 IdleAire multi-service consoles at 2 sites along rest stops in Syracuse
- Installation of 2 shorepower TSE facilities on the Adirondack Northway pending

State/Local Idle Reduction Activities - CA

- $200k EPA grant awarded to EPRI, SMUD, and other partners for idle reduction project
  - Demonstrate use of onboard AC power
  - Reimburse fleets for 50% of purchase price for any one of 3 approved idle reduction packages
  - Installation of technology package and driver training provided by EPRI
- 16 AC power receptacles installed by SMUD at Sacramento's 49er Travel Plaza - free power on a first-come basis. More units upon demand

State/Local Idle Reduction Activities - CA

- **Carl Moyer Clean Engine Incentive Program - provide fleets with up to $1,500 per vehicle for the installation of anti-idling technologies**
  - **Subsidy of $2,500 per vehicle for advanced technology systems such as fuel cell auxiliary power units (APUs)**
  - **All devices must be certified and operated within California for at least 100 hours per year for five years**

State/Local Idle Reduction Regulations

State	Applicability	Idling Time Limit
AZ	Heavy duty diesel vehicles >14,000 lbs GVW	5 minutes*
CA	•Marine terminals @ ports >100,000 containers per year •Pending: limit idling MY 2007 and later on-road heavy-duty vehicles. Sleepers can use automatic start-stop or other IR technologies	•30 minutes* •Engine off if idling >5 minutes
CO	Any motor vehicle	10 minutes in any 1 hour*
CT	•Mobile source engine •School buses	•3 consecutive min* •off > 3 minutes*

Source: CARB and EPA

**with some exemptions*

State/Local Idle Reduction Regulations

State	Applicability	Idling Time Limit
DC	Diesel/gasoline vehicles	3 minutes*
HI	All motor vehicles	No specified time*
MD & MA	All motor vehicles	5 minutes*
MN (St. Cloud)	All motor vehicles within 2 block area of city	5 minutes*
MO (St. Louis)	All motor vehicles	10 minutes*
NV / NY	Diesel truck or bus	15 / 5 minutes
NH	Diesel/gasoline vehicles	5 min* >32ºF & 15 min* >-10ºF & <32ºF

Source: CARB and EPA

**with some exemptions*

State/Local Idle Reduction Regulations

State	Applicability	Idling Time Limit
NJ	Diesel-powered motor vehicles	3 min* / 15 min* if stopped >= 3 hrs
NYC	All motor vehicles	3 minutes*
PA (Philly)	Diesel vehicles >8,500 lbs GVW or passenger carrying >12	2 min for layovers / 5 min <32ºF / 20 min < 20ºF / 20 min buses w/AC & no open windows & > 75ºF

Source: CARB and EPA

**with some exemptions*

State/Local Idle Reduction Regulations

State	Applicability	Idling Time Limit
TX (Houston / Galveston)	Diesel/gasoline motor vehicles (> 14,000 lbs GVW)	5 min* April 1 – Oct 31 30 min* for heat/AC transit/school buses
UT (Salt Lake City)	Diesel vehicles	15 minutes*
VA	Buses when unattended, parked, or stopped	10 minutes*

Source: CARB and EPA

**with some exemptions*

DOE Idle Reduction Demonstration

- **Goal: To gather objective in-use information on the performance of available technologies by characterizing:**
  - **Specifications and Costs: system descriptions, capital and installation costs, payback periods**
  - **Vehicle Operations: fuel consumption (truck idling and IR systems), engine oil consumption and changes, maintenance (truck and IR systems)**
  - **Other Evaluation Information: engine and component wear, resale value, user impressions**

DOE Idle Reduction Demonstration

- Reduce 800+ million gallons of annual fuel use during idling periods
- Reduce average of 2,000 hours of idling
- Fleet/component demonstration/data collection project partners:
  - Caterpillar, International Truck, Cox Trucking
  - Schneider National, Freightliner, Webasto Thermosystems
  - Espar, Wal-Mart Transportation, Truck manufacturer TBD

DOE Idle Reduction Demonstration – Caterpillar Team

- Team: Caterpillar, International Truck, and Cox Transfer
- Five new idle reduction trucks, five control trucks
- Trucks idle about 1840 hours/year
- MorElectric™ Technology
- Electrically driven accessories
- Three main components
  - HVAC unit, generator, and APU
  - IR uses 0.2 gallons fuel/hour versus 0.9 gallons fuel/hour for C13 engine
- Duration - FY03 4 Quarter – FY05 4 Quarter

DOE Idle Reduction Demonstration – Schneider National Team

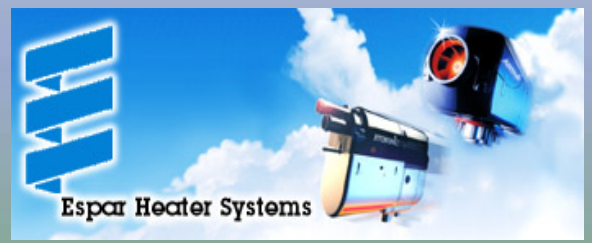
- Team: Schneider National, Freightliner, Webasto Thermosystems
- 100 trucks with heating and 20 trucks with cooling systems
- Trucks idle approximately 480 hours/year

DOE Idle Reduction Demonstration – Schneider National Team (cont'd)

- Webasto Air Top 2000 cab heater
  - Self contained diesel fueled air heater
  - Offered as standard installation option from Freightliner
- Webasto Cab Cooler
  - New product that utilizes phase change cooling storage technology
  - Medium is charged during normal tractor operation using existing air conditioning system
- Duration - FY03 4 Quarter – FY05 2 Quarter

DOE Idle Reduction Demonstration – Espar Team

- Team: Espar, Wal-Mart Transportation, truck manufacturer TBD
- 20 trucks with combined heating / cooling systems
- At least two control trucks
- Espar Airtronic Bunk Heater
  - Diesel fueled coolant heater for engine pre heat
- D.C. Airco
  - Rooftop mounted electric air conditioning unit
  - Operates on starting or auxiliary batteries
- Duration - Award expected FY04



All vehicle testing reports and fact sheets available via:

http://avt.inel.gov