



# National Alternative Fuels Training Consortium

**Clean Cities Joint Regional Coordinator  
Peer Exchange**  
Pittsburgh, PA

*June 29, 2007*

## **NAFTC Training and Resources**





# Today's Objectives:

- To give you a better idea of the services we provide and
- To thank you for your past support, especially with National AFV Day Odyssey and –
- To explore other ways for us to work together



# Thank You



U. S. Department of Energy

A photograph of a tall skyscraper with a banner that reads "THANKS" in large, blue, stylized letters. The banner is hanging from the side of the building. The sky is blue with some clouds. The overall image is tilted slightly to the right.

**Clean Cities**  
U. S. Department of Energy

Clean Cities Coordinators,  
*Thank You*  
for Your Past Participation  
in National AFV Day Odyssey  
Please join us again!

**Together,  
We Can Make  
a Difference**

National Alternative Fuel Vehicle Day  
**Odyssey**

...because clean air & energy independence matter!

Headquartered at  
West Virginia University

The logo for the National Alternative Fuel Vehicle Consortium, featuring a stylized flame and the text "NATIONAL ALTERNATIVE FUEL VEHICLE CONSORTIUM".



# The National Alternative Fuels Training Consortium

- Headquartered at West Virginia University
- Presently Consists of
  - ✦ 29 Training Centers Throughout the U.S.
  - ✦ 70+ Affiliate and Associate Members
    - - Fuel Providers
    - - Industry Partners
    - - Federal & State Agencies
    - - Local Clean Cities Coalitions
    - - High Schools



# NAFTC Mission Statement

*“To improve air quality and decrease U.S. dependence on foreign oil by promoting, supporting, and expanding the use of advanced technology vehicles and alternative fuel vehicles.”*



# NAFTC Headquarters – Morgantown, WV





# Locations Nationwide





# The NAFTC Provides

- Curriculum Development
- Competency-based Training
- Education & Outreach

*Regarding Alternative Fuel Vehicles  
and  
Advanced Technology Vehicles*





# Curriculum Development

## NAFTC Curriculum

**Overview of Biodiesel**

**Overview of Biodiesel**

**Instructor's Manual**

National Alternative Fuels Training Consortium  
West Virginia University

**Introduction to Biodiesel**

**Module 1 Introduction to Biodiesel**

National Alternative Fuels Training Consortium  
West Virginia University

**Module 1: Introduction to Biodiesel**

Slide 1-1

**Introduction to Biodiesel**

**Module 1 Review Questions**  
Overview of Biodiesel

**Matching: Write the letter of the correct answer in the space provided (1 point each).**

- Blockseed
- Triglyceride
- Polyunsaturation of petroleum
- Examples of feedstock
- Common rail
- Three-way catalyst, particulate trap, selective catalyst reduction converter
- Three fatty acids bonded to a molecule of glycerin
- Sunflower seeds, peanuts, olive, cottonseed, sesame seeds, jojoba, linseed, avocado, and corn
- The primary reasons why we should seek alternative fuels
- Mono-alkyl esters of long chain fatty acids derived from plant and animal matter
- Examples of after-treatment systems
- High-pressure fuel injection

**Matching Answers:**

- D: Page 1-10
- A: Page 1-19
- C: Page 1-5, 1-3
- F: Page 1-16
- E: Page 1-17

**True / False Answers:**

- Page 1-5
- Page 1-20
- Page 1-19
- Page 1-8
- Page 1-13
- Page 1-14

**The Nature of Lipids – First Stage in Understanding Biodiesel**  
Overview of Biodiesel

...of Energy's Office of Energy Efficiency and ..." biodiesel would be made only from ...

**Teaching Tip:**  
Show students samples of common feedstocks containing unsaturated and saturated fatty acids. For instance, items containing unsaturated fatty acids include vegetable oil, canola oil, or olive oil. Examples of feedstocks containing saturated fatty acids are tallow and lard. (Cite sources for oilseed marketing reasons.)

**Canada is a specific source of biodiesel developed in Canada, and it name is a combination of "canada" and "oil". The name was chosen for oilseed marketing reasons.**

**Match (1 point each):**  
...es of transportation that ...

...fats are carbon, ...

...oil from, ...

...oil at the pump, ...

...biodiesel.

... pH.

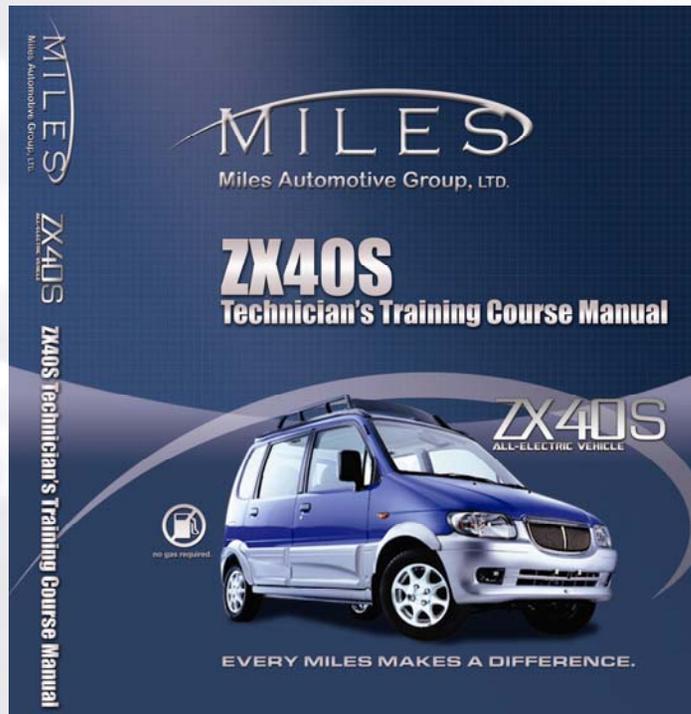
**Saturated Fatty Acids**  
...contain single bonds within the aliphatic tail. Saturated refers to the amount of hydrogen, aliphatic tail contain many hydrogen ...

**Macromedia Flash Player 8**  
1-20  
1-20



# Curriculum Development

## 💧 Contract Curriculum



Manual

Example:

Miles Automotive Group



Interactive DVD



# Curriculum Development

## 🔹 Extensive Process

### ✦ Identify Need

- Consortium Members request
- Information/insight gained from industry connections/exposure

### ✦ Carefully and diligently develop materials with SME involvement

### ✦ Goes through review process – internally and externally

### ✦ Beta test conducted

**All before being released for use.**





# Training

- Only Nationwide AFV Training Organization in U.S.
- Conduct Training Using NAFTC Standardized Curriculum
- Instructors are Industry Experts



# Over 20 Courses and Workshops!

The National Alternative Fuels Training Consortium is the only nationwide alternative fuel vehicle and advanced technology vehicle training organization in the U.S.!

- The National Alternative Fuels Training Consortium (NAFTC) develops curricula and disseminates training about alternative fuel vehicles (AFVs) and advanced technology vehicles.
- The NAFTC educates consumers about AFVs and advanced technology vehicles, which increases our nation's energy security and improves our air quality by reducing greenhouse gas emissions.



## Curriculum Development

Our courses undergo a rigorous examination by professional automotive instructors and technicians before being released.



## Courses & Workshops

Learn the basics or gain in-depth knowledge of alternative fuels and advanced technology vehicles by attending one of over 20 courses and workshops.



## Education & Outreach

The NAFTC attends and conducts multiple education and outreach events such as National AFV Day Odyssey. In 2006, nearly 40,000 people were in attendance at 60 sites and over 30 million were reached through media outlets.

# Training with Impact



## COURSES

- Clean Air and Energy Independence: An Overview of Alternative Fuels and Advanced Technology Vehicles
- Overview of Biodiesel
- Natural Gas Vehicles: CNG Cylinder Inspection
- Light-Duty Natural Gas Vehicles
- Heavy-Duty Gaseous Fuel Applications
- Liquefied Natural Gas Vehicles
- Transient Emissions Testing

- Propane Vehicle Training
- Forklift and Material Handling AFV Applications
- Hydrogen Fuel Cell Engines and Related Technologies
- Electric and Hybrid Vehicles: Technician's Guide
- Electric and Hybrid Vehicles: Fleet Manager's Guide

## COURSES CURRENTLY UNDER DEVELOPMENT

- A Guide for First Responders: Safety and Emergency Response Procedures for Advanced Technology Vehicles
- Hybrid Vehicle Technologies

## WORKSHOPS

- Introduction to Alternative Fuels and Advanced Technology Vehicles
- Introduction to Battery-Powered Electric Vehicles
- Introduction to Hybrid Electric Vehicles
- Introduction to Hydrogen-Powered Vehicles
- Introduction to Fuel Cells and Fuel Cell Vehicles
- Introduction to Ethanol Vehicles
- Introduction to Biodiesel Vehicles
- Introduction to Natural Gas Vehicles
- Introduction to Propane Vehicles
- Overview of Ethanol and Flex-Fuel Vehicles for Technicians

[www.naftc.wvu.edu](http://www.naftc.wvu.edu)

# Courses and Workshops

- Presently offer over twenty courses and workshops
- Courses and/or workshops available on all types of alternative fuel and advanced technology vehicles
- Courses and workshops are customizable to meet needs and requirements of the audience
- Available at our National Training Centers or at your location



# Training Includes

## 💧 Classroom Study





# Training Includes

- Lab Activities





# Training Includes

- Hands-on Shop Applications





# Training Audiences

- The NAFTC has delivered over 775 courses, training over 7,750 individuals from the following audiences:
  - ✓ Instructors (Train-the-Trainer)
  - ✓ Pre-Service and In-Service Technicians
  - ✓ Fleet Managers
  - ✓ Government & Industry Representatives
  - ✓ Students
  - ✓ Consumers
  - ✓ Others
  
- The NAFTC has conducted over 900 workshops and education/awareness events with over 200,000 attendees.





# Example Client List

- ◆ U.S. Air Force
- ◆ U.S. Postal Service
- ◆ U.S. DOE
- ◆ U.S. EPA
- ◆ U.S. GSA
- ◆ U.S. National Park Services
- ◆ NASA
- ◆ Walt Disney World
- ◆ Atlanta MARTA
- ◆ CA Highway Patrol
- ◆ Baltimore Gas & Electric
- ◆ City of Phoenix
- ◆ Phoenix Valley Metro Bus Service
- ◆ Greater Cleveland Regional Transit Authority
- ◆ City of Louisville, KY





# Resources

NAFTC  
eNews

## Newsletters

### National AFV Day Odyssey 2006

October 12, 2006, was a landmark day, as it marked the third National Alternative Fuel Vehicle (AFV) Day Odyssey, the largest one-day event dedicated to promoting the use of AFVs and advanced technology vehicles. The biennial celebration, coordinated by the National Alternative Fuels Training Consortium (NAFTC), strengthened millions of individuals' awareness of these alternative transportation options.

This year's Odyssey consisted of sixty local events conducted throughout the United States, Canada, and Germany. Millions heard the message of Odyssey thanks to the dedication of the NAFTC National Training Center members, Clean Cities Coalitions, and other organizations concerned with our nation's dependence on foreign oil.

Kicking off the events across the United States, Canada, and Germany, the 2006 National Media Kickoff Event was conducted

### Senator Byrd Champions Senate Resolution Along with 24 Other Senators

Recognizing the current and potential impact of hybrids, bio-diesel, ethanol, natural gas, hydrogen/fuel cells and other types of alternative fuel (AFVs) and advanced technology vehicles, the U.S. Senate passed a resolution designating October 12, 2006 as National Alternative Fuel Vehicle Day. West Virginia Senator Robert C. Byrd championed Senate Resolution 600 in conjunction with 24 additional Senators. The resolution highlights the need for energy independence, improved air quality, clean energy options, and the continued development of AFVs and advanced technology vehicles by the domestic automobile industry. A link to the resolution can be found at [www.nationalafvdayodyssey.org](http://www.nationalafvdayodyssey.org).

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...and much more!	

## Clean Alternatives Report (CAReport)

Web site  
[www.naftc.wvu.edu](http://www.naftc.wvu.edu)



# Resources

## Examples of Training





# Clean Air and Energy Independence

*An Overview of Alternative Fuels  
and Advanced Technology Vehicles*





# Module 1

## Why Do We Need Alternative Fuels?





# Lesson 1

## What are Vehicle Emissions?

- Created by the combustion of fuel and “evaporative emissions.”
- Pollutants released directly into the atmosphere.
- All gasoline and diesel engines produce emissions.





# Effects of Emissions

## ● Health Effects

- ✦ Some emissions are poisonous, others interfere with breathing.
- ✦ Some cause cancer and other illnesses.

## ● Environmental Effects

- ✦ Harm plants, soil, and water.
- ✦ Affect “ecological balance.”





# What are Vehicle Emissions?

- Environmental Protection Agency (EPA) list:

carbon monoxide	CO
carbon dioxide	CO <sub>2</sub>
oxides of nitrogen	NO <sub>x</sub>
oxides of sulfur	SO <sub>x</sub>
hydrocarbons	HCs
particulate matter (soot)	PM





# Carbon Monoxide (CO)

- 🔥 **What it is:** carbon + oxygen
- 🔥 **Where it comes from:** product of incomplete combustion of fuels.
- 🔥 **What it does:** highly toxic; prevents delivery of oxygen to organs
  - ✓ EPA says 95% of CO in U.S. cities comes from gasoline vehicles.



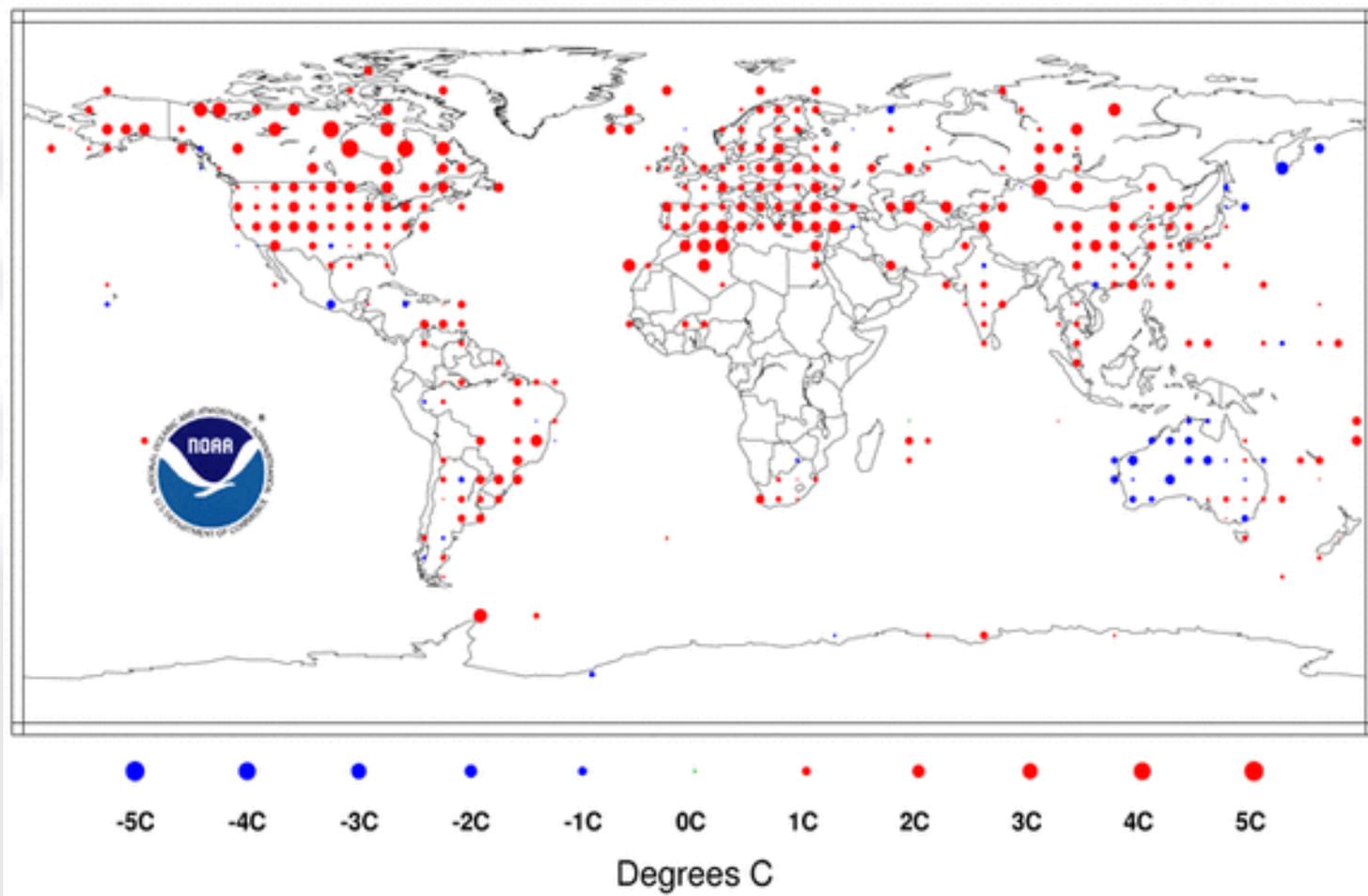
# Carbon Dioxide (CO<sub>2</sub>)

- **What it is:** carbon + 2 oxygen
- **Where it comes from:** naturally-occurring product of combustion & plant & animal respiration.
- **What it does:** causes “global warming.”
  - ✦ It is a “greenhouse gas.”
  - ✦ U.S. produces ~25% of CO<sub>2</sub> in world.



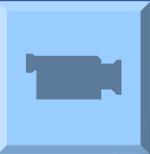
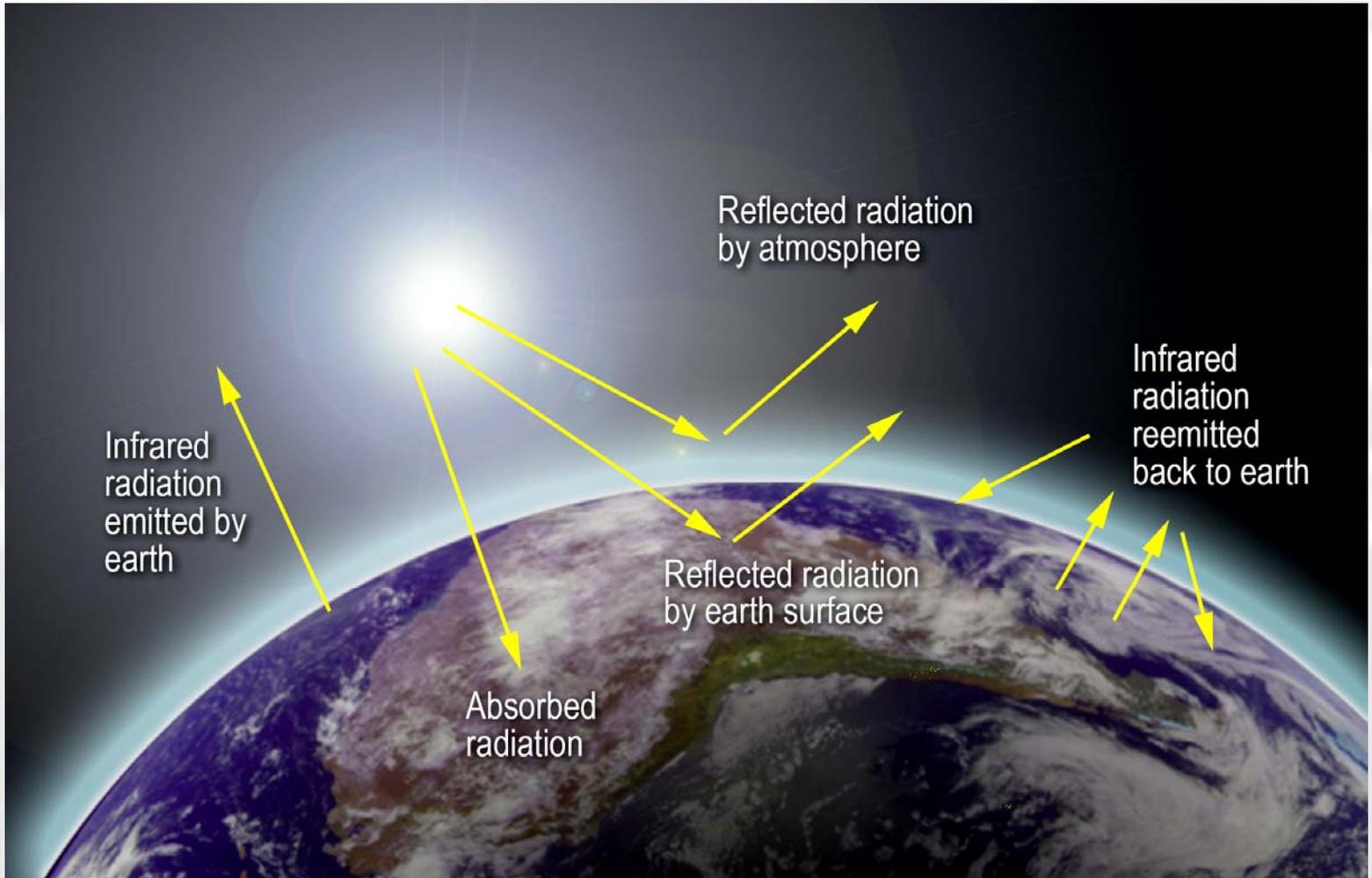
# Data on Climate Change

(2001 temps compared with average)





# Effects of CO<sub>2</sub> Build-Up



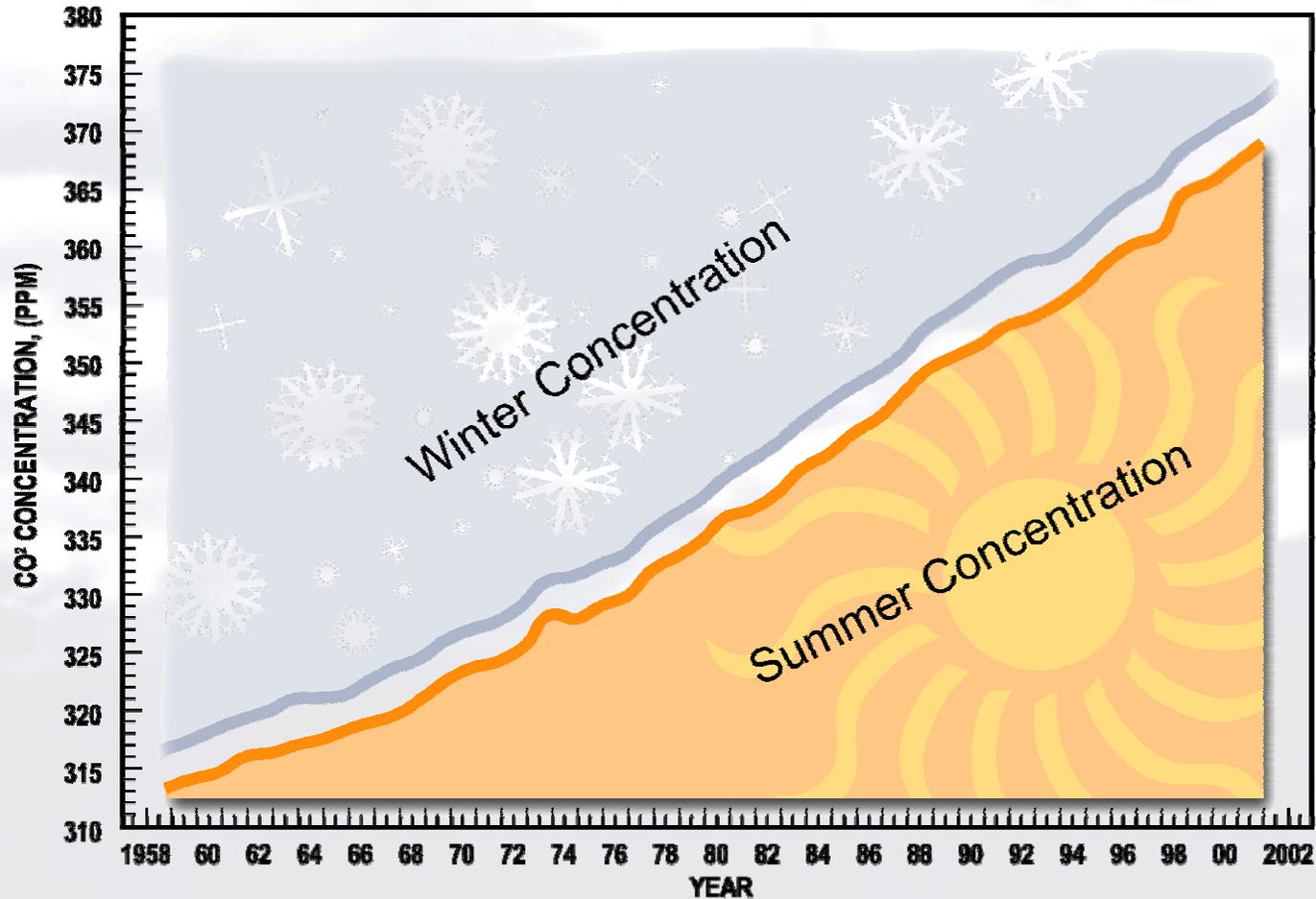
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# Is Global Warming Real?

**Average Atmospheric CO<sup>2</sup> in the Northern Hemisphere**





# Oxides of Nitrogen (NO<sub>x</sub>)

- 🔥 **What it is:** nitrogen + oxygen
- 🔥 **Where it comes from:** the atmosphere is 78% nitrogen.
  - ✓ Generic name for all nitrogen-oxygen emissions is “NO<sub>x</sub>.”
  - ✓ Created by high combustion temperatures
- 🔥 **What it does:** damages respiratory system, creates smog and acid rain
  - ✓ 6 of the 10 worst cities for smog in the U.S. are in California.



# Oxides of Sulfur (SO<sub>x</sub>)

- **What it is:** sulfur + oxygen
- **Where it comes from:** gasoline & diesel fuel, power plants, factories
  - ✦ Generic name for all sulfur-oxygen emissions is "SO<sub>x</sub>."
- **What it does:** produces "acid rain"
  - ✦ Turns in to sulfuric acid.
  - ✦ Harms people & animals, lakes & streams (aquatic life), and damages buildings & monuments.



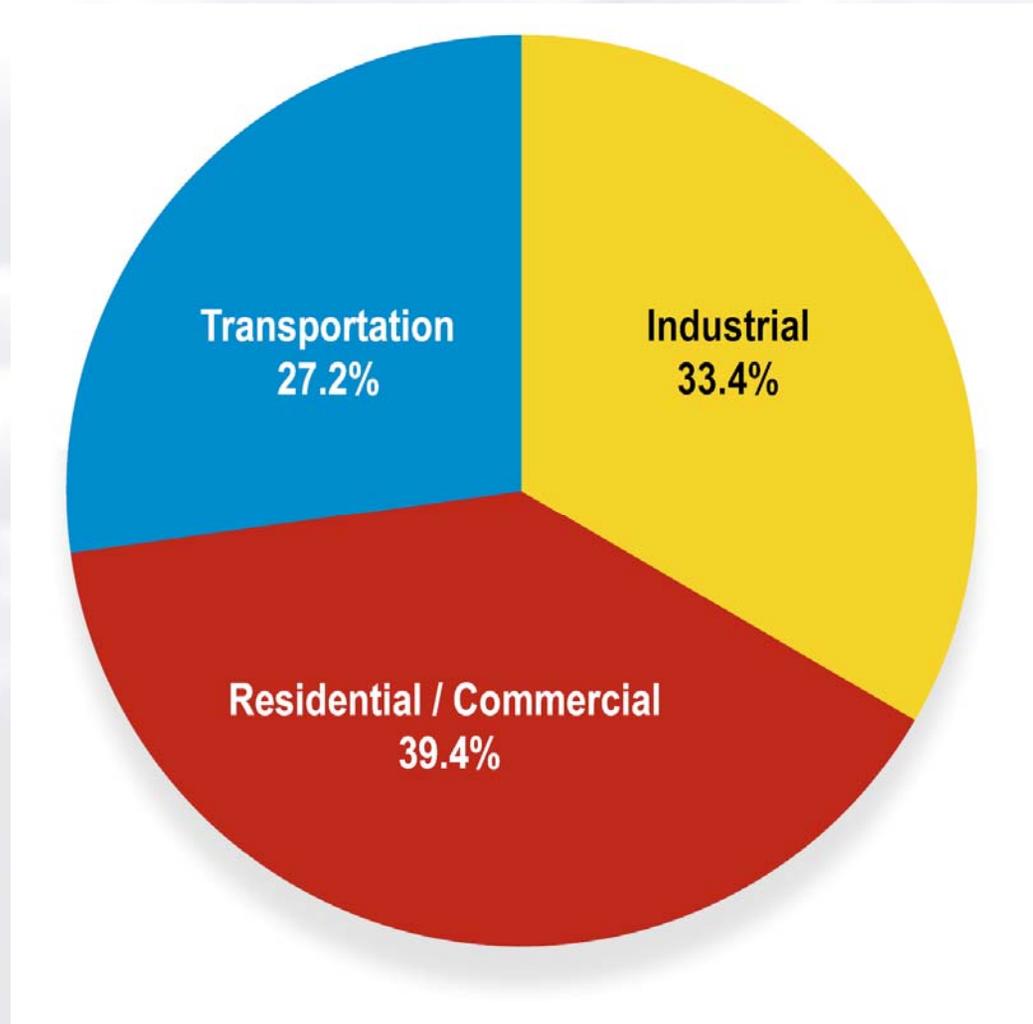
# Hydrocarbons (HCs)

- 🔥 **What it is:** carbon + hydrogen (unburned fuel)
- 🔥 **Where it comes from:** Vapors from gasoline & diesel fuel
  - ↘ Produced by cold engines and poorly-maintained vehicles.
  - ↘ Released during vehicle refueling
  - ↘ Also called VOCs
- 🔥 **What it does:** harms health & environment, contributes to smog





# U.S. Energy Consumption (2002)





# What are Alternative Fuels?

- Battery-powered electric vehicles
- Hybrid electric vehicles
- Hydrogen-powered vehicles
- Fuel Cells
- Ethanol and Methanol
- Biodiesel
- Natural gas (compressed and liquid)
- Propane (LP gas)





# Module 2

## Laws, Regulations, Programs & Incentives





# Module Introduction

- Air pollution and dependence on foreign energy sources are real problems for the U.S.
- What is being done about them?
  - ✓ For more than 30 years, federal & state governments have been passing laws to deal with the problems.
  - ✓ Many public and private agencies and organizations are making efforts to encourage the use of alternative fuels.





# Lesson 1

## A Brief History...

- Earliest recorded complaint:  
Seneca (Roman philosopher), A.D. 61
  - ✓ Disliked Rome's smoky air
- Henry II of England, 1306
  - ✓ Banned the burning of coal in London
- Industrial Revolution
  - ✓ Hidden costs of progress
- World War II – economic boom
  - ✓ Interstate Highway System





# U.S. Pollution Control Efforts



- California leads the way!
  - ✦ First “smog alert” was in 1943.
  - ✦ CA passed laws to address problems.
  - ✦ Other states followed, creating a patchwork of laws & regulations.
- First U.S. federal law:  
Air Pollution Control Act (1955)
  - ✦ 1<sup>st</sup> time that U.S. government tried to do anything about air pollution.



# Clean Air Act of 1963 (CAA-63)

- Purpose: “to improve, strengthen, and accelerate programs for the prevention and abatement of air pollution.”
  - ✦ \$95 million over 3 years
  - ✦ State and local governments
- It has been amended many times!





# Air Quality Act of 1967 (AQA)

- 1967 Amendments to Clean Air Act.
  - ✓ Mandated nationwide measuring of air quality.
  - ✓ Required states to prove that they were taking action.
  - ✓ Established AQCRs (Air Quality Control Regulations)
  - ✓ Set timetable for creation of state attainment plans.





# CAAA-70

## ● Clean Air Act Amendments of 1970

- ✓ First law to set strict exhaust emission levels.
  - Set specific emission standards for CO, HCs, and NO<sub>x</sub>.
- ✓ Set up NAAQS (national ambient air quality standards)
  - Target date for compliance: 12/31/1982
- ✓ Required certain states to develop State Implementation Plans (SIPs)
  - DOT funds withheld if states did not meet federal mandate.





# CAAA-77 and CAAA-90

## ● Clean Air Act Amendments of 1977

- ✓ Granted extension of 1970 standards
- ✓ First attempt to protect ozone layer.

## ● Clean Air Act Amendments of 1990

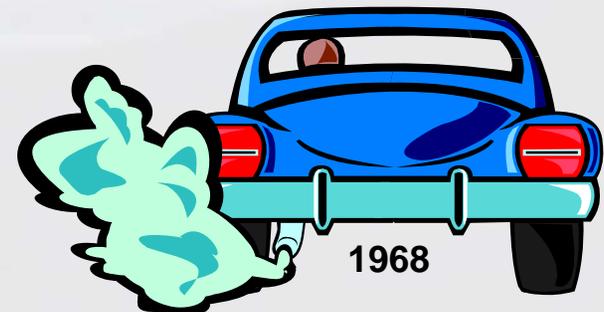
- ✓ Higher standards for vehicle emissions
- ✓ EPA could enforce FIPs (Federal implementation plan) for nonattainment states.





# Motor Vehicle Air Pollution Control Act of 1965

- First nationwide emission standards.
  - ✦ Went into effect with 1968 model year.
- Also funded research into effects of U.S. pollution on Canada & Mexico.





# EPA Act

## 💧 Energy Policy Act of 1992

- Decrease dependence on foreign oil.
- Increase energy security by using domestic alternative fuels.

## 💧 Affected certain fleets:

- Own or operate 50 or more light-duty vehicles.
- 20 or more vehicles must be in a metro area that does not meet air quality stds.
- Must use central fueling operations.





# What is Ethanol ?

- Ethanol fuel produced by fermenting plant sugars
  - ✦ Typically derived from corn and other grain products
- Usually mixed with gasoline when used in transportation
  - ✦ E10
  - ✦ E15
  - ✦ E85





# What is Ethanol?

- ◆ Any conventional vehicle can operate on E10 ethanol fuel.
  - ✦ E-10 has been used for decades
  - ✦ Vehicles that can use E-85 are called ***flexible fuel vehicles***

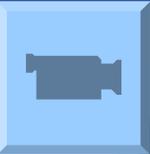




# What is Ethanol?

## ● Flexible Fuel Vehicles

- ✦ Run on E85 fuel
- ✦ Also operate on conventional gasoline
- ✦ Engine management system that can change fuel delivery map.
- ✦ E-85 runs at a different air fuel ratio than gasoline



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# Flexible Fuel Vehicles



# Overview of Biodiesel: A Renewable Alternative Fuel



Courtesy of The Robert Bosch Corporation





# Endorsement



The National Biodiesel Board (NBB) is the national trade association representing the biodiesel industry as the coordinating body for research and development of biodiesel in the United States. The NBB has reviewed these materials for accuracy and technical content in accordance with current accepted industry standards. NBB endorsement of this material does not necessarily imply endorsement of this organization's other products and services.





# Biodiesel is NOT....

- ◆ Straight vegetable oil (SVO) or waste vegetable oil (WVO).
- ◆ Ethanol blended with diesel fuel, known as “E-Diesel.”
- ◆ Any fuel suitable for use in diesel engines not derived from plant or animal sources, such as synthetic fuels.





# Biodiesel Formulations

- B100 = pure 100% biodiesel is non-petroleum fuel made from agricultural products.
- Typically, biodiesel is blended with petro-diesel.
- The most common blends are:
  - ↘ B2 = 2% biodiesel + 98% petro-diesel
  - ↘ B5 = 5% biodiesel + 95% petro-diesel
  - ↘ B20 = 20% biodiesel + 80% petro-diesel



# A Brief History of the Diesel Engine



- ◆ Rudolf Diesel (1858-1913), designed an oil-fuel based engine in 1892.
- ◆ The engine was an alternative to the inefficient steam engine.
- ◆ This early engine was fueled by straight peanut oil, the original “biodiesel.”

**Figure 1-8:** An early diesel engine. Source: NAFTC.



# Lipids

- Lipids are oils, fats, steroids, and triglycerides that are used by plants and animals to store energy.
- ✦ Sources of triglycerides include:
  - Vegetable oils such as canola, soybean, and palm.
  - Rendered beef and chicken fat.
  - Used cooking oils – yellow and brown grease.





# Saturated vs. Unsaturated Fatty Acids

- Examples of some common foodstuffs containing saturated FAs:

- ✦ Butter, lard, and shortening

- They are usually animal based.
- Saturated FAs do not flow well at ambient temperatures.

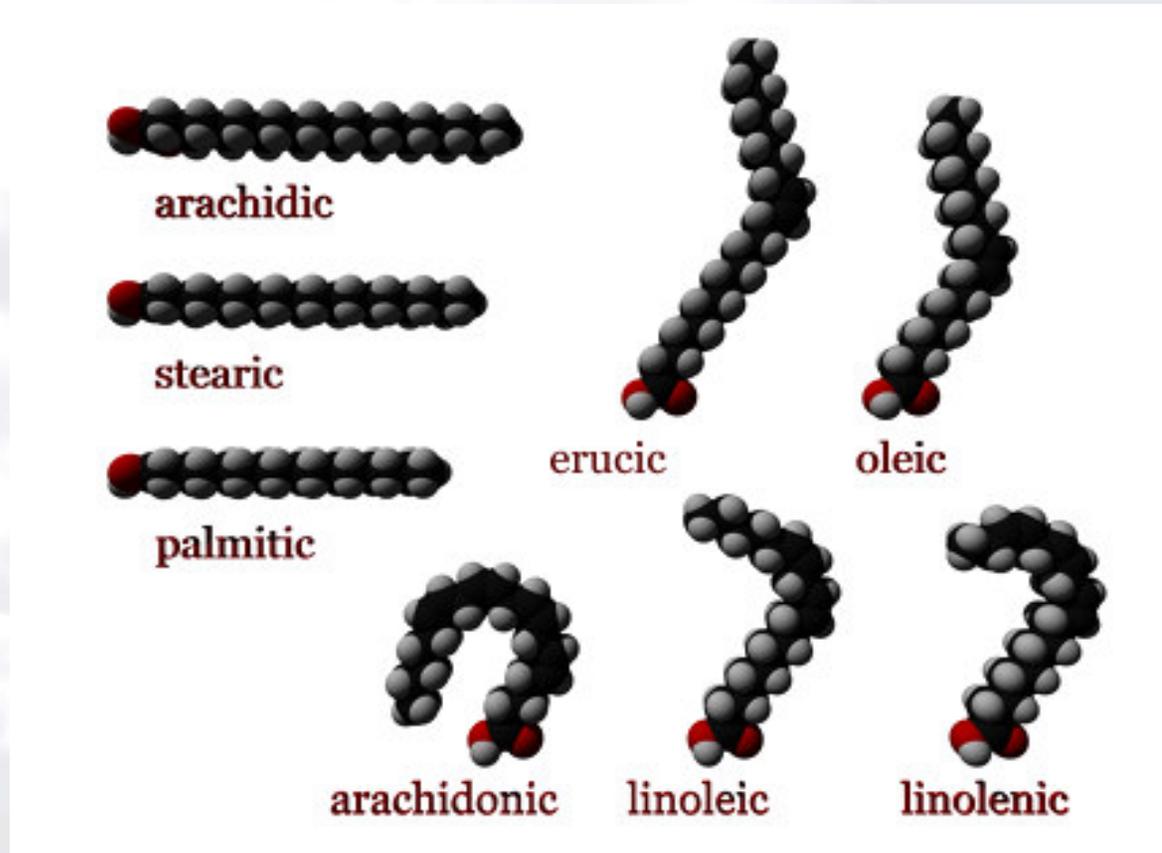
- Examples of some common foodstuffs containing unsaturated FAs:

- ✦ Vegetable oils such as corn, canola, or olive oil

- They are usually plant based and liquid at room temperature.



# Saturated and Unsaturated FAs



**Figure 1-12:** Examples of Saturated and Unsaturated Fatty Acids.



# Petroleum Formation and Refining

- Petroleum formation – animal and plant matter decay over a long period of time, combined with pressure and catalysts from the earth's crust, and are turned into hydrocarbons that contain essentially no oxygen. Crude petroleum hydrocarbons must be refined into a usable product, e.g., gasoline, jet fuel, and diesel fuel.



# Feedstock Formation and Refining

- Biodiesel formation – feedstock is converted into a fuel through a chemical process called **transesterification**. In this process, a catalyst is supplied which produces alkyl esters and are made up of both oxygen and hydrocarbons. Biodiesel does not require refining.





# A Processor – A Small Batch Biodiesel Plant at the NAFTC



- ☹ The chemical processing of feedstock occurs in a tank-like reservoir called a reactor.
- ☹ Can you identify the various structures and functions of the structures?

**Figure 2-2:** Thirty gallon/batch processor at the NAFTC Training Lab.



# Ingredients

- Virgin oil (soy or canola is preferred)
- Methanol
  - ↘ Where the ratio of oil to methanol is about 4:1
- Sodium Hydroxide (catalyst)

Yield = Biodiesel + Glycerol





# Transesterification

- **Transesterification** describes a chemical reaction that takes place to separate the three fatty acids from a glycerin molecule (in the triglyceride), bonding each of them to an alcohol molecule to form 3 mono-alkyl esters.





# Transesterification

● The process takes place in three stages:

(1) Triglyceride + alcohol  $\xrightarrow{\text{NaOH}}$  alkyl ester + diglyceride

(2) Diglyceride + alcohol  $\xrightarrow{\text{NaOH}}$  alkyl ester + monoglyceride

(3) Monoglyceride + alcohol  $\xrightarrow{\text{NaOH}}$  alkyl ester + glycerin



# Time & Temperature

- Biodiesel can be made at room temperature, but will take up to 8 hours.
- A process temperature of 120°F/49°C should ensure completion of the reaction within 90-120 minutes.





# Time & Temperature

- The process requires sufficient heat. The higher the temperature, the faster the reaction will reach completion.
- Temperature maximums are limited by the vaporization temperature of the methanol (149°F/65°C) unless the reaction vessel is pressurized.





# General Handling

- It is recommended that the same handling procedures as used for petro-diesel be applied to biodiesel.
- Use eye protection and have adequate ventilation.
- See MSDS.





# General Transportation

- Under the U.S. Dept. of Transportation hazardous material code, the transportation of neat biodiesel (B100) may be handled in the same manner as vegetable oil.
- For other blends, the procedure should be the same as for petro-diesel.
- Both B100 and other blends should be shipped in clean, dry containers or tanks free of contaminants, dirt, and moisture.





# General Storage

- Similar procedures for the storage of petro-diesel should be followed for biodiesel.
- Store fuel in a clean, dry, dark environment.
- Approved storage tank materials – aluminum, steel, fluorinated polyethylene and polypropylene, and Teflon.
- Avoid concrete and concrete-lined tanks, as well as copper, brass, lead, tin, and zinc.





# General Storage Principles

- ◆ Store in closed containers between 50-120°F (10°– 49° C); when possible, avoid extremes of temperatures.
- ◆ Keep away from oxidizing agents and ignition sources, such as heat, sparks, flames, and out of the sun.
- ◆ Store in well-ventilated areas.
- ◆ Do no puncture, drag, or slide holding tanks.
- ◆ Never use pressure to empty storage tanks.





# Important Biodiesel Fuel Properties

- The following fuel properties are discussed based on ASTM D6751-06e1:
  - ✓ Water
  - ✓ Total Glycerin
  - ✓ Free Glycerin
  - ✓ Flash Point
  - ✓ Sulfated Ash
  - ✓ Acid Value
  - ✓ Viscosity
  - ✓ Cetane Value
  - ✓ Sulfur and Phosphorus
  - ✓ Cloud Point





# Light Duty Natural Gas Chapter 7

## Combustion and Engine Design





# Combustion & Engine Design

- One of the most important topics for a diesel technician to master.
  - ✓ Natural gas engines are spark-ignited.
- Emissions are a result of incomplete combustion.
  - ✓ Auto-ignition, pre-ignition, and detonation contribute to engine damage.
- Design of engine components is intended to remedy these problems.





# Basic Definitions

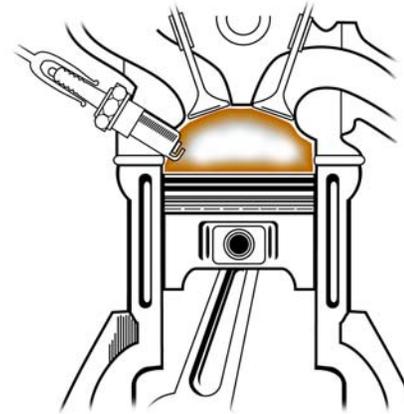
- Reciprocating – same process repeated over and over
- Internal combustion – fuel is burned inside the engine
- Liquid fuels – gasoline, diesel, LNG, LPG
- Gaseous fuels – CNG, propane



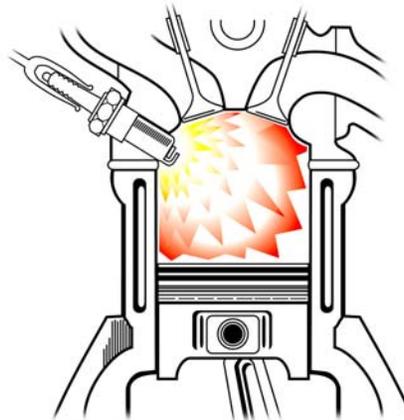
# Four-Stroke Otto Cycle



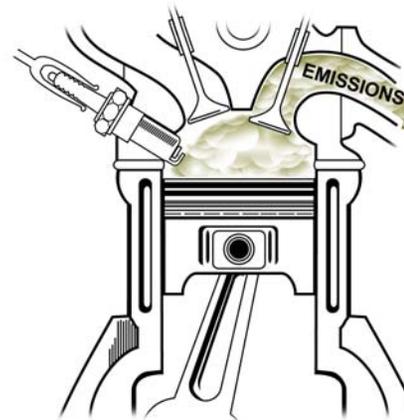
1. INTAKE STROKE



2. COMPRESSION



3. POWER STROKE



4. EXHAUST STROKE

Peter Aschwanden





# Hybrid Safety Workshop for First Responders

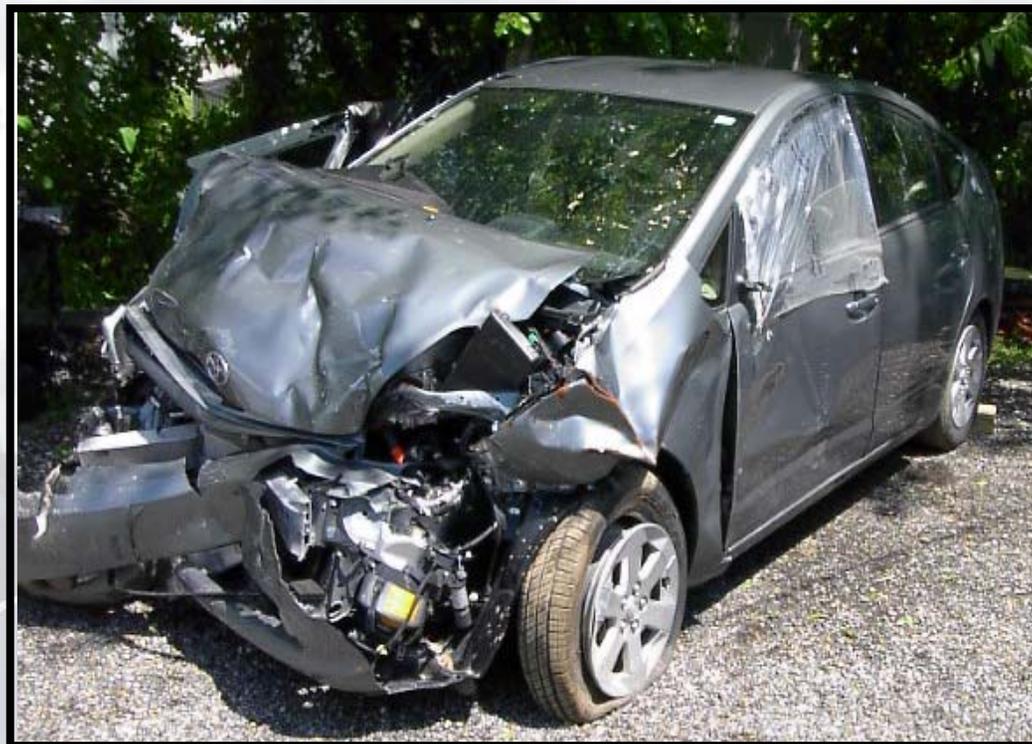


Photo courtesy [www.autobeyours.com](http://www.autobeyours.com)

**How Can We Work Together?**





# Workshop Outline

- ◆ Introduction to Hybrid Vehicles
- ◆ Current & Future Hybrids
- ◆ Hybrid Technology
- ◆ Identifying a Hybrid
- ◆ First Responder's Approach
- ◆ Vehicle Specifics & Emergency Response Guides (ERGs)





[Click to start intro film](#)

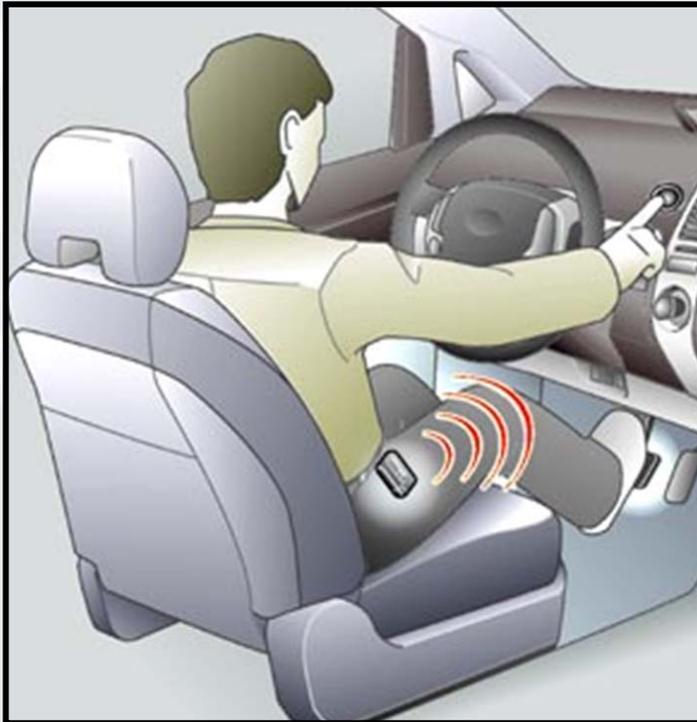




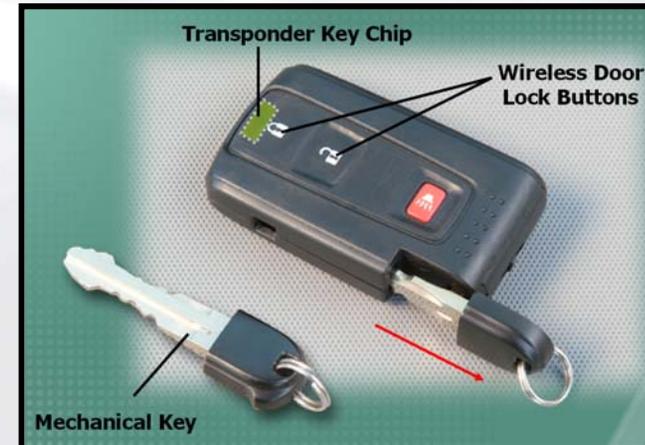
# First Responder's Approach

## Toyota Prius Smart Key System

- ◆ Optional item on Prius
- ◆ Does not require key to be in ignition



*As long as the transponder is in the vehicle, the system can remain "on."*



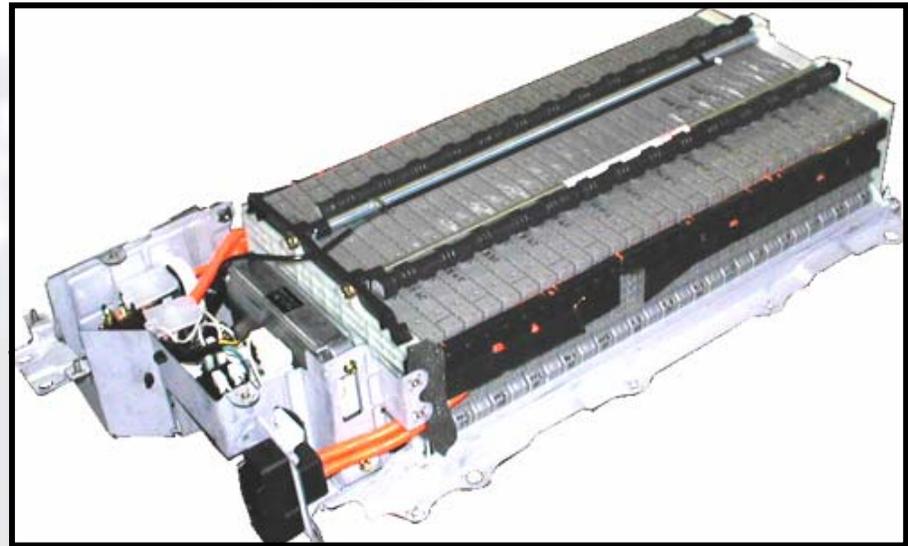
**Press POWER button on dash to turn car on/off.**



# Hybrid Batteries

- 💧 Batteries ALWAYS have voltage.
- 💧 Never attempt to open or repair a battery pack.
- 💧 Batteries are not generally explosive.

**Note:**  
**Special procedures are needed if battery is on fire.**



Toyota Prius battery pack





# Battery Fire Procedures

- To extinguish a NiMH battery, use large amounts of water (250 gpm).
- Some recommend a class D type 1 fire extinguisher. (Type 2 contains copper which can create an explosive reaction.)
- Another option is to allow the battery to burn itself out.

Note: A Self-Contained Breathing Apparatus (SCBA) should be worn throughout the duration of the fire.



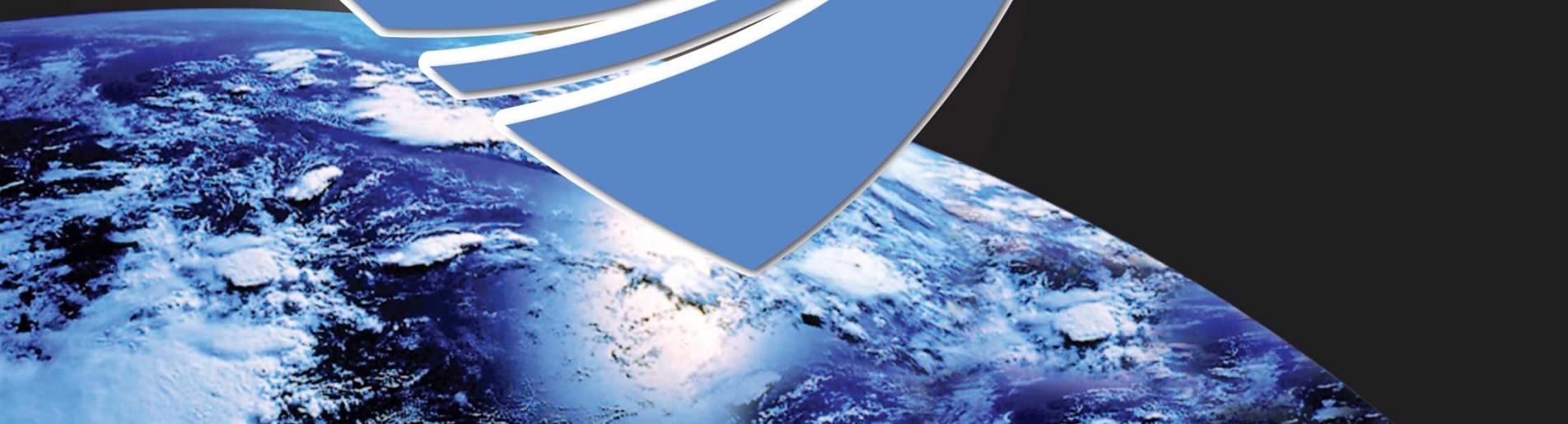


# Outreach and Education

- National AFV Day Odyssey
  - ✓ Largest Education and Outreach Event Ever Conducted
- NAFTC also attends/displays/conducts workshops at numerous conferences and meetings

National Alternative Fuel Vehicle Day

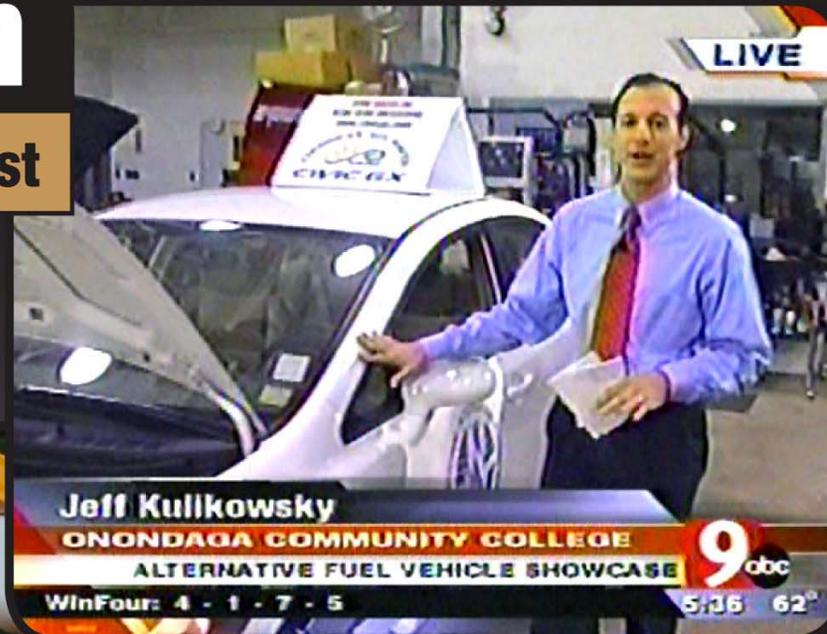
# Odyssey





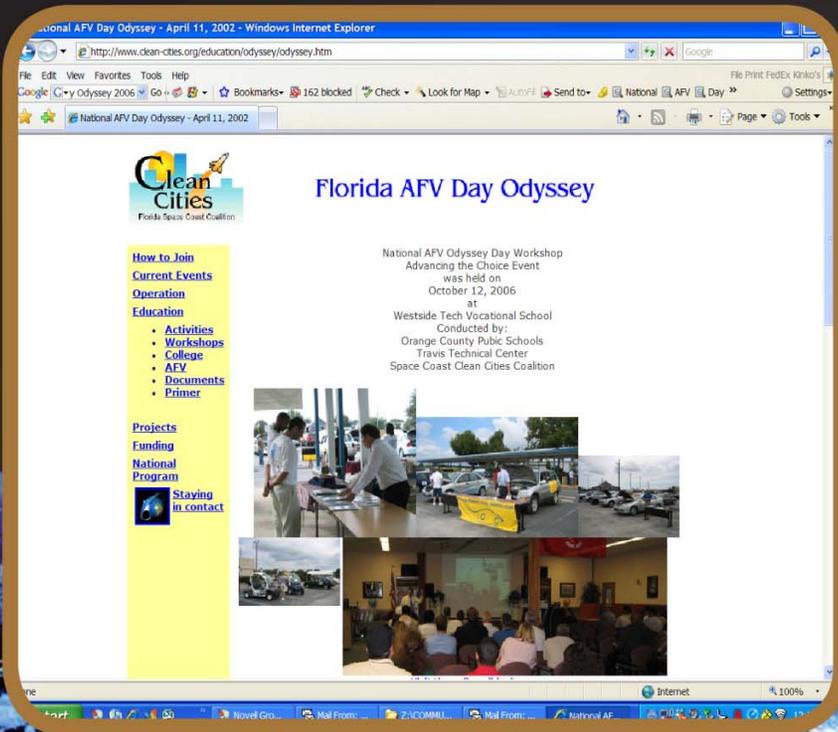
# Over 2.3 Million

reached through radio & broadcast



# Over 24.4 Million

## reached through Internet



Headquartered at  
West Virginia University

About Odyssey  
Host a Site  
Partners and Sponsors  
Locations  
Past Events  
For Coordinators Only

National Alternative Fuels  
Training Consortium  
Ridgeview Business Park  
1100 Frederick Lane  
Morgantown, WV 26508  
304-293-7882



**MEDIA  
PORTAL**

View Odyssey  
Video Trailer

Our Sponsors:

DAIMLERCHRYSLER



HONDA

TOYOTA



Developed and coordinated  
by the National Alternative  
Fuels Training Consortium  
with support from our

The banner features the "National Alternative Fuel Vehicle Day Odyssey" logo with a hot air balloon graphic. Below the logo, a yellow banner reads: "Thanks to everyone involved for a successful Odyssey! Planning has already begun for 2008. Get involved now." The date "October 12, 2006" is prominently displayed, followed by the tagline "Showcasing alternative transportation technologies - a pathway to energy independence!". A section titled "One Day" states "60 with more locations coming!" and includes a map of the United States with a mouse cursor pointing to a location. Below the map, it says "A LOCATION NEAR YOU!" and "Scroll Over Map to See Odyssey Locations for the United States, Canada and Germany." A note at the bottom of the map section reads "Javascript must be enabled to view this site!". At the bottom of the banner, it says "Developed and coordinated by the National Alternative Fuels Training Consortium with support from our".

# Over 4.8 Million

reached through print media



# ***The Results***

**31,608,094**

**individuals reached through national  
and local media coverage**



# Governmental Support



**October 12, 2006**  
**"National Alternative Fuel Vehicle Day"**

109th CONGRESS

2d Session  
S. RES. 600

Designating October 12, 2006, as 'National Alternative Fuel Vehicle Day'  
~ IN THE SENATE OF THE UNITED STATES ~

November 16, 2006

*The resolution (S. Res. 600) designating October 12, 2006 as  
'National Alternative Fuel Vehicle Day' was considered and agreed to.  
The preamble was agreed to.*

~ THE RESOLUTION, WITH ITS PREAMBLE, READS AS FOLLOWS ~

**Whereas** the United States should reduce the dependence of the Nation on foreign oil and enhance the energy security of the Nation by creating a transportation sector that is less dependent on oil;  
**Whereas** the United States should improve the air quality of the Nation by reducing emissions from the millions of motor vehicles that operate in the United States;  
**Whereas** the United States should foster national expertise and technological advancement in cleaner, more energy-efficient alternative fuel and advanced technology vehicles;  
**Whereas** a robust domestic industry for alternative fuels and alternative fuel and advanced technology vehicles will create jobs and increase the competitiveness of the United States in the international community;  
**Whereas** the people of the United States need more options for clean and energy-efficient transportation;  
**Whereas** the mainstream adoption of alternative fuel and advanced technology vehicles will produce benefits at the local, national, and international levels;  
**Whereas** consumers and businesses require a better understanding of the benefits of alternative fuel and advanced technology vehicles;  
**Whereas** first responders require proper and comprehensive training to become fully prepared for any precautionary measures that they may need to take during incidents and extrications that involve alternative fuel and advanced technology vehicles;  
**Whereas** the Federal Government can lead the way toward a cleaner and more efficient transportation sector by choosing alternative fuel and advanced technology vehicles for the fleets of the Federal Government; and  
**Whereas** Federal support for the adoption of alternative fuel and advanced technology vehicles can accelerate greater energy independence for the United States, improve the environmental security of the Nation, and address global climate change: Now, therefore, be it



**Resolved, That the Senate--**

- (1) designates October 12, 2006, as 'National Alternative Fuel Vehicle Day';
- (2) proclaims 'National Alternative Fuel Vehicle Day' as a day to promote programs and activities that will lead to the greater use of cleaner, more efficient transportation that uses new sources of energy, including --

- (A) biofuels;
- (B) battery-electric and hybrid-electric power;
- (C) natural gas and propane;
- (D) hydrogen and fuel cells; and
- (E) emerging alternatives to conventional vehicle technologies; and

to increase the personal and commercial use of cleaner and energy-efficient alternative fuel and advanced technology vehicles;  
to promote public sector adoption of cleaner and energy-efficient alternative fuel and advanced technology vehicles; and  
to encourage the enactment of Federal policies to reduce the dependence of the United States on foreign oil through the advancement and adoption of alternative, advanced, and emerging vehicle and fuel technologies.



# Additional Governmental Support

- Congressman Peter J. Visclosky of Indiana
  - ⚡ Tribute on the floor of the House of Representatives
    - South Shore Clean Cities, Inc.
    - Ivy Tech Community College
  
- Governor Tom Vilsack, Iowa
  - ⚡ Proclamation
    - Des Moines Community College
  
- Mayor Robert E. Walkup, City of Tucson
  - ⚡ Proclamation
    - Tucson Regional Clean Cities Coalition
    - Pima Association of Governments



***The Journey Continues...***

***Odyssey 2008***

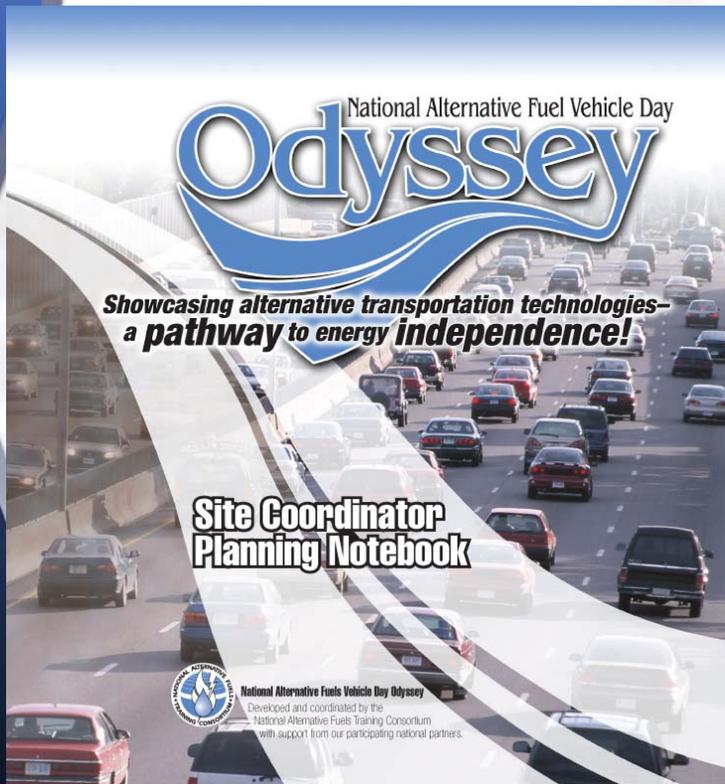
***Together,  
we will make  
a difference!***



**October 3, 2008**



# Site Coordinator Notebook



- Pre-Planning
  - Coordinator designation
  - Site selection
  - Planning committee selection
- Planning
  - Event planning
  - Media planning
  - Web site development
  - Deliverables planning
- Post Event
  - Deliverables  
(Pictures, Media Coverage, Number of Attendees, etc.)





This is your planet, this is our planet. We don't need a GPS to see where we are headed. By joining together, we can reverse the adverse effects that we have started. We can no longer sit back and wait for the world to change; it is our responsibility to work together to fix the things we have broken. No one is asking you to save the world; we are asking you to become part of the solution...

Together, we can make a difference!

**Odyssey**

**October 3, 2008**

**Our 2006 Sponsors:**  
**DAIMLERCHRYSLER**  
**GEM**  
**HONDA**  
**TOYOTA**  
**JOHN DEERE**

Developed and coordinated by the National Alternative Fuels Training Consortium with support from our sponsors and partners.

# Odyssey '08 Materials

This is your planet, this is our planet. We don't need a GPS to see where we are headed. By joining together, we can reverse the adverse effects that we have started. We can no longer sit back and wait for the world to change; it is our responsibility to work together to fix the things we have broken. No one is asking you to save the world; we are asking you to become part of the solution...

Together, we can make a difference!

**Odyssey**

**Join Us October 3, 2008 as the Journey Continues**

**National Alternative Fuels Training Consortium**  
 Ridgely Business Park  
 1100 Frederick Lane  
 Morgantown, WV 26508  
 Phone: 304-293-7882  
 Fax: 304-293-6944  
 www.afvdayodyssey.org  
 www.naftc.wvu.edu

**National AFV Day Odyssey**  
 is coordinated by the National Alternative Fuels Training Consortium (NAFTC), headquartered at West Virginia University. The NAFTC develops and delivers curricula and conducts educational outreach activities on alternative fuel and advanced technology vehicles. Presently consisting of twenty-nine members, the consortium is dedicated to its mission of eliminating harmful vehicle emissions from the air and reducing our nation's dependence on foreign energy.

[www.afvdayodyssey.org](http://www.afvdayodyssey.org)

**About Odyssey**  
 National AFV Day Odyssey is a nationwide celebration dedicated to promoting the use of alternative fuel vehicles (AFVs) and advanced technology vehicles. First held in 2002, again in 04, and most recently in 2006, each event has been an extremely successful one. Through ongoing efforts, we have been made aware of the importance of AFVs and advanced technology vehicles. Educating the public about these vehicles and promoting their implementation and widespread use is critical to our success. On October 3, 2008, the NAFTC plans to conduct the fourth National AFV Day Odyssey to continue the success of past Odyssey events.

**Potential Sponsors**  
 Contributions from National AFV Day Odyssey sponsors are invaluable in making this nationwide event a success. Sponsorships are available at several levels. Each level has numerous benefits, and by investing in this important AFV and advanced technology vehicle movement, all sponsors receive:  
 • National and international recognition as a leader in the advancement of the AFV industry  
 • Access to over 40,000 potential customers at multiple sites across the United States and abroad  
 • Product and service awareness to over 30 million individuals through media coverage  
 • Unparalleled industry networking opportunities  
 • Post-event support recognition in widely-distributed National AFV Day Odyssey Executive Report

**Potential Site Coordinators**  
 Becoming a site coordinator is possible for all those who want to get involved and make a difference. The only stipulations are to:  
 • Host an event in 2008  
 • Meet the national goals and objectives  
 • Sign a Letter of Agreement  
 • Supply NAFTC headquarters with post-event information.  
 As a site coordinator, you will generously receive:  
 • National promotion and publicity  
 • Site materials including posters and brochures  
 • Giveaway items  
 • Streamlined coordinator's notebook packed with event ideas, media templates, and marketing aids.

**Quick Statistics for 2006**  
 Dates: October 12, 2006    Total sites: 60  
 Total attendees: 39,163    United States: 57  
 Total countries: 3    Total states: 33  
     Canada: 2  
     Kentucky: 1

**Ranking of Odyssey Sites by Organization**  
 1st to 5th: 27  
 6th to 10th: 23  
 11th to 15th: 10  
 16th to 20th: 10  
 21st to 25th: 10  
 26th to 30th: 10

**Sponsors and Partners**  
 5  
 DaimlerChrysler, GEM, Honda, John Deere, and Toyota

**Number of National Members**  
 29  
 2008: 29  
 2007: 29  
 2006: 29  
 2005: 29  
 2004: 29  
 2003: 29  
 2002: 29

**A Huge Success!**  
 Nearly 40,000 People in 30 States Reached by Media Outlets

# Thank You

## Sponsors

DAIMLERCHRYSLER

HONDA

TOYOTA



JOHN DEERE



## Partners



U.S. Department of Energy



National Ethanol Vehicle Coalition



U.S. General Services Administration



New West Technologies, LLC





# In Summary

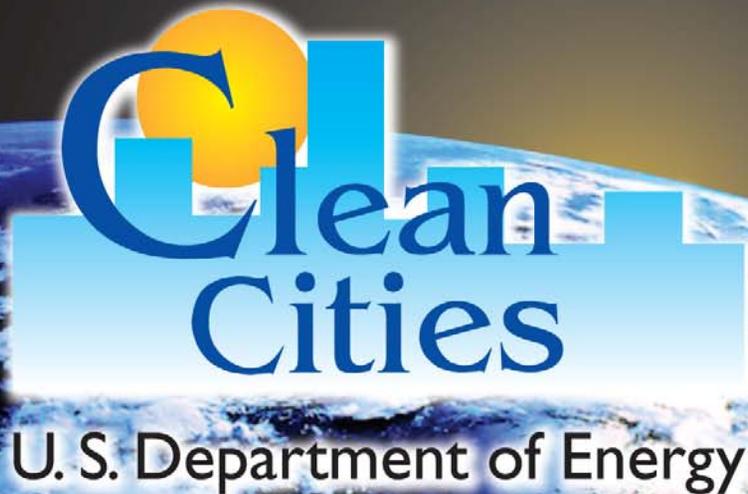
How can we work together?

💧 NAFTC can:

- ✦ Develop Curricula and Workshops
- ✦ Provide Training, Outreach and Education
- ✦ Conduct National AFV Day Odyssey with you as Partners
- ✦ Develop Programs through Partnerships with you and others



# Thank You





# Contact

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(304) 293-6944 fax

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[www.nationalafvdayodyssey.org](http://www.nationalafvdayodyssey.org)

