

2012 Merit Review Clean Cities Learning Program (CCLP)

Principal Investigator/Presenter:

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- Clean Cities Learning Program Principal Investigator

Presenter:

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- National Alternative Fuels Training Consortium (NAFTC)
- Clean Cities Learning Program Project Coordinator

May 15, 2012

Project ID: TI017



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Overview

- **Timeline**

- Start: September 24, 2009
- End: December 31, 2013^{**}
- 75% Complete

^{**}
Extended due to awarding of additional funds.

- **Budget**

- Total project funding
\$1,780,890
 - *FY10 Funding \$819,463*
 - *FY11 Funding \$780,537*
 - *FY12 Funding \$180,890*

- **Barriers Addressed**

- Consumer Reluctance to Purchase New Technologies
- Lack of Knowledge and Technical Experience with New Fuels and Vehicle Technologies

- **Partners**

- 12 NAFTC National Training Centers (NTCs)
- 12 U.S. DOE Clean Cities Coalitions
- 10 Industry Partners



Relevance

- The NAFTC *Clean Cities Learning Program* will support the mission of the DOE Vehicle Technologies Program by **raising awareness** and fostering a **greater understanding** of alternative fuels and advanced technology vehicles.
- Provides Clean Cities Coalitions, and other stakeholders, with state-of-the-art **curricula and training, outreach and education materials**, and a concentrated **marketing and communications plan**, including resources available from an **Online Toolbox**.
- Provides awareness and technical education to **encourage consumer decisions** to adopt vehicles and fuels that will significantly reduce the consumption of petroleum-based fuels.



Objectives (March 2011 – March 2012)

1. Implement developed ***First Responder Safety Training*** to help reduce risk when responding to incidents involving alternative fuels, AFVs, and advanced technology vehicles
STATUS – ORIGINAL OBJECTIVE COMPLETED.
ADD-ON OBJECTIVE – IN PROGRESS
2. Develop ***Petroleum Reduction Technologies*** curricula to help raise awareness and increase understanding of alternative fuels, AFVs, and advanced technology vehicles
STATUS – IN PROGRESS
3. Develop and execute a comprehensive **Marketing and Communications Plan** **STATUS – ONGOING**



Milestones

Completed / In Progress (March 2011 – March 2012)

- Milestone 2: Completion of Marketing and Communications Plan **Anticipated FY12**
- Milestone 5: Completion of *Clean Cities Learning Program* Toolbox Materials
First Responder Safety Training Completed.
Petroleum Reduction Technologies completion -- Anticipated FY12
- Milestone 6: Completion of Petroleum Reduction Technologies Curriculum Development **Anticipated FY12**
- Milestone 8: Petroleum Reduction Technologies Webinars Conducted
Anticipated FY12
- Milestone 9: 2010 National Alternative Fuel Vehicle Day Odyssey Program Report
☑ COMPLETED
- Milestone 10: Completion of First Responder Safety Training **Completed.**
Add-on training completion -Anticipated FY12
- Milestone 11: Completion of Petroleum Reduction Technologies Training
Anticipated FY12



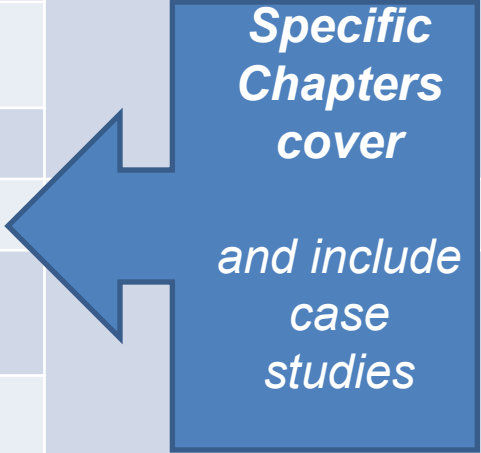
Approach / Strategy

Petroleum Reduction Technologies Curriculum

9 Modules		
Biodiesel	<div>for example</div> <div>Each MODULE includes</div> <div></div>	Part A
Ethanol		Lesson 1: What is Biodiesel
Natural Gas		Lesson 2: Biodiesel Production, Infrastructure, and Sustainability
Propane		Lesson 3: Biodiesel Vehicles
Hydrogen		
Electric Drive		Part B
Fuel Economy		The Importance of Biodiesel
Idle Reduction		(This is the Awareness/Outreach component.)
Fleet Applications	See next slide for Fleet Applications module details.	

Approach / Strategy

Petroleum Reduction Technologies Curriculum

Module 9 – FLEET APPLICATIONS STRUCTURE		
Chapter Topics		
Biodiesel		
Ethanol		Section 1 Understanding Fleets and Alternative Fuels
Natural Gas		
Propane		
Hydrogen		
Electric Drive		Section 2 Specific Fleet Applications Divided into 8 Chapters
Fuel Economy		
Idle Reduction		

Approach / Strategy

Petroleum Reduction Technologies Training

REGIONAL PILOT TRAINING - DAY ONE		
<u>WHO</u>	<u>ROLE</u>	<u>AUDIENCE</u>
CCC Partner (as lead) in coordination with NTC Partner	Recruits other Clean Cities Coalition members in region to attend	Clean Cities Coalition members in the region.
NTC Partner (as lead) in coordination with CCC Partner	Conducts Train-the-Trainer	

Approach / Strategy

Petroleum Reduction Technologies Training

REGIONAL PILOT TRAINING – DAY TWO

<u>WHO</u>	<u>ROLE</u>	<u>AUDIENCE</u>
CCC Partner (as lead) in coordination with NTC Partner	Selects 2 workshop topics to conduct as part of End-User Training	Citizens, key decision makers, stakeholders, etc. in the region.
NTC Partner (as lead) in coordination with CCC Partner	Provides assistance (may include, facilities, vehicles, etc.) for End-User Training	

Approach / Strategy Summary

Training and Workshops

- **Number of First Responder Safety Training**

Workshops / Webinars = 53 Total*

- 45 Workshops (includes Train-the-Trainer and End-User)
- 2 First Responder Safety Training Webinars
- 6 Anticipated Additional Trainings (due to add-on funding)

- **Number of Petroleum Reduction Technologies**

Workshops / Webinars = 46 Total

- 24 End-user Workshops (4 per each region)
- 14 Train-the-Trainer Workshops (2 per region + 2 original Train-the-Trainers)
- 8 Petroleum Reduction Technologies Webinars

*** Note: Includes Add-on Funded Workshops**



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Previous Accomplishments

- ***First Responder Safety Training*** Status: **COMPLETED**
 - Materials developed and distributed for the four modules (Biofuels; Gaseous Fuels; Hydrogen; and Electric Drive), including Presentation Guide, Instructor Manual, Workshop Booklets, and Quick Reference Guide.
 - Additional Train-the-Trainer workshops, end-user trainings, and promotional webinars offered.
- ***Marketing – Clean Cities Learning Program*** Status: **COMPLETED AND ONGOING**
 - Website and Online Toolbox publicly hosted. Promotional and highlight first responder videos are completed.
 - Program promoted at numerous conferences and meetings.
- ***National AFV Day Odyssey 2010*** Status: **COMPLETED**
 - Conducted nationwide on October 15, 2010
 - 131 event sites, nearly 230,000 attendees, more than 98 million reached



FY 11 Accomplishments and Progress

- **Task 3.0 Curriculum Development – Petroleum Reduction Technologies** **Status: NEAR COMPLETION**
 - Curricula for the eight modules, including educational modules, **awareness & outreach** components, **fleet applications** module, and **fleet case studies** are being reviewed by industry experts and DOE representatives and on track for completion, per grant deliverables.

Module Topics include:

1. *Biodiesel*
2. *Ethanol*
3. *Natural Gas*
4. *Propane*
5. *Hydrogen*
6. *Electric Drive*
7. *Fuel Economy*
8. *Idle Reduction*

Barriers Addressed:

- **Lack of Knowledge and Technical Experience with New Fuels and Vehicle Technologies**
- **Consumer Reluctance to Purchase New Technologies**

This curricula will inform consumers about petroleum reduction technologies and new technologies, while educating auto technicians, fleet managers, and decision makers regarding new fuels and vehicle technologies.



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FY 11 Accomplishments and Progress

- **Task 5.0 Delivery of Training – Petroleum Reduction Technologies**

- Plans for conducting Train-the-Trainer workshops, as well as the pilot end-user workshops are all in progress and on track for completion, per grant deliverables.

Status: IN PROGRESS

- **Subtask 5.5 Petroleum Reduction Technologies Webinars**

- Two beta webinars, **above and beyond grant deliverables**, have been delivered as part of the U.S. DOE Intern Program. Topics included Biodiesel (November 2011) and Natural Gas (December 2011).

Status: IN PROGRESS

Barriers Addressed:

- **Lack of Knowledge and Technical Experience with New Fuels and Vehicle Technologies**
- **Consumer Reluctance to Purchase New Technologies**

This training will inform consumers about petroleum reduction technologies and new technologies, while educating auto technicians, fleet managers, and decision makers regarding new fuels and vehicle technologies. Training to be disseminated nationwide.



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FY 11 Accomplishments and Progress

- **Task 6.0 Marketing**

Clean Cities Learning Program

- The Online Toolbox **continues to be updated** as new material is available.
- The NAFTC continues to actively promote the Clean Cities Learning Program:
 - Nationally via **conferences and meetings**
 - Monthly column in **NAFTC eNews** publication
 - **Social media**, including Facebook, Twitter, YouTube
- The NAFTC received national media exposure from mobile application for first responders
www.afvsafetytraining.com

Barriers Addressed:

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Status: IN PROGRESS



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Collaboration – Training Partners

National Training Centers (NTCs)

- *Rio Hondo Community College*
- *Gateway Community College*
- *Ivy Tech Community College – Lafayette*
- *Lawson State Community College*
- *Nashville Auto-Diesel College*
- *NAFTC / West Virginia University*
- *Onondaga Community College*
- *Shoreline Community College*
- *Tyler Junior College*
- *Utah Valley University*
- *Yuba College*

Clean Cities Coalitions

- *Alabama Clean Fuels Coalition*
- *Clean Cities of Middle Tennessee*
- *Clean Communities of Central New York*
- *Dallas-Fort Worth Clean Cities Coalition*
- *East Texas Council of Governments*
- *Greater Indiana Clean Cities Coalition*
- *Greater Sacramento Regional Clean Air Coalition*
- *Las Vegas Regional Clean Cities Coalition*
- *New Haven Clean Cities Coalition*
- *Puget Sound Clean Cities Coalition*
- *State of WV Clean Cities*
- *Utah Clean Cities Coalition*



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Collaboration: Industry Partners

- **AC & S, Inc.**
www.acandsinc.com
- **Advanced Vehicle Research Center (AVRC)**
www.avrc.com
- **Cabaire, Inc.**
www.controlmod.com/cabaire
- **WVU Mechanical & Aerospace Engineering**
www.cemr.wvu.edu
- **Clean Fuels Development Council**
www.cleanfuelsdc.org
- **Electric Drive Transportation Association**
www.electricdrive.org
- **ICF International, Inc.**
www.icif.com
- **Gas Technology Institute, Inc.**
www.gastechnology.org
- **Sustainable Biodiesel Alliance**
<http://sustainablebiodieselalliance.com>
- **WVU Fire Service Extension**
<http://fireservice.ext.wvu.edu>



Proposed Future Activities

Additional Funding:

Original Task Completed. Add-on Funding Tasks In Progress.

- **Subtask 2.7** First Responder Safety Training Workshop Booklets and Quick Reference Guides
 - As part of the awarding of additional funds, this subtask will be revised to **develop additional material** specifically for **vehicle recovery operators** and **salvage yard workers**, as pertaining to alternative fuel and advanced technology vehicles.



Proposed Future Activities

- **Milestone 8:** Petroleum Reduction Technologies Webinars Conducted
 - Expected Number of Webinars = **8**
 - One for each of the module topics: Biodiesel, Ethanol, Natural Gas, Propane, Hydrogen, Electric Drive, Hydrogen, Fuel Economy, Idle Reduction
- **Milestone 11:** Petroleum Reduction Technologies Training Completion
 - Expected Number of Workshops Nationwide = **38**
 - 24 End-user Workshops (4 per each region)
 - 14 Train-the-Trainer Workshops (2 per region + 2 original Train-the-Trainers)

Note: Total Workshops/Webinars = 46



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Summary

The **NAFTC Clean Cities Learning Program** is complementary to the U.S. DOE Vehicle Technologies Program's mission to

“...develop more energy efficient and environmentally friendly highway transportation technologies that enable America to use less petroleum ... that will provide Americans with greater freedom of mobility and energy security, with lower costs and lower impacts on the environment.”

- **Relevance:**

- The NAFTC *Clean Cities Learning Program* **raises awareness** and fosters a **greater understanding** of alternative fuels and advanced technology vehicles

- **Accomplishments/ Progress:**

- Number of FR Training Workshops/Webinars = **53**
- Number of PRT Training Workshops/Webinars = **46**

- **Approach:**

- Face-to-face workshops, webinars, and printed marketing material

- **Collaborations:**

- 12 NAFTC National Training Centers (NTCs)
- 12 U.S. DOE Clean Cities Coalitions
- 10 Industry Partners



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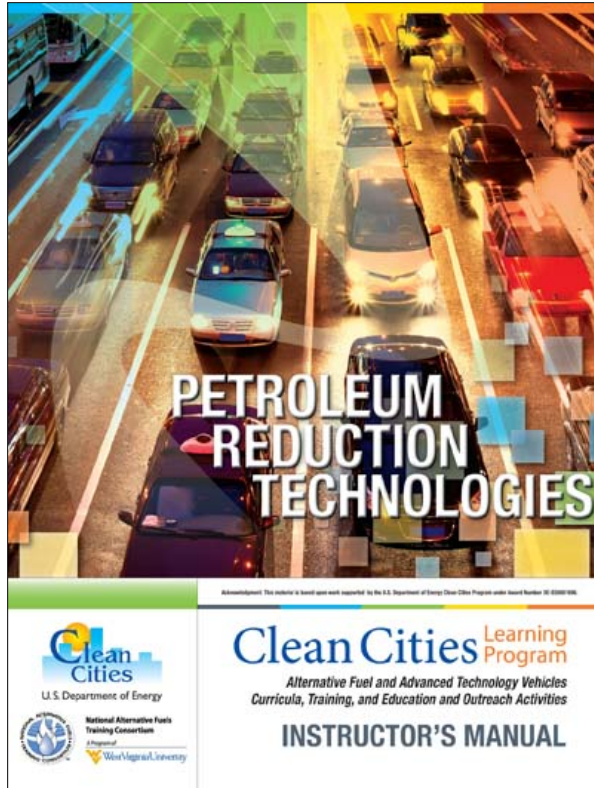
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Technical Back-Up Slides (Visuals)



Petroleum Reduction Technologies



Consumer Friendly Curricula with Interactive Features



Icons for Visualization of Module Topic Benefits



Petroleum Reduction Technologies



Clean Cities Learning Program
Petroleum Reduction Technologies

Biodiesel

- **Biodiesel Color**
 - Water white to pale gold and dark brown
 - Depends upon the feedstock used to make the fuel
- **Biodiesel Smell**
 - Pure biodiesel (B100) is odorless
 - Blends that are 5% conventional diesel or more begin to smell like petro-diesel
- **Biodiesel Identification**
 - Renewable Inventory Numbers (RINs)


Clean Cities Learning Program
Petroleum Reduction Technologies

Biodiesel Fleet Applications


Section 2:
Alternative Fuel
Applications

Biodiesel Case Study

CASE STUDY



Location: Morgantown, WV
Company: Monongalia County Schools' Transportation Department
Study: Biodiesel



In West Virginia, Monongalia County Schools' Transportation Department started using biodiesel in its fleet of school buses beginning in 2003. The school system's experience in adopting biodiesel included the benefits of reduced emissions, lower fuel costs, and budget savings. The challenges, however, also involved pumping fuel tanks that were improperly blended and achieving driver buy-in during the transition.

Shortly after state legislation created incentives for counties and municipalities to use alternative fuels, officials committed to the use of B20 biodiesel in refueling the school bus fleet. The fleet's experience with biodiesel was one of the first in the state, and Irv Schuetzner, the school system's transportation director, said their use of biodiesel has been successful in multiple ways.

Decision Points

As fleet managers decide to use alternative fuels, these decisions are often driven by economic incentives, government mandates, and/or the benefits of green branding and emissions reductions. All these factors played a role in influencing the Monongalia County Board of Education.

As mentioned, members of the Monongalia County Board of Education encouraged the use of biodiesel after the West Virginia State Legislature created budget incentives for local governments. The school board qualified for these incentives, starting the momentum toward adopting alternative fuels in the school bus fleet.

After state incentives were put in place, Schuetzner explained that Monongalia County was the first school bus fleet in West Virginia to implement the use of biodiesel. Two counties were early adopters of alternative fuels in West Virginia - Monongalia County adopted biodiesel, and Wood County adopted natural gas. Biodiesel provided Monongalia County immediate returns because it did not have to invest in new buses, conversions, or refueling infrastructure.

Test Your Knowledge

- **True or False:** The cost of biodiesel depends on the biodiesel blend. (Ex: B20 costs less than B100)
- Biodiesel is produced from feedstocks such as soy bean oil and vegetable oil. New research also suggests that _____ can be made into biodiesel.
- **True or False:** The biggest obstacle for widespread biodiesel use in fleets, and other alternative fuels, is lack of infrastructure.
- List one of the three reasons mentioned in the text as to why the U.S. should use biodiesel.
- **True or False:** Fleet managers should expect to change fuel filters after the first tank of biodiesel runs through their vehicle.

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Petroleum Reduction Technologies

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Page 1

First Responder Safety Training

Instructor Manual, Presentation Guide and Supplemental Materials

First Responder Safety Training
Instructor's Manual

- Biofuels and Biofuel Vehicles
- Gaseous Fuels and Gaseous Fuel Vehicles
- Hydrogen and Hydrogen-Powered Vehicles
- Electric Drive Vehicles

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First Responder Safety Training: Gaseous Fuels and Gaseous Fuel Vehicles
Gaseous Fuels and Gaseous Fuel Vehicles

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Natural gas is made up of methane, ethane, propane, and butane. Natural gas is mostly 95% to 98% methane. There are other trace hydrocarbons in natural gas. However, these make up less than 1% of the gas composition. Since natural gas is lighter than air, it does not remain in the atmosphere.

Below are some safety facts and figures regarding compressed natural gas (see Figure 1).

CGF Facts and Figures

- Formula: CH₄
- Specific gravity: 0.5527
- Auto-ignition temperature: 1202°F/650°C
- Flammability range:
 - Lower explosive limit (LEL): 5% to 15%
 - Upper explosive limit (UEL): 14%
- Heat of combustion: 1,030 BTU/lb
- Boiling point: -259°F/-162°C

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Natural gas is easily ignited by heat, sparks, or flames, and will burn rapidly without an air supply. The heat is the result of oxidation and flash back. The flammability limit for air is 5% to 15% by volume. The heat of combustion of natural gas is between 10 and 15% of the heat of combustion of gasoline. The heat of combustion of natural gas is 1,030 BTU/lb.

Follow-Up Questions

1. What are the chemical properties of natural gas?

2. What are the physical properties of natural gas?

3. What are the safety facts and figures regarding natural gas?

Part 1: Compressed Natural Gas and Compressed Natural Gas Vehicles
Gaseous Fuels and Gaseous Fuel Vehicles

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CGF Facts and Figures

- Formula: CH₄
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There are several components of passenger vehicles that operate on CNG. CNG passenger vehicles would be classified as dedicated, partial, or dual fuel applications.

Dedicated Vehicles

There are several components of passenger vehicles that operate on CNG. CNG passenger vehicles would be classified as dedicated, partial, or dual fuel applications.

Three types of NGVs are natural gas as a fuel:

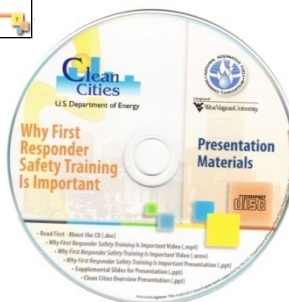
- Dedicated NGVs run only on natural gas.
- Bi-fuel NGVs are designed with two separate fueling systems that allow them to operate on natural gas as well as conventional gasoline.
- Dual fuel NGVs operate on a mixture of natural gas and gasoline or natural gas and diesel.

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There are several components of passenger vehicles that operate on CNG. CNG passenger vehicles would be classified as dedicated, partial, or dual fuel applications.



Why First Responder Safety Training is Important



Definition / Important Terms Icons

At relevant spots throughout the guide, unfamiliar or technical terms are explained using the definition icons.

Definition / Important Terms Icons

As defined by OSHA, definition icons are provided for the following terms: CNG, LNG, LPG, natural gas, and dual fuel. These icons are used throughout the guide to provide a clear understanding of the terminology used in the training materials.

Clean Cities Learning Program
Alternative Fuel and Advanced Technology Vehicles
Curricula, Training, and Education and Outreach Activities

Why First Responder Safety Training Is Important

Getting Started
Tips for Delivery of the Why First Responder Safety Training Is Important Presentation

Clean Cities
U.S. Department of Energy

First Responder Safety Training Awareness

Tips for Delivery of the Why First Responder Safety Training Is Important Presentation
First Responder Safety Training Awareness

PowerPoint Slide 3 example:

About the U.S. DOE Clean Cities Program

- Clean Cities offers a variety of resources, including technical assistance, training, and outreach, to help states and local governments improve their energy efficiency and reduce greenhouse gas emissions.
- Clean Cities is part of the U.S. DOE Office of Energy Efficiency and Renewable Energy Vehicle Technology Program.

PowerPoint Slide 4 with Talking Points example:

About the U.S. DOE Clean Cities Program

- Clean Cities is a national program that provides technical assistance, training, and outreach to help states and local governments improve their energy efficiency and reduce greenhouse gas emissions.

Clean Cities Learning Program

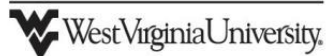
Module Content

- Part 1: Compressed Natural Gas and Compressed Natural Gas Vehicles
- Part 2: CNG Infrastructure, Transport, Stations, and Handling
- Part 3: Liquefied Natural Gas and Liquefied Natural Gas Vehicles
- Part 4: LNG Infrastructure, Transport, Stations, and Handling
- Part 5: Propane and Propane-Powered Vehicles
- Part 6: LPG Infrastructure, Transport, Stations, and Handling
- Part 7: First Responder Procedures

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First Responder Safety Training



*Photographs from
nationwide end-user
training workshops*