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Advanced Electric Drive Vehicle Education Program Overview

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Abstract

The National Alternative Fuels Training Consortium (NAFTC) is a pioneer and national leader in developing, managing, and promoting programs and activities that desire to cure America's addiction to oil, lead to energy independence, and encourage the greater use of cleaner transportation. The NAFTC is the only nationwide alternative fuel vehicle and advanced technology vehicle training organization in the United States. The NAFTC is developing an Advanced Electric Drive Vehicle Education Program funded by the US Department of Energy. This program will help accelerate mass market introduction and education of advanced electric drive vehicles to help reduce the country's dependence on foreign oil. The end result will be a cutting-edge nation-wide program for education, training, outreach, and public awareness for advanced electric drive vehicles, electric system components, and supporting electrical infrastructure. Curriculum development for this project include First Responder Safety Training, Automotive Technician Training, Career and Technical Training (High School Audience), and Infrastructure Training. Audiences for these courses include but not be limited to: mechanics/automotive technicians; automotive technology instructors and other community college instructors; career and technical education teachers; electrical infrastructure installation and repair technicians; first responders; fleet operators; safety, code and standards officials; utilities personnel; and others. This project will also encompass a robust outreach and education component consisting of a Advanced Electric Drive Vehicle Education Program website, toolkit, extensive marketing plan, vehicle simulation and training tool, and National AFV Day Odyssey.

Keywords: *Education, electric drive, infrastructure, safety*

1 Introduction

The National Alternative Fuels Training Consortium (NAFTC) is the only nationwide training organization dedicated to improving air quality and decreasing U.S. dependence on foreign oil by promoting, supporting, and expanding the use of alternative fuels and alternative fuel

vehicles (AFVs) and advanced technology vehicles. The NAFTC is a pioneer and national leader in developing, managing, and promoting programs and activities that desire to cure America's addiction to oil, lead to energy independence, and encourage the greater use of cleaner transportation. The mission statement of the NAFTC is *"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.”

The NAFTC develops and disseminates curricula for in-service and pre-service auto technicians, fleet managers, automotive trainers, and others in the AFV and automotive fields; first responders and other safety personnel; government officials; and consumers. Headquartered at West Virginia University, the NAFTC consists of Training Centers located nationwide from Maine to California. Each center provides *Training with Impact* through its experienced instructors and real-world shop facilities. Numerous other members from secondary schools, small businesses, government, and industry also support the NAFTC's mission.

Services provided by the NAFTC

- Offers more than 25 courses and workshops nationwide on alternative fuel and advanced technology vehicles
- Develops and delivers new courses and workshops yearly to meet demand and updated technology needs
- Manages programs through funding from government and private sector industry entities
- Provides extensive technical assistance through timely and accurate technical data available on NAFTC website
- Produces two NAFTC newsletters reporting on top industry news stories and NAFTC updates - the NAFTC eNews, a dynamic, monthly web-based newsletter, and the NAFTC Clean Alternatives Report (CARReport), a printed publication

Since its inception in 1992, the NAFTC has created tremendous impact through

- Delivering more than 1,600 courses and training more than 30,000 technicians, fleet managers, students, decision-makers, and others nationwide
- Conducting more than 1,500 workshops and education/awareness events with more than 600,000 attendees
- Strengthening alliances with regional fuel providers and local industries
- Enhancing liaisons with automobile manufacturers

- Enhancing alliances with aftermarket retailers within an NTC's region
- Heightening awareness for millions about alternative fuel and advanced technology vehicles by conducting National AFV Day Odyssey*
- Conducting international training
- Providing technical assistance to thousands
- Collaborating with other industry partners to conduct special projects

The NAFTC is the developer of the nation's largest non-profit consumer educational program, National AFV Day Odyssey. National AFV Day Odyssey was designed to create public awareness and to promote the use of alternative fuel and advanced technology vehicles. Odyssey was conducted in 2002, 2004, 2006, 2008, and 2010. The 2010 Odyssey event attracted more than 230,000 direct attendees and reached 98 million people through media coverage.

The NAFTC currently manages three federally funded programs:

- Advanced Electric Drive Vehicle Education Program- Provides educational and outreach materials about advanced electric drive vehicles, including battery, hybrid, plug-in, and fuel cell electric vehicles
- Clean Cities Learning Program- Raises awareness about alternative fuel and advanced technology vehicles through a strategic outreach and education effort, funded by the Clean Cities Program
- Hydrogen Fuel Dispensing Station at West Virginia University- Demonstrates that hydrogen is a safe and competitive alternative to petroleum by building, operating, and evaluating a hydrogen station at WVU

2 Project Goals

The NAFTC is developing an Advanced Electric Drive Vehicle Education Program funded by the

US Department of Energy. This program will help accelerate mass market introduction and education of advanced electric drive vehicles to help reduce the country's dependence on foreign oil. The end result will be a cutting-edge nation-wide program for education, training, outreach, and public awareness for advanced electric drive vehicles, electric system components, and supporting electrical infrastructure. Specifically the project will:

- Automotive Technician Curriculum
 - Infrastructure Curriculum
 - Career and Technology Education
- Develop and provide teaching materials to secondary schools.
- Train in-service and pre-service personnel, automotive technicians, and first responders to work with advanced electric drive vehicles, including electric vehicles (EVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), fuel cell vehicles (FCVs), and the respective supporting infrastructure
- Educate consumers on the basics of advanced electric drive vehicles.
- Conduct National AVF Day Odyssey to help educate current and future consumers inclusion of secondary schools, on the subject of advanced electric drive vehicles
Website and toolkit development focusing on Advanced Electric Drive Vehicles

3 Curriculum Development

The Advanced Electric Drive Vehicle Education Program will develop curricula and training to be provided for four (4) major audiences as part of the project. These audiences include 1) Career and Technology Education (CTE) teachers and students; 2) in-service and pre-service automotive technicians; 3) first responders; and 4) infrastructure technicians and service personnel. Targeted vehicle types for the curriculum development are: Electric Vehicles-EV's, Hybrid Electric Vehicles-HEV's, Plug-in Hybrid Electric Vehicles-PHEV's and Fuel Cell Electric Vehicles-FCV's

All curricula development activities will include the development of training materials including, but not limited to, lesson plans, workshop

- Create an external advisory committee that will provide input on project-related activities.
- Curriculum Development
 - First Responder Safety Training Curriculum- electric vehicles (EVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), fuel cell vehicles (FCVs),

curriculum, surveys, exams, practical exercises, instructor manuals, participant manuals, webinars, videos, and presentations. A hybrid cut-away trainer will also be developed to supplement and reinforce learning by CTE students, pre-service and in-service automotive technicians, first responders, and consumers.

3.1 First Responder Safety Training:

The First Responder Safety Training teaches first responders and public safety officers such as firefighters, law enforcement personnel, paramedics, hazard response teams, vehicle retrieval personnel, emergency medical technicians, code officials, and construction permitting officers how to respond to incidents involving advanced electric drive vehicles and their supporting infrastructure. Includes workshops for hybrid electric vehicles (HEVs), battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs). The first responder training materials also include a quick reference guide (QRG) and a QRG phone app for your mobile device.

3.2 Automotive Technician:

Teaches trainers, pre-service and in-service technicians, fleet managers, and other interested participants the fundamentals, system design, diagnostic considerations and special service topics of HEVs, BEVs, PHEVs, and FCEVs. Explains appropriate safety measures in maintaining advanced electric drive vehicles and describes electric propulsion systems including the construction, operation, control strategies, service tools, scan tool data, and basic diagnostic fundamentals.

Course materials include instructor manual, participant manual, training video, animations,

vehicle training and simulation tool, on-line training tool, supportive training activities.

3.3 Electrical Infrastructure:

The Electrical Infrastructure curriculum provides the necessary information that consumers, installers, and utility companies need to better handle installing the appropriate charging and electrical equipment for residential and fleet advanced electric drive vehicle customers. The curriculum also explains the electrical and building code requirements that apply to all installers and users of electric vehicle supply equipment as well as the special needs of the different classes of electric vehicle users such as homeowners (including multifamily residences), fleet facilities, and public access and commercial charging facilities.

Course materials include instructor manual, participant manual, training video, animation, on-line training tool, supportive training activities.

3.4 Career and Technical Education:

Provides classroom materials and an online course related to BEVs, HEVs, PHEVs, and FCEVs so career and technical schools can incorporate information and real-world examples related to advanced electric drive vehicles into the automotive technology curriculum. Offers secondary school professional development for career and technical teachers and administrators to gain a better understanding of advanced electric drive vehicles and incorporate these new technologies into their programs.

Course materials include instructor manual, participant manual, training video, animations, vehicle training and simulation tool, on-line training tool, supportive training activities. Each local event site offers unique activities designed to educate attendees about cleaner transportation technologies and is tailored to the specific needs of the site's given audience. Examples of such activities include:

- ride-and-drives
- vehicle displays
- workshops

- demonstrations
- panel discussions
- trivia contests
- automotive lab tours
- EcoCar garage tours

Additionally, industry experts are often on hand at Odyssey events to answer questions, and educational seminars are frequently featured to provide detailed information about viable alternative fuel options and how they apply to the audiences' local communities.

Since the inaugural National AFV Day Odyssey in 2002, the number of Odyssey site locations and attendance has grown from approximately 17,000 attendees at 51 events to more than 230,000 individuals attending one of 131 events in 2010. Additionally, media reach has multiplied dramatically during this period, from less than 20,000 individuals reached in 2002 to more than 98 million people being touched by National AFV Day Odyssey's message via media outlets in 2010!

The worldwide recognition of National AFV Day Odyssey has enabled millions of individuals to become aware of the difference alternative fuel and advanced technology vehicles can make in our nation's energy security and our quest for cleaner air.

Odyssey presents significant networking opportunities to all who participate in this well respected, cooperative event. This extraordinary collaboration includes national and local sponsors and partners; NAFTC National Training Centers; Department of Energy Clean Cities Coalitions; industry leaders; state, local and federal government officials; secondary schools; and a vast number of like-minded companies, organizations, groups, and individuals.

National AFV Day Odyssey also teams up with special events partners like the Santa Monica AltCar Expo and Conference. Such partnerships present further networking opportunities and serve as unique platforms to deliver Odyssey's message.

Importance:

The continued education made available through National AFV Day Odyssey is crucial in order for consumers to make well informed and environmentally friendly choices in transportation.

In the midst of regularly rising gas prices, increased public awareness is an essential step toward helping to decrease our dependence on foreign oil and improving our quality of air. Odyssey makes a positive impact by bringing up-to-date information to consumers about energy efficient vehicles and cleaner fuels that are viable options to consider when purchasing a vehicle.

National AFV Day Odyssey provides much needed support and recognition to the manufacturers that make AFVs and advanced technology vehicles available for individuals everywhere.

Odyssey is a well defined endeavor that brings together industry experts and fosters ideas, research, and education in the alternative fuel and advanced technology fields.

Ten-Year Anniversary: The 2012 Odyssey will mark its ten-year anniversary of this collaborative event. Planning is underway for an amazing, bigger-than-ever Odyssey!

4.0 Education and Outreach Activities

National Alternative Fuel Vehicle (AFV) Day Odyssey is a biennial, outreach and education event dedicated to promoting the use of AFVs and advanced technology vehicles.

Odyssey is comprised of numerous green transportation related events coordinated and hosted by NAFTC members, Clean Cities Coalitions, and others who believe in cleaner, more energy efficient forms of transportation. These local events take place on a designated date every other year throughout the U.S. and in Canada.

The NAFTC has also developed and maintains a website dedicated to the Advances Electric Drive Vehicle Education Program. Also made available through this program is a tool kit which is available on line or in a CD format. The Toolkit features PowerPoint presentations, video, fast facts, white papers and many additional resources on advances electric drive vehicles.

Each curriculum is also accompanied by a video to support the teaching and understanding of its specific topic. Videos include AED 101: an overview of advanced electric drive vehicles, First Responder Safety Training, Infrastructure, Career and Technical Education and Automotive Technician.

The NAFTC also includes social media as an important part of its public awareness and outreach campaign. The AED program is accessible through Facebook, Twitter and LinkedIn.

The AED project has an extensive marketing and media relations component that consists of press releases, advertisements, partnerships, conferences, tradeshow, and many educational and outreach activities

The NAFTC has partnered with MotorWeek and completed a segment that had aired on Motorweek two times with a total reach over 2 million viewers nationwide.

5.0 Program Impact

Throughout the life of the Advanced Electric Drive Vehicle Education Program over 98 training courses will be delivered reaching over 20,000 individuals. Over 200 million people will be reached through a combined effort of education, outreach activities and media resources.

Authors



Al Ebron is Executive Director of the NAFTC and Division Director for the National Research Center for Coal and Energy (NRCCE) at West Virginia University (WVU). Mr. Ebron has over 23 years of extensive experience with alternative fuel and advanced electric drive vehicle projects. Mr. Ebron earned a B.A. degree in Business Management from North Carolina State University and an MBA from WVU.