FEMP FIRST THURSDAY SEMIN@RS 2.0

What you need to know... live, online, and anytime.

Learner's Guide

Federal Fleet Infrastructure and Electric Vehicles

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Seminar: Federal Fleet Infrastructure and Electric Vehicles

Background on the **FEMP First Thursday Seminars**

The **First Thursday Seminars** are designed for Federal Energy Managers but are open to anyone whose scope of responsibility involves influencing decisions to increase energy efficiency, conserve water resources, and meet other Federal sustainability goals.

There are three ways to participate in the seminars.

1. Live streaming video available on the day of the event over the internet to a desktop computer or via a projection system in a conference room;
2. Digital and Analog Satellite downlink technology for group showings; and,
3. Archived streaming video available after the event over the Internet on a desktop computer or via a projection system in a conference room.

To learn more about accessing specific seminars, access http://www.femp.energy.gov/firstthursday.

Introduction

"Federal Fleet Infrastructure and Electric Vehicles" is being offered live on Thursday, June 2, 2011 at 1:30 pm Eastern Time. The 90-minute seminar will benefit professionals seeking a basic understanding of advances in EV technology and infrastructure. For additional course information or to register, access the seminar's landing page.

Learner Objectives

After completing this seminar, the learner will:

1. Explain how electric vehicles might fit into an overall GHG emissions and petroleum reduction strategy.
2. List 4 types of electric vehicles on the market and compare them to other vehicle types in terms of cost and performance.
3. Discuss the basic requirements and options for creating or expanding an electric vehicle recharging infrastructure.
4. Discuss present and future options for the acquisition of EV and charging infrastructures.
5. Incorporate EVs into multi-year fleet strategies.
6. Discuss Federal reporting requirements for EVs.
7. Access FEMP resources for EVs and EV infrastructures.

Asking Questions

At the end of the seminar, there will be an opportunity for you to ask questions. You will be able to email, fax, or ask questions by phone. You may email or fax your questions anytime during the broadcast. You will be able to speak "live" with the instructor at the end of the presentation. The phone, fax, and email information will be posted on the screen during the seminar.

During the live broadcast, ask questions by either:

- Dialing the toll free number 800-775-3728
- Faxing questions to 865-381-0554
- Or by sending an email to FTS@energyworkshops.org.

Upon Seminar Completion

Each participant who registers for the training via FEMP Central or who signs a Roster (at a satellite broadcast location) will be sent an email with a link to the seminar evaluation and the open book quiz. If you do not have a Roster, they are available here. Please sign the Roster and scan/ email to ruleb@tds.net or Fax to 865-381-0554. Upon completion of the evaluation and the open book quiz, you will be able to print a course completion certificate for your records.

Additional Materials

The materials in this section support the learning in the presentation.

Resources for Your Use

Use the following link to review materials that FEMP has available regarding Electric Vehicles and their supporting infrastructure: http://www1.eere.energy.gov/femp/program/fedfleet_advancedvehicles.html

Glossary of Terms

Advanced Technology Vehicle (ATV): A vehicle that combines new engine/power/drive-train systems to significantly improve fuel economy. This includes hybrid power systems and fuel cells, as well as some specialized electric vehicles.

Aftermarket: Broad term that applies to any change after the original purchase, such as adding equipment. When applied to AFVs, it refers to conversion devices or kits for conventional fuel vehicles.

All-electric vehicles (EVs): EVs use a battery to store the electrical energy that powers the motor. EVs are sometimes referred to as battery electric vehicles (BEVs). EV batteries are charged by plugging the vehicle into an electric power source. Although electricity production might contribute to air pollution, all-electric vehicles are considered zero-emission vehicles because their motors produce no exhaust or emissions. Because EVs use no other fuel, they help reduce petroleum consumption.

Alternating Current (AC): The standard type of electricity in homes and an option for powering an electric vehicle. In an AC circuit, the current flows in both directions.

Alternative Fuels and Advanced Vehicles Data Center (AVDC): The Alternative Fuels and Advanced Vehicles Data Center provides a wide range of information and resources to enable the use of alternative fuels (as defined by the Energy Policy Act of 1992), in addition to other petroleum reduction options such as advanced vehicles, fuel blends, idle reduction, and fuel economy. (Formerly known as the Alternative Fuels Data Center - AFDC).

Alternative Fuel Vehicle (AFV): As defined by the Energy Policy Act, any dedicated, flexible-fuel, or dual-fuel vehicle designed to operate on at least one alternative fuel.

Alternative Fuel: Methanol, denatured ethanol, and other alcohols; mixtures containing 85% or more by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels; natural gas; liquefied petroleum gas; hydrogen; coal-derived liquid fuels; non-alcohol fuels (such as biodiesel) derived from biological material; and electricity. 'P-Series' fuels were added to this list since the original definition in EPAct.

Alternative Fuels Utilization Program (AFUP): A program managed by DOE with the goals of improving national energy security by displacing imported oil, improving air quality by development and widespread use of alternative fuels for transportation, and increasing the production of AFVs.

Alternative Motor Fuels Act of 1988 (AMFA): Public Law 100-494. Encourages the development, production and demonstration of alternative motor fuels and AFVs.

Battery Electric Vehicle (BEV): An electric vehicle whose electricity is exclusively stored in batteries rather than a fuel cell or generator.

Battery management system: Mini onboard computer to monitor entire battery system and each individual battery. Also may be built into charging system.

Bi-Fuel Vehicle: A vehicle with two separate fuel systems designed to run on either an alternative fuel, or gasoline or diesel, using only one fuel at a time. Bi-fuel vehicles are referred to as "dual-fuel" vehicles in the Clean Air Act Amendments and Energy Policy Act.

Clean Fuel Vehicle (CFV): Any vehicle certified by EPA as meeting certain Federal emissions standards. The three categories of Federal CFV standards from least to most stringent are low emission vehicles (LEVs), ultra-low emission vehicles (ULEVs), and zero emission vehicles (ZEVs). The inherently low emission vehicle (ILEV) standard is voluntary and does not need to be adopted by states as part of the Clean-Fuel Fleet Program.

Clean Fuel: Any fuel or power source that is used to certify a vehicle to the LEV, ILEV, ULEV, SULEV, or ZEV standard.

Converted or Conversion Vehicle: A vehicle originally designed to operate on gasoline or diesel that has been modified or altered to run on an alternative fuel.

Depth of discharge: A measure of how much energy has been withdrawn from a battery. It is expressed as a percentage of the total battery capacity.

Direct current (DC): A form of electricity in which the current flows in only one direction. This is the form produced by batteries and the most common system used in EV conversions.

Domestic Fuel: As defined by the Energy Policy Act, Section 301, domestic fuel is derived from resources within the United States, its possessions and commonwealths, and Canada and Mexico (the two nations in a free-trade agreement with the United States).

Dual-Fuel Vehicle (EPAct definition): Vehicle designed to operate on a combination of an alternative fuel and a conventional fuel. This includes vehicles using a mixture of gasoline or diesel and an alternative fuel in one fuel tank, commonly called flexible-fueled vehicles; and vehicles capable of operating either on an alternative fuel (usually compressed natural gas or propane), a conventional fuel, or both, simultaneously using two fuel systems. These are commonly called bi-fuel vehicles.

Dual-Fuel Vehicle: Vehicle designed to operate on a combination of an alternative fuel and a conventional fuel. This includes (a) vehicles that use a mixture of gasoline or diesel and an alternative fuel in one fuel tank, commonly called flexible-fuel vehicles; and (b) vehicles capable of operating either on an alternative fuel, a conventional fuel, or both, simultaneously using two fuel systems. They are commonly called bi-fuel vehicles.

Electric Vehicle Charging Station (EVSE): An element of the infrastructure that supplies electric energy for the recharging of electric vehicles.

Electric Vehicles (EVs): Electric vehicles use energy stored in a battery pack in combination with an electric motor. EVs require no fuel and release no exhaust fumes or emissions into the environment. The battery pack must be recharged from an electric power source.

Electricity: Electricity is considered a fuel when used in electric vehicles. Electricity as a fuel shifts the burden of pollution control to the electrical supply systems, resulting in much lower emissions per mile traveled.

Energy Policy Act of 1992 (EPAct): Passed by Congress to enhance U.S. energy security by reducing our dependence on imported oil. It mandates the use of alternative fuel vehicles, beginning with Federal, then state, then fuel provider fleets.

Excluded Vehicles and Equipment: Any vehicle, vessel, aircraft, or non-road equipment owned or operated by an agency of the Federal Government that is used in combat service or support, tactical or relief operations or training, Federal law enforcement, emergency response, or space flight vehicles

Federal Automotive Statistical Tool (FAST): Facilitates the annual reporting to Congress related to compliance with Federal fleet annual reporting deadlines.

Flex-fuel Vehicle (FFV): Flex-fuel vehicles accept, and are powered by, regular gasoline or an ethanol blend, such as E85 -- a fuel blend consisting of 85 percent ethanol and 15 percent gasoline requiring less demand on natural resources than traditional fossil fuels.

Fossil Fuels: Fossil fuels (such as oil and natural gas) are formed by the natural resources of buried dead organisms that lived millions of years ago. They produce a significant amount of energy yet they emit greenhouse gases, which contribute largely to the global warming crisis. Because they take millions of years to form, fossil fuels are considered non-renewable fuels.

Fuel Cell Vehicle (FCEV): A fuel cell vehicle generates power by combining hydrogen fuel and oxygen to produce electricity. The only emission from this type of vehicle is water.

Fuel Cell: An electrochemical engine with no moving parts that converts the chemical energy of a fuel, such as hydrogen, and an oxidant, such as oxygen, directly to electricity. The principal components of a fuel cell are catalytically activated electrodes for the fuel (anode) and the oxidant (cathode) and an electrolyte to conduct ions between the two electrodes.

Fuel consumption: The amount of fuel consumed in a given distance (e.g., gallons per 100 miles). This is the inverse of fuel economy.

Fuel economy: Fuel Economy refers to the average number of miles traveled per gallon of fuel consumed.

Fuel-Efficient Vehicle: Hybrid electric vehicles that have an internal combustion engine and an electric motor. These vehicles are powered by an alternative or conventional fuel, such as gasoline and a battery, which is charged by regenerative braking.

Full hybrids: Full hybrids have more-powerful electric motors and larger batteries that can drive the vehicle on just electric power for short distances and at low speeds. These systems cost more than mild hybrids but provide better fuel economy.

Greenhouse Gas (GHG): Are defined to include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Gross Vehicle Weight Rating (GVWR): Maximum weight of a vehicle, including payload.

Heavy-Duty Vehicle: Generally, a vehicle that has a GVWR of more than 26,000 lb. Definitions vary by organization.

Hybrid Electric Vehicle (HEV): A vehicle powered by two or more energy sources, one of which is electricity. HEVs may combine the engine and fuel of a conventional vehicle with the batteries and electric motor of an electric vehicle in a single drivetrain.

Hybrid Vehicle: Hybrid electric vehicles that have an internal combustion engine and an electric motor. These vehicles are powered by an alternative or conventional fuel, such as gasoline and a battery, which is charged by regenerative braking.

Infrastructure: In transportation, this term generally refers to the charging and fueling network necessary to successful development, production, commercialization, and operation of alternative fuel vehicles. It includes fuel supply, public and private charging and fueling facilities, standard specifications for fueling outlets, customer service, education and training, and building code regulations.

Inherently Low Emission Vehicle (ILEV): This is a Federal standard only. Such a vehicle meets EPA CFV ILEV exhaust emission standards and produces very few or no evaporative emissions (5 grams or less per test without using auxiliary emission control devices). ILEVS are dedicated AFVs in most cases. Dual-fuel vehicles will be considered ILEVs only if both fuels meet the standard. ILEV credits can be banked in the Consolidated Metropolitan Statistical Area.

Internal Combustion Engine (ICE): the conventional way to power a vehicle.

Lithium Ion (Li-ion): A rechargeable battery in which lithium ions move from the negative electrode (anode) to the positive electrode (cathode) during discharge, and from cathode to the anode when charged.

Low Speed Electric Vehicle (LSEV): also referred to as the NEV or Neighborhood Electric Vehicle - a battery powered vehicle meant for low speed travel and non-highway usage.

Mild hybrids—also called micro hybrids: Use a battery and electric motor to help power the vehicle and can allow the engine to shut off when the vehicle stops (such as at traffic lights or in stop-and-go traffic), further improving fuel economy. Mild hybrid systems cannot power the vehicle using electricity alone. These vehicles cost less than full hybrids but provide lower fuel economy than full hybrids.

Parallel hybrids: The most common HEV design—have the engine and the electric motor connected to the wheels through mechanical coupling. Both the electric motor and the internal combustion engine drive the wheels directly.

Parallel plug-in hybrids: Connect the engine and the electric motor to the wheels through mechanical coupling. Both the electric motor and the engine can drive the wheels directly.

Petroleum Fuel: Gasoline or diesel fuel.

Plug-in hybrid (PHEV): Plug-in hybrid electric vehicles (PHEVs) are powered by conventional or alternative fuels as well as electric power stored in a battery. Using electricity from the grid to run the vehicle some of the time costs less and reduces petroleum consumption compared with conventional vehicles.

Plug-in Hybrid Vehicle (PHEV): A hybrid electric vehicle with a substantial battery pack, which can be charged by an external source other than fossil fuel.

Rechargeable Energy Storage System (RESS): A system that stores energy for delivery of power and which is rechargeable.

Regenerative brake: An energy recovery mechanism which slows a vehicle by converting its kinetic energy into another form, generally in a battery for the purposes of hybrid vehicles.

Renewable Fuels: Renewable fuels are produced from resources that are current, available, and can be replenished, such as hydrogen and fuels made from plant matter. Fossil fuels, in contrast, are non-renewable fuels because they are derived from the natural resources of buried dead organisms that lived millions of years ago.

Series hybrids: Where just the electric motor drives the wheels, are more common in plug-in hybrid electric vehicles.

Series plug-in hybrids: Use only the electric motor to drive the wheels. The internal combustion engine is used to generate electricity for the motor. General Motors (GM) uses a slightly modified version of this design in the Chevy Volt. GM refers to this design as an extended range electric vehicle (EREV). In an EREV, the electric motor drives the wheels almost all of the time, but the vehicle can switch to work like a parallel hybrid at highway speeds when the battery is depleted.

Super Ultra-Low-Emission Vehicle (SULEV): A vehicle that produces fewer exhaust emissions than do ultra-low-emission vehicles. ULEV credits can also be banked in the Consolidated Metropolitan Statistical Area.

Tailpipe Emissions: EPA-regulated vehicle exhaust emissions released through the vehicle tailpipe. Tailpipe emissions do not include evaporative and refueling emissions, which are also regulated by EPA. EPA publishes allowable emission levels and vehicle certification standards in the Code of Federal Regulations.

Toxic Emission: Any pollutant emitted from a source that can negatively affect human health or the environment.

Ultra-Low-Emission Vehicle (ULEV): Describes a vehicle that meets either EPA's CFV ULEV standards. ULEVs produce fewer emissions than LEVs. Fleets that purchase CFV ULEVs may earn credits under the Clean-Fuel Fleet Vehicle Program. Manufacturers that sell CFV ULEVs may earn credits under the Federal California Pilot Program.

Variable Fuel Vehicle (VFV): A vehicle that has the capacity of burning any combination of gasoline and an alternative fuel. Also known as a flexible-fuel vehicle.

Vehicle Allocation Methodology (VAM): Vehicle Allocation Methodology is a process that will assist in achieving a fleet that is the right size and type for the agency's mission.

Vehicle Conversion: Retrofitting a vehicle engine to run on an alternative fuel.

Vehicle Miles Traveled (VMT): The miles traveled by motor vehicles over a specified length of time (e.g. daily, monthly, or yearly) or over a specified road or transportation corridor.

Zero Emission Vehicle (ZEV): A vehicle that emits no tailpipe exhaust emissions. ZEV credits can be banked within the Consolidated Metropolitan Statistical Area.