Federal Energy Management Program

Federal Fleet Infrastructure and Electric Vehicles

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FEMP Expert: Brad Gufstason, Federal Energy Management Program

www.femp.energy.gov/training
Learner Objectives

After completing this seminar, the learner will:

1. Explain how electric vehicles fit into overall GHG emissions and petroleum reduction strategies
2. List 4 types of electric vehicles 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 EVs 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
FEMP First Thursday Seminars

Agenda

• FEMP’s Fleet Management Program
• Why Electric Vehicles
• Electric Vehicles and the Federal Fleet
• Infrastructure
• Acquiring Electric Vehicles
• Integrating EVs into a Multi-Year Strategy
• Reporting
• Resources
FEMP’s Fleet Management Program
FEMP’s Fleet Management Program

• Assists Federal agencies with meeting or exceeding requirements for reducing fleet petroleum consumption
FEMP Resources

• **Regulatory guidance**
  - E.O. 13514 Fleet Management Guidance

• **Resources for meeting requirements**
  - E.O. 13514 Fleet Management Handbook

• **Assistance with fulfilling requirements**
  - FAST maintenance, upgrades, training
  - Review of waiver applications, under EPACT 701
  - Facilitation of agency scorecard submissions to OMB
FEMP Resources

• Technical Assistance with fleet assessments
  – Vehicle acquisition optimization tool
  – Fuel use analysis tool
  – Station Locator tool
  – Fleet Atlas
FEMP Resources

- Facilitation of alternative fuel use infrastructure development
- Research
  - Vehicle monitoring
- Information sharing
  - INTERFUEL Working Group
  - Federal Fleet Monthly newsletter
FEMP First Thursday Seminars

FEMP Resources

• Training
  – FedFleet Conference
  – Webinars
Upcoming Guidance on Reporting Electricity for EVs

- Facility energy reporting and fleet fuel reporting are both impacted by electricity used to charge EVs
- FEMP is developing guidance to clarify how to report electricity used to charge EVs
- Guidance anticipated by end of FY 2011
  - Agency input on drafts will be solicited and highly valued
Why Electric Vehicles
Why Electric Vehicles in Federal Fleet: *Benefits*

- **Petroleum Use**
  - Reduce our dependence on foreign petroleum

- **GHG Emissions**
  - Source of electricity key factor in scale of reductions

- **Operating costs**
  - Lower fuel cost per mile and maintenance costs

- **Support market development**
  - Lead by example in growing the electric vehicle market
Why Electric Vehicles in Federal Fleet: **Challenges**

- **Acquisition costs**
  - Large price premium for electric vehicles

- **Availability**
  - Limited production of electric vehicles through 2015

- **Organizational resistance**
  - New technology requires change

- **Employee charging**
  - Can the Federal fleet provide charging infrastructure for employees?
Overview of Electric Vehicles
## Terminology

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV</td>
<td>Electric Vehicle</td>
</tr>
<tr>
<td>HEV</td>
<td>Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>PHEV</td>
<td>Plug-in Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BEV</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>LSEV</td>
<td>Low-speed Electric Vehicle</td>
</tr>
<tr>
<td>ZEV</td>
<td>Zero-emission Vehicle</td>
</tr>
<tr>
<td>EVSE</td>
<td>Electric Vehicle Supply Equipment</td>
</tr>
<tr>
<td>kW</td>
<td>Kilowatt</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gas</td>
</tr>
</tbody>
</table>
Types of Electric Vehicles

Battery Electric Vehicles (BEVs)

– Electric motor the only power source
– Batteries charged from:
  • Electric grid
  • Regenerative braking
Types of Electric Vehicles

Low Speed Electric Vehicle (LSEV)

- 4-wheeled motor vehicles weighing less than 3,000 pounds
- Top speed of 20 to 25 mph
- Recharge with standard 110 outlet in 6-8 hours
- Not considered vehicles in Federal fleet
- LSEV electricity may be counted in fleet alternative fuel use reporting
Types of Electric Vehicles

Hybrid Electric Vehicles (HEVs)

- Internal combustion engine and electric motor generator
- Recovers kinetic energy from vehicle braking (regenerative braking)
- Electric motor uses the stored energy to assist in powering the vehicle
# Hybrid Electric Vehicle Drive Types

<table>
<thead>
<tr>
<th></th>
<th>Parallel</th>
<th>Parallel/Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Braking</strong></td>
<td><img src="image1.png" alt="Battery" /></td>
<td><img src="image2.png" alt="Battery" /></td>
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<tr>
<td><strong>Slow</strong></td>
<td><img src="image3.png" alt="Engine" /></td>
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<tr>
<td><strong>Cruising</strong></td>
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<td><img src="image8.png" alt="Engine" /></td>
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<td><img src="image9.png" alt="Battery" /></td>
<td><img src="image10.png" alt="Battery" /></td>
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</table>
Types of Electric Vehicles

Plug-in Hybrid Electric Vehicles (PHEV)

- Operates like a **hybrid electric vehicle**
- Can be charged with electricity like a **pure electric vehicle**
- Classified according to their all electric range (PHEV-10, PHEV-40)
### Plug-in Hybrid Electric Vehicle Drive Types

<table>
<thead>
<tr>
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<th>Parallel/Series</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Braking</strong></td>
<td>🌋⚡</td>
<td>🌋⚡</td>
</tr>
<tr>
<td><strong>Initial Range</strong></td>
<td>⚡</td>
<td>⚡</td>
</tr>
<tr>
<td><strong>Extended Range</strong></td>
<td>🌋⚡ HYBRID</td>
<td>🌋⚡ GASOLINE-ELECTRIC</td>
</tr>
<tr>
<td><strong>Stopped</strong></td>
<td>⚡</td>
<td>⚡</td>
</tr>
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</table>
Primary Drivers of EV market growth

- **Geopolitics**
  - Oil Dependence
  - Oil Prices

- **Environment**
  - Climate Change Policy
  - Congestion and Air Quality

- **Technology**
  - Battery Technology Advances
  - Economies of Scale

- **Consumer**
  - Cost
  - Availability of charging stations
  - Convenience

Source: PRTM
U.S. HEV HISTORICAL SALES (1999 -2009)
U.S. PROJECTED SALES of HEVs, PHEVs, and BEVs
Battery Cost and Performance

As orders increase, per kWh cost of batteries are decreasing rapidly.

Barriers to commercialization:
- Cost per kWh
- Energy density
- Abuse tolerance
- Life

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost Range</th>
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<tr>
<td>HEV</td>
<td>$1,600</td>
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<tr>
<td>Current</td>
<td>$375 - $1,000</td>
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<tr>
<td>PHEV-10</td>
<td>$500</td>
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<tr>
<td>PHEV-40</td>
<td>$300</td>
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<tr>
<td>BEV-200</td>
<td>$100 - $150</td>
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</table>
Range Anxiety

- Need 1.8 charging stations/vehicle
- Service station fueling not feasible
- Focus on home and workplace charging
- Drives choices towards PHEVs
Total Cost of Ownership

- As fuel costs rise and battery costs decrease, TCO moves further in EVs favor
- HEVs reaching TCO parity today
- BEV/PHEV parity projected to begin after 2016

Source: GE
### Lowest TCO Drivetrain Technology by Year and Segment

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<tr>
<td>Psgr.</td>
<td>1 Sales, Serv., Utility</td>
<td>22k</td>
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<td>10 Rental Car Sharing</td>
<td>31k</td>
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<td>Sales, Serv. Util., Sh. Haul</td>
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<td>4a Light Gov.</td>
<td>6k</td>
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<tr>
<td>Class 4/5</td>
<td>Med. Short Haul</td>
<td>31k</td>
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<tr>
<td></td>
<td>6 Med. Utility, Gov</td>
<td>8k</td>
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<tr>
<td>Class 6/7</td>
<td>Heavy Short Haul</td>
<td>26k</td>
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<td>8 Heavy Utility, Gov</td>
<td>18k</td>
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Source: PRTM
EVs and Federal Fleets
## Electric Vehicles in Overall Federal Fleet Strategy

| Core component of petroleum reduction strategy | Effective at reducing petroleum consumption, especially in locations where alternative fuel is not available |
| AFV credits where alternative fuel not available | Federal fleets can get AFV credits for acquisition of most EVs |
| Meet E.O. 13423 alternative fuel use targets | Electricity use (from grid) counts towards alternative fuel use targets |
| Lower fuel cost | Electricity used in EVs typically costs <$1 per GGE |
| Reduce dependence on foreign energy | Almost all electricity is produced domestically |
EV and Federal Fleet Requirements

1. **AFV Acquisition**
   - AFVs represent 75% of covered light-duty acquisitions (*EPAAct 92*)
   - Use PHEVs when commercially available (*E.O. 13423*)

2. **Petroleum Reduction**
   - 2% annual reduction in petroleum use FY 05 through FY 20
     (*E.O. 13514, E.O. 13423, EISA§ 142*)

3. **Electric Vehicle Impact**
   - EVs receive AFV credits
   - GSA will issue fleet order

   - Use of electricity in EVs displaces petroleum use
## EV and Federal Fleet Requirements

### Alternative Fuel Use
- 10% annual increase in AF use FY 05 through FY 15 *(E.O. 13423)*
- Dual-fueled AFVs use only AF unless waived *(EPAct 05 § 701)*

### Electric Vehicle Impact
- Electricity counts towards alternative fuel targets
- TBD

### Alternative Fuel Infrastructure
- Install renewable pumps at FedFleet refueling centers *(EISA §246)*

### Electric Vehicle Impact
- EV charging stations meet requirement *(if sourced with renewable electricity or RECs)*
### EV and Federal Fleet Requirements

#### GHG Emissions Reduction
- Acquisition of low-GHG vehicles (*EISA §141*)
- Agency GHG emissions reduction targets (*EO 13514*)

#### Electric Vehicle Impact
- Almost all EVs are low-GHG vehicles
- Electricity is effective at reducing fleet GHG emissions

#### Fleet Planning
- Agency plan to meet sustainability, petroleum and AF goals (*EO 13514, EISA §142*)

#### Electric Vehicle Impact
- Use of EVs is an important component of fleet planning
Driving Principles of Petroleum Reduction

- Reduce vehicle miles traveled
- Increase fleet fuel efficiency
- Use alternative fuels
Increase Fleet Fuel Efficiency

Hybrid electric vehicles

- Can reduce petroleum and GHG emissions by 30% or more
- Locate HEVs in areas lacking access to alternative fuel
Electricity is More Fuel Efficient

Nissan Leaf (BEV)

Chevy Volt (PHEV)
Identifying Optimal Electric Vehicle Strategies

**Step 1:** Identify conventional-fuel vehicles that are not candidates to be replaced with AFVs or use biodiesel

**Step 2:** Identify optimal electric vehicle strategies based on fleet location characteristics

**Step 3:** Evaluate availability of EVs to replace conventional-fuel vehicles

**Step 4:** Evaluate life cycle costs for acquisition of EVs
## Comparison to Gasoline Vehicles

<table>
<thead>
<tr>
<th></th>
<th>HEVs</th>
<th>PHEVs</th>
<th>BEVs</th>
<th>Gasoline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel Economy</strong></td>
<td>+ 50%</td>
<td>+ 210%</td>
<td>+ 230%</td>
<td>~30 mpg</td>
</tr>
<tr>
<td><strong>Price Premium</strong></td>
<td>+$3k</td>
<td>$6k-$18k</td>
<td>$20k+</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Operating Costs</strong></td>
<td>9¢/mi</td>
<td>&lt;6¢/mi</td>
<td>3¢/mi</td>
<td>13.5¢/mi</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>610 mi</td>
<td>~400 mi</td>
<td>&lt;100 mi</td>
<td>405 mi</td>
</tr>
<tr>
<td><strong>Refueling Time</strong></td>
<td>2 min</td>
<td>2 or &gt;1 hr</td>
<td>4-8 hr</td>
<td>2 min</td>
</tr>
</tbody>
</table>
CO₂ Emissions

- Gasoline: -21%
- Corn E85: -33%
- HEV: -43%
- U.S. Grid: -86%
- Renewable U.S. Grid: -50%
- Renewable: -100%
# Current Market

<table>
<thead>
<tr>
<th></th>
<th>Shopping</th>
<th>Commuting</th>
<th>Traveling</th>
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<tr>
<td><strong>HEVs</strong></td>
<td><img src="HEVs.png" alt="Image" /></td>
<td><img src="HEVs.png" alt="Image" /></td>
<td><img src="HEVs.png" alt="Image" /></td>
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<tr>
<td><strong>PHEVs</strong></td>
<td><img src="PHEVs.png" alt="Image" /></td>
<td><img src="PHEVs.png" alt="Image" /></td>
<td><img src="HEVs.png" alt="Image" /></td>
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<tr>
<td><strong>BEVs</strong></td>
<td><img src="BEVs.png" alt="Image" /></td>
<td><img src="BEVs.png" alt="Image" /></td>
<td><img src="BEVs.png" alt="Image" /></td>
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</tbody>
</table>

- **Stop-and-go driving locations**
  Locations without alternative fuel infrastructure
- **Longer range driving needs (>100 mi/day)**
- **Shorter range driving needs (<100 mi/day)**
FEMP First Thursday Seminars

FEMP
Federal Energy Management Program
Electric Vehicle Infrastructure
Becoming Plug-In Ready
FEMP First Thursday Seminars

Transmission and Wiring

Charging Station

Level II Plug

Inlet

Inverter

On Board Charger

Batteries
## Electric Vehicle Charging Options

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outlet</strong></td>
<td>Standard outlet 120 V, 15 A</td>
<td>Dedicated circuit 240 V, 30 A</td>
</tr>
<tr>
<td><strong>Charge Time</strong></td>
<td>15-20 hours</td>
<td>4-8 hours</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Regular outlet, available everywhere</td>
<td>Charging station, installed by electrician</td>
</tr>
<tr>
<td><strong>Plug</strong></td>
<td>Included with car</td>
<td>After-market</td>
</tr>
<tr>
<td><strong>Best for...</strong></td>
<td>LSEVs and PHEVs w/in 10-20 mile range</td>
<td>BEVs and PHEVs &gt;20 mile range</td>
</tr>
</tbody>
</table>
Electric Vehicle Charging Options

• **Level 3: 480V?**
  – Standards not yet set
  – 15-30 minutes to charge
  – Best for fueling stations and easing range anxiety

• **Battery Swapping**
  – Requires standardized battery packs for vehicles
  – 2-15 minutes to swap
  – Best for fueling stations and easing range anxiety
EVSE Implementation Planning

1. Determine EVSE access
   - Public access
   - Restricted access
   - Open access
   - Closed access

2. Anticipate number of EVs
   - Fleet projections
   - Other vehicles served

3. Identify charging speed
   - Long-term parking, irregular use
   - Employee charging, daily
   - Continual fleet operations

4. Identify EVSE needs
   - Other EVSE available?
   - Time of use
   - Opportunistic vs. scheduled
   - # of vehicles simultaneously
EVSE Implementation Site Assessment

• Selection of EVSE location and parking spaces
• Power availability and requirements
• Cord management
• Walkways
• Selection of type/model of EVSE
• Data collection
• ADA considerations
• Area lighting
EVSE Implementation Checklist

1) Decision made to install EVSE  
   Fleet manager

2) EVSE specifications identified  
   Fleet manager

3) Statement of work drafted  
   Fleet manager

4) Installation estimate made  
   Contractor

5) Proposals reviewed and award made  
   Fleet manager

6) Site plan created; Need for electrical upgrade determined  
   Contractor/Utility

7) Permit application filed*  
   Contractor

8) Electrical upgrade completed, if required  
   Utility/Contractor

9) Power restored  
   Contractor

10) Installation  
    Contractor

11) Inspection  
    Inspector

12) Work completed/Performance verified  
    Fleet manager
EV Standards

Vehicle  
SAE J2344 – Guidelines for EV Safety

Connector/inlet  
SAE J1772 – EV Conductive Charge Coupler

EVSE  
UL 2594 – Safety of EVSE (cords, stations, power outlets)
NEC 625 – Electric Vehicle Charging System
Infrastructure Costs

- Includes purchase, installation, and maintenance cost components
- Costs vary according to:
  - No. of charging stations
  - Location (existing wiring, indoor/outdoor, etc.)
  - Average charging stations can range in price from $500 to $15,000
### Potential Infrastructure Cost Type

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Cost ($)</th>
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</thead>
<tbody>
<tr>
<td>Charging (and billing) unit</td>
<td>200 – 3,000</td>
</tr>
<tr>
<td>Pad Mount</td>
<td>0 – 10,000</td>
</tr>
<tr>
<td>Commercial Feeder and Cable Pole</td>
<td>0 – 10,000</td>
</tr>
<tr>
<td>Higher Ampage Main Circuit Breaker</td>
<td>0 – 7,500</td>
</tr>
<tr>
<td>Termination of fusible switches feeding PHEVs</td>
<td>0 – 20,000</td>
</tr>
<tr>
<td>Sawcutting and Trenching</td>
<td>0 – 24,000</td>
</tr>
<tr>
<td>Conduit and Wiring</td>
<td>0 – 2,500</td>
</tr>
<tr>
<td>Labor</td>
<td>0 – 3,000</td>
</tr>
<tr>
<td><strong>Average per charging station</strong></td>
<td><strong>500 – 15,000</strong></td>
</tr>
</tbody>
</table>
Acquiring Electric Vehicles
GSA’s Recent EV Contract Award

Chevy Volt PHEV
40 mile all electric range

Think City BEV
113 mile range

Nissan Leaf BEV
73 mile range
Other EVs Available Through GSA

Smith Newton BEV Truck
100 mile range, $61k incremental

Zero Truck BEV Truck
100 mile range, $117k incremental

LSEVs through GSA Schedule 23V
GSA’s EV Pilot Program

• 116 vehicles acquired
• Leased to 20 agencies
• Five cities
  (D.C., Detroit, LA, SF, San Diego)
• GSA will assist in installing EVSE in pilot cities
## U.S. BEV Deployment Plans

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Electric Range (mi)</th>
<th>U.S. Target Intro. Date</th>
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<tbody>
<tr>
<td>Nissan</td>
<td>Leaf</td>
<td>73</td>
<td>2010</td>
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<td>Ford</td>
<td>Transit Connect Electric</td>
<td>100</td>
<td>2010</td>
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<td>Tesla</td>
<td>Roadster Sport 2.5</td>
<td>245</td>
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<td>iMiEV</td>
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<td>100</td>
<td>2011</td>
</tr>
</tbody>
</table>
## U.S. PHEV Deployment Plans

<table>
<thead>
<tr>
<th>Model</th>
<th>All Electric Range (mi)</th>
<th>U.S. Target Intro. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chevrolet Volt</td>
<td>40</td>
<td>2010</td>
</tr>
<tr>
<td>BYD F3DM Plug-in Hybrid</td>
<td>60</td>
<td>2011</td>
</tr>
<tr>
<td>Toyota Prius Plug-in Hybrid</td>
<td>12.4-18.6</td>
<td>2012</td>
</tr>
<tr>
<td>Ford Escape Plug-in Hybrid</td>
<td>40</td>
<td>2012</td>
</tr>
<tr>
<td>Fisker Karma S Plug-in Hybrid</td>
<td>50</td>
<td>2012</td>
</tr>
<tr>
<td>Bright IDEA Plug-in Hybrid</td>
<td>40</td>
<td>2012</td>
</tr>
<tr>
<td>Ford C-MAX Energi</td>
<td>TBD</td>
<td>2012</td>
</tr>
</tbody>
</table>
Integrating EV into Multi-Year Fleet Strategy
FEMP First Thursday Seminars

Identify fleet opportunities for EVs
• Locations where AF not practical
• LSEVs for campus settings
• HEVs, BEVs, and PHEVs for small subfleets

Build charging infrastructure
• Determine locations for electric charging stations
• Contract for installation
• Establish vehicle procedures

Purchase electric vehicles
• Acquire through GSA or other sources
• Deploy at locations with electric charging stations

Monitor electricity usage
• Collect vehicle-specific data from charging station
• Report vehicle electricity use in FAST

Expand fleet EVs
• Expand deployment of electric vehicles near infrastructure
• Build new charging infrastructure as necessary
Getting Ready

• Are EVs right for my fleet? What type?
• How many stations will I need?
• When and how will I acquire EVs?
• Who will install and maintain the stations?
• What is the cost and how will we pay for it?
Reporting Requirements
FEMP First Thursday Seminars

**FAST Reporting**
- Annual input of vehicle inventory, cost, and fuel use data

**Annual Fleet Compliance Report**
- Agency’s annual compliance with fleet requirements

**EISA §246 Renewable Pumps**
- Agency status in installing renewable fuel pumps at Federal fleet fueling centers

**OMB Scorecards**
- Performance, actions, and plans towards meeting agency goals

**Mid-Year OMB Scorecards**
- Mid-year report on actions and plans towards meeting agency goals

**Updated Fleet Plans**
- Revised plan to meet fuel use requirements

**OMB A-11 Report**
- Current and projected fleet budget estimates

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**Mid-Year OMB Scorecards**
- Mid-year report on actions and plans towards meeting agency goals
Reporting Requirements via FAST each December

<table>
<thead>
<tr>
<th>Reporting Requirement</th>
<th>Electric Vehicles</th>
</tr>
</thead>
</table>
| Alternative Fuel Use  | **BEVs and LSEVs**
All electricity used to charge BEVs and LSEVs counted |
|                       | **PHEVs**
All electricity used to charge PHEVs will be counted
(Does not include electricity generated by internal combustion engine or regenerative braking) |
## Measuring Electricity Used in EV On-Site

<table>
<thead>
<tr>
<th>Charging Infrastructure</th>
<th>Electricity Use Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site separate infrastructure <em>with</em> metering capability</td>
<td>Collect and report <strong>sub-metered electric vehicle consumption data</strong> (provides the most accurate information on electricity use)</td>
</tr>
<tr>
<td>On-site separate infrastructure, <em>no</em> metering capability</td>
<td>Use <strong>protocols</strong> established through the <strong>measurement and verification standards</strong> used for buildings</td>
</tr>
<tr>
<td></td>
<td>Use of <strong>informally-metered data</strong> (e.g., Kill A Watt™)</td>
</tr>
<tr>
<td></td>
<td>Use of <strong>vehicle mileage</strong> in conjunction <strong>with a calibrated vendor-provided vehicle efficiency factor</strong> to calculate consumption</td>
</tr>
</tbody>
</table>
# Measuring Electricity Used in EV Off-Site

<table>
<thead>
<tr>
<th>Charging Infrastructure</th>
<th>Electricity Use Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-site charging infrastructure <em>with reported electricity consumption</em></td>
<td>Collect and report electricity consumption on transaction receipt</td>
</tr>
<tr>
<td>Off-site separate infrastructure, <em>without reported electricity consumption</em></td>
<td>Use of <em>vehicle mileage</em> in conjunction with <em>a calibrated vendor-provided vehicle efficiency factor</em> to calculate fuel consumption</td>
</tr>
</tbody>
</table>

*Use charging time and kW*
Measuring Electricity Used in EV
(Based on 12,000 Annual Miles)

**BEV (LEAF) 34kW/100 miles (EPA)**
Estimated electricity use 4,080 kWh

**PHEV (Chevy Volt) 36kWh/100 miles (EPA)**
Estimated electricity use 4,320 kWh

**LSEV (4 passenger GEM) 16.9 kWh/100 miles (DOE)**
Estimated electricity use 2,028 kWh
### EV Acquisition Reporting via FAST each December

<table>
<thead>
<tr>
<th>Reporting Requirement</th>
<th>Electric Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of AFVs</td>
<td><strong>BEVs</strong> are dedicated AFVs</td>
</tr>
<tr>
<td>(Agencies must accumulate 75 AFV credits per 100 covered vehicles acquired within fiscal year)</td>
<td>- light duty – 2 credits</td>
</tr>
<tr>
<td></td>
<td>- medium duty – 3 credits</td>
</tr>
<tr>
<td></td>
<td>- heavy duty – 4 credits</td>
</tr>
<tr>
<td></td>
<td><strong>PHEVs</strong> are also AFVs (NDAA 08)</td>
</tr>
<tr>
<td></td>
<td>- All PHEVs – 1 credit</td>
</tr>
<tr>
<td></td>
<td><strong>LSEVs</strong> are are not considered vehicles (EPAct)</td>
</tr>
<tr>
<td></td>
<td>- All LSEVs – 0 credits</td>
</tr>
</tbody>
</table>
### EISA Section 246 Reporting via FAST Each June

<table>
<thead>
<tr>
<th>Reporting Requirement</th>
<th>Electric Vehicles</th>
</tr>
</thead>
</table>
| Agencies must install renewable fuel pump at each Federal fueling center in US by 1/1/10 | • Electric charging infrastructure satisfies requirement if:  
- renewable source of energy  
- non renewably generated electricity  
(if RECs equal to or greater than electricity used) |
| Renewable fuels include E85, B20, and renewable electricity |
### Acquisition of PHEVs

<table>
<thead>
<tr>
<th>Reporting Requirement</th>
<th>Electric Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agencies must acquire PHEVs when commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PHEVs</td>
<td><strong>GSA will issue a fleet order</strong> for PHEVs in all vehicle categories when applicable</td>
</tr>
</tbody>
</table>
## Acquisition of Low GHG Emitting Vehicles

<table>
<thead>
<tr>
<th>Reporting Requirement</th>
<th>Electric Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 141 prohibits Federal agencies from acquiring light-duty motor vehicles and MDPVs that are not low-GHG-emitting vehicles</td>
<td>EPA Green Vehicles Guide provides data to evaluate vehicle GHG emissions</td>
</tr>
<tr>
<td>EPA guidance requires each agency to self-report</td>
<td>All BEVs and PHEVs on EPA’s <em>Green Vehicles Guide</em> are low-GHG-emitting vehicles</td>
</tr>
<tr>
<td></td>
<td>LSEVs are not considered “vehicles”</td>
</tr>
</tbody>
</table>
Resources
FEMP First Thursday Seminars

AFDC

Alternative Fuels & Advanced Vehicles Data Center

- Comprehensive geo-database of EVSE locations (*GeoEVSE Forum*)
- Basics of EV vehicles
- Deployment case studies

www.afdc.energy.gov
FedFleet EVSE Project (end of FY11)

FedFleet Guidance and Support
• EVSE implementation
• EV deployment and acquisition
• Best practices and common pitfalls
• Case studies

FedFleet EVSE and EV project surveys
• Share data and lessons learned
• Benchmark costs
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