AGENDA

• Federal Mandates
• Acronyms and Definitions
• Electric Vehicle (EV) Features
• Charging an EV
• EV Maintenance
• Best Practices
• Resources
### FEDERAL MANDATES

<table>
<thead>
<tr>
<th>Law/Mandate</th>
<th>Requirements</th>
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</table>
| Executive Order 13693: Planning for Sustainability in the Next Decade      | • By 2020, 20% of new fleet acquisitions must comprise of zero emission and plug-in hybrid electric vehicles  
  o Increase to 50% by 2025  
• Reduce federal fleet per-mile greenhouse gas (GHG) emissions by 30% by 2025 from a 2014 baseline  
• Procure charging stations and infrastructure that will allow for vehicle-level data reporting capabilities  
• Determine optimum fleet inventory, with an emphasis on eliminating unnecessary or non-essential vehicles |
| Energy Policy Act 1992/2005 (EPAct)                                        | • 75% of light duty vehicle acquisitions must be alternative fuel vehicles in metropolitan areas                                                   |
  o MY16 Passenger Cars: 300 g/mile max CO2 emission  
  o MY16 Light-Duty Trucks: 375 g/mile max CO2 emission |
ACRONYMS AND DEFINITIONS

• BEV – Battery Electric Vehicle
  » All-electric vehicle powered exclusively by a battery. Qualifies as a zero emission vehicle.

• PHEV – Plug-in Hybrid Electric Vehicle
  » A vehicle propelled by both an internal combustion engine (ICE) and an electric motor. Counts towards federal zero emissions mandates.

• HEV – Hybrid Electric Vehicle
  » A vehicle powered by the engine and fuel of a conventional vehicle with the batteries of an electric motor. Hybrid vehicles do not need to be plugged in to utilize electric power.
  » Does not count towards federal zero emissions mandates.
ELECTRIC VEHICLE FEATURES

• Regenerative Braking
  » Energy is recovered when drivers brake slowly, extending the vehicle’s electric range and the life of the braking system.

• ECO Mode
  » Allows the driver to increase fuel economy. Works by drawing energy from the vehicle’s AC system or reducing throttle responsiveness to encourage slower acceleration.
ELECTRIC VEHICLE FEATURES

• Efficiency indicators
  » Green leaves (Ford) or bars show drivers how efficiently they are driving.
• “EV Later” Option (PHEVs only)
  » Vehicle operator can choose whether to use gas or the vehicle’s electric charge at any point, maximizing efficiency.
• Level 1 charging station cord comes standard with every vehicle
2016 FORD DASHBOARD FEATURES

- **Brake Coach**: guides your braking habits to help you recapture more energy through gradual braking.

- **Customize display**: show trip summary, driving history, brake coach, etc.

- **Efficiency Indicator**: (butterflies in the Focus Electric, leaves in other models) grow as the vehicle is driven more efficiently.
2016 CHEVY VOLT DASHBOARD FEATURES

- **EV Battery Level**
- **Gas Tank Level**

**MyLink Display**
- Charging information,
- energy usage, energy flow

**Instrument Panel**
Steering wheel controls allow you to change what appears in the middle – average speed, tire pressure, oil life percentage, total fuel range with EV/gas mode combined

**Energy usage since last charge**

**Charging Details**
## EV CHARGING TIME AND RANGE

### BEV and PHEVs on Contract in FY16

<table>
<thead>
<tr>
<th></th>
<th>Ford Fusion PHEV</th>
<th>Ford CMAX Energi PHEV</th>
<th>Chevy Volt PHEV</th>
<th>Ford Focus BEV</th>
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</thead>
<tbody>
<tr>
<td>Electric Range</td>
<td>19 miles</td>
<td>19 miles</td>
<td>53 miles</td>
<td>76 miles</td>
</tr>
<tr>
<td>Total Range</td>
<td>550 miles</td>
<td>550 miles</td>
<td>420 miles</td>
<td>76 miles</td>
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<tr>
<td>Charge Time (Level 2)</td>
<td>2.5 hrs</td>
<td>2.5 hrs</td>
<td>4.5 hrs</td>
<td>3.6 hrs</td>
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<tr>
<td>Passengers</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
HOW TO CHARGE YOUR EV

• Vehicle should be turned off and in park (P) before initiating a charge.
• Level 1 wall plug:
  » Plug charging cord into wall outlet before connecting the charging coupler into the vehicle. Per OEM guidance, do not use extension cords to reach outlets.
• Level 2 charging station:
  » RFID card or key fob will release the charging coupler.
    ▪ On public stations, credit cards or alternative methods of initiating a charge may be used. Follow the station’s on-screen instructions.
    ▪ Use WEX card to pay for charging.
• Make sure the coupler clicks to lock it into the port.
  » An indication light will appear either on the vehicle’s dashboard or on the ring around the vehicle charging port to indicate that the vehicle is charging.
CHARGING INDICATOR LIGHTS AND WHAT THEY MEAN

• Ford Models – Ring around the charging port
  » Ring flashes in a clockwise manner two full times to indicate the beginning of a normal cycle.
  » Charge port illuminates in quadrants to indicate how much vehicle is charged.
  » When fully charged, all four quadrants are illuminated for a short time and then charging process ends.

• Chevy Volt – Indicator light on the dashboard near the windshield
  » Flashing green light – vehicle is charging
    ▪ 1 flash: 0-25% charged
    ▪ 2 flashes: 25-50% charged
    ▪ 3 flashes: 50-75% charged
    ▪ 4 flashes: 75-99% charged
  » Solid green light – vehicle is fully charged
  » Solid yellow – vehicle is plugged in but not charging
  » No light – vehicle is not plugged in or there is an issue with the charger or outlet
CHARGING ETIQUETTE

• Unplug and/or move your vehicle when charging is complete.
• Do not unplug vehicles connected to a charging station unless the vehicle being charged is in your control or possession.
• Charge vehicles overnight to make use of reduced electricity rates (if applicable).
• The driver who uses the electric range is responsible for ensuring the vehicle is properly recharged for the next driver.
DATA COLLECTION

• Option 1: Automatic Data Collection
  » Level 2 charging stations with network capability collect and record charging session data.

• Option 2: Manual Data Collection and Recording
  » Use menu options on vehicle dashboard to record kWh and mileage and manually enter into the Federal Automotive Statistical Tool (FAST).
  » Fleet Management Information Systems
    ▪ GSA Drive-thru
    ▪ Federal Fleet Management System (FedFMS)
**EV MAINTENANCE**

- Plug-in EV maintenance must be handled by the OEM
- Only dealerships authorized to work on plug-in electric vehicles can complete work on the vehicle. Certified dealerships for EV maintenance:
  - Nissan: [http://www.nissanusa.com/nissandealers/?_vipreq=1650499919](http://www.nissanusa.com/nissandealers/?_vipreq=1650499919)
- Contact your Fleet Service Representative (FSR) or Maintenance Control Center (MCC) for a list of approved vendors in your area for maintenance and repairs
PHEV MAINTENANCE

• Preventative maintenance every 15,000 miles or 24 months – whichever comes first.
  » Change engine oil and filter using engine manufacturer’s specified grade of oil; inspect cooling system and fluids.
  » Vehicle operators should notify their Fleet Service Representative (FSR) once oil change is completed.
• Preventative maintenance every 10,000 miles or 12 months – whichever comes first.
  » Inspect: main drive battery, high voltage wiring, tire pressure, cooling system and fluids, and rear and front brakes.
BEST PRACTICES

Operating an Electric Vehicle
• When possible, park EVs in covered spaces that are protected from extreme weather
• In extreme temperatures, EVs get less-than-average range
  » AC/heat systems drain the battery more quickly
• When it is hot outside, allow for a 60 minute “break” between charging and operating the vehicle
  » This will allow the battery to cool down before use, resulting in more range and less strain on the battery
• Consider pre-heating or pre-cooling the car before disconnecting the vehicle from the charger.
• Key measure of efficient driving in an EV is miles-per-kilowatt-hour (kWh)
• MPGe = miles per gallon equivalent
  » Compares AFV fuels not measured in gallons to conventional fuel gallons
  » 100 MPGe is roughly equivalent to 34 kWh per 100 miles
• Drive safely
  » Aggressive driving can reduce vehicle efficiency by as much as 30%
• Control acceleration and deceleration
  » Slower, controlled acceleration maximizes range.
  » Brake slowly to regenerate electricity
• Use AC sparingly
  » Heating and cooling systems can reduce range by as much as 20%.
  » At high speeds, opened windows reduce vehicle aerodynamics and decrease fuel economy more than AC
MAXIMIZING RANGE AND EFFICIENCY

• Driving up inclines
  » Switch to gas mode in PHEVs for better fuel efficiency.
  » If using a vehicle with ECO mode, turn off ECO mode for better acceleration up hills

• Heavy loads
  » Reduce load weights when possible. 100 pounds of added weight can decrease MPG(e) by 2%.

• Routine maintenance
  » Routine maintenance can improve MPG(e) by 10%

• Tire pressure
  » Maintaining proper tire pressure can increase MPG(e) by 3%
OVERCOMING RANGE ANXIETY

• Plan your trips ahead of time to make sure the distance traveled does not exceed vehicle capacity
  » Think strategically about driving routes to reduce unnecessary miles

• Fully charge the vehicle before taking long trips

• Locate free public charging stations or outlets where you can refuel during the trip, if needed
RESOURCES

• GSA Alternative Fuel Vehicle Team:
  » gsafleetafvteam@gsa.gov

• Useful Resources for Fleet Managers
  » DOE Plug-In Electric Vehicle Handbook for Fleet Managers
  » GSA Fleet Drive-thru and Training
  » Alternative Fuel Vehicle Guide
  » New EO 13693
  » DOE Station Locator / Wex Connect
  » Short Term Rental Program
  » Dispatch Reservation Module
  » Car Sharing
  » Telematics