Agenda

- Fleet Requirements
- Emissions Testing
- Fleet Efficiency Best Practices
- GSA Offerings & Industry Trends
- PHEV Charging Challenge - Results
Fleet Requirements
FMR 102-34.50

(a) You may only obtain the minimum size of motor vehicle necessary to fulfill your agency’s mission in accordance with the following considerations:

(1) You must obtain motor vehicles that achieve maximum fuel efficiency.
(2) Limit motor vehicle body size, engine size and optional equipment to what is essential to meet your agency’s mission.
EO 13834

Prioritize actions that

Reduce waste

Enable more effective accomplishment of its mission

Cut costs

Enhance the resilience of Federal infrastructure and operations

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# Current Statutory Requirements

<table>
<thead>
<tr>
<th>Fleet Requirement</th>
<th>Statute or Executive Order</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimize efficiency and performance, eliminate waste, and protect environment</td>
<td>EO 13834</td>
<td>Reduce waste, cut costs, enhance resilience, and enable more effective accomplishment of mission</td>
</tr>
<tr>
<td>Reduce petroleum consumption</td>
<td>EISA § 142</td>
<td>Reduce petroleum consumption by 20% and increase alternative fuel use by 10% by FY15 and continuing thereafter</td>
</tr>
<tr>
<td>Optimum fleet inventory, right-size fleets</td>
<td>41 CFR 102-34.45</td>
<td>Select vehicles with best fuel efficiency for fleet needs</td>
</tr>
<tr>
<td>Acquisition of AFVs</td>
<td>EPAct 1992 § 303</td>
<td>At least 75 percent of covered LDVs acquired in MSAs/CMSAs must be AFVs</td>
</tr>
<tr>
<td>Acquisition of low GHG-emitting vehicles</td>
<td>EISA § 141</td>
<td>Prohibits agencies from acquiring vehicles that are not low-GHG-emitting vehicles</td>
</tr>
<tr>
<td>Alternative fuel use in AFVs</td>
<td>EPAct 2005 § 701</td>
<td>All dual-fueled vehicles must use alternative fuel if reasonably available</td>
</tr>
<tr>
<td>Alternative fuel infrastructure</td>
<td>EISA § 246</td>
<td>Every federal fleet fueling center must install a renewable fuel pump</td>
</tr>
</tbody>
</table>
What does the new EO mean for you?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Find Optimal Fleet Inventory</td>
</tr>
<tr>
<td>2.</td>
<td>Reduce GHGs</td>
</tr>
<tr>
<td>3.</td>
<td>ALD FAST Reporting?</td>
</tr>
<tr>
<td>4.</td>
<td>Buy ZEVs?</td>
</tr>
<tr>
<td>5.</td>
<td>Buy Supporting Infrastructure?</td>
</tr>
<tr>
<td>6.</td>
<td>Telematics where appropriate?</td>
</tr>
</tbody>
</table>
How are you greening the fleet in FY18?

- **81%** of federal purchases were alternative fuel vehicles
- **36%** of the Federal Fleet is AFVs;
  - **74%** of the GSA Leased Fleet is currently AFVs
- The Federal Fleet grew by **1,273** plug-in hybrid electric and **370** battery electric vehicles
- Since 2012 converting to EVs has saved an estimated
  - **155,194 gallons** of gasoline
  - **1,364.9 metric tons** of GHG emissions
Increasing Efficiency in 2018

**Leased MPG % Improvement**

<table>
<thead>
<tr>
<th>Year</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>5.7%</td>
</tr>
<tr>
<td>2010</td>
<td>24.1%</td>
</tr>
<tr>
<td>2011</td>
<td>21.4%</td>
</tr>
<tr>
<td>2012</td>
<td>15.0%</td>
</tr>
<tr>
<td>2013</td>
<td>19.4%</td>
</tr>
<tr>
<td>2014</td>
<td>20.5%</td>
</tr>
<tr>
<td>2015</td>
<td>14.3%</td>
</tr>
<tr>
<td>2016</td>
<td>13.1%</td>
</tr>
<tr>
<td>2017</td>
<td>12.6%</td>
</tr>
<tr>
<td>2018</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

**Federal Fleet GHG Reduction**

- Required Reduction Target
- Actual Fleet-wide gCO2e

2014 (Baseline) 2015 2016 2017 2018

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CAFE Requirements vs Actual Performance

Vehicle Fuel Efficiency (CAFE) Requirements by Year

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How Else Does the Government Ensure the Air is Clean?
Emissions Laws - Why /How?

- The Clean Air Act gives EPA authority to regulate air quality including engine emissions

- States are required to meet national ambient air quality standards (NAAQS) set by EPA

- To meet and maintain NAAQS state’s develop State Implementation Plans (SIPs)
  - Vehicle emissions testing programs often part of a SIP
Emissions Testing By Location

- **Green States** - statewide emissions testing requirement
- **Orange circles** - emissions testing requirements in some but not all parts of the state

Note: *All emissions requirements are subject to change. Continue to check the status of state and local laws.*
How Does GSA Fleet Handle Emissions Testing?

GSA Fleet will notify vehicle POCs when a vehicle is due for emissions testing (leased vehicles only).

Emissions Testing varies by state, locality or zip code and by vehicle type or age; may include smog checks, opacity tests, OBD port diagnostic checks.

*GOVs should follow the regulations in the area they primarily operate. Federal vehicles are not automatically exempt.

It is the responsibility of the operating agency to comply with the applicable requirements.
Idling Laws

- Many states and localities have laws that set maximum allowable idling times
- GOVs have an obligation to comply with these laws
- Emergency and Law Enforcement Vehicles are generally exempt
- Also can help you save money and decrease emissions for your agency!
Did You Know?

- Amendments were added to the Clean Air Act in the 1990s setting the stage for further protections (dust, soot etc.)
- New passenger vehicles are 98-99% cleaner for most tailpipe pollutants compared to the 1960s.
- Fuels are much cleaner—lead has been eliminated, and sulfur levels are more than 90% lower than they were prior to regulation.
- U.S. cities have improved air quality, despite ever increasing population and increasing vehicle miles traveled.
- Standards have sparked technology innovation from industry.
## Prioritizing Light Vehicle Acquisition Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Right-size</strong></td>
<td>GAO study and FMR 102-34.50 encourage agencies to strengthen assessment of underutilized vehicles. Evaluate / recommend opportunities to create more efficient fleet.</td>
</tr>
<tr>
<td><strong>2. Buy Low GHG (EISA)</strong></td>
<td>Acquire ONLY low greenhouse gas (GHG) emitting light-duty vehicles and medium-duty passenger vehicles with some exceptions. Look for best value vehicle is also low GHG.</td>
</tr>
<tr>
<td><strong>3. Match fueling locations to acquisitions</strong></td>
<td>Use inventory and GSA tools help match fueling to locations to available offerings and fleet inventory.</td>
</tr>
<tr>
<td><strong>4. Buy AFVs (EPAct)</strong></td>
<td>75% of an Agency's annual acquisitions in Metropolitan Statistical Areas (MSAs) must be AFVs. Place emphasis on the low-bid EISA-compliant vehicle but look for opportunities to use alternative fuel where possible.</td>
</tr>
</tbody>
</table>
# Fuel Economy Rules of Thumb

<table>
<thead>
<tr>
<th>Considerations:</th>
<th>More Green</th>
<th>-</th>
<th>-</th>
<th>Less Green</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>Small</td>
<td>-</td>
<td>-</td>
<td>Large</td>
</tr>
<tr>
<td><strong>Transmission</strong></td>
<td>Continuously Variable (CVT)</td>
<td>-</td>
<td>-</td>
<td>Automatic</td>
</tr>
<tr>
<td><strong>Vehicle Class</strong></td>
<td>sedan</td>
<td>Hybrid</td>
<td>Diesel/CNG/E85</td>
<td>Truck/SUV</td>
</tr>
<tr>
<td><strong>Advanced Powertrain</strong></td>
<td>Battery/Electric</td>
<td>-</td>
<td>-</td>
<td>Gas</td>
</tr>
<tr>
<td><strong>Engine Displacement</strong></td>
<td>Smaller</td>
<td>-</td>
<td>-</td>
<td>Bigger</td>
</tr>
<tr>
<td><strong>Vehicle Weight</strong></td>
<td>Lighter</td>
<td>-</td>
<td>-</td>
<td>Heavier</td>
</tr>
<tr>
<td><strong>Cylinders</strong></td>
<td>Less</td>
<td>-</td>
<td>-</td>
<td>More</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>Younger</td>
<td>-</td>
<td>-</td>
<td>Older</td>
</tr>
</tbody>
</table>
What about Larger Vehicles?
Vehicle Types in Federal Fleet

Note: Based on FY2017 Federal Fleet Report
Did You Know?

Big rigs, delivery vans, and other medium- and heavy-duty trucks make up less than 7% of all vehicles on U.S. highways, yet consume more than 25% of the oil and emit more than 25% of emissions from US vehicles.
The MPG Illusion

Note: Each category on the horizontal axis shows a five-mile per gallon improvement in fuel economy.

Source: Oak Ridge National Laboratory, Transportation Energy Data Book: Edition 37, ORNL/TM-2018/198, January 2019, Figure 4.3.
EPA Efforts with Larger Vehicles

1970 Clean Air Act, requires a 90% reduction in emissions from new automobiles by 1975.

1975 CAFÉ Program established phase-in of more stringent fuel economy standards.

1985 EPA sets stringent standards for emissions of NOx & of PM from HD diesel-powered trucks and buses.

1990 EPA imposes limits on diesel fuel sulfur content.

2000 EPA develops a program to regulate the HD vehicle and its fuel as a single system. These new standards apply to model year 2007.

2011 EPA & NHTSA announce the first-ever regulations to reduce greenhouse gas emissions and improve fuel efficiency of heavy-duty trucks and buses.

New heavy-duty trucks and buses are roughly 99 percent cleaner than 1970 models!!

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November 13, 2018, EPA announced the Cleaner Trucks Initiative (CTI), a future rulemaking to update standards for nitrogen oxide (NOx) emissions from highway heavy-duty trucks and engines.
How to Improve

- Replace Aging Vehicles
  - Upgrading to MY10 or newer engines or vehicles
    - Particulate Matter filters
    - Extensive aerodynamic technology
    - Automated transmissions
- Reduce Idling / Drive more efficiently
  - Drivers can have as much as a 30 percent impact on fuel efficiency
- Telematics
- Low-rolling resistance tires
<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>PRO</th>
<th>CON</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>Widely available High fuel economy</td>
<td>Local air quality emissions concerns Higher vehicle costs</td>
<td>~13% more efficient than gasoline</td>
</tr>
<tr>
<td>Electric</td>
<td>No GHG emissions Low fuel costs High fuel economy</td>
<td>High vehicle and infrastructure costs Long refueling time Limited vehicle class options</td>
<td>Extremely fuel efficient</td>
</tr>
<tr>
<td>&gt;85% Ethanol</td>
<td>Domestically produced Renewable Less expensive vehicles</td>
<td>Emits GHGs Lower fuel economy than gas Somewhat corrosive</td>
<td>~28% less efficient than gasoline</td>
</tr>
<tr>
<td>Propane</td>
<td>Domestically produced Clean-burning</td>
<td>Lower fuel economy than gas Limited LD vehicle availability</td>
<td>~27% less efficient than gasoline</td>
</tr>
<tr>
<td>Natural Gas (CNG/LNG)</td>
<td>Domestically produced Low fueling costs Can retrofit gas vehicles</td>
<td>High vehicle/equipment costs Limited fueling infrastructure</td>
<td>~35% less efficient than gasoline</td>
</tr>
<tr>
<td>Biodiesel (B20)</td>
<td>Domestically produced Renewable Clean-burning Better fuel economy than gas</td>
<td>More expensive Limited fueling infrastructure Lower fuel economy than diesel</td>
<td>~11% more efficient than gasoline</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Zero tailpipe emissions Domestically Produced</td>
<td>Limited availability, Fuel storage difficult, Costly</td>
<td>Highly fuel efficient</td>
</tr>
</tbody>
</table>
Fleet Solutions
Carsharing/Motorpools

- Drive Alone, 76%
- Carpool, 9%
- Public Transit, 5%
- Work at Home, 5%
- Walk, 3%
- Bike, 1%
- Other (including taxi/motorcycle), 1%

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Resources to Assist in Efficiency Efforts

- AFV Guide & Tool
- Desktop Workshops
- Federal Fleet Manager Certification Program
- Electric Vehicle Charging Station BPA and Resources
- FedFMS

- Short Term Rental Program
- Dispatch Reservation Module
- Telematics
- Training & Education
- Vehicle Consolidations
Trends & Vehicle Offerings
Where’s Industry Going

• Partnerships to share technology
• Continued investment in EVs
• Trump Administration Policies
• Efficiency
  • Cleaner diesel engines and solutions for larger trucks
• Emerging mobility models – autonomy/connectivity/shared mobility
  – Bans on Gas & Diesel. Pledges to Electrify
  • Cities and companies moving to test autonomous
  – Commercial move towards smaller efficient SUVs
### FY19 GSA Offerings: Low GHG Gas

<table>
<thead>
<tr>
<th>Category</th>
<th>Diesel/B20 Capable</th>
<th>E85</th>
<th>Gas</th>
<th>Hybrid</th>
<th>EV</th>
<th>PHEV</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo Van</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Compact Sedan</td>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Compact SUV</td>
<td></td>
<td>2</td>
<td>18</td>
<td>1</td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Crossover SUV</td>
<td></td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Intermediate SUV</td>
<td></td>
<td></td>
<td>3**</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Passenger Van</td>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Police Sedan</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Subcompact Sedan</td>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Explorer Hybrids will open in May**

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FY19 GSA Offerings: Electric

- **Light-Duty Passenger Vehicles**
  - BEV Sedan / $29,642-$32,340
  - PHEV Sedans / $21,410-$27,646
  - PHEV Minivan / $40,071
  - PHEV 4X2 & 4X4 SUVs / $21,511 - $31,531

- **Passenger/Cargo Van - Zenith**
  - 80-120 Mile Ranges / Price ceiling of $99K-109K
  - Seating up to 16

- **Shuttle Bus - Phoenix MotorCars - Zeus**
  - 100 Mile Range / Price ceiling of $248K
  - 12-20 passengers

- **Transit Bus - Proterra**
  - 55-350 Mile Ranges/ Price ceiling of $600K-$771K
  - Charging Station ceiling price of $316,474
## Breakdown of Light-Duty Electric Vehicles

<table>
<thead>
<tr>
<th>SIN</th>
<th>Model</th>
<th>MPG</th>
<th>EV Range</th>
<th>Purchase Price</th>
<th>Incremental</th>
<th>Rate</th>
<th>Low GHG?</th>
</tr>
</thead>
<tbody>
<tr>
<td>8E</td>
<td>Chevy Bolt</td>
<td>119</td>
<td>238</td>
<td>$32,320</td>
<td>$18,811</td>
<td>$195 &amp; $0.054/mile</td>
<td>Y</td>
</tr>
<tr>
<td>8E</td>
<td>Nissan Leaf</td>
<td>112</td>
<td>150</td>
<td>$29,642</td>
<td>$16,134</td>
<td>$195 &amp; $0.054/mile</td>
<td>Y</td>
</tr>
<tr>
<td>8P</td>
<td>Hyundai Ioniq PHEV</td>
<td>119</td>
<td>29</td>
<td>$21,411</td>
<td>$7,902</td>
<td>$195 &amp; $0.088/mile</td>
<td>Y</td>
</tr>
<tr>
<td>9P</td>
<td>Hyundai Sonata PHEV</td>
<td>99</td>
<td>28</td>
<td>$26,870</td>
<td>$9,863</td>
<td>$216 &amp; $0.099/mile</td>
<td>Y</td>
</tr>
<tr>
<td>9P</td>
<td>Ford Fusion Energi</td>
<td>103</td>
<td>26</td>
<td>$27,646</td>
<td>$10,639</td>
<td>$216 &amp; $0.099/mile</td>
<td>Y</td>
</tr>
<tr>
<td>98P</td>
<td>Kia Niro PHEV</td>
<td>105</td>
<td>26</td>
<td>$21,511</td>
<td>$5,317</td>
<td>$260 &amp; $0.089/mile</td>
<td>Y</td>
</tr>
<tr>
<td>96P</td>
<td>Mitsubishi Outlander</td>
<td>74</td>
<td>22</td>
<td>$31,531</td>
<td>$9,811</td>
<td>$319 &amp; $0.144/mile</td>
<td>Y</td>
</tr>
<tr>
<td>20P</td>
<td>Chrysler Pacifica</td>
<td>119</td>
<td>32</td>
<td>$40,071</td>
<td>$19,367</td>
<td>$263 &amp; $0.129/mile</td>
<td>Y</td>
</tr>
</tbody>
</table>
Range of battery electric vehicles (BEVs) is increasing

Vehicle Type
- Compact/Hatchback
- Minivan/Wagon/Van
- Sedan
- Sports car
- Subcompact
- SUV/Crossover

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Battery Prices are Falling

Lithium-ion battery price survey results: volume-weighted average

Battery pack price (real 2018 $/kWh)

Source: BloombergNEF. Note: The data in this chart has been adjusted to be in real 2018 dollars.
More Stations

* Includes 6,270 fast charging outlets.
Source: Bloomberg New Energy Finance
Charging Options for Agencies

• Buy from GSA
  – Pre-negotiated BPA
  – Data plans
  – 5 manufacturers
  – Level 1, Level 2 and DC Fast Charging

• Assisted Acquisition, Installation & Policy from GSA PBS
  – Assisted acquisitions, site planning and engineering to facilitate installation

• 3rd Party installation

• Level 1 charging cord (comes std with vehicle)

• Charge publicly using WEX/Voyager Card
ZEV & Infrastructure Considerations?

- Cost of alternative fuel vehicle
- Annual fuel savings
- Access to infrastructure
- Utilization
- Agency mission
- Environmental goals
Other Considerations

U.S. electricity generation by major energy source, 1950–2017
billion kilowatthours

- petroleum and other
- renewables
- nuclear
- natural gas
- coal
Funding & EVSE Sharing Opportunities

- Funding Opps
  - Local electric utilities
  - Federal, State and local governments
  - Electrify America - federal agencies have successfully won funding through this program

- Share your EVSE with other agencies! GSA is drafting an MOA template
Workplace Charging & Resources
2018 - GSA EV Survey Results: Driving Satisfaction & Increased Utilization

- Ensure driver is engaged & prepared to accept new EV
- ALL drivers must be educated on EVs (even motor pool drivers)
- Share EVSE & Use Public Stations when possible
- Pushing EVs on resistant drivers leads to low utilization & poor charging
- Telematics will improve data integrity on mileage & charging data
950 vehicles
26 agencies
1 interagency competition

PLUG IN. DRIVE. REPEAT
And the agency that improved the most is...

PLUG IN. DRIVE. REPEAT
What can you do?

As a Driver:
• Drive Wise:
  – Drive efficiently
  – Maintain your car
  – Don’t Idle or if so, look for vehicles with stop-start technologies
  – Update Customer Driven Data

As a Fleet Manager:
• Replace aging vehicles / Right size
• Know & adhere to requirements
• Fuel alt. fuel vehicles with the alt. fuel whenever possible
• Use DRM, motorpools
• Encourage training
• Use GSA systems & tools (including telematics) to manage your fleet!
• Be transparent/clear!
Stephanie Gresalfi
AFV Program Manager
202-617-0688

Casey Crandell
AFV Program Analyst
202-257-9517

gsaafleetafvteam@gsa.gov