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# FLEET MANAGEMENT

## Preliminary Observations on Electric Vehicles in the Postal and Federal Fleets

Statement of Jill Naamane, Acting Director, Physical  
Infrastructure

# GAO Highlights

Highlights of [GAO-22-105931](#), a testimony before the Committee on Oversight and Reform, House of Representatives

## Why GAO Did This Study

USPS operates almost 200,000 vehicles that provide mail delivery across the country. USPS, along with the rest of the federal government, relies largely on gas or diesel fuel vehicles in its fleet. Efforts to transition the USPS and other federal fleets to electric vehicles are underway. In December 2021, the Biden Administration issued an Executive Order calling for federal vehicle acquisitions to be zero-emission vehicles by 2035, including 100 percent zero-emission light-duty vehicle acquisitions by 2027.

This statement provides GAO's preliminary observations on (1) USPS's efforts to determine the number of gas and electric delivery vehicles to purchase, and (2) factors that may affect the transition of federal fleets to electric vehicles.

This statement is based on prior and ongoing work. For the ongoing work, GAO has reviewed USPS and General Services Administration data, guidance and reports and has interviewed USPS and agency officials.

View [GAO-22-105931](#). For more information, contact Jill Naamane at (202) 512-2834 or [naamanej@gao.gov](mailto:naamanej@gao.gov).

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## FLEET MANAGEMENT

### Preliminary Observations on Electric Vehicles in the Postal and Federal Fleets

## What GAO Found

The United States Postal Service (USPS) has awarded a contract for the Next Generation Delivery Vehicle (NGDV) (see figure), and recently ordered about 40,000 gas and 10,000 electric vehicles (about 20 percent electric). USPS informed its decision by conducting an analysis of both gas and electric NGDVs. This analysis included factors such as acquisition, maintenance, and fuel costs. Using information from the analysis, USPS created a model to identify the lowest-cost vehicle for each postal route in the U.S. for each of the next 30 years.

### Image of the Next Generation Delivery Vehicle



Source: United States Postal Service. | GAO-22-105931

GAO's preliminary analysis raises questions regarding the way in which USPS's assumptions estimate the costs and benefits of the gas and electric NGDV. Specifically, USPS used a gas price that is almost \$2 per gallon less than the current national average price of gas and assumed maintenance would be more expensive for an electric vehicle than a gas vehicle. In ongoing work, GAO plans to test the effect of changing these assumptions.

In prior and ongoing work, GAO has identified the following three factors that could affect widespread electric vehicle acquisition within federal fleets.

- **Higher up-front costs.** Agency officials identified the higher acquisition costs associated with electric vehicles as a factor that has hindered their integration into federal fleets. However, GAO's ongoing work indicates that these costs have declined and are expected to continue to do so.
- **Infrastructure.** GAO previously identified charging infrastructure costs and installation as a key challenge to acquiring electric vehicles.
- **Availability.** GAO's previous work found that many agency mission needs require larger vehicles for which there may not be electric options, including pick-up trucks or sports-utility vehicles. Ongoing work indicates that manufacturers are increasing the types of electric vehicles available.

Chairwoman Maloney, Ranking Member Comer, and Members of the Committee:

I am pleased to be here today to discuss our past and ongoing work on federal efforts to increase the number of electric vehicles in the United States Postal Service (USPS) and the federal government. USPS operates almost 200,000 vehicles that provide mail delivery across the country. USPS, along with the federal government and the rest of the nation, relies largely on vehicles powered by gasoline or diesel fuel (“gas vehicles”). In fiscal year 2020, federal fleets, including the postal delivery fleet and the fleets of agencies across the federal government, comprised around 660,000 vehicles—around 610,000 of these are operated domestically—that traveled over 4 billion miles to help meet a variety of government missions.<sup>1</sup> Over the course of the same fiscal year, federal fleets consumed more than 360 million gallons of gasoline and diesel.

Electrifying the postal delivery and federal fleets represents a significant transformation in the federal government’s approach to vehicle procurement and in perceptions about the capability of electric vehicles to adequately meet mission needs in terms of performance and range. USPS has begun a procurement of new vehicles for its delivery fleet that will include some electric vehicles. In March 2022, USPS announced an initial order of 50,000 new delivery vehicles under a contract with Oshkosh Defense, of which about 10,000 will be electric. USPS had committed to purchasing at least 10 percent electric vehicles, and this initial order is for about 20 percent electric. Executive branch agencies are responding to the Administration’s December 2021 Executive Order that established the goal of acquiring only zero-emissions vehicles, beginning with the acquisition of light-duty vehicles in 2027.<sup>2</sup> <sup>3</sup> Our ongoing work examining the postal delivery fleet, as well as federal fleets, will delve further into how agencies are responding to this transformation effort. Other agencies, such as the General Services

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<sup>1</sup> This total includes non-tactical military vehicles.

<sup>2</sup>A light-duty vehicle is a vehicle of up to and including 8,500 pounds gross vehicle weight and can include cars, smaller pickup trucks, minivans, vans, and sport-utility vehicles.

<sup>3</sup> Exec. Order No. 14057 §§ 102(i), 204, 86 Fed. Reg. 70935 (Dec. 8, 2021). In addition to zero-emission vehicles, this Executive Order established numerous clean energy goals.

Administration (GSA) and the Department of Energy (DOE), will also play an integral role in providing leadership and helping agencies to meet the fleet energy requirements, such as those set forth in the order.

My testimony today is based on our prior and ongoing work. Specifically, it is based on our July 2019 report on alternative fuel vehicles and our ongoing work on USPS and federal fleets.<sup>4</sup> This statement provides preliminary observations on 1) USPS's efforts to determine the number of gas and electric delivery vehicles to purchase, and 2) factors that may affect the federal fleets' transition to electric vehicles.

- To conduct our July 2019 alternative fuel vehicles work, we analyzed information on costs for alternative fuel vehicles and gas vehicles and reviewed relevant studies and government reports.<sup>5</sup> We surveyed 29 federal agencies and interviewed agency officials regarding challenges in using alternative fuel vehicles. More detailed information on our objectives, scope, and methodology can be found in the issued report.<sup>6</sup>
- As part of our ongoing work on USPS, we reviewed information from the agency, including its plans for purchasing new delivery vehicles; its Total Cost of Ownership (TCO) analysis that projected the costs of electric and gas vehicles; an optimal mix model that determined the lowest-cost vehicle for each delivery route; and supporting documentation of USPS's cost estimate model for new delivery vehicles. We interviewed USPS officials about the quality of USPS data and determined the data were reliable for the purpose of describing USPS's analysis. We also interviewed private delivery company officials.
- As part of our ongoing work on federal fleets, we reviewed relevant Executive Orders, guidance, and reports. We also analyzed GSA's publicly available data to determine the composition of the existing fleet and the current upfront costs of electric vehicles. We interviewed GSA Fleet officials about the quality of the data and determined the data

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<sup>4</sup>GAO, *Federal Vehicle Fleets: Agencies Have Continued to Incorporate Alternative Fuel Vehicles into Fleets, but Challenges Remain*, GAO-19-397 (Washington, D.C.: Jul. 26, 2019).

<sup>5</sup>Generally, alternative fuel vehicles can run on fuel that is not substantially petroleum, including electric and hybrid vehicles.

<sup>6</sup>GAO 19-397.

were reliable for our purposes of describing the composition of the fleet. We also interviewed officials from GSA and DOE to obtain their views on the challenges to meeting the requirements of the December 2021 Executive Order.<sup>7</sup>

We conducted the prior work on which this statement is based in accordance with generally accepted government auditing standards. The ongoing work is also being conducted in accordance with those standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## **Background**

The almost 200,000 vehicles that USPS operates in its delivery fleet include purpose-built right-hand drive vehicles as well as commercial off-the-shelf vehicles. Most of the purpose-built vehicles, which USPS purchased from 1987 to 1994, are approaching the end of their useful life. These vehicles do not have modern features such as airbags and air conditioning, and they are experiencing increasing maintenance costs and are at greater risk of safety incidents.

To update its delivery fleet, USPS awarded a 10-year contract to Oshkosh Defense in February 2021 to manufacture the Next Generation Delivery Vehicle (NGDV), a right-hand drive vehicle with two powertrain options—gas engine or battery electric. Under the terms of the contract, USPS can order a total of 50,000 to 165,000 vehicles with either powertrain option. In March 2022, USPS announced an initial order of 50,000 vehicles, of which 39,981 will be gas and 10,019 electric. USPS also uses separate, commercial off-the-shelf vehicle acquisitions to replace vehicles each year.<sup>8</sup>

Federal agencies' fleets perform a variety of purposes. For example, federal vehicles may be used to carry staff and gear to remote, off-road locations to conduct maintenance or other tasks; transport and provide healthcare to veterans; deliver mail; or support daily operations on military

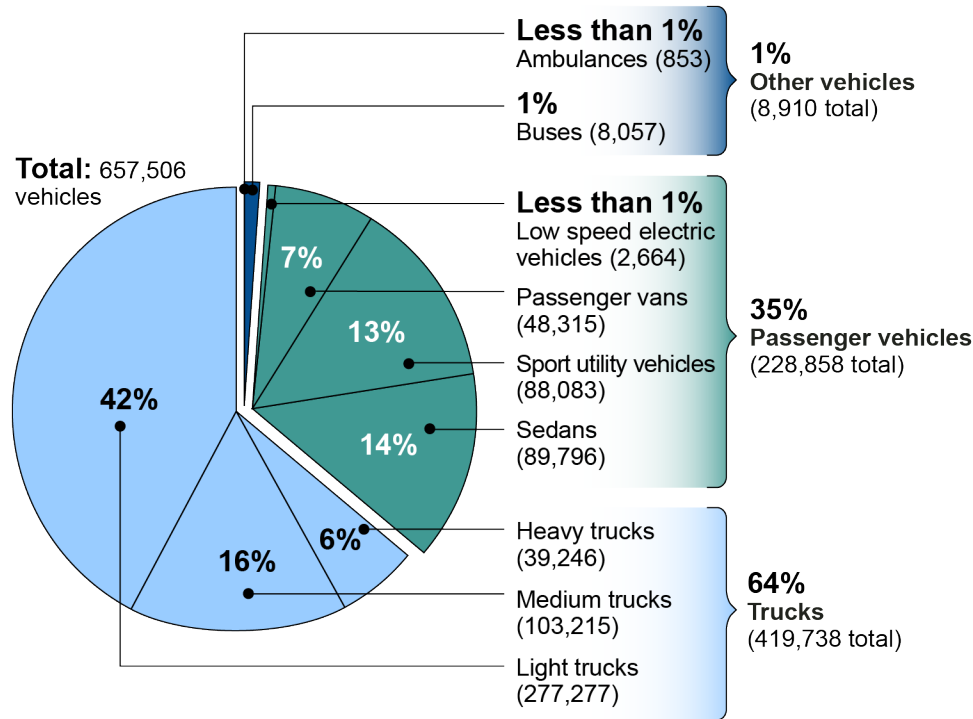
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<sup>7</sup>Our ongoing work is examining the composition and location of federal fleets and how selected agencies are prioritizing which vehicles in their federal fleets to transition to electric vehicles, among other issues.

<sup>8</sup>The NGDV includes features such as allowing the driver to stand in the cargo area, providing a driver's seat at a comfortable height for reaching mailboxes, and a large area for cargo.

installations. To fulfill these purposes, agencies may require many types of vehicles, ranging from sedans to ambulances to buses. See Figure 1 for a summary of vehicle types that make up federal fleets.

**Figure 1: Types of Vehicles in Federal Fleets, Including USPS, as of Fiscal Year 2020**



Source: GAO analysis of General Services Administration data. | GAO-22-105931

Notes: Around 610,000 of these vehicles are operated domestically.. United States Postal Service (USPS) delivery vehicles are generally light trucks. This total includes non-tactical military vehicles.

Over the past 30 years, various laws and requirements related to fleet management have targeted all or specific vehicle types to increase the use of alternative fuels and decrease gas use and acquire vehicles that decrease per-mile greenhouse gas emissions. For example, the Energy Policy Act of 2005 stated that vehicles that can run on ethanol—and plug-in hybrid electric vehicles that can run on electricity—are to be operated on alternative fuels unless an agency qualifies for and receives a waiver. In addition, generally, the Energy Independence and Security Act of 2007 generally provides that federal agencies should not acquire a light-duty

vehicle or a medium-duty passenger vehicle that is not a low greenhouse gas-emitting vehicle.<sup>9</sup>

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In December 2021, the Biden Administration issued an Executive Order calling for all federal vehicle acquisitions to be zero-emission vehicles by 2035, including 100 percent zero-emission light-duty vehicle acquisitions by 2027. This order does not apply to USPS, which is not an Executive agency for purposes of the order. For executive branch agencies, the order requires agencies with fleets comprised of 20 or more vehicles to develop and annually update a zero-emission fleet strategy. Vehicles that produce zero exhaust emissions qualify as zero-emission.<sup>11</sup>

While the federal government has taken steps to increase its acquisition of alternative fuel vehicles, manufacturers in the U.S. and elsewhere are increasing their production of electric vehicles. For example, General Motors has committed to introducing 30 new electric vehicles for sale around the world by 2025, and Tesla increased its sales of electric vehicles in the U.S. from about 50,000 in 2017 to over 300,000 in 2021. Package delivery companies are also moving towards an electric fleet; for example, Federal Express plans to increase its purchase of electric vehicles, and to purchase only electric delivery vehicles by 2030.

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<sup>9</sup>According to EPA, the greenhouse gas emissions level for any given model year will be determined by estimating the level needed to designate approximately 25 percent of cars and 25 percent of light-duty trucks and medium-duty passenger vehicles as compliant with the Energy Independence Security Act of 2007. These vehicles can consume alternative fuels or petroleum and are considered low greenhouse-gas-emitting vehicles. Exceptions exist if the head of an agency certifies in writing for each vehicle purchased that either (i) no low greenhouse gas emitting vehicle is available to meet the functional needs of the agency and details in writing the functional needs that could not be met with a low greenhouse gas emitting vehicle; or (ii) that the agency has taken specific alternative more cost-effective measures to reduce petroleum consumption.

<sup>10</sup>The Energy Independence and Security Act of 2007 defines these vehicles with reference to vehicle weight and basic frontal area. For example, agencies can classify a pickup truck with an open cargo area of less than 72 inches as a passenger vehicle if it is used to carry passengers.

<sup>11</sup>Vehicles that meet this standard include battery electric vehicles which use a battery to power an electric motor, plug-in hybrid vehicles which have both a battery powered electric motor and a petroleum-fueled internal combustion engine, and hydrogen fuel cell vehicles, which use hydrogen to produce electricity which powers an electric motor.

## **Preliminary Observations of USPS's Analysis to Determine the Number of Gas and Electric Vehicles to Purchase**

To determine what type of vehicle to purchase, USPS conducted two analyses. The first was a total cost of ownership (TCO) analysis, and the second was an analysis to optimize the mix of vehicles to the requirements of the delivery routes. USPS conducted a TCO analysis of both gas and electric NGDVs as well as of commercial off-the-shelf vehicles. This analysis included factors such as the acquisition cost of each vehicle, maintenance costs, and fuel costs. As part of this forward-looking analysis, USPS used past data and developed estimated costs using information from other U.S. government agencies. For example, USPS used data on maintenance costs for its current delivery vehicle to inform its estimate of future maintenance costs.

Using information from the TCO analysis, USPS created a model to identify the lowest-cost vehicle for each postal route in the U.S., or "optimal mix model." The model includes information such as route distance, number of stops, and weather conditions. Based on inputs from the TCO analysis, the model determines the lowest cost vehicle based on a set of cost factors and assumptions. The model aggregates the results for each route and recommends a mix of vehicles to purchase for each year over a 30-year period. According to USPS data, the model recommends not purchasing any electric vehicles until 2026. However, USPS committed to purchasing at least 10 percent electric delivery vehicles. USPS also used some additional factors and assumptions in a separate model that will inform where it deploys the new vehicles, and we plan to look at deployment challenges as part of our ongoing work.

Our preliminary analysis raises questions regarding the way in which USPS's assumptions estimate the costs and benefits of the gas and electric NGDV. Specifically:

- **Price of fuel.** USPS used a gas price in the optimal mix model that is almost \$2 per gallon less than the current national average price of gas. Specifically, the TCO analysis includes gas prices from 2020 and estimated that gas would cost \$2.21-\$2.36/gallon from 2020-2030. As of March 28, 2022, the national average was \$4.24 per gallon, according to the AAA Gas Prices website. USPS officials told us they are continuing to evaluate changes in fuel costs in using this model.



- **Fuel efficiency.** The optimal mix model appears to assume the NGDV gas vehicles would achieve a gas mileage efficiency of 15 miles per gallon, which does not account for the use of air conditioning. Instead, the NGDV gas vehicle achieves a gas mileage efficiency of 8.6 miles per gallon when the air conditioning is in use. As a result, the formula uses a lower total cost calculation for fuel purchases that may not be reasonable. USPS officials told us that the model applies an additional factor in the analysis that assumes the air conditioning will be used most of the time. We will continue to further investigate how the model's expected fuel usage for gas vehicles could affect the model's selections.
- **Maintenance costs.** The model we reviewed appears to use maintenance cost data showing that NGDV electric vehicles would be more expensive to maintain than NGDV gas vehicles. This data is contrary to the expected maintenance cost data we have identified in research, interviews with private delivery companies, and USPS's documents which showed that the NGDV electric vehicles are expected to achieve maintenance cost savings compared to the NGDV gas vehicles. USPS officials said the NGDV electric is expected to require 8 percent less maintenance than the gas vehicle. As we continue our work, we will further assess how the model's formula applies maintenance costs in selecting optimal vehicles.
- **Emissions.** The TCO analysis does not include a reduction in carbon or pollutant emissions as a benefit. Specifically, USPS's Environmental Impact Statement issued as part of the NGDV acquisition program found that electric vehicles contain no tailpipe emissions and produce fewer pollutants than gas vehicles, thus having a greater beneficial effect on reducing carbon and pollutant emissions than alternatives considered.<sup>12</sup> USPS officials told us that the TCO model is not intended to support environmental assessments, and that USPS included this information in its Environmental Impact Statement.

In our ongoing work, we plan to test the effect of changing these assumptions in the model.

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<sup>12</sup>USPS's Environmental Impact Statement also found a beneficial impact on air emissions by replacing older vehicles with 100 percent gas engines or a mix of 90 percent gas engines and 10 percent electric vehicles. However, this beneficial impact was less than the beneficial impact of 100 percent electric vehicles.

### **Three Factors Could Affect Widespread Acquisition of Electric Vehicles in Federal Fleets**

Our prior work has consistently identified three factors that could affect widespread electric vehicle acquisition within federal fleets.<sup>13</sup> Our ongoing USPS work has also identified two of these as potential factors affecting its acquisition of electric vehicles.

**Higher Up-front Costs.** Our 2019 report on alternative fuel vehicles found that some agency officials identified the higher acquisition costs associated with electric vehicles as a factor that has hindered their integration into federal fleets. As part of our ongoing work, USPS officials said that the higher acquisition costs were a key factor in USPS's decision to limit purchase of electric vehicles for its delivery fleet. Table 1 below shows examples of differences in GSA price between zero-emission vehicles and comparable gas vehicles.

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<sup>13</sup>GAO, *Federal Energy and Fleet Management: Plug-In Vehicles Offer Potential Benefits, but High Costs and Limited Information Could Hinder Integration into the Federal Fleet*, GAO-09-493 (Washington, D.C.: Jun. 9, 2009) and GAO-19-397.

**Table 1: Examples of GSA-Available Electric Vehicles Compared to Equivalent Non-Zero-Emission Vehicles as of February 2022**

<b>Vehicle Type</b>	<b>Gasoline</b>	<b>Plug-in Hybrid (% increase)</b>	<b>Battery Electric Vehicle (% increase)</b>
Sedan, Subcompact	\$18,588.48	\$28,640.58 (54%)	\$22,293.12 (20%)
Sedan, Compact	\$26,585.28 <sup>1</sup>	None available	\$48,222.54 (81%)
Sport Utility Vehicle, Two-Wheel Drive	\$21,581.16	\$28,993.50 (34%)	\$31,649.46 (47%)
Sport Utility Vehicle, Four-Wheel Drive <sup>2</sup>	\$23,131.56	\$35,184.90 (52%)	\$45,959.16 (99%)
Light Duty Pickup Truck, Four-Wheel Drive	\$29,047.56 <sup>3</sup>	None available	\$40,601.00 (40%)

Notes:

<sup>1</sup>Comparison is with a conventional gasoline hybrid vehicle (i.e., not a plug-in hybrid).

<sup>2</sup>Comparison includes multiple types of compact SUVs.

<sup>3</sup>Comparison is with an E85 flex fuel vehicle.

Source: GAO analysis of GSA data.

In our ongoing work, GSA Fleet officials agreed that vehicle costs continue to be a potential challenge to electrifying federal fleets, although they expected that the difference in purchase price of electric vehicles compared to conventional gasoline vehicles would continue to decline as production increases and manufacturing costs decline. In addition, we have previously reported that GSA negotiated a lower purchasing price for some electric vehicle models. For example, GSA negotiated a discounted price for the Chevrolet Bolt in fiscal year 2021—at almost \$10,000 below its market retail price.

GSA officials also told us that widespread adoption of zero-emission vehicles beyond the federal government would result in economies of scale that lower costs to acquire zero-emission vehicles. For example, according to DOE’s Vehicle Technologies Office, the cost of an electric vehicle battery pack declined 87 percent between 2008 and 2021 due, in part, to an increase in manufacturing volume and improvements in battery technologies. According to the same office,

further technological developments have the potential to significantly reduce costs in the future. USPS estimates that an electric and gas delivery vehicle will cost the same starting in 2031.

**Infrastructure.** Our previous work identified charging infrastructure cost and installation uncertainties associated with electric vehicles. Of the 29 federal agencies we surveyed in 2018, 20 identified charging infrastructure as a key challenge to acquiring electric vehicles, citing the costs of installing charging stations, among other challenges. As of March 2022, federal agencies own about 1,100 charging stations, according to DOE's Alternative Fuels Data Center. Some of these stations have multiple ports, each of which can charge an electric vehicle.

To support widespread electric vehicle use, the federal government will need to rapidly expand its charging infrastructure—GSA officials told us that may require needing over 100,000 charging stations. USPS estimated that it would need one charging port for each postal delivery vehicle, in part, to allow each delivery vehicle to fully charge. However, the total price of charging stations is highly variable—from \$1,000 to over \$100,000 for the most complex situations, according GSA officials. This variability, according to the National Renewable Energy Laboratories (NREL), is dependent on the site, speed of charging, model, and features included. USPS estimated that each charging station it installs could average as much as \$18,000.

Additional infrastructure costs for installation sites, according to NREL, could include new circuit breakers, conduit, and wiring. Further, the need to dig trenches to lay electrical cables varies from site to site and can result in a wide range of installation costs, potentially as high as \$150 per foot of trench required, in addition to the purchase price of the charging station and other infrastructure costs. In addition, not all facilities may have a dedicated parking lot with an electric service panel. Further, USPS officials told us that many USPS facilities are older and may not have the power capacity to support a larger fleet of electric vehicles.

To help agencies overcome obstacles related to charging infrastructure, DOE offers technical guidance by providing engineers and other experts to help fleet managers minimize installation costs, including direct and virtual consultations and site visits. Further, the Infrastructure Investment and Jobs Act provided \$7.5 billion for federal grants to states and other entities to install charging stations. In other work, we plan to examine the potential for federal agencies to leverage this source of funding and the implementation of this program.

**Availability.** Our previous work found that to meet many mission needs, federal agencies require larger vehicles for which there may not be electric options.<sup>14</sup> For example, Department of the Interior officials told us the agency's fleets operate on large rural tribal reservations that require pick-up trucks or sport-utility vehicles to navigate the often rugged terrain. Department of Transportation officials also stated that to support their national airspace facilities, their vehicles must drive off-road to transport bulky or sensitive tools to remote air strips.

However, GSA's past offerings generally lacked electric vehicle options for larger models of sport utility vehicles and pickup trucks. GSA officials stated that this is because such vehicles were not commercially available, but automobile manufacturers have indicated that they are optimistic that there will be electric vehicle options for all vehicle types within the next 5 years. For example, the Ford F-150, Chevy Silverado, and Dodge Ram—all pick-up trucks—are expected to offer an electric model by 2024. In our discussions with GSA officials, they recommended that agencies work to install charging infrastructure while waiting for increased vehicle model availability and, in the meantime, GSA officials said they continue to communicate with automobile manufacturers to voice the federal demand. In addition, there is training available to agencies designed to help with the transition. Agencies can also participate in an interagency monthly electric vehicle roundtable for executive agencies, hosted by GSA and DOE, designed to share new information and best practices on fleet electrification, including potential acquisition challenges and strategies.

While the higher purchase cost of electric vehicles may diminish over time due to changes in the private sector marketplace, factors related to an inadequate charging infrastructure may continue to be challenging for agencies to manage. As part of our ongoing work, we will continue to assess how executive agencies are considering the upfront costs, charging infrastructure, and availability of vehicles to meet mission needs in their planning for widespread fleet electrification. Our ongoing work will also continue to examine USPS's analyses and decision making on optimal mission use of electric vehicles.

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<sup>14</sup>GAO 19-397.

Chairwoman Maloney, Ranking Member Comer, and Members of the Committee, this completes my prepared statement. I would be pleased to respond to any questions you might have at this time.

### **GAO Contact and Staff Acknowledgments**

If you or your staff have any questions about this testimony, please contact Jill Naamane, Director, Physical Infrastructure at (202) 512-2834 or NaamaneJ@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are John W. Shumann (Assistant Director), Michael Sweet (Analyst-in-Charge), Melanie Diemel, Ross Gauthier, Catina B. Latham, Alicia Loucks, Nancy Lueke, A. Maurice Robinson, Todd Schartung, Dominic Skinnion, Janet Temko-Blinder, Laurel Voloder, Alicia Wilson, and Elizabeth Wood.