Electrifying the federal fleet could save $6 billion

By Scott Walsh and Ambika Coletti, ICF

The federal government set an ambitious goal to electrify the federal fleet. President Biden's **Executive Order** requires 100% electric vehicle (EV) acquisitions by 2035, including 100% light-duty acquisitions by 2027.

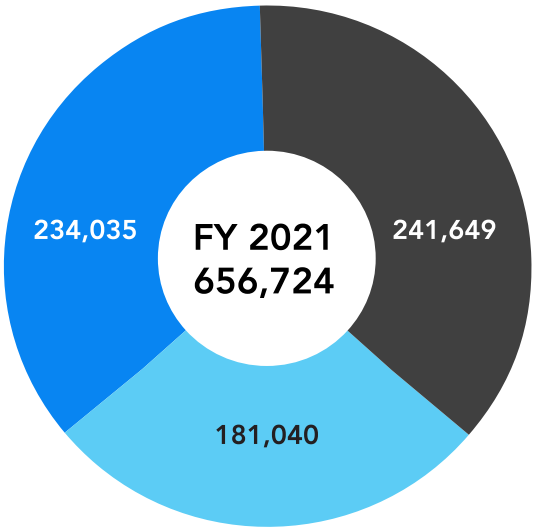
The scope of this challenge is significant: the federal fleet, across all civilian and military agencies, boasts over 650,000 vehicles around the world. These vehicles travel more than 4 billion miles a year; that's like driving around the circumference of the Earth 160,000 times. The cost to operate the fleet is nearly $4.5 billion each year, including spending money on more than 367 million gallons of gas[1]—enough to fill 500 Olympic-sized swimming pools. Put simply, the federal fleet, and the resources needed to keep it running, are massive.

Out of more than half a million vehicles in the federal fleet, only about 4,300 of them are plug-in vehicles, including battery electric and plug-in hybrid electric. That's less than 1%. How should federal agencies approach the electrification of the other 99%?

[1] *Fuel consumption for alternative fuels has been converted to gasoline gallon equivalents.*

Figure 1: Federal fleet composition

Source: U.S. General Services Administration



- **USPS vehicles**
- **Civilian agencies vehicles**
- **Military non-tactical vehicles**

The U.S. Postal Service (USPS) can offer some important lessons. In December 2022, USPS announced a commitment to electrify its fleet, including **66,000 battery electric delivery vehicles**, by 2028—placing USPS at the forefront of the federal government's clean transportation revolution.

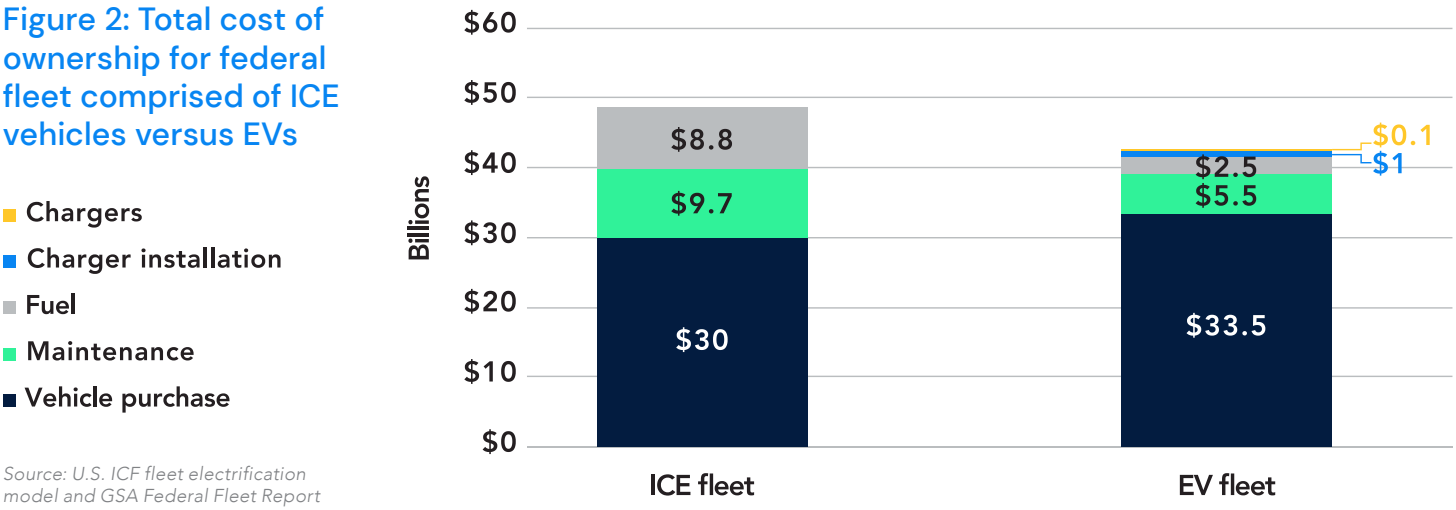
ICF helped the **USPS Office of Inspector General** (OIG) calculate the costs of electrifying its fleet of aging gasoline delivery vehicles. We developed a cost calculator to compare the total cost of ownership for EVs to gas-powered vehicles in the USPS fleet.

Inspired by our work with the USPS OIG and ICF's **electrification work** with fleets across the country, we used our proprietary fleet electrification modeling technology to project the costs, savings, and climate impact of electrifying the entire federal fleet. The findings have important implications for federal fleet managers, government financial planners, and taxpayers across the country.

Electrification as an investment

Understanding vehicle costs and return on investment is key to electrifying the federal fleet. A new EV usually has a higher sticker price than a comparable new internal combustion engine (ICE) vehicle. But EVs are less expensive than ICE vehicles when you consider the total cost of ownership over the lifetime of the vehicle.

Figure 2: Total cost of ownership for federal fleet comprised of ICE vehicles versus EVs

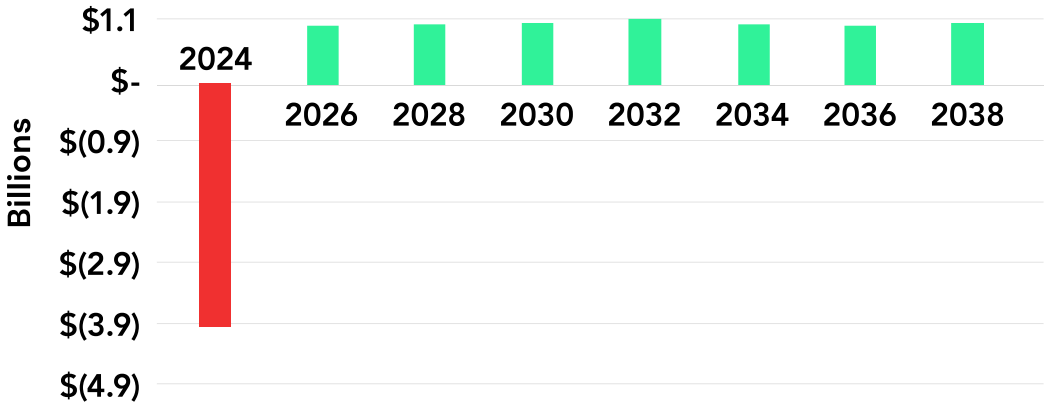


Source: U.S. ICF fleet electrification model and GSA Federal Fleet Report

We modeled the options of replacing the entire federal fleet in 2024 with EVs or ICE vehicles to demonstrate the economic considerations for federal fleet managers. As seen in Figure 2, EVs cost more initially because the vehicles themselves are usually more expensive than comparable ICE vehicles. EV charging equipment and installation further adds to the upfront costs of EVs. However, fuel and maintenance costs are far lower for EVs than ICE vehicles. That means the yearly operating costs for EVs are much lower than those for ICEs.

Figure 3 shows the difference in upfront costs for EVs and ICE vehicles in 2024, and the yearly savings from EVs each following year. With every mile driven and every year owned, EVs save money that offset their higher initial sticker price.

Figure 3: Annual cost and savings from converting entire federal fleet to EVs in 2024[2]



Source: U.S. ICF fleet electrification model

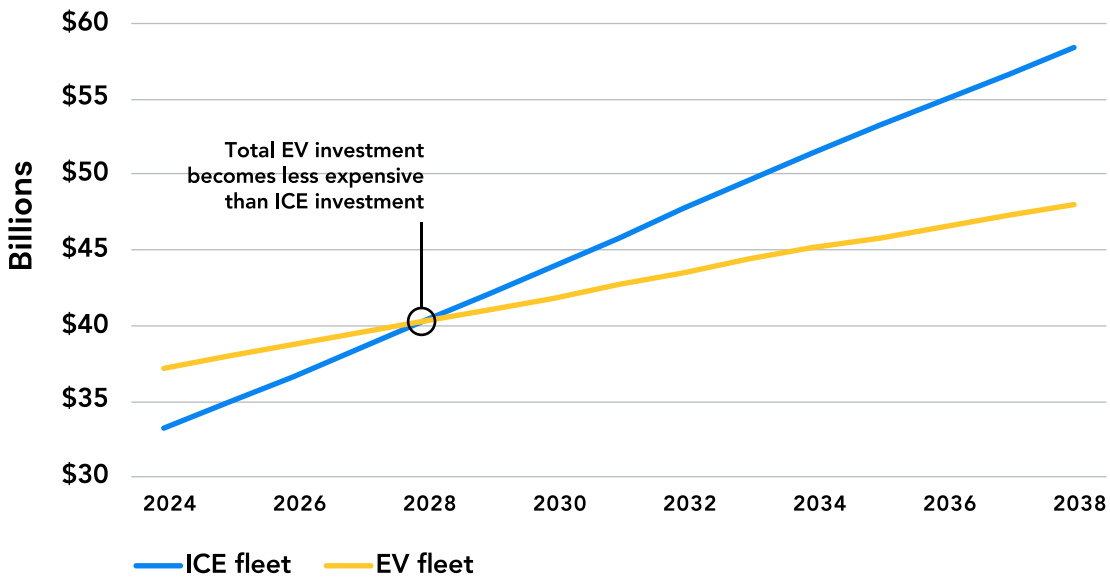
[2] 2024 costs reflect the difference between purchasing new EVs versus new ICE vehicles. 2024 also includes costs savings in that year from switching to EVs. The $6B in savings reflects net present value using a 5% discount rate.

Switching to EVs would save federal fleet managers nearly $6 billion over 15 years.

When you look across the entire federal fleet, electrification would cost $4.6 billion more in upfront investment—including charging hardware and installation costs—than renewing the fleet as ICE vehicles. But, switching to EVs would save federal fleet managers nearly $6 billion over 15 years, even when you account for the upfront investment. As seen in figure 4, the breakeven point for federal fleet managers would occur in 2028. In other words, it's an investment that pays off in only four years. Every dollar EVs save on fuel and maintenance after that goes straight to the bottom line. Few investments can deliver the same value.

It's highly unlikely federal fleet managers would replace the full fleet in one fell swoop. Replacing ICE vehicles with EVs over multiple years would further tip the economics in favor of EVs as prices drop and new models become available. Using a third-party financing or leasing partner is another option many of ICF's clients have used to defray the upfront costs of EVs by spreading them across the life of the vehicles.

Figure 4: Cumulative federal fleet cost comparison

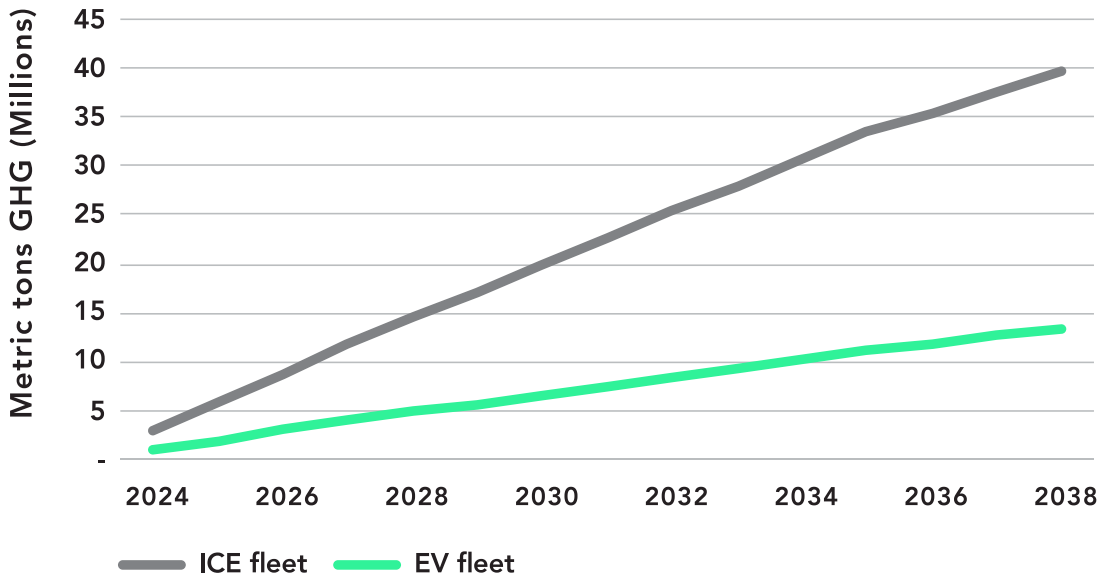


Source: ICF fleet electrification model

Additional benefits of federal fleet electrification

If the cost savings aren't compelling enough, electrifying the entire federal fleet would avoid nearly 1.7 million metric tons of greenhouse gas (GHG) emissions every year. It would cost more than $600 million to purchase carbon credits that represent the same amount of GHG reductions.

Figure 5: Cumulative greenhouse gas emissions from EV and ICE vehicle fleet



Source: ICF fleet electrification model

Transitioning to an all-electric fleet would avoid an additional $1.2 billion in social costs of carbon, such as crop damage, flood risks, increased heating and cooling costs, and health impacts. An EPA rule under review could nearly quadruple this value when it's finalized.

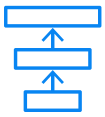
The impact of switching to EVs is even more beneficial to disadvantaged and underserved communities. Increasing the number of EVs on the road can significantly improve air quality and health for highway-adjacent communities, disproportionately affected by tailpipe emissions. These emissions are linked to new cases of asthma in children—and underserved populations have the highest asthma rates. Significantly reducing air pollution will be crucial to achieving the equity goals of President Biden's **Justice40 Initiative** – a goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities.

The **social cost of carbon** assigns a dollar amount to the long-term damage done by a ton of carbon dioxide emissions in a given year. The dollar figure comes from estimates of damages to net agricultural productivity, property damages from increased flood risk, and energy system costs from increased heating and cooling—as well as from detrimental impacts to human health.

The health effects of climate change include increased respiratory and heart diseases, waterborne diseases, premature deaths related to extreme weather events, and poor mental health. Our assessment of the **air quality and climate impacts of electrification** for the American Lung Association found that zero-emission transportation solutions would prevent thousands of premature deaths and avoid tens of billions of dollars in healthcare costs associated with air pollution nationally per year.

Considerations for federal fleet managers

Drawn from our work with the USPS OIG and consultations with private sector fleet managers operating the largest fleets in the country, we've identified 10 key considerations for federal fleet managers planning to electrify their fleets:



1. Phased approach

Electrify your fleet over time, starting with the most cost-effective vehicles first. This approach reduces the upfront costs and allows for the likelihood that EVs will drop in price as new cost-competitive models become available.

2. Duty cycle

Start by electrifying commercially available vehicles such as passenger vehicles. The number of **medium- and heavy-duty EVs** is expected to increase significantly over the next several years, but they are currently far less available.

3. Distance traveled

Understand where and how each vehicle in your fleet is used. The daily mileage each EV travels will impact the cost of operating it.

4. Number of vehicles at a depot

Economies of scale help drive down the costs of charging infrastructure. Multiple EVs at the same depot can often share chargers, saving money on equipment, installation, and maintenance costs.

5. Charging needs

Most USPS vehicles only drive about 20 miles a day, so they only need Level 1 (110V) chargers, which are the lowest cost option. However, it may be beneficial to have a few Level 2 (240V) or Level 3 (480V) chargers at the depot for unforeseen instances when vehicles need a faster charge.

6. Utility engagement

Fleet managers should engage the electric utility company to ensure the utility can serve the load they'll add before they order new EVs. The transformer that serves a depot needs to be able to handle the increase in load. Understanding the load impacts and how to manage them will help avoid having to pay for utility upgrades to increase capacity.

7. Power management

EV charging can significantly increase the amount of electric power a facility needs, with consequences for their utility bills. Onsite solar power, battery energy storage systems, and smart charging software are all ways to minimize electricity costs.

8. Vehicle-to-grid options

If an EV has a charged battery while not in use, emerging technology allows some EVs to discharge power back to the grid during peak hours for a premium. Fleet managers can benefit financially from this vehicle-to-grid technology as it matures and becomes more widely available.

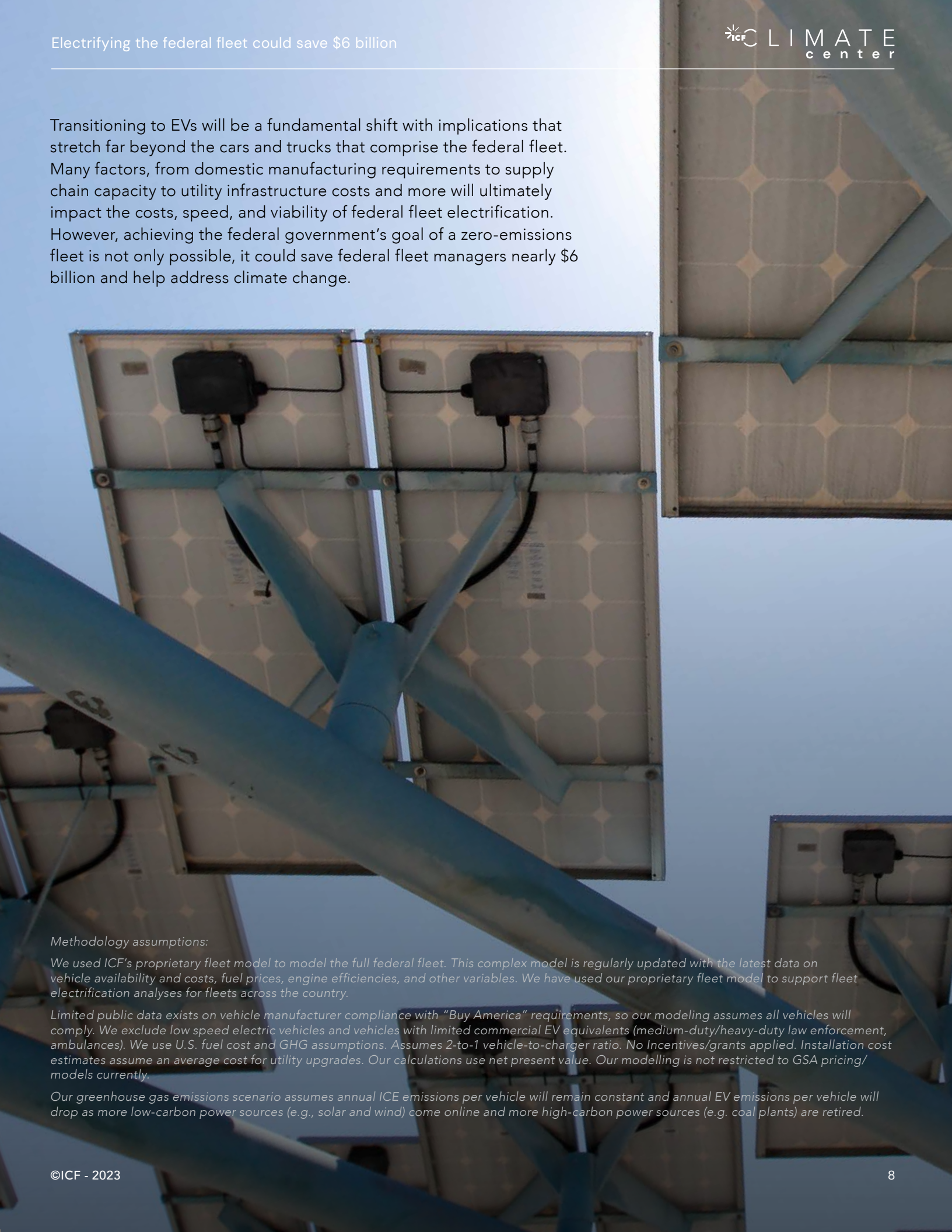
9. Share the cost

Our analysis assumes federal agencies will pay for fleet electrification themselves. But, federal fleet managers should explore cost-sharing agreements, different ownership models, and third-party financing to further drive-down upfront costs.

10. Start now

Start with something and start now. The learnings gathered by adding even one EV and charger can help fleet managers build knowledge and understanding of business, operational, and process changes that will need to be considered.

Transitioning to EVs will be a fundamental shift with implications that stretch far beyond the cars and trucks that comprise the federal fleet. Many factors, from domestic manufacturing requirements to supply chain capacity to utility infrastructure costs and more will ultimately impact the costs, speed, and viability of federal fleet electrification. However, achieving the federal government's goal of a zero-emissions fleet is not only possible, it could save federal fleet managers nearly $6 billion and help address climate change.



Methodology assumptions:

We used ICF's proprietary fleet model to model the full federal fleet. This complex model is regularly updated with the latest data on vehicle availability and costs, fuel prices, engine efficiencies, and other variables. We have used our proprietary fleet model to support fleet electrification analyses for fleets across the country.

Limited public data exists on vehicle manufacturer compliance with "Buy America" requirements, so our modeling assumes all vehicles will comply. We exclude low speed electric vehicles and vehicles with limited commercial EV equivalents (medium-duty/heavy-duty law enforcement, ambulances). We use U.S. fuel cost and GHG assumptions. Assumes 2-to-1 vehicle-to-charger ratio. No Incentives/grants applied. Installation cost estimates assume an average cost for utility upgrades. Our calculations use net present value. Our modelling is not restricted to GSA pricing/ models currently.

Our greenhouse gas emissions scenario assumes annual ICE emissions per vehicle will remain constant and annual EV emissions per vehicle will drop as more low-carbon power sources (e.g., solar and wind) come online and more high-carbon power sources (e.g. coal plants) are retired.

About the authors

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Scott has over two decades of experience advising companies, governments, and nonprofits to improve strategy, operations, finance, and sustainability. He has guided large and small companies across industries to set ambitious goals, design and execute programs, and improve their performance.

Scott has advised federal, state, regional & local agencies, international development organizations, electric utilities, and research organizations on clean transportation programs. His experience includes electric vehicle projects for the US Postal Service, the California Energy Commission, the Asian Development Bank, and cities in California, Colorado, Hawaii, Iowa, and Nepal. Scott's prior experience also includes projects addressing sustainable agriculture, conservation finance, and environmental policy.

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Ambika Coletti has more than 10 years of experience as an energy and beneficial electrification consultant. She specializes in the design and management of beneficial electrification, EV charging, and fleet assessment programs.

Ambika led the development of ICF's fleet electrification assessment model, which has provided more than 140 fleets with customized electrification strategic roadmaps. Her work includes conducting market assessments, running cost-benefit analyses, and developing and executing implementation plans. Ambika also has expertise in project management, data analysis, technical research, program reporting, and stakeholder outreach.

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Our experts have been embedded in every corner of the energy industry for over 40 years, working at the intersection of policy and practice. We work with the top global utilities, plus all major federal agencies and relevant energy NGOs, to devise effective strategies, implement efficient programs, and build strong relationships with their customers. From creating roadmaps to meet net zero carbon goals to advising on regulatory compliance, we provide deep industry expertise, advanced data modeling, and innovative technology solutions, so the right decisions can be made when the stakes are high.