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INDUSTRY OVERVIEW AND ROADMAP FOR EV INTEGRATION AT FEDERAL AGENCIES

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TABLE OF CONTENTS

INTRODUCTION

In January 2021, President Biden announced Executive Order (EO) 14008: *Tackling the Climate Crisis at Home and Abroad*. This EO called for the conversion of the Federal fleet of roughly 650,000 vehicles — including approximately 225,000 postal vehicles, 173,000 military vehicles and 245,000 civilian vehicles — into "clean and zero-emission vehicles for Federal, State, local, and Tribal government fleets." This EO - along with EO 14057: *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability* - has put the spotlight on energy resiliency through EV Integration of the Federal fleet.

Conversion of the federal fleet will add to the burgeoning growth of EV investment seen in the private sector. Some reports forecast an EV share of 20% (of global new car sales) in 2025, and a 50% share in 2030. Signed December 8, 2021, EO 14057 details a plan of 100% zero-emission vehicle (ZEV) acquisitions by 2035, including 100 percent zero-emission light-duty vehicle acquisitions by 2027; Thus, EV Integration and adaption by Federal Agencies is advancing a sustainable future of enhanced mobility inside of a clean energy ecosystem.

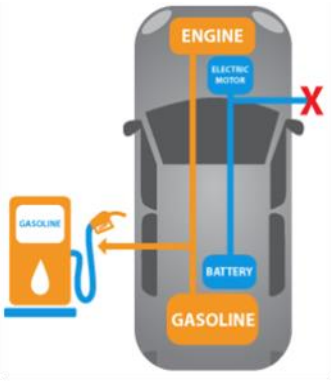
The implementation of a zero emission machine (ZEM) strategy across the Federal Government is a massive undertaking with numerous logistical and technical challenges and considerations to include EV technology, charging hardware, software, workforce development, grid capacity, technology/cost rationale for mass appeal. In addition, Federal Agencies will be required to invest in and integrate EV charging infrastructure within existing office space parking and motor pools as the use of privately owned EVs continue to increase proportionally.

Given these EV infrastructure challenges, implementation of this strategy will necessitate Agencies partner with private industry to leverage the cross-industry subject matter expertise needed for success throughout the EV integration lifecycle.

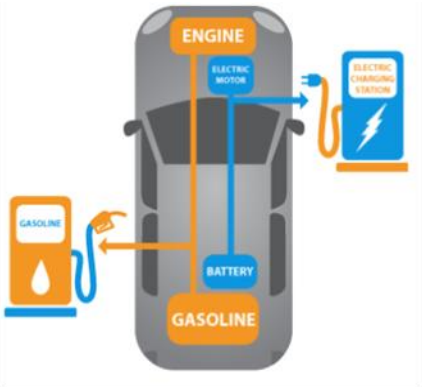
This Paper dives into the complex ecosystem of EVs and provides an implementation strategy that to quickly enable Federal Agencies to leverage the advantages inherent to EVs while seamlessly addressing the inherent challenges to EV program implementation.

EV CHARGING INFRASTRUCTURE

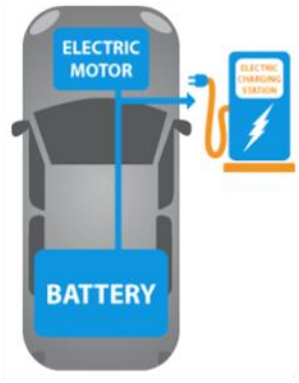
THREE MAIN TYPES OF ELECTRIC VEHICLES



HEV
(Hybrid Electric Vehicle)



PHEV
(Plug-In Hybrid Electric Vehicle)



BEV
(Battery Electric Vehicle)

HEV- Hybrid Electric Vehicles, or HEVs, have both a gas-powered engine and an electric motor that is powered by energy which is stored in the battery. All energy for the battery is gained through regenerative braking, which recoups otherwise lost energy in braking. These Hybrids contribute to maximizing the fuel economy by their dual energy source features however, they have limited capability as they can only be on fully electric mode for short distances.

PHEV- Plug-in Hybrid Electric Vehicles, or PHEVs, are powered by both a gas powered engine and electric motor. Like regular hybrids, they can recharge their battery through regenerative braking. They differ from regular hybrids by having a much larger battery and the option to plug into the grid to recharge. While the PHEV has similar driving range as that of the Internal Combustion Engine (ICE) vehicles, the fuel economy values differ depending on whether it is on full electric mode or ICE mode. These values also vary on basis of external factors as speed, climatic conditions, and accessory usage (Heater/AC).

Some PHEVs operate exclusively on electricity (can go anywhere from 10-40 miles) before the all-electric range is depleted and their gas engines provide assistance. Once the all-electric range is depleted, PHEVs act as regular hybrids, and can travel several hundred miles on a tank of gasoline. Other PHEV, referred to as 'blended mode' PHEV's use gasoline and electricity together to power the vehicle until the battery runs out.

BEV- Battery Electric Vehicles, also called BEVs and more frequently called EVs, are the most common type of Electric Vehicles which have no ICE and are fully electric vehicles powered by rechargeable batteries. All the energy to run the vehicle is provided from the battery pack which can be charged at home using Level 1 (L1) or Level 2 (L2) chargers, or at commercial Level 3 (L3) charging stations equipped with more powerful chargers.

Commercial success for EVs will require installing charging infrastructure that is accessible, easy to use, and relatively inexpensive—whether at home, in public, or at work. Local Governments are still catching up by:

Enacting subsidy programs

Supporting the installation of a charging infrastructure

Starting to develop regulatory initiatives to support and manage an electric vehicle fleet

Current charging infrastructure generally falls into the following categories:

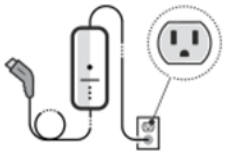
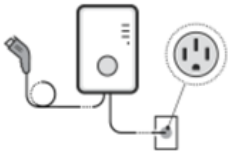
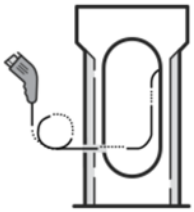
Private- Individual chargers at homes, residences or building communities

Public- A broad category that includes EV charging located in publicly accessible areas or along highway corridors

Workplace- EV charging intended to provide charging to employees during the workday

Commercial/Fleet- EV charging intended to provide charging for electric fleet vehicles, including government and private fleets, car sharing, and transportation network companies.

As of Q1, 2021 there were 91,266 public and workplace Level 2 Electric Vehicle Supply Equipment (EVSE) ports and 17,558 public and workplace Direct-Current fast EVSE ports available in the United States.

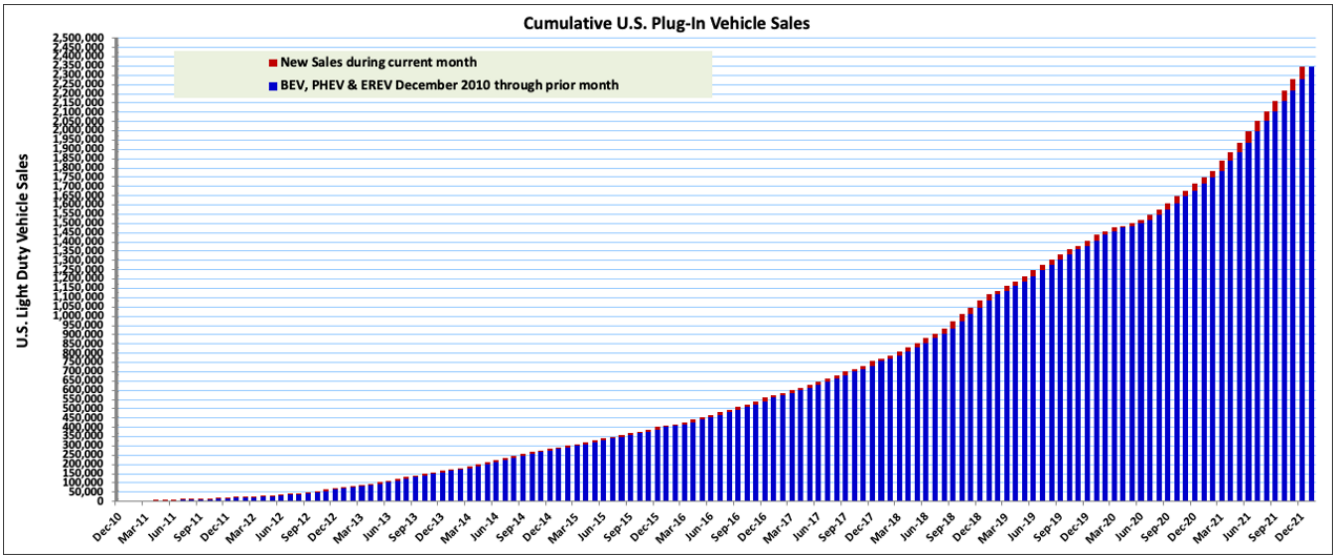
CHARGING OPTIONS	LEVEL 1 (120V)	LEVEL 2 (240V)	DIRECT-CURRENT (DC) FAST CHARGING
			
What does the charge port on the vehicle look like?	 J1772	 J1772	 CCS  CHAdeMO  Tesla Combo
How fast do they charge?	2–5 miles per 1 hour of charging	10–20 miles per 1 hour of charging	At least 60 miles per 20 minutes of charging. Charging time may be shorter depending on station power. *
Can I find them?	• In your house/garage • Possibly at your apartment/condo and workplace • No need to install anything; most automakers provide charger cords	• In your house/garage (You will need additional equipment) • Possibly at your apartment/condo and workplace • At public charging stations	• At public charging stations • Limited availability, though becoming more common

Source ref- EPA.gov

* The charger infrastructure technology is fast-evolving and higher powered DC Fast stations that are able to charge cars faster are becoming more accessible. Furthermore, the newer models of EV come equipped with the ability to accept the faster charge , hence there is a dynamic shift in place.

CHALLENGES TO EV INTEGRATION MODEL

The Biden administration's American Jobs Plan of 2021 will establish grant and incentive programs for state, local, and private sectors to build a network of 500,000 public EVSE ports in the United States by 2030 (The White House 2021b). Once the corresponding legislation and budgets are passed by Congress these efforts will help address the public charging needs. The figures below serves as a useful benchmark for where the country's charging infrastructure is headed and how the challenges noted in this Paper will affect Agencies as they implement EV strategies.



Img ref- https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates

Infrastructure Challenges. In total, 2,430,061 PHEVs and BEVs have been sold in the United States between 2011 and 2021 according to data from the Electric Drive Transportation Association, with 103% sales growth year-over-year from 2020 to 2021. In comparison, there were approximately 116,000 public EVSE ports available as of Q1 2021 in the United States, or 20.2% of the Biden administration's goal of 500,000 public charging stations by 2030. To meet 2030 targets, approximately 11,407 public EVSE ports will need to be installed each quarter for the next 9 years.

Resolving Electrical Grid Constraints. Electrifying federal fleets may require out-of-the-box solutions like on-site microgrids, energy storage, solar and demand charge management strategies to eliminate some of the cost and timeline barriers.

Phasing Out the Old ICE Fleet. To transition into EV fleet, the federal government will have to phase out thousands of old, non-electric ICE vehicles.

Skewed Demand Supply Ratio. EV charging continues to experience rapidly changing technology and growing infrastructure; however, the booming demand is currently met with laggard supply as the process is at nascent stage in many of the states.

Cost. There are two elements of charging infrastructure costs – fixed and variable - both can present significant cost barriers to implementation.

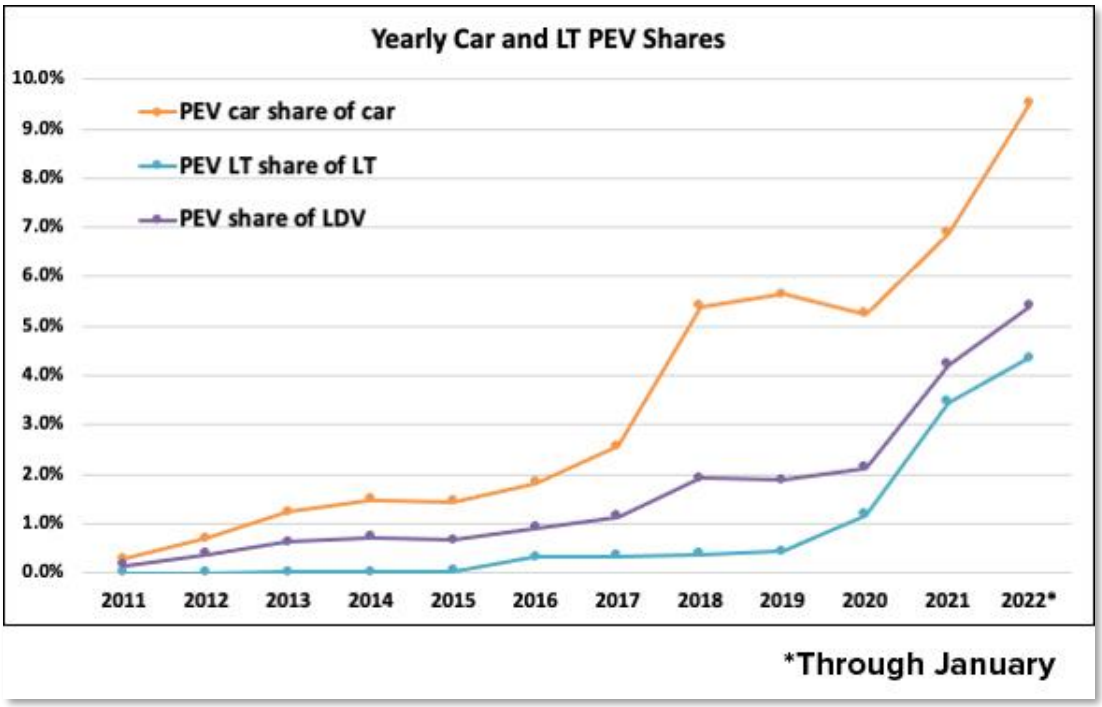
Fixed costs may be associated with upgrading distribution equipment, cybersecurity measures to avoid vehicle hacking, grid modernization, and the replacement of ageing infrastructure.

Variable costs associated with electricity consumption can vary widely depending on the types of charging stations used and how, or if, there are applicable commercial electricity tariffs – which can in some cases dominate operating costs.

Capacity Constraints. High concentration of EV home charging during peak periods can overload local transformers.

Supply Shortages. Component supply shortages coupled with funding roadblocks and a slow fleet turnover, could threaten to stall EV implementation.

Anticipating Demand, Future Planning, Scaling for Growth. Since this field is relatively new, the complexity of the industry dynamics and data constraints make demand forecasting a challenge even for the experts.

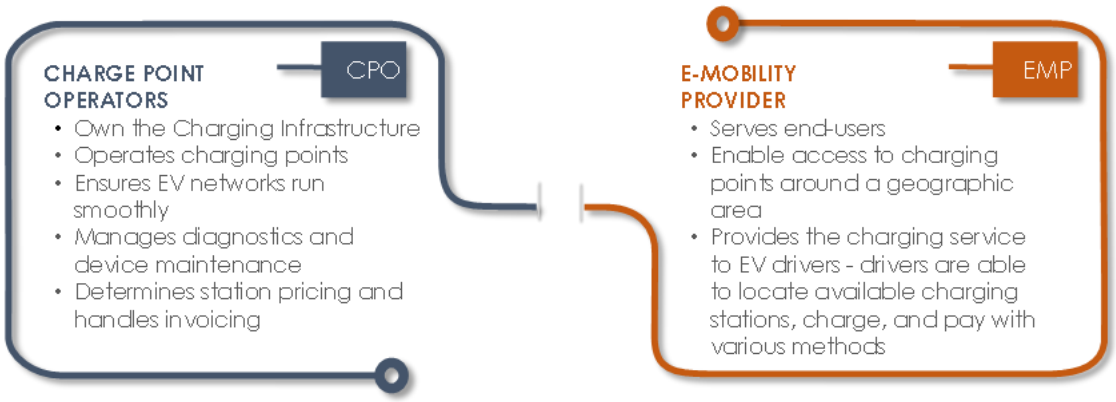


CHARGING AS A SERVICE (CAAS)

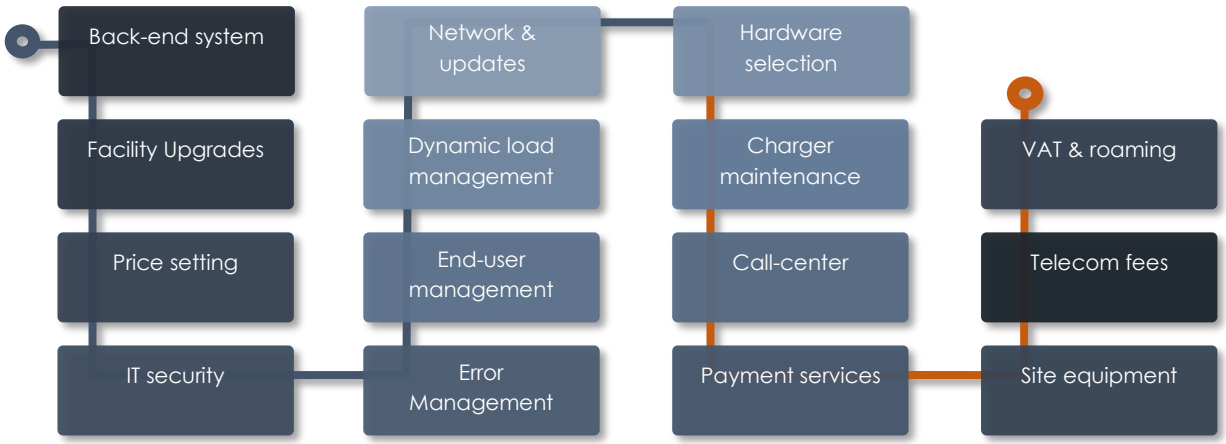
EV Charging as a service (CAAS) is a value-added service and an additional source of revenue for property owners.

Inside the CAAS model, third-party partners install, own, operate (to include point-of-sale cost collections, billing, and reimbursements) and sustain charging capabilities, EVSE, and associated electric and cyber infrastructure for the procuring government Agency. The Government will need to consider solution providers at the installation, regional, or enterprise-wide level. There are two main areas of service that are access points:

Charging as a Service Providers



The Charging as a Service business model provides charging infrastructure and services to accommodate the lifecycle of highly specialized EV charging requirements to include:



Through the CAAS model, implementation risk and overall costs are reduced to the procuring Agency.

Benefits for Partnering with CAAS Service Providers

- Reduction in lead time for implementation of the EV Integration process as CAAS builds on the expertise and infrastructure of the industry partners
- Low upfront costs as EV infrastructure usage and OPEX costs can be bundled
- Rapid adoption of the executive order with innovative solutions from the turnkey EV charging solutions
- Grid integration and regulatory barrier issues can be more easily mitigated
- Scalable solutions to meet demand growth over time while taking into consideration project specific requirements such as charging speeds, reservations/availability, and vehicle prioritization

The ZEV Trend- More Than Green Energy

The President signed an ambitious plan for electrifying the entire Federal fleet, which involves phasing out the traditional ICE vehicles and is forecasted to save the Government billions of dollars. The Federal fleet comprised of 657,000 cars, SUVs, and trucks through the end of last year, of which only 1 % is of electric vehicles.

States have now adopted zero-emissions vehicle requirements modelled after California's Advanced Clean Cars program, meaning that 35% of new vehicle sales in the United States would be required to meet zero-emissions requirements, according to IHS Markit (Adler 2021).

The adoption of emission free cars by the Federal fleet signals the future of embracing EV integration across all verticals, due to the favorable regulatory environment, creation of solid EV infrastructure, plans for building corridors of EV chargers across states to handle a massive variety of vehicles of all shapes and sizes, as well as both on- and off-road and light, medium, and heavy-duty applications.

Pathways to Partner

Agencies looking to partner with a CAAS provider need to deploy an acquisition strategy to include one or more of the following pathways:

- Acquisition through General Services Administration [GSA] Schedule 10-year Area-Wide Contracts
- Utility Privatization
- Enhanced Use Lease [EUL] and Intergovernmental Support Agreements (IGAs), to the extent that any such proposed solution is appropriate for the context proposed
- Energy Savings Performance Contracts (ESPCs) and
- Utility Energy Service Contracts (UESCs)

CONCLUSION

Charging as a Service offers a creative mix of charging solutions and configurations. The multiple configurations of charging stations that can be made available that ensure optimal performance between charge time, battery life for vehicles, real estate requirements, and infrastructure design.

It is estimated that ZEVs will represent 100% of the vehicle market by 2050. The United Kingdom and France are among the many other countries which are signed up for phasing out the ICE vehicles by 2040.

Currently CAAS offers a pathway for the Government, service providers, and industry experts to be among the pioneers in this green revolution, with the possibility of creating a win-win scenario for all parties.

BEST PRACTICES FOR CAAS PARTNERS

KNOW WHAT YOU WANT

- Establish clear goals and success criteria
- What is the funding source?
- Develop a strong program with clear output specifications
- What do you want the partner to do?
- What risk will you assume?
- Benchmark costs and establish targets
- Evaluate strategies

GET THE RIGHT ADVISORS

- Capital formation strategies
- Legal and legislative
- Compliance expertise
- Charging As A Service (CAAS)advisory
- Design and Implementation oversight*
- Communication and public outreach*

HAVE CLEARLY DEFINED PROCESS

- Attainable schedule and milestones
- Goals & expectations
- Design process
- Performance specifications
- Transparency and accountability in process
- Communication plan for internal and external stakeholders

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Concourse has worked on variety of projects leveraging underutilized assets, Utilities, Independent Power Producers (IPP's), Energy Service Companies (ESCO's), and State, Municipal and Regulatory authorities to create holistic third party financed solutions. Our efforts have saved billions for our government and public sector clients. Concourse (www.theconcoursegroup.com) can be contacted at info@theconcoursegroup.com.