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Implementation Approach for Electric Vehicles at Marine Corps Base Camp Lejeune: Task 4

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November 2015

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Implementation Approach for Adoption of Electric Vehicles at Marine Corps Base Camp Lejeune: Task 4

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ABSTRACT

Battelle Energy Alliance, LLC, managing and operating contractor for the U.S. Department of Energy's Idaho National Laboratory, is the lead laboratory for the U.S. Department of Energy's advanced vehicle testing. Battelle Energy Alliance, LLC contracted with Intertek Testing Services, North America (Intertek) to conduct several U.S. Department of Defense-based studies to identify potential U.S. Department of Defense transportation systems that are strong candidates for introduction or expansion of plug-in electric vehicles (PEVs). This study focused on the Marine Corps Base Camp Lejeune (MCBCL), which is located in North Carolina.

Task 1 consisted of a survey of non-tactical fleet vehicles at MCBCL to begin review of vehicle mission assignments and types of vehicles in service. In Task 2, daily operational characteristics of vehicles were identified to select vehicles for further monitoring and attachment of data loggers. Task 3 recorded vehicle movements in order to characterize the vehicles' missions. The results of the data analysis and observations were provided. Individual observations of the selected vehicles provided the basis for recommendations related to PEV adoption (i.e., whether a battery electric vehicle or plug-in hybrid electric vehicle [collectively referred to as PEVs] can fulfill the mission requirements). It also provided the basis for recommendations related to placement of PEV charging infrastructure.

This Task 4 report focuses on an implementation plan for the near-term adoption of PEVs into the MCBCL fleet.

Intertek acknowledges the support of Idaho National Laboratory, Marine Corps headquarters, and MCBCL fleet management and personnel for participation in this study.

EXECUTIVE SUMMARY

Federal agencies are mandated[a] to purchase alternative fuel vehicles, increase consumption of alternative fuels, and reduce petroleum consumption. Available plug-in electric vehicles (PEVs) provide an attractive option in the selection of alternative fuel vehicles. PEVs, which consist of both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), have significant advantages over internal combustion engine (ICE) vehicles in terms of energy efficiency, reduced petroleum consumption, and reduced production of greenhouse gas emissions, and they provide performance benefits with quieter, smoother operation. This study intended to evaluate the extent to which Marine Corps Base Camp Lejeune (MCBCL) could convert part or all of their fleet of vehicles from petroleum-fueled vehicles to PEVs.

More fuel-efficient ICE vehicles, including hybrid electric vehicles, exist that may provide improvements for the current fleet; however, this study's focus is on replacing ICE vehicles with suitable PEVs.

BEVs provide the greatest benefit when it comes to fuel and emissions savings because all motive power is provided by the energy stored in the onboard battery pack. These vehicles use no petroleum and emit no pollutants at their point of use. PHEVs provide similar savings when their battery provides all or a majority of motive power (depending on the PHEV design), but they also have the ability to extend their operating range with an onboard ICE. Because a PHEV can meet all transportation range needs, the adoption of a PHEV will be dependent on its ability to meet other transportation needs such as cargo or passenger capability. Operation of PHEVs in charge depleting-mode, where all or a majority of motive power is provided by the battery, can be increased with opportunity charging at available charging stations. However, not all PHEVs have a mode where the battery provides all motive power at all speeds. Previous work on this study focused on the non-tactical fleet of vehicles at MCBCL to identify a subset of 60 vehicles for data logging in an effort to identify vehicles that may be replaced with PEVs, with emphasis on BEVs that provide the maximum benefit. This report provides an approach for near-term adoption of PEVs at MCBCL.

MCBCL borders on the Atlantic Ocean near Jacksonville, North Carolina. The base and surrounding community is home to an active duty, dependent, retiree, and civilian employee population of approximately 170,000 people. MCBCL contains 156,000 acres and 11 miles of beaches.[b] Adoption of PEVs at MCBCL can have a positive effect on PEV adoption by the retiree and civilian population of the area.

The Task 3 report observed that a mix of BEVs and PHEVs are capable of performing most of the required missions using BEVs for the short trips and PHEVs for the longer trips. It also observed that replacement of vehicles in the current fleet could result in significant reductions in the emission of greenhouse gases and reductions in petroleum use, as well as reductions in fleet operating

[a] Energy Policy act of 1992, Energy Policy Act of 2005, Executive Order 13423, and Energy Independence and Security Act of 2007.

[b] www.lejeune.marines.mil/About.aspx [accessed January 22, 2015].

costs. The other Task 3 report identified potential PEV charging locations should PEV replacements occur.

This report presents a replacement approach for adoption of PEVs at MCBCL. This approach provides a gradual introduction of PEVs into the MCBCL operation and into the balance of the non-tactical fleet. The gradual approach provides a transitional period to allow greater experience in operation, maintenance, and support for PEVs in daily missions. The vehicles introduced by this approach result in 50% of the fleet as PEVs by 2026, assuming the size of the fleet remains as it was in 2015. The projected PEV adoption rate for sedans, non-sedans, and total fleet is presented in Figure ES-1.

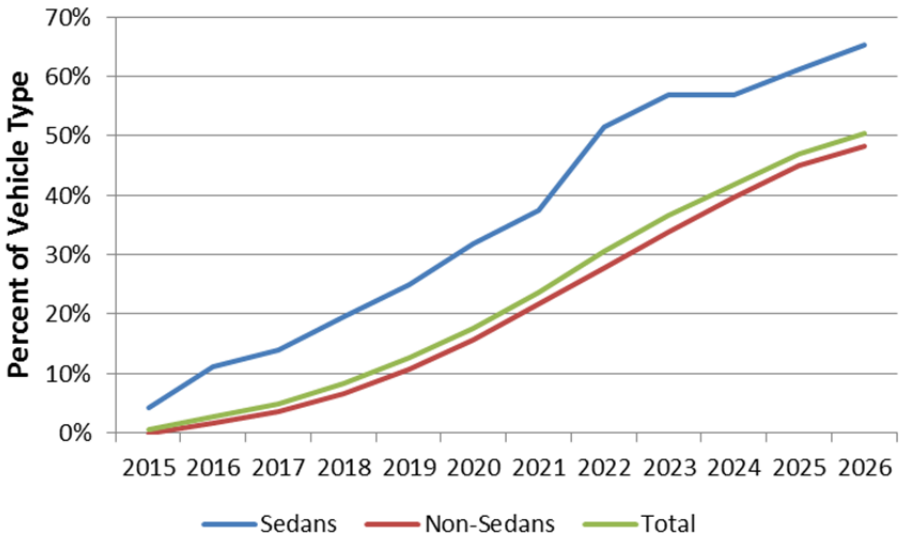

Figure ES-1. Projected PEV adoption rate at MCBCL.

MCBCL will decide whether to adopt PEVs as provided by the General Services Administration only, which now consists only of sedan-type vehicles, or to justify the adoption of non-General Services Administration-listed vehicles. While the greater emphasis and initial adoption is for General Services Administration-listed vehicles, both approaches are presented in this report.

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ACRONYMS

AC	alternating current
BEV	battery electric vehicle
DC	direct current
EPA	U.S. Environmental Protection Agency
EVSE	electric vehicle supply equipment
GHG	greenhouse gas emissions
GSA	General Services Administration
ICE	internal combustion engine
Intertek	Intertek Testing Services, North America
MCBCL	Marine Corps Base Camp Lejeune
OEM	original equipment manufacturer
PEV	plug-in electric vehicles
PHEV	plug-in hybrid electric vehicle
SUV	sports utility vehicle

Electric Vehicle Preparedness: Implementation Approach for Plug-in Electric Vehicles at Marine Corps Base Camp Lejeune: Task 4

1. INTRODUCTION

The U.S. Department of Energy and the U.S. Department of Defense signed a memorandum of understanding on July 22, 2010, for strengthening coordination of efforts to enhance national energy security and to demonstrate federal government leadership in transitioning the United States to a low carbon economy. The memorandum of understanding included efforts in the areas of energy efficiency, fossil fuels, alternative fuels, efficient transportation technologies and fueling infrastructure, grid security, smart grid, and energy storage.

In support of the memorandum of understanding, the Idaho National Laboratory, with funding provided by the U.S. Department of Energy's Vehicle Technologies Office and Federal Energy Management Program, directed Intertek Testing Services, North America (Intertek) to conduct several U.S. Department of Defense-based studies to identify potential transportation systems that are strong candidates for introduction or expansion of plug-in electric vehicles (PEVs). Intertek previously conducted similar fleet, city, state, and countrywide studies using their micro-climate assessment process, which consists of the following four main tasks:

- Task 1: Conduct a non-tactical fleet and infrastructure assessment
- Task 2: Select vehicles for mission and fleet characterizations
- Task 3: Perform detailed assessment of selected vehicles and charging infrastructure needs
- Task 4: Prepare adoption approach for PEV and charging infrastructure.

Assessment of the potential for replacing Marine Corps Base Camp Lejeune (MCBCL) fleet vehicles with PEVs starts with an assessment of the fleet vehicles' missions and vehicle characteristics. This assessment was conducted through correspondence with fleet managers and records analysis. The Task 1 report titled, *Assessment of Data and Survey Results for Marine Corps Base Camp Lejeune*, dated January 2015, provided a summary and fleet assessment.

PEVs generally are classified into two vehicle types: battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). A BEV contains an onboard battery that provides all motive power. PHEVs also have an onboard battery that provides some motive power but there is also another motive power source (such as a gasoline engine). PHEVs have, in general, two modes: (1) charge-depleting (CD) mode, where the battery provides all or most (depending on the PHEV design) motive power and the battery is being depleted, and (2) charge-sustaining (CS) mode, where the non-battery power source provides the majority of the motive power while being supplemented by the battery power with the battery state of charge being maintained within a designed range. A BEV can be considered to operate solely in CD mode. Collectively, BEVs and PHEVs are PEVs.

The Task 1 effort led to identification of fleet vehicles that appeared to be good candidates for replacement by PEVs. The Task 2 report titled, *Identification of Marine Corps Base Camp Lejeune Vehicles for Installation of Data Loggers*, dated February 2015, identified 60 vehicles within the candidate groups for further monitoring and analysis through addition of vehicle data loggers. The data loggers were installed and data were collected on the selected vehicles. The Task 3 report titled, *Utilization Assessment of Target Electrification Vehicles at Marine Corps Base Camp Lejeune*, dated August 2015, provided a summary and details of data collection for the monitored vehicles and extrapolated that to the entire non-tactical fleet of vehicles at MCBCL. The other Task 3 report, titled, *Assessment of Charging Infrastructure for Plug-in Electric Vehicles at Marine Corps Base Camp*

Lejeune, dated August 2015, provided the related charging infrastructure assessment. This report provides an implementation approach for adoption of PEVs at MCBCL in the next few years.

2. NON-TACTICAL VEHICLES

MCBCL reported 784 vehicles in its non-tactical fleet, not counting non-powered equipment, low-speed vehicles, and heavy-duty trucks. The Task 1 report identified the 25 tenant commands (i.e., Commands) and Marine Corps Installations East (i.e., MCIE) departments and divisions to which the vehicles were assigned. Table 1 provides a summary of the vehicle types by class and group.

Table 1. MCBCL non-tactical fleet summary.

	Sedan – Compact	Sedan – Midsize	Sedan – Large	Minivan	SUV	Van Cargo	Van Pass	Pickup	Specialty	Total
Commands	1	7	5	30	20	12	66	108	—	249
MCIE	5	16	38	37	56	50	43	228	62	535
Total	6	23	43	67	76	62	109	336	62	784

Figure 1 shows the vehicle type distribution for all vehicles for comparison.

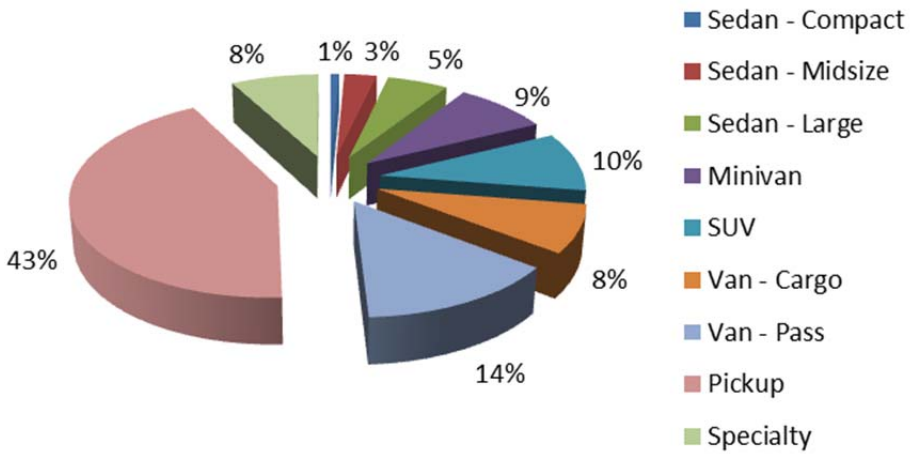

Figure 1. Vehicle type distribution for all non-tactical vehicles.

MCBCL identified 60 vehicles for further study as described in the Task 2 report. Table 2 categorizes the monitored vehicles. This distribution is approximately representative of the entire non-tactical fleet.

Table 2. MCBCL monitored vehicles by group.

	Sedan - Compact	Sedan - Midsize	Sedan- Large	Minivan	SUV	Van Cargo	Van Pass	Pickup	Specialty	Total
Commands	—	—	—	2	3	—	6	7	—	18
MCIE	2	2	—	3	6	4	2	21	2	42
Total	2	2	—	5	9	4	8	28	2	60

The fleet vehicles are used for a variety of purposes by several different divisions on base. Section 2.2 provides details about these purposes or missions. The category of the mission can be helpful in identifying PEVs as potential replacements.

The initial survey also identified the fuel used by the fleet vehicles. In particular, MCBCL has implemented a significant emphasis on E85 fuel used by a majority of the vehicles types. Diesel fuel is

used primarily for specialty vehicles, larger pickup trucks, and cargo vans. Figure 2 illustrates fuel types in use at MCBCL.

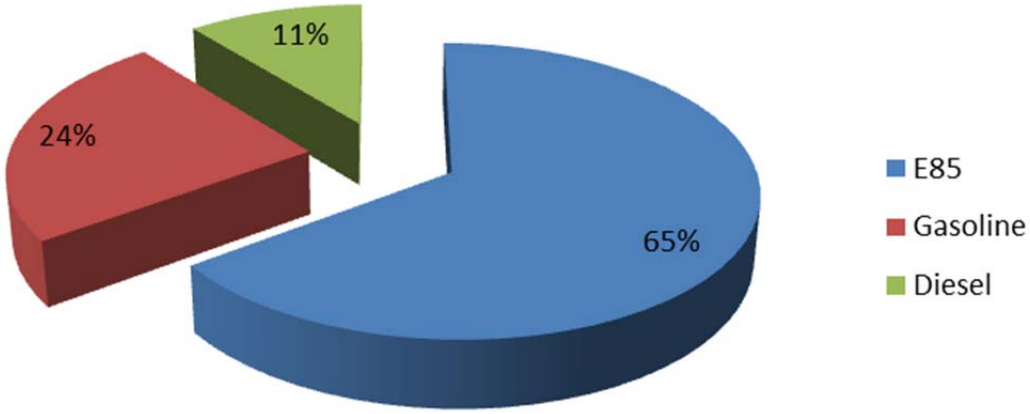

Figure 2. Fuel-type distribution for all vehicles.

2.1 Vehicle Missions

Vehicle mission is an important characteristic in the fleet study. Intertek has established the following seven mission/vehicle categories for analysis. The categories are listed as follows and depicted in Figure 3:

1. **Pool vehicles**: A pool vehicle is any automobile (other than the low-speed vehicle identified below) manufactured primarily for use in passenger transportation, with not more than 10 passengers.
2. **Enforcement vehicles**: Vehicles specifically approved in an agency's appropriation act for use in apprehension, surveillance, police, or other law enforcement work. This category also includes site security vehicles, parking enforcement, and general use, but the vehicles are capable of requirements to support enforcement activities.
3. **Support vehicles**: Vehicles assigned to a specific work function or group to support the mission of that group. Vehicles are generally passenger vehicles or light-duty pickup trucks and may contain after-market modifications to support the mission.
2. **Transport vehicles**: Light, medium, or heavy-duty trucks used to transport an operator and tools or equipment of a non-specific design or nature. The vehicle's possible uses include repair, maintenance, and delivery.
3. **Specialty vehicles**: Vehicles designed to accommodate a specific purpose or mission (such as ambulances, mobile cranes, and handicap controls).
4. **Shuttles/buses**: Vehicles designed to carry more than 12 passengers and further outlined in 49 CFR 532.2.
5. **Low-speed vehicle:** Vehicles that are legally limited to roads with posted speed limits up to 35 or 45 mph (depending on state law) and that have a limited load-carrying capability.

Vehicle mission assignments can be useful for identifying the type of potential replacement PEV (see Section 3).

Figure 3. Vehicle missions.

2.2 General Services Administration Vehicle Replacement Requirements

Table 3 presents the General Services Administration (GSA) replacement requirements for fleet vehicles. Both the age and mileage requirements need to be met in order for the vehicle to qualify for replacement, except where noted as "or."

Table 3. GSA vehicle replacement requirements.

GSA Vehicle Replacement Requirements[3]			
	Fuel Type	Years	Miles
Passenger vehicles	Gasoline or alternative fuel vehicle	3 4 5 Any age	36,000 24,000 Any mileage 75,000
	Hybrid	5	Any mileage
	Low-speed BEV	6	Any mileage
Light trucks 4 x 2	Non-diesel	7 or	65,000
	Diesel	8 or	150,000
	Hybrid	7	Any mileage
Light trucks 4 x 4	Non-diesel	7 or	60,000
	Diesel	8 or	150,000
	Hybrid	7	Any mileage
Medium trucks	Non-diesel	10 or	100,000
	Diesel	10 or	150,000
Heavy Trucks	Non-diesel	12 or	100,000
	Diesel	12 or	250,000

[3] http://www.gsa.gov/graphics/fas/VehicleReplacementStandardsJune2011Redux.pdf [accessed March 12, 2015].

2.3 Plug-In Electric Vehicle Availability

The adoption of PHEVs and BEVs is the primary goal of GSA and it supports many directives in this area. As GSA increases its certification of PHEVs and BEVs, agencies can plan for vehicle replacement through GSA for passenger vehicles and trucks. GSA provides a summary of light and medium-duty passenger vehicles available for lease or purchase through the GSA portal;[4] however, not all BEVs and PHEVs currently on the market are 'certified' to be GSA replacements. Vehicles not on the GSA list of 'certified' vehicles require an agency to self-certify a functional need or alternative measures for exemptions. Tables 4 and 5 summarize the vehicles that may be suitable replacements and are certified replacements through GSA. Note that the "CD/CS" column provides the U.S. Environmental Protection Agency (EPA) fuel economy values for CD and CS modes of the PHEVs, while the city and highway fuel economy values are provided for BEVs. The fuel economy of the PHEV CD mode and BEVs is provided in units of miles-per-gallon-of-gasoline-equivalent (MPGe). This metric allows electricity consumption to be compared with fuel consumption during CS mode (or against conventional vehicles). The Nissan Leaf and Mitsubishi i-MiEV are not included in the alternative fuel guide for 2015, but they have appeared in previous guides. For MCBCL, replacement is dependent on vehicle configuration characteristics and the PEV's ability to meet the vehicle's mission.

Original equipment manufacturers (OEM) provide information related to a vehicle's range in CD mode and EPA provides test results. However, actual results may vary depending on several factors other than travel that may also deplete a vehicle's battery. These factors include changes in the battery's capacity over time, area topography, weather conditions (e.g., cabin cooling/heating), payload, and so forth. This report will identify a BEV's "safe range" as 70 miles because this typically is less than the advertised range of most BEVs. The PHEV's safe range in CD mode is 30 miles.

Tables 6 through 9 provide summaries of PHEVs and BEVs that are either currently available or near commercialization in both passenger cars and pickup trucks, but do not appear on the GSA 'certified' vehicle list. These vehicles may qualify for use by the agency through demonstrating a functional need.

Table 4. GSA-certified PHEVs for 2015.

Make/Model	GSA Class	Type	CD/CS	GSA Incremental Price
Chevrolet Volt*	Sedan, Subcompact	PHEV	98 MPGe/37 mpg	$17,692.17
Ford C-MAX Energi	Sedan, Subcompact	PHEV	88/38 mpg	$14,062.23
Ford Fusion Energi	Sedan, Compact	PHEV	88/38 mpg	$13,640.05

*The Chevrolet Volt has an all-electric CD mode rated for 38 miles. The Ford vehicles have blended CD modes rated for 20 miles.

Table 5. GSA-certified BEVs for 2015.

Make/Model	GSA Class	Type	City/Highway	GSA Incremental Price
Ford Focus Electric	Sedan, Subcompact	BEV	110/99 MPGe	$11,351.15
Smart Fortwo ED	Sedan, Microcompact	BEV	123/93 MPGe	$7,277.05

Note that EPA differs from GSA in vehicle class designation. EPA identifies the Volt as a compact, the C-MAX Energi as a midsize, the Fusion Energi as a midsize, and the Focus as a compact.[5]

[4] http://www.gsa.gov/portal/content/104211 [accessed August 1, 2014]

[5] http://www.fueleconomy.gov/feg/Find.do?action=sbs&id=34130 [accessed August 1, 2014]

Table 6. OEM PHEV cars and availability.

Make	EPA Class	Model	Initial Model Year/Estimated Year for Commercialization
Chevrolet	Compact	Volt	2011
Ford	Midsize	C-MAX Energi	2013
Ford	Midsize	Fusion Energi	2013
Toyota	Midsize	Prius PHEV	2012
Honda	Midsize	Accord PHEV*	2014
Cadillac	Subcompact	ELR	2014
Porsche	Large	Panamera S E-Hybrid	2014
BMW	Subcompact	i3 REx	2014
BMW	Subcompact	i8	2014
Hyundai	Midsize	Sonata PHEV	2015 (estimate)
Audi	Compact	A3 e-Tron	2016 (estimate)
Mercedes	Subcompact	C350 PHEV	2016 (estimate)
Mercedes	Large	S550 PHEV	2016 (estimate)

* Honda did not release a MY2015 Accord PHEV; the return of this vehicle model is uncertain.

Table 7. OEM BEV cars and availability.

Make	EPA Class	Model	Initial Model Year/Estimated Year for Commercialization
Nissan	Midsize	Leaf	2011
Ford	Compact	Focus Electric	2012
Tesla	Large	Model S	2012
Mitsubishi	Subcompact	i-MiEV*	2012
Fiat	Mini	500e	2013
Honda	Small Station Wagon	Fit EV	2013
smart	Two Seater	Fortwo ED	2013
BMW	Subcompact	i3	2014
Chevrolet	Subcompact	Spark EV	2014
Kia	Small Station Wagon	Soul EV	2014
Volkswagen	Compact	e-Golf	2015
Mercedes-Benz	Midsize	B-Class Electric Drive	2015
Chevrolet	Compact	Bolt	2017 (estimate)

* Mitsubishi did not manufacture a MY15 i-MiEV; the vehicle returned in the 2016 MY.

Table 8. OEM PHEV trucks and vans and availability.

Make	EPA Class	Model	Initial Model Year/Estimated Year for Commercialization
Via	Standard Pickup Truck	VTRUX VR300	2013
Via	Special Purpose Vehicle	VTRUX Cargo Van	2013
Via	Vans, Cargo Type	VTRUX Pass Van	2013
Mercedes	SUV	GLE 550e	2016 (estimate)
Mitsubishi	Small SUV	Outlander PHEV	2016 (estimate)
Volvo	SUV	XC90 T8	2016 (estimate)
BMW	SUV	X5 xDrive 40e	2016 (estimate)
Chrysler	Minivan	Town & Country	2017 (estimate)
Audi	SUV	Q7 e-Tron Quattro	2017 (estimate)

Table 9. OEM BEV trucks and vans and availability.

Make	EPA Class	Model	Initial Model Year/Estimated Year for Commercialization
Tesla	Standard SUV	Model X	2015 (estimate)
Nissan	Van	e-NV200	2016 (estimate)

As further indication of the expanding market for PEVs, companies are offering after-market vehicle upgrades involving addition of plug-in capabilities to OEM vehicles. For example, Echo Automotive headquartered in Scottsdale, Arizona offers a "…low-cost, bolt-on, plug-in hybrid system that can quickly be installed on new or existing fleet vehicles to increase fuel efficiency and decrease operating costs – all without affecting the OEM power train or requiring costly infrastructure."[6] EVAOS conducts upgrades of Ford F-series pickup trucks to PHEV models and has delivered vehicles to the U.S. Air Force.[7] Options such as these conversions might be of benefit for vehicles in the MCBCL fleet for which no replacement PEV is currently available.

2.4 Plug-In Electric Vehicle Charging

Refueling electric vehicles presents some challenges and some opportunities not encountered when refueling petroleum-fueled vehicles. Recharging the battery of a PHEV follows the same methodology as that for BEVs. The Task 3 infrastructure report provides detailed information on recharging PEVs.

Most PEV manufacturers supply an alternating current (AC) Level 1 cordset with the vehicle, which provides sufficient capabilities for some drivers, but more typically provides an emergency backup capability because of the long recharge times. AC recharging capabilities found in the public arena more typically are AC Level 2.

Because the battery of a BEV is typically much larger than that of a PHEV, recharge times are longer. BEVs that see daily mileage near the limits of the advertised range do better when recharged using AC Level 2 electric vehicle supply equipment (EVSE) or direct current (DC) fast charging, because AC Level 1 recharge times are usually extensive. PHEVs, on the other hand, generally can use AC Level 1 EVSE for overnight charging to ensure a fully charged battery at the start of daily use. AC Level 2 EVSE units provide greater range in the shortest amount of time when intermediate or opportunity charging. DC fast charging provides the fastest recharge capability for those vehicles equipped with DC fast charge inlets; however, currently, no PHEVs have DC fast charging capability available and there are no announced plans for one to be introduced. The Task 3 reports show that the PEVs studied do not need to rely on DC fast charging to complete their missions.

3. VEHICLE MISSION REPLACEMENT GUIDANCE

3.1 Background and Methods

Section 2.2 identified the mission categories for analysis. The Task 3 report provided specific information for the monitored fleet based on vehicle mission. When suitable PEV types are available to replace the internal combustion engine (ICE) vehicles in the current fleet, the specific mission of the vehicle to be replaced can be a guide in determining whether a BEV or PHEV should be selected. As previously noted, the greater fuel cost savings and greenhouse gas (GHG) reductions occur with BEVs than with PHEVs, which suggests a greater emphasis on BEVs. For MCBCL, the missions monitored included pool, support, enforcement, and two specialty vehicles.

[6] http://www.echoautomotive.com/index.php?option=com_content&view=article&id=8 [accessed July 14, 2014].

[7] http://www.evaos.com [accessed November 20, 2014].

Aside from specific mission functions, the distance a PEV can travel in CD mode between charge opportunities is the most important factor in considering vehicle replacement. The two most significant considerations in vehicle analysis include the vehicle's total daily travel and vehicle outings.

3.2 Pool Mission Guidance

Ten of the vehicles monitored at MCBCL were assigned a pool mission. These vehicles included one sedan, two minivans, two sports utility vehicles (SUVs), two passenger vans, one cargo van, and two pickups. The overall summary for these vehicles is shown in Table 10. These vehicles traveled 6,672 miles, logged 446 hours, and idled for 155 hours during the 31-day study period.

Table 10. MCBCL pool vehicle travel summary.

Pool Vehicles Travel Summary				
	Per Day Average/Peak	Per Outing Average/Peak	Per Trip Average/Peak	Total
Travel Distance (Miles)	35.9/289.4	8.9/537.2	4.6/258.5	6,672
Travel Time (Minutes)	144.0/1,140.0	35.9/875.0	18.4/504.0	26,781
Idle Time (Minutes)	50.2/NA	12.5/NA	6.4/NA	9,328

Figure 4 shows daily travel and outing travel for the group of pool vehicles.

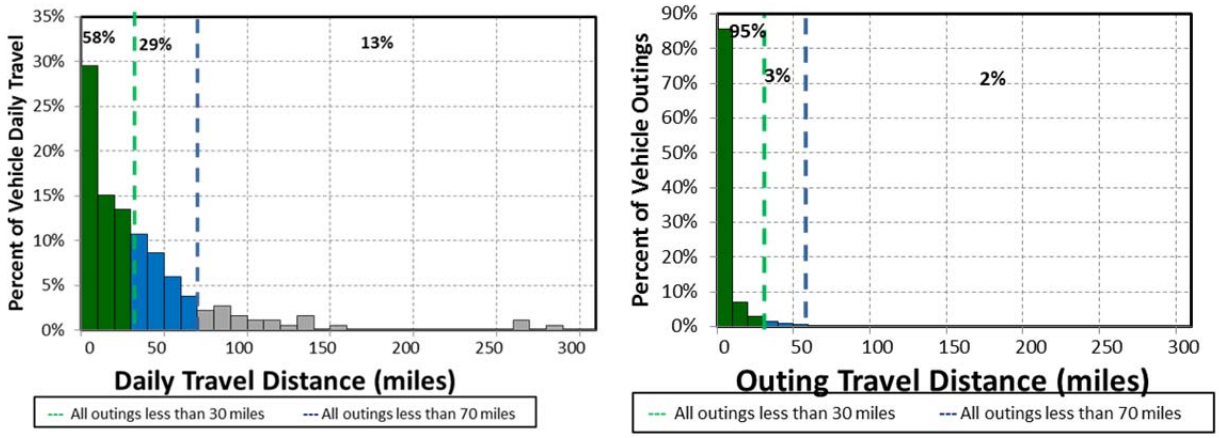

Figure 4. MCBCL pool vehicle daily and outing travel.

The highest outing distance of 537 miles is not displayed in Figure 4 for clarity of scale. A BEV's safe range is considered to be 70 miles (blue and green bars in Figure 4). While a BEV's range can vary based on several factors, most BEVs provide at least 70 miles of vehicle range on a single battery charge.

The average travel distance per day when driven for pool vehicles was 35.9 miles. On 87% of the vehicle travel days, the daily travel was less than the 70 miles considered to be within the BEV safe range. Meanwhile, 58% of vehicle travel days were less than 30 miles considered to be within the CD range of a PHEV (green bars of Figure 4).

The average outing distance driven by pool vehicles was 8.9 miles. Further, 98% of the outing travel was less than the 70 miles considered to be within the BEV safe range (blue and green bars in Figure 4). Meanwhile, 95% of the vehicle outings were less than the 30 miles considered to be within the CD range of a PHEV (green bars of Figure 4).

In general then, if a suitable PEV body style meets vehicle requirements, then 87% of a pool fleet could be BEVs and 13% PHEVs to allow for daily travel greater than the range of the BEV. The fleet

manager would likely desire a more conservative approach to allow for flexibility, but this shows the high capability of BEVs to meet the pool mission at MCBCL.

3.3 Support Mission Guidance

Forty-three of the vehicles monitored at MCBCL provided a support mission. These vehicles included three compact and mid-size sedans, three minivans, five SUVs, 23 pickup trucks, six passenger vans, and three cargo vans. The overall summary for these vehicles is shown in Table 11. These vehicles traveled 36,601 miles, logged 1,745 hours, and idled for 439 hours during the study period.

Table 11. MCBCL support vehicle travel summary.

Support Vehicles Travel Summary				
	Per Day Average/Peak	Per Outing Average/Peak	Per Trip Average/Peak	Total
Travel Distance (Miles)	46.0/405.0	18.1/1,012.4	6.8/208.1	36,601
Travel Time (Minutes)	131.5/836.0	51.7/1,443.0	19.4/362.0	104,690
Idle Time (Minutes)	33.1/NA	13.0/NA	4.9/NA	26,336

Figure 5 shows the daily travel and outing travel for the group of support vehicles.

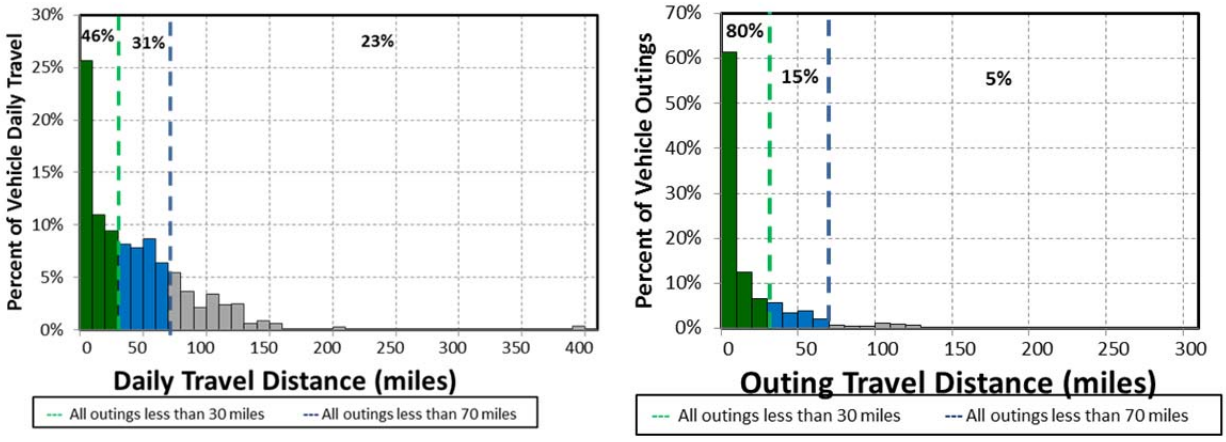

Figure 5. MCBCL support vehicle daily travel and outage distance.

Figure 5 does not show the highest outings of 1,012; 788; and 785 miles for clarity of scale.

The average travel distance per day when driven for support vehicles was 46 miles. On 77% of the vehicle travel days, the daily travel was less than the 70 miles considered to be within the BEV safe range (blue and green bars in Figure 5). In addition, 46% of vehicle travel days were less than 30 miles considered to be within the CD range of a PHEV (green bars of Figure 5).

The average travel outing when driven for support vehicles was 18.1 miles. On 95% of these vehicle outings, the distance traveled was less than the 70 miles considered to be within the BEV safe range. Meanwhile, 5% of support outing travel was greater than 70 miles. Furthermore, 80% of vehicle travel outings were less than the 30 miles considered to be within the CD range of a PHEV.

In general then, if a suitable PEV body style meets vehicle requirements, 77% of the support fleet could be BEVs and 23% PHEVs to allow for daily travel greater than the range of the BEV. The fleet manager would likely desire a more conservative approach to allow for flexibility, but this shows the high capability of BEVs to meet the support mission at MCBCL.

3.4 Enforcement Mission Guidance

Enforcement vehicles are typically light-duty motor vehicles specifically approved in an agency's appropriation act for use in apprehension, surveillance, police, or other law enforcement work. Enforcement missions can vary by agency, location, and jurisdiction; however, they typically utilize sedans, minivans, vans, or small pickup trucks and typically do not carry specific cargo or equipment with the exception of K-9 units. Five of the vehicles monitored at MCBCL provided the enforcement mission. These vehicles included two SUVs and three pickup trucks. The overall summary for these vehicles is shown in Table 12. These vehicles traveled 6,106 miles, logged 520 hours, and idled for 295 hours during the study period.

Table 12. MCBCL enforcement vehicle travel summary.

Enforcement Vehicles Travel Summary				
	Per Day Average/Peak	Per Outing Average/Peak	Per Trip Average/Peak	Total
Travel Distance (Miles)	51.3/208.1	20.6/167.6	6.8/99.7	6,106
Travel Time (Minutes)	262.4/1,464.0	105.5/1,209.0	35.0/752.0	31,228
Idle Time (Minutes)	149.7/NA	60.2/NA	20.0/NA	17,726

Figure 6 shows the daily travel and outing travel for the group of enforcement vehicles. The average travel distance per day when driven for enforcement vehicles was 51.3 miles. On 73% of the vehicle travel days, the daily travel was less than the 70 miles considered to be within the BEV safe range (blue and green bars in Figure 6). Meanwhile, 27% of vehicle travel days were less than the 30 miles considered to be within the CD range of a PHEV (green bars of Figure 6).

The average outing distance driven by support vehicles was 20.6 miles. Further, 95% of the outing travel was less than the 70 miles considered to be within the BEV's safe range (blue and green bars in Figure 6). Meanwhile, 80% of vehicle outings were less than the 30 miles considered to be within the CD range of a PHEV (green bars of Figure 6).

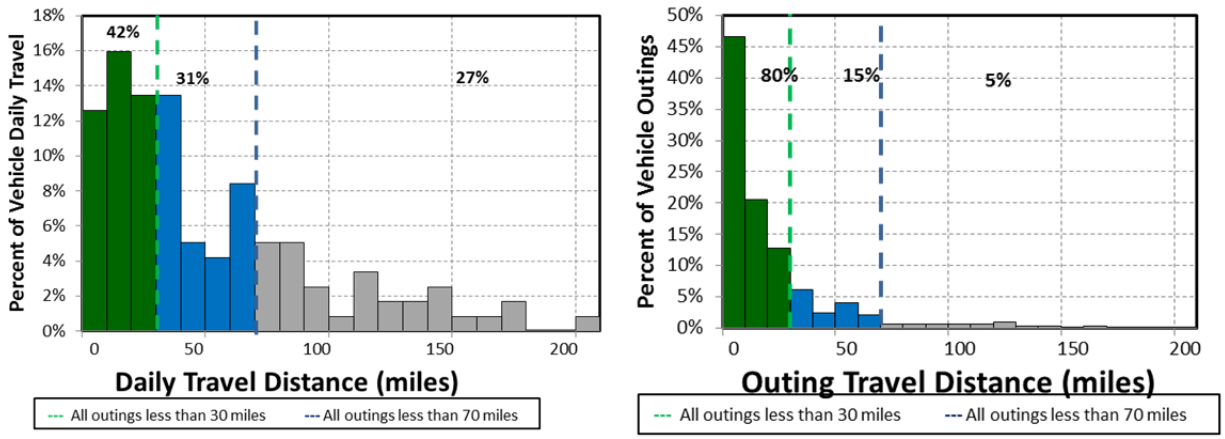

Figure 6. MCBCL enforcement vehicle daily travel and outing travel.

In general, if a suitable PEV body style meets vehicle requirements, 73% of an enforcement fleet could be BEVs and 27% PHEVs to allow for daily travel greater than the range of the BEV. However, enforcement fleet managers typically will desire vehicles without range limitations and would favor a higher percentage of PHEVs. The specific duties of some enforcement vehicles, such as parking

enforcement, could be accomplished by BEVs. Although more PHEVs might be desired, this analysis shows the high capability of BEVs to meet this enforcement mission at MCBCL.

3.5 Specialty Mission Guidance

Two of the vehicles monitored at MCBCL provided a specialty mission. One is a refrigeration truck and the other a bucket truck. The refrigeration truck, operated as a pool vehicle, was not used during the study period. The overall summary for the bucket truck is shown in Table 13. This vehicle traveled 237 miles, logged 21 hours, and idled for 12 hours.

Table 13. MCBCL specialty vehicle travel summary.

Specialty Vehicles Travel Summary				
	Per Day Average/Peak	Per Outing Average/Peak	Per Trip Average/Peak	Total
Travel Distance (Miles)	23.7/69.4	8.5/39.0	4.8/39.0	237
Travel Time (Minutes)	126.6/271.0	45.2/171.0	25.8/152.0	1,266
Idle Time (Minutes)	2.1/NA	26.6/NA	5.2/NA	746

Figure 7 shows the daily travel and outing travel for this specialty vehicle.

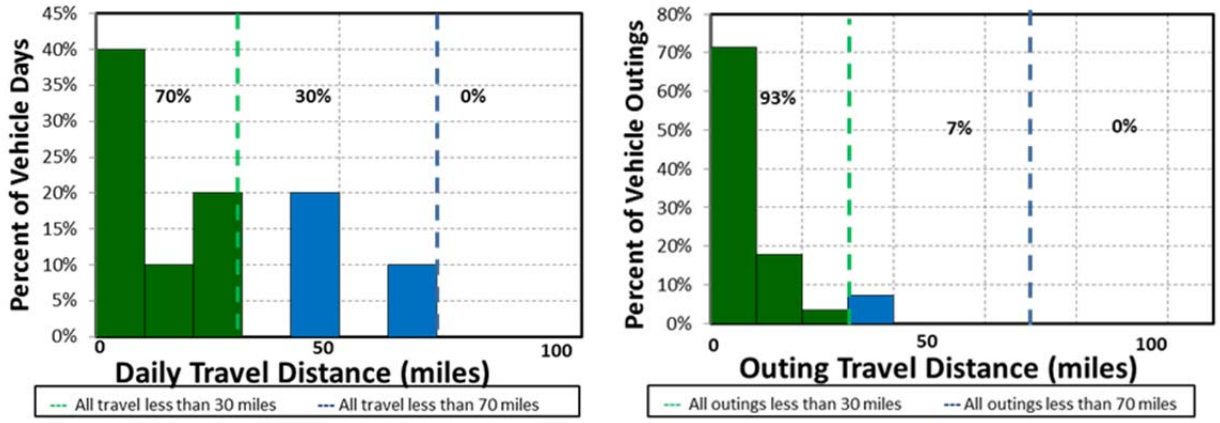

Figure 7. MCBCL specialty vehicle daily travel and outage distance.

The average travel distance per day when driven for this specialty vehicle was 23.7 miles. On all vehicle travel days, the daily travel was less than the 70 miles considered to be within the BEV safe range (blue and green bars in Figure 7). In addition, 70% of vehicle travel days were less than the 30 miles considered to be within the CD range of a PHEV (green bars of Figure 7).

The average outing distance driven by this specialty vehicle was 8.5 miles. All outing travel was less than the 70 miles considered to be within the BEV safe range (blue and green bars in Figure 7). Meanwhile, 93% of vehicle outings were less than the 30 miles considered to be within the CD range of a PHEV (green bars of Figure 7).

In general, if a suitable PEV body style meets vehicle requirements, all of the specialty fleet could be BEVs. However, at this writing, bucket trucks are available only in a PHEV model. This model could fulfill the bucket truck requirements for MCBCL.

4. MARINE CORPS BASE CAMP LEJEUNE REPLACEMENT APPROACH

Executive Order 13693 issued on March 25, 2015, directs "…that by December 31, 2020, zero emission vehicles or plug-in hybrid vehicles account for 20 percent of all new agency passenger vehicle acquisitions and by December 31, 2025, zero emission vehicles or plug-in hybrid vehicles account for 50 percent of all new agency passenger vehicles…".[8] The goal of the approach outlined here is to be consistent with this executive order.

Sixty vehicles belonging to Commands and MCIE were included in the study at MCBCL. The specific requirements of each necessitated that data be analyzed for each individual fleet. The results were extrapolated to the entire non-tactical fleet at MCBCL.

Tables 4 and 5 identified that at the time of this report, GSA has certified five sedan vehicles for replacement as PEVs: three PHEVs and two BEVs. Consequently, the group of potential replacements involves only sedans – a rather small subset of fleet vehicles and only 9% of the vehicles at MCBCL.

Tables 6 through 9 identified other vehicles that are currently or soon to be available but are not listed by GSA. These vehicles provide potential replacements for all non-tactical fleet vehicles except heavy-duty trucks, buses, and specialty vehicles. While the PEV market has introduced and delivered several specialty vehicles on heavy-duty truck frames (e.g., delivery trucks) and electric buses to several customers, their charging needs are typically specialized and generally are not included in this report. Bucket trucks were the primary exception because electric utilities are promoting the conversion of ICE vehicles to PHEV models.

If all PEVs in the tables are included for replacement consideration, the potential includes most (i.e., 775) of the vehicles at MCBCL, except heavy-duty trucks, non-powered vehicles, material handling equipment, and 53 specialty vehicles.

After-market vehicle modifications are also available for converting ICE vehicles to PHEVs and may be considered by MCBCL for vehicles types not currently available.

Appendices A and B provide the details of each monitored vehicle as reported in the Task 3 report. These also identify the suggested PEV replacement vehicle. Note that these replacements are examples of potential PEV replacement. When the ICE vehicle at MCBCL is scheduled for replacement, the available PEV replacements at that time may provide a greater selection opportunity.

The replacement approach for each of the groups and the balance of the MCBCL vehicles is presented in Appendices C and D.

There are four approaches identified for each group:

- Monitored vehicles
  - GSA-listed PEVs only
  - All potential PEV types
- Balance of the full fleet
  - GSA-listed PEVs only
  - All potential PEV types.

MCBCL will need to develop their approach based on specific conditions and requirements. For example, if GSA continues to list sedans only, either MCBCL will need to justify vehicles not listed by

[8] http://www.gpo.gov/fdsys/pkg/FR-2015-03-25/pdf/2015-07016.pdf [accessed August 4, 2015]

GSA or review vehicle needs to replace other vehicle types with sedans. For example, pickup trucks are the most popular vehicle type, but it may be possible that the mission for many of the pickups can be accomplished by a sedan. It is more likely that GSA will list other PEV body types in the coming years to provide more options as more PEVs become available.

The extensive analysis conducted for monitored vehicles (Task 3) results in high confidence that the suggested vehicle can meet the mission requirements. The suggested vehicles for the full fleet rely on extrapolation of those monitored vehicles and the guidance identified in Section 3.

The overall plan is presented first in this section followed by the effects to each of the fleet groups.

4.1 Marine Corps Base Camp Lejeune Summary Replacement Approach

Table 1 identified the types of vehicles by fleet group at MCBCL at the time of the analysis. Supporting incorporation of PEVs into this fleet is the objective of this task. The full fleet inventory was analyzed in 2015 and replacement vehicles were projected for 2015 through 2035. Tale 14 provides the full fleet replacement projections based on GSA replacement criteria and current fleet inventory age, quantity, and mileage. Many of the MCBCL vehicles have exceeded the minimum replacement criteria; this is expected to continue into the coming years of these projections. Note that heavy-duty trucks and buses were excluded from this list. Some heavy-duty specialty trucks have completed conversion to PEVs in demonstration projects. However, few have become commercialized. Electric utilities have promoted bucket trucks with electric drive and these were considered in this replacement approach.

Table 14. Projected fleet vehicle replacements at MCBCL.

Year	Sedan - Compact	Sedan - Midsize	Sedan- Large	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total
2015	—	—	3	1	—	—	1	—	—	5
2016	—	—	20	—	5	3	13	13	5	59
2017	—	2	—	7	6	5	5	16	2	43
2018	—	1	5	7	9	3	12	22	2	61
2019	—	—	4	3	13	1	7	21	—	49
2020	—	3	3	6	12	3	13	27	3	70
2021	—	2	2	10	8	4	7	19	1	53
2022	3	12	—	3	6	6	7	16	1	54
2023	2	2	1	4	1	2	9	27	1	49
2024	—	—	—	6	5	5	8	23	2	49
2025	—	1	3	9	1	4	6	21	4	49
2026	1	—	2	3	—	4	2	21	7	40
2027	—	—	—	6	—	3	4	12	—	25
2028	—	—	—	—	2	3	6	18	3	32
2029	—	—	—	2	1	8	1	23	8	43
2030	—	—	—	—	4	1	1	33	2	41
2031	—	—	—	—	2	1	3	12	3	21
2032	—	—	—	—	1	1	—	5	7	14
2033	—	—	—	—	—	—	—	1	6	7
2034	—	—	—	—	—	3	—	2	3	8
2035	—	—	—	—	—	2	4	4	2	12
Total	6	23	43	67	76	62	109	336	62	784

Replacing vehicles in accordance with this schedule is illustrated in Figure 8. Note that vehicles replaced in the next few years may be replaced prior to 2035. Vehicles projected for replacement in 2030 through 2035 (i.e., 15 to 20 years from this writing) are primarily low-mileage specialty vehicles, pickups, and vans.

As noted above, the vehicles projected for replacement in the later years of this analysis are primarily low-mileage specialty vehicles. Because many of the vehicles projected for replacement in the next few years will likely be replaced themselves, only the vehicles to be replaced during years 2015 through 2026 are projected for further analysis.

The projected approach to PEV introduction is to replace selected ICE vehicles with PEVs as they would normally be replaced. The replacement approach presents a structured and gradual introduction of PEVs into the MCBCL fleet. This approach is based on an increasing percentage of PEVs as replacements are considered over the next few years. While no PEVs are currently in the MCBCL fleet, this approach allows for growth in experience in management, support, and maintenance of the PEV fleet. The presented approach for incorporation of PEVs at MCBCCL is presented in Table 15. Non-sedan types are included to gain initial experience with the vehicle types even though they are not listed on the GSA schedule. GSA may list some of these vehicles in the next few years.

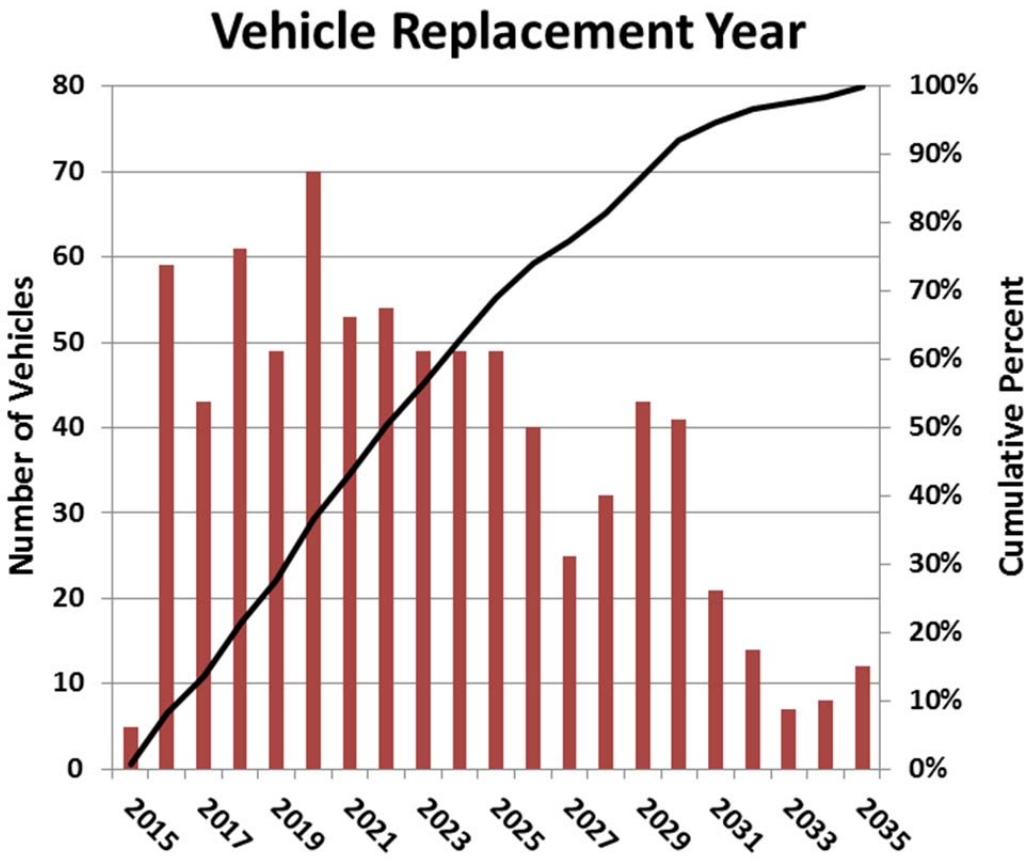

Figure 8. Full fleet vehicle replacement projection.

Table 15. Projected approach for the introduction of PEVs into the MCBCL fleet.

Year	Sedan - Compact	Sedan - Midsize	Sedan- Large	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total	Percent of all Replacements
2015	—	—	3	—	—	—	—	—	—	3	60%
2016	—	—	5	—	2	1	3	2	—	13	22%
2017	—	2	—	3	2	1	1	3	—	12	28%
2018	—	—	4	1	2	2	2	9	—	20	33%
2019	—	—	4	1	5	1	4	10	—	25	50%
2020	—	3	2	2	4	3	6	10	—	30	43%
2021	—	2	2	2	6	4	5	14	—	35	66%
2022	3	7	—	2	4	4	7	12	1	40	74%
2023	2	2	—	2	1	2	5	20	1	35	71%
2024	—	—	—	3	2	4	5	15	1	30	61%
2025	—	1	2	5	1	4	4	13	—	30	61%
2026	1	—	2	2	—	2	1	9	3	20	50%
Total	6	17	24	23	29	28	43	117	6	293	

The vehicles replaced by this approach would result in 50% of the fleet as PEVs in 2026, assuming the size of the fleet remains as it was in 2015. This approach exceeds the purchase percentages of the Executive Order (Figure 9). Certainly, MCBCL can include PEVs at a greater rate if desired.

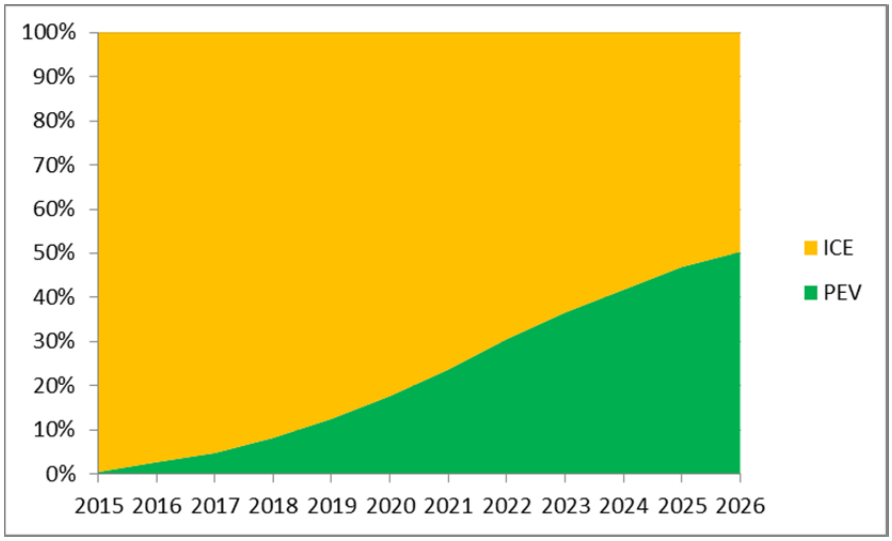

Figure 9. Projected PEVs in MCBCL fleet.

When considering replacement of vehicles with PEVs, MCBCL fleet managers may note the vehicle mission guidance of Section 3. It would be most desirable to select a BEV if the body type and capabilities meet the vehicle's mission in order to gain the most benefit in fuel cost and GHG emission reduction. In most cases, the greatest component of a particular fleet can be BEVs. The analysis in Task 3 shows that the average vehicle travels less than 8,000 miles per year. This is an average of 667 miles per month or about 150 miles per week. This also reflects the opportunity for increasing the percentage of BEVs over PHEVs in each fleet.

4.1.1 Replacement Approach for Sedans

Table 16 presents a planned approach for replacement of sedans with PEVs; this is the sedan portion of Table 14. At the end of the 12-year period with this approach, 65% of fleet sedans will be PEVs with 47% BEVs and 53% PHEVs. Note that the initial years are populated more toward the PHEV because the sedans replaced already have high usage and mileage and this allows an easier transition to PEVs. Of course, MCBCL can select BEVs as replacement vehicles with consideration of fleet capabilities. Note that no sedans are projected to be replaced in the year 2024.

Table 16. Planned approach for the introduction of PEV sedans at MCBCL.

Year	ICE	BEV	PHEV	Total PEVs	Vehicles Replaced	Percentage PEV/Year	Cumulative Percent PEV
2015	—	—	3	3	3	100%	4%
2016	15	—	5	5	20	25%	11%
2017	—	—	2	2	2	100%	14%
2018	2	—	4	4	6	67%	19%
2019	—	—	4	4	4	100%	25%
2020	1	4	1	5	6	83%	32%
2021	—	2	2	4	4	100%	38%
2022	5	7	3	10	15	67%	51%
2023	1	3	1	4	5	80%	57%
2024	—	—	—	—	—	—	57%
2025	1	3	—	3	4	75%	61%
2026	—	3	—	3	3	100%	65%
Total	25	22	25	47	72		4%

Assuming the total fleet inventory remains at 72 sedans, this replacement approach results in the fleet composition shown in Figure 10 for the years 2015 through 2026.

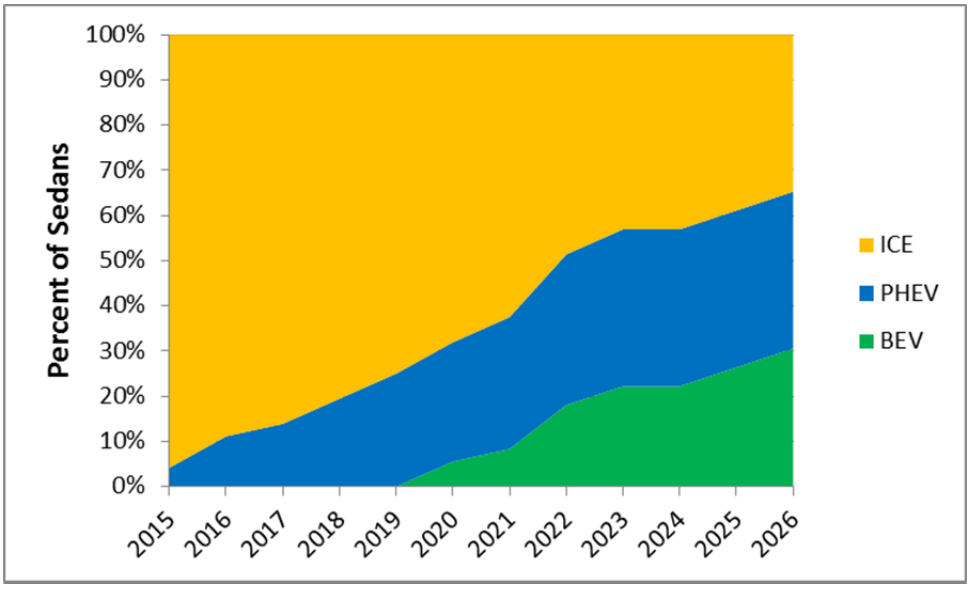

Figure 10. PEV introduction of fleet sedan types 2015 through 2026.

See Appendices A and B for a list of potential replacement PEV sedans.

4.1.2 Replacement Approach for Non-Sedan Vehicles

As noted above, the non-sedan portion of the MCBCL fleet is presented separately because there are no current GSA-listed vehicles as potential replacements. These are included in the suggested replacement approach to allow MCBCL to gain initial experience with the vehicle types. GSA may in fact list some of these vehicles in the next few years. The non-sedan portion of Table 14 is shown in Table 17.

Table 17. Planned approach for the introduction of non-sedan PEVs at MCBCL.

Year	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total	Percentage PEV/Year
2015	0	0	0	0	0	0	0	0%
2016	0	2	1	3	2	0	8	21%
2017	3	2	1	1	3	0	10	24%
2018	1	2	2	2	9	0	16	29%
2019	1	5	1	4	10	0	21	46%
2020	2	4	3	6	10	0	25	39%
2021	2	6	4	5	14	0	31	63%
2022	2	4	4	7	12	1	30	77%
2023	2	1	2	5	20	1	31	70%
2024	3	2	4	5	15	1	30	61%
2025	5	1	4	4	13	0	27	60%
2026	2	0	2	1	9	3	17	
Total	23	29	28	43	117	6	246	
Percent	39%	43%	70%	48%	52%	21%	48%	

At the end of the 12-year period, with this approach and assuming 784 vehicles remain in the total fleet, 48% of the non-sedan fleets will be PEVs with approximately 55% BEVs and 45% PHEVs. This adoption is illustrated in Figure 11.

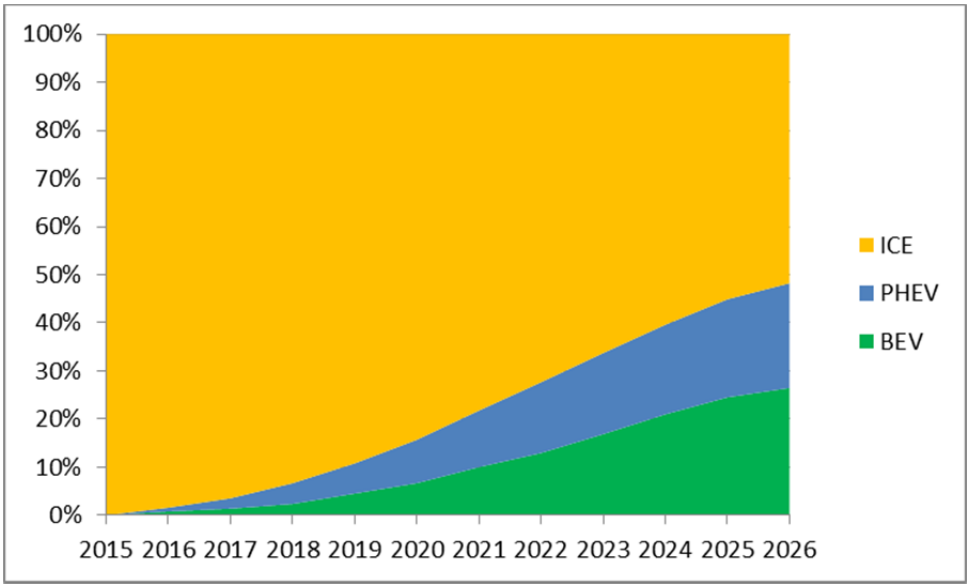

Figure 11. PEV introduction of fleet non-sedan types 2015 through 2026.

4.2 Analysis Results – Commands Group

The Commands Group fleet contains 249 vehicles, with 18 of those vehicles monitored in this study. The monitored vehicles include two minivans, three SUVs, six passenger vans, and seven pickup trucks. The details of each vehicle monitored are included in Appendix A. Appendix C provides the detailed evaluation for the approach summarized in the following sections.

Table 18 identifies the projected year the current vehicle will be replaced based on GSA requirements and extrapolated vehicle mileage. This table factors into the full table provided in Table 14.

Table 18. The anticipated replacement schedule for the Commands Group vehicles at MCBCL.

Year	Sedan Compact/ Subcompact	Sedan Midsize	Sedan Large	Mini-Van	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total
2015	—	—	—	1	—	—	1	—	—	2
2016	—	—	—	—	—	—	12	6	—	18
2017	—	—	—	5	2	—	4	3	—	14
2018	—	1	—	7	2	—	10	9	—	29
2019	—	—	—	1	6	—	5	10	—	22
2020	—	—	1	3	3	—	8	14	—	29
2021	—	—	1	7	1	—	6	11	—	26
2022	1	6	—	1	1	2	3	5	—	19
2023	—	—	—	—	1	—	5	4	—	10
2024	—	—	—	2	—	—	1	4	—	7
2025	—	—	2	1	1	—	1	5	—	10
2026	—	—	1	—	—	—	1	6	—	8
Total	1	7	5	28	17	2	57	77	—	194

4.2.1 Replacement Approach for Commands Group Sedans

Table 19 presents a planned approach for the replacement of sedans with PEVs that flows into the totals shown in Table 15. The percentage of vehicles replaced each year by PEVs is also shown in the table. Appendix C notes that none of the sedans in the Commands group are projected for replacement until 2022.

Table 19. Planned approach for the introduction of PEV sedans into the Commands Group.

Year	ICE	BEV	PHEV	Total PEVs	Percentage PEV/Year
2015	—	—	—	—	—
2016	—	—	—	—	—
2017	—	—	—	—	—
2018	1	—	—	—	—
2019	—	—	—	—	—
2020	—	—	1	1	100%
2021	—	—	1	1	100%
2022	4	3	—	3	43%
2023	—	—	—	—	—
2024	—	—	—	—	—
2025	—	2	—	2	100%
2026	—	1	—	1	100%
Total	5	6	2	8	
Percent	38%	46%	15%	62%	

The final complement of sedans includes 62% PEVs with the PEV component of 75% BEVs and 25% PHEVs. See Appendix C for the list of vehicles recommended for replacement in this approach.

4.2.2 Replacement Approach for Commands Group Non-Sedan Vehicles

Table 20 presents a planned approach for replacement of non-sedans with PEVs that flows into the totals shown in Table 16. The percentage of non-sedan vehicles replaced each year by PEVs is also shown in the table.

Table 20. Planned approach for introduction of non-sedan PEVs into the Commands Group.

Year	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total	Percentage PEV/Year
2015	—	—	—	—	—	—	—	0%
2016	—	—	—	3	—	—	3	17%
2017	3	—	—	—	—	—	3	21%
2018	1	1	—	2	2	—	6	21%
2019	1	2	—	3	6	—	12	55%
2020	1	1	—	5	6	—	13	46%
2021	2	1	—	4	7	—	14	56%
2022	—	1	1	3	3	—	8	67%
2023	—	1	—	3	3	—	7	70%
2024	1	—	—	1	2	—	4	57%
2025	—	1	—	0	2	—	3	38%
2026	—	—	—	1	3	—	4	57%
Total	9	8	1	25	34	—		
Percent	32%	47%	50%	44%	44%	—		

In this approach, the final complement of non-sedans includes 43% PEVs. The final composition of each vehicle type in the fleet is also shown in Table 20. See Appendix C for the list of vehicles recommended for replacement in this approach.

4.3 Analysis Results – Marine Corps Installations East Fleet

The MCIE group fleet contains 535 vehicles, with 42 of those vehicles monitored in this study. This section provides a replacement strategy for this group. The details of each vehicle monitored are included in Appendix B. Appendix D provides the detailed evaluation for the approach summarized in the following sections.

The projected year the current vehicle will be replaced based on GSA requirements and extrapolated vehicle mileage is shown in Table 21. Note the heavy-duty trucks and most specialty vehicles are not included. This table is the MCIE group portion of Table 14.

Table 21. Projected MCIE Group anticipated vehicle replacement schedule at MCBCL.

Year	Sedan - Compact	Sedan - Midsize	Sedan- Large	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total
2015	—	—	3	—	—	—	—	—	—	3
2016	—	—	20	—	5	3	1	7	5	41
2017	—	2	—	2	4	5	1	13	2	29
2018	—	—	5	—	7	3	2	13	2	32
2019	—	—	4	2	8	1	2	11	—	28

Year	Sedan - Compact	Sedan - Midsize	Sedan- Large	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total
2020	—	3	2	3	9	3	5	13	3	41
2021	—	2	1	3	7	4	1	8	1	27
2022	2	6	—	2	5	4	4	11	1	35
2023	2	2	1	4	—	2	4	23	1	39
2024	—	—	—	4	5	5	7	19	2	42
2025	—	1	1	8	—	4	5	16	4	39
2026	1	—	1	3	—	4	1	15	7	32
Total	5	16	38	31	50	38	33	149	28	388

4.3.1 Replacement Approach for Marine Corps Installations East Group Sedans

Table 22 presents a planned approach for replacement of sedans with PEVs that flows into the totals shown in Table 15. The percentage of sedans replaced each year by PEVs is also shown in the table. Note that no sedans are projected for replacement in the year 2024.

Table 22. Planned approach for the introduction of PEV sedans in the MCIE Group.

Year	ICE	BEV	PHEV	Total PEVs	Percentage PEV/Year
2015	—	—	3	3	100%
2016	15	—	5	5	25%
2017	—	—	2	2	100%
2018	1	—	4	4	80%
2019	—	—	4	4	100%
2020	1	4	—	4	80%
2021	—	2	1	3	100%
2022	1	4	3	7	88%
2023	1	3	1	4	80%
2024	—	—	—	—	—
2025	1	1	—	1	50%
2026	—	2	—	2	100%
Total	20	16	23	39	
Percent	34%	27%	39%	66%	

The final complement of sedans includes 66% PEVs with the PEV component of 41% BEVs and 59% PHEVs. See Appendix D for the list of vehicles recommended for replacement in this approach.

4.3.2 Replacement Approach for Marine Corps Installations East Group Non-Sedan Vehicles

Table 23 presents a planned approach for replacement of non-sedans with PEVs that flows into the totals shown in Table 16. The percentage of non-sedan vehicles replaced each year by PEVs is also shown in the table.

Table 23. Planned approach for the introduction of non-sedan PEVs in the MCIE Group.

Year	Minivan	SUV	Cargo Van	Pass. Van	Pickup	Specialty	Total	Percentage PEV/Year
2015	—	—	—	—	—	—	—	—
2016	—	2	1	—	2	—	5	24%
2017	—	2	1	1	3	—	7	26%
2018	—	1	2	—	7	—	10	37%
2019	—	3	1	1	4	—	9	38%
2020	1	3	3	1	4	—	12	33%
2021	—	5	4	1	7	—	17	71%
2022	2	3	3	4	9	1	22	81%
2023	2	—	2	2	17	1	24	71%
2024	2	2	4	4	13	1	26	62%
2025	5	—	4	4	11	—	24	65%
2026	2	—	2	—	6	3	13	43%
Total	14	21	27	18	83	6		
Percent	45%	42%	71%	55%	56%	21%		

In this approach, the final complement of non-sedans includes 51% PEVs. The proportion of each vehicle type is also shown in Table 23. See Appendix D for the list of vehicles recommended for replacement in this approach.

4.4 Balance of Marine Corps Base Camp Lejeune Fleet

The balance of the MCBCL fleet consists of heavy-duty trucks and specialty vehicles. The balance of the powered equipment was not analyzed because there are few PEVs available as potential replacements. Nevertheless, many after-market manufacturers are converting some heavy-duty trucks to electric drive. These are expected to become commercially available in the next several years. None of these types of vehicles were monitored as part of the study.

5. PLUG-IN ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

Preparations for adoption of PEVs also require consideration of recharging stations. With the potential replacements identified in the previous section, the deployment of fleet EVSE can be provided.

The Task 3 infrastructure report provides a detailed review of EVSE types and installation considerations. A detailed review of potential charging locations was completed and, for all of the monitored fleets, charging at the vehicle's home base is all that is typically required. MCBCL may find future value in locating additional charging stations for employee or visitor use for privately owned vehicles, but those locations are not identified as part of this study.

The Task 3 report identifies that AC Level 1 EVSE is sufficient for charging PHEVs whereas AC Level 2 EVSE is recommended for BEVs. As MCBCL begins the planned introduction of PEVs into the fleets, it is recommended that the initial vehicles be provided with AC Level 2 EVSE in order to gain experience with the charging systems and to provide the greatest charge return for all vehicles. In this manner, MCBCL need not be concerned in the early years whether the vehicle is a PHEV or a BEV, but rather focus on adding infrastructure to accommodate AC Level 1 EVSE (that come standard with a PEV purchase) in later years. In addition, the Task 3 report identified that as experience is gained in the management of PEVs, there need not be an EVSE unit for every PEV. However, for these first vehicles, it is recommended that each be assigned its own EVSE unit at its home base. It was also noted in the Task 3 report that many locations had a single monitored vehicle assigned.

Based on the replacement approach identified in Section 4, the charging infrastructure needs of sedans and non-sedan vehicles are discussed separately.

5.1 Plug-in Electric Vehicle Charging Infrastructure for Sedans

Table 24 provides the projected schedule for introduction of EVSE to support the sedan replacement approach. As noted, AC Level 2 infrastructure is emphasized over AC Level 1in the early adoption years. Typically, the EVSE are installed as dual units to reduce installation costs. However, because many buildings host a single PEV, the installation should at least include the stub-in of a second unit.

Table 24. EVSE infrastructure adoption for sedans.

Year	Commands Group AC Level 2/AC Level 1	MCIE Group AC Level 2/AC Level 1	Total AC Level 2/AC Level 1
2015	—	3/—	3/—
2016	—	4/1	4/1
2017	—	—/2	—/2
2018	—	—/4	—/4
2019	—	—/4	—/4
2020	1/—	4/—	5/—
2021	—	2/1	2/1
2022	1/—	4/3	5/3
2023	1/2	3/1	4/3
2024	—	—	—
2025	2/—	1/—	3/—
2026	1/—	2/—	3/—
Total	6/2	23/16	29/18

The Task 3 report detailed the potential for maximizing each group's conversion to PEVs and the potential savings in fuel costs and GHG emissions that result. Table 24 assumes that each PEV is assigned its own EVSE. The Task 3 report identified that with management attention, fewer units may be sufficient because some PEVs can share convenient EVSE.

5.2 Plug-in Electric Vehicle Charging Infrastructure for Non-Sedans

As above, Table 25 provides the schedule for introduction of EVSE to support the non-sedan fleet replacement approach. Again, AC Level 2 infrastructure is emphasized in the early adoption years over AC Level 1. Typically, the EVSE are installed as dual units to reduce installation costs. As above, the facility may not need more than one EVSE because many facilities host a single PEV. In that case, the installation should at least include the stub-in of a second unit.

Table 25. EVSE infrastructure adoption for non-sedan fleets

Year	Commands Group AC Level 2/AC Level 1	MCIE Group AC Level 2/AC Level 1	Total AC Level 2/AC Level 1
2015	—	—	—
2016	3/—	5/—	8/—
2017	3/—	7/—	10/—
2018	2/4	4/6	6/10
2019	6/6	3/7	9/13
2020	9/4	6/6	15/10
2021	7/7	6/11	13/18

Year	Commands Group AC Level 2/AC Level 1	MCIE Group AC Level 2/AC Level 1	Total AC Level 2/AC Level 1
2022	2/6	8/14	10/20
2023	7/—	13/11	20/11
2024	3/1	13/13	16/14
2025	2/1	16/8	18/9
2026	4/—	6/6	10/6
Total	48/29	87/82	135/111

The Task 3 report detailed the potential for maximizing each group's conversion to PEVs and the potential savings in fuel costs and GHG emissions that result. Table 25 only considers the adoption approach identified in this report. The Task 3 report identified that with management attention, fewer units may be sufficient because some PEVs can share convenient EVSE. Table 26 summarizes the fleet charging needs.

Table 26. MCBCL charging infrastructure approach.

Year	Commands Group AC Level 2/AC Level 1	MCIE Group AC Level 2/AC Level 1	Total AC Level 2/AC Level 1
Sedan	6/2	23/16	29/18
Non-Sedan	48/29	87/82	135/111
Total	54/31	110/98	164/129

The Task 3 infrastructure report provides recommendations regarding placement of these EVSE units.

6. OBSERVATIONS

As a result of this intensive study, Intertek suggests that MCBCL is poised for the successful introduction of PEVs into daily operation and that BEVs can provide support for most of the vehicle missions while providing savings in fuel costs and GHG emissions. In meeting the directives and mandates, the adoption approach outlined here should provide input to MCBCL's overall strategy and present an opportunity to gain experience in the operation, support, and maintenance of PEVs. MCBCL may wish to move forward in the near future with the replacement of pool, support, and enforcement vehicles with PEVs as current budget considerations allow. Certainly, the vehicle types studied may be candidates for immediate replacement.

Intertek appreciates presenting the results of this evaluation and working with MCBCL personnel in this study.

Appendix A
Commands Group Vehicle Data Sheets

Note that the replacement years identified in the following data sheets are based on the GSA requirements noted in Table 2 and current fleet usage. The final replacement approach may suggest later years based on vehicle use. Note that none of the monitored vehicles for the Commands group was a sedan. Thus, none of the monitored vehicles PEV replacements would be listed on the GSA schedule.

Table A-1 identifies a potential replacement approach using all currently or soon-to-be available PEVs.

Table A-1. MCBCL Commands Group monitored vehicle replacement (all potential vehicles).

All Vehicle Replacement Approach					
Fleet Vehicle Id	Make/Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
291073	Ford E250	2007	Van - Pass	eNV200	2022
301321	Ford F350	2012	Pickup	eNV200	2027
G41-0762M	Dodge Grd Caravan	2012	Minivan	Outlander	2017
G41-1846K	Dodge Grd Caravan	2011	Minivan	Outlander	2017
G41-2399K	Dodge Dakota	2010	Pickup	eNV200	2021
G42-0216F	Ford E150	2008	Van - Pass	eNV200	2016
G42-0883M	Ford E150	2012	Van - Pass	VTRUX Van	2018
G42-0898M	Ford E150	2012	Van - Pass	VTRUX Van	2018
G43-0326H	Chevrolet 2500HD	2009	Pickup	eNV200	2022
G43-1453G	ChevroletG2300	2008	Van - Pass	Soul	2016
G43-1855P	Ford F350	2015	Pickup	VTRUX PU	2029
G43-2025K	Ford F250	2010	Pickup	Soul	2025
G43-4073F	Chevrolet G2300	2008	Van - Pass	eNV200	2016
G61-0594L	Jeep Patriot	2011	SUV	Outlander	2020
G61-2644P	Jeep Patriot	2015	SUV	Outlander	2019
G62-0791H	Ford Expedition	2009	SUV	Outlander	2018
G63-0309R	Ford F350	2015	Pickup	VTRUX PU	2025
G63-0934G	Chevrolet K3500	2008	Pickup	VTRUX PU	2020

Vehicle G10-291073

	Make/Model/Year	Ford E250 – 2007
	EPA Class Size	Van - Passenger
	Mission	Support
	Contact	Marine Headquarters
	Parking Location	Building PP2
	Fleet Vehicle ID	291073
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$421
	Potential Annual GHG Reduction (lb-CO_2e)	2,260
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	66,092

Vehicle 301321

	Make/Model/Year	Ford F350 - 2012
	EPA Class Size	Pickup
	Mission	Support
	Contact	School of Infantry
	Parking Location	Building TC771
	Fleet Vehicle ID	301321
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$714
	Potential Annual GHG Reduction (lb-CO_2e)	3,351
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2027
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	55,877

Vehicle G41-0762M

	Make/Model/Year	Dodge Grand Caravan – 2012
	EPA Class Size	Minivan
	Mission	Support
	Contact	Marine Aircraft Group 26
	Parking Location	Building AS217
	Fleet Vehicle ID	G41-0762M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$954
	Potential Annual GHG Reduction (lb-CO_2e)	3,490
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2017
	Vehicle Age at Estimated Replacement (Year)	5
	Odometer at Estimated Replacement Date	65,190

Vehicle G41-1846K

	Make/Model/Year	Dodge Grand Caravan – 2011
	EPA Class Size	Minivan
	Mission	Support
	Contact	Special Operation Training
	Parking Location	Building BA134
	Fleet Vehicle ID	G41-1846K
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$346
	Potential Annual GHG Reduction (lb-CO_2e)	1,266
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2017
	Vehicle Age at Estimated Replacement (Year)	6
	Odometer at Estimated Replacement Date	67,785

Vehicle G41-2399K

	Make/Model/Year	Dodge Dakota – 2010
	EPA Class Size	Pickup
	Mission	Support
	Contact	2nd Marine Division
	Parking Location	Building 1707
	Fleet Vehicle ID	G41-2399K
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$989
	Potential Annual GHG Reduction (lb-CO_2e)	9,821
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2021
	Vehicle Age at Estimated Replacement (Year)	11
	Odometer at Estimated Replacement Date	97,335

Vehicle G42-0216F

	Make/Model/Year	Ford E150 – 2008
	EPA Class Size	Van – Passenger
	Mission	Support
	Contact	Marine Headquarters Group
	Parking Location	Building 102
	Fleet Vehicle ID	G42-0216F
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$314
	Potential Annual GHG Reduction (lb-CO_2e)	1,685
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	18,545

Vehicle G42-0883M

	Make/Model/Year	Ford E150 – 2012
	EPA Class Size	Van – Passenger
	Mission	Support
	Contact	Marine Aircraft Group 29
	Parking Location	Building AS4108
	Fleet Vehicle ID	G42-0883M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX Van
	Potential Annual Fuel Cost Savings	$976
	Potential Annual GHG Reduction (lb-CO_2e)	4,241
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	6
	Odometer at Estimated Replacement Date	93,244

Vehicle G42-0898M

	Make/Model/Year	Ford E150-2012
	EPA Class Size	Van – Passenger
	Mission	Support
	Contact	2nd Marine Logistics Group
	Parking Location	Building FC400
	Fleet Vehicle ID	G42-0898M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX Van
	Potential Annual Fuel Cost Savings	$1,954
	Potential Annual GHG Reduction (lb-CO_2e)	8,492
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	6
	Odometer at Estimated Replacement Date	85,203

Vehicle G43-0326H

	Make/Model/Year	Chevrolet 2500HD – 2009
	EPA Class Size	Pickup
	Mission	Support
	Contact	School of Infantry
	Parking Location	Building G554
	Fleet Vehicle ID	G43-0326H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$650
	Potential Annual GHG Reduction (lb-CO_2e)	4,141
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	13
	Odometer at Est. Replacement Date	73,563

Vehicle G43-1453G

	Make/Model/Year	Chevrolet G2300 – 2008
	EPA Class Size	Van – Passenger
	Mission	Support
	Contact	MARSOC
	Parking Location	FC306
	Fleet Vehicle ID	G43-1453G
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$2,145
	Potential Annual GHG Reduction (lb-CO_2e)	12,278
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	80,068

Vehicle G43-1855P

	Make/Model/Year	Ford F350-2015
	EPA Class Size	Pickup
	Mission	Support
	Contact	School of Infantry
	Parking Location	G702
	Fleet Vehicle ID	G43-1855P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$265
	Potential Annual GHG Reduction (lb-CO_2e)	863
	EVSE Type for Recharging	ACL1
	Estimated Replacement Year	2029
	Vehicle Age at Estimated Replacement (Year)	14
	Odometer at Estimated Replacement Date	69722

Vehicle G43-2025K

	Make/Model/Year	Ford F250-2010
	EPA Class Size	Pickup
	Mission	Support
	Contact	School of Infantry
	Parking Location	Building TC846
	Fleet Vehicle ID	G43-2025K
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$518
	Potential Annual GHG Reduction (lb-CO_2e)	2,967
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2025
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	50,417

Vehicle G43-4073F

	Make/Model/Year	Chevrolet G2300 – 2008
	EPA Class Size	Van – Passenger
	Mission	Support
	Contact	MARSOC
	Parking Location	RR272
	Fleet Vehicle ID	G43-4073F
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$630
	Potential Annual GHG Reduction (lb-CO_2e)	3,296
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	55,950

Vehicle G61-0594L

	Make / Model / Year	Jeep Patriot – 2011
	EPA Class Size	SUV
	Mission	Support
	Contact	Special Operation Training
	Parking Location	518
	Fleet Vehicle ID	G61-0594L
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$239
	Potential Annual GHG Reduction (lb-CO_2e)	831
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	9
	Odometer at Estimated Replacement Date	79,392

Vehicle G61-2644P

	Make/Model/Year	Jeep Patriot – 2015
	EPA Class Size	SUV
	Mission	Support
	Contact	Marine Aircraft Group 29
	Parking Location	Bldg AS4122
	Fleet Vehicle ID	G61-2644P
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$524
	Potential Annual GHG Reduction (lb-CO_2e)	1,892
	EVSE Type for Recharging	ACL1
	Estimated Replacement Year	2019
	Vehicle Age at Estimated Replacement (Year)	4
	Odometer at Estimated Replacement Date	96,010

Vehicle G62-0791H

	Make/Model/Year	Ford Expedition - 2009
	EPA Class Size	SUV - K9
	Mission	Support
	Contact	Marine Headquarters Group
	Parking Location	Building SAW353
	Fleet Vehicle ID	G62-0791H
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$846
	Potential Annual GHG Reduction (lb-CO_2e)	3,657
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	9
	Odometer at Estimated Replacement Date	73,433

Vehicle G63-0309R

	Make/Model/Year	Ford F350 – 2015
	EPA Class Size	Pickup
	Mission	Support
	Contact	Marine Wing SS 272
	Parking Location	Building AS4158
	Fleet Vehicle ID	G63-0309R
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$1,083
	Potential Annual GHG Reduction (lb-CO_2e)	3,527
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2025
	Vehicle Age at Estimated Replacement (Year)	10
	Odometer at Estimated Replacement Date	24,690

Vehicle G63-0934G

	Make/Model/Year	Chevrolet K3500 – 2008
	EPA Class Size	Pickup
	Mission	Support
	Contact	MARSOC
	Parking Location	RR450
	Fleet Vehicle ID	G63-0934G
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$181
	Potential Annual GHG Reduction (lb-CO_2e)	858
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	12
	Odometer at Estimated Replacement Date	86,895

Appendix B
Marine Corps Installations East Vehicle Data Sheets

Note that the replacement years identified in the following data sheets are based on the GSA requirements noted in Table 2 and current fleet usage. The final replacement approach may suggest later years based on vehicle use.

Table B-1 identifies a potential replacement approach for the monitored sedan vehicles currently or previously on the GSA list.

Table B-1. MCIE PEV replacement (GSA-listed vehicle).

GSA Listed Vehicle Replacement Approach					
Fleet Vehicle Id	Make/Model	Year	EPA Class	GSA Replacement Vehicle	Replacement Year
294285	Chevrolet Malibu	2009	Sedan - Midsize	Leaf	2023
G10-3327L	Chevrolet Malibu	2012	Sedan - Midsize	Leaf	2022
G13-0325K	Ford Focus	2012	Sedan - Compact	Volt	2022
G13-7974P	Ford Focus	2015	Sedan - Compact	Volt	2022

Table B-2 identifies a potential replacement approach for the rest of the monitored vehicles using all currently or soon-to-be available PEVs. Note that a PEV replacement for the refrigeration truck 291007 is not suggested.

Table B-2. MCIE PEV replacement (all potential vehicles).

All Vehicle Replacement Approach					
Fleet Vehicle Id	Make/Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
290597	Ford E350	1997	Van - Cargo	VTRUX Van	2022
291007	Ford F550	2004	Specialty	NA	2024
294293	Chevrolet HHR	2009	SUV	Soul	2019
294315	Chevrolet 3500	2009	Pickup	eNV200	2023
294324	Chevrolet HHR	2009	SUV	Outlander	2018
300672	Ford F550	2011	Specialty	EDI Bucket Truck	2026
302039	Ford F250 XL	2014	Pickup	VTRUX PU	2026
302040	Ford F250XL	2014	Pickup	VTRUX PU	2022
302334	Ford F350	2015	Pickup	VTRUX PU	2031
G41-0379H	Dodge Grd Caravan	2009	Minivan	Soul	2022
G41-0391H	Dodge Dakota	2009	Pickup	VTRUX PU	2023
G41-0754M	Dodge Grd Caravan	2012	Minivan	Outlander	2027
G41-0806P	Dodge Caravan	2014	Minivan	Outlander	2020
G41-1689L	Ford Ranger	2011	Pickup	VTRUX PU	2021
G41-3297K	Ford Ranger	2011	Pickup	eNV200	2026
G41-3300K	Ford Ranger	2011	Pickup	VTRUX PU	2018
G41-3301K	Ford Ranger	2011	Pickup	eNV200	2023
G42-0644M	Ford E150	2012	Van - Pass	eNV200	2017
G42-0667P	Ford F150	2014	Pickup	VTRUX PU	2024
G42-0671P	Ford F150	2014	Pickup	eNV200	2025
G42-0911L	Chevrolet C1500	2012	Pickup	eNV200	2024
G42-0915M	Ford F150	2012	Pickup	eNV200	2023

All Vehicle Replacement Approach					
Fleet Vehicle Id	Make/Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G42-2985H	Chevrolet C1500	2010	Pickup	VTRUX PU	2016
G43-0310H	Ford E350	2009	Van - Pass	VTRUX Van	2020
G43-0323H	Ford E50	2009	Van - Cargo	VTRUX Van	2016
G43-0324H	Ford E350	2009	Van - Cargo	eNV200	2024
G43-1182M	Chevrolet CG3300	2012	Van - Cargo	eNV200	2020
G43-4075P	Ford F250	2015	Pickup	VTRUX PU	2035
G61-0161H	Dodge Dakota	2009	Pickup	VTRUX PU	2018
G61-0174H	Jeep Liberty	2009	SUV	Outlander	2020
G61-0879P	Chevrolet Equinox	2014	SUV	Outlander	2029
G61-1508D	Jeep Liberty	2008	SUV	Outlander	2016
G61-1509D	Jeep Liberty	2008	SUV	Soul	2016
G62-1583G	Chevrolet K1500	2008	Pickup	VTRUX PU	2016
G62-4085L	Dodge 1500	2012	Pickup	VTRUX PU	2020
G63-0163H	Chevrolet K2500	2009	Pickup	eNV200	2017
G63-2885L	Chevrolet K2500	2012	Pickup	eNV200	2029
G63-2888L	Chevrolet K2500	2012	Pickup	Soul	2029

Vehicle 290597

Make/Model/Year	Ford E350 – 1997
EPA Class Size	Van – Cargo
Mission	Pool
Contact	Motor Transport C-Pool
Parking Location	Building 1200
Fleet Vehicle ID	290597
Fuel Type	Gas

Potential Replacement PEV Make/Model	VTRUX Van
Potential Annual Fuel Cost Savings	$99
Potential Annual GHG Reduction (lb-CO_2e)	523
EVSE Type for Recharging	AC Level 1
Estimated Replacement Year	2022
Vehicle Age at Estimated Replacement (Year)	25
Odometer at Estimated Replacement Date	34,648

Vehicle 291007

	Make/Model/Year	Ford F560 – 2004
	EPA Class Size	Specialty – Refrigeration Truck
	Mission	Specialty
	Contact	MTO
	Parking Location	No data
	Fleet Vehicle ID	291007
	Fuel Type	Diesel
	Potential Replacement PEV Make/Model	NA
	Potential Annual Fuel Cost Savings	—
	Potential Annual GHG Reduction (lb-CO_2e)	—
	EVSE Type for Recharging	—
	Estimated Replacement Year	2024
	Vehicle Age at Estimated Replacement (Year)	20
	Odometer at Estimated Replacement Date	34,042

Vehicle 294285

	Make/Model/Year	Chevrolet Malibu – 2009
	EPA Class Size	Sedan – Midsize
	Mission	Support
	Contact	Postal
	Parking Location	Building 1770
	Fleet Vehicle ID	294285
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Leaf
	Potential Annual Fuel Cost Savings	$323
	Potential Annual GHG Reduction (lb-CO_2e)	1,570
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2023
	Vehicle Age at Estimated Replacement (Year)	14
	Odometer at Estimated Replacement Date	74,550

Vehicle 294293

	Make/Model/Year	Chevrolet HHR – 2009
	EPA Class Size	SUV
	Mission	Enforcement
	Contact	Provost Marshal's Office
	Parking Location	Building AS302
	Fleet Vehicle ID	294293
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$433
	Potential Annual GHG Reduction (lb-CO_2e)	1,676
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2019
	Vehicle Age at Estimated Replacement (Year)	10
	Odometer at Estimated. Replacement Date	70,726

Vehicle 294315

	Make/Model/Year	Chevrolet 3500 – 2009
	EPA Class Size	Pickup
	Mission	Support
	Contact	Fire Department
	Parking Location	Building TC701
	Fleet Vehicle ID	294315
	Fuel Type	Diesel
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$575
	Potential Annual GHG Reduction (lb-CO_2e)	3,701
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2023
	Vehicle Age at Estimated Replacement (Year)	14
	Odometer at Estimated Replacement Date	49,661

Vehicle 294324

	Make/Model/Year	Chevrolet HHR – 2009
	EPA Class Size	SUV
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	294324
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$433
	Potential Annual GHG Reduction (lb-CO_2e)	1,676
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	9
	Odometer at Estimated Replacement Date	67,174

Vehicle 300672

	Make/Model/Year	Ford F550 - 2011
	EPA Class Size	Specialty – Bucket Truck
	Mission	Specialty
	Contact	Public Works
	Parking Location	1023
	Fleet Vehicle ID	300672
	Fuel Type	Diesel
	Potential Replacement PEV Make/Model	EDI Conversion
	Potential Annual Fuel Cost Savings	$558
	Potential Annual GHG Reduction (lb-CO_2e)	2,955
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2026
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	113,322

Vehicle 302039

	Make/Model/Year	Ford F250XL – 2014
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building 670
	Fleet Vehicle ID	302039
	Fuel Type	Diesel
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$434
	Potential Annual GHG Reduction (lb-CO_2e)	2,647
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2026
	Vehicle Age at Estimated Replacement (Year)	12
	Odometer at Estimated Replacement Date	77,445

Vehicle 302040

	Make/Model/Year	Ford F250XL – 2014
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building FC436
	Fleet Vehicle ID	302040
	Fuel Type	Diesel
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$809
	Potential Annual GHG Reduction (lb-CO_2e)	4,933
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	89,642

Vehicle 302334

	Make/Model/Year	Ford F350 Stake – 2015
	EPA Class Size	Pickup
	Mission	Support
	Contact	G3 – Operations and Training
	Parking Location	Building 56
	Fleet Vehicle ID	302334
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$124
	Potential Annual GHG Reduction (lb-CO_2e)	403
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2031
	Vehicle Age at Estimated Replacement (Year)	16
	Odometer at Estimated Replacement Date	19,206

Vehicle G10-3327L

	Make/Model/Year	Chevrolet Malibu – 2012
	EPA Class Size	Sedan – Midsize
	Mission	Pool
	Contact	Motor Transport C-Pool
	Parking Location	Building FC500
	Fleet Vehicle ID	G10-3327L
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Leaf
	Potential Annual Fuel Cost Savings	$736
	Potential Annual GHG Reduction (lb-CO_2e)	2,978
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	89,642

Vehicle G13-0325K

	Make/Model/Year	Ford Focus – 2012
	EPA Class Size	Sedan – Compact
	Mission	Support
	Contact	Eastern Judicial Circuit
	Parking Location	Building 67
	Fleet Vehicle ID	G13-0325K
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Volt
	Potential Annual Fuel Cost Savings	$50
	Potential Annual GHG Reduction (lb-CO_2e)	177
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	10
	Odometer at Estimated Replacement Date	13,639

Vehicle G13-7974P

	Make/Model/Year	Ford Focus – 2015
	EPA Class Size	Sedan - Compact
	Mission	Support
	Contact	G4 - Logistics
	Parking Location	Building 1117
	Fleet Vehicle ID	G13-7974P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Volt
	Potential Annual Fuel Cost Savings	$164
	Potential Annual GHG Reduction (lb-CO_2e)	617
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	7
	Odometer at Estimated Replacement Date	90,295

Vehicle G41-0379H

	Make/Model/Year	Dodge Grand Caravan – 2009
	EPA Class Size	Minivan
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	Building M305
	Fleet Vehicle ID	G41-0379H
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$837
	Potential Annual GHG Reduction (lb-CO_2e)	3,866
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2022
	Vehicle Age at Estimated Replacement (Year)	13
	Odometer at Estimated Replacement Date	65,172

Vehicle G41-0391H

	Make/Model/Year	Dodge Dakota – 2009
	EPA Class Size	Pickup
	Mission	Support
	Contact	G4- Logistics
	Parking Location	Building 1117
	Fleet Vehicle ID	G41-0391H
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$508
	Potential Annual GHG Reduction (lb-CO_2e)	2,206
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2023
	Vehicle Age at Estimated Replacement (Year)	14
	Odometer at Est. Replacement Date	87,196

Vehicle G41-0754M

	Make/Model/Year	Dodge Grand Caravan – 2012
	EPA Class Size	Minivan
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	Building 1407
	Fleet Vehicle ID	G41-0754M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$152
	Potential Annual GHG Reduction (lb-CO_2e)	556
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2027
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	73,114

Vehicle G41-0806P

	Make/Model/Year	Dodge Caravan – 2014
	EPA Class Size	Minivan
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	G41-0806P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$637
	Potential Annual GHG Reduction (lb-CO_2e)	2,236
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	6
	Odometer at Estimated Replacement Date	75,322

Vehicle G41-1689L

	Make/Model/Year	Ford Ranger – 2011
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	G41-1689L
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$290
	Potential Annual GHG Reduction (lb-CO_2e)	958
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2021
	Vehicle Age at Estimated Replacement (Year)	10
	Odometer at Estimated Replacement Date	52,109

Vehicle G41-3297K

	Make/Model/Year	Ford Ranger – 2011
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	G41-3297K
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$473
	Potential Annual GHG Reduction (lb-CO_2e)	1,944
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2026
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	77,061

Vehicle G41-3300K

	Make/Model/Year	Ford Ranger – 2011
	EPA Class Size	Pickup
	Mission	Enforcement
	Contact	Provost Marshal's Office
	Parking Location	Building 43
	Fleet Vehicle ID	G41-3300K
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$459
	Potential Annual GHG Reduction (lb-CO_2e)	1,515
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	7
	Odometer at Estimated Replacement Date	86,171

Vehicle G41-3301K

	Make/Model/Year	Ford Ranger – 2011
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	G41-3301K
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$644
	Potential Annual GHG Reduction (lb-CO_2e)	2,646
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2023
	Vehicle Age at Estimated Replacement (Year)	12
	Odometer at Estimated Replacement Date	80,093

Vehicle G42-0644M

	Make/Model/Year	Ford E150 – 2012
	EPA Class Size	Van – Passenger
	Mission	Pool
	Contact	Motor Transport C-Pool
	Parking Location	Bldg 58
	Fleet Vehicle ID	G42-0644M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$4,325
	Potential Annual GHG Reduction (lb-CO_2e)	20,283
	EVSE Type for Recharging	ACL2
	Estimated Replacement Year	2017
	Vehicle Age at Estimated Replacement (Year)	5
	Odometer at Estimated Replacement Date	87305

Vehicle G42-0667P

	Make/Model/Year	Ford F150- 2014
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building 1005
	Fleet Vehicle ID	G42-0667P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$561
	Potential Annual GHG Reduction (lb-CO_2e)	1,902
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2024
	Vehicle Age at Estimated Replacement (Year)	10
	Odometer at Estimated Replacement Date	92,976

Vehicle G42-0671P

	Make/Model/Year	Ford F150 – 2014
	EPA Class Size	Pickup
	Mission	Support
	Contact	Public Works
	Parking Location	Building BA138
	Fleet Vehicle ID	G42-0671P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$1,019
	Potential Annual GHG Reduction (lb-CO_2e)	3,999
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2025
	Vehicle Age at Estimated Replacement (Year)	11
	Odometer at Estimated Replacement Date	84,468

Vehicle G42-0911L

	Make/Model/Year	Chevrolet C1500 – 2012
	EPA Class Size	Pickup
	Mission	Pool
	Contact	Motor Transport C-Pool
	Parking Location	Building 327
	Fleet Vehicle ID	G42-0911L
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$1,154
	Potential Annual GHG Reduction (lb-CO_2e)	4,771
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2024
	Vehicle Age at Estimated Replacement (Year)	12
	Odometer at Estimated Replacement Date	92,700

Vehicle G42-0915M

	Make/Model/Year	Ford F150 – 2012
	EPA Class Size	Pickup
	Mission	Support
	Contact	Environmental Management
	Parking Location	Near Piney Green Rd
	Fleet Vehicle ID	G42-0915M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$650
	Potential Annual GHG Reduction (lb-CO_2e)	3,699
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2023
	Vehicle Age at Estimated Replacement (Year)	11
	Odometer at Estimated Replacement Date	72,863

Vehicle G42-2985H

	Make/Model/Year	Chevrolet C1500 – 2010
	EPA Class Size	Pickup
	Mission	Enforcement
	Contact	Provost Marshal's Office
	Parking Location	Building 43
	Fleet Vehicle ID	G42-2985H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$1,029
	Potential Annual GHG Reduction (lb-CO_2e)	4,882
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	6
	Odometer at Estimated Replacement Date	83,740

Vehicle G43-0310H

	Make/Model/Year	Ford E350 – 2009
	EPA Class Size	Van – Passenger
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	
	Fleet Vehicle ID	G43-0310H
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX Van
	Potential Annual Fuel Cost Savings	$520
	Potential Annual GHG Reduction (lb-CO_2e)	2,145
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	11
	Odometer at Estimated Replacement Date	91,440

Vehicle G43-0323H

	Make/Model/Year	Ford E350 – 2009
	EPA Class Size	Van – Cargo
	Mission	Support
	Contact	Public Works
	Parking Location	Building 670
	Fleet Vehicle ID	G43-0323H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX Van
	Potential Annual Fuel Cost Savings	$697
	Potential Annual GHG Reduction (lb-CO_2e)	3,555
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	7
	Odometer at Estimated Replacement Date	79740

Vehicle G43-0324H

	Make/Model/Year	Ford E350 – 2009
	EPA Class Size	Van - Cargo
	Mission	Support
	Contact	Public Works
	Parking Location	Building FC360
	Fleet Vehicle ID	G43-0324H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$922
	Potential Annual GHG Reduction (lb-CO_2e)	5,083
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2024
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	85,756

Vehicle G43-1182M

	Make/Model/Year	Chevrolet CG3300 – 2012
	EPA Class Size	Van – Cargo
	Mission	Support
	Contact	Postal
	Parking Location	Building 1770
	Fleet Vehicle ID	G43-1182M
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$2,687
	Potential Annual GHG Reduction (lb-CO_2e)	13,082
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	89,771

Vehicle G43-4075P

	Make/Model/Year	Ford F250 – 2015
	EPA Class Size	Pickup
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	Building 316
	Fleet Vehicle ID	G43-4075P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$962
	Potential Annual GHG Reduction (lb-CO_2e)	3,262
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2035
	Vehicle Age at Estimated Replacement (Year)	20
	Odometer at Estimated Replacement Date	72,464

Vehicle G61-0161H

	Make/Model/Year	Dodge Dakota – 2009
	EPA Class Size	Pickup
	Mission	Support
	Contact	Environmental Management
	Parking Location	Building TP464
	Fleet Vehicle ID	G61-0161H
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$1,326
	Potential Annual GHG Reduction (lb-CO_2e)	5,762
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2018
	Vehicle Age at Estimated Replacement (Year)	9
	Odometer at Estimated Replacement Date	91,830

Vehicle G61-0174H

	Make/Model/Year	Jeep Liberty – 2009
	EPA Class Size	SUV
	Mission	Support
	Contact	Environmental Management
	Parking Location	Building 27
	Fleet Vehicle ID	G61-0174H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$613
	Potential Annual GHG Reduction (lb-CO_2e)	2,949
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	11
	Odometer at Estimated Replacement Date	81,564

Vehicle G61-0879P

	Make/Model/Year	Chevrolet Equinox – 2014
	EPA Class Size	SUV
	Mission	Enforcement
	Contact	Provost Marshal's Office
	Parking Location	Building 979
	Fleet Vehicle ID	G61-0879P
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$217
	Potential Annual GHG Reduction (lb-CO_2e)	689
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2029
	Vehicle Age at Estimated Replacement (Year)	15
	Odometer at Estimated Replacement Date	63,682

Vehicle G61-1508D

	Make/Model/Year	Jeep Liberty – 2008
	EPA Class Size	SUV
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	Building 58
	Fleet Vehicle ID	G61-1508D
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Outlander
	Potential Annual Fuel Cost Savings	$78
	Potential Annual GHG Reduction (lb-CO_2e)	363
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	32,203

Vehicle G61-1509D

	Make/Model/Year	Jeep Liberty – 2008
	EPA Class Size	SUV
	Mission	Pool
	Contact	Motor Transport – C-Pool
	Parking Location	Building 28211
	Fleet Vehicle ID	G61-1509D
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$401
	Potential Annual GHG Reduction (lb-CO_2e)	2,202
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	29,843

Vehicle G62-1583G

	Make/Model/Year	Chevrolet K1500 – 2008
	EPA Class Size	Pickup
	Mission	Support
	Contact	G3 – Ops and Training
	Parking Location	Bldg 54
	Fleet Vehicle ID	G62-1583G
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$676
	Potential Annual GHG Reduction (lb-CO_2e)	3,206
	EVSE Type for Recharging	ACL1
	Estimated Replacement Year	2016
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	71197

Vehicle G62-4085L

	Make/Model/Year	Dodge 1500 – 2012
	EPA Class Size	Pickup
	Mission	Support
	Contact	Fire Department
	Parking Location	Building 58
	Fleet Vehicle ID	G62-4085L
	Fuel Type	E85
	Potential Replacement PEV Make/Model	VTRUX PU
	Potential Annual Fuel Cost Savings	$1,042
	Potential Annual GHG Reduction (lb-CO_2e)	4,297
	EVSE Type for Recharging	AC Level 1
	Estimated Replacement Year	2020
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	70,426

Vehicle G63-0163H

	Make/Model/Year	Chevrolet K2500HD - 2009
	EPA Class Size	Pickup
	Mission	Support
	Contact	Marine Corps Air Station
	Parking Location	Bldg AS427
	Fleet Vehicle ID	G63-0163H
	Fuel Type	Gas
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$1,293
	Potential Annual GHG Reduction (lb-CO_2e)	6,944
	EVSE Type for Recharging	ACL2
	Estimated Replacement Year	2017
	Vehicle Age at Estimated Replacement (Year)	8
	Odometer at Estimated Replacement Date	75848

Vehicle G63-2885L

	Make/Model/Year	Chevrolet K2500HD – 2012
	EPA Class Size	Pickup
	Mission	Support
	Contact	Fire Department
	Parking Location	Building 2600
	Fleet Vehicle ID	G63-2885L
	Fuel Type	E85
	Potential Replacement PEV Make/Model	eNV200
	Potential Annual Fuel Cost Savings	$595
	Potential Annual GHG Reduction (lb-CO_2e)	2,459
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2029
	Vehicle Age at Estimated Replacement (Year)	17
	Odometer at Estimated Replacement Date	68,042

Vehicle G63-2888L

	Make/Model/Year	Chevrolet K2500HD – 2012
	EPA Class Size	Pickup
	Mission	Enforcement
	Contact	Provost Marshal's Office
	Parking Location	Building SAW360B
	Fleet Vehicle ID	G63-2888L
	Fuel Type	E85
	Potential Replacement PEV Make/Model	Soul
	Potential Annual Fuel Cost Savings	$668
	Potential Annual GHG Reduction (lb-CO_2e)	3,085
	EVSE Type for Recharging	AC Level 2
	Estimated Replacement Year	2029
	Vehicle Age at Estimated Replacement (Year)	17
	Odometer at Estimated Replacement Date	76,268

Appendix C
Commands Fleet Vehicle Replacement Approach

There are four replacement approaches identified for the Commands fleet vehicles:

- Monitored vehicles
  - GSA-listed PEVs only for sedans
  - All other potential PEV types
- Unmonitored vehicles part of the full fleet
  - GSA-listed PEVs only for sedans
  - All potential PEV types for non-sedan vehicles.

The extensive analysis conducted for monitored vehicles (Task 3) results in high confidence that the suggested vehicle can meet mission requirements. The suggested vehicles for the full fleet rely on extrapolation of those monitored vehicles and guidance identified in Section 3.

C.1 Monitored Sedan Vehicle General Services Administration Replacement Approach

No sedans assigned to the Commands group were monitored during this study.

C.2 All Monitored Non-Sedan Vehicle Replacement Approach

Table C-1 provides a replacement approach using currently or soon-to-be available PEVs. Although not currently listed by GSA, these or similar vehicles may be listed by the year identified or MCBCL may choose to justify the replacement. The replacement of these vehicles by PEVs is assumed in the analysis of Section 4.

Table C-1. Command fleet all monitored non-sedan vehicle replacement approach.

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
291073	Ford	E250	2007	Van - Pass	eNV200	2022
301321	Ford	F350	2012	Pickup	eNV200	2027
G41-0762M	Dodge	Grd Caravan	2012	Minivan	Outlander	2017
G41-1846K	Dodge	Grd Caravan	2011	Minivan	Outlander	2017
G41-2399K	Dodge	Dakota	2010	Pickup	eNV200	2021
G42-0216F	Ford	E150	2008	Van - Pass	eNV200	2016
G42-0883M	Ford	E150	2012	Van - Pass	VTRUX Van	2018
G42-0898M	Ford	E150	2012	Van - Pass	VTRUX Van	2018
G43-0326H	Chevrolet	2500HD	2009	Pickup	eNV200	2022
G43-1453G	Chevrolet	G2300	2008	Van - Pass	Soul	2016
G43-1855P	Ford	F350	2015	Pickup	VTRUX PU	2029
G43-2025K	Ford	F250	2010	Pickup	Soul	2025
G43-4073F	Chevrolet	G2300	2008	Van - Pass	eNV200	2016
G61-0594L	Jeep	Patriot	2011	SUV	Outlander	2020
G61-2644P	Jeep	Patriot	2015	SUV	Outlander	2019
G62-0791H	Ford	Expedition	2009	SUV	Outlander	2018
G63-0309R	Ford	F350	2015	Pickup	VTRUX PU	2025
G63-0934G	Chevrolet	K3500	2008	Pickup	VTRUX PU	2020

C.3 Unmonitored Sedan Fleet Replacement Approach

GSA currently lists only sedans for PEVs. It is assumed that additional sedans will be added to the list in the next few years. Table C-2 provides the list of sedans in the Commands fleet other than those monitored and included in Section C.1. The projected year of replacement is identified based on the GSA requirements and expected usage. The mileage is projected from the odometer reading in 2014 and annual mileage provided by MCBCL. While other vehicles can certainly be replaced with PEVs, the vehicles identified in green are counted for replacement by PEVs in the analysis of Section 4.

Table C-2. Commands fleet unmonitored sedan fleet replacement options.

GSA Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G103024L	Chevrolet	Malibu	2011	Sedan - Midsize	Fusion	2022
G103025L	Chevrolet	Malibu	2011	Sedan - Midsize	Leaf	2022
G103026L	Chevrolet	Malibu	2011	Sedan - Midsize	Leaf	2022
G103323L	Chevrolet	Malibu	2012	Sedan - Midsize	Fusion	2018
G103325L	Chevrolet	Malibu	2012	Sedan - Midsize	Fusion	2022
G103330L	Chevrolet	Malibu	2012	Sedan - Midsize	Fusion	2022
G103333L	Chevrolet	Malibu	2012	Sedan - Midsize	Fusion	2022
G111174P	Chevrolet	Impala	2014	Sedan - Large	Volt	2021
G111358P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2026
G111360P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2025
G111361P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2020
G111362P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2025
G130846P	Ford	Focus	2014	Sedan - Compact	Focus	2022

Note the GSA schedule does not currently list the Leaf although it did in previous years. It is expected that it will be listed again by 2016.

C.4 Unmonitored Non-Sedan Vehicle Replacement Approach

Table C-3 provides the list of non-sedans in the Commands fleet other than those monitored and included in Section C.2 above that are assumed to be replaced by PEVs through the year 2026. The projected year of replacement is identified based on GSA requirements and expected usage. The mileage is projected from the odometer reading in 2014 and annual mileage provided by MCBCL. This list includes 61 of the 218 vehicles projected for replacement by 2026; more vehicles can be replaced if desired.

Table C-3. Command fleet unmonitored non-sedan replacement options.

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G410383H	Dodge	Grd Caravan	2009	Minivan	Soul	2017
G410382H	Dodge	Grd Caravan	2009	Minivan	Outlander	2018
G420831L	Dodge	1500	2011	Pickup	VTRUX PU	2018
G431455G	Chevrolet	2500HD	2008	Pickup	eNV200	2018
294341	Chevrolet	HHR	2009	SUV	Soul	2019
G416304H	Dodge	Grd Caravan	2010	Minivan	Outlander	2019
G420176H	Ford	E150	2009	Van - Pass	VTRUX Van	2019

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G420181H	Ford	E150	2009	Van - Pass	eNV200	2019
G420235F	Ford	F150	2008	Pickup	eNV200	2019
G420833L	Dodge	1500	2011	Pickup	VTRUX PU	2019
G420902M	Ford	E150	2012	Van - Pass	VTRUX Van	2019
G421290M	Dodge	1500	2012	Pickup	VTRUX PU	2019
G431456G	Chevrolet	2500HD	2008	Pickup	eNV200	2019
G431459G	Ford	F250	2008	Pickup	eNV200	2019
G621587G	Chevrolet	K1500	2008	Pickup	eNV200	2019
G410394H	Dodge	Dakota	2009	Pickup	eNV200	2020
G410397H	Dodge	Dakota	2009	Pickup	eNV200	2020
G410403H	Dodge	Dakota	2009	Pickup	eNV200	2020
G411849K	Dodge	Grd Caravan	2011	Minivan	Soul	2020
G420215F	Ford	E150	2008	Van - Pass	eNV200	2020
G420292H	Ford	E150	2010	Van - Pass	eNV200	2020
G421939K	Chevrolet	G1300	2011	Van - Pass	eNV200	2020
G422972H	Ford	E150	2010	Van - Pass	eNV200	2020
G431450G	Chevrolet	G2300	2008	Van - Pass	eNV200	2020
G620374M	Dodge	1500	2012	Pickup	VTRUX PU	2020
G631524M	Chevrolet	K2500HD	2013	Pickup	VTRUX PU	2020
G410399H	Dodge	Dakota	2009	Pickup	eNV200	2021
G410766M	Dodge	Grd Caravan	2012	Minivan	Soul	2021
G410810P	Dodge	Grd Caravan	2014	Minivan	Outlander	2021
G420659P	Chevrolet	G1300	2014	Van - Pass	VTRUX Van	2021
G420832L	Dodge	1500	2011	Pickup	eNV200	2021
G420882M	Ford	E150	2012	Van - Pass	VTRUX Van	2021
G420884M	Ford	E150	2012	Van - Pass	eNV200	2021
G420895M	Ford	E150	2012	Van - Pass	VTRUX Van	2021
G421289M	Dodge	1500	2012	Pickup	VTRUX PU	2021
G431337L	Ford	F350	2011	Pickup	VTRUX PU	2021
G611507D	Jeep	Liberty	2008	SUV	Outlander	2021
G622008F	Chevrolet	K1500	2008	Pickup	eNV200	2021
G710143K	Ford	F450	2011	Pickup	eNV200	2021
291238	Ford	E250	2007	Van - Pass	VTRUX Van	2022
294288	Chevrolet	HHR	2009	SUV	Outlander	2022
G430312H	Ford	E350	2009	Van - Pass	eNV200	2022
G624088L	Dodge	1500	2012	Pickup	eNV200	2022
G632733F	Ford	F350	2008	Pickup	eNV200	2022
G710141K	Ford	F550	2011	Van - Cargo	VTRUX Van	2022
294287	Chevrolet	HHR	2009	SUV	Soul	2023
G420242F	Ford	E150	2008	Van - Pass	eNV200	2023
G420647M	Ford	E150	2012	Van - Pass	eNV200	2023
G422980H	Ford	E150	2010	Van - Pass	eNV200	2023
G431457G	Ford	F250	2008	Pickup	Soul	2023

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G624093L	Dodge	1500	2012	Pickup	eNV200	2023
G710587N	Ford	F450	2008	Pickup	eNV200	2023
G410809P	Dodge	Caravan	2014	Minivan	Outlander	2024
G420177H	Ford	E150	2009	Van - Pass	eNV200	2024
G710112F	Ford	F450	2008	Pickup	eNV200	2024
G710186L	Ford	F450	2012	Pickup	eNV200	2024
G610167H	Jeep	Liberty	2009	SUV	Soul	2025
G420241F	Ford	E150	2008	Van - Pass	eNV200	2026
G430478M	Ford	F250	2012	Pickup	eNV200	2026
G431340L	Ford	F350	2011	Pickup	eNV200	2026
G432024K	Dodge	3500	2011	Pickup	eNV200	2026

Appendix D
Marine Corps Installations East Fleet Vehicle Analysis

There are four replacement approaches identified for the MCIE fleet:

- Monitored vehicles
  - GSA-listed PEVs only for sedans
  - All potential PEV types
- Unmonitored vehicles part of the full fleet
  - GSA-listed PEVs only for sedans
  - All potential PEV types for non-sedan vehicles

The extensive analysis conducted for monitored vehicles (Task 3) results in high confidence that the suggested vehicle can meet mission requirements. The suggested vehicles for the full fleet rely on extrapolation of those monitored vehicles and guidance identified in Section 3.

D.1 Monitored Vehicle General Services Administration Replacement Approach

The monitored sedans are shown in Table D-1, along with potential replacement PEVs and year of potential replacement. The replacement of these vehicles by PEV is assumed in the analysis of Section 5.

Table D-1. MCIE fleet GSA sedan monitored vehicle replacement approach.

GSA Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
294285	Chevrolet	Malibu	2009	Sedan - Midsize	Leaf	2023
G10-3327L	Chevrolet	Malibu	2012	Sedan - Midsize	Leaf	2022
G13-0325K	Ford	Focus	2012	Sedan - Compact	Volt	2022
G13-7974P	Ford	Focus	2015	Sedan - Compact	Volt	2022

Note that the GSA schedule does not currently list the Leaf, although it did in previous years. It is expected that the Leaf will be listed again by 2016.

D.2 Monitored Non-Sedan Vehicle All Replacement Approach

Table D-2 provides a replacement approach for the non-sedan type monitored vehicles using currently or soon-to-be available PEVs. Although not currently listed by GSA, these or similar vehicles may be listed by the year identified or MCBCL may choose to justify the replacement.

Table D- 2. MCIE fleet non-sedan monitored vehicle replacement approach.

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
290597	Ford	E350	1997	Van - Cargo	VTRUX Van	2022
291007	Ford	F650	2004	SP-Refrig.	NA	2024
294293	Chevrolet	HHR	2009	SUV	Soul	2019
294315	Chevrolet	3500	2009	Pickup	eNV200	2023
294324	Chevrolet	HHR	2009	SUV	Outlander	2018
300672	Ford	F550	2011	SP/Bucket Tr	EDI Conv.	2026
302039	Ford	F250XL	2014	Pickup	VTRUX PU	2026

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
302040	Ford	F250XL	2014	Pickup	VTRUX PU	2022
302334	Ford	F350 Stake	2015	Pickup	VTRUX PU	2031
G410379H	Dodge	Grd Caravan	2009	Minivan	Soul	2022
G410391H	Dodge	Dakota	2009	Pickup	VTRUX PU	2023
G410754M	Dodge	Grd Caravan	2012	Minivan	Outlander	2027
G410806P	Dodge	Grd Caravan	2014	Minivan	Outlander	2020
G411689L	Ford	Ranger	2011	Pickup	VTRUX PU	2021
G413297K	Ford	Ranger	2011	Pickup	eNV200	2026
G413300K	Ford	Ranger	2011	Pickup	VTRUX PU	2018
G413301K	Ford	Ranger	2011	Pickup	eNV200	2023
G420644M	Ford	E150	2012	Van - Pass	eNV200	2017
G420667P	Ford	F150	2014	Pickup	VTRUX PU	2024
G420671P	Ford	F150	2014	Pickup	eNV200	2025
G420911L	Chevrolet	C1500	2012	Pickup	eNV200	2024
G420915M	Ford	F150	2012	Pickup	eNV200	2023
G422985H	Chevrolet	C1500	2010	Pickup	VTRUX PU	2016
G430310H	Ford	E350	2009	Van - Pass	VTRUX Van	2020
G430323H	Ford	E350	2009	Van - Cargo	VTRUX Van	2016
G430324H	Ford	E350	2009	Van - Cargo	eNV200	2024
G431182M	Chevrolet	CG3300	2012	Van - Cargo	eNV200	2020
G434075P	Ford	F250	2015	Pickup	VTRUX PU	2035
G610161H	Dodge	Dakota	2009	Pickup	VTRUX PU	2018
G610174H	Jeep	Liberty	2009	SUV	Outlander	2020
G610879P	Chevrolet	Equinox	2014	SUV	Outlander	2029
G611508D	Jeep	Liberty	2008	SUV	Outlander	2016
G611509D	Jeep	Liberty	2008	SUV	Soul	2016
G621583G	Chevrolet	K1500	2008	Pickup	VTRUX PU	2016
G624085L	Dodge	1500	2012	Pickup	VTRUX PU	2020
G630163H	Chevrolet	K2500HD	2009	Pickup	eNV200	2017
G632885L	Chevrolet	K2500HD	2012	Pickup	eNV200	2029
G632888L	Chevrolet	K2500HD	2012	Pickup	Soul	2029

D.3 Unmonitored Sedan Fleet Replacement Approach

GSA currently lists only sedans for PEVs. It is assumed that additional sedans will be added to the list in the next few years. Table D-3 provides the list of sedans in the MCIE fleet other than those monitored and included in Section D.1. The projected year of replacement is identified based on the GSA requirements and expected usage. The mileage is projected from the odometer reading in 2015 and annual mileage provided by MCBCL. While other vehicles can certainly be replaced with PEVs, the vehicles identified in green are counted for replacement by PEVs in the analysis of Section 4.

Table D-3. MCIE unmonitored sedan fleet replacement approach.

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
294278	Chevrolet	Malibu	2009	Sedan - Midsize	Leaf	2021
294279	Ford	Fusion	2010	Sedan - Midsize	Leaf	2020
294280	Chevrolet	Malibu	2009	Sedan - Midsize	Fusion	2017
294282	Chevrolet	Malibu	2009	Sedan - Midsize	Leaf	2020
294283	Ford	Fusion	2010	Sedan - Midsize	Leaf	2025
294285	Chevrolet	Malibu	2009	Sedan - Midsize	Leaf	2023
294286	Chevrolet	Malibu	2009	Sedan - Midsize	Leaf	2023
294291	Chevrolet	Malibu	2010	Sedan - Midsize	Leaf	2020
G103321L	Chevrolet	Malibu	2012	Sedan - Midsize	Leaf	2022
G103322L	Chevrolet	Malibu	2012	Sedan - Midsize	Leaf	2022
G103324L	Chevrolet	Malibu	2012	Sedan - Midsize	Volt	2022
G103326L	Chevrolet	Malibu	2012	Sedan - Midsize	Volt	2017
G103327L	Chevrolet	Malibu	2012	Sedan - Midsize	Leaf	2022
G103328L	Chevrolet	Malibu	2012	Sedan - Midsize	Fusion	2022
G103329L	Chevrolet	Malibu	2012	Sedan - Midsize	Leaf	2022
G104001M	Dodge	Avenger	2013	Sedan - Compact	Focus	2023
G104002M	Dodge	Avenger	2013	Sedan - Compact	Volt	2023
G104412K	Chevrolet	Malibu	2011	Sedan - Midsize	Leaf	2021
G110419P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2020
G110420P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2019
G110421P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2018
G110422P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2018
G110423P	Chevrolet	Impala	2014	Sedan - Large	Volt	2018
G110424P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2019
G110425P	Chevrolet	Impala	2014	Sedan - Large	Volt	2019
G110426P	Chevrolet	Impala	2014	Sedan - Large	Volt	2019
G110427P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2018
G110428P	Chevrolet	Impala	2014	Sedan - Large	Volt	2020
G110429P	Chevrolet	Impala	2014	Sedan - Large	Fusion	2021
G110430P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2023
G110677L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110678L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110679L	Chevrolet	Impala	2012	Sedan - Large	Volt	2016
G110680L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110682L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110683L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110684L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110685L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110686L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2015
G110687L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110688L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G110689L	Chevrolet	Impala	2012	Sedan - Large	Fusion	2016
G111357P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2025

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G111359P	Chevrolet	Impala	2014	Sedan - Large	Leaf	2026
G112749L	Chevrolet	Impala	2013	Sedan - Large	Volt	2016
G112750L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112751L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112752L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112753L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112754L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112755L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112756L	Chevrolet	Impala	2013	Sedan - Large	Volt	2016
G112757L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2015
G112758L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2015
G112759L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2016
G112760L	Chevrolet	Impala	2013	Sedan - Large	Fusion	2018
G130325K	Ford	Focus	2012	Sedan - Compact	Volt	2022
G137973P	Ford	Focus	2014	Sedan - Compact	Focus	2026
G137974P	Ford	Focus	2015	Sedan - Compact	Volt	2022

D.4 Unmonitored Non-sedan Vehicle Replacement Approach

Table D-4 provides the list of non-sedans in the MCIE fleet other than those monitored and included in Section D.2. The projected year of replacement is identified based on the GSA requirements and expected usage. The mileage is projected from the odometer reading in 2014 and annual mileage provided by MCBCL. There are 137 vehicles projected for replacement with PEVs by 2026 included in the analysis of Section 4. This is too numerous to list individually here. This list includes the 62 projected for replacement with PEVs by 2022; more can be replaced if desired.

Table D-4. MCIE fleet unmonitored non-sedan replacement options.

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
294345	Chevrolet	HHR	2009	SUV	Outlander	2017
G420949L	Chevrolet	C1500	2012	Pickup	VTRUX PU	2017
G434559D	Ford	E350	2007	Van - Cargo	VTRUX Van	2017
G611498D	Jeep	Liberty	2008	SUV	Outlander	2017
G624087L	Dodge	1500	2012	Pickup	VTRUX PU	2017
290746	Ford	F450	2000	Pickup	VTRUX PU	2018
290923	Ford	F550	2003	Pickup	eNV200	2018
290924	Ford	F550	2003	Pickup	eNV200	2018
G430248F	Ford	E350	2007	Van - Cargo	VTRUX Van	2018
G434068F	Chevrolet	CG3300	2008	Van - Cargo	VTRUX Van	2018
G610684M	Chevrolet	Colorado	2008	Pickup	eNV200	2018
G622012F	Chevrolet	K1500	2008	Pickup	eNV200	2018
294325	Chevrolet	HHR	2009	SUV	Soul	2019
G420948L	Chevrolet	C1500	2012	Pickup	Soul	2019

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G431189M	Ford	F350	2012	Pickup	VTRUX PU	2019
G432010K	Ford	E350	2010	Van - Pass	eNV200	2019
G434553D	Ford	E350	2007	Van - Cargo	VTRUX Van	2019
G610166H	Jeep	Liberty	2009	SUV	Outlander	2019
G611246K	Chevrolet	Colorado	2011	Pickup	VTRUX PU	2019
G630183H	Chevrolet	K2500HD	2009	Pickup	eNV200	2019
294318	Chevrolet	HHR	2009	SUV	Outlander	2020
294320	Chevrolet	HHR	2009	SUV	Soul	2020
G434541D	Ford	E350	2007	Van - Cargo	VTRUX Van	2020
G434548D	Ford	E350	2007	Van - Cargo	VTRUX Van	2020
G621730H	Chevrolet	K1500	2010	Pickup	VTRUX PU	2020
G624090L	Dodge	1500	2012	Pickup	VTRUX PU	2020
G630556M	Ford	F350	2012	Pickup	VTRUX PU	2020
291230	Ford	E350	2005	Van - Cargo	eNV200	2021
294292	Chevrolet	HHR	2009	SUV	Soul	2021
294299	Chevrolet	HHR	2009	SUV	Soul	2021
294317	Chevrolet	HHR	2009	SUV	Soul	2021
294319	Chevrolet	HHR	2009	SUV	Soul	2021
294335	Chevrolet	HHR	2009	SUV	Outlander	2021
G410400H	Dodge	Dakota	2009	Pickup	VTRUX PU	2021
G420220F	Ford	F150	2008	Pickup	eNV200	2021
G420231F	Ford	F150	2008	Pickup	eNV200	2021
G420248F	Chevrolet	G1300	2008	Van - Cargo	eNV200	2021
G420989K	Chevrolet	G1300	2011	Van - Pass	eNV200	2021
G430247F	Ford	E350	2007	Van - Cargo	VTRUX Van	2021
G431188M	Ford	F350	2012	Pickup	VTRUX PU	2021
G434543D	Ford	E350	2007	Van - Cargo	VTRUX Van	2021
G630092P	Ford	F250	2015	Pickup	VTRUX PU	2021
G630175H	Chevrolet	K2500HD	2009	Pickup	eNV200	2021
294290	Chevrolet	HHR	2009	SUV	Soul	2022
294316	Chevrolet	HHR	2009	SUV	Soul	2022
300652	Ford	F550	2009	SP	EDI	2022
G410387H	Dodge	Grd Caravan	2009	Minivan	Soul	2022
G412401K	Dodge	Dakota	2010	Pickup	eNV200	2022
G420221F	Ford	F150	2008	Pickup	VTRUX PU	2022
G420886M	Ford	E150	2012	Van - Pass	VTRUX Van	2022
G420899M	Ford	E150	2012	Van - Pass	eNV200	2022
G430316H	Chevrolet	2500HD	2009	Pickup	eNV200	2022
G431175M	Chevrolet	G2300	2012	Van - Pass	VTRUX Van	2022
G432620K	Chevrolet	G2300	2011	Van - Pass	VTRUX Van	2022
G434547D	Ford	E350	2007	Van - Cargo	VTRUX Van	2022
G434550D	Ford	E350	2007	Van - Cargo	eNV200	2022
G610171H	Jeep	Liberty	2009	SUV	Outlander	2022

Non-Sedan Replacement Approach						
Fleet Vehicle Id	Make	Model	Year	EPA Class	Potential Replacement Vehicle	Replacement Year
G630091P	Ford	F250	2015	Pickup	eNV200	2022
G630196N	Chevrolet	K3500	2013	Pickup	VTRUX PU	2022
G631013N	Chevrolet	K2500HD	2014	Pickup	VTRUX PU	2022
G631053M	Ford	F350	2012	Pickup	eNV200	2022
G631365P	Ford	F250	2015	Pickup	VTRUX PU	2022