COLORADO
Department of Personnel & Administration

MEMORANDUM

TO: Joint Budget Committee, Senate Transportation Committee, and House Transportation & Energy Committee
FROM: Kara Veitch, Executive Director, Department of Personnel & Administration
DATE: November 1, 2019
RE: Fiscal Year 2018-19 Vehicle Acquisition Report

This report is submitted pursuant to 24-30-1104 (2)(c)(II), C.R.S. and 24-30-1104 (2)(c)(V), C.R.S. concerning State fleet vehicle acquisitions. The Department of Personnel & Administration is directed by statute to "adopt a policy to significantly increase the utilization of alternative fuels and that establishes increasing utilization objectives for each following year."

24-30-1104 (2)(c)(II), C.R.S. requires the Department to purchase plug-in hybrid electric vehicles (PHEV), battery electric vehicle (BEV), vehicles that operate on compressed natural gas (CNG), or other alternative fuels if either the increased base cost of such vehicle or the increased life-cycle cost of such vehicle is not more than 10% over the cost of a comparable dedicated petroleum fuel vehicle. If the purchase of an Alternative Fuel Vehicle (AFV) is not below the 10% mandate, the Department will recommend the purchase of the most applicable AFV to the assigned agency based on Executive Orders directing the adoption of low emissions vehicle deployment.

State Fleet Management (SFM) collaborates with each agency to maximize the use of AFVs in the State fleet and to ensure each replacement vehicle can perform adequately in the field. In the event that an agency cannot adopt any available AFV option, the Executive Director of the agency must submit documentation supporting the justification of noncompliance with the mandates. This documentation is reviewed by the Department and the Colorado Energy Office for approval.

SUMMARY OF FISCAL YEAR 2018 VEHICLE ACQUISITIONS

SFM worked with State agencies to identify vehicles that meet operational needs while adhering to statutory requirements relating to AFVs. SFM partners with partners across the State to find creative solutions and products that provide agencies with flexibility and responsive solutions while allowing the State fleet to adopt new, innovative vehicle solutions.

Battery Electric & Plug-In Hybrid Electric Vehicles

In FY18 and continuing into FY19, Battery Electric Vehicle partnerships with the Department of Energy/National Renewable Energy Laboratory (NREL) focusing on vehicle utilization recognized the

opportunity for very deliberate expansion opportunities. This resulted in the development of technology and data generation to better understand the most efficient adoption of electric vehicles. The studies used telematics devices pre-installed on the vehicles approved for replacement and identified the proper utilization model as well as available charging infrastructure as the two key hurdles to successful electric vehicle implementation.

These studies resulted in the expansion of Plug-In Electric Hybrid Vehicle purchases, the Department identified 17 PHEVs, representing 2.60% of fleet purchases. PHEVs, powered by both an internal combustion engine and an electric motor that uses the electricity stored in the vehicle's battery, are a good purchase opportunity to help bridge the cultural gap between current petroleum consuming vehicles and the future expansion of vehicle electrification. To maximize the positive impact of the PHEV technology efficiencies, the operators must consistently charge the batteries when not in use.

Battery Electric Vehicles currently have technology and production limitations, but with increased adoption and demand, manufacturers are providing increased quantities of capable products. But concern over range limitations continues. Currently, the main limitation is vehicle charging infrastructure, where the vehicle has overnight dwell time. Nonetheless, in FY19, the state purchased 8 BEVs, 1.23% of fleet orders, throughout the Front Range.

Compressed Natural Gas

For multiple years, the Department has experienced challenges with respect to CNG vehicle costs exceeding the 10% threshold and fewer CNG vehicle platforms being offered by manufacturers. In addition, the State's vehicle ordering timeline continues to be a challenge in aligning with grant funding opportunities. Due to the significant additional equipment costs, and without the offset of this funding resource to the vehicle purchase price, procurement of this AFV platform is challenging.

In FY 2018-19, the Department placed no orders for CNG vehicles within previously approved budgeted appropriations. Infrastructure expansion was flat in the fiscal year, and industry indicators point to CNG displacing approximately 1% of the vehicles within the light duty market place in the coming years. This trend has also been supported by the lack of development of CNG vehicle repair facilities.

Petroleum Vehicles

The Department ordered 278 dedicated petroleum vehicles this year, representing 42.57% of all vehicle orders, with the Colorado Department of Public Safety ordering 179 of those vehicles. Of the 278 the Department ordered, 250 were gasoline and 28 were diesel vehicles for other agency use. This represented 38.28% and 4.29% of all vehicle orders, respectively. The diesel powertrain has become a specialized ordering item due to the high added cost and average rate of return on investment.

DPA PROCEDURES & POLICIES ON ORDERING NEW VEHICLES

The Department's vehicle ordering process is governed by 24-30-1104, C.R.S. and the Governor's executive orders, focusing on AFVs, emphasizing a menu approach for the appropriate vehicle selection. As there is a vast array of job duties required of the State's vehicle fleet, a menu approach allows agencies to identify the correct AFV available for their needs.

Statute requires the Department to purchase AFV capable vehicles whenever the base cost or life-cycle cost for the AFV is within 10% of the cost of the regular gasoline alternative. This will allow the State to take advantage of Colorado's vast reserves of natural resources, reduce our dependence on petroleum, create new jobs, and reduce our carbon footprint.

SFM depends on the cooperation and collaboration of all other State departments and the Governor's Office to fulfill its mission. SFM is invested in functional partnerships and production of accessible analytics tools for the agencies Motor Vehicle Advisory Council (MVAC) and Greening Government Leadership Council (GGLC) to monitor their performance at the unit level. SFM also has produced documentation within the new vehicle ordering packets for the agencies. These specific instructions guide departments through the selection process so the most effective vehicle can be purchased and put into service.

AFV models must be reviewed and considered as the first level of choice during the vehicle selection process. If it is determined that the AFV models available for purchase as CNG, PHEV, or BEV will not meet the functional requirements of the department, the agency will review all vehicle options, and another type of alternative fueled vehicle such as Hybrid or E85 will be selected. The last option will be to purchase a gasoline or diesel petroleum consuming vehicle. If the available proposed AFV model will not work for the department, an additional form "Non-AFV Purchase Justification Form" must be completed and signed off on by the Executive Director of each agency.

Hybrid Vehicles

Hybrid vehicles continue to be a viable option for many operational duties. This year, 161 were ordered. The comparable life-cycle cost on the models ordered was less than 10% compared to their gasoline equivalents' life-cycles. This represents 24.66% of all vehicle orders. As hybrid vehicle platforms have become more commonplace, their associated cost has decreased and their on-board technology has become more efficient. The industry has demonstrated a focus on this pairing of electrification and the internal combustion engine as an efficient means to reduce the states carbon footprint.

Flexible Fuel Vehicles

The Department placed orders for 189 E85 Flexible Fuel Vehicles (FFV), subject to availability. This result was achieved due to the fuel's cost neutrality and the equipment up-fit compared to the dedicated petroleum vehicle cost, being less than 10%. Though this, alternative fuel has been an inexpensive fuel to invest in. Industry trends and announcements from vehicle manufactures have marked a movement away from E-85 in the near term. Specifically, manufacturers are reducing the availability of models with this capability. This represents 28.94% of all vehicle orders.

INFRASTRUCTURE STRATEGY

SFM works closely with the Colorado Energy Office, Department of Energy's Clean Cities Coalition, Regional Air Quality Council, National Renewable Energy Laboratory, political subdivisions, and representatives from AFV suppliers, infrastructure manufacturers, and developers to foster best practices and strategies to develop AFV infrastructure statewide. Since AFV fuel sites, particularly CNG, require a baseline fuel commitment from fleets in order to legitimize operations, it has been imperative for the growth of AFVs in Colorado that there are adequate concentrations of AFV vehicles in place at or near these fueling sites in order to ensure a sustainable alternative fuels market at the local level. Additionally, cooperative processes must be developed between the private sector, and the federal, state, and local government agencies to help diversify the extensive cost of AFV fueling infrastructure. The State of Colorado sets an example by purchasing AFV vehicles for a number of local governments, private fleets, and other states, thereby building demand for AFV far beyond State fleet vehicles. The expanded use of telematics is the key to understanding the opportunities and creating an efficient mechanism to expend limited resources. Working closely with the departments and the Colorado Energy Office, SFM will continue to provide thorough guidance on the placement of AFVs in tandem with other public and private fleets, so potential fuel volumes may be combined in support of Colorado's alternative fuels market.

In October of 2017, the Governors from Colorado, Utah, Nevada, Montana, Wyoming, New Mexico, Idaho, and Arizona signed the Regional Electric Vehicle Plan for the West (REV West) MOU. This MOU provides a framework for creating an Intermountain West Electric Vehicle Corridor to make it possible to drive an electric vehicle across the Signatory States' major transportation corridors. Also in 2017, Governor Hickenlooper signed an Executive Order with a directive for a statewide electric vehicle plan to build out key charging corridors that facilitate economic development and boost tourism across the state while reducing harmful air pollution. The electrification of these corridors is expected to reduce range anxiety and drive further adoption of EVs while helping transform the market by allowing smaller communities to plug into the regional system.

This planning and support for the build out of EV infrastructure and elimination of range anxiety provides direction for the State and other public and private fleets to purchase more EV fleet vehicles. Working closely with the departments and the Colorado Energy Office, SFM will provide guidance on the proper placement of these vehicles and additional charging equipment for fleet charging in order to maximize successful deployment. One such example would be the continued expansion of the PHEV platform. The flexibility of the PHEV's dual fuel sources is a promising bridge technology to capitalize on the expansion of the EV charging infrastructure, by supplementing a portion of petroleum fuel consumption with electrical charging. To be successful, agencies will need to ensure regular charging of PHEVs and manage fleets in a way that maximizes the environmental and economic benefits that come from the electric drivetrain.

AVAILABILITY OF AFV INFRASTRUCTURE STATEWIDE

In 2015, the Colorado Energy Office commissioned the Colorado State Fleet Opportunity Assessment, a study to assess the best options for AFV deployment and the use of telematics and data collection in the State fleet. Fleet managers from several State agencies, worked with the Department to advise on the methodology and results of the study. The outcome of this report indicated high potential for further deployment of dedicated AFV vehicles as well as bi-fuel AFV vehicles, which hold strong potential for increased deployment due to their flexibility, range, and potential for substantial increases in fuel economy in hybrid-electric scenarios. These findings can be used to guide SFM in future vehicle purchases and acquisition efforts. Initial results of these original purchases have demonstrated the key importance of fueling or charging infrastructure in the relatively near proximity to the operational area of the vehicle. It has also illustrated the overwhelming importance the decision the driver of the vehicle makes when fueling the vehicle, especially when there are multiple fuel choices, such as a PHEV that can operate on gasoline or electricity.

As of October, 15, 2018, there were 22 public access CNG fuel sites in operation. The Colorado Energy Office, through the ALT Fuels Colorado grant program, has made awards to 8 stations across the state. These stations are all operational: Glenwood Springs, Pueblo, Trinidad, Colorado Springs, Commerce City, Eaton, Gunnison, and Greeley. Because nearly all of the CNG vehicle models available can be purchased as dual fuel vehicles (i.e. they can utilize either CNG or gasoline), we have greater flexibility in the placement of these vehicles. With the proliferation of private behind-the-fence fuel stations, DPA anticipates few new publicly-available CNG stations to be built as there is less demand for these fueling stations.

Vehicle electrification has promise to be an effective alternative to other attempts to move away from the historical norm of petroleum powered vehicles with vast manufacture investment and an already substantial number charging stations. CNG with 22 stations and E85 with 74, both fall short of the current Electric Vehicle Support Equipment (EVSE) in the region at 889 charging stations, an increase of

28% from 1 year ago. Infrastructure is still the most critical hurdle to influencing the cultural adoption of alternative fuels. Public and private entities are taking steps to address the infrastructure gap. Electrify America, formed out of the VW emissions cheating scandal, is planning to build high-speed charging infrastructure at up to 9 sites along Colorado's interstates while also installing charging in and around the metro area. CEO is planning a separate offering that would install high-speed charging along Colorado's interstates and State and US highways. With this said, With this said, as use suitable use cases for EVs are identified, agencies must identify and request funding for locations to place EV charging stations at State-owned and leased facilities.

EXEMPTIONS

SFM is required by statute to purchase an alternative fuel vehicle if either the increased base cost of such vehicle or the increased life-cycle cost of such vehicle is not more than 10% over the cost of a comparable dedicated petroleum fuel vehicle. The Department's executive director is required to adopt a policy to allow some vehicles to be exempted from this requirement. Current exemptions include:

- Colorado Department of Public Safety (CDPS) law enforcement patrol, undercover, and specialized vehicles like crime scene labs and hazardous materials vehicles are exempted from this requirement until such time AFV vehicles are available and certified. However, CDPS is required to purchase AFV vehicles wherever practicable except for the exemptions listed above.

- Non-CDPS law enforcement "certified patrol" vehicles used by State agencies are exempt from this requirement until such time AFV vehicles are available and proven reliable and certified for this function. At this time this will include Ford Police Interceptors, Police Dodge Chargers, Chevy Police Tahoe, Ford Police Expedition and Interceptor Utility, and Police Dodge Durango. Note: Currently there are no "Pursuit"-rated CNG models available for patrol vehicles from the manufacturer. This is a standard of the Colorado State Patrol (CSP) to perform the required task. The Ford Police Responder, a hybrid platform police vehicle, was reviewed by CSP, and the platform was deemed incapable of performing the strategic mission of the agency.

- This also may cover vehicles that have specialized equipment affixed to the vehicle making it less suitable for general transportation. These vehicles are essentially a "tool on wheels" or "mobile shop" that would be difficult to accommodate large additional fuel tank and battery storage configurations and be certified by the OEM. Examples include a drilling unit, water tanks, lab/research equipment, plumbing or telecommunications equipment, and patient and prisoner transport vehicles.

- Other unknown potential exemptions will be considered on a case by case basis only.

The table below identifies the number of acquisitions by fuel type configuration or hybrid vehicles by department for FY19.

FY 2018-19 Acquisitions by Department and Fuel/Hybrid Type								
Deparment	AFV					NON-AFV		Total by Department
	CNG	E85	Hybrid	PHEV	BEV	Diesel	Gasoline	
CDPS	-	28	11	-	1	8	171	**219**
CDA	-	9	4	-	-	-	1	**14**
CDOC	-	29	28	-	2	7	4	**70**
CDE	-	-	-	-	-	-	-	**0**
CDPHE	-	3	14	1	-	-	-	**18**
CDHE	-	9	8	-	-	2	11	**30**
CDHS	-	8	16	9	-	-	7	**40**
LAW	-	-	5	-	-	-	-	**5**
DOLA	-	-	6	-	-	-	-	**6**
CDLE	-	1	2	-	-	-	-	**3**
DMVA	-	1	1	-	3	-	-	**5**
DNR	-	81	5	-	-	10	12	**108**
DOR	-	-	12	4	-	-	-	**16**
DORA	-	10	4	-	-	-	-	**14**
SOS	-	-	-	-	-	-	-	**0**
CDOT	-	6	33	1	-	1	41	**82**
GOV	-	1	-	-	-	-	1	**2**
DPA	-	3	3	2	2	-	-	**10**
JUD	-	-	9	-	-	-	2	**11**
Total Acquisitions	**0**	**189**	**161**	**17**	8	**28**	**250**	**653**
Percent of Total	**0.00%**	**28.94%**	**24.66%**	**2.60%**	**1.23%**	**4.29%**	**38.28%**	**100.00%**

AFV VEHICLE ACQUISITIONS – FY 2007-08 to FY 2018-19

Since January of 2008, Colorado has been committed to purchasing AFVs available in the marketplace. Fueling infrastructure continues to be a major hurdle when investing in AFV technologies. Additionally, budget constraints can play a role in the investment in emerging technologies. For example, the economic crash in FY 2008-09 resulted in the State only approving vehicles to be replaced in FY 2010-11 and FY 2011-12 if they had an impact on life, health, or safety. Most of these vehicles were for the Department of Public Safety, State Patrol Division with limited AFV opportunity, the majority E-85 and Hybrid. Broader AFV acquisitions resumed in FY 2012-13. See the table below for a summary of vehicle

acquisitions from FY 2007-08 to FY 2018-19. As this is a point in time report based on acquisition made year to date, some variations are expected year over year.

The SFM Program was able to purchase a total of 4,003 alternative fueled vehicles capable of reducing significant quantities of petroleum from FY 2007-08 to FY 2018-19. E-85 has seen a reduction as an option as an AFV, with reduction in fuel infrastructure noted, as well as a reduced number of vehicle options in all categories due to the rise of Hybrid, PHEV, and BEV options. As stated above, the industry has dedicated a significant effort to the expansion of vehicle electrification. That has led to more applications and a broader spectrum of choices for implementation. It has also allowed for the economies of scale to be better realized. This has allowed for purchases of 1,125 Hybrid from FY 2007-08 to FY 2018-19. The PHEV platform is showing continued growth with a total of 39 vehicles purchased between FY 2007-08 and FY 2018-19. The 24 BEV purchases have been a concisely focused effort using lessons learned from previous AFV rollouts, to identify current State owned infrastructure, then review the utilization patterns through telematics, prior to procurement. This has created a more measured approach, but the intent is to identify strong use cases as the technology expands. Lessons learned have demonstrated that users soured to an AFV class can taint the larger pool, making adoption significantly more difficult.

Summary of Vehicle Acquisitions - FY 2007-09 to FY 2018-19								
Fiscal Year	AFV					NON-AFV		Total Acquisitions
	CNG	E85	Hybrid	PHEV	BEV	Diesel	Gasoline	
2008	-	284	30	-	-	52	288	**654**
2009	-	303	213	-	-	44	335	**895**
2010	-	245	86	-	-	5	215	**551**
2011	-	98	4	-	-	30	109	**241**
2012	1	113	12	-	2	9	180	**317**
2013	81	220	53	-	-	21	191	**566**
2014	153	233	61	-	-	16	217	**680**
2015	35	246	69	-	-	40	331	**721**
2016	48	128	158	9	1	44	277	**665**
2017	-	221	136	6	-	46	145	**554**
2018	2	215	142	7	13	30	285	**694**
2019	0	189	161	17	8	28	250	**653**
Total	**320**	**2,495**	**1,125**	**39**	**24**	**365**	**2,823**	**7,191**

SUMMATION

The vehicle transportation industry has become vastly more complex as technology advances, infrastructure develops, and public and private policy makers' priorities evolve. The logistical solutions for moving State employees to effectively serve the public has likewise become more complex. The State's large foot print creates challenges with the type of solutions chosen and insight into the most efficient operation of the transportation vehicle can be situational.

Telematics is the integration of the vehicles onboard computers and pairing the information with GPS reporting. The State has engaged in early piloting of EV specific telematics deployments, and plans to increase its use and access of the data produced by this technology in the coming year on additional fleet vehicles.

Fleet ownership is still an absolute necessity in many of the tasks that the State provides. With that ownership comes the responsibility to provide guidance and support to the employees of the respective agency to be more efficient in the operation of the vehicle.

With each additional decision requested of the agencies, the need for data to analyze travel patterns increases to assist the agencies striving to meet this goal. A keystone tool in the collection of data is the use of vehicle telematics.

Investing in technologies that provide tools for operational guidance at the front line staff level is one of the most important actions that must be taken if the goal is to effectively reduce fuel consumption, and improve utilization of the appropriate AFV. This investment must be systemic in nature and requires the cooperation and support of the leadership at all levels.

Fueling infrastructure is a continuing challenge as we look to alternative fuel sources. Understanding the strengths of our current infrastructure and the limitations of the alternative infrastructure have been a historical challenge. Deployment of new infrastructure is extremely costly and requires robust data analysis to better understand where new investment makes the most effective impact on the move towards a new cleaner transportation system. Agency's need for this information will supersede the request for funding to help support a successful cultural change.

Ultimately, disruption in the vehicle market place is creating the opportunity to effectively utilize these technologies. The State must be positioned to help our employee's transition into this new era of mobility.