TOWN OF UXBRIDGE

MUNICIPAL VEHICLE FLEET TRANSITION

2020

EDCP

UXBRIDGE GREEN COMMUNITY INITIATIVE

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MUNICIPAL VEHICLE FLEET TRANSITION

OVERVIEW

The purpose of this report is to provide a framework for the development of a strategy for the transition of Town vehicles, specifically cars, vans, SUVs, and light-duty trucks from gas to hybrid and/or all-electric vehicles. The intent is to develop a comprehensive fleet policy and a model for a five-year (rolling) plan for the replacement and maintenance of Town vehicles, including all Police, Fire Management, Senior Center transport, Inspectors/Assessors, Facilities Management, and DPW light-duty cars and trucks. The ultimate goal is to evolve the fleet to one that is both environmentally friendly and that is optimally maintained and managed so as to extend the life of each, thereby improving the Town's fiscal approach to Fleet Management as well as reducing the Town's carbon footprint.

This report offers a strategy for Town decision makers when determining if and when a vehicle should be scheduled to be replaced.

The decisions regarding the Town's fleet should be made independent of the Town's Capital Plan. A Fleet Management Plan that is based on a five-year rolling schedule will allow Department Heads, the Town Manager, Board of Selectmen and the Finance Committee to have a clear understanding of the needs. A rolling plan offers no end and remains flexible enough to adjust to the changes and demands of Town government and evolving technology. Such a plan provides a framework and transparency for vehicle purchases based on a prescribed replacement timeline.

To that end, the following strategic plan will serve as a guide in the process of crafting the Uxbridge Fleet Management Plan.

"When Thomas Edison worked late into the night on the electric light, he had to do it by gas lamp or candle. I'm sure it made the work seem that much more urgent."
George Carlin

ACKNOWLEDGEMENT

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THE STRATEGIC PLAN

Desired Outcome: That the Town of Uxbridge has an executable and sustainable strategy for the evolution of the vehicle fleet from all gas/diesel powered to efficient and clean all-electric and/or hybrid vehicles.

Strategy: Determine what each Town Department's light-duty vehicle needs are within a rolling five-year window, and what policies and procedures are necessary for Uxbridge to become a model green community as it relates to the Town's vehicle fleet.

Methodology: Conduct an inventory and develop a baseline of vehicle data for the Town's vehicle fleet (cars, vans, SUVs, light and medium duty trucks) including VIN, year, make model, annual maintenance costs (most recent year and projected), mileage, purpose, anticipated vehicle life, and projected replacement cost for similar vehicle (gas).

Develop a fact gathering tool that will allow individual departments an opportunity to identify needs (replacement vehicles and additions) projecting out on a continuous five-year timeline.

Review and rate each in-service vehicle on a scale of 0-4, zero being 100%, four being lowest usable life.

Determine replacement schedule for each including respective timeline (secondary service) for each.

Identify optimum performance vehicles, both day-to-day and task, as well as longevity experience/projections.

Identify vehicles, both traditional gas or diesel, as well as hybrid and electric that fit the needs of the departments.

Prepare a five-year (rolling) plan for the replacement of all in-service light-duty vehicles with anticipated replacement costs.

Prepare a matrix of maintenance costs for each vehicle option.

Determine availability of vehicles through the State Bid List or other public purchasing system.

Determine if leasing any or all vehicles is a viable approach for the replacement of in-service vehicles.

WHY HYBRID OR ELECTRIC?

Generally, hybrid and all-electric vehicles have a higher upfront cost when compared to traditional gasoline powered vehicles, alternatively they offer lower maintenance costs. That said, as the technology is offered by an increasing number of manufacturers over a broader spectrum of vehicles the purchase cost delta between hybrids and all-electrics and gasoline powered is narrowing. New electric vehicles like the Kia Soul, GM Bolt, Tesla Model 3, and Smart EQ have dipped below the median price for cars in the US (excluding government incentives).

The most obvious reason for the lower operational cost (costs associated with the vehicle after purchase) is fuel: electricity is cheaper than gasoline. That said, the cost of maintenance is often overlooked when comparing fleet purchases. The true cost of ownership is dramatically impacted by the lower maintenance costs of electric vehicles and somewhat so by hybrids. All-electric vehicles have much less moving parts and require minimum maintenance, versus combustion engine powered vehicles that require regular oil changes, filters, fluids and belts replacement, tune-ups, and transmission, exhaust system, and repairs and replacements.

During the course of a 100,000-mile use, electric vehicles typically need replacement tires and brakes. Electric and hybrid vehicle regenerative braking systems reduces the wear on brakes and extends servicing intervals even further. Electric vehicles maximize the gains created by lower cost of maintenance; hybrids have lower operational cost due to lower use of fuel and less strain on the car in short distance and low speed trips.

Municipal fleet data shows promising results with electric vehicles saving municipalities thousands of dollars over their lifespan.

Vehicle Make/Model	Type	Purchase Cost	Ownership Cost/Year	Maintenance Costs/Year	Nine Year Cost
Chevrolet Bolt	All electric			$205	
Nissan Leaf	**All electric**	**$25,797**	**$3,620**	**$344**	**$32,580**
Ford Focus	All electric			$386	
Ford Fusion	Hybrid plug-in			$497	
Toyota Prius	**Hybrid plug-in**	**$22,984**	**$3,738**	**$893**	**$33,644**
Ford Taurus	Gas			$923	
Chevrolet Volt	Hybrid plug-in			$1210	
Ford Fusion	Hybrid			$1311	
Ford Fusion	**Gas**	**$22,866**	**$4,592**	**$1621**	**$41,328**
Ford Focus	Gas			$1805	

Source: Quartz, March 18, 2019

The above Table presents data collected by New York City after their initial experience with electric vehicles. The data as presented is a comparison of the types (including make and model) in the City's fleet (1,893 light-passenger vehicles). The annual savings are a dramatic statement about the value of switching to all-electric when possible.

For a more granular comparison, three vehicles were considered, the all-electric Nissan Leaf, the hybrid plug-in Toyota Prius, and the gas Ford Fusion. After projecting the ownership cost based on a nine-year life cycle and factoring the initial purchase price the difference narrowed with the Prius being the most cost effective. The all electric Nissan Leaf was handicapped by the nearly $3000 difference in purchase cost. Electric and hybrid vehicles, due to their higher purchase price can be cost effective only if they are used at a level that results in a net gain realized from the cost saving benefits of lower fuel and operational costs. An electric vehicle that is used infrequently offers minimal opportunity to recoup its cost; every mile an electric car is driven is money saved. The length of ownership/primary use is vital; the longer the vehicle is in the primary fleet the longer the electric vehicle has the chance to cancel out the difference of the higher acquisition cost.

Logically as more and more electric vehicles come into the marketplace there is an anticipation that the acquisition cost will lower (supply-demand), eventually making the electric the most cost effective. The question of when will the two lines intersect is key to projecting when (and if) the Town will commit to a one-hundred percent electric or combination hybrid and all-electric fleet.

Currently there are funds available through grants, both competitive and non-competitive that can support the fleet transition. The State continues to mandate more and more regulations and restrictions as they address climate change; it is anticipated that additional funding will be made available as a result. In addition, the Town will be moving forward with the next Green Communities application and it is hoped that electric and hybrid vehicles will be included in that strategy.

The Town has one EV charging station in place (adjacent to the Senior Center on South Main Street). The strategy is to add stations at the Police HQ, the DPW facility, Town Hall, the Public Library, schools and the McCloskey Building, the later four will be available for public use.

Societal Benefits

For the purposes of this report the question of carbon footprint is acknowledged but will not be dealt with in depth. It is safe to say that a fleet that is a mix of hybrid and all-electric vehicles will serve to lower the Town's carbon footprint, thereby furthering the Green Community Initiative undertaken by the Town in 2019.

Other than reducing carbon emissions and the growing financial incentive to transition to all-electric vehicles, municipalities are also being encouraged to increase public awareness and confidence about electric vehicles. The Commonwealth of Massachusetts is incentivizing the transition to electric through support programs, information, State buying power, and funding. When State and local governments join the Federal government and large organizations such as Amazon in their commitment to electric vehicles, a clear message is sent to investors and producers of electric vehicles that a major market segment is confident and willing to transition to electric.

Greater investment will move the technology forward at a rapid rate, thereby making more product and improvements readily available by the three and five-year marks of the initial transition period. It is feasible that the Town could be one-hundred percent electric during the seventh, eighth or ninth year. By year ten, Uxbridge should be able to boast about their commitment to being a Green Community, and by leading, provide the confidence that residents and business owners are looking for as they make the choice to transition to electric vehicles.

RANGE ANXIETY

The acceptance of all-electric vehicles by individual consumers as well as fleet buyers seems to always come back to what is commonly referred to as "range anxiety", the concern that a vehicle has insufficient range to reach its destination. The consequences of insufficient range vary from a fear that users will be unable to travel long distances, the concern that the vehicle will need to be recharged frequently, or that the vehicle will exhaust its charge on route to a destination leaving the user stranded.

Electric and hybrid vehicles are evolving and will continue to, just as the gas powered cars and trucks have since the late 1800's. Current available electric vehicles' range varies greatly between models; on the lower end is the Nissan Leaf with a range of one hundred-fifty (150) miles, at the higher end there are Tesla models with a range of four-hundred (400) miles.

Part and parcel of the so-called "range anxiety" is the current lack of electric vehicle charging stations (EV Chargers). While a personal charging station may be out of the

reach of individuals, the Town can build an EV Charger network that includes a Fast Charger (15 -30 minutes) that can serve both Town vehicles as well as be available for use by residents and visitors. Charging stations typically have the ability to accept credit/debit card payments, making them both accessible as well as a potential off-setting revenue source for the Town.

GETTING STARTED

Factors such as types of use, annual mileage, time in use, and idling time should be considered when prioritizing the initial steps toward transition of the fleet.

- ***Vehicles that are driven frequently***: electric and hybrid vehicles generally have a higher upfront cost (purchase price) and a lower operational cost. Every mile driven on an electric or hybrid vehicle that otherwise would have been a mile driven on a gas power vehicle, is money saved.
- ***Vehicles that do short distance low speed trips***: Gas powered vehicles generally perform best while doing stable consistent speeds on highways. While all-electric vehicles can certainly reach the same high speeds as gasoline vehicles, they perform best at low speeds doing short trips. Hybrid vehicles, due to their regenerative braking, are also able to outperform traditional gasoline vehicles at low speed local trips.
- ***Vehicles that spend a lot of time idling***: Idling refers to when a vehicle is left running yet not moving and left in park. Gas vehicles are at their lowest efficiency when idling; long periods of idling can also negatively impact the vehicle and its performance. During the winter, electric vehicles are able to heat a car at a fraction of the fuel usage when compared to gas powered vehicles.

According to a recent study, in the City of Faribault, Minnesota, a municipal Ford Explorer used fifty-seven (57) gallons of fuel per week between June and December and during that same period "forty-five percent (45%) of the vehicles usage time was spent idling." Electric and to a lesser extent hybrid vehicles use a negligible amount of energy while idling and puts less strain on the vehicle.

As the Town sets the priorities for the fleet transition, logic dictates that the Police fleet lead the transition. Police vehicles are used most frequently and spend the most time idling. That combined with the availability of hybrid cruisers (Interceptors) from Ford, make the decision an easy one. At this time there are no Interceptor level vehicles available as all-electric. Tesla is developing an Interceptor type vehicle but it is still a way from the point of being available.

The next vehicles to consider would be those used by inspectional services such as

the Building Inspectors, Deputy Fire Chief, and the Assessor. Currently the individual Building Inspectors, other than the Building Commissioner, are asked to use their private vehicles and are reimbursed for such use. Ideally the Town could have fleet vehicles readily available for their use. The Deputy Fire Chief uses his FD vehicle for emergency response situations as well as inspectional appointments and daily use in his role.

The last of the passenger type vehicles (vs. work trucks) to be entered into the transitional rotation are the Senior Center vehicles, currently two (2) passenger sedans and an eight passenger van. All are candidates for all-electric transition, and for that reason may be subject to funding availability that can support the transition at a time earlier than anticipated.

To that end, the transition need not be held a strict order of priority, rather the priority should serve as a weighted system to assist in the timeline development. Police vehicles are and should remain the priority, as they have a scheduled replacement strategy and the availability of hybrid vehicles that can meet the demands of the Police Department. All other transitions should consider the availability and suitability of proposed hybrid or electric vehicles that will replace gas powered vehicles. Strategically those that can, should be replaced on a schedule according to priority.

SPECIALTY VEHICLES – BUSSES/VANS

The Town of Uxbridge currently has one passenger van in the municipal fleet, operated by the Uxbridge Senior Center as part of their Senior shuttle program. Although electric busses and vans, like other electric vehicles have lower fuel and maintenance costs, most experts still see electric busses as an “emerging technology” that require intense research and planning at such an early stage of development and integration into municipal fleets. To date, no community in Massachusetts has transitioned to an all-electric or hybrid bus for their senior center nor has there been an effort to create public policy or support from states to increase the incentives for cities and towns to take the risk.

The changes in technology and the advancement of designs will result in products (vehicles) that will serve community needs in the near future. Within the initial five-year cycle of the transition, they likelihood that a suitable all-electric small bus will be available is relatively high. Therefore, the Town should include the transition of the vans and the possible introduction of busses in the planning, remaining aware of incentives and funding programs that may become available as the new products are introduced to the marketplace.

In addition, the Town should encourage the school bus provider to transition their fleet to an all-electric or hybrid during the parallel period, thereby increasing the Town's movement to becoming a "green community".

VEHICLE MANAGEMENT RATING TEMPLATES

The simplest plans base replacement on vehicle lifespan or odometer reading. There is some flexibility based on inspections reports. Newport Beach, CA for example, uses the "lifespan/odometer" approach.

Other Community Fleet models also consider additional factors like maintenance costs, availability of replacement parts, replacement cost, and resale value. Point systems used by some municipalities give a more flexible model that incorporates all these factors while still giving clear guidance. The University of Tennessee's Municipal Technical Advisory Service created the model (shown below) that is based on a similar point system used by the American Public Works Association.

The Town of Sherborn (MA) includes a weighted factor test that includes factors like environmental impact, technological evolution, likelihood of failure, and the potential consequences the town would fact if the vehicle did break down unexpectedly.

Simpler models that are based on total lifetime maintenance cost like the one suggested by the Massachusetts Operational Services involve a four factor checklist reviewing odometer, age, lifetime maintenance cost, and recent maintenance cost. A disadvantage of the Massachusetts model is its failure to distinguish between the types of vehicles - different types of vehicles age differently. The challenge of keeping in-depth records of vehicle repairs for the entire fleet is somewhat problematic because the Town does not have a Fleet Management and Maintenance Department. Rather, vehicles are maintained by outside vendors. Individual Town departments have vehicle replacement plans, so the checklist offers a best approach for assessing the current municipal fleet.

Attached to this document is the proposed Municipal Fleet Management Plan form that can be used to take inventory of the fleet and to make periodic information updates. This will allow the Departments as well as the Town Manager an opportunity to establish an information baseline and project out the needs of the Departments in order to formulate the five-year plan.

MUNICIPAL VEHICLE FLEET TRANSITION

TENNESSEE'S MUNICIPAL TECHNICAL ADVISORY SERVICE MODEL

TABLE ONE	
Vehicle Age (Years)	**Points**
More than 15	5
13 - 15	4
10 - 12	3
7 - 9	2
4 - 6	1

TABLE TWO	
Vehicle Mileage	**Points**
More than 100K	5
70 – 100 K	4
50 – 70K	3
30 – 50K	2
Less than 30K	1

TABLE THREE	
Annual Maintenance Cost	**Points**
More than $2000	5
$1500 - 1999	4
$1000 - 1499	3
$500 - 999	2
Less than $500	1

TABLE FOUR	
Vehicle Use (Specialty)	**Points**
Special Built/Purpose	5
Medium Duty	4
Single Purpose with Attachments	3
Four Wheel Drive	2
Standard Vehicle	1

SCORING	
Score	**Condition**
Less than 9 points	Very Good to Excellent
9 to 12 points	Good
13 to 19 points	Qualifies for Replacement
More than 19 points	Needs Immediate Replacement

MA OFFICE OF VEHICLE MANAGEMENT RATING TEMPLATE

CRITERIA	
Age	10 or more years, based on model year to calendar year
Odometer	100,000 or more miles
Maintenance Spend	$10,000 or more over vehicle's lifetime
Percent of Total Maintenance Spend	$5000 or higher during last three years
NUMBER OF CRITERIA MET AND SUGGESTED ACTION	
4	Potentially unsafe vehicle; replace immediately
3	Review for replacement this year
2	Review for replacement this year or next
1	Review for replacement next 2-3 years
0	No replacement planned/needed as of 8/2020

The MA OVM Rating Template is used in the following "Current Town Fleet" rating.

Municipal Vehicle Fleet Transition

Current Town Fleet

Department	Make	Model	Year	Vehicle Type	Comment	Rating
Senior Center	Ford	E350	2018	Van		0
	Chevrolet	Impala	2013	Sedan		2
	Mercury	Sable	2008	Sedan		3
Public Works Highway	Ford	F-350 Super Duty	2000	Pickup		3
	Ford	F-350 Super Duty	2000	Pickup		3
	Ford	F-450 Super Duty	2003	Pickup		3
	Ford	Crown Victoria	2003	Sedan	Formerly UPD	3
	Ford	F-350 Super Duty	2004	Pickup		3
	Ford	F-350	2008	Utility		3
	Ford	F-250	2016	Pickup		0
	Ford	F-250	2016	Pickup		0
	Ford	F-550	2016	Pickup		0
	Ford	F-550	2016	Pickup		0
	Ford	F-250	2018	Pickup		0
	Ford	F-550	2018	Pickup		0
Public Works Sewer	Ford	F-150	2014	Pickup		2
	Ford	F-550	2016	Utility		1
	Ford	F-250	2017	Pickup		0
	Ford	F-250	2017	Pickup		0
Public Works Water	Ford	Ranger	2008	Pickup		3
	Ford	F-550	2013	Pickup		2
	Ford	F-150	2014	Pickup		2
	Ford	F-250	2015	Pickup		1
	Ford	F-350	2016	Pickup		1
Police	Ford	PI Sedan	2014	Sedan	Detective	2
	Ford	PI Sedan	2016	Sedan	Chief - 2020	3
	Ford	PI SUV	2016	SUV	K-9	2
	Ford	F-150 Police Package	2019	Pickup	Lieutenant	0
	Ford	PI SUV	2013	SUV	Patrol	1
	Ford	PI SUV	2018	SUV	Supervisor	1
	Ford	PI SUV	2016	SUV	Patrol	3
	Ford	PI SUV	2017	SUV	Patrol	2
	Ford	PI SUV	2018	SUV	Patrol	1
	Ford	PI SUV	2017	SUV	Patrol	2
	Ford	PI SUV	2015	SUV	Patrol	3
	Ford	PI SUV	2019	SUV	Patrol	0
Fire	Ford	F-350	2006	Pickup	Replace 2021	3
	Ford	PI SUV	2020	SUV	Chief	0
	Ford	PI SUV	2011	SUV	Deputy - 2022	2
Assessor	Ford	Focus	2014	Sedan		2
Building	Ford	F-150	2010	Pickup	Formerly UFD	1

CURRENTLY AVAILABLE VEHICLE SPECIFICATIONS & COMPARISON

ELECTRIC							
Make	**Model**	**Vehicle Type**	**Purchase Price**	**Range (miles)**	**GVWR (pounds)**	**Towing Capacity (pounds)**	**Load Capacity (pounds)**
Hyundai	Ioniq	Midsize	$33,045	170	4,189	NA	855 – 972
Hyundai	KONA	SUV	$37,190	258	3,979 - 4,255	NA	NA
Kia	Nervo EV	Crossover	$39,090	239	4,915	2,800	NA
Chevrolet	Bolt	Sub-compact	$36,620	259	3,563	5,200	NA
Nissan	Leaf	Midsize car	$32,525	149 - 226	4,751- 4,850	2,000	904 - 1,213
Tesla	Cybertruck	Pickup	$39,900	250	NA	5,000 - 6,500	3,500
Tesla	Model 3	Sedan	$31,190	250	5,000 - 6,500	7,500	921 -990
GASOLINE							
Make	**Model**	**Vehicle Type**	**Purchase Price**	**MPG**	**GVWR (pounds)**	**Towing Capacity (pounds)**	**Load Capacity (pounds)**
Chevrolet	Impala	Sedan	$31,620	22	NA	NA	1,000
Ford	Interceptor Hybird	SUV	$41,000	24	6,462 - 6,840	5,000	1,670
Ford	Interceptor	SUV	$37,500	17	6,462 - 6,840	5,000	1,670
Ford	Ranger	Pickup	$24,410	23	6050	7,500	1,609 -2,128
Ford	F-150	Pickup	$28,745	22	6,100 - 7,050	5,000 - 8,000	1,142 - 2,309
Ford	F-250	Pickup	$33,705	15	10,000	12,300 - 15,000	2,462-4,323
Ford	F-350	Pickup	$35,550	13	10,100 - 14,000	12,000 - 20,000	3,775 - 7,044
Ford	F-450	Pickup	$50,210	10	14,000	21,200 - 24,200	5,414 -6,288-

CURRENTLY AVAILABLE ELECTRIC, HYBRID & TRADITIONAL VEHICLES

ELECTRIC							
Make	**Model**	**Vehicle Type**	**Purchase Price**	**Range (miles)**	**GVWR (pounds)**	**Towing Capacity (pounds)**	**Load Capacity (pounds)**
Hyundai	Ioniq	Midsize	$33,045	170	4,189	NA	855 – 972
Hyundai	KONA	SUV	$37,190	258	3,979 - 4,255	NA	NA
Kia	Nervo EV	Crossover	$39,090	239	4,915	2,800	NA
Chevrolet	Bolt	Sub-compact	$36,620	259	3,563	5,200	NA
Nissan	Leaf	Midsize car	$32,525	149 - 226	4,751- 4,850	2,000	904 - 1,213
Tesla	Cybertruck	Pickup	$39,900	250	NA	5,000 - 6,500	3,500
Tesla	Model 3	Sedan	$31,190	250	5,000 - 6,500	7,500	921 -990
TRADITIONAL/HYBRID							
Make	**Model**	**Vehicle Type**	**Purchase Price**	**MPG**	**GVWR (pounds)**	**Towing Capacity (pounds)**	**Load Capacity (pounds)**
Chevrolet	Impala	Sedan	$31,620	22	NA	NA	1,000
Ford	Interceptor	SUV-Hybird	$41,000	24	6,462 - 6,840	5,000	1,670
Ford	Interceptor	SUV	$37,500	17	6,462 - 6,840	5,000	1,670
Ford	Ranger	Pickup	$24,410	23	6050	7,500	1,609 - 2,128
Ford	F-150	Pickup	$28,745	22	6,100 - 7,050	5,000 - 8,000	1,142 - 2,309
Ford	F-250	Pickup	$33,705	15	10,000	12,300 - 15,000	2,462- 4,323
Ford	F-350	Pickup	$35,550	13	10,100 - 14,000	12,000 - 20,000	3,775 - 7,044
Ford	F-450	Pickup	$50,210	10	14,000	21,200 - 24,200	5,414 - 6,288-

CHARGING INFRASTRUCTURE

Charging infrastructure for electric vehicles comes in three types.

Level 1 is alternating current (AC) and are the cheapest option requiring only a household electrical socket. Level 1 is the slowest charge level, requiring a vehicle to charge over night or while stopped for an extended time. Charging from empty could take more than one night.

Level 2 is also alternating current (AC), but is able to draw more current and thereby charges more rapidly. It requires special charging equipment, is more expensive and requires installation by an electrician. Level 2 chargers are popular among individual consumers who have opted to purchase an electric vehicle, and is able to charge an electric vehicle from empty overnight. Typically, the units are installed in residential homes (garages, driveways, etc.) but at times have been installed in areas where vehicles are parked for short durations to get a quick boost in charge without getting to full charge from empty.

The Commonwealth currently offers incentives to municipalities to install Level 2 dual charging stations for their fleets to the tune of $2,500 per municipality, reducing the net cost of installation.

Charge Level	Voltage	Current	Power	Similar to	Time to full charge (24kwh)
Level 1 (AC)	**120 V**	**8-12 amps**	**1.0-1.4 kW**	**Toaster**	**8-24 hours**
Level 2 (AC)	**240 V**	**15-100 amps**	**3.6-19.2 kW**	**Clothes dryer**	**4-8 hours**
Level 3 (AKA DC Fast-Charge)	**480-600V**	**80-120 amps**	**20-72 kW**	**5-10 Central air conditioners**	**30 minutes**

Level 3 (also known as DC Fast Charge) is distinct from Types 1 and 2 in three respects:

- Current: uses Direct Current (DC) rather than Alternating Current (AC).
- Speed: Level 3 charging ports can get an electric vehicle from empty to an eighty percent (80%) charge in twenty (20) to thirty (30) minutes depending on the type of electric vehicle being charged.
- Cost: Level 3 charging ports require an installation. The location of the port is mainly what influences the price. Estimates range from as low as $10,000 to as much as $50,000.

The strategy for the installation of charging stations as part of the Town's network should include a mix of units when available to the public. When for Town vehicle use only (i.e. Police) the Level 3 units should be used exclusively. The added benefit of a Level 3 is the ability to charge multiple vehicles simultaneously.

VEHICLE USE

"Hot Swapping" refers to the practice of municipalities of having vehicles go from being used by one municipal employee directly to another with little to no break in use. In Uxbridge, hot swapping is common in and limited to the Police Department where most officers work on rotating eight-hour shifts. Three officers working on three separate shifts will swap the municipal vehicle (cruiser) between them. The practice of hot swapping presents unique challenges to the broad adoption of electric vehicles, in that with no down time there is no opening to charge the vehicle.

The following should be considered:

- ***Limit hot swapping***: The Police Department could limit the practice of hot swapping and instead have cars swapped between two officers working eight hour shifts instead of three which would give the car an eight-hour window to be charged. This would require the Police Department to increase the number of cruisers, which in turn would in the short-term reduce the financial benefits of switching to all-electric, but would also increase the lifespan of the vehicles by reducing the strain of constant use which would reduce the number of annual vehicle replacements.
- ***Hybrid vehicles***: Hybrid vehicles do not require charging, so no down time is required. The practice of hot swaps could continue but at the expense of the environment, as the hybrids because of their use of gas, contribute to the Town's carbon footprint, although at a reduced rate. As a bridge to an all-electric fleet, the exclusive use of hybrid vehicles makes the best fiscal and operational sense.
- ***DC fast chargers***: While significantly more expensive than other charging methods, fast charging would allow the vehicles to be charged from empty in twenty (20) to thirty (30) minutes. Two fast chargers could be installed at Police HQ providing the needed infrastructure to quickly and efficiently charge the vehicles. Strategic charging times within each shift would need to be planned and coordinated.

LEARNING CURVE

As with any change to the routine, the use and maintenance (charging) of electric vehicles requires time to become educated about their use and limitations. A planned gradual all-electric and hybrid vehicle transition would allow every user of municipal vehicles an opportunity to experience the vehicles in order to gain an understanding of each (i.e. no engine noise), the technology, and capabilities.

COLLABORATION - PARTNERING WITH UTILITIES

Municipalities that transition to all-electric or hybrid fleet vehicles typically do so in a partnership with the electric utility. Topics such as increased demand of the grid, ability to install and service EV charging stations and financial support are important to the strategy and the decision making process.

CLOSING THOUGHTS

Currently the sole electric Police vehicle available is the Chevrolet Bolt, a car that is not suitable for use by the Uxbridge PD. There is no other all-electric vehicle that is built as a Police cruiser. Representatives of Tesla have intimated that one is in the works, and it is logical that the other major manufacturers are not ignoring an important segment of the municipal and governmental fleet market. The market will be better established when a major city such as Los Angeles, New York, Boston or Chicago commits to a complete transition and effectively finances the research and development of the specialized electric vehicles. In the interim, the Uxbridge Police should become an all hybrid department during the first five-year cycle, which will probably coincide with the model life cycle of the newly offered Hybrid Police Interceptors.

This year, the Massachusetts State Police took a big step by transitioning to hybrids. In its fleet of sixteen-hundred (1,600) Ford Police Interceptor Utility vehicles, the State Police only ordered hybrid versions of its patrol vehicles which mean one hundred sixty-one (161) hybrid vehicles were added to the fleet. To some extent, this was out of necessity. The State Police faced challenges with a fifteen-year vehicle budget which, along with the rising price of vehicles, has decreased the amount they can buy year-by-year. By switching to hybrid, they are able to impact save long-term even while operating under a stagnant budget. It is a model for cities and towns.

As for the DPW, currently there are no light duty trucks available as all-electric, although Tesla, Ford, GMC, Chevrolet, and start-ups Rivian and Lordstown, as well as others will be introducing all-electric pick-up trucks to the market during the next twelve to eighteen months. It is expected that the cost of those vehicles may be a cause to pause, as most if not all will be developed for the top end of the pick-up truck market. The new products will come out within a close announcement times of one another causing a very competitive market. If that in fact materializes, there may be manufacturer incentives that the Town may want to take advantage of, especially for the trucks used by the Department head and senior staff.

The total market will emerge and evolve quickly. The Town needs to have a strategy in place and be able to react to incentives, changes in technology, product, and opportunities.

The hybrid vehicle transition should ultimately be viewed as a first step action of a broader strategy to bring the Town to a full all-electric fleet. Decision makers in New York City, which had the biggest hybrid transition in the country, offered the following advice: "Hybrid models also achieve benefits from gas models, though the most dramatic results are with the all-electrics."

NOTES

TOWN OF UXBRIDGE
MUNICIPAL FLEET MANAGEMENT PLAN

Department										
Department Head										
Date										
Vehicle										
Year										
Make										
Model										
Type		Sedan		SUV		Van		Truck		Other
Odometer										
Vehicle Identification Number										
Vehicle number										
Assigned Use										
Overall Condition										
Maintenance Cost										
FY										
FY										
FY										
Replacement Date (FY)										
Preferred Replacement Type		Gas		Diesel		Hybrid		Electric		
Special Needs										
Preferred Make/Model										
Anticipated Cost	$									

NOTES

UXBRIDGE MA

It's Better Here!