

Memo

To: Richmond Town Manager and Select Board

Cc:

From: Jeff Forward, Richmond Town Energy Coordinator/Select Board Member

Date: Monday, January 30, 2023

Re: Findings and Conclusions on Tesla Police Cruiser

Background

On March 8, 2021 Richmond Police Chief, Kyle Kapitanski, proposed to the Select Board for the Town to purchase a Tesla Model 3 and outfit it for use as a cruiser. The ongoing expenses and return on investment were to be evaluated in no less than one year (see attached memo for Chief Kapitanski dated March 8, 2021).

The Select Board agreed to the proposal and the Town subsequently purchased a new Tesla Model 3 over the summer of 2021 and put it into service in the late summer/early fall of 2021.

In his memo, Chief Kapitanski gave the following reasons why he thought the Tesla might save the Town money over the long term:

- The Town budgeted \$45,000 for a conventional cruiser and he estimated that the initial purchase price of the Tesla Model 3 was about \$1,990 over the budgeted \$45,000. The actual purchase price was more like \$52,280. After purchase, the Town received a grant of \$3,000 and a utility incentive \$1,500.¹ The net cost was then \$47,780.
- He estimated 89% in fuel savings.
- He tried to quantify maintenance savings by pointing out that the Tesla has an 8 year 120,000 bumper to bumper warranty which would allow us to extend our cruiser replacement schedule. He estimated this would save the Town approximately \$11,000/year.
- He felt that the environmental benefits were worth noting and that it might help with recruitment and retention because it might attract applicants who were interested in an innovative department and that it is such a “cool car” in his words.

¹ The incentives for EVs in general are much higher now. There is a \$7,500 tax credit from the US Government that municipalities are able to claim as a direct payment to offset the purchase price of an EV. The \$1,500 GMP incentive is still in place and there is a Vermont State incentive of between \$1,500 - \$8,000 depending on the vehicle.

Chief Kapitanski was the primary if not only user of the Tesla until his departure in the summer of 2022. He installed a Tesla Level 2 charger at his home at his utility's expense through a program that GMP was running at the time². Chief Kapitanski used this vehicle to commute back and forth to work from his home in East Randolph in addition to his official duties. As is customary with most electric vehicle (EV) owners, Chief Kapitanski primarily charged the car at home and the town reimbursed him for any electricity used to charge the car.

Since Chief Kapitanski's departure it appears the vehicle has been used infrequently. Current staff have expressed dissatisfaction with the vehicle because of its size and issues they have experienced with charging. The purpose of this memo is to present both my experience with EVs, some research I have done and some preliminary data analysis on the Tesla that the Town owns.

The EV Charging Experience

My wife and I own a Nissan Leaf electric vehicle, which we purchased 3 years ago. The car I had before this one was a Toyota Plug-In Prius, which I owned for 3 years prior to purchasing the Leaf. Like most EV owners, I do most of my vehicle charging at home, mostly overnight. This is one of the biggest differences between EVs and internal combustion vehicles. Instead of refueling at designated fueling stations, EV owners tend to charge mostly at home and at work. Studies have shown that some 80% of EV charging happens at home. How this works in practice is that by and large we plug in at the end of the day when we get home and the car fully charges overnight.

There is nuance to charging any EV. Tesla also has specific recommendations on how to charge their vehicles away from home using their proprietary Level 3 fast charging devices called SuperChargers. For example, Tesla recommends "pre-conditioning" the battery in cold weather. This involves warming the battery prior to arriving at a charging station so that it accepts a charge faster. Tesla says it is relatively quick to charge up to 80%, maybe 15 minutes, and then the charging device slows down considerably. They also recommend not completely "filling up" to 100% using a SuperCharger as it is slow and it can deteriorate the battery. Attached is a tip sheet for Tesla owners that is quite informative about how best to charge a Tesla. It is fair to say there is a learning curve.

The bottom line is refueling an EV is different than refueling an internal combustion vehicle and it takes time for any new EV user to learn how to do so properly and effectively. Chief Kapitanski had a Level 2 charger at his home and he told me he used the Level 2 charger at the Town Center occasionally. He told me that he rarely used a SuperCharger. Best practice is to make sure the vehicle is fully charged overnight or plugged in at work during the day as much as possible. If we continue

² GMP is still running a EV charging program that covers the cost of installation of a charger and provides an off-peak rate lower than the standard residential retail rate.

to have EV town vehicles, extra conduit was installed at the time the Town Center charger was installed so more charging stations could be easily added to the system.

Fuel and Maintenance Costs

Connie was able to get me the 2022 annual fuel records for all the cruisers through our fuel supplier WEX. Below is a summary of that data.

Vehicle	Total mileage as of Dec 2022	Miles driven in 2022	Total Fuel Consumption in gallons	Total Fuel Cost	MPG	Average cost per gallon	Cost per mile
2020 Dodge	54,128	15,944	1,085	\$4,444	17.7	\$4.28	\$0.25
2017 Ford	102,664	4,225	472	\$1,944	10.6	\$4.41	\$0.37
2019 Ford	70,790	8,811	770	\$3,136	11.5	\$4.10	\$0.37
2019 Ford	52,352	17,940	1,255	\$5,217	14.4	\$4.28	\$0.30
Totals		46,920	3,582	\$14,742			
Averages					13.54	\$4.27	\$0.32

It is not surprising that we are getting low gas mileage from our conventional cruisers because much of the time they are idling at 0 MPG in order to keep the cabin conditioned and electronic equipment fully charged. It is likely that an electric vehicle would use much less energy during an idling situation especially during times when the only thing the engine is doing is keeping electronic equipment charged.

The above data squares with EPA estimates. The EPA estimates that a 2017 - 2019 Ford Explorer gets between 19-27 MPG. The 2020 Dodge Durango gets similar ratings of 19-26 MPG. The EPA uses Miles Per Gallon Equivalent (MPGe) in order to compare EVs to conventional vehicles. The EPA estimates the Tesla Model 3 gets between 113-141 MPGe.

So far I have been unable to get all of the Tesla charging data. Chief Herrick has requested this data from Tesla and was told it could take up to a month to get it back. However, I was able to get from Connie how much electricity Chief Kaptianski used at home for charging and how much we we reimbursed him for charging. Between October, 2021 and June, 2022 the Tesla used 5,237 kWh at Chief Kapitanski's home for a total cost of \$703.49. It should be noted that the Chief took advantage of a utility incentive program to offset the cost of installation of the charging equipment and GMP's rate for EV charging under the program was \$.13433/kWh, much less than the typical residential rate³. With this information and information available online, estimates can be made to get a rough idea on costs for the Tesla electricity

³ GMP's residential retail rate is currently \$.183/kWh.

costs.

As stated above, the U.S. Department of Energy estimates that 80% of EV charging happens at home. Chief Kapitanski confirmed with me that he did the vast majority of charging at home and only occasionally charged elsewhere. Since Chief Kapitanski left the department in June, Chief Herrick said he has used the Tesla very little estimating that he has put maybe 1,000-2,000 miles on it at most. Chief Herrick told me he mostly used the Tesla SuperChargers in Williston⁴ and occasionally has charged it at the Town Center. Pricing at Superchargers varies by location, but several sources estimate the cost is typically about \$0.25/kWh. The charging station at the Town Center costs about \$.19/kWh. Tesla estimates that that it takes about .26 kWh/mile to charge.

I do not have the actual charging data from Tesla yet. However, there is enough information to make some calculated estimates. Below is a table that summarizes the information outlined above and extrapolates fuel costs for the Tesla.

User	Actual kWh charged at home	Estimated SuperCharger miles	Estimated Miles charged at home	Estimated Supercharger kWh at .26 kWh/mile	Actual Cost for home charging at \$.13433/kWh	Estimated Cost for SuperCharger charging at \$.25/kWh	Total Estimated Fuel Cost	Cost per mile
Kapitanski	5,237		19,877		\$703.49	\$0.00	\$703.49	\$0.04
Herrick		2,000		527		\$131.74	\$131.74	\$0.07
Total							\$835.22	

Considering Tesla’s estimates of the number of miles/kWh, it would appear that Chief Kapitanski did indeed charge mostly at home. Even if it took a little more than .26 kWh/mile to charge, the calculated mileage based on Tesla estimates is pretty close. It is assumed that Chief Herrick charged 100% of the time at a SuperCharger.

Chief Herrick told us at a recent meeting that the Tesla had about 20,000 miles on it. If we used a conventional cruiser for 20,000 miles at our average fleet fuel efficiency and cost per gallon, the conventional cruiser would have used 1,480 gallons of gasoline for a total cost of \$6,317. Instead, the estimated cost for electricity for the Tesla is \$835 for a savings of well over \$5,000 in fuel costs after about a years worth of use.

Vehicle	mileage as of 12/2022	Average cost per mile	Annual Fuel Cost
Tesla	20,000	\$0.05	\$1,000
Comparative Cruiser	20,000	\$0.32	\$6,400

⁴ There are eight Tesla SuperChargers 7 miles from the Town Center in Williston.

Conclusions

There are 5 main points I would like to make about the decision of whether or not to sell the Tesla at this time.

1. One of the reasons Chief Kapitanski proposed for purchasing a Tesla rather than a conventional cruiser is because he expected significant fuel savings. It would appear that was correct in this. I project that we have saved well over \$5,000 in fuel costs so far.
2. Chief Kapitanski estimated as much as \$11,000/yr in maintenance savings because of Tesla's extended warranty. He said it had an 8 year 120,000 mile warranty, which he felt would allow us to extend our replacement schedule. I would say it is too early to tell if we will realize these savings, but I do know many studies have shown that EVs typically have far less maintenance than conventional vehicles because they have far fewer moving parts. My experience bears this out as well. If were to sell this vehicle now, we would forfeit these potentially savings.
3. Some say we should sell the Tesla so we don't lose more money due to depreciation. The minute you drive any vehicle off the dealer lot it suffers significant depreciation. However, used electric vehicles have held their value remarkably well over the last few years. For context, I bought my 2017 Leaf used 3 years ago from a dealer and the book value is now about what I paid for it. With gas prices so high, electric vehicles have become much more popular and this is reflected in their resale value.
4. It has been said this vehicle is not useful as a police cruiser because of its size and the fact that a cage will not fit in the back seat. Although it may be ideal to have a cage in a cruiser, not all police cruisers have cages. Chief Kapitanski was comfortable driving this vehicle and he knew these limitations when he proposed buying it. In fact, during the time he was chief, it was used more than any other vehicle in our police fleet. Likely many of those miles were commuting miles as Chief Kaptianski lived over an hour away. But we currently have two officers who live over an hour away. Perhaps it could be used as a commuter vehicle for our current officers while we work to build a new department.
5. Finally, at this point we have no idea what our police department will look like in a year. We are trying to hire a new Chief and have no idea how many officers we might have by the end of the year. Our previous police Chief knew of the limitations of size of the Tesla when we bought it, yet he liked it and it was driven many more miles than any other cruiser in our fleet during the year it was in use. While our current Chief clearly has his doubts, he also has had limited experience with it. EVs do take a while to get used to. I feel we should let our new Chief decide for him/herself whether it works for whatever configuration our department is in at that time. We will be able to make a more informed decision in the fall when we start our next budget cycle.

At this point, it is unknowable how many police cruisers we will need by the end of the year. We are currently budgeted for 5 full-time officers and our current police union contract calls for take home cars for each officer, plus an extra vehicle for any part-time officers we may hire. While we may or may not get to a full department by the end of the year, selling one vehicle now may well cut off our options for later on in the year.

Respectfully Submitted,

Jeff Forward
Richmond Town Energy Coordinator
Richmond Select Board Member