

Town of Millbury  
Electric Vehicle Charge Station Use Report  
March 2019

This report is intended to summarize the consumption, cost and usage characteristics of the two electric vehicle car charging stations which were installed in September 2016 at the Library and the Town Hall.

## SECTION 1: ELECTRICITY CONSUMPTION

Table 1, below, summarizes the total electricity consumption of each station each year, from 2016-2018 and the month of January 2019. As seen below, usage at the Town Hall station has increased slightly over the time period. However, in comparison usage at the library doubled from 2017 to 2018. Also, extrapolating January 2019 data to a full year shows that 2019 will likely see another doubling of usage. A review of the data identified the zip codes from the drivers using the library station varied significantly. Drivers were from cities/towns in Massachusetts including Worcester, Sudbury, Sutton, Grafton, Princeton, Auburn, Woburn, Wilbraham, Uxbridge and also a single visit from a driver registered in Providence, RI.

**FIGURE 1**  
**Total Electricity Consumption (kWh) by Year**

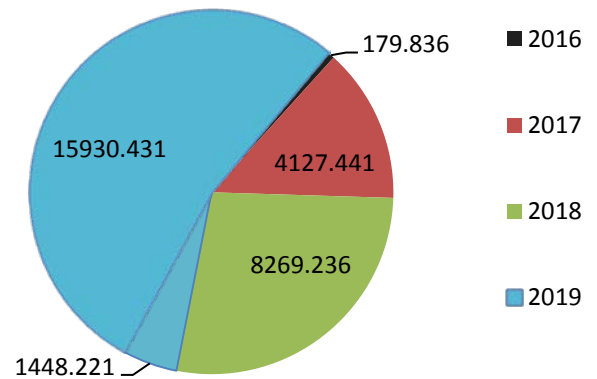
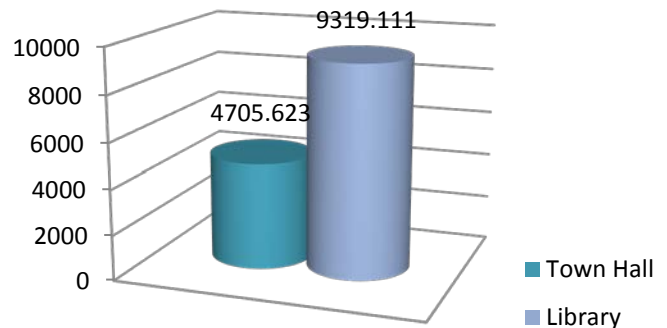


TABLE 1  
Electric Car Chargers - Total Electricity Consumption (kilowatt-hours)

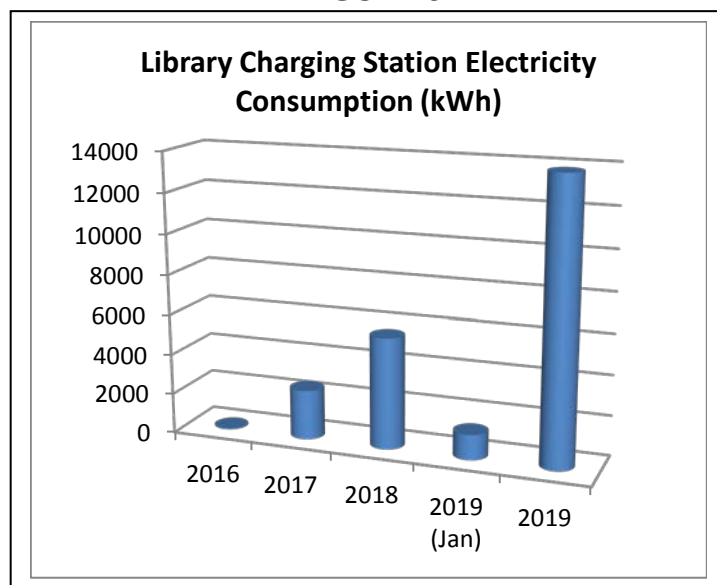
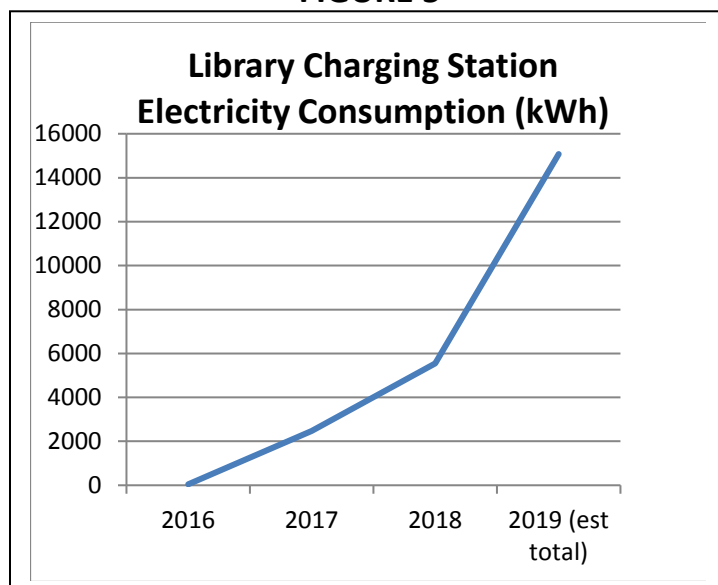
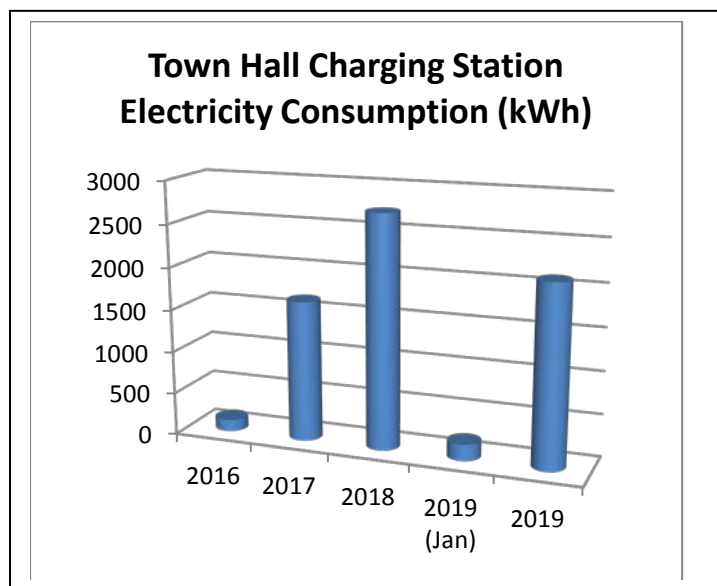
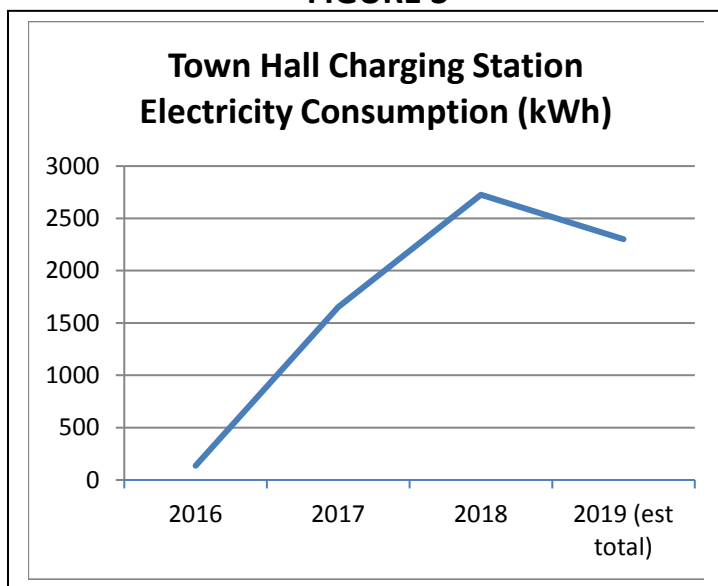
Year	Town Hall	Library	ANNUAL TOTAL
2016	137	44	180
2017	1652	2476	4127
2018	2726	5543	8269
January 2019	192 (annual est=2302)	1256 (annual est=15076)	1448 (annual est=17379)
TOTAL	4,706	9,319	14,025

Total electricity consumption from both charging stations equals 14,025 kWh which is equivalent to the annual electricity use of two Massachusetts houses. This consumption was 33% from the Town Hall charging station, or 4,706 kWh and 67% from the library's station, or 9,319 kWh. In addition, a review of the drivers that used the Town Hall station identified that 90% was utilized by the Town's vehicles while in comparison the drivers that used the Library station consisted of less than 1% Town vehicles.

**FIGURE 2**  
**Electricity Consumption by Location 2016 - 1/2019**



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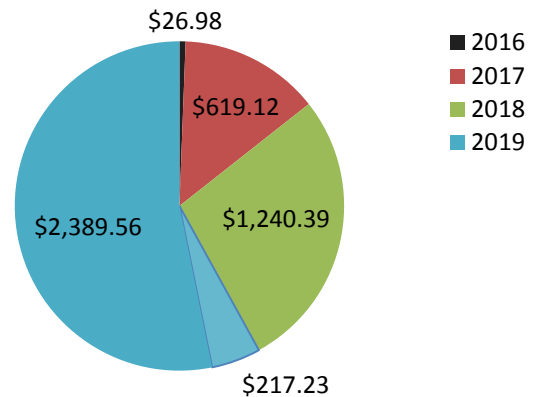


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Total current lifetime electricity costs, through January 2019, equaled \$2,104 which is 33% from the Town Hall charging station (\$706) and 67% at the library (\$1,398).

**Overall Cost - Town Hall Station:** Costs reflect the same trend as consumption. Cumulative lifetime cost at the Town Hall station is \$705.84. Although costs increased 65% from 2017 to 2018, it appears that 2019 will be lower than 2018, implying that usage has leveled off since this station is almost exclusively used by Town vehicles. Calculating the average cost per month shows the cost remains relatively steady at \$20-\$30 per month. Calculating the cost per mile using electricity and comparing to a gas powered vehicle getting 28 mpg, shows cumulative savings of \$600 for the Town, not including avoided maintenance costs.

**FIGURE 7**  
**Total Cost (\$) by Year**



**Overall Cost - Library station:** Costs reflect the same trend as consumption. Cumulative lifetime cost at the Library station is \$1,397.87. Usage at the library more than doubled from 2017 to 2018. Also, extrapolating January 2019 data to the whole year shows that 2019 looks to see another doubling of usage at the library.

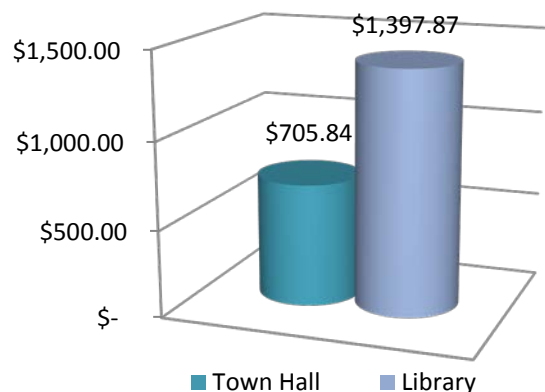
TABLE 2  
Total Cost (dollars \$)

Year	Town Hall	Library	ANNUAL TOTAL
2016	\$20.41	\$6.57	\$26.98
2017	\$247.75	\$371.36	\$ 619.12
2018	\$408.90	\$831.49	\$ 1,240.39
January 2019	\$28 (annual est=345)	\$188.45 (annual est=\$2261)	\$217.23 (annual est=\$2607)
TOTAL	\$705.84	\$1,397.87	\$2,103.71

**Detailed Cost - Town Hall:** Total cumulative cost of electricity through January 2019 = \$705.84. Since a typical car gets 3.1 miles/kW, this translates into about 14,587 miles driven and a cost of five cents per mile compared to at least nine cents per mile for a gasoline vehicle. The Town has saved money by using electricity to power their administrative vehicles instead of gasoline.

**FIGURE 8**

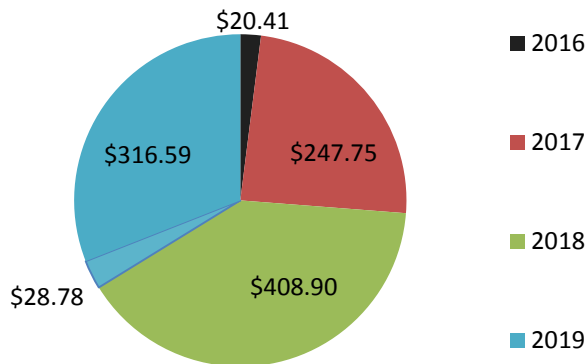
**Total Cost by Location**  
**2016 - 1/2019**



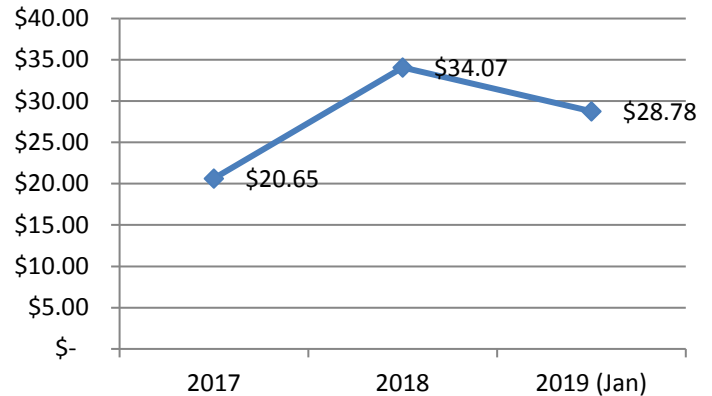
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**FIGURE 9**  
**Town Hall**  
**Total Cost (\$) by Year**



**FIGURE 10**  
**Town Hall**  
**Average Monthly Cost (\$)**



Below is a detailed breakdown of the miles driven, electricity used and costs incurred each Town vehicle at the Town Hall Charging Station.

**1. Building Inspector (7195V, 46801V, 46841V and 23211V): 1,799.5 kWh (32% of town hall usage)**

This vehicle is the largest user. This vehicle was plugged in 114 times over the lifetime of the vehicle. Assuming a two-year and one month period, this averages 4.5 plug-ins per month or about once per week.

Usage of this vehicle has avoided about 2.1 tons of greenhouse gas emissions and 214 gallons of gasoline. The approximate operating cost over the last twenty-eight months is \$270 (electricity=\$0.15/kWh). Approximate distance travelled is 5998 miles and overall savings is \$266 (cost using gas car at 28 mpg, \$2.50/gal and 3.3 mi/kWh charge minus cost of using electricity as power). The savings is actually greater because of the following:

- the calculation did not include avoided oil changes and other maintenance items such as spark plugs, etc.
- In the past, the building inspector received an annual stipend for travel which is no longer necessary since a dedicated vehicle exists.

**2. Town Manager's Office (7297V): 1318.4 kWh (27% of town hall charger usage)**

Usage of this vehicle has avoided about 1.5 tons of greenhouse gas emissions and 157 gallons of gasoline. The approximate operating cost was \$198. Approximate distance travelled is 4395 miles and overall savings from driving with electricity instead of gasoline is \$195. The savings is actually greater because the calculation did not include avoided oil changes and other maintenance items such as spark plugs, etc.

This vehicle is most often utilized by a Selectman to assist in weekly Meals on Wheels and infrequently by staff when another electric car is unavailable.

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TABLE 3  
Electric Car Chargers – Town Vehicle Details

Car:	46801V Bldg Insp		46841V Bldg Insp		23211V Bldg Insp		7301V Police		7297V Town Mgr		7299V DPW		TOTAL
Year	visits	kWh	visits	kWh	visits	kWh	visits	kWh	visits	kWh	visits	kWh	
2017	0	0	0	0	14	236	13	158.2	54	737	30	291	<b>111 visits / 1421kWh</b>
2018	34	607.1	27	343	31	524	30	388.7	42	572	3	56	<b>140 visits/ 2492</b>
Jan 2019	3	66.7	5	23	0	0	6	48.2	2	9	0	0	<b>11 visits/ 147</b>
<b>TOTAL</b>	<b>37</b>	<b>673.8</b>	<b>32</b>	<b>366</b>	<b>45</b>	<b>760</b>	<b>49</b>	<b>595.1</b>	<b>98</b>	<b>1318</b>	<b>33</b>	<b>347</b>	<b>262 visits/ 4060kWh</b>
Usage	10%		9%		13%		14%		27%		9%		<b>82%</b>
Ave Miles driven	2246.05		1220.46		2531.95		1983.64		4394.7		1157.49		<b>13,534</b>
Cost of electricity	\$101.07		\$54.92		\$113.94		\$89.26		\$197.76		\$52.09		<b>\$609</b>
Average Cost/ Mile	\$0.05		\$0.05		\$0.05		\$0.05		\$0.05		\$0.05		
Avoided Gas (gal)	80 gal		44 gal		90 gal		71 gal		157 gal		41 gal		<b>483 gal gas</b>
Avoided GHG (tons)	0.79		0.43		0.89		0.69		1.54		0.41		<b>4.7 tons GHG</b>
Savings (gas\$-el\$)	\$99.50		\$54.05		\$112.13		\$87.85		\$194.62		\$51.26		<b>\$599 saved</b>

3. **Police (7301V):** 595.1 kWh (14% of town hall charger usage)

Usage of this vehicle has avoided about 0.7 tons of greenhouse gas emissions and 71 gallons of gasoline. The approximate operating cost was \$89 (electricity=\$0.15/kWh). Approximate distance travelled is 1984 miles and savings is \$88 (cost using gas car at 28 mpg, \$2.50/gal and 3.3 mi/kWh charge minus cost using electric). The savings is actually greater because the calculation did not include avoided oil changes and other maintenance items such as spark plugs, etc.

4. **DPW (7299V):** 347 kWh (9% of town hall charger usage)

Usage of this vehicle has avoided about 0.4 tons of greenhouse gas emissions and 41 gallons of gasoline. The approximate operating cost was \$52. Approximate distance travelled is 1157 miles and cumulative savings is \$51. The savings is actually greater because the calculation did not include avoided oil changes and other maintenance items.

It should be noted that the DPW vehicle has likely been used more than this data suggests since the above data does not include usage from the garage. The garage has a non-monitored charging station exclusively used by the DPW.

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**Detailed Costs - Library:** Total cumulative cost of electricity through January 2019 = \$1,397.87. Usage at this station has increased dramatically every year. The Town is currently paying an average of \$188 per month for usage at this station.

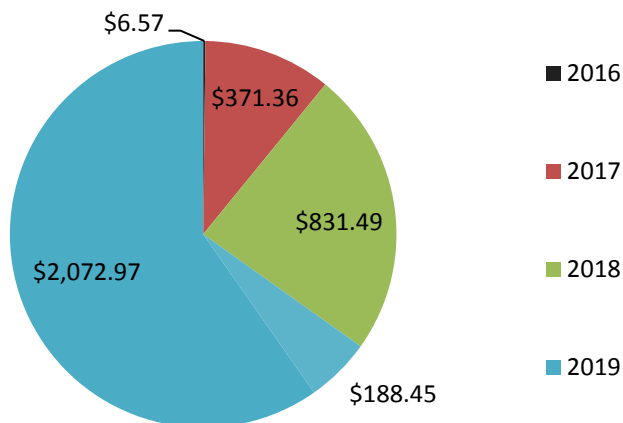
TABLE 4  
Electric Car Chargers – Library “High Use” Vehicle Details

Car:	Others		Princeton 2868891		Millbury 738175		Millbury 2055011		Sutton 811399		Millbury 3578701		TOTAL
Year	visits	kWh	visits	kWh	visits	kWh	visits	kWh	visits	kWh	visits	kWh	
2017	tbd	tbd	0	tbd	155	tbd	0	tbd	50	tbd	0	tbd	<b>425 visits / 2759</b>
2018	tbd	tbd	42	tbd	251	tbd	73	tbd	91	tbd	1	tbd	<b>849 visits / 5548</b>
Jan 2019	19	97	19	440	17	57	29	236	17	194	11	250	<b>112 visits / 1275</b>
TOTAL			61		423		102		158		12		<b>1386 visits/ 9319kWh</b>
Percentage of 2019 use	17%		17%		15%		25%		15%		10%		<b>100%</b>

Due to rising costs, a price system should be instituted at this location. Suggested structure is one hour free and \$1.50 per hour thereafter, equivalent to 2 cents per minute. The structure would still encourage visitors but charge a reasonable fee for long-term users. The fee is based on a typical onboard charger drawing power at 6.6 to 7.4 kW and electrical cost of 15 cents per kWh. At this rate, an hour will cost the town from \$0.99-\$1.11 but still allows an electric car to travel cheaper than a gas version. As an example: One free hour plus three hours of paid charging would cost \$4.50 and give about 22.5kWh. A typical car gets 3 mi/kWh, so a driver is paying about 7 cents per mile, in comparison a 28 mpg gas vehicle costs about 9 cents per mile.

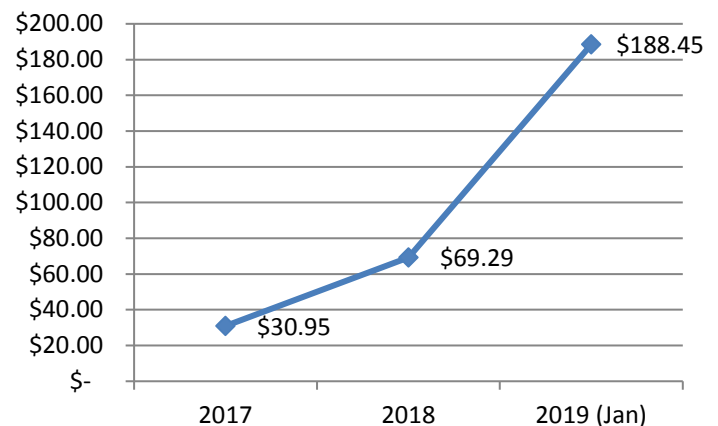
**FIGURE 11**

**Library  
Total Cost (\$) by Year**



**FIGURE 12**

**Library  
Average Monthly Cost (\$)**



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### SECTION 3: ENVIRONMENTAL BENEFIT

Powering a car's wheels with electricity instead of burning gasoline eliminates carbon dioxide and other greenhouse gas emissions. Carbon dioxide (CO<sub>2</sub>), the main greenhouse gas emitted from combustion, is emitted at 19.6 pounds per gallon of fuel burned. Using the electric cars for town business has avoided burning a cumulative 503 gallons of gas, equivalent to eliminating 4.9 tons of greenhouse gases (measured as CO<sub>2</sub>). According to the EPA greenhouse gas equivalencies calculator (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>), this is equivalent to the amount of carbon dioxide sequestered by 5 acres of forest in one year.

In addition, the usage at the library avoided burning 996 gallons of gas, equivalent to eliminating 9.8 tons of greenhouse gases (measured as CO<sub>2</sub>). According to the EPA greenhouse gas equivalencies calculator, this is equivalent to the amount of carbon dioxide sequestered by 10.4 acres of forest in one year.

Overall, since October 2016, the Town has eliminated 15 tons of greenhouse gases.

**FIGURE 13**

