
TO: GENERAL COMMITTEE

SUBJECT: INVESTIGATION- INSTALLATION OF LEVEL II EV CHARGING STATIONS

WARD: ALL

PREPARED BY AND KEY CONTACT: BARRY THOMPSON CET, CEM
MANAGER OF ENERGY MANAGEMENT EXT 4557

SUBMITTED BY: RICK PEWS P. ENG
DIRECTOR OF CORPORATE FACILITIES

GENERAL MANAGER APPROVAL: PATTI ELLIOTT-SPENCER, GENERAL MANAGER OF COMMUNITY AND CORPORATE SERVICES

CHIEF ADMINISTRATIVE OFFICER APPROVAL: C. LADD, CHIEF ADMINISTRATIVE OFFICER

RECOMMENDED MOTION

1. That the General Manager of Community and Corporate Services or designate be authorized to enter into an agreement with the Province of Ontario to accept funding for 100% of the cost to install Electric Vehicle charging stations, should the Province offer a program substantially similar to the Electric Vehicle Chargers Program offered in 2015-2016.
2. That the Planning and Building Services Department recommend to all building permit applicants for single family, townhouses, apartment buildings, condominiums, commercial and industrial buildings that they rough in or install Level II charge stations until Provincial legislation requiring them is established.
3. That new city facilities that provide public uses include Level II charge stations for use by the public.
4. That all Level II Electric Vehicle Charge Stations installed by the City of Barrie offer free charging of vehicles, however the stations must have the ability to charge for the electricity used should Council choose to implement a charge for use in the future.
5. That staff investigate and report back to General Committee on the following matters:
 - a) Possible partnerships or advertising opportunities for Electric Vehicle charging stations to reduce the costs associated with them;
 - b) The feasibility of expanding the number of electric/hybrid vehicles within the City of Barrie's corporate fleet; and
 - c) The use of City owned street light poles as bases for Level II charge stations for curbside charging.

PURPOSE & BACKGROUND

Purpose

6. The purpose of this report is to provide recommendations to Council for the development of a strategy for the installation of Electric Vehicle (EV) Charging stations at City facilities and parking lots.
7. The Province of Ontario has made the adoption of electric vehicles a priority and has set targets of 5% of car sales by 2020, and 12% by 2025.
8. Car manufacturers are offering more electric vehicle models each year; and the range of travel is increasing dramatically while the price is falling. The opening of Tesla's gigafactory for lithium batteries is projected to drop the price of a lithium ion battery pack by 30 percent, and, when fully operational in 2018, the gigafactory will produce more lithium ion batteries than were produced worldwide in 2013.
9. There are opportunities for the City of Barrie to participate/lead in this upcoming technological advancement by getting out ahead of the curve in the installation of infrastructure to support these changes.
10. In order to assist in reaching their priority, the Province has identified funding priorities which they believe will help spur adoption of electric vehicles and reach these goals. Included in the funding measures are initiatives aimed specifically at EV charging stations (Appendix A).

BACKGROUND

11. On October 24th, Council passed motion 16-G-226 which stated;

That staff in the Facilities and Planning and Building Services Departments report back to General Committee, prior to consideration of the 2017 Business Plan, on the feasibility of installing Level 2 EV Charging Stations in order to service the public and City operations in well-used areas, including the following information:

- a) A comparison of the functionality and costs associated with three different levels of charging stations (home charging, Level 2 charging stations and faster Level 3 charging stations);
 - b) The availability of grants or other financial assistance from Provincial and Federal levels of Government in the short term and any details concerning longer term financial assistance;
 - c) The comparison of the two operational methods - free usage versus pay to charge;
 - d) How other municipalities operate this program;
 - e) Identifying possible locations for installation of the Level 2 EV Charging Stations;
 - f) The costs associated with implementing the program and identify potential partnerships to possibly mitigate capital and operational costs; and
 - g) A strategy that would provide for the installation of Level 2 EV Charging Stations in multi-residential developments.
12. There are currently three types of EV charging stations. They are known as level I, II and III. Essentially the differences are in voltage and amps supplied and, therefore, in how long it takes to charge your car; Level I being the slowest and Level III the fastest. While generally Level I chargers can charge your car in 24 hours, level II in ten hours and Level III in half an hour, there are differences between all makes of cars and plug in electric hybrids cannot even use level III chargers. Some in the industry refer to a Level IV charger or call it a supercharger - this refers to the Tesla charger which can only be used by Tesla cars at this point.

Level I 120 Volt 15 Amp

Most vehicle charging is going to take place at home, anywhere from 85% to 95%. All electric cars have what is termed an “onboard charger” in the car itself. So, all you need is to use the charging cord you get with your car to connect your car to a source of electricity.

Level II 240 volt 30 Amps

The most common charging station is Level 2. Easily installed in your garage or driveway, at storefronts and in parking lots, Level 2 stations can charge your electric car in 10 to 12 hours. Most of the stations you see in public spaces are Level 2. All electric cars and charging stations sold in North America use the same plug for Level 2. This means that any electric car can use any Level 2 station in Canada and the U.S.A.

Level III

Level 3 stations are often called "DC-Quick Chargers". DC-Quick Chargers will charge your electric car in 25-30 minutes and are perfect for highway driving applications. Only fully electric cars have access to Level 3 charging. There are three standards of Level 3 charging:

- **CHAdeMO** is a Japanese standard used by the Nissan LEAF, Kia Soul EV and Mitsubishi i-MiEV
- **SAE Combo** is a European/North American standard used by the BMW i3
- **Tesla Supercharger** is used by the Tesla Model S and Tesla Model X. All Tesla vehicles can be purchased with adapters for the other two plug standards.

13. The Province announced a funding opportunity in December 2015 of \$20 million dollars to fund the installation of Level II and Level III charge stations across Ontario. The goal was to establish a network of Level III fast charge stations near the major highways in Ontario and Level II stations at work places, condominiums, apartments and public places. Funding of 100% of the cost of the stations was provided.
14. Through this funding, there will be a level III station installed at the McDonalds on Bayfield Street.

ANALYSIS

15. The deployment of EV charge stations is crucial to the uptake of electric vehicles. One of the biggest obstacles to the purchase of EV vehicles is known as range anxiety. Range anxiety is the fear that a vehicle has insufficient range to reach its destination and would thus strand the vehicle's occupants.
16. Placement of EV charge stations alleviates a certain amount of range anxiety and, along with advancements in the actual range a fully charged battery is able to travel, will go a long way in increasing the adoption of Electric Vehicles.
17. Future Charging patterns are likely to favour roll out of level II which are much cheaper and can be used for a greater variety of vehicles including plug in hybrid as well as battery electric vehicles. Level III stations are much more expensive to install and will be most useful for those taking long trips.
18. Use of charge stations at home and work would be the two most obvious areas, where a slow charge would be acceptable. Certain areas of municipal infrastructure also have uses where people tend to stay for extended periods of time.

19. The placement of the stations in Barrie should follow the Provincial guidelines and therefore would include Level III stations close to the 400 highway (one kilometre from major intersections is the goal), while Level II would be placed in most other locations.
20. Potential facility locations for EV charge stations include all multi –use centres East Bayfield, Holly and Allandale, where visitors could be expected to stay 1 to two hours regularly on a daily basis. While generally visit length to other sites vary and can be for much shorter times, City Hall is high profile and does get many visitors for meetings which could run for several hours. All City Facilities also have a component of staff parking which could be considered as vehicles could be there eight hours a day.
21. Electric Vehicle charge stations can be purchased with the ability to only provide a charge after a service network card is used. These cards allow the owner of the charge station to set the price for the electric charge from \$0 to any amount. This system is administered by the service network and they record and collect all fees and submit to the owner.
22. Prices to use charge stations vary and as examples; BC Level II charge stations do not charge for use but Level III charge .35/kWh with a minimum \$2.00 fee (\$9.50 for a 43 KW charge). Payment is made through an affiliated member card for the charging service network for that particular charge station.
23. In Quebec the Electric Circuit, is a provincial system of 670 240 volt Level II statins and 34 400 volt fast charging stations. Charges are either a \$2.50 flat fee or, in Montreal for curb side charging, it is \$1.00 per hour plus parking charges for Level II chargers. Fast charging with a Level III charger is \$10 per hour billed by the minute and is based on total time connected, not total charge. Billing is done through an electric circuit charge card.
24. In Ontario, based upon information received from fourteen Ontario Municipalities, no Municipality is charging for the use of Level II stations. Markham is charging \$2/10 minutes for use of its Level III charge station. Most municipalities require users of the charge station to join a service network to access the charging station even when there is no charge.
25. All of the Service networks provide apps showing locations of the charge stations within their network and Ontario, BC and Quebec all have Provincial maps showing charge station locations for stations installed under their various provincial programs.
26. Charging for the use of stations, whether Level II or III, will require some form of agreement between the service network that is specific to the Charge Station and the city in order to collect the fees.
27. Free usage will encourage use and at present there are no Ontario Municipalities charging for using a Level II charge station. The electrical cost of running a Level II station should not exceed \$1500 dollars a year (28 hours of use a week at 6.6 kW) because there are so few electric vehicles in service (6505 in Ontario as of March 2016) at present.
28. As uptake for electric vehicles increases, this should be revisited as there should be cost recovery, so any Level II installed must have the ability to accept payment for service.
29. Electric Vehicle charging stations that are Level III have a much higher capital and operating cost and should have a fee from the beginning. Markham's methodology could be looked at to determine a pricing model.
30. In order to further reduce operating costs, partnerships could be sought out to either help fund capital costs or generate revenue through advertising opportunities. Local electric car dealers or companies looking to help promote green activities might be willing to advertise or share in the capital cost of a station.

31. The Province has announced that they will be providing \$60,000,000 in funding for electric vehicle charge stations. They have already funded \$20,000,000 through the Electric Vehicle Chargers Ontario program in early 2016. Ministry staff has indicated that a similar program will be offered in February of 2017. Based on the previous program there is likely a fairly tight time line for applications.
32. The City can either join with another organization who is leading an application or apply on its own. During the last program, 24 applications were approved including 10 municipalities. The City could join with any consortium which would mean the City would only have to offer locations and would not be responsible for any of the project management.
33. The Provincial program goals are to establish a charging network across the Province, there will likely be somewhat limited numbers of locations awarded per City. Of the ten municipal applications approved two received approval for 4 charge stations and the rest were for three or less. Seven of the municipalities will install at least one Level III and four got approval for up to four level II stations.
34. It is recommended that the City participate in this program as a sole applicant rather than with a consortium to maintain complete control over where stations are placed
35. Should the City not be successful in the Provincial Program staff will need to develop an alternative plan for roll out.
36. If the City continues to purchase electric vehicles and receives the provincial rebate, we may also apply for an incentive for a Level II charging station for up to \$1000 for each vehicle purchased.
37. It is recommended that initially the Multi-use centres should be targeted for one system each along with City Hall, which would be four Level II stations - public lots at the waterfront, employee parking at all City facilities (priority based on number of employees) and curb side chargers which are attached to streetlight poles.
38. At this point there are no recommendations for a public level III charge station.
39. The cost for Level II charge station equipment are typically around a \$1,000 but installation of the system increases the cost significantly. In the recent Provincial program, Level II charge stations were being funded at costs ranging from \$4,500 to \$8,000 each. Level III charge stations are much more expensive and range from \$75,000 to \$100,000 each.
40. The Province has announced they will establish regulations that will require rough-in of electric vehicle charging stations in residential dwellings and in apartments and condominiums by 2018. The Simcoe county Home Builders Association has provided a letter regarding this subject (Appendix B). In summary they believe the proposed regulations for the next iteration of the Building Code in regards to rough-ins for Charge Stations is sufficient at this time.
41. Staff in Planning could consider asking all new site plan proponents to consider the installation of Level II charge stations prior to the passing of regulations and for all developments including commercial and industrial.
42. Many municipalities have at least one charge station. Appendix C (attached) contains a survey of fourteen municipalities and their charging infrastructure. Toronto is rolling out a strategy specific to Electric Vehicles, most municipalities have no formal strategy specific to electric vehicles, but some include it in Climate Change plans.
43. The Climate Change adaptation Plan being developed by staff would be a good place to ensure specific implementation plans are developed for adoption of electric vehicle charging stations. There is also a community component which is a good vehicle to solicit support from the private sector to further the rollout of charge stations across the city.

ENVIRONMENTAL MATTERS

44. The installation of electric vehicle charge stations will assist in the adoption of electric vehicles which is a key plank in the Provincial Government's climate change action plan.

ALTERNATIVES

The following alternatives are available for consideration by General Committee:

- Alternative #1** General Committee can choose to receive the report for information only
- This alternative is not recommended as it costs nothing to participate in the expected Provincial funding program.
- Alternative #2** General Committee could choose to charge for use of Level II Electric Vehicle charging Stations
- This alternative is not recommended at this point, as it may slow adoption of electric vehicles locally
- Alternative #3** General committee could choose to not have staff in the Planning and Building Services Department recommend roughing in or installing of Level II charge stations with building permit applications.
- This alternative is not recommended as this regulation has already been announced for residential dwellings and simply moves the date forward. By recommending no builder is forced to comply.

FINANCIAL

45. There are no financial implications associated with this report. Should the City be unsuccessful or the Province not offer a 100% funded program, staff will come back to Council with a funding plan.

LINKAGE TO 2015-2018 COUNCIL STRATEGIC PLAN

46. There are no linkages to the Council strategic plan.

APPENDIX "A"

Action Number	Action	Intended GGRA Funding	Timetable: Action Start
2.1	Maintain incentives for electric vehicles: Ontario will extend the rebate program to 2020 for leasing or buying an eligible electric vehicle (up to \$14,000 per vehicle), including rebates for purchase and installation of home charging stations (up to \$1,000 per station).	\$140,000,000 to \$160,000,000	2017
2.2	Action 2 - Increase The Use Of Electric Vehicles Total Intended GGRA Funding: \$246,750,000 to \$277,000,000. Est. GHG Reduction In 2020: 50,000 Tonnes. Est. Cost Per Tonne: \$75.	--	2017/18
2.3	Free overnight electric vehicle charging: The province intends to establish a four-year free overnight electric vehicle-charging program for residential and multi-unit residential customers starting in 2017.	\$15,000,000	2016
2.4	Replace older vehicles: The province will help get older and less fuel-efficient vehicles off the roads by offering a rebate to low- and moderate-income households that will help them replace old cars with new or used electric vehicles or a plug-in hybrid.	\$10,000,000 to \$20,000,000	2017/18
2.5	Ensure charging infrastructure is widely available: Ontario will increase access to the infrastructure required to charge electric vehicles by ensuring the following:	See Below	See Below
2.5.1	More charging stations: The province will invest in the rapid deployment of charging in workplaces, multi-unit residential buildings, downtowns and town centres.	\$80,000,000	Ongoing
2.5.2	Electric-vehicle-ready homes: Ontario will require all new homes and townhomes with garages to be constructed with a 50-amp, 240-volt receptacle (plug) in the garage for the purpose of charging an electric vehicle.	--	January 2018
2.5.3	Electric-vehicle-ready workplaces: Ontario will establish a requirement that, as of 2018, all newly built commercial office buildings and appropriate workplaces must provide charging infrastructure.	--	2018
2.6	Electric and Hydrogen Advancement Program: Starting in 2017, vehicle manufacturers that offer their customers access to Ontario's Electric Vehicle Incentive Program will need to participate in an Electric and Hydrogen Vehicle Advancement Program.	--	2017
2.7	Increase public awareness: Ontario will work with Plug'n Drive, a non-profit electric vehicle advocacy organization, to establish and operate a facility to showcase electric vehicles and related technology to Ontarians across the province.	\$1,750,000 to \$2,000,000	2017/18

APPENDIX "B"



Simcoe County Home Builders' Association
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November 25, 2016

The City of Barrie
Planning & Building Services Department
70 Collier Street
Barrie, Ontario L4M 4T5

Dear Mr. Andrew Hill,

RE: Level 2 EV Charging Stations

The Simcoe County Home Builders' Association represents the residential building industry in Simcoe County and our comments regarding electric vehicle (EV) charging stations are specific to residential buildings only and not potential commercial, industrial and institutional installations.

We live in a rapidly changing world. Simcoe County and in particular the City of Barrie will experience a tremendous amount of growth in the near future. The need to utilize infrastructure and resources efficiently and mitigate the effects of this growth on our environment is important. As technology and the price of EV's improve so will their use, thereby minimizing the environmental impact by reducing the carbon footprint. Our industry is supportive of this trend and given that typically homes have a considerable lifespan the provision for future charging stations makes sense. Our concern, however, is that at this juncture this provision be both cost effective and flexible. Since EV technology is evolving quickly the installation of charging stations now would be impractical since they may not be compatible with a specific EV that the homeowner may purchase at some point in the future. Furthermore, it could be costly since the vast majority of homeowners would be carrying the cost of the charger on their mortgage until EV's become mainstream and they purchase one. The solution would be to provide roughed in wiring or a conduit for the charging station. This approach is flexible and cost effective enabling the widespread use of charging stations at home at any future date.

It is our understanding that the next iteration of the Ontario Building Code (OBC) has specific recommendations for the provision of charging stations in homes. It is our opinion that these regulations accomplish this goal, therefore, making it redundant for the City of Barrie to implement these same policies.

Thank you for the opportunity to comment and provide feedback on this relevant issue. We would be pleased to meet and or have further discussion should you have any further questions or concerns.

Yours truly,
Simcoe County Home Builders' Association

A handwritten signature in black ink, appearing to read "Bob Schickedanz".

Bob Schickedanz, President



APPENDIX "C"

See attachment.