



EV READY REQUIREMENTS FOR MUNICIPALITIES



Clean Air Partnership

ABOUT THE CLEAN AIR PARTNERSHIP:

Clean Air Partnership (CAP) is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities. Our applied research on municipal policies strives to broaden and improve access to public policy debate on air pollution and climate change issues. Clean Air Partnership's mission is to transform cities into more sustainable, resilient, and vibrant communities where resources are used efficiently, the air is clean to breathe and greenhouse gas emissions are minimized.

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This initiative is funded by
The Atmospheric Fund

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EXECUTIVE SUMMARY

Achieving deep decarbonization will require the widespread adoption of electric vehicles (EVs). Municipalities are seeking additional information on the role they can play in future proofing new developments to enable at home charging of EVs. The large majority of EV charging occurs at home, and access to at home charging is one of the most important factors determining whether a household will purchase an EV. Municipalities are seeking to better understand options for how to cost-effectively design and implement EV Ready parking within new developments to avoid expensive and complex EV charging retrofits. To advance this goal Clean Air Partnership, with funding from The Atmospheric Fund, commissioned an [Electric Vehicle Charging Infrastructure Costing Study](#) (referred to in this Primer as the EV Costing Study) to compare costs of making parking EV Ready at time of construction to post-construction retrofits. The Study advances our understanding of the upfront capital costs and longer-term value proposition for EV Ready requirements.

The goal of the EV Costing Study was to inform local governments, developers, electrical designers, utilities, and other stakeholders, about the costs of making parking in new construction EV Ready, and the design strategies that can help minimize these costs. The Study provides Ontario-specific costing and technology information as of early 2021 to drive adoption and address concerns with advancing EV Ready parking within the residential sector. Emphasis was placed on the multi-unit residential building (MURB) sector, because of the significant challenges of retrofitting these buildings to provide EV charging to property owners post construction. The actions undertaken to achieve this goal were:

- Initial consultations with key stakeholders (municipalities, developers and utilities) to better understand their questions and concerns.



- AES Engineering then completed the EV Costing Study and EV Charging Performance Requirements Report to better understand the cost implications and design options for advancing EV Ready requirements.
- Consultation with each stakeholder group to see how the EV Costing Study answers their questions/concerns and determine next steps related to advancing EV Readiness within new developments.

The EV Costing Study found a significant economic and logistical benefit to securing EV Ready charging capabilities for new buildings through municipal site plan (via Green Standards) or parking/zoning by-law authorities.

This EV Ready Requirements Primer for Municipalities summarizes the input and findings from the consultations and EV Costing report. These consultations were undertaken via group webinars as well as individual interviews.

1.0 |

**THE NEED FOR HUMANITY
TO ACT ON CLIMATE
CHANGE AND WHY ELECTRIC
VEHICLES ARE PART OF THE
SOLUTION**



1.0 | THE NEED FOR HUMANITY TO ACT ON CLIMATE CHANGE AND WHY ELECTRIC VEHICLES ARE PART OF THE SOLUTION

Human activities, with the burning of fossil fuels being the major contributor, have fundamentally increased the concentration of greenhouse gases (GHGs) in our atmosphere, thereby impacting the Earth's carbon cycle and warming the planet. Human activities have raised atmospheric carbon dioxide levels from pre-industrial levels of 280 parts per million to present levels of 417 parts per billion in about 150 years. These higher concentrations of GHGs trap heat within Earth's atmosphere, keeping it from being radiated back into space. The more GHGs in our atmosphere - the more heat they trap, and the warmer our planet gets. Increased GHG concentrations have already caused global average temperatures to increase by at least 1.4° C since 1880. With most of the warming occurring since 1975, at a rate of roughly 0.15 - 0.20° C per decade. Increased GHG concentrations poses direct threats to humans in the form of extreme weather (hurricanes, tornadoes, floods, droughts and heat events), increased forest fires, and water supply concerns, among others.

CLIMATE CHANGE AND TRANSPORTATION

Our GHGs come from a variety of sectors (see Figure 2) but transportation accounts for a significant, and increasing, portion of our total emissions. Advancing a more sustainable transportation system means providing more transportation options for Ontarians. All levels of government are critical in ensuring more resources are allocated to the most sustainable transportation opportunities within our communities. Local governments, with their influence over land use, new developments and transportation services and decisions are particularly critical in helping to ensure our communities advance more sustainable transportation options.

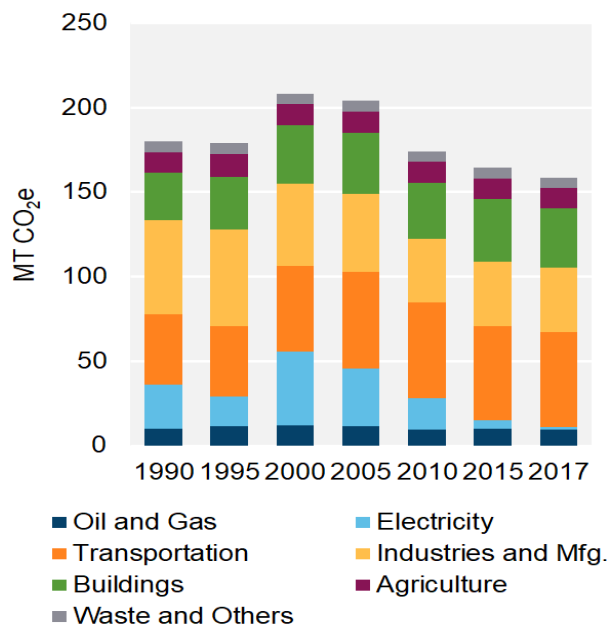


Figure 1: GHG Emissions of Ontario by Sector

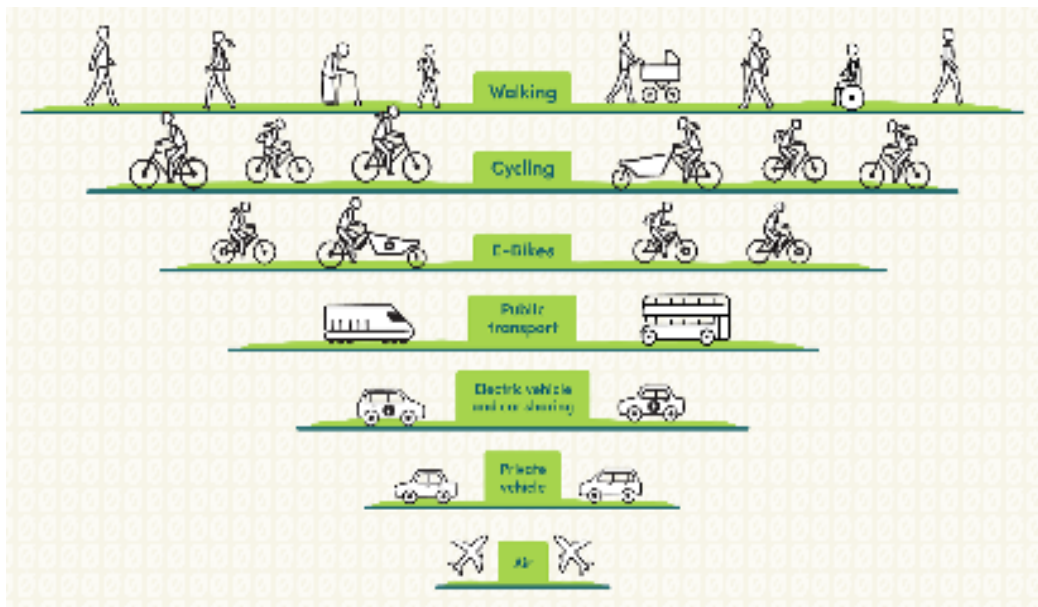


Figure 2: Flipping our transportation hierarchy requires more investment in moving people, not just vehicles

Transitioning our vehicle fleets from internal combustion engines (ICEs) towards EVs and Plug-in Hybrid Electric Vehicles (PHEV) is another action we must accelerate to address our climate change challenge. EVs are a critical component of a broader comprehensive sustainable transportation system over which local government have some control, particularly with regard to how new developments ensure their EV charging readiness. It is important to acknowledge, however, that advancing EV readiness and uptake will not achieve sustainable transportation goals. Municipalities need to make progress towards flipping the transportation hierarchy (see figure 2) and advancing planning and investment in moving people, rather than vehicles. At present there is an over-emphasis on investment and policies that prioritize investments for single occupancy vehicles over more sustainable transportation options such as active transportation, e-mobility, transit and EV sharing.

AIR POLLUTION AND TRANSPORTATION

The transportation sector is one of the largest contributors to Ontario's air pollution burden of health. Public health studies show that people who live near roads and highways are exposed to a harmful amount of air pollution from cars, buses and trucks, increasing the risk of life-threatening heart and lung conditions. Environmental Defense in their report [Clearing the Air](#) found that air quality improvements from cleaner vehicles could prevent hundreds of premature deaths every year, and lead to billions of dollars in social benefits, including about \$10,000 in social benefits for every gas powered car replaced with an EV. With health care spending accounting for 37.5% of Ontario's total 2021 budget, investments in reducing Ontarian's health care costs are a necessary investment in the long-term financial sustainability of Ontario's health care system.

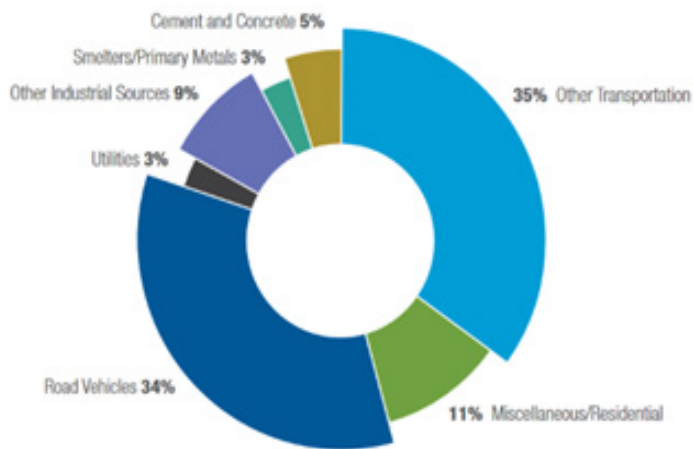


Figure 3: Ontario Nitrogen Oxides Emissions by Sector (2016 Estimates for Point/Area Transportation Sources)

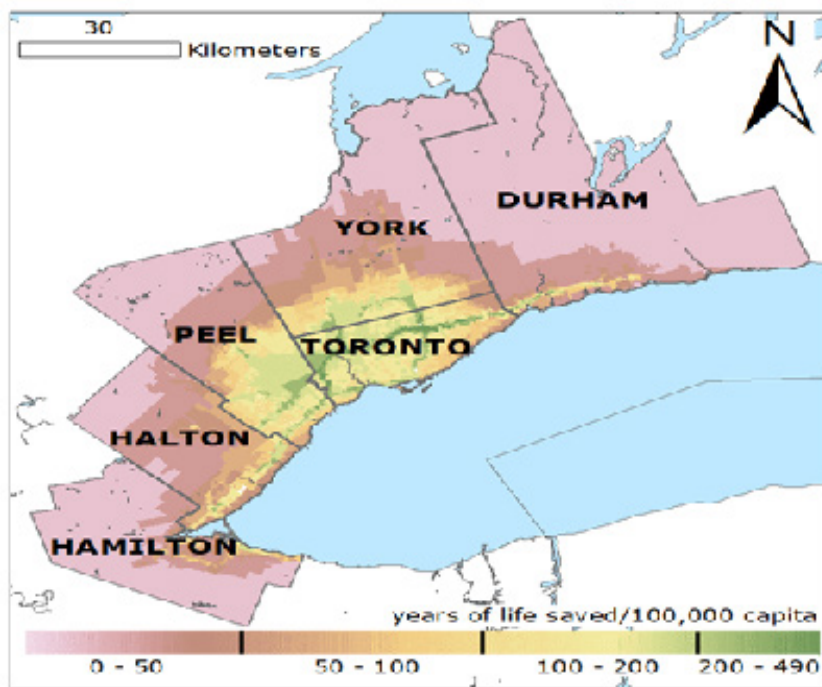


Figure 4: Years of Life Saved per 100,000 inhabitants in the GTHA every year if 100% of Cars/SUVs are electric taken from [Clearing the Air](#).

THE ECONOMIC VALUE OF ELECTRIC VEHICLES IN ONTARIO

In addition to health benefits, EVs also present a cost saving opportunity for drivers and an economic development opportunity for Ontario.

- **Bold Cost Savings:** Future EV drivers will save significantly on the life-cycle costs of their vehicles. The fuel cost to charge an EV at home in Ontario is equivalent to roughly \$0.20 per litre gasoline (exact costs depend on timing of EV charging under time-of-use or wholesale pricing utility rates, and other factors relating to utility tariffs and vehicle efficiency). Maintenance costs of EVs are about half that of gasoline vehicles. Despite EVs currently having higher upfront costs than comparable ICEVs, from a life cycle cost analysis EVs are already either cheaper or competitive with ICEVs. In addition, the purchase and lease costs of EVs are declining, and it is estimated that by mid 2020s, the upfront purchase price of EVs will be on par with ICEVs.
- **Bold Improved Performance:** EVs typically have superior handling. Additionally, EVs are quieter inside, which many drivers report makes for a more enjoyable environment for music and conversation.
- **Bold Economic Benefit:** In 2019, the auto sector contributed 16% of Ontario's manufacturing GDP (equivalent to 1.9% of Ontario's total GDP). It employs approximately 100,000 Ontarians and generates spin off jobs across Ontario. While Ontario presently lags other provinces (such as British Columbia and Quebec) on EV uptake, there is little doubt that EVs will be the future of the automobile industry. Every international automaker has PHEV and/or EV options. Some auto companies have set dates for when they will produce only PHEV and/or pure EVs. The Government of Canada has set a mandatory target for 100% of all new light-duty car and passenger truck sales to be zero emission by

2035, with a target for at least 50% zero emission vehicle sales by 2030. There is little doubt that the EV trajectory is moving from its early adopter market towards mainstream scale up.

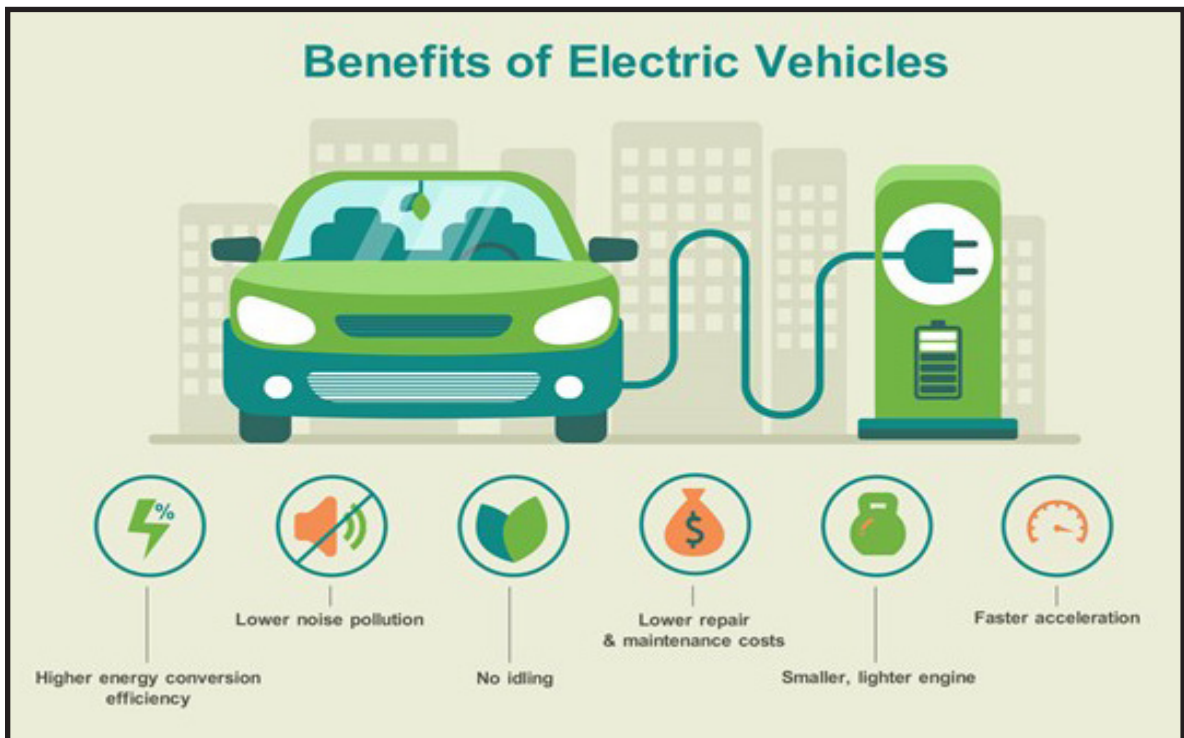


Figure 5: Benefits of Electric Vehicles



2.0 |

THE ROLE EV READY
REQUIREMENTS PLAYS IN
DRIVING EV UPTAKE



2.0 | THE ROLE EV READY

REQUIREMENTS PLAYS IN DRIVING EV UPTAKE

EV adoption is growing rapidly, and near total replacement of ICEV with EVs will be required to achieve municipal, provincial and federal government GHG reduction targets. Providing access to at home EV charging is a critical factor to driving uptake of EVs. Local governments are increasingly considering what they can do to ensure the EV readiness of their communities. EV Ready parking requirements for new developments are emerging as a leading practice. EV Ready parking is defined as a parking stall that has an adjacent energized outlet (i.e. an electrical junction box or a receptacle) where an EV supply equipment (EVSE – i.e. an EV charger) can be installed in the future.

The [Electric Vehicle Charging Infrastructure Costing Study](#) summarizes design options and costing analysis for four residential development archetypes to comply with 100% EV Ready residential parking requirements.

The [EV Charging Performance Requirements Report](#) is a technical resource document that provides guidance to municipalities and developers for EV Ready design options that meet the daily driving needs while still allowing for the efficient use of electrical infrastructure, and reducing up front capital costs.

This EV Ready Requirements Primer for Municipalities highlights:

- The results of the EV Costing Study;
- The feedback received from municipalities, developers and utilities;
- The status of municipal EV Ready requirements in Ontario thus far; and
- What Ontario can learn from the experiences of other jurisdictions that are further ahead of Ontario in their EV uptake journey.

RATIONALE FOR RESISTANCE TO THE EV READY REQUIREMENTS IN THE ONTARIO BUILDING CODE

The EV market is not without its challenges. The infrastructure needed for accessible charging is one of the factors greatly limiting the wide scale adoption of the market towards EVs. Municipalities have been developing EV strategies that identify and act on opportunities to advance EV readiness and uptake within their communities. Advancing EV readiness of new developments has emerged as a leading action within municipal EV Strategies. EV Ready requirements that are advanced at the time of construction reduce the need for future logistically challenging and costly retrofits. This is particularly important in the case of MURBs and townhomes where common space rules and processes result in logistically challenging and costly retrofits.

In 2018, the Ontario Building Code (OBC) brought in EV charging requirements via Regulation O.Reg. 139/17 that required every new single detached, semi-detached and row townhouse to be provided with a rough in for the installation of future EVSE (charging stations). The rough-in was required to include:

- A minimum 200 amp panel board
- Conduit that is not less than 1-1/16" (27mm) trade size; and
- A square 4-11/16" (119 mm) trade size electrical box.

In addition to the above Part 9 (three stories and less) building requirements, the OBC also required electric vehicle charging in commercial workplace buildings with parking spaces in the buildings (this did not apply to MURB developments such as condominiums and apartment buildings). It was required that not less than 20% of parking spaces be provided with EVSE and the remaining 80% of parking spaces be provided with rough ins for future installation of EVSE. In addition to the EV charging requirements in new buildings, the Government of Ontario also provided incentives for the purchase of EV and PHEVs and financial support for EV charger installations in Ontario workplaces. The EV

purchase and charging incentives were cancelled in 2018 when a change in the Ontario provincial government cancelled Ontario's Cap and Trade program. The removal of all EV ready requirements in the OBC occurred in 2019. With the removal of EV uptake support and charging readiness requirements in Ontario, municipalities increased their exploration of opportunities to ensure the necessary conditions for EV readiness and uptake within their communities. Ontario municipalities looked towards other jurisdictions such as British Columbia, where municipalities have been implementing EV Ready requirements within new developments for several years for leading practices and lessons learned.

To better understand the barriers and cost implications of advancing EV readiness within the new building sector, Clean Air Partnership, with funding from The Atmospheric Fund, advanced an EV Costing Study. The Study undertaken by AES Engineering, determined the up-front capital costs of ensuring EV Charging readiness at the time of construction, to better understand how those costs compare to projected future retrofit costs. In addition, consultations with key stakeholders (developers, municipalities and utilities) were undertaken to better understand the issues that resulted in developers' calling for the province of Ontario to remove EV Ready requirements in the OBC.

Based on the consultations with the development community, the following issues were identified as most concerning.

- The OBC did not incorporate energy sharing technology into its electricity allocation requirements. When the EV ready requirements were brought into the OBC, the Electrical Safety Code had not yet brought in standards and guidance for the use of EV energy sharing technology. As such, energy sharing wasn't brought into OBC requirements, thereby requiring the electrical design of the building to assume a full electricity requirement for each EV Ready Spot. This

resulted in significant increases to electricity allocation costs for new developments.

- The potential cost implications that EV ready requirements could pose to the electrical utility infrastructure deposit system (also called the Capital Cost Recovery (CCR) process). The electrical utility infrastructure deposit system is enacted when there are infrastructure investments that an electrical utility needs to make to provide the electricity allocation needed for a specific development. The deposit system covers a 5-year time horizon, whereby if the electricity demand requested by the development materializes, more of the deposit is returned to the developer. But if the electricity demand does not materialize, then part of the deposit is retained by the utility to cover the infrastructure costs that were required to provide the electricity allocation for that development. The CCR or electricity deposit system structure is not managed by the utility, but is governed by the Ontario Energy Board's [Distribution System Code](#). This issue is further explored later in this Primer.

The initial pre-EV Costing Study consultations undertaken with developers, municipalities and utilities helped inform the questions, issues and concerns from each of the stakeholder groups and thereby informed the scope for the EV Costing Study.



3.0 |

**RESULTS OF THE ELECTRIC
VEHICLE CHARGING COSTING
STUDY**



3.0 | RESULTS OF THE ELECTRIC VEHICLE CHARGING COSTING STUDY

The purpose of the [EV Costing Study](#) and the [EV Charging Performance Requirements](#) is to inform local governments, developers, electrical designers, utilities and other stakeholders about the costs of making new construction EV Ready, possible design strategies that can help minimize these costs, and how those costs compare to future EV charging installation retrofit costs. This helped each of the stakeholder groups to better understand how EV Ready requirements affect affordability both at purchase price, as well as by bringing in future retrofit costs into the affordability analysis.

ENERGY MANAGEMENT SYSTEMS/EV ENERGY SHARING GUIDANCE

Due to the important role that EV energy management systems (EVEMS) or EV energy sharing systems can play in reducing up-front infrastructure and electricity allocation costs, the EV Costing Study brought in data from the Transportation Tomorrow Survey (TTS) to better understand the vehicle kilometres travelled (VKT) by drivers across the Greater Toronto and Hamilton area (GTHA). This real-world data helped inform the level of energy sharing that could be employed to reduce electricity allocation costs, while still providing adequate charge to ensure that the EV driver is able to meet their next day's commute/ VKTs.

The analysis from the TTS found that GTHA and region developers can achieve significant up front costs savings by incorporating energy sharing in their EV ready designs. Based on VKTs across the GTHA, there is the ability to employ up to 4 way sharing on a 40 Amp circuit (or 10 share on a 80 Amp circuit) and still

meet the overwhelming majority of their next day's required EV charging. Therefore, energy sharing can play a significant role in reducing up-front costs associated with EV readiness and should be considered for incorporation into EV Ready requirements and EV charging electrical designs.

Circuit Breaker Size	Maximum number of EVs (by mean daily weekday VKT)					
	45km or less	50km	55km	60km	65km	70km
20A	1					
30A	2	2	1	1	1	1
40A	4	3	3	2	2	2
50A	5	4	4	3	3	2
60A	6	5	5	4	4	3
70A	8	7	6	5	5	4
80A	10	8	7	6	6	5
100A	12	10	9	8	7	7
125A	15	14	12	11	10	9

Figure 6: Summary of performance requirements in terms of the amount of sharing allowed on each circuit size for different mean VKT

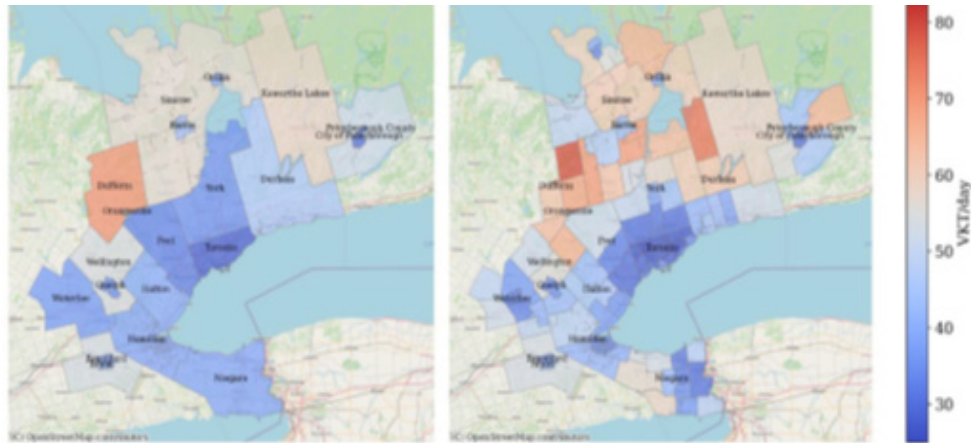


Figure 7: VKT by Region and Planning District in the GTHA data from Transportation for Tomorrow Survey

FUTURE TELLING THE ELECTRIC VEHICLE CHARGING MARKET

With regards to advancing EV Ready infrastructure in new buildings, some developers expressed concerns with not fully understanding the role at home charging would play in the future when EVs are more mainstream. They identified the possibility that at home charging will not be as important in the future as it is at present since there are likely to be increased commercial EV charging options to meet the charging needs of drivers. As such, there were a few developers who questioned the need for EV ready infrastructure in the home setting.

Another question that we asked developers was what they were hearing from their customers regarding EV charging. There was one developer who indicated that they were hearing more requests for EV Ready infrastructure from the higher wealth client base more so than from other client demographics.

There was, however, recognition across all developers that they expected requests for EV readiness to increase over time.

Despite low current market demand for EV charging, and the lack of clarity on EV charging business model options that will be available in the future, there was recognition of the important role the ability to charge a vehicle played at present in increasing the favorable conditions for EV uptake. In addition, it was also acknowledged that at home charging is likely to be the most convenient and cost-effective charging option available to EV drivers. As such there was recognition across all stakeholders of the importance of access to at home EV charging now and into the future. There was also recognition that the most cost-effective time for EV Ready charging installations is at the time of construction, and that EV ready requirements create a level playing field across residential development and advances equity goals related to ensuring all housing archetypes and demographics benefit from the value EV ready requirements play in reducing EV charging retrofit costs.

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE COSTING

To better understand how the costs related to EV charging readiness differs across different building archetypes, four different housing archetypes were considered as part of the EV Costing Study. The archetypes used design from real world development applications to ensure that the design reflected actual circumstances as opposed to hypothetical electrical designs. The four archetypes considered were:

- High-Rise (ex. 16 stories)
- Mid-Rise (ex. 7 stories)
- Townhouse (ex. 3 stories and common parking lot location)
- Single Family (ex. 3 stories individual parking location – i.e not common parking lot)

For each of the archetypes, a range of different electrical design scenarios were developed.

- Complying with the Toronto Green Standards Version 3 requirement for 20% EV Ready parking.
- The EV Ready Costing Study also analyzed various different energy sharing options (ex. dedicated, 3 way, 4 way, 10 way) to achieve 100% EV Ready Requirements.

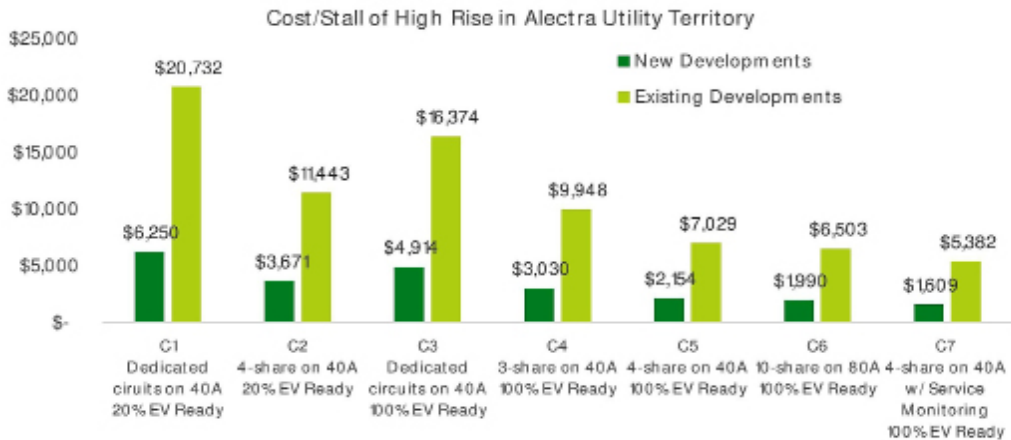
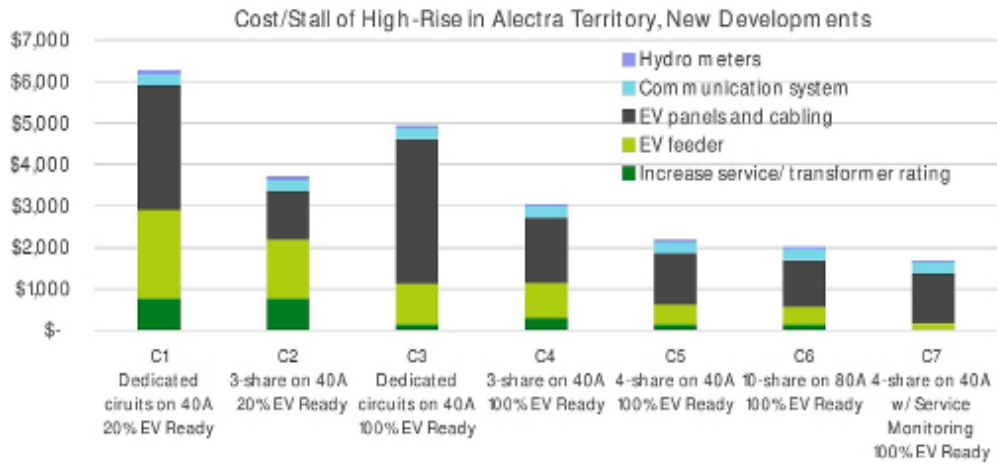
EV READY COSTING FOR DIFFERENT BUILDING ARCHETYPES

Below are the top-level results from the EV Costing Study that compared upfront costs of ensuring EV Ready requirements at the time of construction versus the costs to retrofit post construction. One of the largest barriers raised to EV Ready requirements is the upfront costs it adds to parking spots prior to when the property owner has an EV and requests access to charging. There were also significant concerns raised by municipalities related to equity considerations related to advancing EV charging across different housing archetypes. With single family developments having the easiest ability to retrofit post construction, but with town/row, mid- and high-rise building archetypes (with common parking areas) experiencing far more difficulty and costs associated with retrofitting parking spots post construction. As the market transitions towards EVs, these retrofit costs and logistical challenges can have resale value and equity concerns. Single family homes while still being far more cost-effective to advance EV readiness at the time of construction, often do not encounter as much challenges as the other archetypes when retrofits are required.

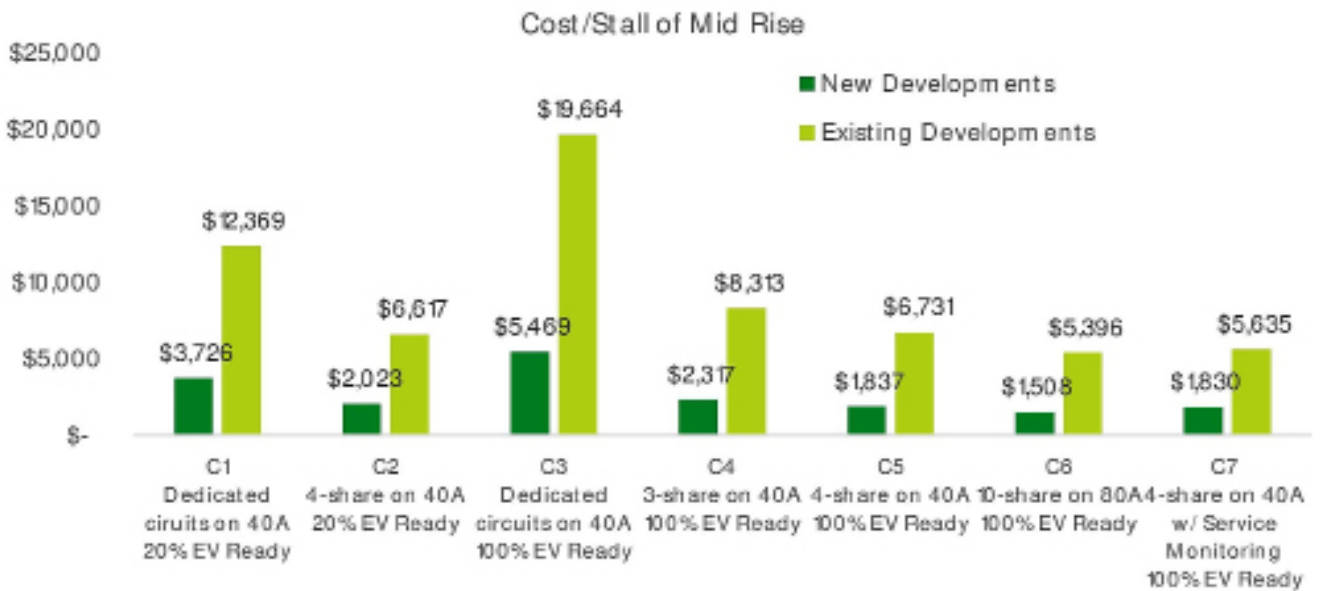
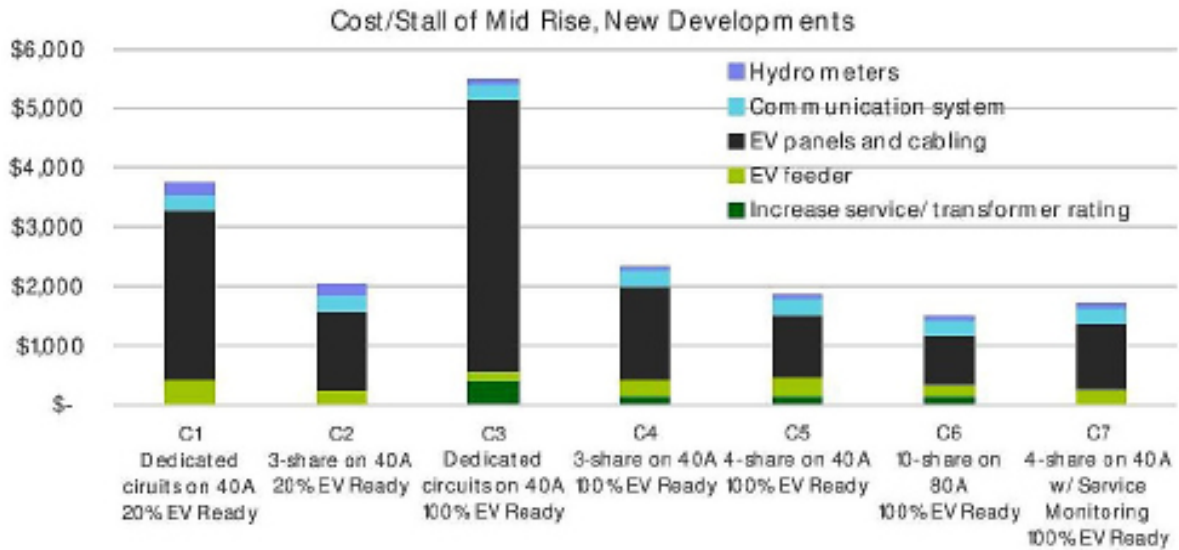
The charts below provide a summary of the different costs related to EV Ready

components, as well as how those costs compare at the time of construction to future retrofits costs for each of the building archetypes.

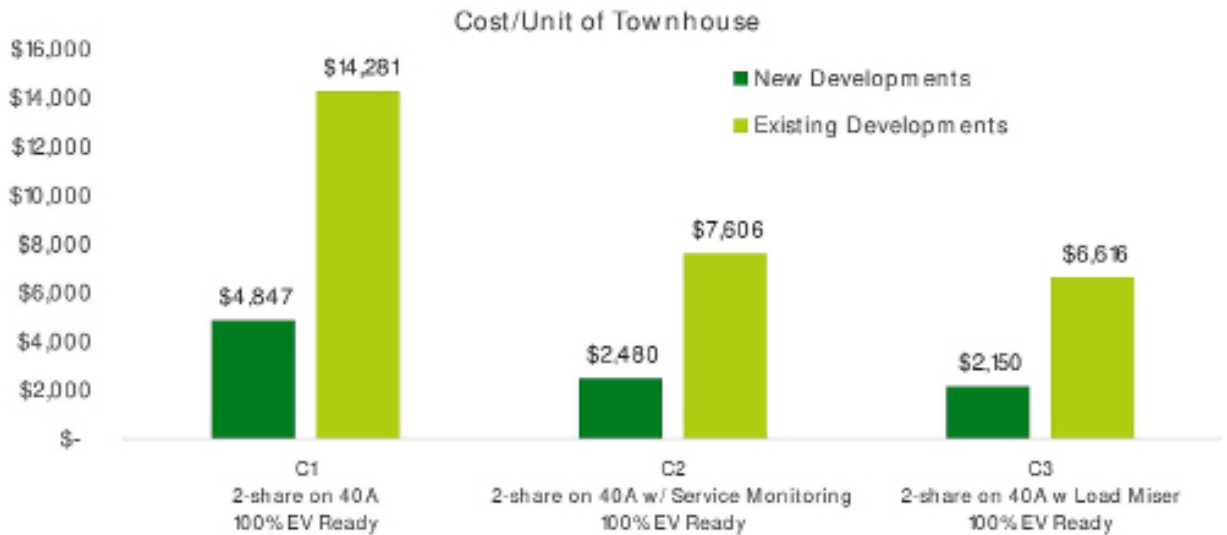
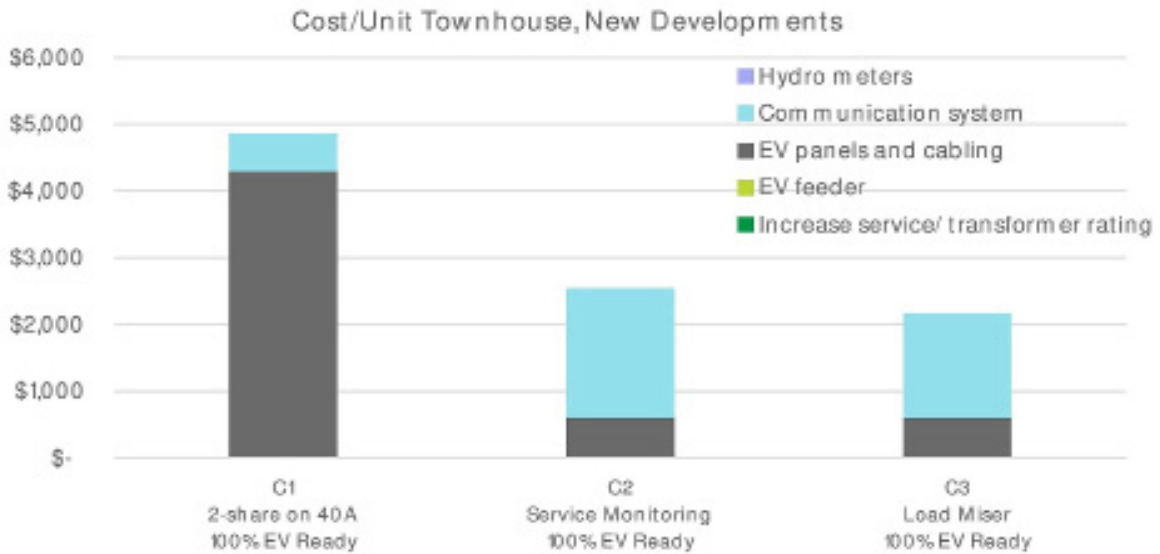
EV READY COSTING FOR HIGH RISE ARCHETYPE FOR NEW DEVELOPMENTS



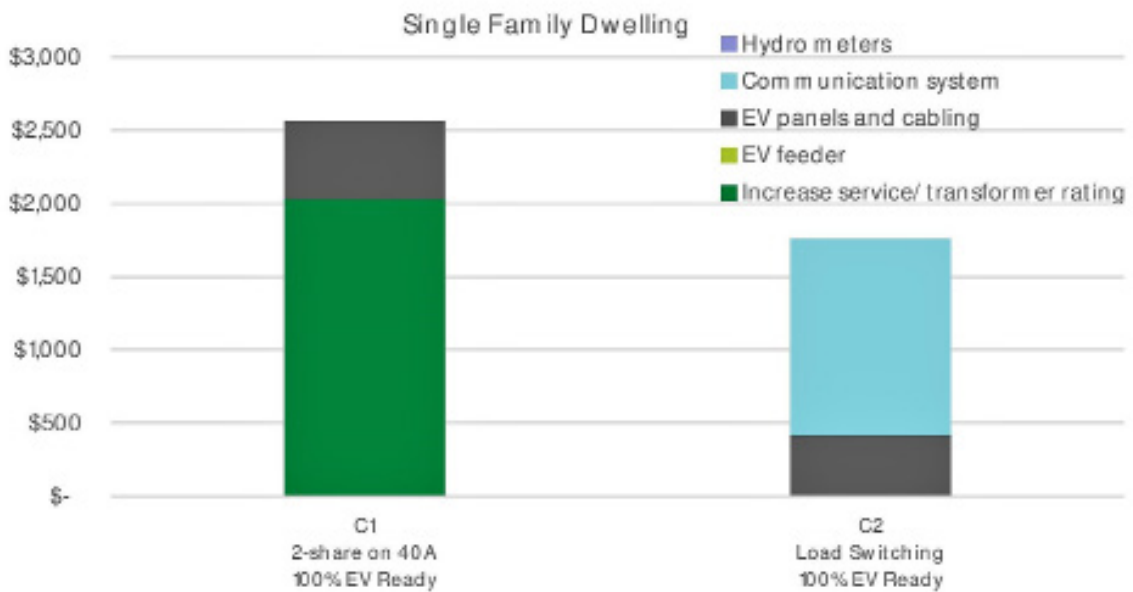
EV READY COSTING FOR MID RISE ARCHETYPE FOR NEW DEVELOPMENTS



EV READY COSTING FOR TOWNHOUSE ARCHETYPE FOR NEW DEVELOPMENTS



EV READY COSTING FOR SINGLE FAMILY ARCHETYPE FOR NEW DEVELOPMENTS



4.0 |

MUNICIPAL AUTHORITY
TO SECURE EV READY
REQUIREMENTS



4.0 | MUNICIPAL AUTHORITY TO SECURE EV READY REQUIREMENTS

Municipal governments are created under provincial statute, which allows them to govern over matters of local jurisdiction. In Ontario, municipalities can make by-laws under the [Municipal Act](#) (s 11(2)) relating to matters of health, safety, and environmental well-being, including respecting climate change. Courts have interpreted this to include for example, limiting the [use of pesticides](#) within the municipality. The guidance to municipal authorities, however, is that they should aim to not conflict with provincial or federal regulations via their by-laws. It is important to note there are various roles and responsibilities that different levels of government play in advancing regulation. For example, in the court challenges to municipal pesticide by-laws, the Supreme Court of Canada affirmed that there are three different aspects of pesticide regulation. The Court described in detail the federal role (registration), the provincial role (commercial use) and the municipal role (local use decisions) and noted that each are appropriate and complementary aspects of pesticide regulation. In advancing EV Ready requirements municipalities have identified a few possible mechanisms available to them to secure EV Ready requirements. They are:

- Planning Act and Site Plan Authorities (with EV Ready being advanced via Green Standards);
- Parking Requirements/Zoning By-laws; and
- Climate Change By-law Authorities.

PLANNING ACT AND SITE PLAN AUTHORITIES

The Ontario Planning Act provides municipalities with authority to mandate urban design through site plan approvals. The Planning Act provides a

framework and legislative authority for municipalities to engage in land-use planning by creating Official Plans, Zoning By-laws and Community Improvement Plans. The Planning Act is provincial legislation that governs how municipalities in Ontario may plan and regulate the use of land. In particular, the Act outlines the Province's key land use and development concerns, identifies other provincial policy documents that provide further direction on each of the key concerns, and establishes the tools available to municipalities for regulating development within their boundaries.

Section 2 of the Planning Act requires that municipalities, when carrying out their responsibilities under this Act, shall have regard to matters of provincial interest, which include, but are not limited to, the:

- Protection of ecological systems and agricultural resources, including natural areas, features and functions;
- Conservation and management of natural resources;
- Supply, efficient use and conservation of energy and water;
- Adequate provision and efficient use of transportation, sewage and water services and waste management systems;
- Minimization of waste;
- Protection of public health and safety;
- Appropriate location of growth and development;
- The promotion of development that is designed to be sustainable development, to support public transit and is pedestrian-oriented; and
- Mitigation of greenhouse gas emissions and adaptation to a changing climate.

Section 3 of the Planning Act allows the Province to issue Provincial Policy Statements (PPS) as well as Provincial Plans with which all municipal planning decisions must be consistent. The Act provides the legislative basis to undertake land use planning—in exchange for addressing matters of Provincial interest.

Section 16(14) of the Act directs that Official Plans “shall contain policies that identify goals, objectives and actions to mitigate greenhouse gas emissions, and to provide for adaptation to a changing climate, including through increasing resiliency.”

Section 41 of the Act provides powers for site plan control including exterior sustainable design features for buildings. A municipality can pass a Site-Control by-law, which can be used to ensure that any development meets certain standards and regulations. Some Ontario municipalities have incorporated EV Ready requirements/metrics within their Green Standards (link to Appendix A: Ontario Municipality EV Ready scan).

Section 37 of the Act as amended by Bill 197 (2020) provides the ability for Community Benefits Charges (CBCs), which offer the possibility to incentivize sustainable development. CBCs can be applied to development or redevelopment that requires a variety of planning permissions, including but not limited to zoning by-law amendments, approvals of plans of subdivision, and plans of condominium. There is potential for a strategy whereby a municipality defers the CBCs chargeable to a development or development project that meet certain green design thresholds.

PARKING REQUIREMENTS AND ZONING BY-LAWS

A zoning by-law controls the use of land in a municipality. It states:

- How land may be used;
- Where buildings and other structures can be located;
- The types of buildings that are permitted and how they may be used; and
- The lot sizes and dimensions, parking requirements, building height and density (the number of people, jobs, and building floor area per hectare), and setbacks from the street.

An Official Plan sets out a municipality's general policies for future land use. Zoning bylaws put the Plan into effect and provide for its day-to-day administration. Zoning bylaws contain specific requirements that are legally enforceable. Construction or new development that doesn't comply with a zoning bylaw is not allowed, and the municipality can refuse to issue a building permit.

When Council considers a zoning bylaw, its decision shall be consistent with the [Provincial Policy Statement](#) (PPS) issued under the [Planning Act](#). This means that a Council must ensure that the policies of the PPS are applied as an essential part of the land use planning decision-making process. The PPS contains policy directions on matters of [provincial interest](#) related to land use planning and development. It is expected that the council will implement the PPS in the context of other planning objectives and local circumstances. (See [section 1, The Planning Act](#), and the [Provincial Policy Statement, 2020](#))

MUNICIPAL ACT AND CLIMATE CHANGE BYLAWS

In 2017 the province of Ontario updated Bill 68 – Modernizing Municipal Legislation Act. Bill 68 introduced a variety of changes to several municipal statutes (Municipal Act, City of Toronto Acts and the Planning Act). The Municipal and City of Toronto Acts updates enabled municipalities to pass by-laws respecting climate change as part of their powers to enact by-laws relating to economic, social and environmental well-being of the municipality. Municipalities were also provided with authorities to provide for, or participate in, long-term energy planning, which could include among other considerations, climate change.

PROS AND CONS OF MUNICIPAL AUTHORITIES FOR SECURING EV READY REQUIREMENTS

While each of the above municipal authorities can be used to secure municipal EV Ready requirements there are different considerations that municipalities should discuss to determine which authority makes the most sense for a municipality to use.

- **Planning Act and Site Plan Authorities:** If a municipality has a Green Standard in place, this provides a relatively easy mechanism to advance EV Ready requirements. An EV Ready requirement can be added as a metric to their Green Standard. The pros associated with this approach include, but are not limited to, the fact that Green Standards often have a time frame for updating of the metrics included in their Green Standard and the fact that Green Standards have not been legally challenged. The con of using this approach is that Green Standards are not binding in terms of securing uptake of metrics due to enforcement challenges. EV Ready requirements, however, require a live box to be installed at the time of construction, and that can be relatively easily verified via building inspections. It is recommended that training of building officials occurs to better enable them to verify the installation of EV Ready requirements.
- **Parking Requirements and Zoning By-laws:** If a municipality does not have a Green Standard in place, then parking requirements and Zoning By-laws present another opportunity to secure EV Ready requirements. The benefit of using this approach is that zoning by-laws have more legal authority related to enforcement than is available for Green Standards. The con associated with this approach is that zoning by-laws have traditionally faced more legal challenges than Green Standards.

- **Municipal Act and Climate Change Bylaws:** Since this authority is relatively new there is less municipal experience for how it can be enacted than there is with the above two authorities. Therefore, while a possible mechanism to enact EV Ready requirements, this municipal authority can pose challenges due to the lack of familiarity on what climate change by-laws can be applied to.

EV READY REQUIREMENTS AND THE ONTARIO BUILDING CODE

Municipalities often want to ensure that they are not duplicating requirements from other levels of government and may be concerned about conflicts between municipal Green Standards, Parking Requirements/By-laws and the Ontario Building Code. It is important to note that in May 2019 the OBC EV charging requirements were revoked. As such, there is no conflict between Ontario Building Code or other provincial regulatory provisions relating to EV charging infrastructure in buildings.



5.0 |

CONSIDERATIONS AND
RECOMMENDATIONS FOR
ADVANCING EV READY
REQUIREMENTS



5.0 | CONSIDERATIONS AND RECOMMENDATIONS FOR ADVANCING EV READY REQUIREMENTS

OPPORTUNITY TO IMPROVE CONSISTENCY REGARDING EV READY REQUIREMENTS IN ONTARIO

When comparing existing EV Ready requirements or metrics within Ontario municipalities (see Appendix A for Ontario Municipalities EV Ready Scan) it is apparent that there are significant opportunities to improve consistency across Ontario EV Ready requirements. The leading practice emerging from municipalities in other jurisdictions (with British Columbia municipalities leading national efforts – See Appendix B) is 100% EV Ready requirements for residential development.

There is still at present more variation on EV Ready requirements within the commercial sector with between 20 – 45% emerging as a leading practice. The commercial sector is a little more challenging in determining a leading practice as the EV charging opportunities for their clients/customers/staff vary more depending on the type of commercial establishment occupying the building (retail, office, etc).

ELECTRICITY ALLOCATION AND UTILITY DEPOSIT IMPLICATIONS FOR EV READY REQUIREMENTS

Consultations were undertaken with each of the stakeholder groups (municipalities, developers, electrical utilities) prior to undertaking the EV Costing study to better understand the issues and barriers related to advancing the EV readiness of new developments. Developers were asked for their input on the issues that resulted in them lobbying the provincial government to remove the EV Ready/Charging requirements from the Ontario Building Code (OBC).

Developers spoke to their concerns related to the cost implications associated with electricity allocation requirements triggered by the OBC EV Ready requirements. Specifically, the lack of ability to bring energy sharing into the electrical design. The lack of energy sharing guidance in the OBC seems to be related to the fact that when the EV requirements were brought into the OBC, energy sharing was not yet brought into the Canadian Electrical Safety Code and as such energy sharing guidance was not able to be brought into the OBC requirements. Energy sharing has now been incorporated into the Canadian Electrical Safety Code and is a critical consideration for how a development can reduce the electricity allocations associated with the installation of EV Ready design.

Developers also raised a concern with how EV Ready requirements could negatively impact the deposit structure that is triggered when a development requires an electricity infrastructure investment to provide the building with its requested electricity allocation. The electricity allocation deposit system is triggered when there is an electricity infrastructure investment that the utility needs to make to provide the peak electricity allocation for a specific development. The deposit system requires a deposit from the developer that sits in escrow for a period of 5 years. If the electricity use requested by the building materializes, then more of the deposit is returned to the developer. However, if the electricity allocation does not materialize, then the utility can retain more of the deposit to pay for the electricity infrastructure costs. The thinking for this approach is that if that electricity allocation did materialize, then the electricity use has provided revenue to cover the costs of the electricity infrastructure upgrade. But if the electricity allocation does not materialize, then more of the deposit would be allocated to the utility to compensate them for the electricity system infrastructure investment that they made to provide that electricity allocation to that specific development (See Appendix C for more information on the electricity infrastructure deposit system/Capital Cost Recovery (CCR) process).

It is important to keep in mind that the electricity allocation deposit system is not specifically related to EV Ready requirements, but rather related to the overall electricity allocation requested by the developer to meet the peak electricity use of that specific development. Based on the utility input received during the consultations it does not appear that utilities will provide developers with guidance or requirements for how they should/could design their EV Ready requirements. Guidance for that design will more likely be taken from the Electrical Safety Code. However, the [EV Charging Performance Requirements](#) report was developed to provide municipalities and developers with possible ways that their EV Ready requirements/design can reduce upfront capital costs while still providing enough charge to meet the EV drivers' next day driving distance.

The process in place at present for the electrical design of a development is that the developer works with their electrical engineer to determine the electrical design and load required by the development. They then submit that to the electrical utility and the electrical utility determines if the existing electricity allocation can be accommodated with existing infrastructure or if an infrastructure upgrade will be required. If an electricity infrastructure is required that is when the deposit system is triggered. The issue with the potential for EV Ready requirements to negatively impact the deposit structure to the detriment of developers, is that EV Ready requirements require the installation of the live box that the EV charger will eventually connect to. That live box requirement triggers an Electrical Safety Code requirement that the electricity allocation be considered as part of the electrical design for the development (it is recommended that energy sharing be considered as part of the EV Ready electrical design). It is generally understood, however, that the complete build out of the actual EV chargers is not likely to occur within the 5-year deposit system. This can negatively impact the amount of the deposit that is returned to the developer. There is the ability for the developer to incorporate load management in their electrical design to reduce the need to increase EV electricity allocation. Bringing in load management will be especially important

and applicable for those developments that do require a system infrastructure upgrade that triggers the deposit system. Load management present other benefits such as:

- Enabling the electrical design to avoid peak electricity allocations for EV charging. Load management presents a significant opportunity for EV Ready requirements to not have to increase peak electricity capacity for the building. It does mean, however, that there may be times during the day at certain times of the year when there may not be adequate electricity allocation for all drivers to charge at the same time during peak hours. However, it is recognized that peak electricity time periods are an anomaly and there is often more than adequate electrical capacity available for EV charging under that electrical peak. In addition, by bringing load management into the EV Ready electrical design, EV charging is less likely to increase peak electricity use across the provincial electrical system. Peak electricity is the most expensive and difficult to manage for the electricity system and design that limits EV charging during peak periods will not only reduce costs to the development and the EV driver but will also reduce costs to Ontario's electricity system as a whole.
- As electrical codes and electrical design emphasize safety there is often more than enough electrical capacity under the peak electricity allocations to enable ample capacity for EV chargers at nonpeak electricity time periods.

There are a few options for how the deposit system can be updated to consider EV Ready requirements:

1. Extend the deposit time frame from 5 to 10 years to provide more time to have a more complete roll out of the actual EV charger installations, thereby increasing electricity use via the installation of EV chargers. It is

likely this is not the preferred option for developers as the deposit sitting in an escrow account for a longer period could have financial implications.

2. Remove the EV Ready electricity allocation calculation from the deposit system. The EV Ready electricity allocation requirement would still be brought into the electrical design for the building but recognizing that that load will be unlikely to materialize within the 5-year time period of the deposit system it would not be brought into the deposit system calculations. This would reduce its potential to negatively impact the amount of the deposit that is returned to the developer, while still supporting electricity use overall to help pay for the infrastructure upgrade over time.
3. Use load management in EV Ready electrical design so that peak electricity allocations do not have to be increased. It should be noted that some developers raised concerns related to the operational costs of load management services. As the EV charging market grows, it is likely that more load management suppliers will come into the market and with increased demand and competition across service providers, load management costs are expected to decrease over time. It is also important to note that designing for load management and the installation of smart EV chargers will also set up the development to participate in future vehicle to grid programs that are expected to come into market in the coming years.

It is not yet fully understood how many new developments trigger the electricity system infrastructure upgrade deposit system and the deposit system will not affect all developments. If this poses a significant issue for advancing EV Ready requirements across many new developments it would be worthwhile for municipalities, developers and utilities to work together with the OEB to update the deposit system.

EV READINESS AND PARKING MINIMUMS – WHAT’S THE CONNECTION?

In addition to municipal considerations regarding the advancement of EV Ready requirements, it would also be of value for municipalities to review their minimum parking requirements. Developers noted that there are several developments where the municipal minimum parking requirements result in the development overbuilding parking spots that then remain unsold. This increases costs for the developers and ultimately the property owners. There is a growing trend towards municipalities eliminating or reducing their parking minimums. This will be especially important for those developments that are sited close to well served transit routes or within a transit-oriented development/growth node. The City of Toronto serves as example of this effort, in that they recognized that parking minimums were resulting in overbuilt and unsold parking spots. The City of Toronto removed parking minimums, while moving their EV Ready requirements from 20% of parking spots to 100% of parking spots and moving their EV Ready requirements from their Green Standard/Site Plan authorities to Parking By-law authorities. It would be of significant value for municipalities to review parking requirement while they advance EV Ready requirements considerations. [This map](#) identifies municipalities that have updated their parking minimums.

EV READINESS AND AFFORDABILITY CONCERNS

The upfront capital cost concerns related to advancing EV Readiness before the market is asking for EV charging, was raised as a concern by many developers. They did acknowledge that the most cost-effective time to advance EV Readiness is at the time of construction, but because of the increased costs associated with parking spots (especially for parking spots within the MURB archetype) has resulted in significant concerns related to the cost implications of parking spots. The high costs of parking spots

within the MURB sector are likely part of the reason for the reduced market demand for parking spots. But unsold parking spots are also a result of changes in vehicle ownership trends and the attractiveness of developments in transit-oriented development locations, which are particularly prone to parking spot over builds and unsold spots.

Affordability concerns do not stem specifically from EV Ready requirements, it is simply that it can potentially exacerbate existing affordability concerns. Therefore, there is the need for education to the market on the value of securing EV Readiness at the time of construction and how this will reduce the need for future costly retrofits. In addition, it would also be of value to speak to the cost savings of being able to charge at home, thereby reducing the need for commercial EV charging (which is expected to be a more expensive charging option than at home charging).

This Primer presents the results of the EV Costing Study and Performance Requirements, summarizes the feedback received by the different stakeholder groups, and provides recommendations to enable municipalities to advance EV Ready requirements for new developments within their community. It is recognized that the focus on new developments does not address how municipalities can advance the EV Readiness of their existing building stock. This is an area requiring a significant future collective effort. It is believed that advancing the market for EV Readiness within new developments will have significant value in growing the EV charging market and will hopefully reduce costs of advancing EV charging within existing buildings. There are efforts taking place to support the MURB sector in particular to move from one-off EV charger installations towards more comprehensive EV Ready retrofits. It is recommended that municipalities review the below resources to gain more understanding of how they can advance the EV Readiness of their existing building stock.

- [Making Parking EV Ready: Requirements for New Construction & Incentives for Existing Buildings](#)

APPENDIX |



APPENDIX A: EV READY SCAN FOR ONTARIO MUNICIPALITIES

MUNICIPALITY	METRICS/ REQUIREMENTS	NOTES
AJAX	Going to Council in early 2022 with Ajax Green Standard: Tier 1 calls for 50% of dwelling units to have EV chargers or are EV ready. T2 is 75%.	
AURORA	No EV Ready Metrics/Requirements	
BRAMPTON	Will be going to Council in mid 2022 with update to Sustainability Metrics. Aiming to include EV ready requirements in update.	
BURLINGTON	Electric Vehicles: A voluntary metric of a minimum of 3% of parking spaces provide charging stations to accommodate electric vehicles and design additional areas to be EV conversion ready.	https://www.burlington.ca/uploads/92/
CALEDON	No EV Ready requirements at present. In the process of developing Green Standards	
CLARINGTON	An EV Plan has been developed for the Municipality of Clarington and was approved by Council in early 2022. Development of Green Standards is planned. Timeframe for green standards not finalized.	Clarington EV Plan
HALTON HILLS	Added in EV to Green Standards: Provide 5% of parking spaces or a minimum of 1 space with plug-ins for electric vehicles.	https://www.haltonhills.ca/en/your-government/resources/Documents/Green-Development-Standards-Checklist.pdf Green Standard as the mechanism to advance EV Readiness
KING	Menu Approach Green Standard in place: Minimum target: if parking in provided on-site, a minimum of 25% of parking spaces have the infrastructure for electric vehicle charging conduits.	King Green Standards Green Standard as the mechanism to advance EV Readiness

MUNICIPALITY	METRICS/ REQUIREMENTS	NOTES
KITCHENER	Using Zoning By-law 2019-051 to secure 20% (non-residential is 17.5%) of parking spaces required for multiple dwellings shall be designed to permit the future installation of electric vehicle supply equipment	Page 26 of https://cleanairpartnership.org/cac/wp-content/uploads/2022/02/Kitchener-ZBL-Section-5-Parking-Regulations.pdf Using Zoning Authorities to secure EV Ready requirements
MARKHAM	No EV Ready requirements at present. No EV ready metric in Sustainability Metrics.	
MISSISSAUGA	No EV Ready requirements at present. In the process of developing green standards but looking to bring EV ready requirements into parking by-law.	
NEWMARKET	No EV Ready requirements at present	
OAKVILLE	No EV Ready requirements at present	
PICKERING	Pickering in the process of developing their green standard. Aiming to have EV ready metric in green standard.	
RICHMOND HILL	No EV ready requirements at present.	

APPENDIX A: EV READY SCAN FOR ONTARIO MUNICIPALITIES

MUNICIPALITY	METRICS/ REQUIREMENTS	NOTES
TORONTO	<p>Ev Ready Requirements Were Previously In The Tgsv3: Aq 1.3 Electric Vehicle Infrastructure Design The Building To Provide 20 Per Cent Of The Parking Spaces With Electric Vehicle Supply Equipment (Evse). The Remaining Parking Spaces Must Be Designed To Permit Future Evse Installation (Conduit). T2 Of V3 Was 25%. In Mid 2021 The Tgsv4 Approved An Increase To 25% Ev Ready For Tier 1.</p> <p>Toronto In Late 2021 Moved To Using Zoning By-Law Authorities. City Council Directed The Chief Planner And Executive Director, City Planning To Revise The Performance Measures For Electric Vehicle Requirements In The Toronto Green Standard Version 4 In Accordance With The Revised Zoning By-Law. Toronto Is Planning On Moving Towards 100% Ev Ready As The New Ev Ready Requirement As Was Identified In The Ev Strategy. The Ev Ready Requirements Were Advanced While Toronto Was Also Reviewing Minimum Parking Requirements.</p>	<p>Toronto Council Report: Recommended Parking Requirements for New Development</p> <p>EV Ready Requirements in Toronto Green Standard</p> <p>Toronto Electric Vehicle Strategy</p> <p>Toronto was previously using the Toronto Green Standard to secure EV Ready requirements but are in the process of transferring their EV Ready requirements into their parking by-law authorities</p>
VAUGHAN	No EV Ready Metrics/Requirements	
WATERLOO	Will be going to Council in mid 2022 with update to Sustainability Metrics. Aiming to include EV ready requirements in update.	<p>Page 151 of https://www.waterloo.ca/en/government/resources/Documents/Zoning-bylaw/Zoning-Bylaw-2018-050.pdf</p> <p>Using Zoning Authorities to secure EV Ready requirements Amendment: https://www.waterloo.ca/en/government/resources/Documents/Zoning-bylaw/General-amendments/2020-061-to-modify-regulations-pertaining-to-electric-vehicle-parking.pdf</p>

MUNICIPALITY	METRICS/ REQUIREMENTS	NOTES
<p>WHITBY</p>	<p>Using Whitby Green Standard to advance EV readiness of new builds. No mandatory requirements in Tier 1 of WGS. Tier 2 is: At least 20% of parking spaces are equipped with electric vehicle charging stations. Tier 3: At least 20% of parking spaces are equipped with electric vehicle charging stations. All remaining spaces are designed to enable future charging station installation. Tier 4:</p> <p>At least 30% of parking spaces are equipped with electric vehicle charging stations. All remaining spaces are designed to enable future charging station installation.</p>	<p>https://www.whitby.ca/en/work/whitby-green-standard.aspx</p> <p>Whitby has used their Green Standard as the mechanism to advance EV Readiness</p>

APPENDIX B: EV READY REQUIREMENTS IN OTHER CANADIAN JURISDICTIONS

JURISDICTION	RESIDENTIAL	COMMERCIAL
City of Toronto, ON	100% EV Ready	25% EV Ready
Province of Quebec	100% EV Ready (single family)	
Ville de Laval, QC	50% EV Ready	
City of Vancouver, BC	100% EV Ready	45% EV Ready
City of North Van, BC	100% EV Ready	45% EV Ready
City of Port Moody, BC	100% EV Ready	20% EV Ready
City of Surrey, BC	100% EV Ready	20% EV Ready
District of North Van, BC	100% EV Ready	20% EV Ready
District of Saanich, BC	100% EV Ready	Varies, ~5% EV Ready
City of Victoria, BC	100% EV Ready	5% EV Ready
Town of View Royal, BC	100% EV Ready	~5% EV Ready
City of Richmond, BC	100% EV Ready	
City of Burnaby, BC	100% EV Ready	
City of New West, BC	100% EV Ready	
District of Squamish, BC	100% EV Ready	
City of Coquitlam, BC	1 EV Ready / dwelling	
District of West Van., BC	100% EV Ready	
Township of Langley, BC	1 EV Ready / dwelling	
City of Nelson, BC	1 EV Ready / dwelling	10% EV Ready

APPENDIX C: CITY OF TORONTO BY-LAW 89-2022

Authority: Planning and Housing Committee Item PH29.3,
adopted as amended, by City of Toronto Council on
December 15, 16 and 17, 2021

CITY OF TORONTO
BY-LAW 89-2022

Whereas Council of the City of Toronto has the authority to pursuant to Section 34
of the Planning Act, R.S.O. 1990, c. P. 13, as amended, to pass this By-law; and

Whereas Council of the City of Toronto has provided adequate information to the
public and has held at least one public meeting in accordance with the Planning
Act.

The Council of the City of Toronto enacts:

Full By-law available [here](#). EV Ready sections provided below:

2. Zoning By-law 569-2013, as amended, is further amended by adding new
definitions in Chapter 800.50 (233) for energized outlet and (413) for Level 2
charging so that they read:

Energized Outlet means a connected point in an electrical wiring installation
at which current is taken to supply utilization equipment for electric vehicle
charging.

Level 2 Charging means a Level 2 electric vehicle charging level as defined by
SAE International's J1772 standard, as amended.

12. Zoning By-law 569-2013, as amended, is further amended by adding to
Regulation 200.5.1.10(2) a new subsection (E), so that it reads:

(E) Equipment for the charging of one electric vehicle is permitted within a
parking space, subject to the equipment being located in the same parking
space as the vehicle to be charged and:

(i) being within 0.25 metres of two adjoining sides of the parking space which are not adjacent and parallel to a drive aisle from which vehicle access is provided, measured at right angles; or

(ii) being at least 5.35 metres from a drive aisle from which vehicle access is provided, measured at right angles, and at least 1.0 metre from the ground.

17. Zoning By-law 569-2013, as amended, is further amended by adding to Clause 200.5.1.10 a new regulation (14), so that it reads:

(14) Electric Vehicle Infrastructure

Parking spaces must be equipped with an energized outlet, which is clearly marked and identified for electric vehicle charging, in accordance with the following:

(A) all residential parking spaces provided for dwelling units located in an apartment building, mixed use building, "multiple dwelling unit building", detached house, semi-detached house, townhouse, duplex, triplex, fourplex, or for a secondary suite or laneway suite, excluding visitor parking spaces, must include an energized outlet capable of providing Level 2 charging or higher to the parking space; and

(B) in cases other than those set out in (A) above, 25 percent of the residential and non-residential parking spaces in a building must include an energized outlet capable of providing Level 2 charging or higher.

APPENDIX D: ELECTRICITY DISTRIBUTION INFRASTRUCTURE SYSTEM

1) Section 3.2 of the [Distribution System Code](#) discusses expansions of electrical distribution infrastructure.

S. 3.20 discusses the deposits that a distributor can require from customer:

- 100% of present value of the forecasted revenues, in the case where a capital contribution* from the customer is required
- Up to 100% of present value of the forecasted revenues, in the case where a capital contribution from the customer is not required

* Per s. 3.2.4: "The capital contribution that a distributor shall charge an embedded distributor or a customer other than a generator to construct an expansion shall be equal to that customer's share of the difference between the present value of the projected capital costs and on-going maintenance costs for the facilities and the present value of the projected revenue for distribution services provided by those facilities.

S. 3.23 describes how deposits will be returned to the customer:

"the distributor shall annually return the percentage of the expansion deposit in proportion to the actual connections (for residential developments) or actual demand (for commercial and industrial developments) that materialized in that year (i.e., if twenty percent of the forecasted connections or demand materialized in that year, then the distributor shall return to the customer twenty percent of the expansion deposit). This annual calculation shall only be done for the duration of the five-year customer connection horizon. If at the end of the customer connection horizon the forecasted connections (for residential developments) or forecasted demand (for commercial and industrial developments) have not materialized, the distributor shall be allowed to retain the remaining portion of the expansion deposit."

