



INFRASTRUCTURE & ENVIRONMENTAL SERVICES COMMITTEE AGENDA

Thursday, June 23, 2022 at 9:00 a.m.

By video conference – The meeting will be live streamed on YouTube at the following link: <https://www.youtube.com/channel/UCCx9vXkywflJr0LUVkKnYWQ>

Land Acknowledgement Statement

We would like to begin by respectfully acknowledging that Dufferin County resides within the traditional territory and ancestral lands of the Tionontati (Petun), Attawandaron (Neutral), Haudenosaunee (Six Nations), and Anishinaabe peoples.

We also acknowledge that various municipalities within the County of Dufferin reside within the treaty lands named under the Haldimand Deed of 1784 and two of the Williams Treaties of 1818: Treaty 18: the Nottawasaga Purchase, and Treaty 19: The Ajetance Treaty.

These traditional territories upon which we live and learn, are steeped in rich Indigenous history and traditions. It is with this statement that we declare to honour and respect the past and present connection of Indigenous peoples with this land, its waterways and resources.

Roll Call

Declarations of Pecuniary Interest by Members

PUBLIC QUESTION PERIOD

To submit your request to ask a question, please contact us at info@dufferincounty.ca or 519-941-2816 x2500 prior to 4:30 p.m. on June 22, 2022.

DELEGATION

1. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #1
Dufferin Solar Power Inc.

A delegation from Jeff Hammond, Senior Vice President, and Dan Bernhard,

Infrastructure & Environmental Services Committee Agenda – June 23, 2022

Operations Manager, Longyuan Power o/a Dufferin Solar Power Inc., regarding a land lease proposal for the development of a utility-scale solar and energy storage system.

REPORTS

2. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #2
County Owned Land 195620 Amaranth-Grand Valley Townline - Future Considerations

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to inform Committee and Council on the opportunities currently being explored for the County-owned property located at 195620 Amaranth-Grand Valley Townline and to seek approval to continue to investigate opportunities for the property.

Recommendation:

THAT Report, County Owned Land 195620 Amaranth-Grand Valley Townline - Future Considerations, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be directed to develop a master plan for the property and explore other possible uses for the site and return to committee with recommendations on how to proceed.

3. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #3
Climate Change – Advancing Adaptation Project Update

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to provide an update to Committee and Council on the County's progress in the Advancing Adaptation program.

Recommendation:

THAT Report, Climate Change - Advancing Adaptation Project Update, dated June 23, 2022, from the Director of Public Works/County Engineer, be received.

4. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #4
Regional Electric Vehicle Charging Network Strategy – Summary Report

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to

update Committee and Council on the completion of the Regional Electric Vehicle Charging Station Network Strategy.

Recommendation:

THAT Report, Regional Electric Vehicle Charging Network Strategy – Summary Report, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be approved to continue to work with the partnership to determine the next steps regarding implementing the Strategy.

5. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #5
Residential Energy Retrofit Pilot Program Design

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to provide Committee and Council with a proposed design for a third-party delivery model of a residential energy retrofit pilot program and to seek approval to move the program forward.

Recommendation:

THAT Report, Residential Energy Retrofit Pilot Program Design, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be directed to continue working with the BetterHomes Ontario Consortium as third-party delivery agent of a residential energy retrofit program;

AND THAT staff be directed to proceed with the next phase of the program to determine the financial model for program delivery and report back with recommendations to support Dufferin's application to the FCM CEF Capital and Grants Stream.

6. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #6
Mono Centre No Parking and Community Safety Zone

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to seek approval to amend a no parking zone and to include a community safety zone on Dufferin Road 8 for Mono Center in the Consolidated Traffic By-law 2005-32.

Recommendation:

THAT Report, No Parking and Community Safety Zone -Mono Centre, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT the Consolidated Traffic By-Law 2005-32, be amended, to include the following:

Schedule A – No Parking

Dufferin Rd.	From	To
8	A point at the Mono Centre intersection	A point situated 260 m south of the Mono Centre intersection
8	A point 130 m east of Mono Centre intersection	A point 170 m east of 3 rd Line Mono

Schedule I – Community Safety Zones

Dufferin Rd.	From	To
8	A point situated 250m South of the Mono Centre intersection	A point situated 380m east of the Mono Centre intersection.

7. **INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #7**
Orangeville West Environmental Assessment (EA)

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to update Committee and Council with respect to ongoing work related to the Orangeville West Environmental Assessment (EA).

Recommendation:

THAT Report, Orangeville West Environmental Assessment, from the Director of Public Works/County Engineer, dated June 23, 2022, be received.

8. **INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #8**
Dufferin Courthouse – Historic Courtroom Repairs Update & Costing

A report from the Director of Public Works/County Engineer, dated June 23, 2022, to inform Committee and Council of the architectural investigation results, repair

recommendations, and opinion of cost to restore the aged plaster and moulding within the historic Courtroom 204 of the County Courthouse.

Recommendation:

THAT Report, Dufferin Courthouse – Historic Courtroom Repairs Update and Costing, dated June 23, 2022, from the Director of Public Works/County Engineer, be received.

9. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #9
Strategic Action Plan Progress Update – IES Objectives

A report from the Chief Administrative Officer, dated June 23, 2022, to provide committee members with a progress update of the strategic objectives that fall within the oversight of the Infrastructure and Environmental Services Committee and to provide additional detail on the actions planned to achieve those objectives.

Recommendation:

THAT the report of the Chief Administrative Officer, regarding the Strategic Action Plan – IES Objectives, dated June 23, 2022, be received.

CORRESPONDENCE

10. INFRASTRUCTURE & ENVIRONMENTAL SERVICES – June 23, 2022 – ITEM #10
Township of Mulmur Resolution

A resolution from the Township of Mulmur, dated June 7, 2022, to encourage all Dufferin municipalities to join the Ontario Climate Caucus.

Recommendation:

THAT the resolution from the Township of Mulmur, dated June 7, 2022, encouraging all Dufferin municipalities to join the Ontario Climate Caucus, be received.

Next Meeting

Thursday, August 25, 2022 at 9:00 a.m.
Video Conference



Land Lease Proposal to Dufferin County for the Dufferin Solar Farm

Grand Valley, Ontario

2022

A proposal to lease Dufferin County's 189 acres of land located in Grand Valley, Ontario for the development of a utility-scale solar and energy storage system.

Dufferin Solar Power Inc.
40 King Street West, Suite 5101
Toronto, Ontario M5H 3Y2



Executive Summary

After years of strong supply, Ontario is entering a period of emerging electricity system needs, driven by increasing demand, the retirement of the Pickering nuclear power plant, the refurbishment of other nuclear generating units, as well as expiring contracts for existing generating facilities.

Recognizing the necessity to address these needs in a timely manner, Ontario's Independent Electricity System Operator (the "IESO") has announced the first three procurements of a series of expected long-term procurements to satisfy upcoming reliability needs. The first procurement is an expedited procurement process for 1,000 MW of new electricity resources able to commit to commercial operation by 2025 (the "Expedited Process"). The next procurement is the IESO's first Long-Term Request for Proposals (the "LT1 RFP") for up to 2,500 MW of capacity from new resources starting by 2027 or earlier. Following this, the IESO intends to launch the second long term procurement (the "LT2 RFP") for up to 1,500 MW of new generation for delivery starting in 2028/2030. Additional rounds of procurement are expected to be announced thereafter.

To help meet this growing demand for new electricity resources, Dufferin Solar Power Inc. respectfully requests to lease Dufferin County's approximate 189 acres of land near the Junction of Highway 89 and Amaranth East Luther Townline in Grand Valley for the purpose of building a utility-scale solar and energy storage facility.

The proposed facility would consist of a ground-mounted solar panel array, inverters, a battery storage system and a project substation that would connect to the Ontario electricity grid using Dufferin Wind Power's existing transmission line which is connected to Hydro One's Orangeville Transformer station. The project would use the 500W to 600W class of solar panels to maximize production and efficiencies and the battery system is expected to offer a minimum 4 hour discharge capacity; which is an IESO requirement.

Development of the project will be subject to approvals from the Town of Grand Valley, the Township of Amaranth, Dufferin County and regional and provincial authorities.

Under the proposed land lease, Dufferin Solar Power Inc. would pay Dufferin County \$500 per acre per year during the project's construction and operational periods. This would equate to a lease payment of approximately \$94,500 per year for Dufferin County. With proposed CPI adjustments, Dufferin County would receive approximately \$2M in land lease payments by the end of the first operational period and over \$4M in land lease payments over the lifetime of the lease.

The "Dufferin Solar" project would also bring additional and significant long term benefits to Dufferin County and local communities in the form of additional property taxes, economic development and job creation and would also contribute to Dufferin County's Climate Action Plan goals.

We would like to thank you for your consideration of this proposal. The enclosed information provides a brief overview of the proposed project, the anticipated development and procurement schedules, and a draft land lease for your consideration. We would like to determine if a lease agreement could be reached at your earliest opportunity in order to meet the IESO's upcoming procurement schedule. Thank you.



Project Proponent

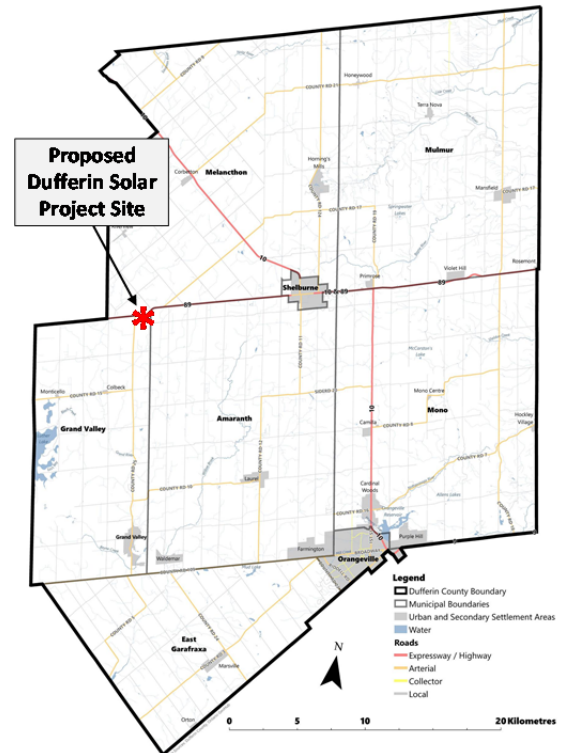
Longyan Canada Renewables Ltd (“LCR”) is the owner/operator of the Dufferin Wind Farm in Melancthon, Ontario. In 2014, LCR invested over \$275M in Dufferin County to develop the Dufferin Wind Farm and we are grateful to be a part of the community. Since being placed into service, the Dufferin Wind Farm has contributed over \$2M in property taxes, over \$1.8M in community benefits and over \$6.8M to local farms and families. We would like to build upon this success and contribute further to Dufferin County and its local communities. We have the experience, the capabilities and the capital resources needed to make the proposed solar project a success and to bring its significant, long term benefits to Dufferin County. The “Dufferin Solar” project would be developed under the project company: Dufferin Solar Power Inc.

Proposed Location

The proposed project would be located on Dufferin County’s land located in the northeast corner of Grand Valley, approximately 15 km north of the Town of Grand Valley and 11 km west of the Town of Shelburne. The proposed project location consists of approximately 76.4 hectares (189 acres) and is contained within an area bounded on the north by Highway 89, Concession Road 12 to the south, Amaranth East Luther Townline to the east, and Highway 25 to the west.

Project Description

The project would consist of a fixed or single-axis tracking, ground-mount, solar panel array that would convert solar energy into electricity. The Direct Current (DC) electricity generated from the panels would be collected and converted into Alternating Current (AC) electricity by inverters, which would be contained in several Medium-Voltage (MV) stations located throughout the project site. The AC voltage would be “stepped-up” to 34.5 kV through transformers at the MV stations and then connected to a main High Voltage (HV) transformer station where the voltage would be “stepped-up” again to 230 kV for connection to the electricity grid.



The project would be connected to the Ontario electricity grid using the existing Dufferin Wind transmission line which has available capacity and is already connected to the Hydro One Orangeville Transformer Station.

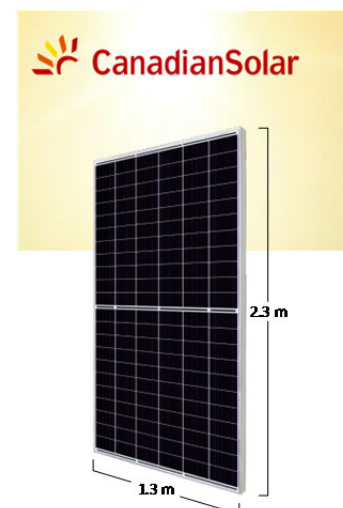
A Battery Energy Storage System (“BESS”) would be installed on site and would be charged by the solar array. The battery system would dispatch its’ stored energy when the IESO needs the additional power to support grid operations; usually during periods of high demand. Once discharged, the battery system would be recharged and prepared for the next time that the IESO requires additional capacity.



Project Size and Layout

The project's final size and layout would be determined during the design & engineering phase of the development process however, based on an updated assessment the project could be approximately 36 MWac (+/-) in size and the battery storage system would provide between 4 to 8 hours of discharge capacity.

The ground-mounted racks that the solar panels would be mounted to would be installed in rows that are approximately 6 m to 10 m apart in a north-to-south orientation. The ground-mounted racks would be installed using standard piles, helical piles or ground screws to anchor the racks to the ground. The final anchoring solution will be determined during the design & engineering phase and after geotechnical investigations of the site are completed. Solar panels would then be mounted on the racks and connected in "strings".



Example 600W Class Solar Panel

The output from the solar panel "strings" would be transported by the DC collection system to Medium Voltage ("MV") inverter stations that would be located throughout the solar array. Each MV station would include one or more inverters, control and monitoring equipment and a step-up transformer.

The inverters would convert the solar panel's DC voltage to AC voltage and the step-up transformers would raise the voltage to 34.5 kV. Underground cables would transport the AC output to the project transformer station where the voltage would be stepped-up to 230 kV to connect to the Hydro One transmission system.



Example Medium Voltage (MV) Station

A small control building, similar in appearance and size as the medium voltage stations would be installed on-site to house the Supervisory Control and Data Acquisition (SCADA) system and other control and monitoring equipment. A communications tower may also be installed for an operations link to Hydro One.

New gravel access roads would be utilized to access the panel arrays and medium voltage stations within the project site. These roads would comply with the project's stormwater management plan and the number of internal access roads would be kept to a minimum. The access roads would be approximately 6 m wide and constructed as appropriate for the project location and final design. Temporary access roads and laydown areas may be required to support construction and delivery of equipment.

Collection lines would generally follow the internal access roads and connect the solar panel arrays to the medium voltage stations. The medium voltage stations would then be connected to the project substation. The battery storage system would be collocated with the solar panels or the project substation. Standard security lighting and perimeter fencing would be installed for public safety and security.

Overgrown areas of the project site would be cleared and grubbed and areas that required additional drainage would be either tiled and/or graded to better utilize municipal drains.



Project Development & Permitting

Development of the project is subject to approval by the Town of Grand Valley, the Township of Amaranth, Dufferin County and numerous provincial authorities. The project will also require approvals from the Grand River and Nottawasaga Valley Conservation Authorities.

The primary permit for solar farms in Ontario is the Renewable Energy Approval or “REA” which is issued by the Ministry of the Environment, Conservation and Parks (MECP). Both the MECP and the IESO require that proposed projects have Resolutions of Support from the host municipalities. The project is also required to consult with affected First Nations and Metis.

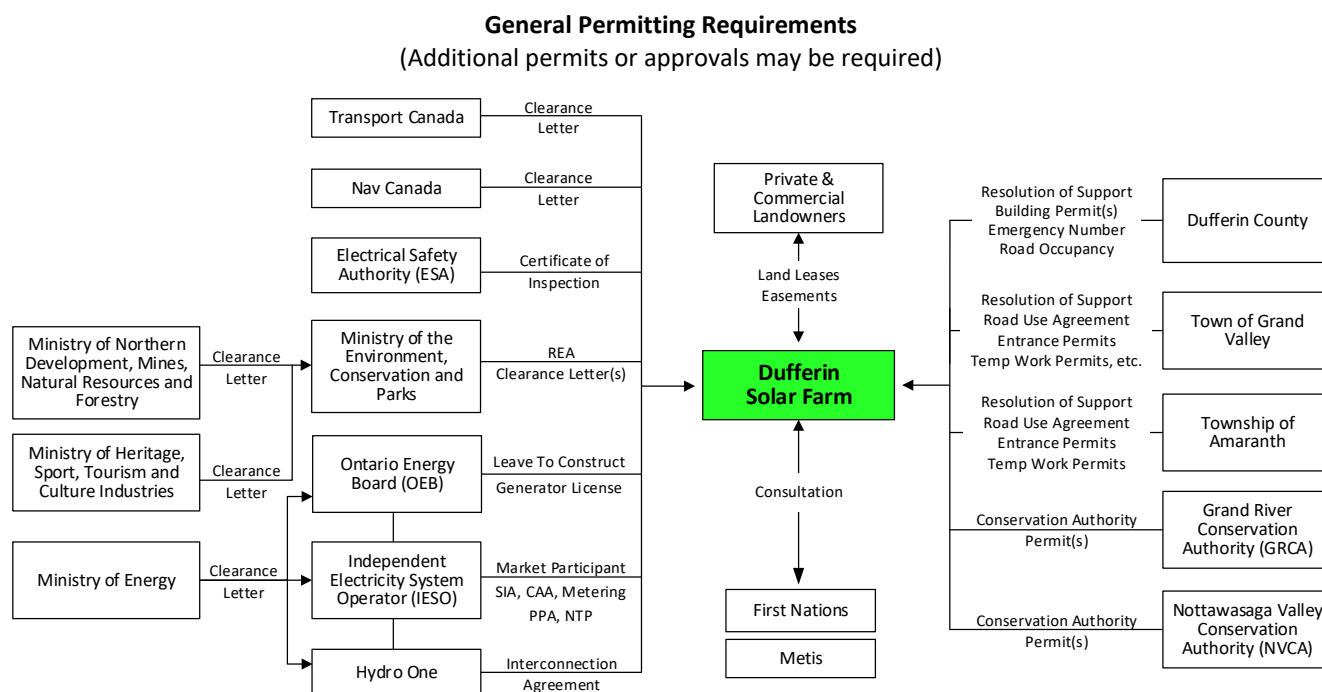
The REA requires a comprehensive review of the project as well as extensive public consultation. Site investigations and seasonal studies that are required by the REA process require 1 to 2 years to complete and the overall REA process, along with other provincial and municipal permits and approvals may require up to 36 months or more to complete.

The REA process requires projects to consult with the public and other project stakeholders on an ongoing basis throughout the development process. A key requirement of the REA application is the project’s consultation report which records and documents this important work. Additional studies and reports that are required in the REA application, and that will be made available to the public, include:

Project Description Report	Consultation Report
Project Information	Stakeholder Consultation
Project Components	Municipal Consultation
Project Activities	Indigenous Consultation
Regulatory Framework	Agency Consultation
Potential Environmental Effects	Communications & RF Consultation
	NAV CANADA Consultation (NOTAM)
Construction Plan Report	Environmental Impact Study (EIS)
Archeological Assessment	Project Activities
Cultural Heritage Assessment	ANSI, Life Science
Design and Operations Report	Wetlands
Noise Assessment	Woodlands
Environmental Effects Monitoring Plan	Wildlife Habitat
Emergency Response and Communications Plan	Water Assessment Report
Post-Construction Monitoring Plan	
Natural Heritage Assessment	Decommissioning Plan Report
Records Review	Visual Impact Assessment Report
Site Investigations	Landscape Screening Plan (if required)
Evaluation of Significance	
Environmental Impact Study (EIS)	
Property Line Setback Assessment	Other Site Studies as required
Waterbody Report	



A summary diagram showing the comprehensive nature of the permitting and consultation requirements and the overall approval process can be found below.



Operations and Decommissioning

The proposed project would be required to operate for an initial 20-year period under the IESO contract. At the end of this “First Operational Term”, Dufferin Solar Power Inc. would either “repower” the facility and contract with the IESO again or decommission the project and restore the site to a clean and safe condition.

At the time of decommissioning, after the solar facility has been disconnected from the electricity grid and all electrical components have been disconnected, components will be dismantled and removed for reuse or recycling. Solar panels, racks, piles, concrete pad foundations, cables, transformer stations and perimeter fencing would all be removed. Access roads would also be removed unless the landowner requested that they remain to support future land use. All compacted areas would be tilled in a manner adequate to restore the sub-grade material to the proper density and depth, consistent with the surrounding field. Clean, compatible sub-grade material, followed by topsoil would be applied as necessary.

Decommissioning would be undertaken by licensed subcontractors using similar techniques and equipment as those employed during construction. Mitigation measures similar to those employed during the construction phase of the Project will be implemented to minimize potential disturbance (e.g. erosion/sedimentation) to the site and adjacent natural features.

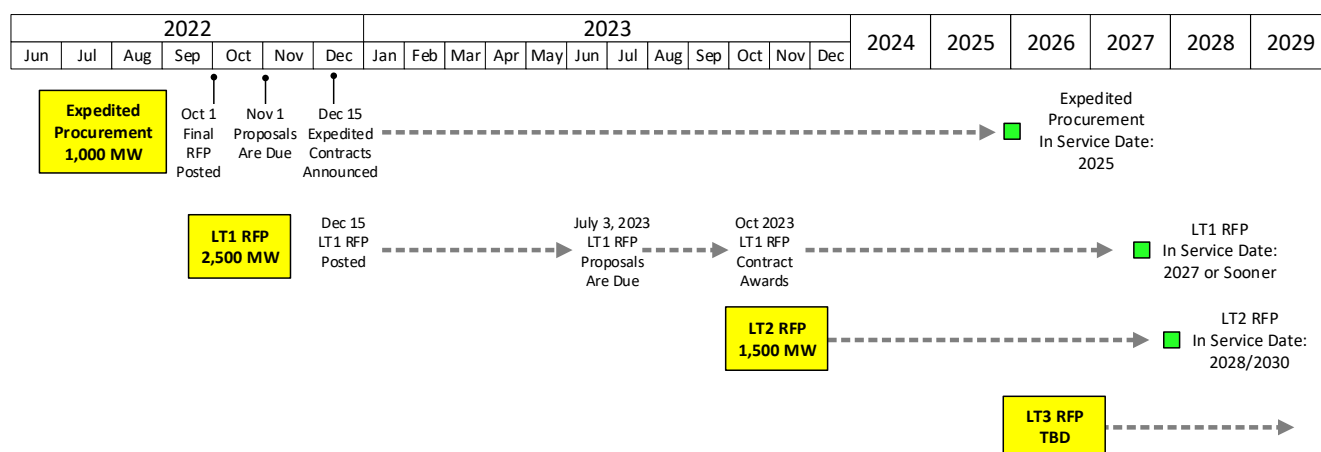
Decommissioning of the project would follow the standards of the day. Decommissioning activities may also require permits from local municipalities and provincial agencies, which are expected to be similar to those required during the construction phase of the project. Dufferin Solar Power Inc. would obtain these permits prior to decommissioning.



Ontario Procurement Schedule

The IESO has already announced three procurements for new resources and intends to announce additional procurements thereafter. The bidding opportunities are expected to continue well into 2030. The announced procurements include:

- The first procurement, designated as the “*Expedited Process*” will procure up to 1,000 MW of new capacity to be placed into commercial service by 2025.
- The second procurement, designated as the “*Long Term 1 RFP*” (“LT1 RFP”) will procure up to 2,500 MW to be placed into service on or before 2027.
- The third procurement, designated as the “*Long Term 2 RFP*” (“LT2 RFP”) is expected to procure up to 1,500 MW to be placed into service in the 2028/2030 time period.



Project Schedule

Development of the proposed project will require approximately thirty-six months to complete. During the development period, Dufferin Solar Power Inc. would complete the necessary site investigations, public consultations, design & engineering and permitting work. During this time period, Dufferin Solar Power Inc. would only need to access Dufferin County’s land occasionally for short-term seasonal site investigations (e.g. birds, bats, fauna, etc.), land surveys and general planning. The majority of this work would be scheduled to minimize any impact to current tenant farming operations and Dufferin Solar Power Inc. would pay for any crop damages that it caused. Dufferin County would have full use of the land during this time.

Construction is estimated to require approximately nine months once started and construction activities would normally run from May thru December of the construction year. Dufferin Solar Power Inc. would provide Dufferin County with advanced notice of the start of construction so that tenant farming operations can smoothly transition off the land at the appropriate time.

At the end of the project’s life, decommissioning is expected to take up to 18 months to depower, remove project components for reuse or recycling and to restore the land.

Proposed Land Lease

Dufferin Solar Power respectfully requests to lease Dufferin County’s approximate 189 acres located in Grand Valley for the purpose of building the proposed solar and energy storage facility. The proposed lease is enclosed for your reference. The lease terms and conditions are summarized in the table below and reflect the IESO procurement schedule, the requirements of the IESO contract and the standard stages of the project’s lifecycle as outlined above.



The terms and conditions of the proposed land lease include:

Term	Duration	Rent
Development Term	Up to seven years or upon start of construction; whichever is sooner	\$10/acre/year
Construction Term	Estimated 9 Months	\$500/acre/year
First Operational Term	20 years from COD	\$500/acre/year*
Second Operational Term	20 years	\$500/acre/year*
Decommissioning Term	18 Months	\$500/acre/year
*Operational Rent increased by a CPI Adjustment every 5 th year		
Tenant pays Rent in advance at the first of each year + applicable HST		
Tenant pays all property tax attributable to the Solar/Energy Storage Project		
Tenant pays Landowner for any crop damages that it causes prior to construction		
Tenant pays Landowner's reasonable legal expenses to negotiate land lease/agreements		

During the development period, Dufferin Solar Power Inc. would pay Dufferin County a “Development Term Rent” of \$10 per acre per year and would invest the resources and capital to develop and bid the project. Dufferin County would have full use of its land during this time, including continued tenant farming.

During the construction period and the operating periods, Dufferin Solar Power Inc. would pay Dufferin County \$500 per acre per year in rent. The Operational Term Rent amount would be escalated by CPI every 5th year.

Assuming 189 leased acres and a conservative CPI adjustment of 2.0%, it is estimated that as the Landlord, Dufferin County would receive:

- Approximately \$94,500 per year during construction and the First Operational Term (Approx. \$2M)
- Approximately \$102,000 per year during the Second Operational Term (Approx. \$2.1M)
- Approximately \$166,000 for the 18 month decommissioning term, and
- Overall, approximately \$4.3M in total land lease payments over the lifetime of the lease

Dufferin County would also have the opportunity to participate as a minority investor if it so desired.

SOLAR AND ENERGY STORAGE FACILITIES LAND LEASE

THIS LEASE made this _____ day of _____, 2022 (the “**Effective Date**”).

B E T W E E N:

THE CORPORATION OF THE COUNTY OF DUFFERIN

(the “**Landlord**”)

OF THE FIRST PART

- AND –

DUFFERIN SOLAR POWER INC.

(the “**Tenant**”)

OF THE SECOND PART

1. Definitions

In this Lease, the following capitalized terms will have the following meanings:

- | | | |
|-----|---|--|
| 1.1 | “Business Day” | any day other than a Saturday, Sunday or statutory holiday in the Province of Ontario. |
| 1.2 | “Commercial Operation Date” | the date that the Solar Energy System on the Premises delivers electricity, other than electricity delivered for the purposes of facilities testing, to the Ontario interconnected electric system pursuant to an IESO dispatch or directive. |
| 1.3 | “Construction Commencement Date” | the date that construction of the Solar Energy System on the Premises has begun. For clarity, environmental assessment and permitting work, site investigations, installation of solar met stations, archaeological work, including tractors, geotechnical testing equipment, and other machinery associated with the assessment and permitting process does not trigger the Construction Commencement Date. |
| 1.4 | “HST” | harmonized sales tax payable pursuant to |

- the *Excise Tax Act* (Canada).
- 1.5 **“Landlord”** The Corporation of the County of Dufferin
- 1.6 **“Landlord’s Address”** 55 Zina St
Orangeville, ON L9W 1E5
- Attention: County Clerk
- Telephone: (519) 941-2816
Facsimile: (519) 941-4565
E-mail: clerk@dufferincounty.on.ca
- 1.7 **“Landlord’s Proportion”** the ratio of the area of the Premises to the area of the lands leased by the Tenant in the Solar Energy Project Area.
- 1.8 **“Lease”** this land lease, including all Schedules attached hereto, as the same may be amended, extended modified or supplemented from time to time; and, unless otherwise indicated, references to Sections and Schedules are to Sections and Schedules of this Lease.
- 1.9 **“Lease Year”** means each of the consecutive periods of twelve (12) months commencing on January 1 and ending on December 31 comprising the Term of this Lease, excepting the first Lease Year which shall commence on the Effective Date and end on December 31 of that same calendar year and the last Lease Year which shall commence on January 1 and end on the expiry or termination of the Term.
- 1.10 **“Party”** refers to Landlord or Tenant and **“Parties”** refers to Landlord and Tenant, collectively.
- 1.11 **“Premises”** those lands and premises municipally described as PIN 34058-0017, 34058-0018, and 34160-0088 and more fully described and identified in Schedule A attached hereto, and having a total area of approximately 189.71 acres. Once the

Tenant has completed the construction of the Solar Energy System on the Premises, the Tenant will amend the description of the Premises from what is identified on Schedule A and used to calculate rent to reflect the as-built location of the Solar Energy System on the Premises. For greater certainty, the Tenant shall have the right, at any time during the Term, to amend the description of the Premises by providing to Landlord a sketch or an amended plan of survey (the “**Plan**”) which identifies the amended description of the Premises that is being demised and leased to the Tenant. Upon the delivery by the Tenant to Landlord of the Plan, the description of the Leased Lands, as set out in Schedule A and used to calculate rent, shall automatically be replaced by the amended description of the Leased Lands as set out in the Plan, without the requirement of any further action on behalf of either Tenant or Landlord. The Landlord shall, at the request of the Tenant, execute a lease amendment which sets out the amended description of the Premises in accordance with the Plan.

1.12 **“Solar Energy Project Area”**

means the area comprising the Premises and any adjacent or nearby lands in which the Tenant has rights or interests which are designated as the Solar Energy Project Area for the purpose of this Lease by the Tenant acting reasonably as such may be modified by the Tenant from time to time.

1.13 **“Tenant”**

Dufferin Solar Power Inc.

1.14 **“Tenant’s Address”**

40 King Street West, Suite 5101
Toronto Ontario M5H 3Y2

Attention:

Telephone:

Facsimile:

Email:

2. Lease of Premises

In consideration of the payments and covenants herein contained, Landlord hereby grants, demises and leases unto Tenant, and Tenant hereby leases from Landlord, the Premises for Tenant's exclusive use, on the terms and conditions expressed in this Lease.

3. Term

The term of this Lease (the "**Term**") shall be comprised of the following:

3.1 Development Term

This Lease shall be for an initial term commencing on the Effective Date and expiring on the earlier of:

- (i) the seventh (7th) anniversary of the Effective Date; and
- (ii) the Construction Commencement Date,

such term being referred to as the "**Development Term**". Notwithstanding anything to the contrary, in the event the Tenant exercises its right and option set out in Section 3.2, the Development Term shall end on the date on which the Construction Term (defined below) commences.

3.2 Construction Term

The Tenant shall have the right and option, but not the obligation, to extend the term of this Lease for a period commencing on the Construction Commencement Date and expiring on the Commercial Operation Date (such term being referred to as the "**Construction Term**").

The Tenant may exercise its option to commence the Construction Term hereunder by delivering to the Landlord, at least sixty (60) days prior to the Construction Commencement Date, written notice of such extension, and notifying the Landlord therein that the Tenant will commence constructing the Solar Energy System on the Premises on the Construction Commencement Date, and the Construction Term shall commence (and the Development Term shall end) upon such date (which date shall, in any event, not be later than the expiration of the Development Term).

3.3 First Operational Term

The Tenant shall have the right and option, but not the obligation, to extend the term of this Lease for a period not exceeding twenty (20) years (the "**First Operational Term**").

The Tenant may exercise its option to commence the First Operational Term hereunder by delivering to the Landlord written notice of such extension at any time prior to the expiry of the Construction Term and the First Operational Term shall commence

(and the Construction Term shall end) upon the date specified in such written notice (which date shall, in any event, not be later than the expiration of the Construction Term).

3.4 Second Operational Term

The Tenant shall have the right and option, but not the obligation, to extend the term of this Lease for a further period not exceeding twenty (20) years (the “**Second Operational Term**”, the First Operational Term and, if exercised, the Second Operational Term, shall be defined herein as the “**Operational Term**”).

The Tenant may exercise its option to commence the Second Operational Term hereunder by delivering to the Landlord written notice of such extension at any time prior to the expiry of the First Operational Term and the Second Operational Term shall commence upon the expiration of the First Operational Term.

4. Payments to Landlord

Tenant will pay Landlord, as rent, the following amounts:

4.1 Rent during Development Term

From the Effective Date and throughout the Development Term, Tenant will pay to Landlord in advance an annual rent of Ten Dollars (\$10.00) per acre of the Premises (the “**Development Term Rent**”), plus all applicable HST. The first annual payment of Development Term Rent will be payable within sixty (60) days following the Effective Date and, thereafter during the Development Term, the annual rent will be paid in advance within sixty (60) days following the beginning of each Lease Year. Development Term Rent will be pro-rated for any partial year calculated on a per diem basis, but if Tenant terminates the Lease, Landlord will be entitled to keep all Development Term Rent paid prior to termination of the Lease.

4.2 Rent during Construction Term

During each year of the Construction Term, Tenant will pay to Landlord an annual rent of Five Hundred Dollars (\$500.00) per acre of the Premises (the “**Construction Term Rent**”), plus all applicable HST. The Construction Term Rent for each applicable Lease Year will be paid in advance within sixty (60) days following the beginning of each such applicable Lease Year.

4.3 Rent during Operational Term

In the event the Tenant exercises its right and option to extend the term of this Lease as provided in Section 3.3 above, during each year of the Operational Term, Tenant will pay to Landlord an annual rent of Five Hundred Dollars (\$500.00) per acre of the Premises (the “**Operational Term Rent**”), plus all applicable HST. The Operational Term Rent for each applicable Lease Year will be paid in advance within sixty (60) days following the beginning of each such applicable Lease Year.

4.4 Increases in Operational Term Rent every Five Years

With effect from the fifth (5th) anniversary of the Commercial Operation Date, and on each fifth (5th) anniversary thereafter during the remainder of the Term, the amount of Operational Term Rent payable in accordance with Section 4.2 will be adjusted by the CPI Adjustment for that year. In this Section 4.4:

4.4.1 “**CPI**” means the Consumer Price Index (All items for Ontario, base year 2002 = 100) published by Statistics Canada (or by a successor or other governmental agency, including a provincial agency), or (b) if the CPI is no longer published, an index published in substitution for the CPI or any replacement index designated by Tenant with the consent of Landlord. If a substitution is required, Tenant will make the necessary conversions. If the base year for the CPI (or the substituted or replacement index) is changed by Statistics Canada (or by its successor or other governmental agency) Tenant will make the necessary conversions; and

4.4.2 “**CPI Adjustment**” means to multiply the Operational Term Rent described in Section 4.2 by a fraction, the numerator of which is the CPI on January 1 of the year in which the CPI Adjustment is to be made, and the denominator of which is the CPI on January 1st of the year during which the Commercial Operation Date occurs.

4.5 Crop Damage during Development Term

Landlord and Tenant acknowledge that, in exercising its rights hereunder during the Development Term and prior to the Construction Commencement Date, the Landlord shall be permitted to grow and harvest crops on the Premises. Notwithstanding the foregoing, the Tenant may interfere with Landlord’s ability to grow and harvest crops on the Premises, but that Tenant will have no obligation of any kind whatsoever to compensate Landlord for crop damage occurring after the commencement of the Construction Term. Accordingly, Tenant will pay Landlord, in addition to the Development Term Rent, compensation for crop damage occurring during the Development Term on the following basis:

4.5.1 in each year of the Development Term where Tenant is obliged to pay compensation, Tenant will pay to Landlord compensation for such crop damage or loss based on its fair market value. If Landlord and Tenant are unable to agree on the fair market value of the crops which were so damaged or lost, the fair market value of such crops shall be determined by a mutually agreed independent arm’s length crop appraiser or by arbitration in accordance with Section 45 if the parties cannot agree upon a crop appraiser;

4.5.2 if, on or before March 31st in any year during the Development Term, Tenant gives written notice to Landlord that it intends to commence construction of the Project, no compensation for crop damage will be payable for that year or any future years of the Term; and

4.5.3 if Tenant does not give Landlord the written notice to Landlord that it intends to commence construction of the Project on or before March 31st of that year and Tenant damages Landlord's crops, Tenant will compensate Landlord for the crop damage or loss Tenant caused in accordance with Section 4.5.1.

4.6 Payment of Rent.

Tenant will make rental payments payable to Landlord as set out in Section 1.5. and remit such payments to its address set out in Section 1.6 or as Landlord may otherwise direct by written notice to Tenant.

5. Use of Premises by Tenant

5.1 Permitted Uses.

This Lease is for solar energy conversion, for the collection, distribution and transmission of electric power in connection with the Project, and for related and incidental purposes and activities (collectively, "**Operations**"), including, without limitation:

- (a) conducting project viability assessments which include but are not limited to, studies of solar radiation, solar energy, soils, hydrology and other meteorological and geotechnical data including, placing testing equipment on the Premises for prolonged periods of time, and conducting environmental inspections, including drilling boreholes where appropriate;
- (b) constructing, reconstructing, erecting, installing, improving, replacing, relocating and removing from time to time, and maintaining, using, monitoring and operating, existing, additional or new (i) individual units or arrays of solar energy collection cells, panels, mirrors, lenses and related facilities necessary to harness sunlight for photovoltaic energy generation, including without limitation, existing and/or future technologies used or useful in connection with the generation and storage of electricity from sunlight and other sources, and associated support structure, braces, wiring, plumbing, and related equipment ("**Solar Energy Facilities**"), (ii) electrical transmission and distribution facilities, including without limitation, overhead and underground, distribution or collector lines, circuit breakers, meters, conduit, footings, towers, poles, crossarms, guy lines, anchors, cabling and wires, (iii) overhead and underground control, communications and radio relay systems, (iv) substations, interconnection and/or switching facilities and electric transformers and transformer pads located on or off the Premises, (v) energy storage facilities, (vi) solar energy measurement equipment, (vii) control buildings, control boxes and computer monitoring hardware, (viii) utility installation, (ix) safety protection facilities, (x) maintenance yards, (xi) roads and erosion control facilities, (xii) signs and fences, and (xiii) other improvements, fixtures, facilities, machinery and equipment associated or connected with the generation, conversion, storage, switching, metering, step-up, step-down, transmission, distribution, conducting,

sale or other use or conveyance of electricity (all of the foregoing listed in items (ii) to (xiii) shall include those systems, equipment and other related infrastructure located on or off the Premises and all of the foregoing together with the Solar Energy Facilities, shall be collectively a “**Solar Energy System**”);

- (c) removing, trimming, pruning, topping or otherwise controlling the growth of any tree, shrub, plant or other vegetation; dismantling, demolishing, and removing any improvement, structure, embankment, impediment, berm, wall, fence or other object, on or that encroaches over, under or into the Premises or that is located on other land owned by Landlord that is adjacent to, or abuts, the Premises that could obstruct, interfere with or impair the Solar Energy System or the use of the Premises intended by Tenant hereunder;
- (d) excavating, grading, leveling and otherwise modifying the Premises, all in Tenant’s sole discretion as Tenant may deem desirable or necessary in connection with the Project;
- (e) undertaking any other lawful activities, whether accomplished by Tenant or a third party authorized by Tenant, that Tenant determines are necessary, helpful, appropriate or convenient in connection with, incidental to or to accomplish any of the foregoing purposes; and
- (f) drilling, digging and excavating one or more wells on the Premises for the purposes of servicing, operating and maintaining the Solar Energy System. Tenant covenants and agrees to obtain any necessary permits required in connection with such wells. Upon the expiry, surrender or termination of this Lease, Landlord will either direct Tenant to leave any wells, created by Tenant, intact for Landlord’s ongoing use or to seal and decommission the wells.

5.2 Additional Uses.

The Parties acknowledge and agree:

- (a) that solar energy technologies are improving at a rapid rate and that it is probable that Tenant may (although Tenant will not be required to) replace from time to time existing Solar Energy Facilities on the Premises with newer models or designs for Solar Energy Facilities which have increased energy capture and efficiency. Tenant shall have the right to replace from time to time existing Solar Energy Facilities on the Premises without the consent of Landlord, provided the Landlord is provided with prior written notice of each such replacement;
- (b) this Lease includes the right of ingress to and egress from the Solar Energy System over, under, and along the Premises, will include the right of ingress to and egress from the Solar Energy System over, under, and along any existing roads and lanes thereon, and by such other route or routes as Tenant may construct on the Premises from time to time, for the benefit of and for purposes incidental to Operations on the Premises and to Solar Energy Systems that are developed, constructed and/or operated on the Premises, and on other property to

be acquired by leasehold, easement or by fee simple purchase, by or on behalf of Tenant, as a single integrated Solar Energy System to generate and deliver electrical power to purchasers of such power (the “**Project**”), and for the benefit of and for purposes incidental to Operations, activities and projects on lands other than the Premises; and

- (c) this Lease will include the right to conduct any and all Operations on the Premises, for the benefit of and for purposes incidental to Operations, activities and projects on lands other than the Premises which may be owned, leased or licensed by Tenant, including but not limited to, the right to (i) install and maintain on the Premises distribution lines and facilities, both overhead and underground, which carry electricity to and/or distribution or from such other lands, and (ii) install and maintain on the Premises communication lines and facilities, both overhead and underground, which carry communications to and/or from such other lands.

5.3 Exclusive Use.

Tenant will have the sole and exclusive right to convert all of the solar resources of and to conduct Operations on the Premises. Landlord will not grant any rights in the Premises purporting to permit others to conduct Operations on the Premises or on lands owned by Landlord that are adjacent to the Premises, in derogation of Tenant’s sole and exclusive right to conduct Operations on the Premises. This shall include prohibiting the undertaking of any building, installing or planting on the Premises or on the lands owned by Landlord that are adjacent to the Premises of any barns, houses, garages, sheds, fencing, bushes, hedges or anything that may shadow the Premises and prevent the Project from receiving direct sunlight or negatively affect any aspect of the Operations. Without the prior written consent of Tenant, Landlord will not (i) waive any right available to Landlord or grant any right or privilege subject to the consent of Landlord by law or contract, including without limitation any environmental regulation, land use ordinance or zoning regulation, with respect to setback requirements, noise limitations or other restrictions and conditions respecting the placement of Solar Energy Facilities and other equipment ancillary to Solar Energy System operations on parcels adjacent to or in the vicinity of the Premises or (ii) grant, confirm, acknowledge, recognize or acquiesce in any right claimed by any other person to conduct Operations on the Premises whether arising in judicial proceedings or otherwise and Landlord agrees to give Tenant notice of any such claims or proceeding with respect to such claims and to cooperate with Tenant in resisting and disputing such claims.

6. Permits and Governmental Approvals

Tenant will be responsible for obtaining at its sole cost and expense from any governmental agency or any other person or entity any environmental impact review, permit, entitlement, approval, authorization or other rights necessary or convenient in connection with Operations or proposed Operations. Tenant, its contractors, consultants, agents and appointees, are hereby duly appointed as Landlord’s agent for the purposes of making applications or proceedings for Approvals, at Tenant’s expense, in relation to the Premises and the rights granted

under this Lease and permitting any authorities, their employees, consultants and agents to enter onto the Premises to conduct inspections and investigations to issue or grant Approvals. Landlord agrees to co-operate with Tenant and execute and deliver such further agreements, applications and confirmations, and do such further things, as Tenant may reasonably require to obtain any Approvals, at Tenant's sole cost and expense. The term "**Approvals**" includes any authorizations, licenses, approvals, permits, subdivision consents, rezoning applications, site plan agreements, conservation authority approvals, entrance permits, culvert permits, building permits and any other permissions from any authorities having jurisdiction which may be necessary or advisable for the Tenant's proposed Operations in relation to the Premises or to develop, install, construct and operate the Solar Energy System and any related activities. In addition, Landlord will promptly upon request, execute, and, if appropriate, cause to be acknowledged, at Tenant's expense, any reference plan, application, postponement, partial discharge, document or instrument (including any variance, encroachment agreement, site plan agreement, development agreement or setback waiver) that is reasonably requested by Tenant in connection therewith, provided that Tenant will reimburse Landlord for its reasonable out-of-pocket expense directly incurred in connection with such cooperation. Where any permits or governmental approvals to be obtained, executed or consented to by Landlord reasonably requires legal review on Landlord's behalf, Tenant will reimburse the associated reasonable legal fees borne by Landlord.

7. Liens

Landlord and Tenant will keep the other's interest in the Premises free and clear of all construction liens and claims of liens for labour and services performed, and materials, supplies and equipment furnished, in connection with Landlord's or Tenant's (as applicable) use of the Premises, subject to Landlord's and Tenant's (as applicable) right to contest such liens and claims. If Landlord or Tenant (as applicable) wishes to contest any such liens or claims, such Party will, within thirty (30) days after it receives notice thereof, provide a bond or other security as the other Party may reasonably request, pay the required amount into court to obtain a discharge of such lien, or remove any such liens from the Premises pursuant to applicable law.

8. Encumbrances

The Tenant may, at its option, pay or discharge any arrears owing under any encumbrances upon the Premises which has priority over the interest of Tenant under this Lease and without limiting the generality of the foregoing, Tenant shall have the right, but not the obligation to pay or discharge any arrears owing in respect of realty taxes for the Premises and for any lands owned by Landlord that are adjacent to the Premises. Any amount paid by Tenant in exercising its rights pursuant to this provision shall be set off against any compensation owed by Tenant to Landlord under this Lease (including but not limited to Development Term Rent, Construction Term Rent and Operational Term Rent and, if applicable, the purchase price for the Premises if Tenant purchases the Premises pursuant to its rights in Section 22) or any other agreement between the Parties.

9. Access

Tenant will at all times during the Term have access to the Premises and to Tenant's Solar Energy Systems for all purposes specified in this Lease.

During the Development Term, provided the Tenant has not delivered written notice of its intention to commence construction of the Project, the Landlord shall be permitted to access the Premises for the purposes of growing and harvesting crops on the Premises.

During the Construction Term, Landlord may obtain access to the Premises for the purpose of inspection of activities thereon upon reasonable written notice to Tenant, provided that such access will not unreasonably interfere with construction of the Solar Energy System on the Premises. For greater certainty, from and after the Construction Commencement Date, the Landlord shall not be permitted to use the Premises for growing or harvesting crops.

During the Operational Term, Landlord may obtain access to the Premises for the purpose of inspection of activities thereon upon reasonable written notice to Tenant, provided that such access will not unreasonably interfere with the Project or Operations.

10. Indemnity

10.1 Indemnity by Tenant. Tenant will defend, indemnify and hold Landlord harmless from and against all liability and claims of liability, for damage to property or injury to persons resulting from the negligent or intentional activities of Tenant, its agents, contractors, employees, guests, invitees, licensees and permittees (collectively, “**Tenant’s Agents**”) on or about the Premises, except to the extent that such liability or loss is due to any acts of Landlord or its agents, employees, contractors, guests, invitees, licensees and permittees (collectively, “**Landlord’s Agents**”).

10.2 Indemnity by Landlord. Landlord will defend, indemnify and hold Tenant harmless from and against all liability and claims of liability, for damage to property or injury to persons resulting from the activities of Landlord and Landlord’s Agents on or about the Premises; except to the extent that such liability or loss is due to any negligent or intentional acts of Tenant or Tenant’s Agents.

10.3 Hazardous Materials.

- (a) To the best of his knowledge and belief after due inquiry, Landlord represents and warrants to Tenant that as of the Effective Date, there exists no Hazardous Materials (as hereinafter defined) on or under the Premises. In addition, Landlord covenants and agrees that it will not (i) use, store, dispose of or release on or under the Premises or (ii) cause or permit to exist or be used, stored, disposed of or released on or under the Premises as a result of Landlord’s operations any pollutant, contaminant, chemical, deleterious substance, industrial, toxic or hazardous waste, petroleum or petroleum product, asbestos, PCBs, underground storage tanks and the contents thereof, flammable materials or radioactive materials (collectively, “**Hazardous Materials**”). Should any claim or action be brought against Landlord, Tenant or the Premises with respect to any of the foregoing, Landlord will immediately notify Tenant upon becoming aware of same and will indemnify Tenant from all costs associated with such claim or action.

- (b) Tenant covenants and agrees that it will not (i) use, store, dispose of or release on or under the Premises or (ii) cause or permit to exist or be used, stored, disposed of or released on or under the Premises as a result of Tenant's operations, any Hazardous Materials, except in such quantities as may be required in its normal business operations and only if in material compliance with applicable laws. Should any claim or action be brought against Tenant, Landlord or the Premises in connection with Tenant's operations with respect to any of the foregoing, Tenant will immediately notify Landlord upon becoming aware of same and will indemnify Landlord from all costs associated with such claim or action.

11. Insurance

11.1 Tenant's Insurance.

The Tenant shall, during the Term or any further extension(s) thereof, and during such other time as the Tenant occupies the Premises or any part thereof, at its sole cost and expense, take out and keep in full force and effect the following insurance:

- (a) "all risks" insurance not less broad than the standard commercial property floater policy with the exclusions such as, without limitation, those relating to sprinkler leakages (where applicable), earthquake, flood and collapse removed therefrom upon the Solar Energy System contained therein in an amount not less than the full replacement cost thereof; and
- (b) comprehensive general liability insurance including but not limited to property damage, public liability, and personal injury liability, all on an occurrence basis, with respect to any use, occupancy, activities or things, in on or about the Premises and with respect to the use and occupancy of any part of the Premises by the Tenant or any of its servants, agents, contractors or persons for whom the Tenant is in law responsible, including, without limitation, the activities, operations and work conducted or performed by the Tenant, by any other person on behalf of the Tenant, by those for whom the Tenant is in law responsible and by any other person on the Premises at the request of the Tenant.

Each of the foregoing policies of insurance shall name the Landlord and its mortgagee(s), if any, as additional insureds as their interests may appear.

11.2 Failure to Insure

If the Tenant fails to take out or to keep in force any of the policies of insurance referred to in Section 11.1 hereof, and should the Tenant not rectify such default within forty-eight (48) hours after receipt of written notice thereof from the Landlord, the Landlord may, but shall not be obligated to, effect such insurance and the Tenant shall pay to the Landlord, forthwith on demand, all premiums, costs, charges and expenses incurred by the Landlord in effecting such insurance.

12. Assignment

12.1 Assignment by Tenant.

Tenant will at all times have the right to transfer, sell, convey or otherwise assign all of its rights and interests in this Lease, the Premises, the Solar Energy System and the Project without Landlord's consent. Without limiting the generality of the foregoing, Tenant may transfer, sell, encumber, convey or otherwise assign all of Tenant's rights and interest in this Lease, the Premises, the Solar Energy System and the Project as security to one or more lenders, mortgagees, chargees, secured creditors, trustees and beneficiaries of deeds of trust, or other holders of a beneficial interest in a Leasehold Mortgage (as defined in Section 13) (each a "**Secured Creditor**") in connection with financing (including refinancing) of the Project, the Solar Energy Facilities, Solar Energy Systems and the development of the Premises. Tenant will notify Landlord in writing promptly upon any assignment of this Lease as provided for herein. Upon assignment of this Lease in whole, but not by way of security, Tenant will be released from all liability hereunder from and after the date of assignment to the extent that the assignee assumes the obligations of Tenant under this Lease, but no assignment will release Tenant from any liability or obligations it may have had prior to the date of assignment.

12.2 Easements and Other Grants by Tenant.

Tenant will have the right to grant easements or licences on or under any part of the Premises at any time, and from time to time. At Tenant's request, Landlord will grant any necessary easements and/or licences to Hydro One required in connection with the Project or the Tenant's Operations, any public utility or any transmitter for the purpose of the Project's electrical transmission and interconnection facilities. No easement or licence granted pursuant to this Section 12.2 will: (i) have a term that exceeds the Term (including any further renewal(s) or extension(s) thereof); and (ii) relieve Tenant of any of its obligations under this Lease

13. Consent to Leasehold Mortgage

13.1 Consent.

Tenant may from time to time, without the prior written consent of Landlord, encumber Tenant's interest in this Lease, the Project, the Solar Energy System and its interest in the Premises by one or more charges, mortgages, deeds of trust or other real or personal property security agreements (each a "**Leasehold Mortgage**"), provided that any Leasehold Mortgage and all rights acquired under it will be subject to each and all of the covenants, conditions and restrictions stated in this Lease and to all rights and interests of Landlord and, further provided, that Tenant or Secured Creditor will promptly after execution of any Leasehold Mortgage give written notice thereof to Landlord. Nothing contained in such Leasehold Mortgages will release or be deemed to relieve Tenant from full and faithful observance and performance of the terms, covenants and conditions herein contained to be observed and performed by Tenant or from any liability for the non-observance or non-performance of any of the terms and conditions hereof, nor

be deemed to constitute a waiver of any rights of Landlord hereunder, except as expressly provided for herein.

13.2 Statement by Landlord.

At the request of Tenant or a Secured Creditor, Landlord (a) will execute, acknowledge and deliver to Tenant and/or Secured Creditor, a written statement declaring: (i) either that the Lease is unmodified and in full force and effect, or the manner in which the Lease had been modified and whether the Lease as so modified is in full force and effect; (ii) the dates to which Tenant's monetary obligations hereunder have been paid in advance; (iii) whether Tenant is or is not then in default hereunder; (iv) whether any past defaults have been fully cured, and (v) as to such other matters as Tenant or Secured Creditor may reasonably require; and (b) will enter into agreements directly with any Secured Creditor which requests such an agreement confirming that Landlord will recognize all of the rights intended to be accorded to a Secured Creditor hereunder including those rights described in Section 20 and Schedule B.

14. Taxes and Utilities

14.1 Taxes.

During the Term, Tenant will pay any personal property taxes on the Solar Energy System and/or for any such taxes that were directly attributable to solar energy conversion equipment installed by Tenant. Landlord will pay all real property taxes and assessments (collectively, "**Real Property Taxes**") levied against the Premises. Notwithstanding the foregoing, the Tenant shall be responsible for all increases in Real Property Taxes levied against the Premises during the Operational Term that are directly caused by or attributable to the Project or the Tenant's Operations thereon.

14.2 Payment of Utilities.

During the Operational Term, Tenant agrees to pay for all utility services used by Tenant by reason of Tenant's Solar Energy System and Operations during the Term of this Lease. Tenant and Landlord acknowledge that Tenant will install separate individual metering for utility services used by Tenant on the Premises. In the event such services are invoiced in the name of Landlord, as part of the services for the adjacent lands owned by Landlord, Tenant agrees to reimburse Landlord for Tenant's share thereof, or to promptly pay same directly to the utility provider at Landlord's direction, in each case, thirty (30) days following written notice from Landlord to Tenant setting forth Tenant's said share.

15. Surrender and Restoration

15.1 Surrender.

Upon any termination, surrender or expiration of this Lease, Tenant will remove, within eighteen (18) months from the date this Lease is terminated, surrendered or expires, all of Tenant's Solar Energy System and will peaceably deliver up to Landlord

possession of the Premises or any part thereof, and other rights granted by this Lease, and will execute, at Landlord's request, any and all reasonable documents needed to record or evidence such termination. Following the date this Lease is terminated, surrendered or expires, the Landlord shall grant the Tenant with a non-exclusive license with respect to the Premises for a period not to exceed eighteen (18) months for the sole purpose of the removal of the Tenant's Energy System.

15.2 Restoration.

Within eighteen (18) months after any termination, surrender or expiration of this Lease or a reasonable period of time, whichever is longer, Tenant will remove structures and Solar Energy System to the extent reasonably practicable to a depth of three (3) feet below the surface of the Premises. In addition, Tenant will restore the surface of the Premises as is reasonably practicable to its original condition as the same existed prior to the commencement of construction of the Project (reasonable wear and tear excepted) and will repair any damage, to the extent reasonably practicable, to the Premises as a result of any removal of Tenant's Solar Energy System under this Section. Notwithstanding any of the foregoing, in no event will Tenant have the obligation to modify the grade of the Premises as established by Tenant for its uses or to restore any vegetation. Prior to commencing such restoration, Tenant will consult with Landlord regarding Tenant's restoration plans.

15.3 Landlord's Removal Rights.

Subject to the rights of any Secured Creditor, if Tenant fails to remove its Solar Energy System in accordance with the provisions of Section 15.1 and 15.2, Landlord shall provide to Tenant and any Secured Creditor written notice of such failure and Landlord's intention to carry out the obligations of Tenant pursuant to such provisions. If Tenant has not commenced the removal of its Solar Energy System in accordance with the provisions of Section 15.1 and 15.2 within 30 days of the date of such notice from Landlord, Landlord may remove the Solar Energy System without liability to Tenant and Landlord's costs of removal of the same will constitute a first lien and security interest upon the Solar Energy System.

16. Expropriation

16.1 Expropriation.

If all of the Premises is taken by expropriation, or is purchased by any governmental agency or governmental body exercising the power of expropriation of eminent domain, or should a partial taking render the remaining portion of the Premises substantially unusable for Tenant's permitted uses, then this Lease will terminate upon the vesting of title or taking of possession. Notwithstanding the foregoing, if the taking is partial, Tenant will have the option of terminating this Lease or continuing this Lease with payments of rent being reduced to reflect the partial taking. Development Term Rent, Construction Term Rent or Operational Term Rent, as the case may be, shall be apportioned and shall be payable by Tenant only to the date of such termination.

16.2 Awards and Damages.

The Landlord shall not accept any award for compensation without Tenant's written consent. Tenant will be entitled to any award made for the reasonable removal and relocation costs of any Solar Energy System that Tenant has the right to remove, and for the loss and damage to any such Solar Energy System that Tenant elects or is required not to remove, and for the loss of use of the Premises by Tenant. If the parties do not agree upon a decision of such award or purchase price, it will be settled by arbitration pursuant to Section 45.

17. Default

Where there is an alleged default or failure to perform any obligation under this Lease, the non-defaulting Party will give the alleged defaulting Party and any Secured Creditor written notice thereof, which notice will include the acts required to cure the same with reasonable specificity (the "**First Notice of Default**"). The Party failing to make any monetary payment when due will have a period of ten (10) Business Days after such notice is given within which to cure such default after which the non-defaulting Party will give the alleged defaulting Party and any Secured Creditor a second written notice thereof, which notice will state that if the default is not remedied within ten (10) Business Days after such second notice (the "**Second Notice of Default**") then Landlord shall have the right, subject to the rights of any Secured Creditor, to terminate this Lease and re-enter the Premises. In the event of any other failure, the defaulting Party will have a period of forty-five (45) Business Days within which to cure such default, which period will be extended to the extent reasonably necessary to complete such cure so long as the cure was commenced forty-five (45) Business Days after such notice is given and thereafter pursued with due diligence. Delinquent payments will bear interest from their respective due dates until paid at the rate of the lesser of (i) of 12 twelve percent (12%) per annum, or (ii) the maximum rate permitted by law. Any prohibited conduct under this Lease may be enjoined and this Lease will be specifically enforceable, but neither Party's remedies will include the right to terminate this Lease or evict the other Party from the Premises except as provided above, or except where an arbitration award has been made by a duly appointed arbitrator or a court order has been issued by a court of competent jurisdiction and Tenant has failed to comply with such award or order within twenty (20) Business Days of its making or issue. The Landlord may require Tenant to post security for its obligations under the award or order as a precondition to appealing the award or order. Notwithstanding anything in this Lease, a Secured Creditor shall have the right, but not the obligation, at any time to cure a default on behalf of Tenant and the rights set forth in Section 20 and in Schedule B hereto.

18. Termination by Tenant

Subject to the obligations of Tenant under Section 15, but notwithstanding any other provisions of this Lease, Tenant will have the right, at any time on not less than 90 days' written notice to Landlord, to terminate this Lease and surrender to Landlord all of Tenant's right, title and interest in and to the Premises by executing and delivering to Landlord a quitclaim deed or surrender of this Lease respecting the Premises.

19. Certain Protective Covenants

19.1 Interference.

During the Term, Landlord covenants and agrees that neither it nor Landlord's Agents will (i) materially interfere with or prohibit the free and complete use and enjoyment by Tenant of its rights granted by this Lease; (ii) take any action or permit any condition to exist on the Premises which will materially interfere with the availability or accessibility of sunlight to the Premises; (iii) take any action which will in any way materially interfere with the transmission or distribution of electricity to or from the Premises; or (iv) take any action which will materially impair Tenant's access to the Premises for the purposes specified in this Lease or materially impair Tenant's access to any or all of the Solar Energy Systems, where "materially" will mean, among other things, any act or acts cumulatively that would violate Section 5.3 or that could impair the generation, distribution and transmission of electrical energy from any Project or Projects constructed on the Premises.

19.2 Quiet Enjoyment.

As long as Tenant observes the terms and conditions of this Lease, Landlord warrants, covenants and agrees that Tenant will peaceably hold and enjoy the Premises, and any and all other rights granted by this Lease for its entire Term without hindrance or interruption by Landlord or any other person or persons lawfully or equitably claiming by, through or under Landlord except as expressly provided in this Lease.

19.3 Title.

Landlord hereby represents and warrants with respect to the Premises that:

- (i) Landlord is the registered and beneficial owner of the Premises in fee simple, with good and marketable title thereto;
- (ii) save for as disclosed to the Tenant in writing prior to the Effective Date, Landlord has not leased, licensed or granted any Person a right of occupancy or use of the Premises, or any part thereof, that is currently effective; and
- (iii) the leasehold estate created hereby with respect to the Premises is free from encumbrances done, made, or suffered by Landlord, or any person claiming under Landlord, except, in each case, for such encumbrances that are registered in the applicable land registry office against title to the Premises.

Tenant may conduct a current search of title for the Premises at its expense and advise Landlord of all liens, encumbrances and other instruments registered against title to the Premises and require, at the sole cost and expense of Landlord, any liens or financial encumbrances to be discharged, or subordinated and postponed to this Lease and the rights of Tenant hereunder in form and substance satisfactory to Tenant.

19.4 Conditions of Premises.

The Landlord represents and warrants that it knows of no physical conditions of the Premises which would prevent or significantly restrict Tenant's development of the Premises for the purposes specified herein.

19.5 Observance of Laws and Covenants.

Tenant will use the Premises granted by this Lease only for the purposes stated herein and will conduct all of its Operations on the Premises in a lawful manner after obtaining all necessary permits and government approvals. Tenant will carry out its responsibilities, exercise any rights which it possesses under this Lease, and maintain, operate and install the Solar Energy System in a manner which is in material compliance with all applicable laws, rules, ordinances, orders and regulations of governmental agencies.

19.6 Non-Disturbance.

If the Premises are subject to any financial encumbrance, Landlord agrees to use its best efforts to obtain a non-disturbance and attornment agreement from the holder of such encumbrance in favour of Tenant substantially in the form of Schedule C hereto.

19.7 Legal Advice.

Landlord acknowledges and confirms that:

- (i) Tenant has advised Landlord to seek independent legal representation with respect to entering into this Lease;
- (ii) Landlord has received, or has had the opportunity to receive, independent legal representation and advice prior to entering into this Lease;
- (iii) Landlord understands its rights and obligations under this Lease; and
- (iv) Landlord is entering into this Lease freely and voluntarily.

20. Protection of Secured Creditors

Any Secured Creditor will, for so long as its Leasehold Mortgage is in existence and until the lien thereof has been extinguished, be entitled to the following protections:

20.1 No Amendment.

Landlord will not agree to any amendment or modification of this Lease which would adversely affect Secured Creditor's interest in the Lease, or agree to any mutual termination or accept any surrender of this Lease, nor will any such amendment, termination, modification or surrender be effective, without the written consent of Secured Creditor.

20.2 Notice of Default.

Notwithstanding any default by Tenant under this Lease, Landlord will have no right to terminate this Lease or take possession of the Premises unless and until Landlord will first have given Secured Creditor(s) a second written notice of Tenant's default and failure to cure same within the period(s) specified in Section 17 and thereafter afforded Secured Creditor(s) an opportunity to cure such default within the period(s) specified in Section 17 and Secured Creditor(s) have failed to effect the cure of such default to the extent that Secured Creditor is capable of doing so or commenced diligently to cure such default within 90 days of such second written default notice.

20.3 Rights of Secured Creditors.

Landlord hereby grants to any Secured Creditor the rights and remedies set forth in Schedule B hereto. In addition, Landlord will, from time to time, at the request of Tenant or a Secured Creditor, promptly execute and deliver in favour of any Secured Creditor such consents and acknowledgements granting and confirming Secured Creditor's rights and remedies hereunder, including the right to obtain a new lease upon the same terms and conditions as this Lease for the balance of the Term, including any rights of extension or renewals and options to purchase, if this Lease is terminated or disclaimed for any reason and the rights and remedies set forth in Schedule B hereto, together with such other rights or remedies as may be reasonably requested by Secured Creditor.

20.4 No Merger.

In the event Tenant acquires fee ownership of the Premises, or in the event of Tenant's voluntary surrender of the leasehold estate, there will be no merger of the leasehold estate created by this Lease with the fee without the prior written consent of all Secured Creditors.

21. Further Amendments

Landlord and Tenant will cooperate in including in this Lease by suitable amendment from time to time any provision which may reasonably be requested by a proposed Secured Creditor; provided, however, that such amendment does not impair any of Landlord's rights under this Lease in any material respect or materially increase the burdens or obligations of Landlord hereunder.

22. Right of First Offer

22.1 Right of First Offer.

If Landlord wishes to sell, transfer, assign or otherwise dispose of its interest in the Premises or any portion thereof, before approaching any third parties or listing the Premises, Landlord will first notify Tenant in writing of its interest and the terms on which it wishes to so dispose of its interest in the Premises. Tenant will have the exclusive right for a period of fifteen (15) Business Days from notification by Landlord

(the “**ROFO Period**”) to accept such terms or otherwise negotiate in good faith to acquire the Premises from Landlord on the Closing Date (as hereinafter defined) and closing procedures set forth in this Section 22 (the “**ROFO**”). The closing date (the “**Closing Date**”) for completion of the purchase and sale of the Premises shall take place on the date determined by the Parties, but any such Closing Date will be automatically extended until the tenth (10th) Business Day following the date that any required *Planning Act* subdivision consent has been obtained and all applicable appeal periods have expired. If the Landlord and Tenant are unable to reach an agreement for Tenant to acquire the Premises during the ROFO Period, Landlord shall be free to and may sell, transfer, assign or otherwise dispose of its interest therein at any time within the period of 180 days following expiration of the ROFO Period, failing which the Tenant's right of first offer as described in this Section 22 shall again apply to any subsequent sale of the Premises or any part thereof by the Landlord during the Term. In the event the Landlord sells, transfers, assigns or otherwise disposes of its interest in the premises to a third party, the agreement of purchase and sale in respect of such disposition shall require the purchaser to assume the Landlord's liabilities and obligations under this Lease. Notwithstanding anything contained herein to the contrary and for greater certainty, the ROFO will not apply where Landlord disposes of its interest in the Premises to Landlord's heirs or a family trust of Landlord, provided such transferee agrees in writing with Tenant to be bound by this Lease including this Section 22.

22.2 Closing Procedures.

On the Closing Date, Landlord will convey and transfer to Tenant, or as it may otherwise direct in writing, title to Premises free and clear of all Liens against delivery to Landlord's solicitors of the Purchase Price, less all rent paid by Tenant under this Lease from the Effective Date up to the Closing Date; there will be no other adjustments to the Purchase Price. Tenant shall be liable for and shall pay all transfer taxes, including those pursuant to *Land Transfer Tax Act* in connection with its exercise of the ROFO. Tenant agrees to deliver to Landlord on or before closing a statutory declaration of Tenant stating that it is registered under the *Excise Tax Act* (Canada) (the “**Act**”) as registrant for HST, setting out its HST registration number and undertaking to self-assess itself for HST payable in connection with its purchase of the Premises as required under the Act, and to indemnify Landlord against its failure to self-assess in accordance with the Act. Landlord acknowledges and agrees that it will not, and will not be liable to, collect HST based on the representations and indemnity by Tenant.

22.3 No Encumbering.

During the Term, Landlord will not transfer title to, or grant any Lien on all or any part of, the Premises which will prevent Tenant from acquiring good and marketable fee simple title to the Premises free of all Liens upon its exercise of the ROFO. Landlord will discharge all Liens registered against title to the Premises on or prior to the Closing Date. Notwithstanding the foregoing and for greater certainty, the Landlord shall not be restricted or prohibited from granting any mortgage or charge of its interest in the Premises.

23. Notice

23.1 Writing.

All notices given or permitted to be given hereunder will be in writing; provided, however, that no writing other than the cheque or other instrument representing the rent payment itself need accompany the payment of rent.

23.2 Delivery.

Any notice, election, demand or exercise of option to which a party to this Lease is entitled or is required to give, shall be in writing and delivered personally, by postage prepaid registered mail, or by facsimile or other electronic means of transmission and addressed as follows:

(a) Notice to Landlord.

See Section 1.6 for Landlord's Address.

(b) Notice to Tenant.

See Section 1.14 for Tenant's Address,

and shall be deemed to have been given and received when delivered personally, or on the first Business Day following the date that same is sent by facsimile or other electronic transmission, or four (4) Business Days from the day that it is mailed, except in the case of interruption of normal postal service, in which case, it shall be deemed to have been received four (4) Business Days from the later of the time when it is mailed and the resumption of normal postal service.

23.3 Change of Recipient or Address.

Either Party may, by notice given at any time or from time to time, require subsequent notices to be given to another individual person, whether a Party or an officer or representative, or to a different address, or both. Notices given before actual receipt of notice of change will not be invalidated by the change.

24. Expenses of Enforcement

If any Party hereto brings any proceedings to enforce any of the terms, covenants or conditions hereof, the prevailing Party will be entitled to recover from the other Party or Parties thereto reimbursement for all reasonable expenses, costs and solicitors' fees incurred in connection therewith.

25. Further Assurances

The Parties hereto will at all times hereafter execute any documents and do any further acts which may be necessary or desirable to carry out the purposes of this Lease and to give full force and effect to each and all of the provisions thereof.

26. Approvals and Consents Generally

Whenever in this Lease the approval or consent of either Party is required or contemplated, unless otherwise specified, such approval or consent will not be unreasonably withheld and/or delayed nor will it be conditioned upon the payment of money not otherwise due hereunder.

27. Amendments

This Lease will not be amended or modified in any way except by an instrument signed by Landlord and Tenant and consented to by Secured Creditor, if applicable, pursuant to Section 20.1.

28. Severability

If any term or provision of this Lease, or the application thereof to any person or circumstance will, to any extent, be determined by judicial order or decision to be invalid or unenforceable, the remainder of this Lease or the application of such term or provision to persons or circumstances other than those as to which it is held to be invalid or unenforceable will not be affected thereby.

29. Governing Law

This Lease will be governed by the laws of the Province of Ontario and the laws of Canada applicable therein. The Parties hereby irrevocably submit to the jurisdiction of the Province of Ontario in any action or proceeding arising out of or relating to this Lease and hereby irrevocably agree that all claims in respect of such action or proceeding may be heard and determined in such court.

30. Headings and Section References

The section headings herein are inserted only for convenience of reference and will in no way define, limit or describe the scope or intent of a provision of this Lease. Reference to any Schedules or Sections are to schedules to this Lease or sections in this Lease, unless otherwise specifically provided.

31. Entire Agreement

This Lease constitutes the entire agreement between the Parties as of the Effective Date, and supersedes all prior negotiations, agreements and documentation exchanged by the parties or their agents or representatives and, except as is set forth herein, there are no promises, understandings or representations, expressed or implied, either written or oral, made by either

party or their agents or representatives to the other and none shall be binding upon or inure to the benefit of either of the Parties. This Lease shall not be modified by any oral agreement, either express or implied, and all modifications hereof shall be in writing and signed by both the Parties.

32. Effect of Termination

Any termination of this Lease pursuant to the terms hereof will not relieve either Party from any liabilities, obligations or indemnities arising prior to the effective date of such termination.

33. Time of Essence

Time is of the essence regarding each provision of this Lease.

34. No Waiver

No waiver by either Party of any provision of this Lease will be deemed to be a waiver of any other provision hereof or of any subsequent breach by the other Party.

35. Counterparts and Electronic Transmission

This Lease may be executed in counterparts and by facsimile or other electronic transmission.

36. Force Majeure

Tenant's obligations under this Lease (exclusive of payments of rent) will be suspended and excused, and the term (except for the expiration date), and any other time periods set forth herein will continue and be extended for a like period of time, while (a) Tenant is hindered or prevented, in whole or in part, from (i) conducting Operations or (ii) complying with any term, covenant, condition or provision of this Lease, by any matter or condition beyond the reasonable control of Tenant, and (b) while litigation contesting all or any portion of the right, title and interest of Landlord in the Premises and/or Tenant under this Lease will be pending and not finally determined.

37. Ownership of Solar Energy System

The Solar Energy System shall remain at all times the sole personal and moveable property of Tenant and will not be deemed to be permanent fixtures (even if permanently affixed to the Premises). Landlord hereby waives any statutory or common law lien or right of distress that it might otherwise have in or to the Solar Energy System or any part thereof and agrees that, notwithstanding the occurrence of an event of default under the Lease beyond all applicable notice and cure periods (including those granted to a Secured Creditor), Secured Creditor (or its designee) or Tenant may remove the Solar Energy System from the Premises in compliance with Section 15.2 if applicable.

38. Confidentiality

Landlord will hold and maintain in the strictest confidence, and will require its principals, officers, employees, representatives, agents and independent contractors to hold and maintain in the strictest confidence, for the sole benefit of Tenant, any financial information, books, records, computer printouts, product design, information regarding Tenant, or an affiliate of any thereof, and any information regarding Operations on the Premises or any other lands or projects (collectively, “**Confidential Information**”), whether disclosed by Tenant, or an affiliate of any thereof or discovered by Landlord, unless such Confidential Information either (a) is in the public domain by reason of prior publication through no act or omission of Landlord or its principals, officers, employees, representatives or agents, or (b) was already known to Landlord at the time of disclosure and which Landlord is free to use or disclose without breach of any obligation to any person or entity. Landlord will not use any such Confidential Information for its own benefit, publish or otherwise disclose such Confidential Information to others, or permit the use of such Confidential Information by others for their benefit or to the detriment of Tenant.

39. No Partnership

Nothing contained in this Lease will be deemed or construed by the Parties or by any third person to create the relationship of principal and agent, partnership, or any other association between Landlord and Tenant, other than the relationship of lessor and lessee.

40. Successors and Assigns

This Lease will enure to the benefit of and be binding upon the Parties and their respective successors and assigns.

41. Brokerage Commissions

Landlord and Tenant each represent that such Party has not incurred, directly or indirectly, any liability on behalf of the other Party for the payment by the other Party of any real estate brokerage commission or finder's fee in connection with this Lease. Landlord and Tenant will indemnify, defend and hold the other Party harmless from and against any claim for any brokerage commissions or finder's fees claimed to be due and owing by reason of the indemnifying Party's activities.

42. Planning Act

This Lease and the provisions hereof, which create or are intended to create an interest in the Premises, will be effective to create such an interest only if the subdivision control provisions of the *Planning Act* (Ontario), as amended, are complied with. Pending any such compliance, Tenant hereby declares, and Landlord acknowledges, that the Term, including any further renewals or extensions, shall be deemed to be for a total period of one (1) day less than twenty-one (21) years.

Tenant may apply for a consent from the appropriate land division committee or committee of adjustment with respect to the Term under the *Planning Act* (Ontario), and should it do so, Tenant will be responsible for all costs, expenses, taxes and levies imposed, charged or

levied as a result of such application and in order to obtain such consent and Landlord agrees to provide any consents required and execute any documentation as may be required from time to time, without delay, which may be necessary to permit the Tenant to make any such application comply with the *Planning Act* (Ontario).

43. Land Registrations

Tenant may, at its cost and expense, register this Lease or a notice of this Lease and any required reference plans in the applicable land registry office and Landlord agrees to execute at no cost to Tenant all necessary documents and plans for that purpose.

44. No Affect on Statutory Rights

Nothing in this Lease will adversely affect either Party's ability to exercise any rights or powers authorized under any instrument issued by the Ontario Energy Board pursuant to the *Ontario Energy Board Act*, 1998 (and any other successor legislation).

45. Arbitration

If any dispute arises between Landlord and Tenant under this Lease and remains unresolved after thirty (30) days, then either Landlord or Tenant may require arbitration of the dispute by giving to the other written notice to arbitrate. Such dispute shall then be arbitrated and finally resolved pursuant to the Simplified Arbitration Rules of the ADR Institute of Canada Inc. The place of arbitration shall be Toronto, Ontario and the language of the arbitration shall be English.

46. Legal Fees

Tenant shall pay for Landlord's properly incurred legal expenses associated with:

- (a) the preparation, negotiation and grant of this Lease, easements, related agreements and any amendments thereto requested by Tenant, provided Landlord enters into such agreements; and
- (b) any requests made by Tenant for a consent as herein required or made necessary that would reasonably require input by legal counsel but not such costs relating directly to the unreasonable refusal of Landlord to grant consents or the grant of consents subject to unreasonable conditions;

provided that such legal expenses reflect commercially reasonable rates and billing time given the task at hand and that Tenant's liability per agreement or per consent shall not exceed One Thousand Dollars (\$1,000.00) (adjusted by CPI every five (5) years following the Commercial Operations Date). Landlord shall provide copies of the underlying legal bills upon submission of a request for payment.

If it becomes necessary for either party to employ a lawyer to commence an action for collection of moneys owing by the other party or to enforce performance of the covenants, terms

and conditions of this Lease, then as long as the said party is successful in such action, it shall be entitled to collect all reasonable lawyer's fees on a substantial indemnity basis.

[Remainder of Page Intentionally Left Blank; Signature Page Follows.]

IN WITNESS WHEREOF, the Parties have executed this Lease as of the date first written above.

SIGNED, SEALED AND DELIVERED
in the presence of Witness (as to all
signatures)

Name:

LANDLORD

**THE CORPORATION OF THE
COUNTY OF DUFFERIN**

Name:
Title:

Name:
Title:

[I/We] have the authority to bind the
Corporation

TENANT

DUFFERIN SOLAR POWER INC.

By: _____

Name:
Title:

By: _____

Name:
Title:

By: _____

Name:
Title:

[I/We] have the authority to bind
the Tenant

SCHEDULE A
TO LEASE
LEGAL DESCRIPTION OF PREMISES

PIN: 34058-0017

Legal Description: PT LT 32, CON 14 AS IN MF101692; E LUTHER/GRAND VALLEY

PIN: 34058-0018

Legal Description: S ½ LT 32, CON 14; E LUTHER/GRAND VALLEY

PIN: 34160-0088

Legal Description: PT LT 8 CON 9 SWTSR AS IN MEL16695; PT RDAL BTN TOWNSHIPS
MELANCTHOM AND EAST LUTHER LYING E OF HWY # 89 AND RDAL BTN
MELANCTHON AND AMARNTH; MELANCTHON

SCHEDULE B

TO LEASE RIGHTS AND REMEDIES ACCORDED TO SECURED CREDITORS

1. Landlord will from time to time execute and deliver such consents and acknowledgements reasonably requested by a Secured Creditor.
2. Landlord agrees that, upon any Secured Creditor giving Landlord written notice of a Leasehold Mortgage, Secured Creditor will, without any further action being required, have the benefit of the following provisions until such time as Secured Creditor advises Landlord in writing that its Leasehold Mortgage is no longer in effect (and, if Secured Creditor so requests, Landlord will (i) acknowledge in writing that such Secured Creditor benefits from these provisions, or (ii) enter into a written agreement with Secured Creditor substantially in accordance with these provisions):
 - (a) Landlord will give prompt written notice to Secured Creditor of any breach or default by Tenant of its obligations under the Lease in respect of which Landlord proposes to exercise any of its remedies;
 - (b) Landlord will give Secured Creditor the right to cure any breach or default by Tenant under the Lease, within a period of 90 days commencing on the later of (i) the expiry of the cure period afforded Tenant under the Lease, and (ii) the date on which Landlord gives Secured Creditor notice of such breach or default pursuant to Section 2(a), or such longer period of time as Secured Creditor may reasonably require to cure such breach or default; and no exercise by Landlord of any of its rights or remedies against Tenant will be effective against Tenant or Secured Creditor unless Landlord has Secured Creditor such notice and opportunity to cure;
 - (c) if Secured Creditor is not capable of curing any breach or default of Tenant under the Lease (such as a breach or default relating to the bankruptcy or insolvency of Tenant), Secured Creditor will have the right to cure all defaults that are curable within the time period specified in Section 2(b) and Landlord agrees that it will not terminate the Lease (or exercise any other rights or remedies against Secured Creditor) if all curable defaults are cured by Secured Creditor within such time period;
 - (d) Landlord agrees that if there exists any breach or default of Tenant under the Lease at any time when any receivership, insolvency, bankruptcy or similar proceedings or events relating to Tenant are proceeding or when Secured Creditor is enforcing the security of the Leasehold Mortgage, (i) Landlord will not terminate the Lease as a result thereof, and (ii) if the Lease is actually terminated or disclaimed in connection with or as a result of any such proceedings or enforcement, Secured Creditor or its nominee or appointee will have the right to enter into a new Lease upon the same terms and conditions (including any options to renew or to purchase) as the terminated Lease (the “**New Lease**”), provided that:

- (A) Secured Creditor has notified Landlord in writing of its intention to enter into the New Lease within 90 days from the date Secured Creditor receives written notice from Landlord that the Lease has been terminated or disclaimed; and
- (B) Secured Creditor pays to Landlord such amounts as may then be owing by Tenant to Landlord under the terminated Lease and cures or commences diligently to cure any breach or default by Tenant under the terminated Lease that is capable of being cured by Secured Creditor;

and if Secured Creditor notifies Landlord of its intention to enter into a New Lease, then Landlord will forthwith execute and deliver to Secured Creditor a New Lease;

- (e) if Secured Creditor takes enforcement proceedings under the Leasehold Mortgage and advises Landlord of its intention in writing to maintain the Lease (the “**Secured Creditor Notice**”), Secured Creditor: (i) will be entitled to all of the rights of Tenant under the Lease as though it were an original party thereto, and (ii) will only be liable for: (A) the payment of any arrears that Landlord gives Secured Creditor written notice of within five (5) Business Days of Secured Creditor Notice being given to Landlord, and (B) the performance of Tenant’s covenants and obligations arising under the Lease for the period starting on the date enforcement proceedings were commenced and ending on the date such enforcement proceedings are terminated or Secured Creditor assigns, transfers, surrenders or terminates the Lease in accordance with its terms;
- (f) although Landlord and Tenant may modify the Lease from time to time between themselves, a Secured Creditor will not be bound by any adverse modifications made without Secured Creditor’s prior written consent;
- (g) Landlord will, at any time and from time to time, upon not less than five (5) Business Days’ prior request by Tenant or a Secured Creditor or proposed Secured Creditor, deliver to Secured Creditor a statement in writing certifying that: (i) the Lease is in full force and full effect unamended (or setting out any such amendments), (ii) all amounts owing and payable under the Lease have been paid (or setting out any unpaid amounts), and (iii) to Landlord’s knowledge, Tenant is not in default of its obligations under the Lease in any material respect (or setting out particulars of any such defaults);
- (h) in addition to its obligations under Section 2(g), Landlord will, at any time and from time to time, upon not less than five (5) Business Days’ prior request by Tenant or a Secured Creditor or proposed Secured Creditor, execute any agreements, certificates or acknowledgements that Tenant or a Secured Creditor may reasonably request with respect to this Lease; and

- (i) all notices to Secured Creditor from Landlord will be in writing and will be sent by personal delivery, registered mail, email or by fax to the address, email address or facsimile number of Secured Creditor set out in any notice that Secured Creditor delivers to Landlord.
- 3. The provisions of Section 2 will enure to the benefit of Secured Creditor and its successors and assigns, and any rights conferred on Secured Creditor by the terms of this Schedule B to the Lease or limiting its liability under the Lease will benefit each receiver or receiver-manager appointed by a Secured Creditor or by a court of competent jurisdiction; and
- 4. Landlord will give any purchaser or any other person acquiring an interest in the Premises notice of the Lease (including the terms of this Schedule B) and any notice received from a Secured Creditor.
- 5. Landlord hereby acknowledges that Lessee may grant a Leasehold Mortgage or other security to a trustee or collateral agent acting on behalf of one or more lenders (a “**Collateral Agent**”), and Landlord hereby acknowledges and agrees that upon its receipt of notice that such a Leasehold Mortgage or other security was granted, the Collateral Agent will be entitled to all of the rights of a Secured Creditor set forth in this Schedule B to the Lease and such notice will constitute notice of the existence of the Collateral Agent as a Secured Creditor.

SCHEDULE C
TO LEASE
NON-DISTURBANCE AND ATTORNMENT AGREEMENT
(LANDLORD'S CHARGE TO TENANT)

THIS AGREEMENT made as of the ____ day of _____, 2022.

B E T W E E N:

DUFFERIN SOLAR POWER INC.

(hereinafter called the "**Tenant**")

OF THE FIRST PART

- and -

THE CORPORATION OF THE COUNTY OF DUFFERIN

(hereinafter called the "**Chargee**")

OF THE SECOND PART

WHEREAS by a mortgage/charge of land made between _____ (the "**Chargor**") and Chargee registered on _____ in the _____ Land Registry Office as Instrument No. _____ (which mortgage/charge of land, as amended, supplemented, modified, replaced and/or restated from time to time is herein called the "**Charge**"), Chargor did charge in favour of Chargee certain lands and premises in the County of _____ in the Province of Ontario more particularly described therein; and

WHEREAS by a lease (as amended, supplemented, modified, replaced and/or restated from time to time, the "**Lease**") dated _____ between Chargor and Tenant, notice of which was registered on _____ in the _____ Land Registry Office as Instrument No. _____, Chargor did demise and lease certain of the lands and premises that were subject to the Charge (as increased or decreased from time to time, the "**Premises**") to Tenant upon, and subject to, the terms and conditions more particularly set forth in the Lease; and

WHEREAS for their mutual protection and benefit Chargee and Tenant have agreed to enter into this Agreement.

NOW THEREFORE this Agreement witnesses that in consideration of the Lease, and of the terms, covenants and conditions set forth herein and the sum of ONE (\$1.00) DOLLAR now paid by each of Chargee and Tenant to each other (the receipt and sufficiency whereof are hereby acknowledged by each) it is hereby covenanted and agreed as follows:

1. **Non-Disturbance.** The Chargee hereby (i) subordinates and postpones the Charge to the Lease and agrees that the Lease will rank in priority to the Charge, (ii) agrees that, so long as Tenant is not in default in the payment of rent or in the performance of the covenants and terms of the Lease in any material respect after the giving of all requisite notices and the expiry of all applicable cure periods, Tenant will have the right to peaceably and quietly have, hold and enjoy the Premises, without interruption or disturbance from or by Chargee or by any person claiming by, through or under Chargee and (iii) agrees that Tenant's rights and privileges under the Lease, and any renewal or extension of the term provided for therein, will not be in any way disturbed, diminished or interfered with by Chargee, notwithstanding that Chargor may be in default under the Charge or that Chargee may be exercising any of its rights under the Charge.
2. **Attornment.** If Chargee takes any proceedings in respect of the Premises (including taking possession, foreclosure or power of sale) as a result of the occurrence of an event of default under the Charge which is continuing, Tenant will attorn and be bound to Chargee under all of the terms of the Lease for the balance of the term thereof remaining with the same force and effect as if Chargee were the landlord under the Lease, and Tenant hereby attorns to Chargee as landlord under the Lease, such attornment to take effect automatically without the execution of any further instrument on the part of either of the parties hereto, immediately upon Chargee taking possession of the Premises or foreclosing the Charge or otherwise becoming the owner of the Premises; provided that notwithstanding such attornment, Tenant will be under no obligation to pay any rent or other amount owing under the Lease to Chargee by virtue of this Agreement until Tenant receives written notice from Chargee or its agent (including any receiver or receiver and manager) that an event of default under the Charge has occurred and is continuing and that Chargee is attorning such rents and amounts pursuant to the Charge.
3. **Obligations of Chargee while in Possession.** If Chargee takes possession of the Premises or forecloses the Charge or otherwise becomes the owner of the Premises, from and after the occurrence of such event and only so long as Chargee will remain in possession of the Premises or remain the owner of the Premises (but subject to the obligation of Chargee pursuant to paragraph 4 of this Agreement), Chargee will be bound to Tenant under the Lease, as landlord, and Tenant will have the same remedies against Chargee for the breach of any of the landlord's covenants therein contained which will occur during such period of possession or ownership that Tenant would have had under the Lease against Chargor, as landlord, provided, however, in no event will Chargee: (a) be liable for any act or omission of Chargor or any prior landlord, or (b) be liable for any obligations under the Lease from and after ceasing to be the owner of, or in possession of, the Premises.
4. **Sale by Chargee.** If Chargee sells the Premises, including any sale by way of power of sale, Chargee will obtain from the purchaser an agreement pursuant to which such purchaser will, from and after the date of such purchase, assume all of the obligations of the landlord under the Lease, subject to the proviso contained in paragraph 3 hereof. Upon such purchaser executing such assumption agreement, Tenant will attorn and be bound to such purchaser under all of the terms of the Lease for the balance of the term thereof remaining with the same force and effect as if such purchaser were the landlord

under the Lease and Tenant agrees, upon the request of Chargee, to execute any further instrument to evidence such attornment.

5. **Notices.** Any notice or other communication required or permitted to be given pursuant to this Agreement will be given or made in writing and will be served personally upon the party for whom it is intended, or mailed by prepaid registered mail or sent by facsimile transmission as follows:

in the case of Tenant addressed to:

Dufferin Solar Power Inc.
40 King Street West, Suite 5101
Toronto, Ontario M5H 3Y2

Attention:
Facsimile:

Email:

in the case of Chargee addressed to:

The Corporation of the County of Dufferin
55 Zina St
Orangeville, Ontario L9W 1E5

Attention:
Fax:
E-mail:

or to such other address or in care of such other person or to such other facsimile number as any party may from time to time advise the other party hereto by notice in writing. The date of receipt of such notice or other communication will be deemed to be the date of delivery of such notice or other communication if delivered personally or, if delivered by facsimile transmission, on the first business day next following transmission, or if mailed, on the third business day next following the date of such mailing provided that if at the date of such mailing interruption in the operation of the postal service of Canada does or is likely to delay the mailing, such notice or other communication will be delivered personally by facsimile transmission.

6. **Successors and Assigns.** This Agreement will enure to the benefit of and be binding upon the parties hereto and their respective successors and assigns. The Chargee acknowledges that Tenant will have the right to assign the benefit of this Agreement to any one or more chargee or mortgagee of Tenant's interest in the Lease and its and their successors and assigns.
7. **General Matters.** This Agreement is governed by the laws of the Province of Ontario and the laws of Canada applicable therein. This Agreement may be signed in counterparts and sent by facsimile or similar electronic transmission and each of such counterparts

will constitute an original document and such counterparts, taken together, will constitute one and the same instrument and be legal and binding on the party or parties executing the same. The parties hereby agree that this Agreement or the subordinations and postponements contained herein, or notice thereof, may be registered in the format required under the Province of Ontario's electronic land registration system against title to the Premises, and the parties hereby irrevocably authorize the solicitors of Tenant or Chargee to execute and register the documentation to effect the foregoing on their behalf and acknowledge that each will be a party thereto and bound thereby to the same extent as if the documentation had been signed by such party.

IN WITNESS WHEREOF the parties hereto have executed this Agreement.

**THE CORPORATION OF THE
COUNTY OF DUFFERIN**

DUFFERIN SOLAR POWER INC.

Per: _____
Name:
Title:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

[I/We] have the authority to bind the Corporation

[I/We] have the authority to bind the Corporation

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REPORT TO COMMITTEE

To: Chair Brown and Members of Infrastructure and Environmental Services Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **County Owned Land 195620 Amaranth-Grand Valley Townline - Future Considerations**

In Support of Strategic Plan Priorities:

Sustainable Environment and Infrastructure (SEI)- Protect assets both in the natural and built environment.

Economic Vitality - Promote an environment for economic growth and development.

Purpose

The purpose of this report is to inform Committee and Council on the opportunities currently being explored for the County-owned property located at 195620 Amaranth-Grand Valley Townline and to seek approval to continue to investigate opportunities for the property.

Background & Discussion

The 193.27-acre property located at 195620 Amaranth-Grand Valley Townline has been owned by the County for several years and was originally discussed for the purpose of a landfill site. Approximately 93.5 acres of the property is currently rented for agricultural use, while the remaining 99.77 acres is swampy and not suitable for farming, but is a natural wetland asset. While much of the property has been naturalized and remains vacant, there is a renewed interest by staff and various stakeholders to re-imagine what could be done on such a unique municipal asset. Recent interest from groups such as a local dirt bike club and the Dufferin Wind Power Inc. solar project has highlighted the need to formally discuss the property.

Any potential use for the property will require in-depth review in order to move forward. This review may include; legal, Conservation Authority, servicing needs, transportation,

planning, local municipal requirements, etc. For example, based on the Dufferin Wind Power Inc. presentation to Committee, there is an intent to connect the proposed solar farm to their existing transmission line along the County-owned former rail corridor. This transmission line was installed through an agreement with the County to service their previously constructed wind farm. This 2014 agreement stipulates several clauses including that the transmission line is permitted to serve only the lands associated with the wind farm. This is not to say that potential obstacles cannot be resolved, but it does highlight the need for detailed and thorough review. Municipal projects on the property would also be subject to similar review and would be subject to several costs related to servicing, roadwork, etc. as required by any given project.

Early conversations on the site's potential use have identified value in developing the property as a community-driven multi-use site with sustainability principles that align with local priorities. Opportunities for the property are being explored in collaboration with neighbouring municipalities, Conservation Authorities, post-secondary institutions, non-profits, and cooperative model private sector entities. Potential initiatives discussed have been framed to advance progressive energy planning, land stewardship, and local climate priorities while providing strong environmental, financial, and social benefits directly to the community.

Potential projects within the sphere explained above could include:

- Post-secondary research partnerships in areas such as agriculture innovation, circular food economy, and biodiversity enhancements
- Income-generating activities to support the financial sustainability of any on-site programs (e.g. pilot-sized renewable energy installation with community investment options, growing crops for biofuels)
- Expansion of recreation trails to develop as a tourism asset
- Creation of accessible garden plots dedicated to equity-deserving groups to support decolonization
- Education space for learning about any demonstration host projects on site (e.g. renewable energy, regenerative agriculture)

Funding opportunities through the [Federation of Municipalities' Green Municipal Fund](#) are available to support municipalities to conduct a study or plan, run a pilot, and then implement bold environmental projects, such as the ones above, that reduce greenhouse gas (GHG) emissions and protect the air, water or land. Funded projects deliver best-in-class municipal projects, meaning they are highly innovative and impactful. The County-owned property is a strong candidate for such funding program and has the capacity to become both a showcase site and a valuable tourism asset in Dufferin County.

As many of the projects envision the community as active users of the land, it is important to engage residents early in the process to create a shared vision for the future of the site. While prospective projects are at a preliminary stage and require further study, staff recognize the long-term potential of the site as well as the sensitive nature of land use change that requires thoughtful public engagement. Therefore, it is recommended that all possible options be fully explored and a master plan created prior to committing the property to a single prescribed use.

In line with this report, some current options for the property include:

1. Develop a master plan to fully explore a community-driven multi-use site with sustainability principles that align with local priorities as described above in this report;
2. Develop connections with local user groups, such as the dirt bike club, for all or portions of the property;
3. Proceed with further review and investigation to facilitate a solar project with Dufferin Wind Power Inc.;
4. Sell the land;
5. Do nothing.

Staff recommend proceeding with option 1 to ensure that a comprehensive review of all options is considered.

Financial, Staffing, Legal, or IT Considerations

None as a direct result of this update report.

Recommendation

THAT Report, County Owned Land 195620 Amaranth-Grand Valley Townline - Future Considerations, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be directed to develop a master plan for the property and explore other possible uses for the site and return to committee with recommendations on how to proceed.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

Prepared by:
Sara MacRae
Manager of Climate & Energy



REPORT TO COMMITTEE

To: Chair Brown & Members of the Infrastructure and Environmental Services Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **Climate Change – Advancing Adaptation Project Update**

In Support of Strategic Plan Priorities:

Sustainable Environment and Infrastructure (SEI)- protect assets both in the natural and built environment

Inclusive and supportive community (ISC) – support efforts to address current and future needs for a livable community

Purpose

The purpose of this report is to provide an update to Committee and Council on the County's progress in the *Advancing Adaptation* program.

Background & Discussion

The Dufferin Climate Action Plan (DCAP), adopted by Council in March 2021, includes greenhouse gas reduction targets to move the County to net-zero emissions by 2050, and a set of actions to serve as a roadmap towards achieving the community climate goals. The DCAP's focus is to reduce our collective emissions to slow down the impacts of human contributors to a changing climate. This said, climate change is and will continue to be experienced by communities including Dufferin County; flooding, extreme heat, changing water levels, and increased storms are only some of the impacts facing municipalities in Ontario and throughout Canada. Despite efforts to reduce emissions, communities will continue to experience the impacts of climate change for years to come and must be prepared by building resilient infrastructure and communities while continuing to reduce greenhouse gases.

In September 2022, Dufferin County was accepted into the *Advancing Adaptation* program administered by the International Council for Local Environmental Initiatives

Canada (see October 28 2021 report). *Advancing Adaptation* is a no-cost program in Ontario that supports municipalities in becoming climate-ready communities. Dufferin County was accepted into the program for two consecutive phases:

- 1) Risk and Vulnerability Assessment: November 2021 –April 2022
- 2) Adaptation Planning: May 2022 – December 2022

In April 2022, the County completed Phase 1 of *Advancing Adaptation* with the output of a Community Risk and Vulnerability Assessment Report. The report summarizes and prioritizes climate impacts that pose a significant threat to Dufferin County. A Climate Adaptation Working Group (CAWG), comprised of County and local municipal staff, and representatives from diverse community organizations, was formed to collaborate in the assessment process. Staff facilitated two workshops and a virtual assessment survey in which members of the Climate Adaptation Working Group used local climate projections and an equity lens to identify how the community could be impacted by a changing climate and to what degree.

The County is currently undertaking Phase 2 of *Advancing Adaptation*. During this phase, the CAWG will examine best practices from other municipalities, and identify adaptation actions through collaborative engagement to produce an implementation-ready climate adaptation strategy. The climate adaptation strategy is expected to be completed by the end of 2022 and will be presented for adoption in 2023.

Financial, Staffing, Legal, or IT Considerations

Interdepartmental staff participation is critical to this project. Beyond the Climate and Energy division, nine County staff members have been identified to have specific knowledge that will meaningfully contribute to this process. Those staff have been asked to commit 12 hours to the project running between November 2021 to December 2022.

Recommendation

THAT Report, Climate Change - Advancing Adaptation Project Update, dated June 23, 2022, from the Director of Public Works/County Engineer, be received.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

Prepared by:

Sara MacRae
Manager of Climate & Energy

REPORT TO COMMITTEE

To: Chair Brown and Members of Infrastructure and Environment Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **Regional Electric Vehicle Charging Network Strategy – Summary Report**

In Support of Strategic Plan Priorities and Objectives:

Sustainable Environment and Infrastructure (SEI)- protect assets both in the natural and built environment

Economic Vitality - Promote an environment for economic growth and development

Purpose

The purpose of this report is to update Committee and Council on the completion of the Regional Electric Vehicle Charging Station Network Strategy.

Background & Discussion

In spring 2021, Dufferin entered into agreements with the neighbouring municipalities of Wellington County, Perth County (including St. Marys and Stratford), Grey County, Huron County, Bruce County and the City of Guelph to apply for funding to develop a regional electric vehicle (EV) charging network strategy. Strategy objectives are:

- To better understand charging needs of current and future EV drivers.
- To identify suitable locations for Direct Current Fast Chargers (also referred to as DCFC or Level 3 chargers) and banks of Level 2 chargers to support tourism and economic development across the study area.
- To identify strategies to manage dwell time (the amount of time drivers stay at a charger) in areas of high demand for parking.

The main Summary Report is attached which includes an executive summary.

The County of Wellington led this effort on behalf of the Partnership. The Partnership was successful in acquiring \$35,150 from Federation of Canadian Municipalities Green Municipal Fund to undertake the project. The municipal partners equitably contributed the remaining funds of approximately \$5,000 each.

The Community Energy Association was contracted in fall 2021 to guide the partnership in this undertaking. The Association has completed several regional EV charging network strategies in western Canada including the award-winning Accelerate Kootenays network.

Project Engagement

The Strategy development process included surveys with existing EV drivers who live in or visit the study area and with study area residents who do not currently own an EV. The surveys were designed to better understand driver charging preferences and project EV adoption over the next several years. Engagement also included the formation of a technical advisory group consisting of representatives from local electricity providers, including Orangeville Hydro, Hydro One, and the Independent Electricity Systems Operator (IESO). The technical advisory group provided input into the capacity of the local electrical grid to support future charging infrastructure and site-specific capacity to host DCFC (i.e. the presence of a phase-3 power source).

Project Outcomes

Resident surveys showed that 76% (659 people) of respondents are considering buying an EV in the next two to five years. Projected across the study area, local EV adoption will lead to an estimated net annual savings of greenhouse gas emissions of 5,623 tCO₂e/year by 2025 and 58,119 tCO₂e/year by 2040. The project team developed siting criteria with which the recommended sites must meet. The network plan recommends the addition of 17 DCFC chargers across the study area. One DCFC was recommended in Dufferin County within the Town of Shelburne to supplement the other two DCFC chargers that are part of Dufferin's *Charge Up in Dufferin* Network.

The partners are currently working to determine the logistics and processes needed to continue to work together to implement the recommended DCFC network across the study area.

Participation in this initiative supports action T4 of the Dufferin Climate Action Plan: *Work with regional and municipal partners to expand low and zero-emission vehicle uptake and charging networks.*

Financial, Staffing, Legal, or IT Considerations

The Strategy identifies available funding opportunities for implementation as well as models for EV charger ownership. The Strategy recommends a third-party ownership model, thus no municipal capital impact at this time.

Recommendation

THAT Report, Regional Electric Vehicle Charging Network Strategy – Summary Report, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be approved to continue to work with the partnership to determine the next steps regarding implementing the Strategy.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

Prepared by:
Sara MacRae
Manager of Climate & Energy

Attachment: Regional EV Network Strategy Summary Report 2022

Regional EV Charging Network Strategy

Summary Report
May 2022



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Acknowledgements

This strategic plan would not be possible without the input and guidance from the following:

Project Partners: County of Wellington, County of Perth, County of Dufferin, Bruce County, City of Guelph, City of St. Marys, City of Stratford, Huron County, Grey County and Nuclear Innovation Institute.

Study Area Municipalities: Town of Goderich, Municipality of Bluewater, Municipality of South Huron, Township of Ashfield-Colborne-Wawanosh, Municipality of Central Huron, Municipality of Huron East, Municipality of Morris-Turnberry, Township of Howick, Township of North Huron, Township of Wellington North, Town of Minto, Town of Erin, Township of Puslinch, Township of Guelph-Eramosa, Township of Mapleton, Township of Centre Wellington, Municipality of North Perth, Township of Perth East, Township of Perth South, Municipality of West Perth, City of Stratford, Town of St Marys, Township of Chatsworth, Township of Georgian Bluffs, Municipality of Grey Highlands, Town of Hanover, Municipality of Meaford, City of Owen Sound, Township of Southgate, Town of The Blue Mountains, Municipality of West Grey, Township of Amaranth, Township of East Garafraxa, Town of Grand Valley, Township of Melancthon, Town of Mono, Township of Mulmur, Town of Orangeville, Town of Shelburne, Town of Saugeen Shores, Municipality of Kincardine, Municipality of Brockton, Town of South Bruce Peninsula, Municipality of Arran-Elderslie, Township of Huron-Kinloss, Municipality of South Bruce, Municipality of Northern Bruce Peninsula.

Technical Advisory Group: Westario Power, EPCOR, Festival Hydro, Hydro One, Alectra, Centre Wellington Hydro, Wellington North Hydro, EARTH Power, Orangeville Hydro, Bruce Power, IESO

Project facilitator: Community Energy Association. CEA recognizes that communities play a critical role in addressing climate change and as a not-for-profit organization, we do what it takes to help local governments accelerate the transition to a low-carbon, resilient future. This includes identifying the sources of local greenhouse gas emissions, planning how to reduce emissions, and implementing the best solutions - all in ways that build local capacity and foster collaboration among governments, Indigenous communities, energy providers, and citizens.

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This project was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.



SECTION ONE Executive Summary

Electric Vehicle (EV) ownership has grown considerably in Ontario, along with opportunities for rural communities to benefit from EV tourism. The partnership of County of Wellington, County of Dufferin, County of Perth, County of Huron, Bruce County, County of Grey, City of Guelph, and Nuclear Innovation Institute (hereafter referred to as “the Partners”) – want to ensure residents and businesses in their collective region (hereafter referred to as the “Study Area”) are afforded the opportunity to benefit from the transition to EVs. They are therefore collaborating to develop a regional EV charging network strategy. By working together and across boundaries, they can amplify success and gain more from their resources than they can alone. Specifically, the Partners realized that when they implemented stations independently, they had an insufficient network; by collaborating, they can leverage time and resources to build a cohesive charging experience that allows EV drivers to travel throughout the region. Currently, the region has 22 Level 3 (DC Fast Charging) and 145 Level 2 EV charging stations for public use.

Strategically designing an EV charging network that facilitates travel to and within a region is particularly important in rural areas where distances between communities are large, yet critical services often require travel to neighbouring areas. There are two key benefits of thoughtfully designing and implementing a charging network. First, it can make EV ownership more realistic for rural residents as well as urban residents who want the freedom to visit rural amenities. Second, supporting EV travel builds co-benefits. Beyond the driver experience, the Partners recognized that by strategically deploying fast charging stations throughout the Study Area, they ensure the communities in their region gain economic and environmental benefits from EV travel – enhanced tourism and lower pollution, respectively.

The Partners hired Community Energy Association (CEA), a non-profit with deep expertise in regional EV charging network planning and implementation, to develop this strategy. CEA created and facilitated a process to support the Partners to succeed in installing Level 3 (DC Fast Charging) and Level 2 charging stations that contribute to the network as a whole while offering benefits to the host community.

The following outcomes informed the strategy:

- the results of an EV driver and local resident feedback survey
- an assessment of the existing and planned EV charging stations and charging station gap analysis
- an assessment of options to address prolonged dwell time at charging stations
- the development of siting criteria to reflect both the local context and the Partners’ goals
- an analysis of opportunities to incorporate renewable energy into station design

This regional EV charging network strategy proposes the installation of an additional seventeen Level 3 (DC Fast Charging) EV charging stations and 13 banks (at least four stations) of Level 2 EV charging stations across the Study Area. To ensure the network is constructed to meet current and future (>five plus years) demand and technology advances, this strategy proposes the installation of at least two >100kw Level 3 (DC Fast Charging) EV charging stations at each identified location.

Level 3 (DC Fast Charging) stations will primarily serve longer-distance travellers passing through a community. Banks of Level 2 charging stations will compliment these core fast charging stations because they service visitors who are coming to the community for a longer stay and as such must be sited strategically at destinations with a longer (2+ hours) dwell time. Increasing the number of Level 2 chargers across the region can also benefit residents who may not have access to home charging. This coordinated approach can reduce prolonged dwell time that some of the Partners identified as a challenge at locations where access to EV charging is limited. The strategy also explores potential solutions to further address dwell time.

Adoption of EVs can present significant environmental benefits to the Partners and their communities. A summary of the analysis and estimated emission reductions for 2030, 2040 and 2050 is included. Similarly, the Partners noted the opportunity to power charging stations with renewable energy. The strategy includes a guide for evaluating proposed sites.

There is significant federal funding available or coming available soon (Summer/Fall 2022) for EV charging network implementation. The strategy provides a discussion of implementation options for information as the Partners plan their next steps.

Benefits of EVs

1. You'll save on fuel costs

Electricity is not only cleaner than gas, it's also cheaper. Especially when you charge at home.



2. You'll save on maintenance

EVs have far fewer moving parts than gas vehicles, so there's a lot less that can go wrong. No transmission or exhaust system to maintain and no more oil changes!



3. You'll love driving it

Driving an EV is fun, fast and QUIET.



4. Breathe clean air

With no exhaust system, you won't be filling the air with pollution. Better for you and better for the planet.

5. Enjoy some perks

If you own an EV in Ontario you can apply for a HOV lane/EV permit and decal. This allows you to drive in HOV lanes even if it's just you.



6. Showcase your values

There are other social benefits to driving an EV. You're signaling that you and/or businesses value sustainability and this can inspire others to make low carbon choices too.





SECTION TWO Introduction

Background

The partnership of County of Wellington, County of Dufferin, County of Perth, County of Huron, Bruce County, County of Grey, City of Guelph, and Nuclear Innovation Institute (hereafter referred to as “the Partners”) – want to ensure residents and businesses in their collective region (hereafter referred to as the “Study Area”) are afforded the opportunity to benefit from the transition to EVs. The strategy provides the Partners with guidance on how to install EV chargers including a network of Level 3 (DC Fast Charging) and Level 2 EV charging stations thoughtfully and strategically. The following outcomes inform the strategy:

- results of an EV driver and local resident feedback survey
- an assessment of the existing and planned EV charging stations and charging station gap analysis
- an assessment of options to address prolonged dwell time at charging stations
- opportunity to harness renewable energy
- siting criteria developed by the Partners

The Partners understand that with EV ownership growing in the region, in Ontario, and in surrounding jurisdictions including neighboring provinces and states – Quebec, Michigan, Ohio, Pennsylvania, New York, their communities have much to gain from facilitating travel to and within their region.

Over the past five years, the Partners have individually planned and implemented various local EV charging stations. The installation of this charging infrastructure has been in response to the acquisition of supportive funding and has not, to date, been informed by a comprehensive strategy. Many of the existing stations in the Study Area are located to support municipal staff and community members at Town Halls, recreational facilities, and in public parking lots. While this is a commendable first step to support EV adoption and travel, the growth of EVs now requires a more coordinated and holistic approach; a well-planned EV charging network can avoid challenges experienced in other jurisdictions (e.g., long dwell times) while acting as a catalyst to build economic and environmental benefits.

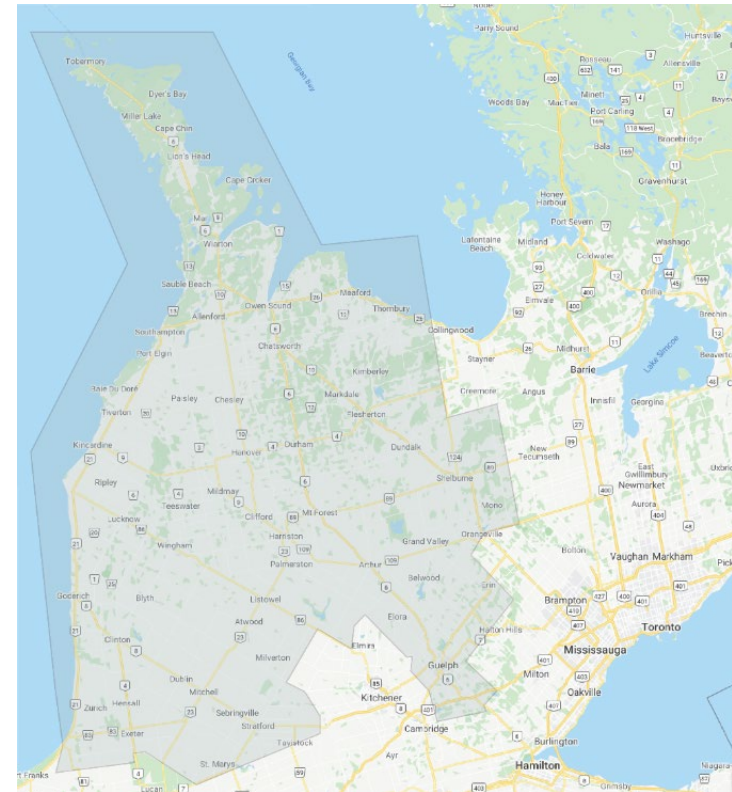


Figure 1. Map of southwestern Ontario. Grey shape indicates boundary of project Study Area.

Rather than installing chargers one-by-one as the opportunity arises, a charging network strategy considers how each station is useful and beneficial on its own while contributing to the network. This includes evaluating the distance between chargers and connections along travel routes; strategically locating charging stations near tourist destinations (e.g., restaurants, attractions, shopping, etc.); and giving existing EV drivers the opportunity to lend their real-world experience. This final point, EV driver input, is an important tactic to consider so that future stations will, ultimately, be used! EV drivers can offer insights into preferred charging locations, perception regarding the ease of charging in the community and other factors that influence driver use of charging stations.

Further, there have been reports of local drivers using public charging stations as personal chargers, reducing their availability for visiting EV drivers and increasing demand for parking in high traffic tourist areas which the Partners wish to solve. The 2021 study [*Plugging In, Why Bruce Grey and Huron must prepare for an Electric Vehicle Future*](#) by Nuclear Innovation Institute and Plug 'N Drive revealed that EV drivers perceive charging in Grey, Bruce and Huron Counties as being difficult or very difficult.

Scope

Figure 1 depicts the Study Area for the EV charging network strategy. It encompasses the Counties of Grey, Dufferin, Perth, Huron, Bruce, Wellington and Cities of Guelph, Stratford, and St. Marys. Notably, the urban municipalities Kitchener & Waterloo are not included.

EV Charging Network

EV charging networks facilitate travel to and within a region. Designing and implementing networks thoughtfully can help a region's residents and visitors adopt EVs. By strategically deploying fast charging stations throughout the Study Area, the Partners will ensure that the rural communities gain economic and environmental benefits from EV travel all while supporting greater adoption of EVs across the province by enabling long distance travel. The decision to purchase an electric vehicle is driven by several factors; however, the ability to travel to desirable destinations reliably is a major factor. Regional connectivity to larger urban centres can drive electric vehicle adoption in those cities while also bolstering opportunities for economic development and tourism. The Study Area encompasses several significant destinations. By electrifying routes to and within the region, the communities within the region will have an opportunity to capture a significantly growing market of EV tourists from major drivable markets within Ontario and across the US border.



Level 3 DC Fast Charging station in a small BC community as part of Accelerate Kootenays

Strategic siting of the EV charging stations across the region can support network connectivity while also maximizing economic benefits to the region. It is important to site charging stations so drivers can easily access local amenities like shopping, restaurants, and cafes, as well as parks, museums and other local attractions. This integration of EV driver needs with local economic development opportunities ensures drivers will use the infrastructure while also leveraging investments to gain as many benefits as possible. Creating a base network across a region can bring confidence to the private sector and attract future investment to build and expand access to EV charging.

Previous EV charging networks that have resulted in a marked increase in EV visitors and local resident adoption of EVs has informed the approach to this regional EV charging network strategy. Specifically, Southern Alberta's [Peaks to Prairies](#) and Southeastern British Columbia's [Accelerate Kootenays](#).

Deliverables & Outcomes

The following is a summary of the deliverables and outcomes of the regional EV charging network strategy:

- Collect public input via a survey and incorporate into proposed EV charging network design.
- A proposed network of Level 3 (DC Fast Charger) EV charger stations across the Study Area, including location, site and a preliminary desktop technical feasibility analysis.
- A proposed network of banks (e.g., more than four chargers and at one site) of Level 2 EV chargers across the Study Area, complimenting the proposed Level 3 (DC Fast Charger) network and addressing demand in high volume traffic corridors and destinations.
- A summary of optional pathways for implementation of the EV charging network strategy.
- A guide for assessing EV charging station sites for suitability for solar arrays.
- A summary of different methodologies for addressing extended dwell time at EV charging stations.

Dwell time is the amount of time an EV is plugged into a charging station. At busy charging stations, extended dwell times can inconvenience drivers who really need to charge to continue their travels. In the context of small communities, it has been observed that residents may occupy a charger even when they do not “need” the energy. If an EV is parked and occupying a charger because it's convenient, that long dwell time means a visitor may not have access.



SECTION THREE Research & Analysis

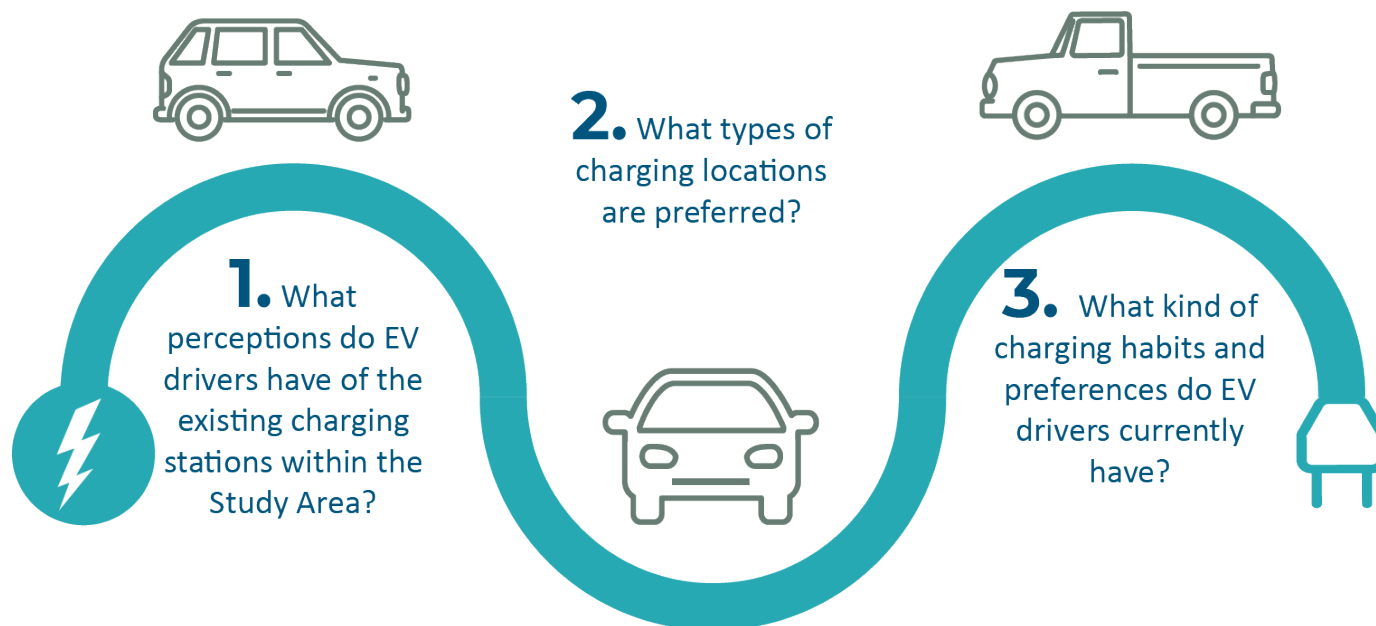
Public Surveys

At the project's onset, CEA developed a Resident and EV Driver survey. Previous work by CEA in B.C. and Alberta informed these surveys and the team adapted the questions to reflect the local context of the study area. The resident survey targeted individuals who reside in the Study Area, while the EV Driver survey sought input from drivers within and outside the study area. The intended reach included surrounding states in the USA and neighbouring provinces. This section summarizes the results of the surveys; for full resident survey results, see Appendix 1.

EV Driver Survey Analysis

Expanding upon the study completed by Nuclear Innovation Institute (NII) and Plug 'n Drive title, *Plugging In, Why Bruce, Grey and Huron Must Prepare for an Electric Future* (2021), the EV driver survey solicited input on the perceptions of charging within the study area, preferred charging locations and charging and driving habits. The research team also extended the driver survey to American EV drivers who have visited or intend to visit the study area.

The three main questions the EV driver survey sought to answer:



The survey had 330 responses. The dominant age group of responders being 45-54 (24%) (Figure 2). This is consistent with previous analysis of EV ownership. Specifically, the recent survey and analysis completed by Natural Resource Canada (November 2021).

Question 19: Do you think a fee should be applied to charge at Level 2 stations?

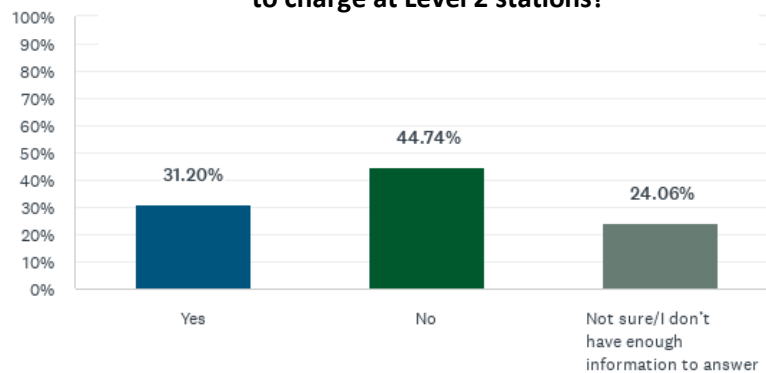


Figure 3. EV Driver Survey Question 19: Do you think a fee should be applied to charge at Level 2 Stations?

Most EV driver respondents indicated that they own their home (single or semi-detached house), but most do not have a charger installed. This is noteworthy because if the drivers cannot charge at home, they will make use of public infrastructure. This behavior leads to increased demand and potentially less opportunity for visitors to use public charging stations. To this point, survey respondents were asked if a fee should be applied to charge at Level 2 stations—only 30% said yes (Figure 3). However, most participants agree with a stepped fee to limit dwell time. A stepped fee is one that increases the longer an EV is plugged into a charger. For example, zero to two hours at a Level 2 charger costs \$2/hr. but at set time intervals, the fee increases. The intent of a stepped fee is to discourage users from occupying a charging station when charging is not needed. The nature of the site and associated amenity should be considered when determining fees. For example, a stepped fee may not be appropriate at a location where dwell time is likely to be longer than 2 hours, and sufficient infrastructure has been installed to meet demand (for example, at a ski hill destination, where it is unlikely a driver would be able to return within 2 hours to move their vehicle).

Question 1: What is your age range?

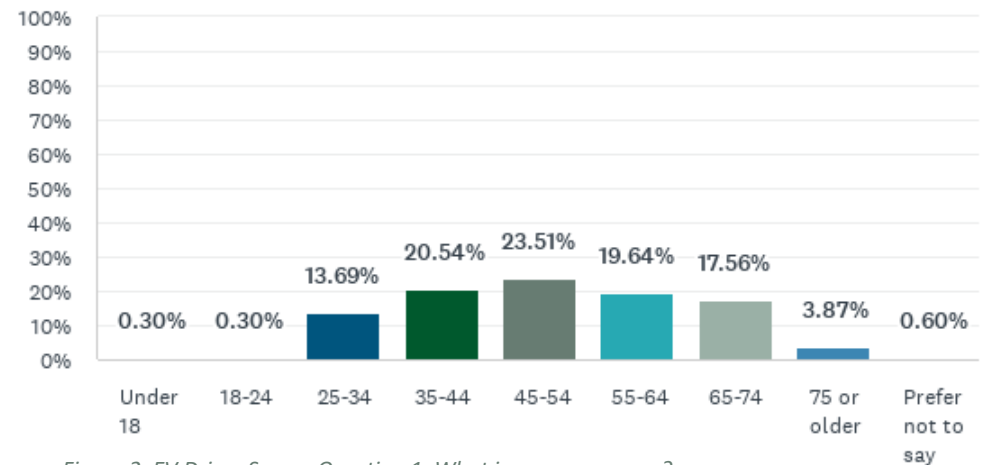


Figure 2. EV Driver Survey Question 1: What is your age range?

Most EV driver respondents indicated that they own their home (single or semi-detached house), but most do not have a charger installed. This is noteworthy because if the drivers cannot charge at home, they will make use of public infrastructure. This behavior leads to increased demand and potentially less opportunity for visitors to use public charging stations. To this point, survey respondents were asked if a fee should be applied to charge at Level 2 stations—only 30% said yes (Figure 3). However, most participants agree with a stepped fee to limit dwell time. A stepped fee is one that increases the longer an EV is plugged into a charger. For example, zero to two hours at a Level 2 charger costs \$2/hr. but at set time

Over 95% of respondents were from Ontario with a small number of Nova Scotia, Quebec, and Manitoba households. Of these Ontario residents, 79% indicated they live in the Study Area and 16% responded that they have visited for tourism and recreation.

Not surprisingly given the current low volume of public EV charging stations available in the region, respondents cited range anxiety as a significant barrier to owning an EV and 29% identified the challenge of EV chargers being in use when needed. However, 88% of respondents take their EVs for longer trips outside their communities. Notably, most survey respondents have a second car in their household and most of the second cars are internal combustion engine vehicles.

To accommodate the lack of EV charging stations, EV drivers alter their behaviours to ensure they can get to where they want to go (Figure 4). This is important data to support the concept of strategically creating a network of stations. There is opportunity to site stations so that they are convenient for drivers while also connecting them to amenities to visit while they charge.

As per Figure 5, while using a public charger, drivers tend to look for places to eat, shop, and exercise. This insight was helpful to the Partners when developing the siting criteria for new EV charging stations in the Study Area.

Survey respondents further indicated that the most important features of public EV chargers are reliability, charging speed, and proximity to a planned route. Additionally, and of significance to the Partners when it comes to planning for implementation, powering EV charging stations with electricity from renewable energy sources is also important to most survey participants.

Question 23: If you answered yes to the previous question, has owning an EV changed how you plan your trips? Specifically, in what ways do your behaviours change, if any?

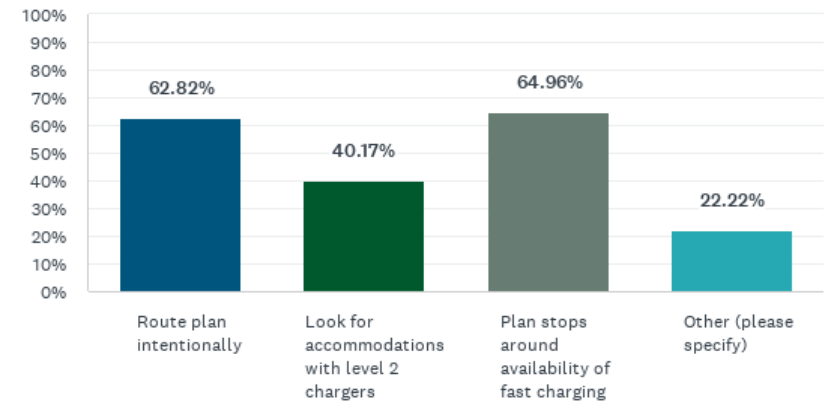


Figure 4. EV Driver Survey Question 23: If you answered yes to the previous question, has owning an EV changed how you plan your trips? Specifically in what ways do your behaviors change, if any?

Question 27: While using a public charger, how would you prefer to use your time while the car charges?

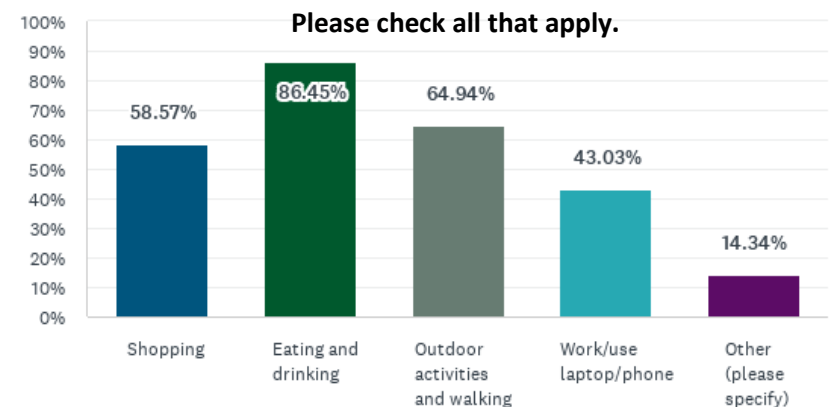


Figure 5. EV Driver Survey Question 27: While using a public charger, how would you prefer to use your time while the car charges?

Residents Survey Analysis

The audience of the second survey was residents who do not own an EV. This survey examined the barriers to EV adoption and sought to understand the impact a regional EV charging network may have on residents' future vehicle purchasing decisions including their likelihood to purchase an EV. In total, 1,015 individuals participated in the resident survey. The majority reside in (listed in descending order of number of responders per community) Guelph, North Bruce, Saugeen Shores, Center Wellington, St. Marys, West Grey, West Perth, South Bruce Peninsula, North Perth, Kincardine, Owen Sound, Brockton, Puslinch, Grey County, Goderich, Meaford, Arran-Elderslie, Bruce County, Mono, Dufferin County, Grey Bruce, Wellington County, Amaranth, Central Huron, Huron County, Huron Kinloss and Orangeville.

Interestingly, cars, not SUVs or trucks are the number one type of vehicle driven by those who responded. Currently, the majority of EVs available to consumers are compact cars. This bodes well for adoption of EVs in the Study Area because the models currently driven matches with the type of passenger vehicle currently available. This is a notable difference from some other rural areas like BC and Alberta where most households' own trucks and SUVs. Furthermore, the much-anticipated arrival of electric pick-up trucks and larger SUVs will provide consumers in the region with even more options.

Question 16: If you were considering buying an EV, which factors would motivate you? Please check all that apply.

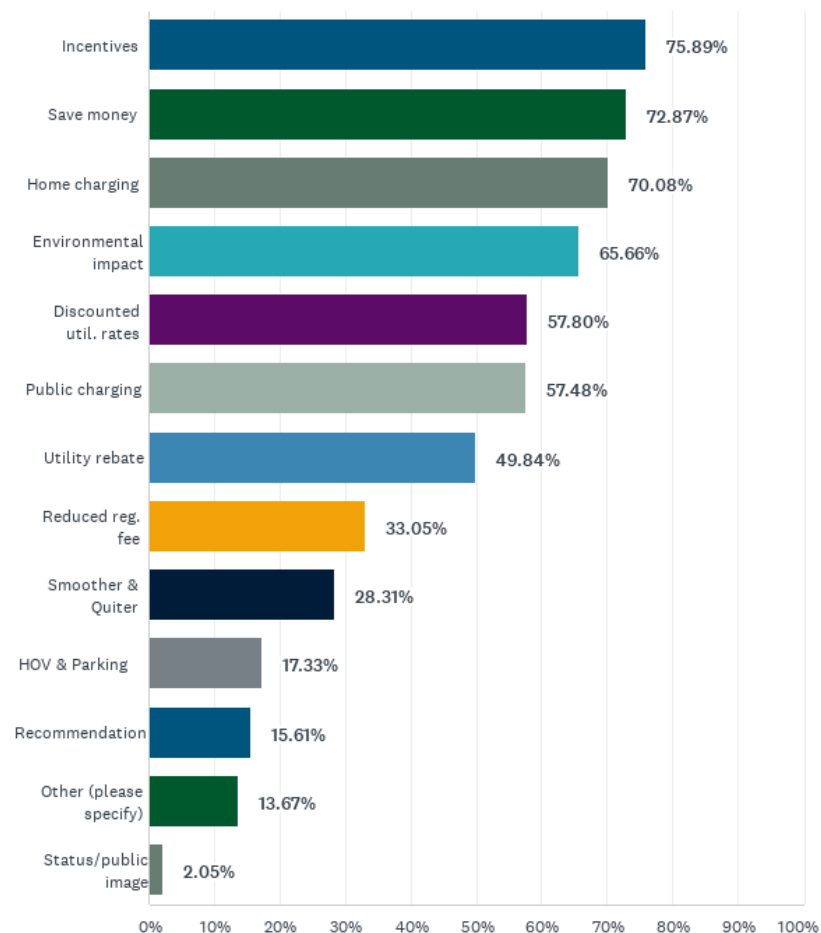


Figure 6. Resident survey question 16: If you were considering buying an EV, which factors would motivate you?

Sixty-seven percent (659 people) of respondents are planning to buy a new vehicle in the next two to five years and all indicated they are considering an EV, meaning there could potentially be 659 new EVs on the road in the Study Area in the coming years. Notably, the survey had a small sample size. If that same percentage (67%) were applied across the whole region the number is even larger, and if we assume even half of that it's still a significant growth as compared to today.

The biggest motivators for residents to buy an EV are receiving EV tax rebates and incentives, having access to home charging, and saving money (Figure 6).



Only about half of responders know someone who has an EV. Forty-eight percent of people said they would source information on buying an EV from friends and family and 48% said they would use consumer reports. The main source of information preferred by residents is internet search (90%).

Investigating barriers to purchasing an EV, 45% of responders believe a lack of charging for long trips is an extreme concern for owning an EV, and 25% indicated they felt “very concerned” about the lack of charging. Negative perceptions of EV driving range and EV performance in winter continue to be a barrier to EV adoption, like most jurisdictions across Canada.

A lack of at-home and workplace charging were not significant concerns of survey respondents, but this might be because most of the residents who responded live in single-family detached or semi-detached homes; challenges associated with charging at home are often bore by residents of multi-unit residential buildings where stratas may not be supportive of installing charging.

Finally, most participants in the resident survey agree that it is important that EVs are powered by renewable energy. However, they don't feel as strongly about this when compared to the EV driver survey responders.

Question 18: Listed below are some of the most common real and perceived barriers to EV adoption. How concerned would you be about the following when purchasing an EV?

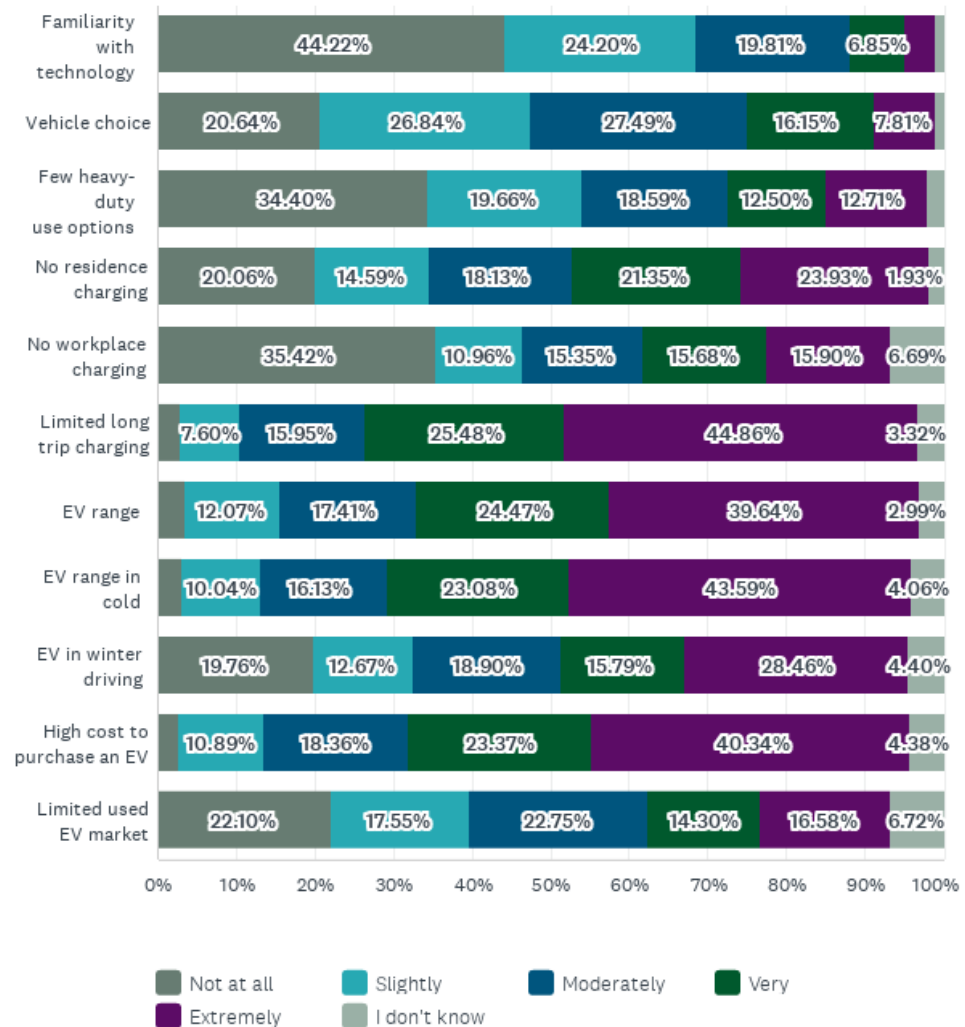


Figure 6. Resident survey question 18: Real and perceived concerns when considering purchasing an EV.

Additional Opportunities

When analyzing the survey, CEA flagged additional opportunities for partner communities to support EV adoption by expanding the places and spaces where charging infrastructure can be found in the Study Area. While these opportunities are out-of-scope for the present strategy – workplaces, residential or multi-unit residential contexts – opportunities include:

- Incentives and/or outreach and engagement to encourage businesses-owners/workplaces to install Level 2 chargers is key. Most of the EV drivers who responded do not have home chargers. EVs are typically parked at home and workplaces for extended periods (6-8 hrs. or longer), ideal for Level 2 charging. In the absence of provincial incentives, local governments may want to evaluate opportunities to support businesses to undertake these behaviours, especially where chargers can be accessed by both the public and staff.
- Incentives and/or outreach and engagement to support homeowners to install Level 2 chargers at home. Charging overnight during off-peak hours is a tremendous opportunity. Increasing the number of EV drivers who charge at home has the added value of freeing up public stations for visitors or those who strictly are not able to add a charger to their residence – renters, condo-dwellers, etc.
- Increased communications regarding existing EV charging network. While the current network is not robust, there are EV charging options in the Study Area that could serve the driving habits of several residents and visitors. A communications campaign in partnership with local governments and tourism agencies could help some residents see that the current charging options in fact meet their needs.
- Communication of available EV car models on the market today. The survey indicated that most residents currently drive cars and will replace like-for-like when their current car retires. Given that there are many EV car models on the market, and at least 659 people plan to buy a new car in the next 2-5 years, there is an opportunity for them to all be EVs. A collaboration with Plug N Drive and their Mobile Electric vehicle Education Trailer (MEET) could be a critical first activity. Additional engagement with local dealerships will further amplify the messaging.
- Add EVs to municipal/county fleets and create communications materials to address EV myths (e.g., reliable in cold weather). Through leading by example, counties and municipalities can help build confidence and normalize seeing EVs on regional roads.
- Survey responses of non-EV drivers indicate that many residents maintain misconceptions about the reliability of EVs. Outreach and engagement activities to address EV myths could help the EV-curious feel more confident in the technology.

Literature Review

The literature review provides a summary of published documents and information relevant to the Regional EV Charging Network Strategy for the Partners. The review serves to create familiarity with current thinking on EV charging in the project area, provincially, federally, and in neighbouring states. The scope of the literature review is to consider the future demand for EV chargers in the study area, and recent investments and commitments made by the Provincial and Federal governments regarding EV manufacturing and the goal to have all new vehicles be electric by 2035.

The review encompasses three sections:

- EV related policies, targets, infrastructure and zero emission vehicle (ZEV) mandates
- Current and forecasted electric vehicle registrations
- Co-Benefits of EV adoption

Current EV related policies, targets, infrastructure and zero emission vehicle mandates

EV related policies and targets locally, provincially, nationally and in neighbouring States as applicable

At the **local level**, none of the Partner communities have a policy requiring new buildings to be EV ready at the completion of construction. The definition of EV-ready is having capacity at the electrical panel for a Level 2 EV charger and the necessary conduit running from the panel to the parking space. Further, none of the Partner communities have a policy committing to purchase EVs as they retire vehicles within their municipal fleets. A handful of municipalities in and close to the Study Area, including Toronto, Owen Sound, Southgate, and The Blue Mountains, have committed to increasing the adoption of EVs by the municipality and its residents.

A review of the Partners municipal planning documents identified the following commitments regarding emission reductions in the transportation sector: (see over page)

Town of Goderich

Over the last few years, the Town has added two EVs to its fleet, and Public Works has started to replace certain types of machinery and equipment (e.g., weed whackers) with battery-operated. As a result of this awareness, at the August 16, 2021 Council meeting, Goderich Town Council adopted an amendment to the Town's Asset Management Policy, at the recommendation of the Environmental Action Committee, to require the consideration of electric, energy-efficient, or alternative fuel source fleet, machinery, and equipment at an affordable lifecycle cost at the time of an asset's replacement.¹

Grey County

Grey County adopted their first Climate Change Action Plan, *Going Green in Grey* in 2022. It establishes a Net-Zero by 2050 community GHG emissions reduction target, and Action 7 identifies zero-emissions vehicle adoption as a priority next step. Grey County is also electrifying its Corporate fleet.

Dufferin County

The 2021 Dufferin Climate Action Plan commits the County to Net-Zero emissions by 2050 with an interim reduction target of 10% by 2030. To help achieve this, Dufferin has prioritized 'accelerating the transition to low-GHG transportation by developing an EV charging station network across Dufferin and neighbouring municipalities.'

City of Guelph

As per their Climate Action Plan, the City of Guelph is targeting GHG emission reductions to net-zero by 2050. They have identified 20 priority actions; #17 states their objective to 'Electrify personal vehicles'.

Huron County

The County recently completed their Corporate Climate Action Plan, in which they identify several goals and supporting actions. Of interest for this Review is Action 14.1 *Apply for funding to install electric vehicle chargers across the County in partnership with local municipalities.*

Perth County

The County's (includes communities of Stratford and St. Marys) Corporate and Community Climate Action Plan outlines their Vision 'to mitigate climate change risks by ambitiously reducing local greenhouse gas emissions, and will ensure a more resilient and healthy future for our communities.' They specifically focus on decarbonizing vehicles via Action 3. *Install charging stations*

Wellington County

As per the 2021 Climate Change Mitigation Plan, the County committed to GHG emission reduction targets for the community of 6% by 2030 and 80% by 2050. The County is anticipating growing interest in EVs in forthcoming years and identified a suite of supporting actions (TS1 – TS5) to address growing interest and achieve GHG emission reduction targets.



Provincially, the Government of Ontario commits to reducing emissions to 30% below 2005 levels by 2030, a target that aligns with the Federal Government's Paris commitments.¹ However, there are no provincial policies regarding EVs or EV charging infrastructure. The forthcoming Provincial election (June 2022) may result in significant changes in this space and CEA recommends completing a follow-up review six months following the election. Notably, since coming into power in 2018, the government scrapped an existing buyer incentive program, which provided up to \$14,000 on the purchase of an EV. For comparison, buyer incentives exist in eight provinces and territories. The government also removed a \$2.5 million incentive program that helped homeowners install their own charging equipment. The government also removed EV charging station requirements in Ontario's building code.²

Federally, the Government of Canada's climate targets are to reduce GHG emissions by 40% to 45% below 2005 levels by 2030 and to achieve net-zero emissions by 2050.³ The Government of Canada also remains committed to aligning with the most ambitious light-duty vehicle GHG regulations in the United States. Supporting a strong and unified North American automotive sector to transition towards zero-emission vehicles contributes to Canada's climate change goals. It positions Canadian and American workers alike to benefit economically from this global shift⁴. The Government of Canada is making investments to support the transformation towards electrification, including contributing \$295 million to the Ford Motor Company of Canada's \$1.8 billion project to build electric vehicles at its Oakville Assembly Complex.⁵

Across the border, several municipalities and states have communicated EV related policies and targets. For example, in September 2021, the Regional Electric Vehicle Midwest Coalition ("REV Midwest") established a Memorandum of Understanding between the five States of Illinois, Indiana, Michigan, Minnesota, and Wisconsin. The Coalition creates a regional framework to accelerate vehicle electrification in the Midwest. REV Midwest provides the foundation for cooperation on fleet electrification along key commercial corridors to safeguard economic security, reduce harmful emissions, improve public health, and advance innovation. REV Midwest will future-proof the region's manufacturing, logistics, and transportation leadership, and position the region to realize additional economic opportunity in clean energy manufacturing and deployment.

¹ Government of Ontario. (2022). *Climate Change*. <https://www.ontario.ca/page/climate-change>

² Syed, F. (2021). Electric vehicles in Ontario: a look at Doug Ford's love-hate relationship. *The Narwhal*. <https://thenarwhal.ca/ontario-electric-vehicle-policy/>

³ Government of Canada. (2022). *Net-Zero Emissions by 2050*. <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html>

⁴ Transport Canada. (2021, June 29). *Building a green economy: Government of Canada to require 100% of car and passenger truck sales be zero-emission by 2035 in Canada* - Canada.ca. Government of Canada. <https://www.canada.ca/en/transport-canada/news/2021/06/building-a-green-economy-government-of-canada-to-require-100-of-car-and-passenger-truck-sales-be-zero-emission-by-2035-in-canada.html>

⁵ Government of Ontario. (2021). *Driving Prosperity*. https://www.ontario.ca/page/driving-prosperity-future-ontarios-automotive-sector?utm_source=newsroom&utm_medium=email&utm_campaign=%2Fen%2Frelease%2F1001176%2Fontario-stakes-its-claim-to-compete-for-future-auto-sector-investments&utm_term=media

The Coalition will develop a coordinated approach to advance electrification that is informed by industry, academic, and community engagement. The Coalition will work together to enable an equitable transition to EVs for all with specific consideration for communities that are historically disadvantaged. REV Midwest will position states in the Midwest region to leverage and collectively increase public and private investment in EVs and EV infrastructure.⁶

Another example is the City of Pittsburgh. As per their Public Facility EV Charging Strategic Plan, the City of Pittsburgh has committed that every household be within a 10-minute walk of a public Level 2 EV charger or a 10-minute drive of a DC fast charger.⁷

The state of Michigan's Charge Up Michigan Program is an EV charger placement project that aims to build the infrastructure for DC fast charging stations in the state of Michigan to ensure the feasibility of all long-distance trips for EV users within the state, and to neighbouring states and Canada. To achieve this, the Department of Environment, Great Lakes, and Energy (EGLE) and partners (electric utilities and applicant) will provide funding for qualified DCFC EV charging equipment, site preparation, equipment installation, networking fees and signage.⁸

Zero emission vehicle (ZEV) mandates locally, provincially, nationally and in neighbouring States as applicable

Zero emission vehicles (ZEVs) are vehicles that can operate without producing tailpipe emissions, such as battery-electric, plug-in hybrid electric, and hydrogen fuel cell vehicles.

Locally, none of the Partners has a corporate ZEV mandate at the time of the literature review nor does the Government of Ontario. Yet, the Government of Canada acknowledges light-duty vehicle (LDV) emissions account for approximately 50% of Canada's transportation-related greenhouse gas emissions and 12% of the country's total emissions. Decarbonizing these vehicles is critical to reducing overall emissions in Canada. To move towards the decarbonization of the transportation sector, the federal government has established Canadian LDV ZEV sales targets of 10% by 2025, 30% by 2030 and 100% by 2035.⁹



In the U.S., ZEV mandates are only issued at the state level. Currently, there are no mandates for low-density vehicles (i.e., personal use), and there is a multi-state medium and heavy-duty ZEV MOU. The goal is to ensure that 100% of all new truck and bus sales are ZEVs by 2050, with an

⁶ U.S. Department of Energy. (2021). *Regional Electric Vehicle (REV) Midwest Plan*. <https://afdc.energy.gov/laws/12708>

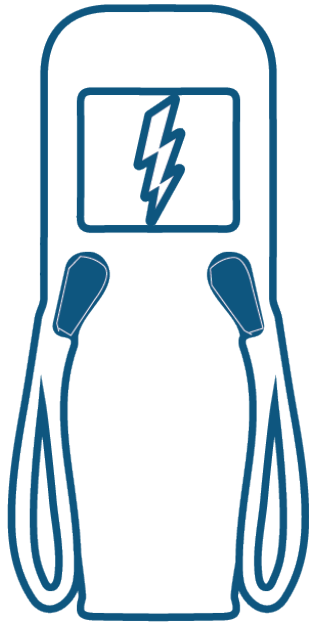
⁷ City of Pittsburgh. (2020). *Public Facility EV Charging Strategic Plan*.

https://apps.pittsburghpa.gov/redtail/images/13902_FINAL_2021_PGH_EV_Strategic_Plan.pdf

⁸ Government of Michigan. (2022). *Electric Vehicles*. https://www.michigan.gov/climateandenergy/0,4580,7-364-85453_98214_98294-521149--,00.html

⁹ Transport Canada. (2021). *Zero Emission Vehicles*. <https://tc.canada.ca/en/corporate-services/transparency/briefing-documents-transport-canada/20191120/20191120/zero-emission-vehicles>

interim target of 30% by 2030. The 17 signatory states include California, Colorado, Connecticut, District of Columbia, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, and Washington.¹⁰



EV charging infrastructure locally, provincially, nationally and in neighbouring States

Locally

Across the project Study Area (20,160 km²) there are currently 22 Level 3 (DC Fast Charger) stations servicing a resident population of 755,483.

The County of Huron, along with the Town of Goderich, Municipality of Huron East, and the Township of North Huron recently received funding through Natural Resources Canada Zero Emission Vehicle Infrastructure Program (NRCan ZEVIP). Huron County will be receiving 14 Level 2 EV chargers with 26 individual charging ports distributed across various locations within the participating municipalities.¹¹ In Goderich, the EV charging stations will be installed at Bannister Park, the Cove Pavilion, and the parking lot on Lighthouse Street.

In Dufferin County, in addition to the 24 EV chargers recently installed (two are DCFCs, located at Museum of Dufferin and Orangeville Courthouse), 20 more Level 2 or Level 2 max chargers will be installed at workplaces by the end of 2022. This was made possible through a second phase of funding through the ZEVIP for \$100,000 from the Department of Natural Resources Canada. This funding is in addition to \$289,000 provided through ZEVIP to install the first 24 EV chargers.¹²

In the Town of Blue Mountains, Council approved the installation of 12 EV charging stations in six designated locations (generally described as Hester Street parking lot, Town Hall, Thornbury Post Office parking lot, Beaver Valley Community Centre, LE Shore Library, and Craigeleith Heritage Depot Museum). The Town joined an application process to Natural Resources Canada (NRCan) ZEVIP with Ontario Power Generation (OPG) in 2019. The ZEVIP program was a pooled application including other Ontario municipalities.¹³

¹⁰ Multi State Medium and Heavy Duty Zero Emission Vehicle Memorandum of Understanding. (2021). https://www.nescaum.org/documents/mhdv-zev-mou_12-14-2021.pdf

¹¹ County of Huron. (2021, July 20). *Making More Electric Vehicle Chargers Available in Huron County*. <https://www.huroncounty.ca/news/making-more-electric-vehicle-chargers-available-in-huron-county/>

¹² Odrowski, S. (2021, December 9). Dufferin County installs 24 electric vehicle chargers. *Shelburne News*. <http://shelburnefreepress.ca/?p=29531>

¹³ Fletcher, J. (2021). *Staff Report Operations Department*. <https://pub-bluemountains.escribemeetings.com/filestream.ashx?DocumentId=2716>

In 2017, the County of Wellington installed three Level 3 (DC Fast Charger) EV charging stations at Arthur, Puslinch and Guelph thanks to funding from the Government of Ontario's Electric Vehicle Grant Programme (EVCO).¹⁴

Remainder of Ontario

Recently, the Ivy Charging Network, a joint venture of OPG and Hydro One, the province's largest distribution utility, was announced. IVY is funded in part by both companies, as well as \$8 million from NRCan, with the goal of launching 160 Level 3 (DC Fast Charger) at 73 locations. Stations will be, on average, less than 100 kilometers apart. It will make Ivy the largest fast charger network in Ontario, connecting Kenora in the northwest to Cornwall in the southeast.¹⁵ The agreements also include retailer Canadian Tire and Ontario's Ministry of Transportation. While the ministry offered no financial assistance, it owns the sites leased to ONroute, so its participation was needed for this agreement to move forward.



Neighbouring Provinces & States

In Ohio, the VW Mitigation Grants help fund the installation of publicly available DC Fast Charging EC stations in Ohio counties. In 2021, Ohio Environmental Protection Agency (EPA) awarded approximately \$3.28 million in grants to support the installation of more than 600 publicly accessible Level 2 EV charging ports at over 170 locations in 22 counties.¹⁶ In partnership with the Northeast Ohio Area Coordinating Agency (NOACA), the City of Cleveland applied for and received grant funding for two EV charging stations through the Ohio EPA's disbursement of the Volkswagen Mitigation Trust Fund. Across Cuyahoga County, 22 charging stations received funding through the OEPA grant program and will be implemented over the next two years. Along with a \$3 million allocation toward regional EV charging stations from NOACA, Sustainable Cleveland is hopeful that residents, employees, and visitors to the city will continue to see accelerated development in robust EV infrastructure.¹⁷

In New York, the City of Rochester has installed 24 public EV charging ports at several City-owned facilities, including municipal parking garages, City Hall, the Public Market, and the Port of Rochester. Placing additional charging stations at locations where people work, shop and recreate will further encourage the adoption of EVs. Installing the charging stations in conjunction with public education and awareness provides an

¹⁴Wellington County. News and Notices. <https://www.wellington.ca/Modules/News/index.aspx?feedId=44678d8e-66d0-4745-9af9-31ac1a8c708d&newsId=d2e84ce0-ca9a-4bac-9d24-37452788b6dd>

¹⁵ Syed, F. (2021). Electric vehicles in Ontario: a look at Doug Ford's love-hate relationship. *The Narwhal*. <https://thenarwhal.ca/ontario-electric-vehicle-policy/>

¹⁶ Ohio Environmental Protection Agency. (2022). *VW Mitigation Grants*. <https://epa.ohio.gov/divisions-and-offices/environmental-education/grant-programs/vw-mitigation-grants>

¹⁷ City of Cleveland. (2021, April 6). *City of Cleveland Daily News Updates*. <https://www.clevelandohio.gov/04.06.21GeneralUpdates>

opportunity for synergy between implementation actions. Potential partners include large employers, institutions, businesses and apartment buildings/complexes.¹⁸

In Quebec, there are approximately 450 public Level 3 (DC Fast Charger) stations and 1,700 Level 2 stations, with the highest concentration of DCFCs in and around Montreal (130) and Quebec City (30). There are also DCFC stations strategically placed along major highway arteries including the A15, Trans-Canada, Hwy 40, and around the Gaspé Peninsula, with distance between stations ranging from 20-50 km. The provincial utility, Hydro-Québec, has installed most of the charging infrastructure. Quebec currently has the largest incentives for EVs: \$7,000 for new EVs and \$3,500 for used.¹⁹ There are currently over 130,000 battery and plug-in hybrid EVs registered in Quebec, and they also accounted for 43% of all new ZEVs registered in Canada in 2021.^{20,21} Despite this progress, there are no DCFC stations, and only two Level 2 stations, in the northern half of the province²². This presents an opportunity to facilitate province-wide network development. This is further justified by the Province's mandate to have Hydro-Québec increase the number of DCFCs to 2,500 by 2030. In addition, Hydro-Québec will be constructing 4,500 Level 2 charging stations in collaboration with relevant municipalities and municipal organizations, mainly in city centres.²³

Current and Forecasted Electric Vehicle Registrations

Our approach focused on the data compiled by NII, as well as making use of the information available through Natural Resources Canada for provincial EV adoption, and working with the Ministry of Transportation, Transportation Safety Division, Drivers & Vehicles Services Branch of the provincial government to obtain light duty vehicle registration data.

Battery electric vehicle (BEV) and Plug In Hybrid Electric Vehicle (PHEV) registration data disaggregated by postal code (first 3 digits only) was obtained from the Ontario Ministry of Transportation for the years 2018 to 2021. As per Figure 7, BEV registrations²⁴ in the Study Area increased from 1,155 to 3,476 during that time, with a compound annual growth rate (CAGR) of 48% in 2019, 35% in 2020, and 51% in 2021. This, despite the provincial EV rebate being eliminated in 2018, and the effects of the pandemic in 2020, and to a lesser extent, 2021. Of note, PHEV registrations in 2018 were similar to BEV (1,329), however their CAGR has been significantly lower, with a maximum of 24% in 2021. As a result, there are only 2,229 PHEV registrations as of the end of 2021. Note that since data was requested for 2018 on, no CAGR rate was available for 2018 as it required 2017 data for use as a baseline.

¹⁸ City of Rochester. (2021). *Rochester Climate Action Plan*. <https://www.cityofrochester.gov/climateactionplan/>

¹⁹ Government of Quebec, 2022. *Government Rebates*. <https://vehiculeselectriques.gouv.qc.ca/english/rabais/rabais-offert-gouvernement-du-quebec.asp>

²⁰ Government of Quebec, 2022. *Electric Vehicles and Charging Stations*. <https://vehiculeselectriques.gouv.qc.ca/english/decouvrir/decouvrir-ve-recharge.asp>

²¹ Statistics Canada, 2022. *Automotive Statistics*. <https://www.statcan.gc.ca/en/topics-start/automotive>

²² Plugshare, 2022.

²³ Government of Quebec, 2020. *A Win-Win for Québec and the Planet – 2030 Plan for a Green Economy, Framework Policy on Electrification and the Fight Against Climate Change*.

²⁴ Registrations includes all vehicles fit to be on the road (does not include inactive vehicles); it is not referring to new registrations only

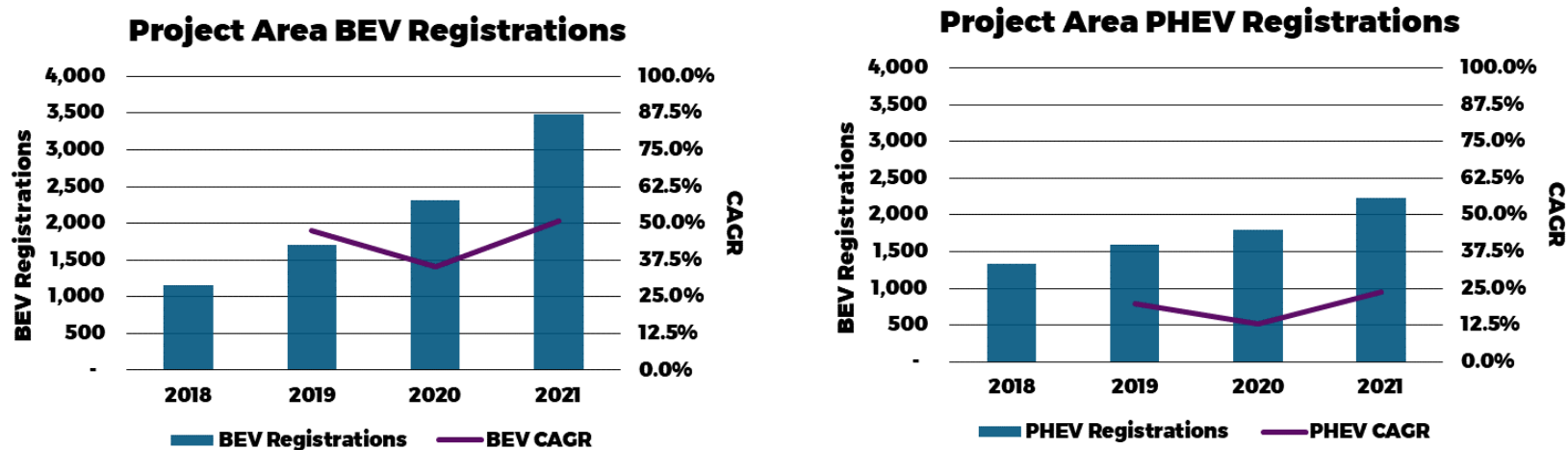


Figure 7. BEV and PHEV Registrations and CAGR in Project Area from 2018 to 2021

As an example of the effects of a community-led EV infrastructure project on BEV registrations, the [Accelerate Kootenays](#) project in southeastern BC, a collaboration of three BC regional districts resulted in the installation of 13 Level 3 (DC Fast Charger) stations and 30 Level 2 stations in 2018. BEV registrations, according to data obtained by the Insurance Corporation of BC, have risen over nine-fold since 2017, from 44 to 410. The CAGR grew from 69% in 2017, to 98% and 114% in 2018 and 2019, respectively.

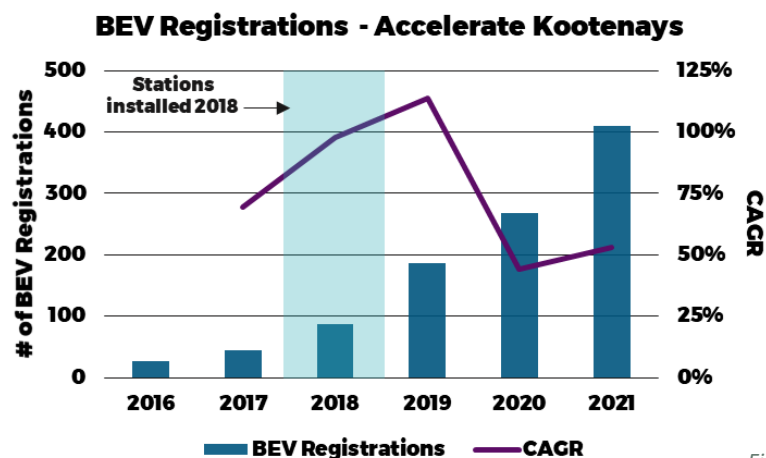


Figure 8. Accelerate Kootenays BEV Registrations

The project was also a key precursor to additional EV infrastructure from electrical utilities operating in the area (FortisBC, and BC Hydro). There are now 34 Level 3 (DC Fast Charger) stations and 67 Level 2 stations throughout the Kootenays,²⁵ much of which would not have been possible without Accelerate Kootenays to catalyze infrastructure development.

With respect to forecasted EV adoption, the Government of Canada has mandated that 100% of new vehicle sales be zero-emission by 2035. For the purposes of this Project, it is assumed that 100% of those sales will be BEVs. As a result, the number of BEVs on the road within the Study Area will rise accordingly at a CAGR of 30-35% per year to 2030 and tapering off by 2035 as they reach 100% of new sales. Total BEVs will continue to rise beyond 2035 as fossil fuel vehicles are retired, eventually reaching 99% of the overall fleet by 2045,²⁶ and a projected maximum of 520,000 by 2050 as per Figure 9. This forms the Business-As-Usual (BAU) Forecast from which the Project will be compared against.

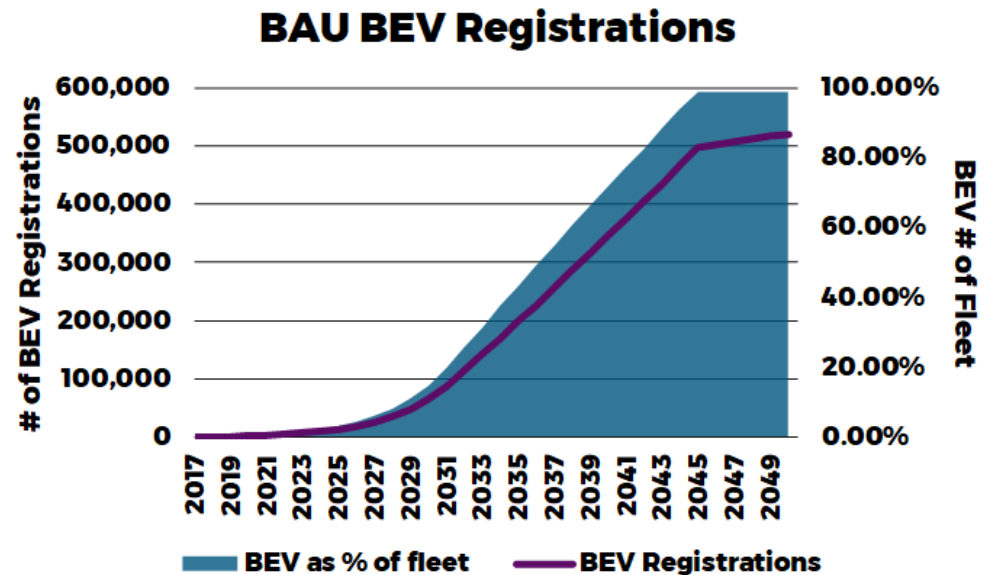


Figure 9. BEV Projections to 2050 under BAU Scenario

²⁵ Plugshare, 2022. <https://www.plugshare.com>

²⁶ A maximum threshold of 99% of vehicles as BEVs (1% as ICEs) has been assumed to account for some vehicle owners retaining their ICEs.

Co-benefits of EV adoption

The installation of an EV charging network can bring additional benefits to a region including bolstering economic development opportunities for local businesses in rural communities and enhancing tourism experiences.

1. Local – residents

As evidenced by the resident survey, there are several residents in the Study Area who simply aren't confident in EV technology yet to transition to an EV. And yet, owning and operating an EV can be much cheaper than driving a gas car. EV drivers can save money on fuel and maintenance. EVs have far fewer moving mechanical parts than gas-powered vehicles, so there's a lot less to go wrong. Braking is different in an EV, with the vast majority of slowing and stopping performed by regenerative braking. So, an EV's traditional friction brakes are used much less. Anecdotal evidence from drivers suggests those friction brakes can last up to 300,000 km or more before requiring replacement.

2. Local - tourists

A testimonial from a café in a small town in rural BC attests to the economic benefit that can come with facilitating more EV travel in a region:

"I've noticed A LOT of drivers who stop to charge will come into the Dragonfly Cafe for breakfast, lunch or coffee and snacks, and as a small business owner in a small community, I'm thrilled the charger is here. I think many drivers are happy to have a reason to stop in our great town, and we're grateful for the additional business these travelers bring." ~Lamiah, Owner, Dragonfly Cafe, Salmo

EV ownership is growing exponentially, and federal targets for ZEV sales will prop up this growth even more. So, it follows that many tourists will be looking to travel to and within the Study Area in their primary vehicle, an EV. It is therefore critical that when they are planning their trip, they see several options to charge. Many EV drivers acknowledge that when they plan a road trip, they look at charging options first, and build the experiences around that.

3. Environmental

The environmental legacy of an EV charging network like the one proposed in this strategy will continue to be realized post-implementation as more residents and visitors adopt EVs. The implementation of even Phase 1 of the Level 3 (DC Fast Charger) stations will create immediate environmental benefits through reduction in gasoline consumption and reduction of GHG emissions because of adoption of EVs locally. Fewer gasoline cars driving through the region means better air quality²⁷. In addition, as EV adoption grows, so too might interest and investment in renewable energy.

²⁷ [WDG Public Health report Climate Change and Health Vulnerability Assessment](#)



SECTION FOUR Regional EV Charging Network Strategy

Objective

The Partners set out to develop a regional EV charging network strategy for both Level 3 (DC Fast Charger) and Level 2 EV chargers. The scope includes 'universal' chargers (those accessible by most types of EVs) and does not include proprietary chargers and charging infrastructure (namely, Tesla vehicles and equipment).

EV Chargers 101



Level 2 EV Charger

Level 2 chargers are very common and can be found at community centres, parks, shopping malls, hotels, parkades and rest areas. Electric vehicle owners typically install one in their home garage using a 240v connection.

These charging stations use the J1772 plug except for Tesla versions, which of course use the Tesla plug. They provide more power than a regular household outlet and most vehicles will gain 20-40km of range per hour of charging.



Level 3 EV Charger

Level 3 charging is better known as Direct Current Fast Charging (DCFC) or simply 'fast charging'. These charging stations enable most EVs to charge to 80% in under an hour, making road trips easier and quicker.

Current EV charging stations in Study Area

The following image (Figure 10) summarizes the existing electric vehicle charging stations (location, type, and ownership) in the Study Area. There are 22 Level 3 (DC Fast Charger) and 145 Level 2 EV charging stations currently available. Table 1 provides a summary of the location and site where the current Level 3 (DC Fast Charger) EV chargers are installed. Table 1 – Location of Existing DCFC Chargers

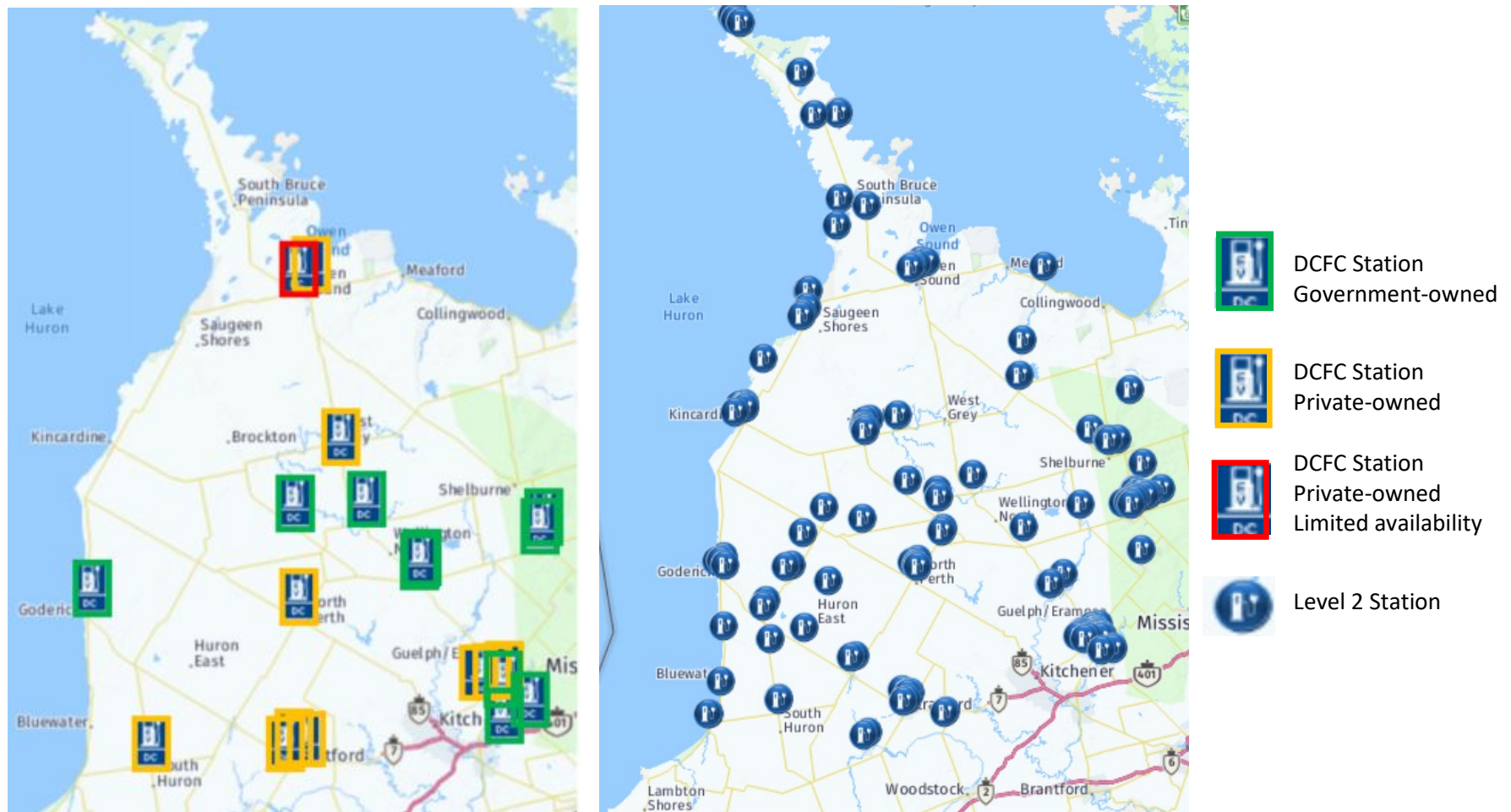


Figure 10 – Existing Level 3 and Level 2 EV charging stations in Study Area.

Table 1 – Location of Existing DCFC Chargers

Community	Station
Owen Sound	Hal Wright Chevrolet Cadillac GMC Buick
Owen Sound	Comfort Inn Owen Sound
Durham	Pebbles Restaurant
Goderich	Goderich Tourist Information Centre
Listowel	Scotiabank
Arthur	Arthur Library and Medical Center
Arthur	Arthur Arena & Pool
Mount Forest	Mount Forest Downtown Parking Lot
Clifford	Clifford & Community Arena
Exeter	Tim Hortons
Stratford	Scotiabank
Stratford	Bank of Nova Scotia - Retail Service Centre
Stratford	Canadian Tire
Guelph	Barry Cullen Chevrolet Cadillac
Guelph	Guelph VW
Guelph	Denny's
Guelph	County of Wellington
Wellington County	ONRoute Cambridge North
Wellington County	ONRoute Cambridge South
Puslinch	Puslinch Library
Orangeville	Dufferin Courthouse
Orangeville	Orangeville VW

Approach & Methodology

Siting Criteria

The first step in developing a regional EV charging network strategy was a CEA-facilitated workshop with the Partners to develop siting criteria. The workshop expanded on the outputs of the Resident and EV Driver surveys and allowed the Partners to jointly develop criteria for site selection, ultimately with an emphasis on tourism, economic development, and optimization of co-benefits to site hosts. The following image (Figure 11) is a summary of siting criteria developed by the Partners for this project and is applicable to both Level 3 (DC Fast Charger) and Level 2 EV chargers. Siting criteria serves as a guide to the Partners to evaluate proposed charging station locations. The Partners can choose to require all, most, or some of the criteria be met when evaluating potential locations.

Siting Criteria

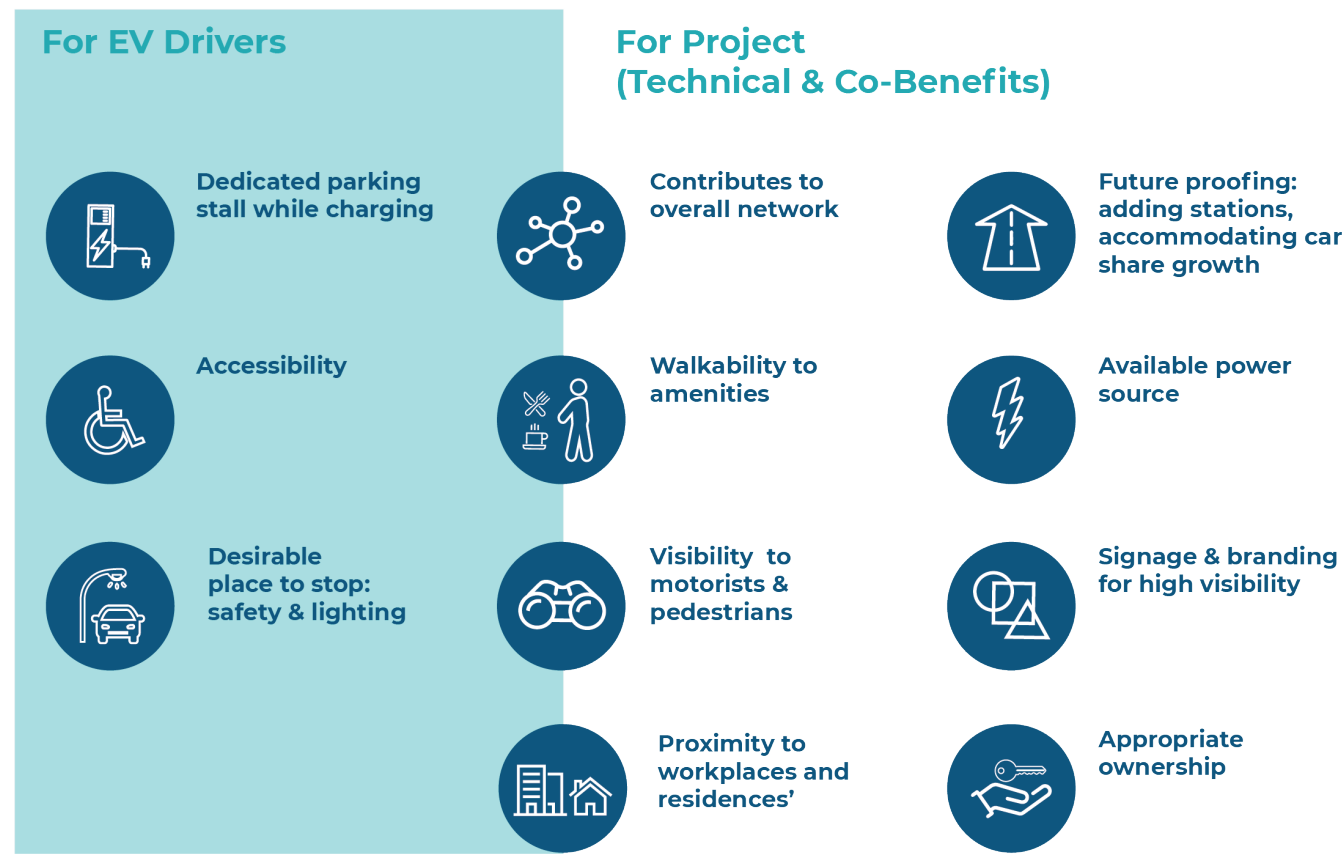
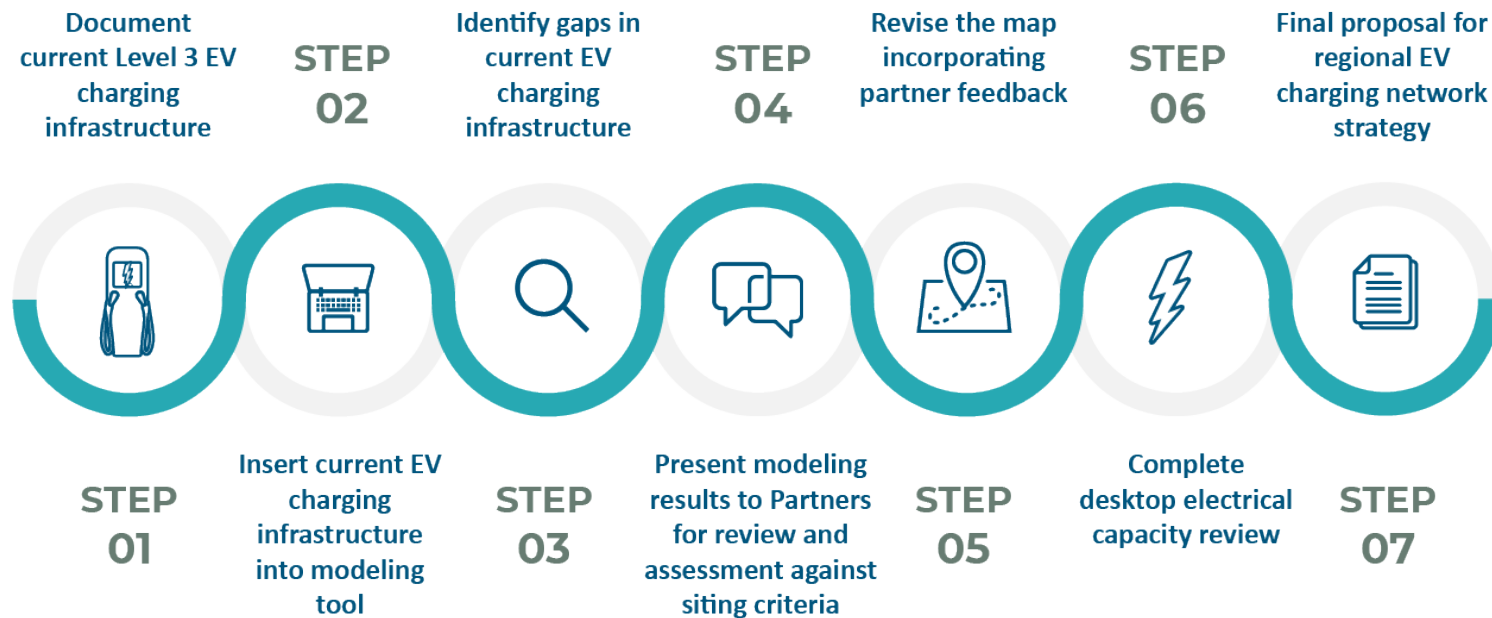


Figure 11. Partner developed siting criteria for regional EV charging network Applicable to identifying locations for Level 3 and Level 2 EV charging stations. The criterion in the left column is focused to EV drivers, the criterion in the right column is focused to the Project.

Level 3 Charger Network

The following is a summary of the process completed by the Partners to identify the proposed Level 3 (DC Fast Charger) EV charging station locations.



- **Document current Level 3 EV charging infrastructure.** For the analysis of existing charging stations in the study area, CEA reviewed publicly available datasets such as those provided by PlugShare, ChargePoint, and Ontario's Ministry of Transportation.
- **Insert current EV charging infrastructure into modeling tool.** CEA employed the BC Institute of Technology (BCIT) proprietary modelling software which can be customized to consider different vehicle types, climate, number of passengers and terrain.
- **Identify gaps in current EV charging infrastructure.** CEA analyzed outputs from the BCIT modelling software to determine where current gaps in charging infrastructure preclude drivers from moving across the region. This is shown in [Figure 12](#): with the current infrastructure, EV drivers can only travel along the routes highlighted in blue. Traveling outside of these routes would be beyond the car

battery range and the driver may become stranded. This means the businesses and tourist attractions along those routes cannot participate in the EV driver economy.

- **Identify new EV charging station locations to close gaps.** The model CEA created represents a reliable network layout that can inform the number and general location of stations. Standard practice is to identify EV charging infrastructure and overall network design assuming a cold-weather climate (0°C) with multiple passengers (2), to ensure we are designing to the lower end of expected EV range.
- **Present modeling results to Partners for review and assessment against siting criteria.** Using the initial output from the model, CEA convened a workshop with the Partners to refine the proposed network design and leverage their local knowledge and context. Local input is key at this stage as it allowed CEA to adjust proposed locations to reflect local priorities and consider real-world travel patterns. This balances convenience to drivers while maximizing benefits for communities and the region as a whole.
- **Revise the map incorporating Partner feedback.** CEA updated the BCIT model to reflect local priorities and opportunities.
- **Complete desktop electrical capacity review.** At the onset of the project, the Partner established a Technical Advisory Group (TAG). The TAG included representatives from utilities and electrical distribution companies servicing communities across the project Study Area. The role of the TAG was to review the proposed Level 3 (DC Fast Charger) station locations and provide feedback to the Partners as to the electrical capacity of proposed sites. At a minimum, Level 3 (DC Fast Charger) stations need access to 3-phase power. Appendix 2 is an excel spreadsheet and provides a summary of proposed sites including street addresses as well as the outcome of the desktop technical feasibility assessment completed by the TAG.
- **Final proposal for regional EV charging network strategy.** CEA updated the strategy to incorporate TAG review findings and then presented the findings to the Partners.

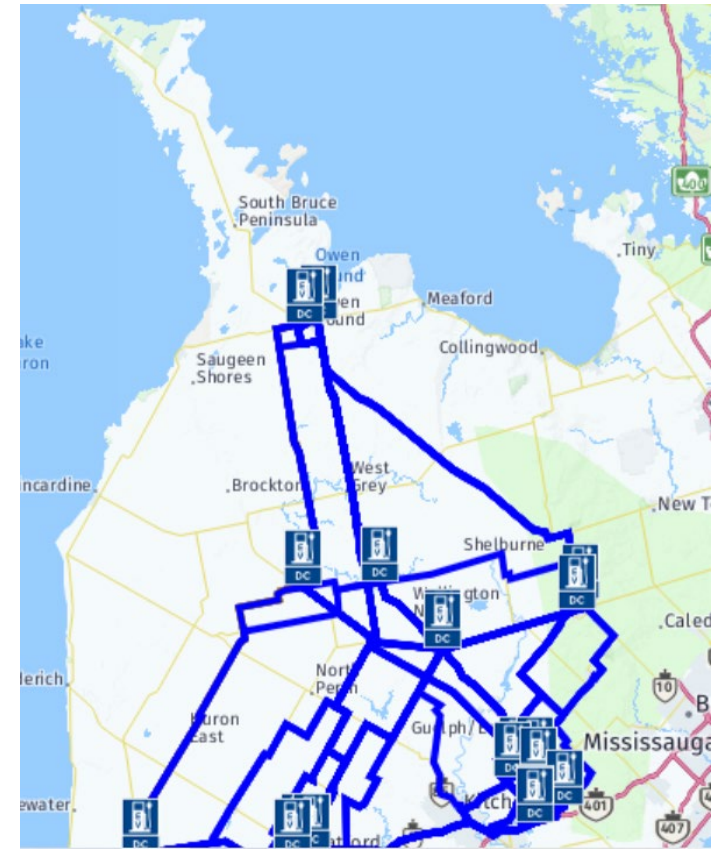


Figure 12. Map of existing Level 3 charging stations in Study Area. Blue lines indicate the feasible highways/routes that an EV driver must travel to ensure they arrive at their destination.

Level 2 Charger Network

The process for identifying locations for banks of Level 2 EV chargers was very similar to the approach for determining Level 3 (DC Fast Charger) EV charging locations. This process was completed after the Level 3 (DC Fast Charger) EV charging locations were identified, as the goal for the banks of Level 2 EV chargers is to support and complement the proposed Level 3 (DC Fast Charger) EV charger network and target locations that are appropriate for a longer dwell time. These locations are typically destinations, attractions, recreational areas, and accommodations. Potential locations for banks of Level 2 chargers were identified via input from:

- Partners
- Review of regional tourism association reports
- Tourism association representatives
- Noteworthy attractions and destinations
- Popular travel routes

Of note, a desktop electrical review of proposed Level 2 EV charger banks was not completed. Key next steps in advance of installation are:



Further engagement with utilities and electric service providers to confirm electrical capacity for banks of Level 2 EV chargers (install will require 40amps per charger).



Further discussion with regional municipalities to confirm proposed sites both satisfy siting criteria and are fit-for-purpose given local context.

Regional EV Charging Network Strategy

The regional EV charging network strategy proposes the installation of a minimum of two Level 3 (DC Fast Charger) stations (100kW or greater) at each identified location and a 'bank' (four or more charging stations at one location, see image to the right) of Level 2 chargers (<20kW) at each identified location. The current iteration of the strategy does not have Level 3 (DC Fast Charger) stations and banks of Level 2 chargers installed at the same location. Given the volume of amenities, services, attractions, businesses etc. available across the Study Area, banks of Level 2 chargers will ensure there is sufficient infrastructure to support the growing demand for public charging and reduce volume on Level 3 (DC Fast Charger) EV charging stations which have been intentionally sited to facilitate cross-regional travel.



Bank of Level 2 charging stations installed in Toronto Zoo carpark.

Level 3 (DC Fast Charger)EV Stations

Modeling results indicate the Study Area requires 17 additional Level 3 (DC Fast Charger) sites distributed across the region to create a complete charging network. This number of charging stations will ensure the majority, if not all the highways (primary, secondary and tertiary) across the Study Area are travelable for EV drivers. For ease of reference, we have identified potential locations using the name of the community; the final EV charging station location could be sited within the municipal boundary or in the surrounding county. The 17 locations are:

- | | |
|----------------|-----------------------------------|
| 1. Bluewater | 10. Paisley |
| 2. Durham | 11. Seaforth |
| 3. Ferndale | 12. Shelburne |
| 4. Flesherton | 13. Southampton or Saugeen Shores |
| 5. Kincardine | 14. Thornbury |
| 6. Lion's Head | 15. Tobermory |
| 7. Listowel | 16. Wiarton |
| 8. Lucknow | 17. Wingham |
| 9. Mitchell | |

Level 3 (DC Fast Charger)EV Stations

The proposed locations are visually summarized in Figure 13 along with the 22 existing Level 3 (DC Fast Charger) stations across the region. Stations with green boxes are those that will be added in Phase 1, while orange boxed stations will be added in Phase 2. Those without a colored box are already existing.

As discussed, there is currently minimal EV charging infrastructure in the Study Area. The modeling process identified the need for 17 additional DCFC charging station locations to ensure connectivity across all major routes and travel corridors in the region. This is a significant amount of infrastructure (estimated cost of \$130K+ per install) and may not be achievable in a single phase, though joint procurement can be an effective and efficient approach if the appropriate funding opportunity arises. CEA has proposed two phases of implementation. Phase 1 will build the baseline network (Figure 14) required to facilitate travel from corner to corner across the Study Area. Phase 1 stations include Tobermory, Wiarton, Durham, Kincardine, Shelburne, Wingham, Listowel, Bluewater, Flesherton, Thornbury, Lucknow, and Paisley. Phase 2 will increase the EV charging locations across the Study Area and is dubbed the 'Robust' network (Figure 15). Phase 2 stations include Mitchell, Seaforth, Southampton or Saugeen Shores, Lion's Head and Ferndale. The following images (Figure 14 and Figure 15) show the difference in connectivity across the region at the completion of the two phases. See Appendix 3 for an image summarizing connectivity across the Study Area at completion of Phase 2 and how the proposed network will connect to the existing Level 3 EV charging infrastructure outside the Study Area.

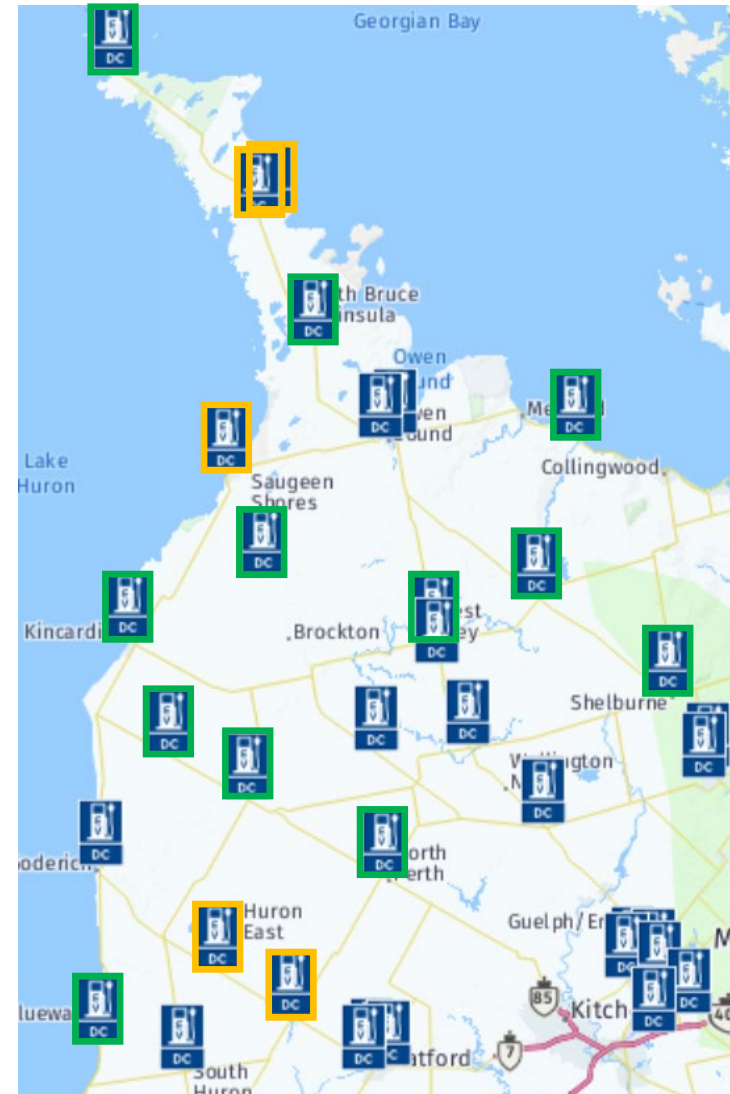


Figure 13. Study Area map including existing and proposed (17) Level 3 EV charging stations.



Figure 14. Regional EV charging network (including existing stations) after installation of **Baseline/Phase 1** (12) Level 3 EV charging stations. Blue lines indicate which routes are travelable by an EV without any range limitations.

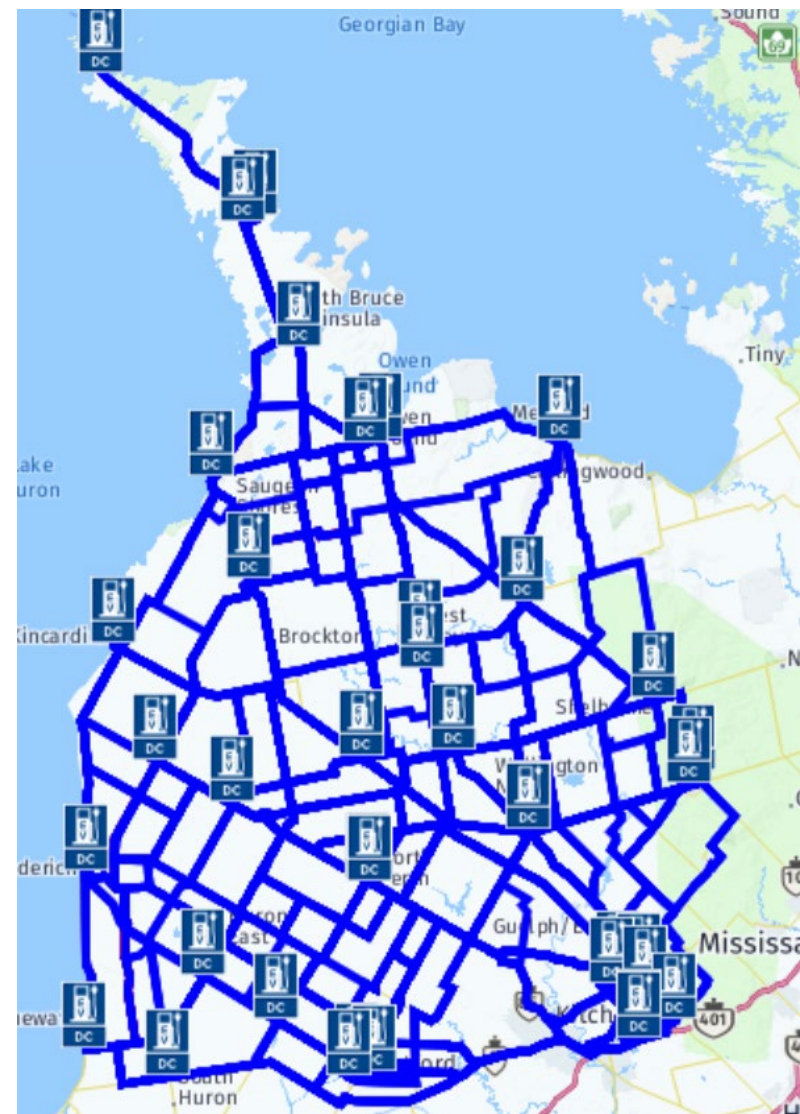


Figure 15. Regional EV charging network (including existing stations) after installation of **Robust/Phase 2** (5) Level 3 EV charging stations. Blue lines indicate which routes are travelable by an EV without any range limitations.

As part of the development of the regional EV charging network strategy, the Partners, in collaboration with representatives from all municipalities in the Study Area had an opportunity to collaborate and identify potential sites within each location to host the Level 3 (DC Fast Charger) EV station. Appendix 2 provides a summary of proposed sites including street addresses as well as the outcome of the desktop technical feasibility assessment completed by the TAG.

Environmental Benefits of Level 3 EV charging network

Calculations and modeling were undertaken based on the proposed EV charging stations of phases 1 and 2 to demonstrate the environmental benefit of the charging network. This modeling includes forecasted local adoption of EVs because of the project as well as use of the network by visitors. Calculations included greenhouse gas (GHG) emissions and air pollutants avoided due to fuel switching. These results were compared against a business-as-usual (BAU) case where the project does not go ahead, as per Figure 16. However, the BAU case does include the Federal mandate that 100% of new passenger vehicles sold will be zero-emission by 2035. This is reflected by the gradual decrease emissions after 2030 in the BAU scenario (blue line).

The results indicate a positive outlook from a GHG emission perspective and cost savings for fuel consumption. For specific outputs from the model for the years 2025, 2030, and 2040, as well as other environmental benefits, see Appendix 4.

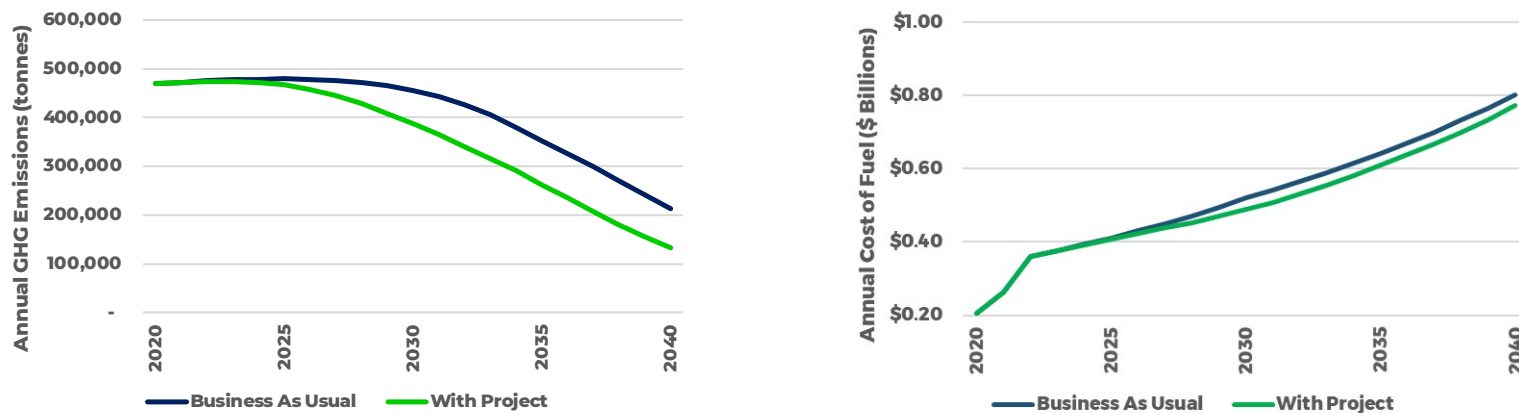


Figure 16. GHG Emissions Reductions (left) and Energy Costs (right) of Project vs. BAU

Level 2 EV Charging Stations

In addition to the 17 proposed Level 3 (DC Fast Charger) EV stations, this strategy presents a ranking of priority locations for banks of Level 2 EV chargers. The priority ranking results from a review of each location against the siting criteria and as compared to the proposed locations for Level 3 (DC Fast Charger) EV stations (e.g., proximity to nearest existing or proposed Level 3 EV charger). Appendix 5 provides the full list of identified locations and sites for Level 2 EV charger banks as well as the priority ranking for implementation.

The priority ranking and proposed sites for Level 2 EV charger banks are provided to inform further discussion amongst the County, municipality, and community stakeholders.

Nature Appreciation Assessment

Of the number one priority ranking proposed Level 2 EV charger station locations (13 locales), which are summarized in Appendix 5, all of the proposed locations are noted for the opportunity of the EV Driver to participate in nature appreciation be it through close access to trails, natural spaces, parks etc.

33 Victoria St N, Southampton, ON N0H 2L0	11 Lakeshore Blvd N, Sauble Beach, ON N0H 2G0	5 Lakeshore Blvd N, Sauble Beach, ON N0H 2G0
12 Nelson St E, Meaford, ON N4L 1N6	80 Dundalk Street, Dundalk ON	341 10th Street, Hanover ON
377 Gypsy Ln, Blyth, ON N0G 2W0	9 Huron Road, Mitchell, ON	5 James St N, St. Marys, ON N4X 1B1
386 Church St S, St. Marys, ON N4X 1C2	51 Main St, Erin ON	6 The Square, Bayfield, ON N0M 1G0
14 Main Street West, Drayton ON		

Level 2 EV Charger Costing

The cost of a Level 2 EV charger varies from manufacturer to manufacturer. As of 2022, networked charging stations range in value from \$4,500 - \$6,500. Prices vary depending on manufacturer.

In addition to the equipment cost, additional costs that need to be accounted for when budgeting for Level 2 EV charger installation includes equipment shipping, station cable management, electrical cabling, trenching, line painting, signage and protective posts plus install etc. These costs are highly variable and difficult to estimate without accounting for the specific context of the chosen site. CEA's experience with several dozen Level 2 EV charger installations estimates this cost to range from \$15,000 - \$25,000.

When contemplating Level 2 EV charger purchase and installations, costs savings and efficiencies can be realized by installing multiple chargers at one location. This way, the costs for electrical cabling, trenching, etc. are shared amongst the many units.

In addition to initial implementation costs, there are operating costs such as warranty and networking fees. CEA's previous experience with equipment operation estimates these costs to range from \$300 - \$700 annually.

CEA has supported several communities with Level 2 EV charger station implementation and has developed the [Level 2 Owner's Toolkit](#) to support municipalities and ensure they have all the information necessary (e.g., FAQs and responses, EV 101, EV Charging 101) to benefit from electric travel.



SECTION FIVE Options for Implementation

The following is a discussion (i.e., pros and cons) on the various approaches to implementation from CEAs perspective and experience with implementing EV charging station networks beginning with a discussion on different types of collaboration models.

Collaboration Models

Regional Collaboration

Regional scale deployment of EV charging infrastructure has proven successful in several regions across Canada, particularly in locations where private sector is less inclined to invest (dispersed small to medium and rural communities and regions). There is an opportunity for local and regional governments to support early adoption of electric vehicles locally and promote EV tourism through the facilitation of regional network development. Regional collaborations have been an effective way to streamline procurement, maximize leveraged funding and ensure consistency in the technology, operations, and maintenance of a network. For small to medium sized communities, managing the procurement, funding, reporting, project management and on-going operations and maintenance for Level 3 (DC Fast Charger) equipment in particular can be a significant burden, from both a staff capacity and financial perspective. If there is a desire to continue a collaborative approach in the deployment of an EV charging network across the Study Area, it is recommended that a lead community be identified, and that either a dedicate staff or a contracted external project manager support the process of applying to funding and overseeing the procurement and project management process. With a collaborative model, there are two options:

1. Install all stations. through a single procurement and funding process

There is benefit in preparing a funding application on behalf of all sites, as long as each site location is confirmed to meet all criteria and specifications, and that the landowner for the site has confirmed willingness to enter into a license of occupation. There can be cost efficiencies in a major infrastructure project, and potential opportunity for proponents to offer competitive pricing and value add. Construction costs can be minimized through pre-fabrication and effective deployment scheduling. The primary challenge with this approach is the securement of sufficient funding to offset the capital cost of the project. Funding opportunities are discussed in the following section. This approach may be of interest to utility and distribution companies, as there may be opportunity to optimize load management. Typically, funders like to see approaches that are collaborative and demonstrate maximized benefit for their investment. Deploying a complete network to connect a dispersed region in a collaborative manner maximizes impact and provide immediate benefit to the region.

2. Install stations in multiple phases.

In cases where sufficient funding is not available, or regional nuances in utility and distribution companies requires a more localized approach to deployment, it may be necessary to facilitate a phased deployment approach. Or the Partners may determine that a sub-regional approach is more appropriate. Phasing the deployment would be most effective if priority locations still supported broad regional connectivity, building and densifying stations with each phase. This approach may result in opportunities to split ownership and long-term operation (see options for ownership and operation below). The timeline for deployment will be significantly longer, as there will be multiple procurement rounds, and construction is typically limited to months outside of November – March due to the incremental cost of working in the winter.

Individual approach

The output of the model can be used to inform individual site host installations. This approach would require that each site host/community secure the funding and manage the procurement, installation and coordination of operations and maintenance individually. This option is less desirable due to the already constrained capacity of local governments.

Hybrid approach

There may be situations where certain communities are ready to proceed with an installation sooner than others, which may warrant an approach whereby some communities proceed independently of a coordinated procurement approach. Communities are encouraged to consider the site criteria and specifications identified by the Partners to ensure consistency in the experience, quality and long-term operations and maintenance of the infrastructure.

Models for ownership, operations and maintenance

The following summarizes, at a high-level, the options available to the Partners for ownership, operations and maintenance.

Third-Party Ownership and Operations

When it comes to ownership and long-term operations of Level 3 (DC Fast Charger) infrastructure, it is strongly recommended that small to medium sized local and regional governments identify opportunities for external ownership and management of the asset. Level 3 infrastructure has a high replacement and operational cost. Local and regional governments should play an enabling role in the deployment of Level 3 infrastructure, including securing capital funding. The Partners have confirmed the preference of external ownership and operation for Level 3, though all options are explored in a high level of detail below.

There is precedent for this approach. With funding confirmed for implementation of the full network, the Peaks to Prairies partners in southeast Alberta sought to identify a partner to install, own and operate the charging equipment at all twenty of the stations identified through the development of their plan. Such a partnership would lift the burden and liability from small communities to own and maintain the charging equipment while allowing them to gain maximum co-benefits from the investment.

A competitive Request for Proposal (RFP) process was developed and managed by project partners, and ultimately ATCO, an Alberta-based utility and energy company was selected as the successful proponent. ATCO would become the long-term owner and operator of the equipment, and Quebec-based FLO the network operator. The final siting and technical confirmation, equipment selection and procurement, construction, commissioning and operations and maintenance was all managed by ATCO. Service level agreements (i.e., the minimum expected operational standard) were adopted through the licenses of occupation. The Partners managed funding applications, the RFP process and supported the site selection, working with communities to identify the best location.

As similar approach could be taken by the Partners for the Study Area, streamlining the procurement and deployment of the network. It is recommended that the Partners aim to have sites selected and be in an advanced state of readiness. Specific to the NRCan ZEVIP opportunity, the partners may wish to consider issuing a call for partners and identifying a preferred implementation partner to submit a ZEVIP application on behalf of the collaboration. The business case for private sector or utility ownership improves when funding is secured to cover capital costs.

Municipal Ownership and Third Party Operations

Though a less desirable structure from the perspective of the Partners, should the communities feel comfortable with the ownership of Level 3 (DC Fast Charger) equipment but wish to not own and operate the equipment, a structure could be established whereby the operations and maintenance of the infrastructure is managed by a third-party. The burden of demand charges, asset replacement and repair and networking fees would remain with the local government. The local government would also have to pay for the operations and maintenance service, though this could be structure on a regular maintenance program, or as needed basis.

Funding options for implementation

Funding opportunities for EV charging stations are continually coming available. The following is a summary of what is available to the Partners as of the writing of this report.

NRCan ZEVIP

Natural Resources Canada will be launching a Request for Proposals (RFP) under the [Zero Emission Vehicle Infrastructure Program](#) (ZEVIP) on May 5, 2022. This RFP will target electric vehicle charging and hydrogen refuelling infrastructure projects in public places, on-street, workplaces, multi-unit residential buildings (MURBS) and for vehicle fleets. Funding is available for 50% of total project costs up to a maximum of \$5 Million per applicant.

The ZEVIP is a \$680M initiative that supports the deployment of a network of zero emission vehicle charging stations (Level 2 and higher) and hydrogen refuelling infrastructure in more localized areas where Canadians live, work and play.

Provincial partnership

Present strategic plan to regional MPP as an initial first step. Await outcomes of June 2022 election.

Private Funding

Approach private sector operating throughout the region, for example, [Westario and Bruce Power turnkey Level 2 EV charger funding](#) opportunity and [EPCOR funding](#).

Municipal Funding

The site host funds each station.

Combination of Above

Each of the above funding options could be combined to full fund the network.





SECTION SIX Other Considerations

Solar PV Opportunities for Co-Location with EV Charging Stations

This briefing provides a summary of opportunities for integration of solar photovoltaic (PV) at electric vehicle (EV) charging infrastructure sites. Because there are so many variabilities to consider in planning solar integrated charging, this is a high-level summary of the context, options and considerations that should be made in the planning phase. Further engineering and detailed planning must be completed prior to any scale of solar PV installation.

Context

Local governments are often interested in exploring opportunities to integrate solar PV with electric vehicle charging infrastructure deployments. There are a variety of motivations for exploring solar PV, and some key considerations that need to be made to ensure the intended purpose is met.

Very generally, the study area has promising photovoltaic potential, assuming a south-facing aspect. The map below (Figure 17) indicates *annual average* photovoltaic potential. There is significant seasonal variability, and in the Study Area the months of November – February is limited in their photovoltaic potential, but still producing between 600-900 kWh/kWp. Solar PV is often installed with the knowledge that summer production offsets the lower production during the winter. Seasonal production for the study area can be explored at [this link](#).

Ensuring solar is grid-tied with the ability to net meter or monetize the energy produced will improve the business case, given that depending on the size of the installation, more energy may be generated during peak months than consumed (variable according to the size on installation and demand of associated charging infrastructure). Solar installations can also integrate battery technology as an intermediary between the solar panel and grid, buffering demand charges and optimizing solar storage.

The following sections explore the motivations for integrating solar PV into an EV infrastructure deployment, and some of the key considerations when determining whether it is applicable to a specific location.

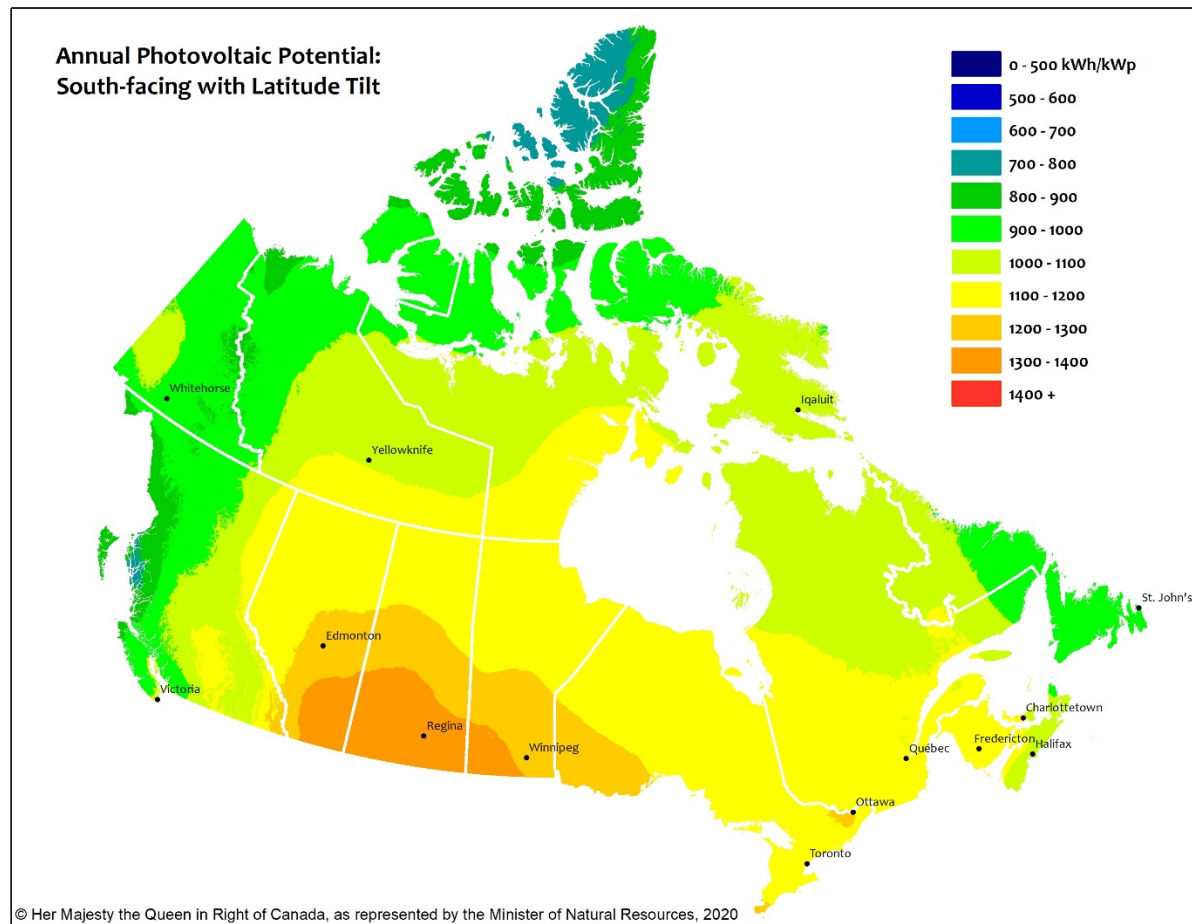


Figure 17. Annual average PV potential summary map of Canada, source - Source: <https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/renewable-energy/solar-photovoltaic-energy/tools-solar-photovoltaic-energy/photovoltaic-potential-and-solar-resource-maps-can>

Solar PV + EV Charging Infrastructure: Confirming the Purpose

There are a variety of reasons that a local government may pursue the integration of solar PV into a charging infrastructure deployment. The purpose will determine scale and budget and may also clarify the intended co-benefits of the installation. The location, siting, size, and number of charging stations will be affected by the intended purpose of co-located solar PV.

- 1) Small-scale Demonstration Solar PV



Solar PV array installed atop car park cover at Kimberly Platzl

The most cost-effective application of solar PV associated with municipally owned or supported EV charging infrastructure is a small demonstration installation associated with the charging unit. EV charging infrastructure is a perfect co-located technology for solar PV, as there is an opportunity to share a narrative with the public around electric mobility and clean energy. The intent of a small-scale solar PV installation is primarily about education and demonstration of emerging technology, less so about energy production to offset or support the electrical demand of the co-located EV charger. The City of Kimberley in British Columbia has an excellent example of a demonstration installation in their downtown core, integrating elements of local design and situated over a Level 2 charger.

2) Energy production/offset of grid electricity

A solar PV installation capable of producing sufficient electricity to offset or supplement an EV charging station would require a significant scale of deployment, and as a result, significant physical space for the installation. The scale of solar PV required would depend on the type of charger (Level 2 vs DC fast charger), however the primary barrier to meeting or supplementing the energy demand of the stations (independent of cost) is space. In a study done out of the University of Calgary, an assessment was completed on a single DC Fast Charging station in Red Deer. The researcher assessed the scale of solar required to offset the energy demand and found that solar arrays would need to cover significantly more spaces in a parking lot than the single space dedicated to the fast charger.²⁸

A partnership with a utility or co-located building may be an opportunity to increase the scale of a solar installation associated with an EV charger, but it is not practical for a local government to provide exclusive solar energy for EV charging due to cost and space required.

²⁸ <https://prism.ucalgary.ca/handle/1880/108761>.

3) Integration with co-located building

To address a number of co-benefits, local governments may consider the strategic siting of EV charging near buildings where solar installations would be appropriate and provide both demonstration and energy production opportunities. The intent would not be to dedicate solar power to the charging infrastructure, but to promote co-benefit of solar on an adjacent building. This approach demonstrates a holistic approach to decarbonization and energy resilience, by promoting electric mobility and building application of solar.

4) Energy storage and load management

Battery-supported solar installations can be an effective way to manage load and demand chargers at EV charging sites. Like a demonstration install, this approach could be scaled to a size appropriate for the specific site. A battery would then be installed as primary energy storage, with excess going into the grid. There are examples of this approach in both large- and small-scale applications. The Oasis Project at the British Columbia Institute of Technology was an early example of battery supported solar PV with integration of EV charging infrastructure.²⁹

More information about the options for integration of battery storage is explored and compared to traditional grid-tied deployment in this local government [guide](#) (Page 8).

Siting Solar PV: Primary considerations

As a community considering integration of solar PV into EV charging infrastructure deployments, there are several considerations that need to be made. Ideally, if the intent is to integrate solar on-site, the final site selection for the EV charging should be made to optimize the solar component of the site.

It is the assumption that a local government in the Study Area is mostly like to support a small-scale demonstration installation associated with an EV charger installation, potentially integrating battery storage. The considerations summarized below reflect that scale of installation. Should a unique partnership or funding opportunity arise to increase the scale of a solar PV installation, further considerations must be made and assessed with respect to local regulations around grid-tied systems. Further, significant engineering and site-specific plans must be completed to ensure the design is conducive to the intended use of the site (e.g., If using as a parking lot cover, how does snow shed? Does the design allow for continued parking lot maintenance, etc.?)



²⁹ <https://www.bcit.ca/applied-research/smart-microgrid/projects/energy-oasis/>.

Siting for Solar + EV Charging

While the concept of installing a single-stall car or EV charger solar PV cover may appear straightforward, to maximize the benefit of the solar, the siting and aspect is critical. At the same time, assuming the solar is co-located with the EV charging infrastructure, it is important to ensure that the site selected has all the technical specifications required for that infrastructure (access to appropriate power, site free of any subsurface utilities, proximity to amenities, etc.). It is not straightforward to identify sites that support criteria and specifications perfectly for both solar PV and EV charging. The following siting specifications are important to consider:

1) Solar aspect

Solar panels should be installed to face south or just west of south to maximize solar gain. The location should be free of shading year-round, by either trees or buildings. Consider any future development in the vicinity.

2) Site Specifications + Vicinity

Acknowledging the requirement for the solar PV to be south/southwest facing, consider the vicinity of the site to ensure there are no unintended interferences with surrounding assets or infrastructure. For example, where would snow shed from the panels? Is there a walking path, sidewalk or roadway onto which snow would shed, creating barriers and interference with movement of people, bikes, and cars? Is there potential for damage to the installation? Is there sufficient space for the charging infrastructure and associated transformers or other ground mounted equipment? Is there opportunity to expand off the site in the future?

3) Site Design

Designing the infrastructure should consider year-round maintenance and access to the site. Ensure that there is sufficient space to access, maintain and replace (as necessary) the co-located EV charging equipment. Can snow and other debris be easily removed from the site? Can all sizes of vehicles access the EV charger? Consider whether the solar will be installed to cover just the EV charging infrastructure, or the vehicle stall(s) as well. The design of a stall cover should consider accessibility of equipment, and placement of any beams vs cantilevered design to keep the stall free of barriers.

4) Local electrical utility/provincial regulations

Grid-tying the solar PV will maximize the benefit of the installation, and depending on local regulations, allow for net-metering. Integrating a battery as an intermediary could be beneficial, particularly where DC fast charging equipment is installed and will have associated demand charges.

Concluding Recommendations

For small local governments installing a base network of EV charging stations to benefit tourism and connectivity across a dispersed area, integrating solar PV should be considered as a value-add where the siting provides a natural opportunity. Ensuring the EV charging infrastructure siting is optimized for cost and co-benefits to the community should be the primary focus of the local government, with the application of solar considered where the specifications allow.

If there is opportunity to partner with a utility, distributor, or private sector partner to secure additional funding and expand a solar PV installation associated with EV charging, a larger scale deployment may be a viable option, assuming the site specifications are conducive to the infrastructure.

It is recommended that the local governments in the study area prioritize first the siting of EV charging infrastructure to areas that support the technical specifications while maximizing local community co-benefits. A scan can then be done on those sites across the region to determine if the siting would be appropriate for a solar installation.

Addressing Dwell Time

The Challenge

Parking demand and availability of chargers for EV drivers in need of energy is a growing concern for municipalities in the Study Area. In some locales, the demand for parking is exceeding availability. In addition, some charging stalls are used as personal parking and charging spaces in lieu of at-home charging, reducing their access for visitors and other users. The recent study by Nuclear Innovation Institute and Plug N Drive revealed that EV drivers perceive charging in Grey, Bruce and Huron Counties as being difficult or very difficult. This is an emerging challenge as EV adoption grows, especially in areas around urban centres. As urban EV drivers embark on road trips to their favourite destinations, they rely on public charging to ‘energize’ their travel. But if public charging spaces are occupied for extended amounts of time by EV drivers for whom the charging instance is merely convenient, not necessary, that location isn’t available for someone who needs it to travel to the next destination. The amount of time an EV driver spends at a charging station is commonly referred to as ‘dwell time’. Notably, Level 3 (DC Fast Charger) EV stations aren’t often challenged by prolonged dwell times as EV drivers are in transit and typically looking to charge then move on. Dwell time is longest at free public Level 2 stations where someone may simply be plugging in for convenience while they shop, eat, etc.



There have been app and non-app-based solutions implemented in other jurisdictions across Canada to overcome dwell time challenges to varying degrees of success. CEA has compiled and evaluated some potential solutions relevant to the local context of the Study Area including dynamic pricing, permitting, etiquette signage and education, contracted parking arrangements, new construction requirements, apps etc.

Potential Solutions

'Refueling' an EV is fundamentally different from filling up the gas tank in an internal combustion engine (ICE) vehicle. Refueling an ICE vehicle typically occurs when the tank is near empty. However, EV drivers are more likely to charge, or "top up" their vehicle battery even if they are not near empty. This difference needs to be considered into the planning of charging infrastructure³⁰.

4. Dynamic Pricing

"Proper pricing can increase overall productivity by motivating drivers to only consume the resources they require when they need them. Resources include not only the energy required to recharge a vehicle, but also the time needed, and physical space occupied during the charging session. These space and time elements must be considered when determining a site's pricing policy to curb excessive usage, which can impose a physical constraint on the number of vehicles serviceable per day." – Ryan Winn, author of Electric Vehicle Charging at Work.

Winn's analysis of EV charging behaviours across workplaces in southern California concluded:

- Dynamic or graduated pricing (where the hourly rate increases after the first few hours) effectively curbs excessively long stays.
- On average, paid charging sessions result in shorter session durations by 9 minutes, longer active charging times by 20 minutes, and shorter post-charge dwell time of approximately 29 minutes across the entire day. The largest effect is on the post-charge dwell time as this metric decreases by 29 minutes for paid transactions, when the overall duration only decreases by 9 minutes, on average. This demonstrates that charging stations are utilized in a more efficient manner when the driver is required to pay for at least part of the transaction.
- Pricing policies should be based on a parking model to incorporate all resources consumed (i.e., time, physical space, and energy)
- Hourly then Penalty approach encourages the most efficient usage of the EVSE and generates the most revenue for the site host.
- Minimum activation fees can be used to disincentive very inefficient transactions by discouraging users to occupy the space if they have a near-full state of charge.
- Dynamic pricing is typically needed only for Level 2 EV chargers, most drivers depart Level 3 (DC Fast Charger) stations as soon as their session ends.

For reference, BC Hydro recently implemented base pricing at all their station in British Columbia, effective April 1, 2022, the cost to charge at BC Hydro EV stations is:

- 12.07 cents per minute for 25 kW charging (+5% GST)
- 21.13 cents per minute for 50 kW charging (+5% GST)
- 27.17 cents per minute for 100 kW charging (+5% GST)

³⁰ Electric Vehicle Charging at Work, https://innovation.luskin.ucla.edu/wp-content/uploads/2019/03/EV_Charging_at_Work.pdf

Our recommendation is to employ dynamic pricing at all Level 2 EV charging stations across the Study Area (both existing and proposed stations). To maximize effectiveness, the Partners should couple this solution with one, or all, of the other solutions outlined. CEA completed a scan of charging rates currently in place at both Level 2 and Level 3 (DC Fast Charger) EV stations across Ontario, the results are summarized in Appendix 6. A small sample of Level 2 EV chargers situated in Quebec were noted as well. Level 2 EV Charger pricing ranged from \$1/hr to \$2.50/hr.

5. Etiquette Signage and Education

Accessible and informative signage when paired with other dwell time solutions such as permitting and dynamic pricing can help to incent desired EV charging behaviours. Installing signage at the charging station can remind or inform EV drivers of charging etiquette. Messages such as the following:

- Only Park in an EV charging space when you're actually charging
- Remember to always move your vehicle as soon as charging is complete
- Use the charging station app (Flo, ChargePoint) to monitor your charge should you decide to leave your vehicle
- If you don't need 100% state of charge, consider leaving the station available for a fellow EV driver
- Consider finishing your charge at 80% because the last 20% of your battery charges slower. If you have time, consider moving to a Level 2 charger.
- Use the PlugShare App to check in and leave notes for other drivers

A bonus opportunity is to add EV charging etiquette messaging to interpretive signage about local amenities, services and attractions.

6. Permitting

Like the methodology already used by parking lot owners, parking at EV charging stations could be managed via enforcement (e.g., tickets and fines). This approach could employ parking control systems (e.g., visual inspection by an individual, or camera) already in use by the parking lot owner. The parking lot owner could set limits on the length of stay in a charging station stall. They would reflect the speed of charge associated with the type of charging station (Level 2 vs. Level 3). This solution would be best for high-volume parking lots with limited EV charging stations installed. This solution could be coupled with dynamic pricing to further incent desired EV driver behaviour.

7. Valet Service

Implementing a valet service at sites with sufficient demand can maximize turnover of vehicles. This solution is best for popular tourist attractions, shopping centres, public beaches etc. This practice promotes equity and accessibility by allowing the greatest number of drivers to use the charging resource in the most efficient manner. The attendant moves the charging vehicle once it has completed its session and replaces it with another vehicle that requires charging.³¹ In this way, dwell time matches the need of various drivers.

8. Apps

App-based solutions unique to the Study Area can be costly, as they require annual licensing and maintenance of existing software. While using a modern app may be ideal for residents, visitors are unlikely to research an additional app for a new area; visitors are more likely to react to the pricing or policy at public stations when they arrive. Further, most of the charging networks currently operating across the Study Area (Greenlots, Flo, ChargePoint, SWTCH, IVY etc.) have apps for their stations which already notify EV drivers when their charging session is completed.

ChargePoint even has a waitlist function. Waitlist (available on some stations) lets drivers get in a virtual line to charge when all stations are busy, helping more drivers get a charge. For Waitlist to work, drivers need to move their cars when done charging.

Utilities in other jurisdictions have developed custom apps for their network (see BC Hydro EV app in British Columbia). This additional app communicates with the charging station networks in operation in the Province (Flo, ChargePoint etc.) and enables users to search across all network providers. If it is of further interest, our recommendation is for the Partners to collaborate with local utility providers to bring one app that will service the entire Study Area. Too many apps can have the exact opposite effect where none will be used.

9. New Construction Requirements

As noted previously, one of the sources of extended dwell time at EV charging stations across the Study Area are the “garage orphans”. Garage orphans are residents who live in either residential condominiums or apartment buildings (collectively known as “multi-unit residential buildings” or MURBs) or in dwellings that lack access to a driveway or a garage. There are a few reasons why home charging may not be possible in these scenarios: the strata simply refuse to allow installation or there is not electrical capacity to support multiple Level 2 chargers, for example.

³¹ EV Charging at Work, https://innovation.luskin.ucla.edu/wp-content/uploads/2019/03/EV_Charging_at_Work.pdf

While it is difficult to address the lack of charging in existing homes and buildings, the main solution here is for municipalities across the Study Area to adopt “EV-ready” requirements for new single- and multi-family residential and non-residential developments. For example, the cities of Toronto³², Surrey and Port Moody in B.C., and multiple cities in California, have adopted requirements that 20% or more of parking spaces in new developments must feature either an EV charging station or an adjacent electrical outlet (i.e., be “EV-ready”). These innovative policies will make it easier to charge EVs in these buildings in the future.³³

Given over 70% of EV charging happens at home, the primary solution is more home charging and workplace charging to alleviate stress on public infrastructure.³⁰

³² [https://www.toronto.ca/news/city-of-toronto-raises-green-performance-standards-for-new-development-and-mandates-net-zero-ghg-emissions-for-new-city-owned-buildings/#:~:text=Electric%20vehicles%3A%20Tier%201%20will,electric%20vehicle%20\(EV\)%20ready.](https://www.toronto.ca/news/city-of-toronto-raises-green-performance-standards-for-new-development-and-mandates-net-zero-ghg-emissions-for-new-city-owned-buildings/#:~:text=Electric%20vehicles%3A%20Tier%201%20will,electric%20vehicle%20(EV)%20ready.)

³³ Commercial buildings: an EV-ready approach for new builds and retrofits, <https://electricautonomy.ca/2021/04/14/commercial-buildings-ev-ready/>

³⁴ B.C. looks to Ontario example in growing right-to-charge debate, <https://electricautonomy.ca/2019/10/30/b-c-looks-to-ontario-example-in-growing-right-to-charge-debate/>

Appendix 1. Resident and EV Driver Survey Questions and Results

EV Driver Survey

Introduction

The County of Wellington and their Partners (Cities of Guelph, Stratford, and St. Mary's and the Counties of Wellington, Dufferin, Perth, Huron, Grey and Bruce) are developing a preliminary strategy to design a regional electric vehicle charging network. The map below identifies the 'Study Area.'



To inform the strategy, the Partners are gathering public feedback from local, regional and international individuals and groups.

The purpose of this “EV Driver” survey is to understand EV charging behaviour better and uncover the needs of local and visiting EV drivers. It is intended to be completed by individuals who currently own and drive an electric vehicle. If you do not currently drive an EV, but would like to contribute, please complete this survey.

This survey will look at the following questions:

- What motivates drivers to buy an EV?
- What are the habits and behaviours of current EV drivers?
- What challenges do EV drivers experience while travelling to and within the Study Area?
- What would help address these challenges and improve the EV driving experience?

The survey will close on Tuesday, February 15, 2022. Please enter your contact info for a chance to win one of three \$50 gift cards for a local business.



Community Energy Association is conducting the survey on behalf of the Cities of Guelph, Stratford, and St. Mary's and the Counties of Wellington, Dufferin, Perth, Huron, Grey and Bruce to help develop a preliminary regional electric vehicle charging network strategy. All personal information created, held or collected in this survey is protected in accordance with the Municipal Freedom of Information and Protection of Privacy Act, 1990 (MFIPPA). For questions related to this collection of personal information, contact info@communityenergy.bc.ca. This survey is hosted by Survey Monkey. Review Survey Monkey's Privacy Policy.

EV Driver Survey

Background Info

This survey asks questions related to why you purchased an EV, and the barriers you currently face. If you do not own an EV, please contribute by completing this survey.

1. What is your age range?

- ☐ Under 18
- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65-74
- ☐ 75 or older
- ☐ Prefer not to say

2. Do you:

- ☐ Own your home
- ☐ Rent your home
- ☐ Rent subsidized housing
- ☐ Other (please specify)

3. What municipality do you live in?

4. What province or state do you live in?

5. Which of the following statements best describe you?

- ☐ I live in the Study Area
- ☐ I commute to the Study Area for work
- ☐ I visit the Study Area (e.g., weekly, monthly, or annually) for tourism and recreation

6. Which of the following best describes your residence?

- ☐ Single detached or semi-detached house
- ☐ Townhouse house
- ☐ Apartment/condo
- ☐ Suite in a single detached or semi-detached house
- ☐ Other (please specify)

7. How many dependents (e.g., children or parents) reside alongside you in your home?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ More than 4

EV Driver Survey

Perceptions of EV Charging Infrastructure

8. What kind of EV do you have (Make and model)?

9. Do you have a second car in your household?

☐ Yes

☐ No

10. If you answered yes to the previous question, what type of vehicle is it? If you answered no, please leave this question blank.

☐ Electric

☐ Hybrid

☐ Internal combustion engine

11. I have owned an EV for:

☐ Less than 1 year

☐ 1-2 years

☐ 2-3 years

☐ 3-4 years

☐ More than 4 years

12. How important were the following motivators for you to purchase an EV?

	Extremely important	Very important	Moderately important	Slightly important	Not important at all	I don't know
Save money by not purchasing gas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce my impact on the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take advantage of government grants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A smoother, quieter ride than other vehicles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommendation from someone I know	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Status/positive public image	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. When you were considering buying an EV, what information sources were most valuable to you during your research? Please check all that apply.

- ☐ Internet search
- ☐ Consumer reports
- ☐ Friends, family, neighbours, colleagues
- ☐ Car companies
- ☐ News articles
- ☐ Online owner forums/groups
- ☐ Automotive magazines
- ☐ Federal government
- ☐ Provincial, Territorial, or State government
- ☐ Municipal government
- ☐ Utilities
- ☐ Not-for-profit research and advocacy organizations
- ☐ Other (please specify)

* 14. Do you have a subscription/account with more than one charging network (e.g., flo, chargepoint, etc.)?

- ☐ Yes
- ☐ No

EV Driver Survey

Network Subscription - Perceptions of EV Charging Infrastructure

* 15. How many networks are you subscribed to?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ More than 4

EV Driver Survey

Network Accounts - Perceptions of EV Charging Infrastructure

16. Please let us know why you have an account with only one (or none) charging networks. Please select all that apply.

- ☐ I don't do road trips in my EV
- ☐ I only charge at home/at work
- ☐ I don't want to pay for it
- ☐ Other (please specify)

EV Driver Survey

Perceptions of EV Charging Infrastructure

17. Which networks are you subscribed to? (Please check all that apply)

- ☐ Flo
- ☐ Chargepoint
- ☐ Electrify Canada
- ☐ Other (please specify)

18. To what degree do you believe range anxiety is a significant barrier to owning an EV?

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Strongly disagree

19. Do you think a fee should be applied to charge at Level 2 stations?

- ☐ Yes
- ☐ No
- ☐ Not sure/I don't have enough information to answer

20. Do you think a stepped fee should be applied to charge at Level 2 stations in an effort to limit dwell time? (e.g., First 4 hours are .50cents/hour, and following hours are \$4/hour).

- ☐ Yes
- ☐ No
- ☐ Not sure/I don't have enough information to answer

21. How important is it that the electricity used in an EV comes from renewable energy?

- ☐ 1 = not all important
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 = very important

EV Driver Survey

Charging and Driving Habits

22. When taking longer trips (e.g. outside of your community), do you drive your EV?

- ☐ Yes
- ☐ No

23. If you answered yes to the previous question, has owning an EV changed how you plan your trips? Specifically, in what ways do your behaviours change, if any?

- ☐ Route plan intentionally
- ☐ Look for accommodations with level 2 chargers
- ☐ Plan stops around availability of fast charging
- ☐ Other (please specify)

24. How often do you charge your EV at each of the following locations?

	Never	Monthly	Weekly	Multiple times a week	Daily
At home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At work, using a wall charger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At work, using a level 2 charger provided by my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At work, using a public level 2 charger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public level 2 charger (on-street, public parkade)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public DCFC (fast charging)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. How do you primarily use fast chargers? Select one that best represents your habits?

- ☐ I don't. I only charge at home
- ☐ I don't. I primarily use Level 2 chargers
- ☐ They are my main sources of charging
- ☐ I only use them on road trips (regional or national travel)
- ☐ I don't know/No preference

26. How important are the following features of a public charging station?

	Extremely important	Very important	Moderately important	Slightly important	Not important at all	I don't know/no preference
Charging speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amenities (cafes, restaurants, parks) within walking distance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proximity to the route you are on	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability (e.g., station status is accurate)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can pay with a credit card	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can activate with multiple network cards (interoperability)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Located immediately at a facility/business	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High level of perceived safety (e.g., lighting)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multiple stations co- located	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. While using a public charger, how would you prefer to use your time while the car charges? Please check all that apply.

- ☐ Shopping
- ☐ Eating and drinking
- ☐ Outdoor activities and walking
- ☐ Work/use laptop/phone
- ☐ Other (please specify)

28. How much of a challenge are the following to being an EV owner? [Drop down menus with Not a challenge, Minor challenge, Significant challenge]

	Not a challenge	Minor challenge	Significant challenge
High cost to purchase an EV	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chargers are usually unavailable or in use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charges take too long	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of charging at residence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of charging at work provided by my employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of charging for longer trips	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited options for heavy-duty use (e.g., towing, off-road, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of driving range in cold weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. What comments do you have about the challenges of being an EV driver, and how could the charging options could be improved

EV Driver Survey

Contact Info (Optional)

30. Please enter your contact information if you would like to be entered into the draw for prizes:

Name

Email Address

Phone Number

Resident Survey

Introduction

The County of Wellington and their Partners (Cities of Guelph, Stratford, and St. Mary's and the Counties of Wellington, Dufferin, Perth, Huron, Grey and Bruce) are developing a preliminary strategy to design a regional electric vehicle charging network. The map below identifies the 'Study Area.'



The purpose of this “Resident” survey is to better understand issues residents face when considering purchasing an EV. Your answers will also help us determine how a regional EV charging network might help residents overcome barriers to EV adoption. This survey is intended to be completed by individuals who do not currently own or drive an EV. If you already own/drive an EV, [please complete our EV Driver Survey here](#). The survey will close on Tuesday, February 15, 2022. Please enter your contact info for a chance to win one of three \$50 gift cards for a local business.



Community Energy Association is conducting the survey on behalf of the Cities of Guelph, Stratford, and St. Mary's and the Counties of Wellington, Dufferin, Perth, Huron, Grey and Bruce to help develop a preliminary regional electric vehicle charging network strategy. All personal information created, held or collected in this survey is protected in accordance with the Municipal Freedom of Information and Protection of Privacy Act, 1990 (MFIPPA). For questions related to this collection of personal information, contact info@communityenergy.bc.ca. This survey is hosted by Survey Monkey. [Review Survey Monkey's Privacy Policy](#).

Resident Survey

Background Info

1. What is your age range?

- ☐ Under 18
- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65-74
- ☐ 75 or older
- ☐ Prefer not to say

2. Do you:

- ☐ Own your home
- ☐ Rent your home
- ☐ Rent subsidized housing
- ☐ Other (please specify)

3. What municipality do you live in?

4. What province or state do you live in?

5. Which of the following statements best describe you?

- ☐ I live in the Study Area
- ☐ I commute to the Study Area for work
- ☐ I visit the Study Area (e.g., weekly, monthly, or annually) for tourism and recreation

6. Which of the following best describes your residence?

- ☐ Single detached or semi-detached house
- ☐ Townhouse house
- ☐ Apartment/condo
- ☐ Suite in a single detached or semi-detached house
- ☐ Other (please specify)

7. How many dependents (e.g., children or parents) reside alongside you in your home?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ More than 4

Resident Survey

Resident Survey Questions

8. What type of vehicle(s) do you currently drive? Enter the number of vehicles you own in each category. If you don't own a vehicle or use a car share, put a "1" in the last row.

SUV

Van

Car

Pick-up Truck

Motorcycle

I don't own a vehicle

9. When do you anticipate purchasing or leasing a new vehicle for your household?

- ☐ No plan
- ☐ 5+ years
- ☐ 2-5 years
- ☐ Next 2 years

10. Will your next vehicle be an additional vehicle for your household or a replacement vehicle?

- ☐ Replacement vehicle
- ☐ Additional vehicle

11. Have you considered purchasing or leasing an electric vehicle for your household?

- ☐ Yes
- ☐ No

12. What is the average distance you drive on a typical day?

- ☐ Less than 20 km (less than 12 miles)
- ☐ 20-40 km (12-24 miles)
- ☐ 60-80 km (37-50 miles)
- ☐ 80-100 km (50-62 miles)
- ☐ Over 100 km (over 62 miles)



Resident Survey

Resident Survey Questions

13. How familiar are you with electric vehicles?

- ☐ Very familiar (Have looked at different EV models or gone for a test drive)
- ☐ Somewhat familiar (Heard about them, but haven't researched very much)
- ☐ Not at all familiar (I know very little about them)
- ☐ Other (please specify)

14. Have you noticed EV chargers in your neighbourhood or within the Study Area when travelling regionally?

- ☐ Yes
- ☐ No

15. Do any of your friends or neighbours own an EV?

- ☐ Yes
- ☐ No

16. If you were considering buying an EV, which factors would motivate you? Please check all that apply.

- ☐ EV tax rebates and incentives
- ☐ Access to home charging
- ☐ Save money by not purchasing gas
- ☐ Access to high-occupancy vehicle (HOV) lanes and EV parking
- ☐ Utility rebate for a charging station
- ☐ Discounted utility rates for EV charging
- ☐ Reduced registration fee
- ☐ A smoother, quieter ride than gas-powered vehicles
- ☐ Public charging stations are more common
- ☐ Strong recommendation from someone I know
- ☐ Status/public image
- ☐ Reduced environmental impact
- ☐ Other (please specify)

17. If you were interested in finding out more about EVs, where would you go to get this information? Please check all that apply.

- ☐ Internet search
- ☐ Consumer reports
- ☐ Friends, family, neighbours, colleagues
- ☐ Car companies
- ☐ News articles
- ☐ Online owner forums/groups
- ☐ Automotive magazines
- ☐ Federal government
- ☐ Provincial, Territorial, or State government
- ☐ Municipal government
- ☐ Utilities
- ☐ Not-for-profit research and advocacy organizations
- ☐ Other (please specify)

18. Listed below are some of the most common real and perceived barriers to EV adoption. How concerned would you be about the following when purchasing an EV? [Extremely concerned, Very concerned, Slightly concerned, Not concerned at all, I don't know]

[illegible]

Resident Survey

Resident Questions

19. If you owned an EV, where might you charge it most often?

- ☐ At work
- ☐ On the go/public charging
- ☐ At home
- ☐ I don't know

20. Do you have the ability to charge an EV at home?

- ☐ Yes, I have access to an outlet on my property
- ☐ No, but I could easily retrofit my home to have charging
- ☐ No, I only have on-street parking
- ☐ No, I'm in a multi-unit building (condo) or apartment without charging facilities
- ☐ I don't know
- ☐ Other (please specify)

Resident Survey

Resident Survey Questions

21. How important is it that the electricity used in an EV comes from renewable energy?

- ☐ 1 = not all important
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 = very important

22. What benefits do you think could result from having a more robust EV charger network? Please select all that apply.

- ☐ More EV adoption
- ☐ Reduced costs for vehicle maintenance
- ☐ Positive environmental impact: Improved air quality/ reduced vehicle emissions
- ☐ No benefits
- ☐ Other (please specify)

23. Do you have any other comments or questions?

Resident Survey

Contact Info (Optional)

24. Please enter your contact information if you would like to be entered into the draw for prizes:

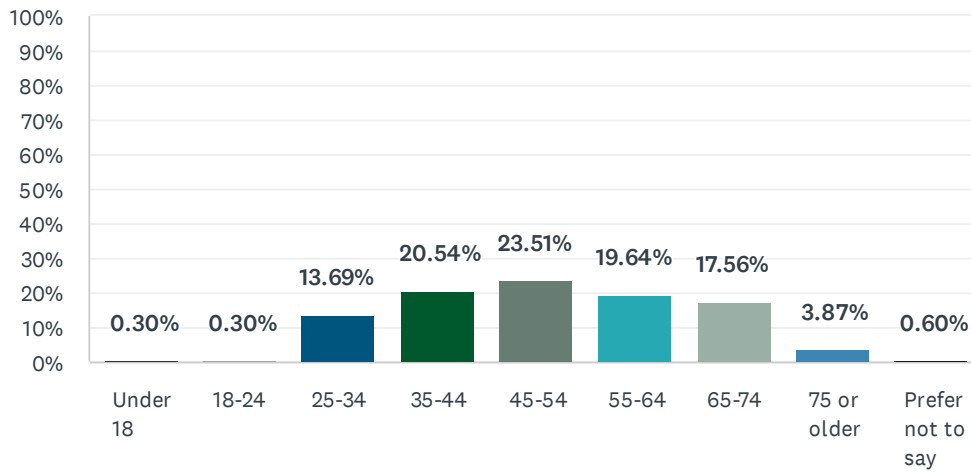
Name

Email Address

Phone Number

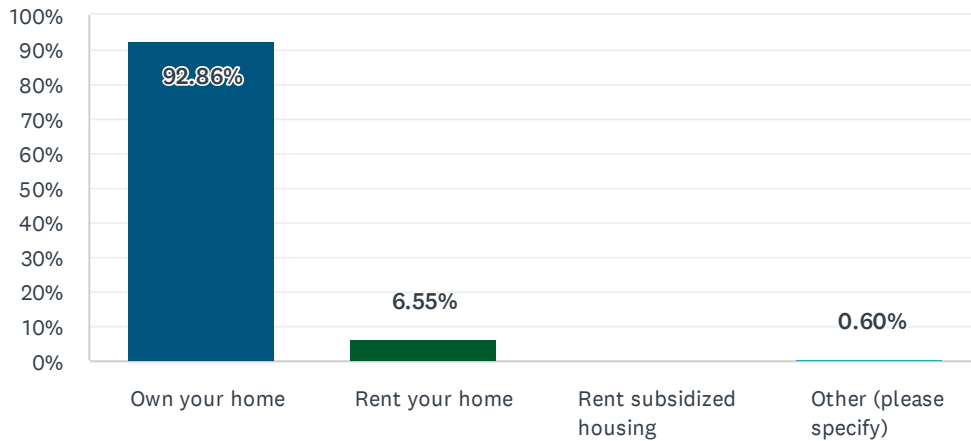
Q1 What is your age range?

Answered: 336 Skipped: 2



Q2 Do you:

Answered: 336 Skipped: 2



Q3 What municipality do you live in?

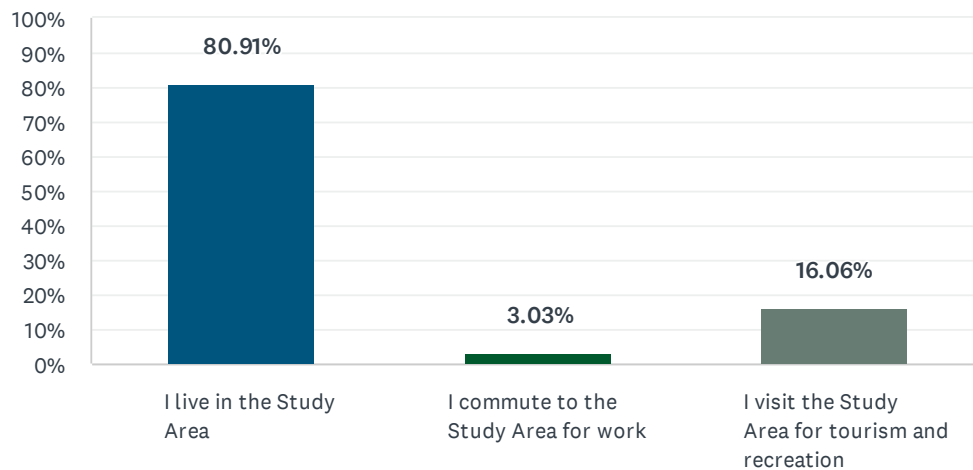
Answered: 337 Skipped: 1

Q4 What province or state do you live in?

Answered: 336 Skipped: 2

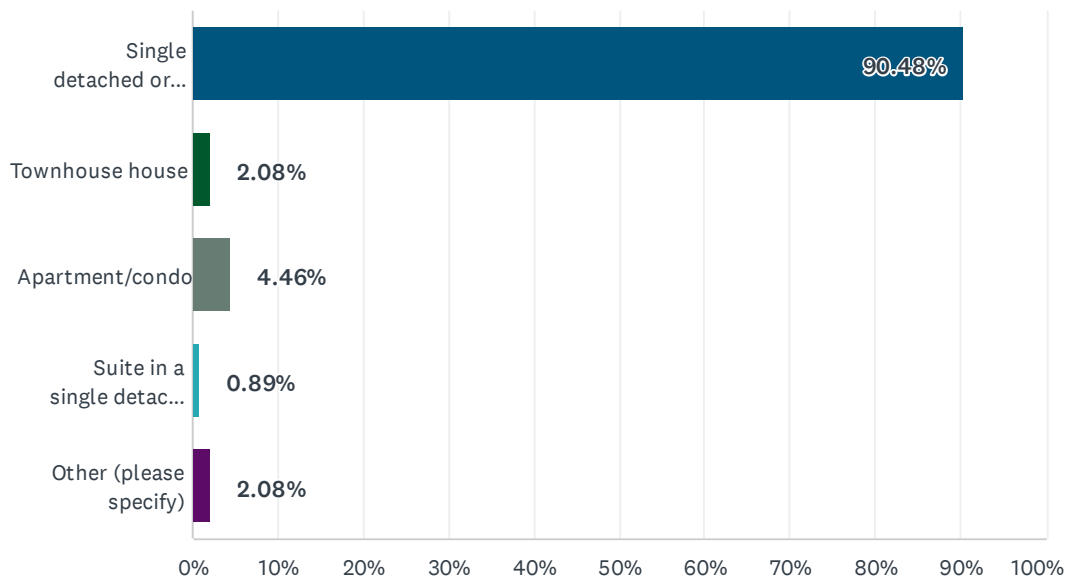
Q5 Which of the following statements best describe you?

Answered: 330 Skipped: 8



Q6 Which of the following best describes your residence?

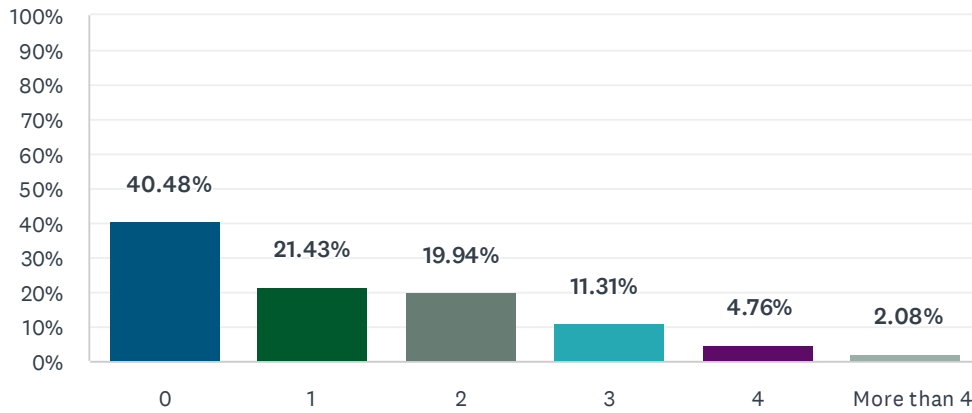
Answered: 336 Skipped: 2



Q7 How many dependents (e.g., children or parents) reside alongside you in your home?

Answered: 336 Skipped: 2

EV Driver Survey

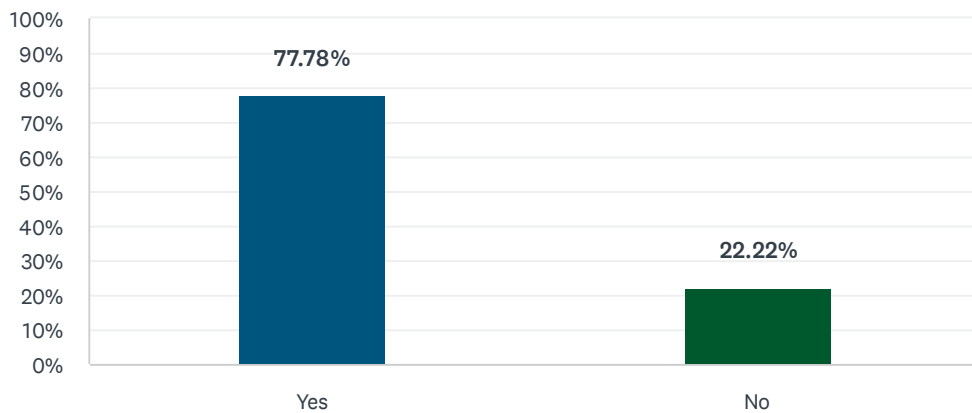


Q8 What kind of EV do you have (Make and model)?

Answered: 267 Skipped: 71

Q9 Do you have a second car in your household?

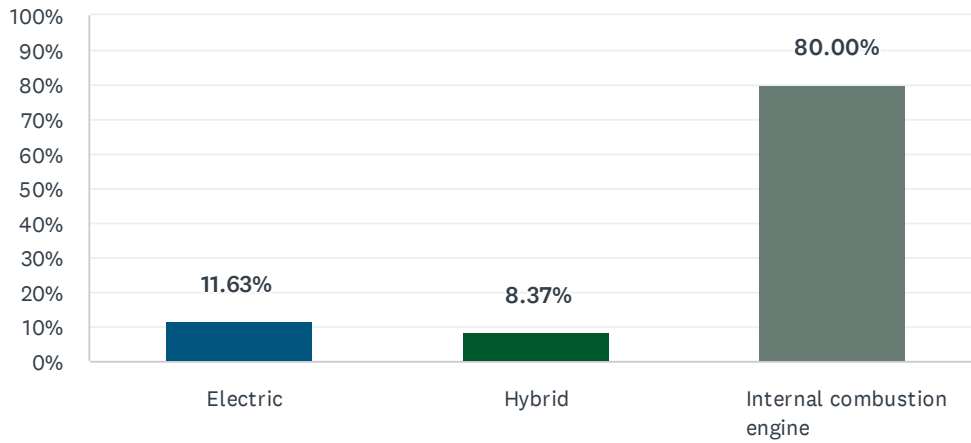
Answered: 270 Skipped: 68



Q10 If you answered yes to the previous question, what type of vehicle is it? If you answered no, please leave this question blank.

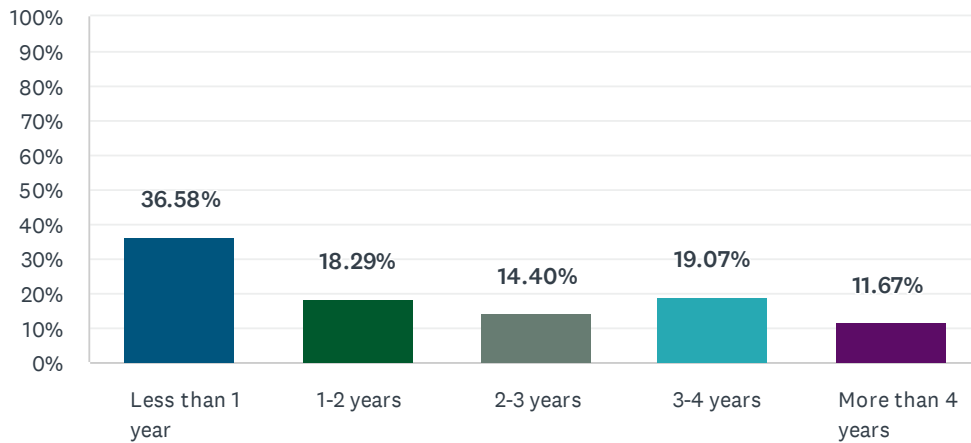
Answered: 215 Skipped: 123

EV Driver Survey



Q11 I have owned an EV for:

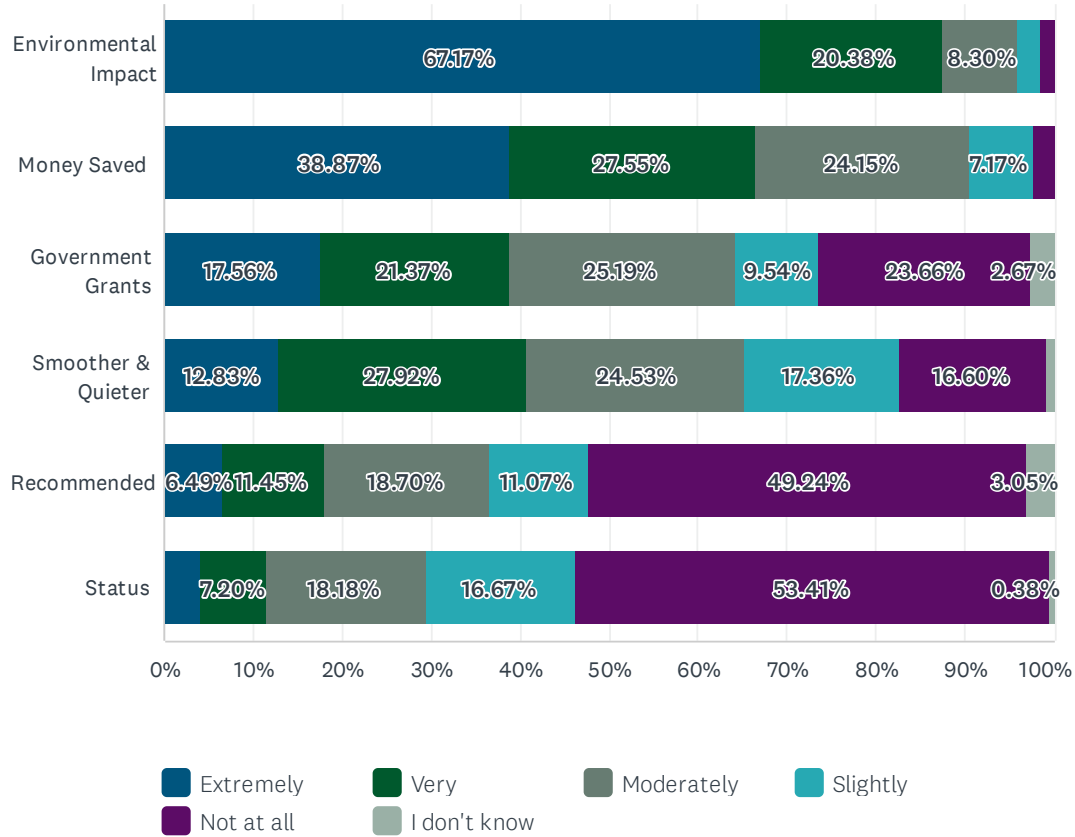
Answered: 257 Skipped: 81



Q12 How important were the following motivators for you to purchase an EV?

Answered: 266 Skipped: 72

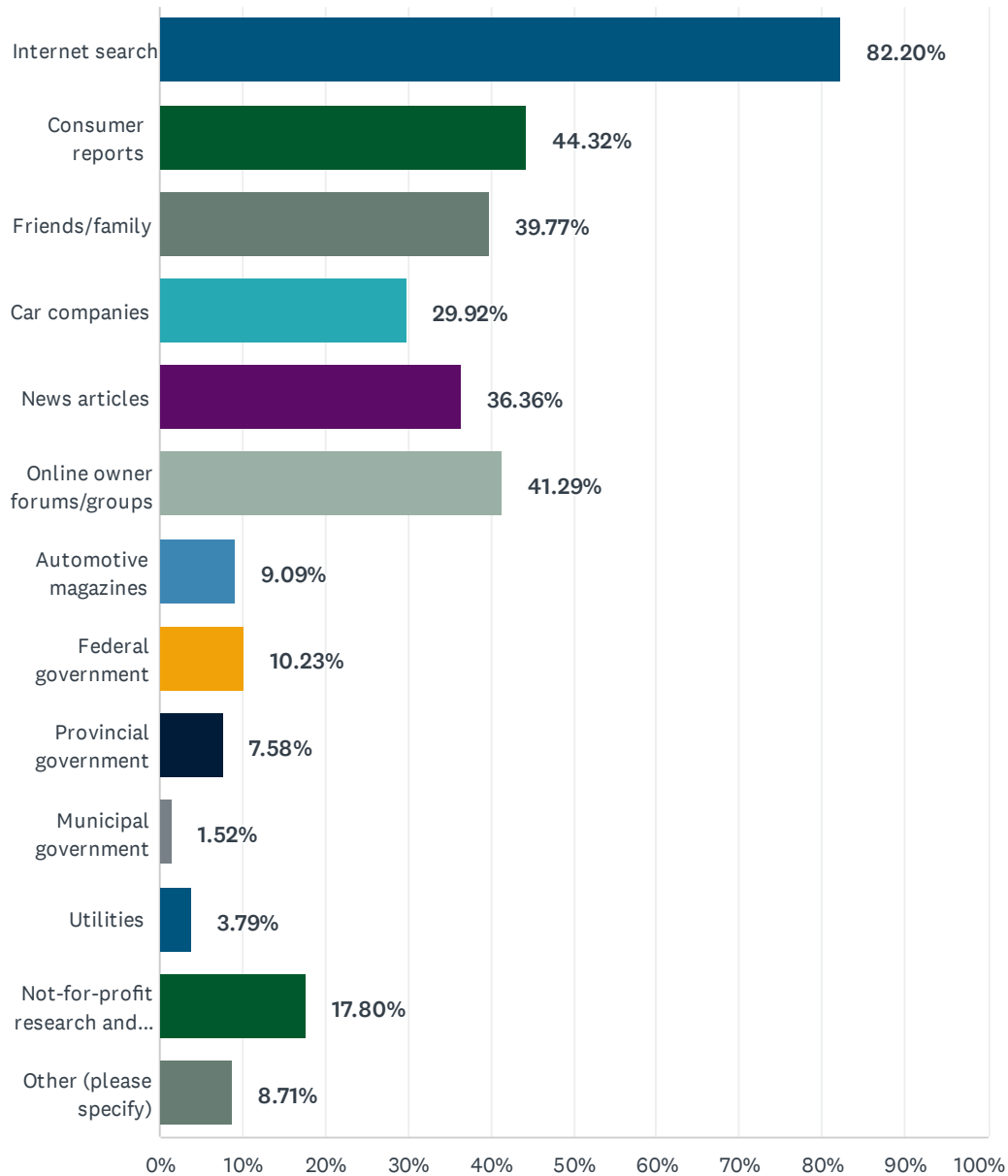
EV Driver Survey



Q13 When you were considering buying an EV, what information sources were most valuable to you during your research? Please check all that apply.

Answered: 264 Skipped: 74

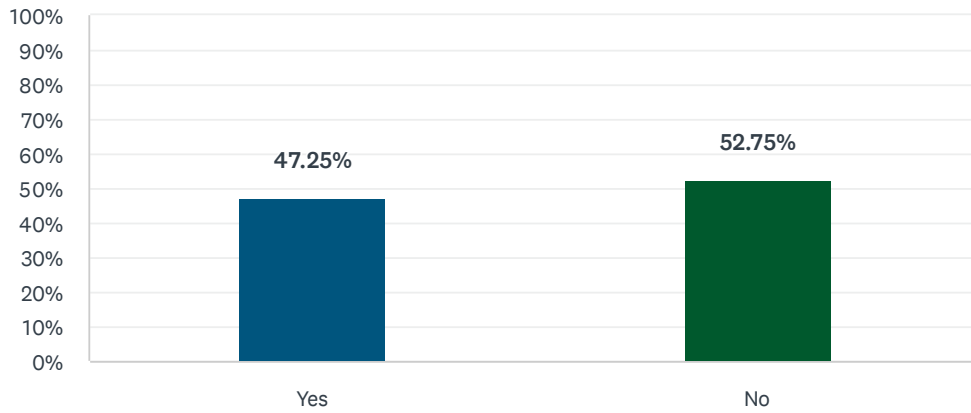
EV Driver Survey



Q14 Do you have a subscription/account with more than one charging network (e.g., flo, chargepoint, etc.)?

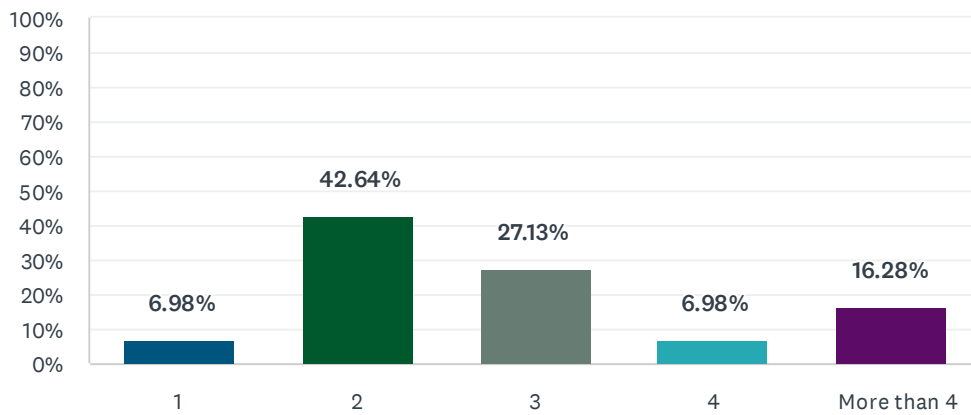
Answered: 273 Skipped: 65

EV Driver Survey



Q15 How many networks are you subscribed to?

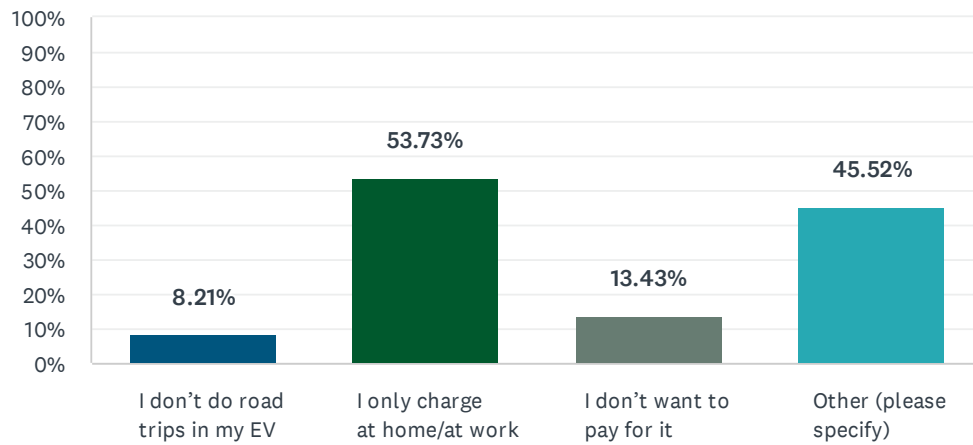
Answered: 129 Skipped: 209



Q16 Please let us know why you have an account with only one (or none) charging networks. Please select all that apply.

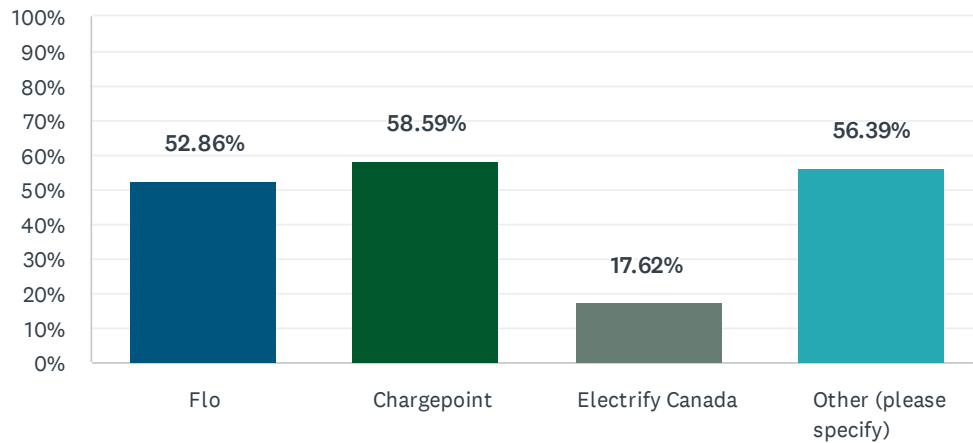
Answered: 134 Skipped: 204

EV Driver Survey



Q17 Which networks are you subscribed to? (Please check all that apply)

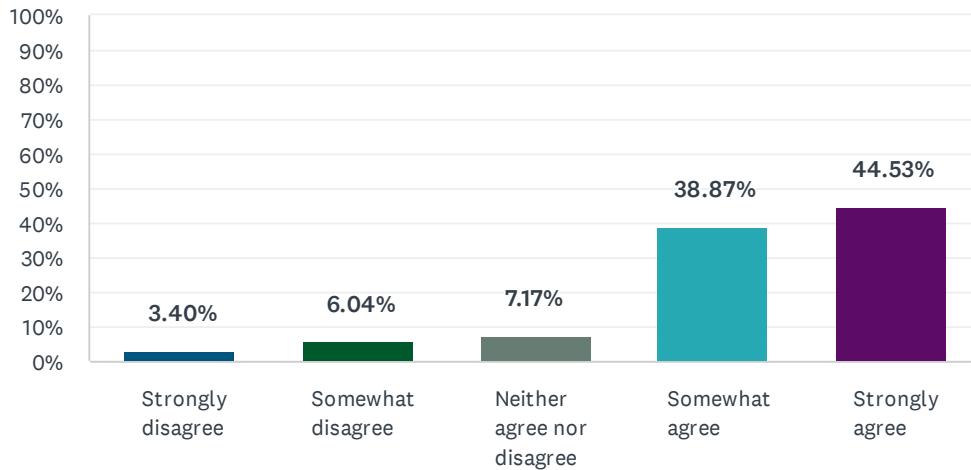
Answered: 227 Skipped: 111



Q18 To what degree do you believe range anxiety is a significant barrier to owning an EV?

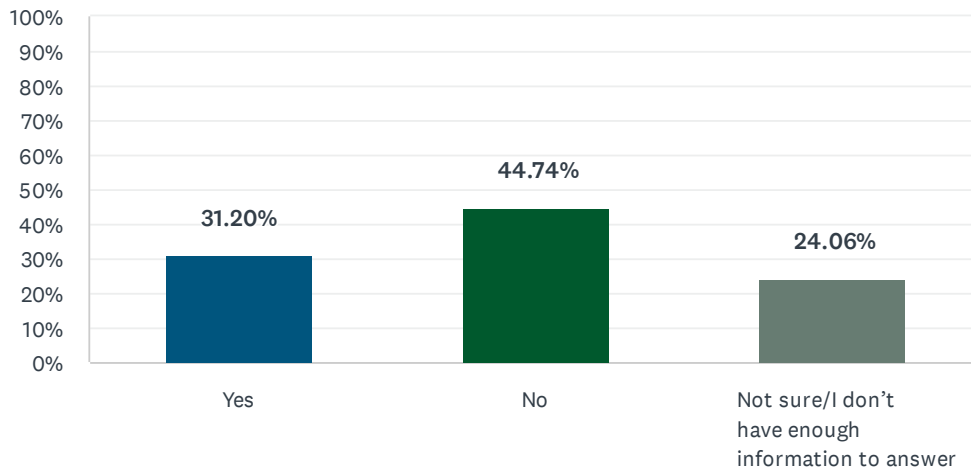
Answered: 265 Skipped: 73

EV Driver Survey



Q19 Do you think a fee should be applied to charge at Level 2 stations?

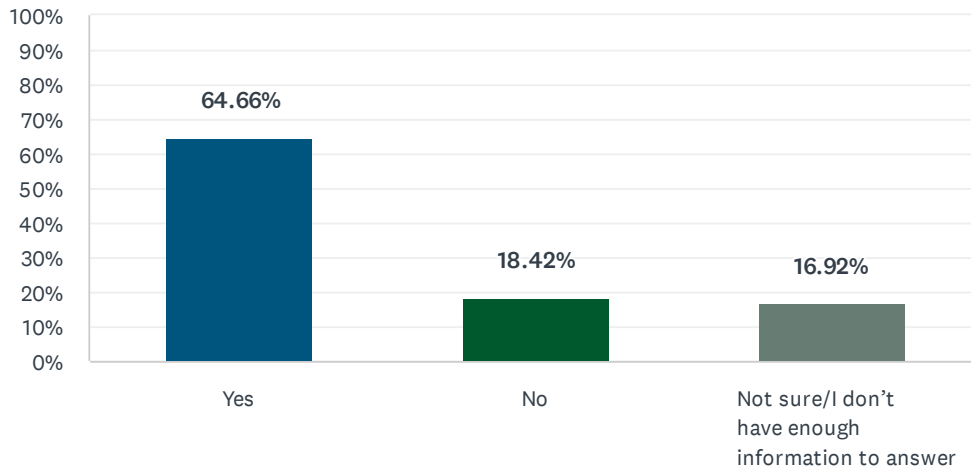
Answered: 266 Skipped: 72



Q20 Do you think a stepped fee should be applied to charge at Level 2 stations in an effort to limit dwell time? (e.g., First 4 hours are .50cents/hour, and following hours are \$4/hour).

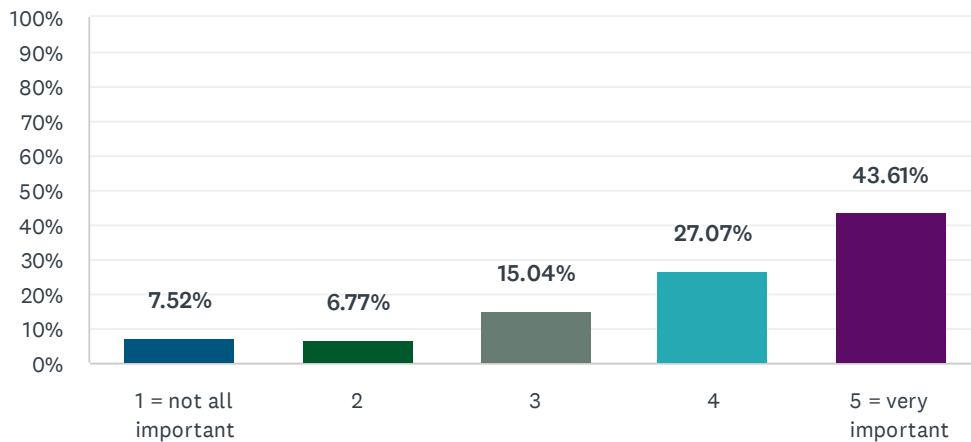
Answered: 266 Skipped: 72

EV Driver Survey



Q21 How important is it that the electricity used in an EV comes from renewable energy?

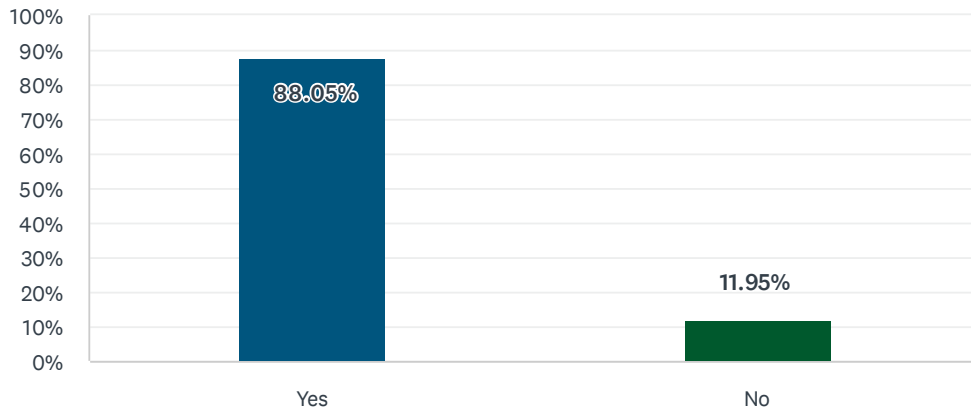
Answered: 266 Skipped: 72



Q22 When taking longer trips (e.g. outside of your community), do you drive your EV?

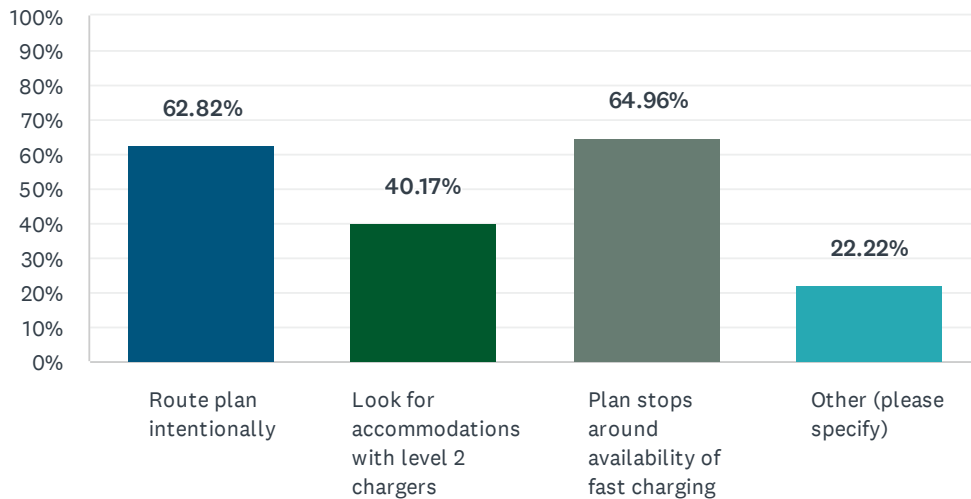
Answered: 251 Skipped: 87

EV Driver Survey



Q23 If you answered yes to the previous question, has owning an EV changed how you plan your trips? Specifically, in what ways do your behaviours change, if any?

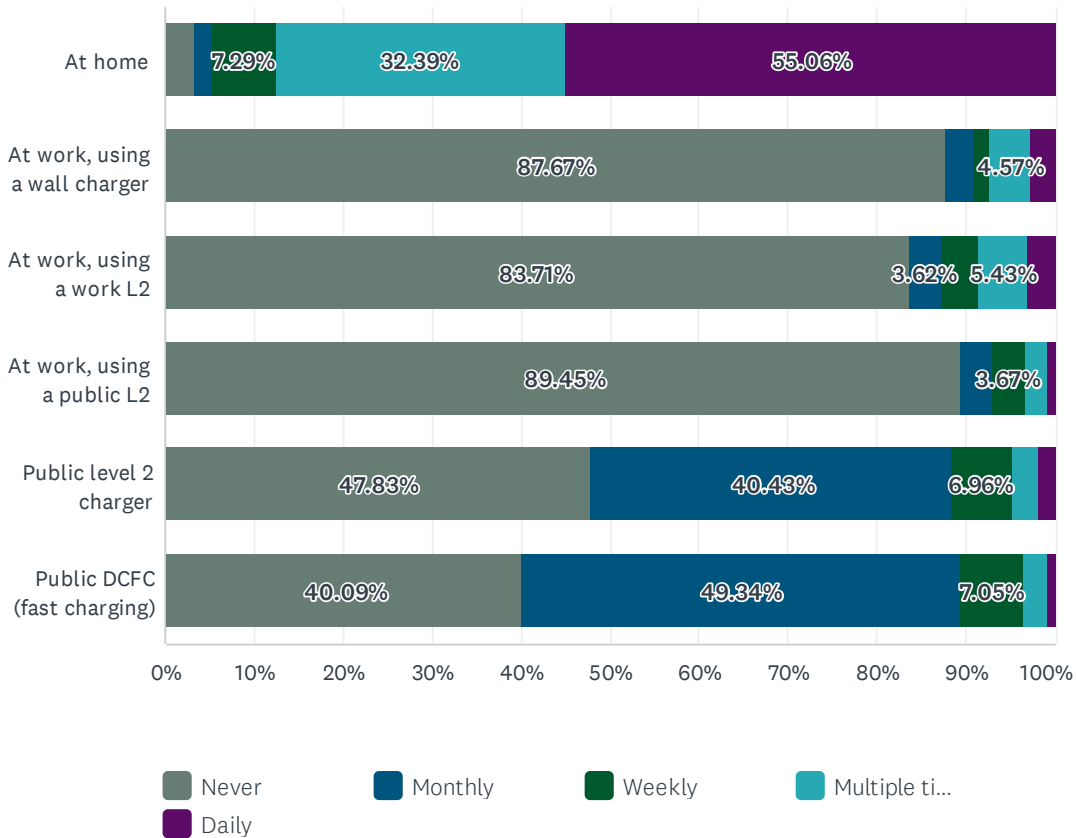
Answered: 234 Skipped: 104



Q24 How often do you charge your EV at each of the following locations?

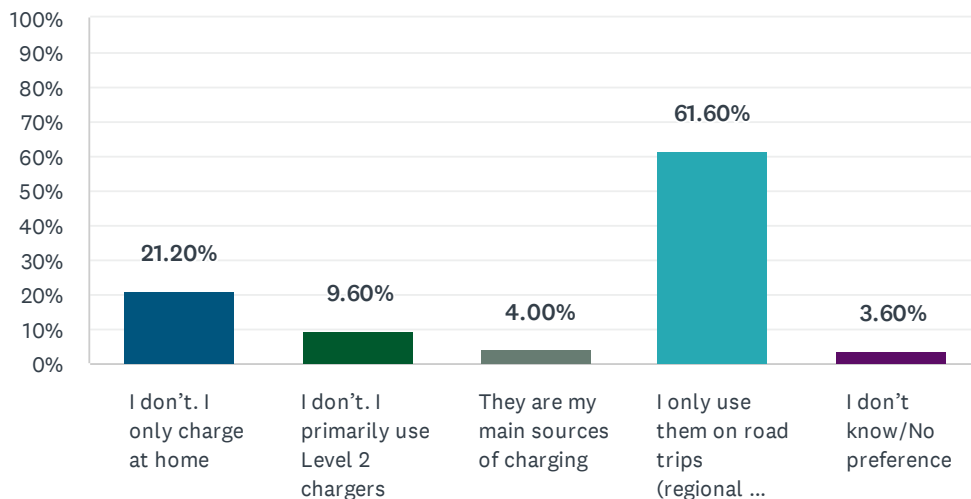
Answered: 250 Skipped: 88

EV Driver Survey



Q25 How do you primarily use fast chargers? Select one that best represents your habits?

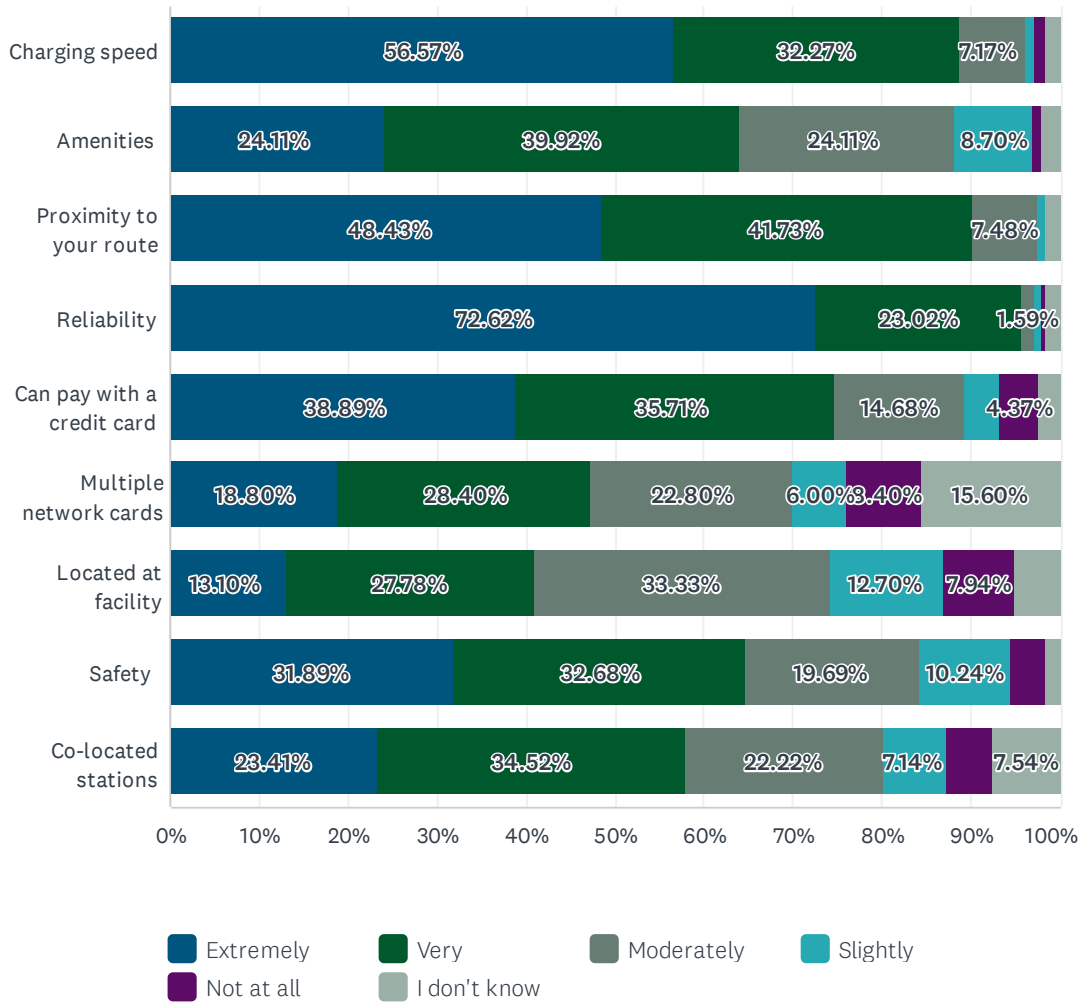
Answered: 250 Skipped: 88



Q26 How important are the following features of a public charging station?

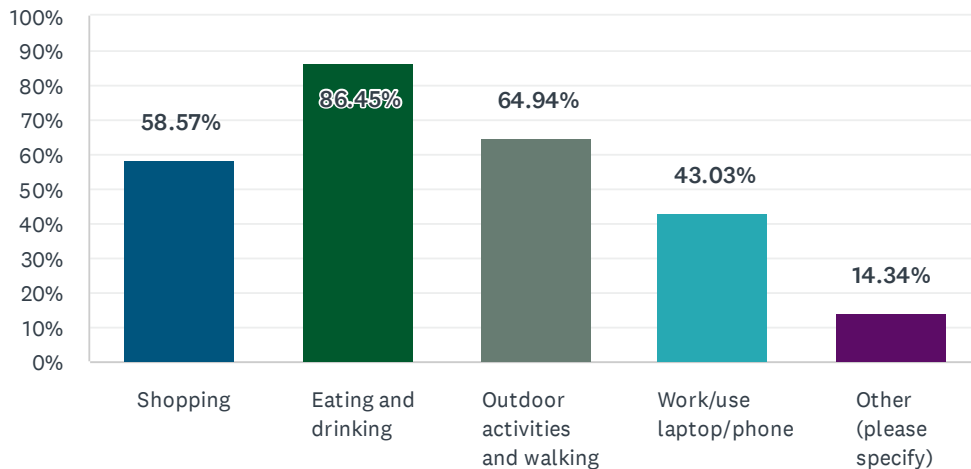
Answered: 254 Skipped: 84

EV Driver Survey



Q27 While using a public charger, how would you prefer to use your time while the car charges? Please check all that apply.

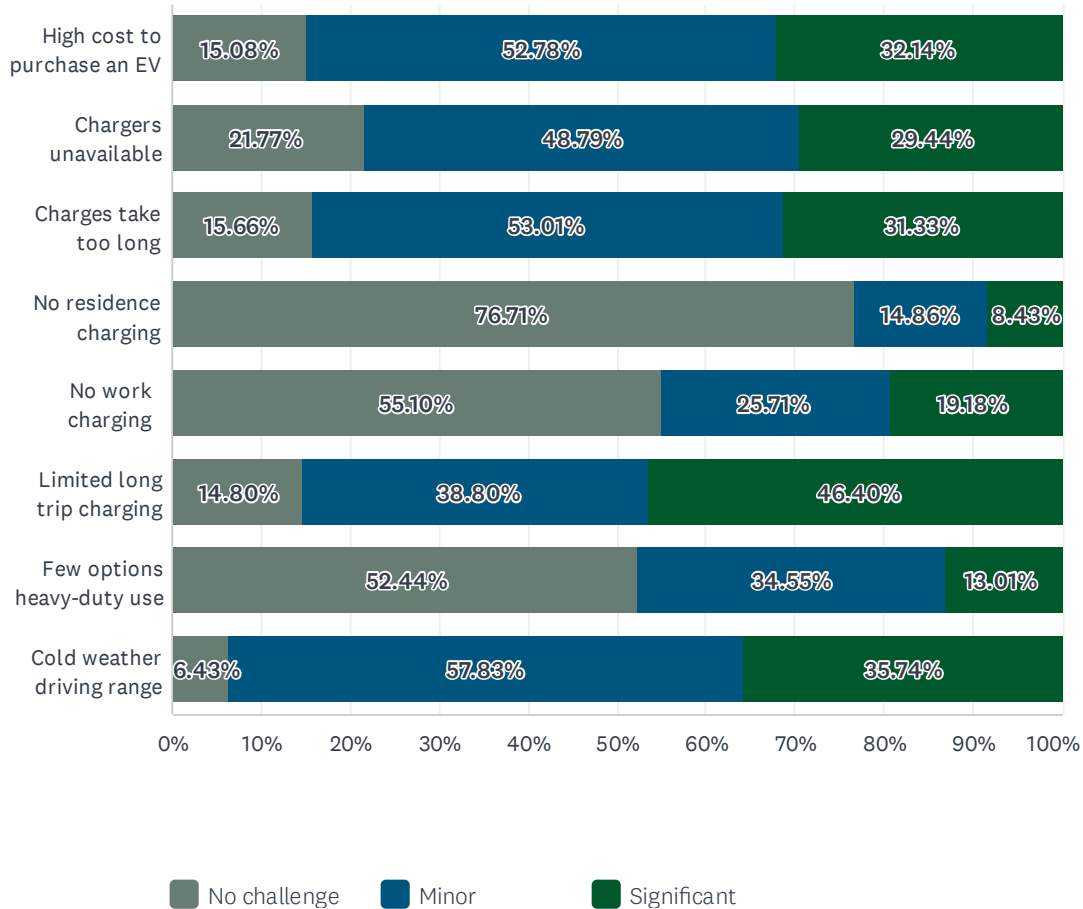
Answered: 251 Skipped: 87



EV Driver Survey

Q28 How much of a challenge are the following to being an EV owner?

Answered: 252 Skipped: 86



Q29 What comments do you have about the challenges of being an EV driver, and how could the charging options could be improved

Answered: 195 Skipped: 143

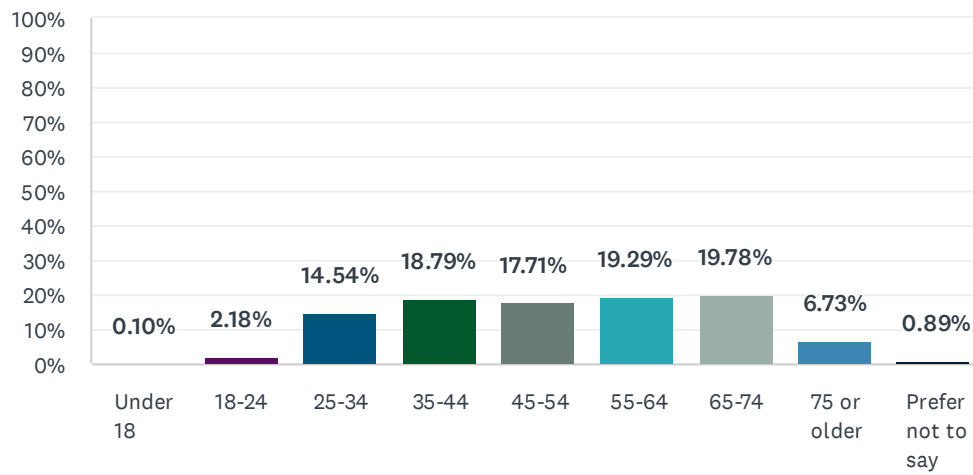
Q30 Please enter your contact information if you would like to be entered into the draw for prizes:

Answered: 202 Skipped: 136

Resident Survey

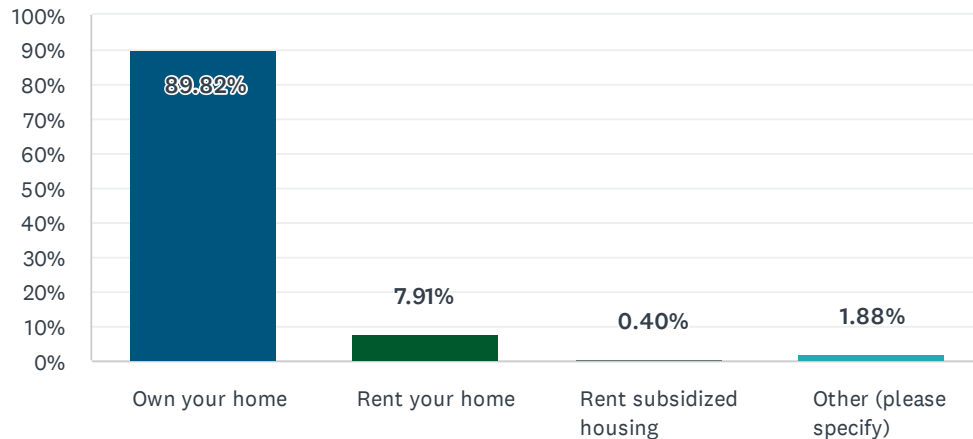
Q1 What is your age range?

Answered: 1,011 Skipped: 4



Q2 Do you:

Answered: 1,012 Skipped: 3



Q3 What municipality do you live in?

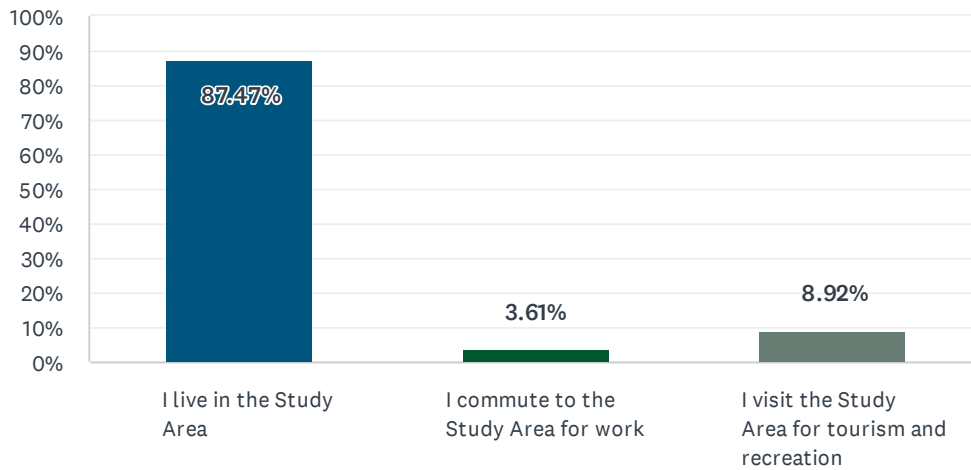
Answered: 1,004 Skipped: 11

Q4 What province or state do you live in?

Answered: 1,005 Skipped: 10

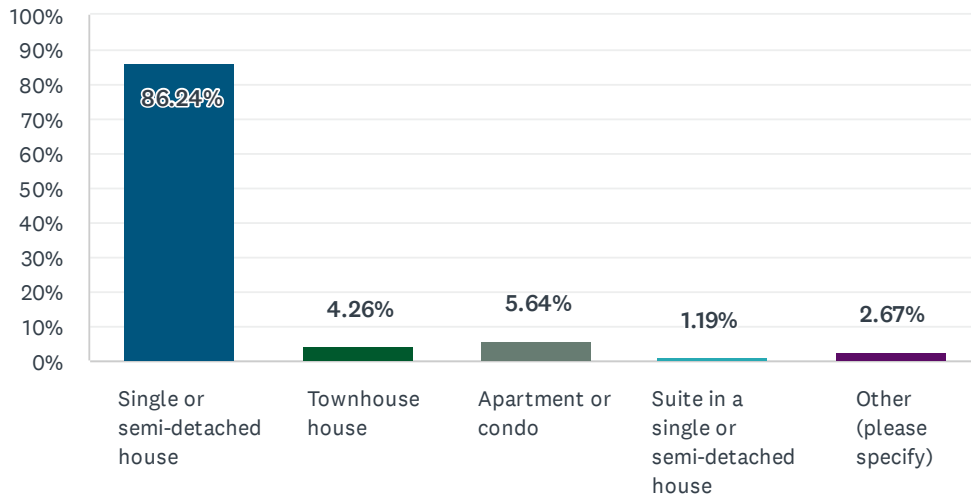
Q5 Which of the following statements best describe you?

Answered: 998 Skipped: 17



Q6 Which of the following best describes your residence?

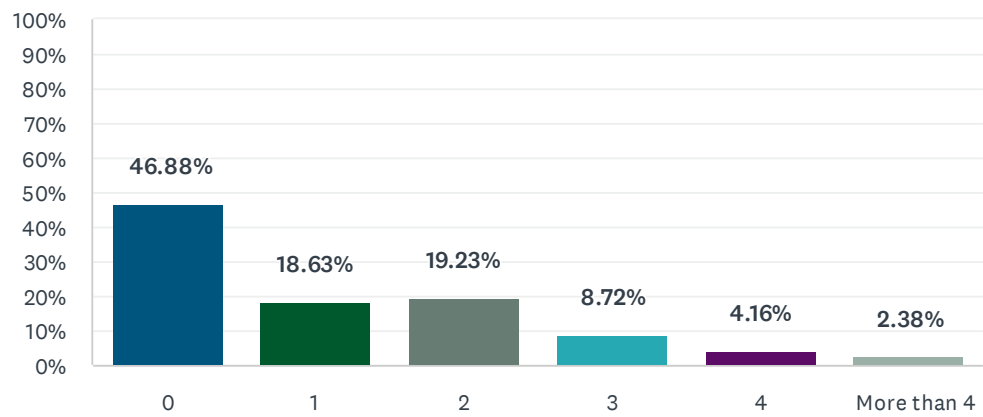
Answered: 1,010 Skipped: 5



Q7 How many dependents (e.g., children or parents) reside alongside you in your home?

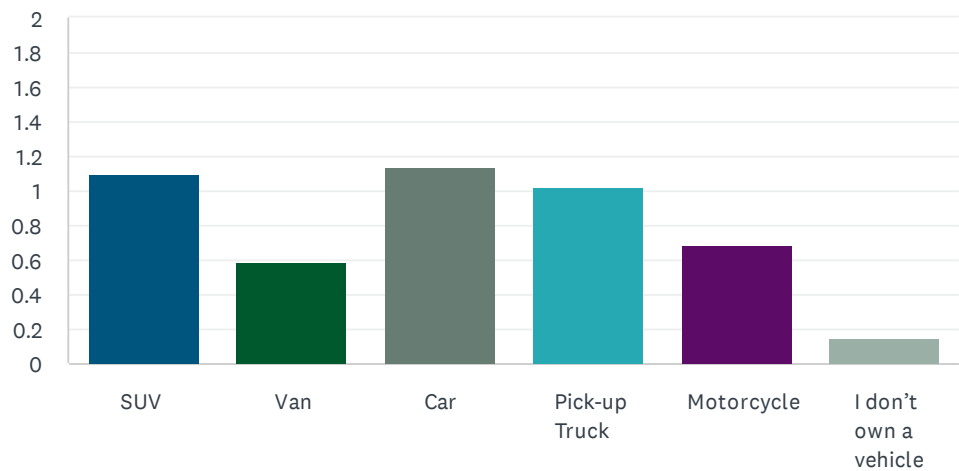
Answered: 1,009 Skipped: 6

Resident Survey



Q8 What type of vehicle(s) do you currently drive? Enter the number of vehicles you own in each category. If you don't own a vehicle or use a car share, put a "1" in the last row.

Answered: 977 Skipped: 38

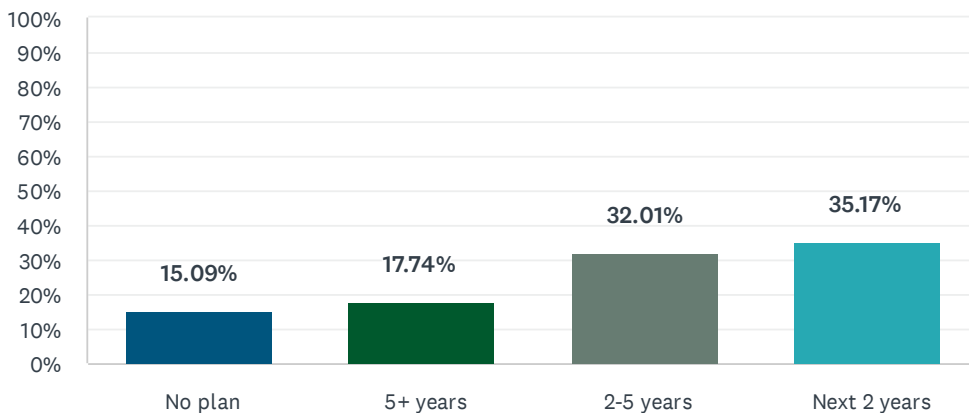


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
SUV	1	643	588
Van	1	92	155
Car	1	676	592
Pick-up Truck	1	422	414
Motorcycle	1	95	138
I don't own a vehicle	0	7	46
Total Respondents: 977			

Q9 When do you anticipate purchasing or leasing a new vehicle for your household?

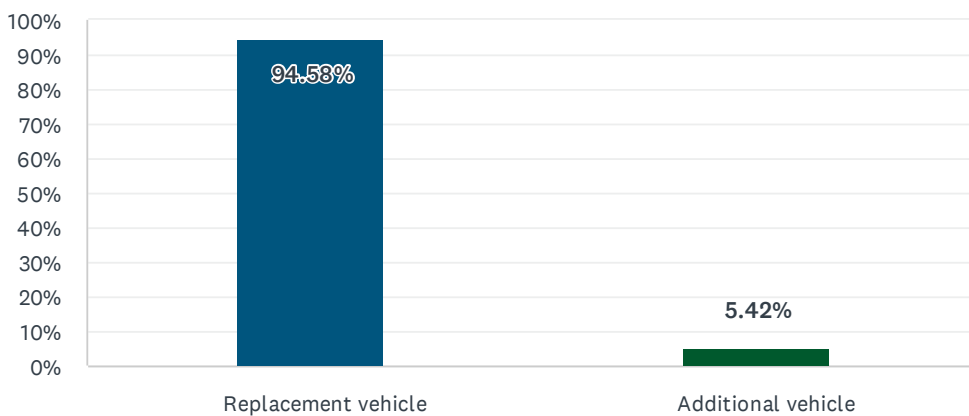
Resident Survey

Answered: 981 Skipped: 34



Q10 Will your next vehicle be an additional vehicle for your household or a replacement vehicle?

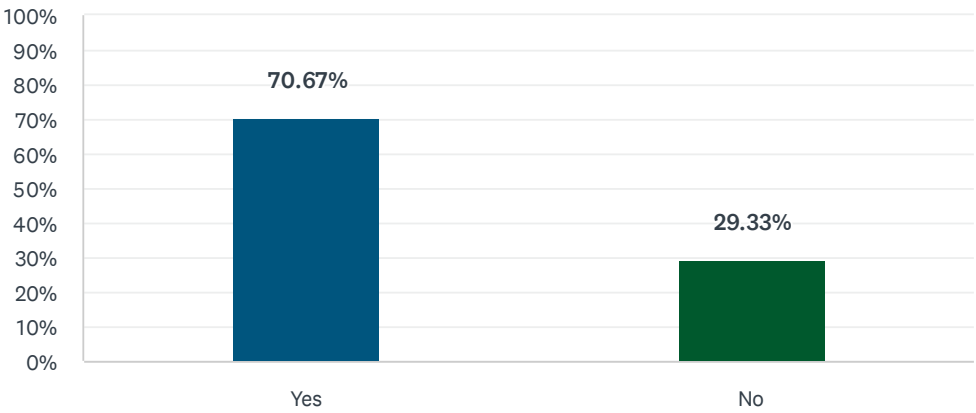
Answered: 978 Skipped: 37



Q11 Have you considered purchasing or leasing an electric vehicle for your household?

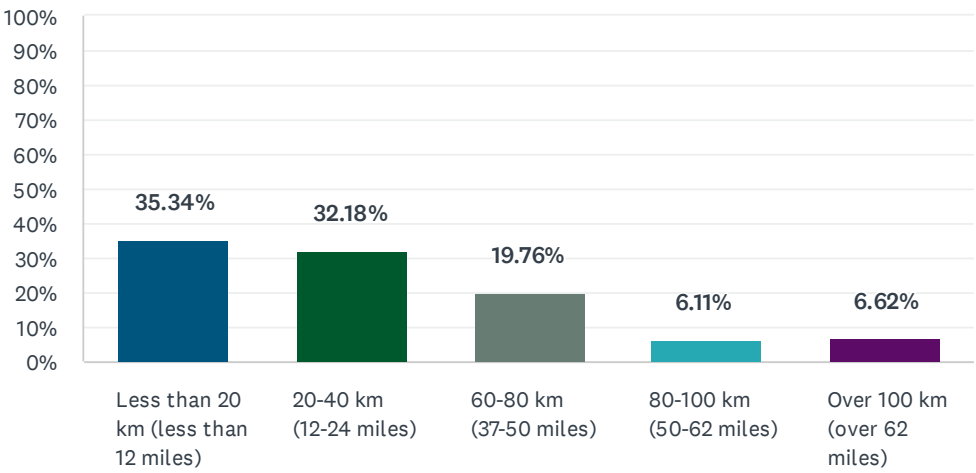
Answered: 982 Skipped: 33

Resident Survey



Q12 What is the average distance you drive on a typical day?

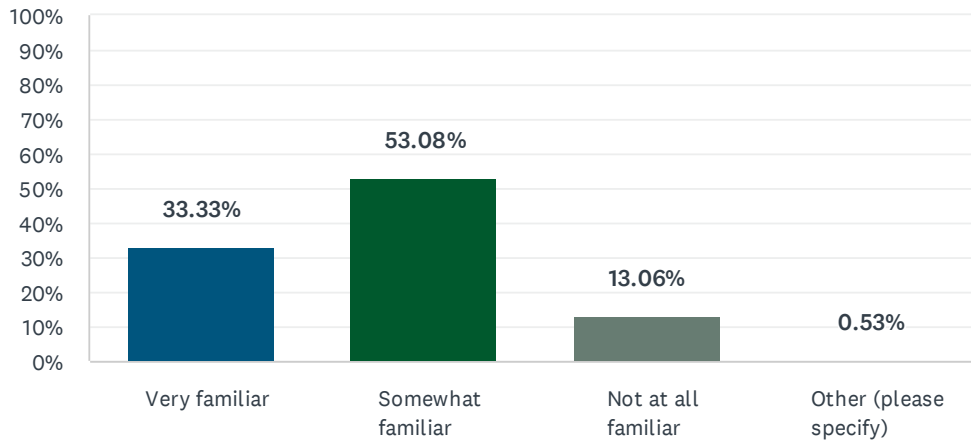
Answered: 982 Skipped: 33



Q13 How familiar are you with electric vehicles?

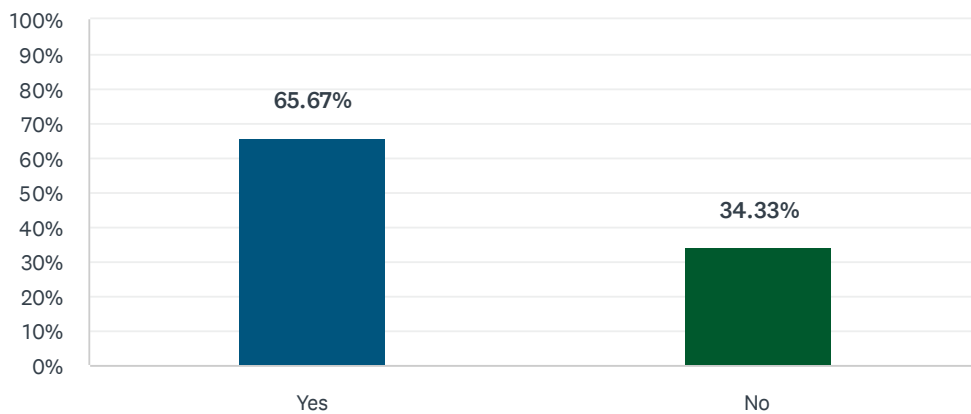
Answered: 942 Skipped: 73

Resident Survey



Q14 Have you noticed EV chargers in your neighbourhood or within the Study Area when travelling regionally?

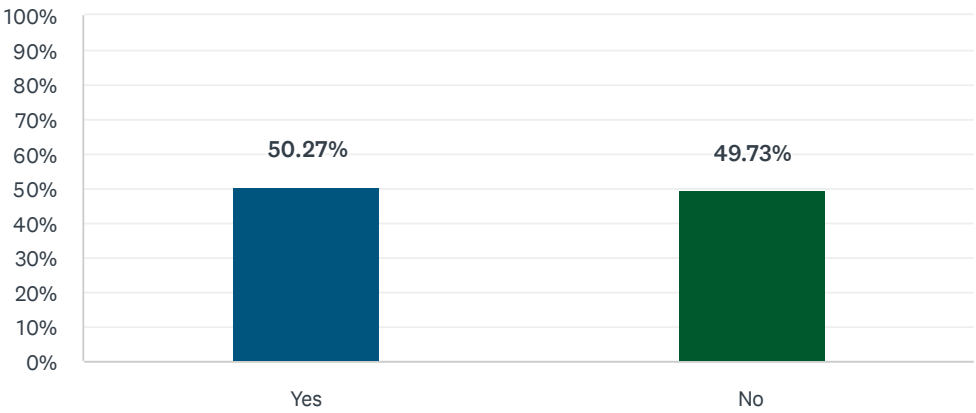
Answered: 941 Skipped: 74



Q15 Do any of your friends or neighbours own an EV?

Answered: 941 Skipped: 74

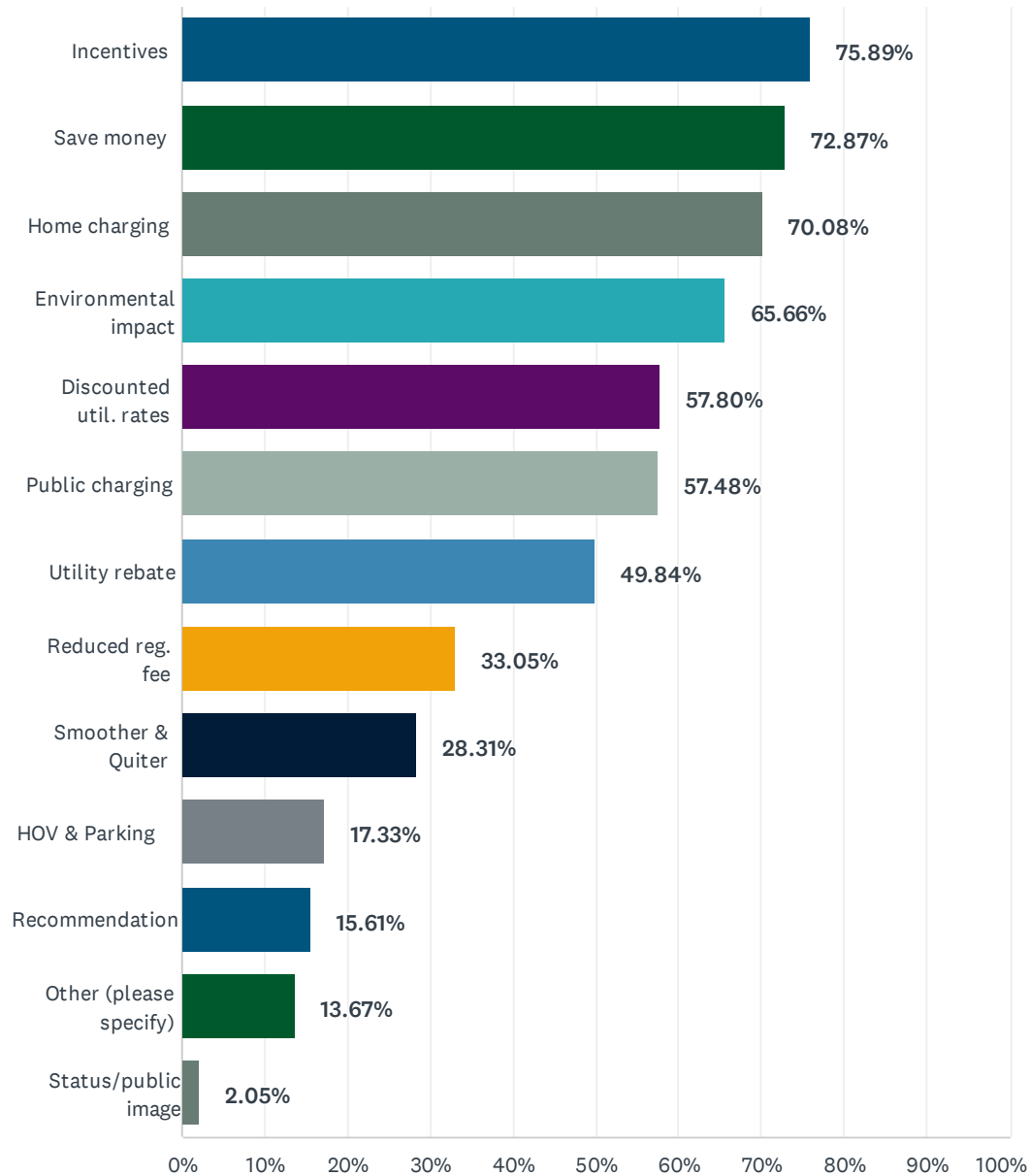
Resident Survey



Q16 If you were considering buying an EV, which factors would motivate you? Please check all that apply.

Answered: 929 Skipped: 86

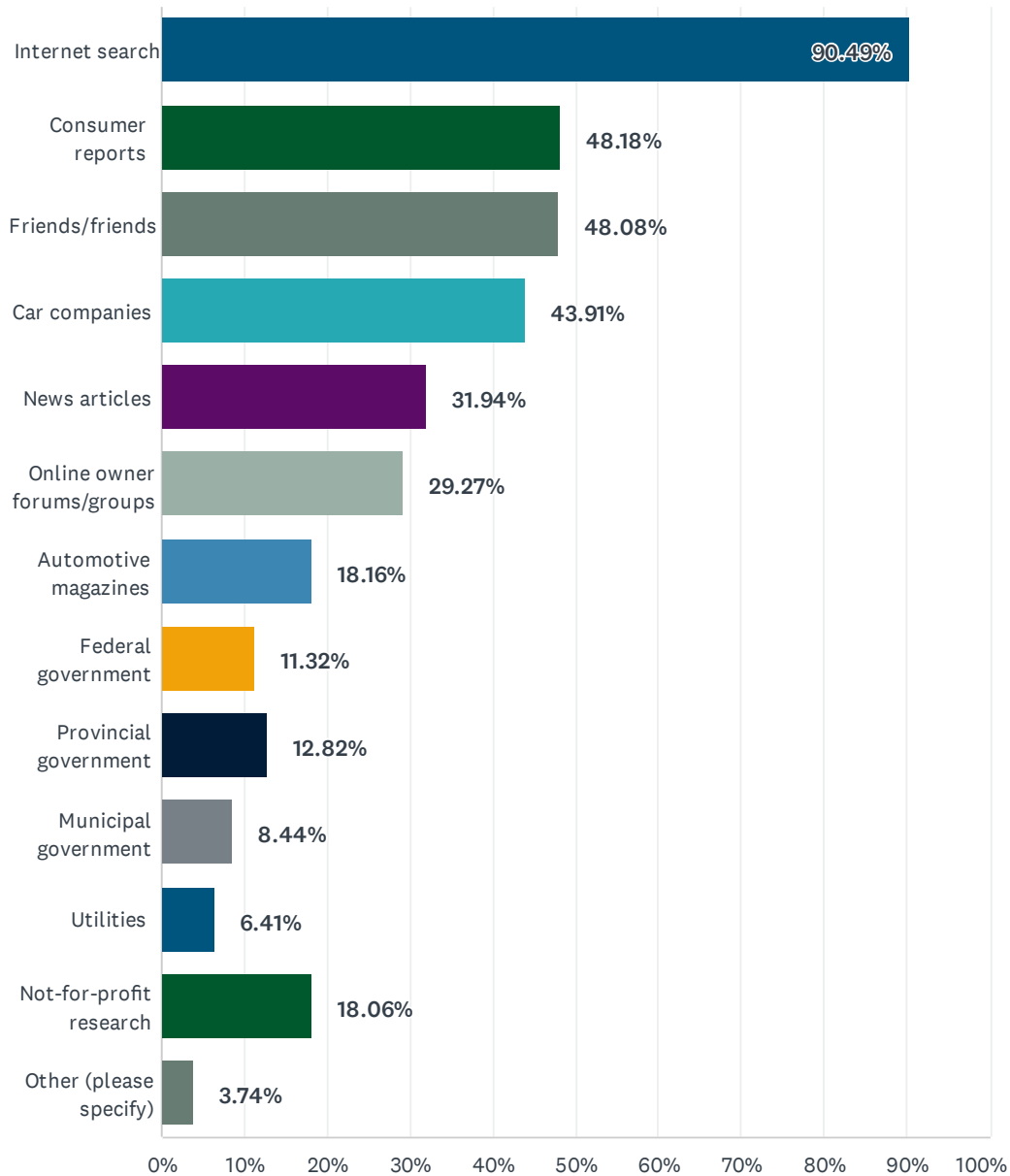
Resident Survey



Q17 If you were interested in finding out more about EVs, where would you go to get this information? Please check all that apply.

Answered: 936 Skipped: 79

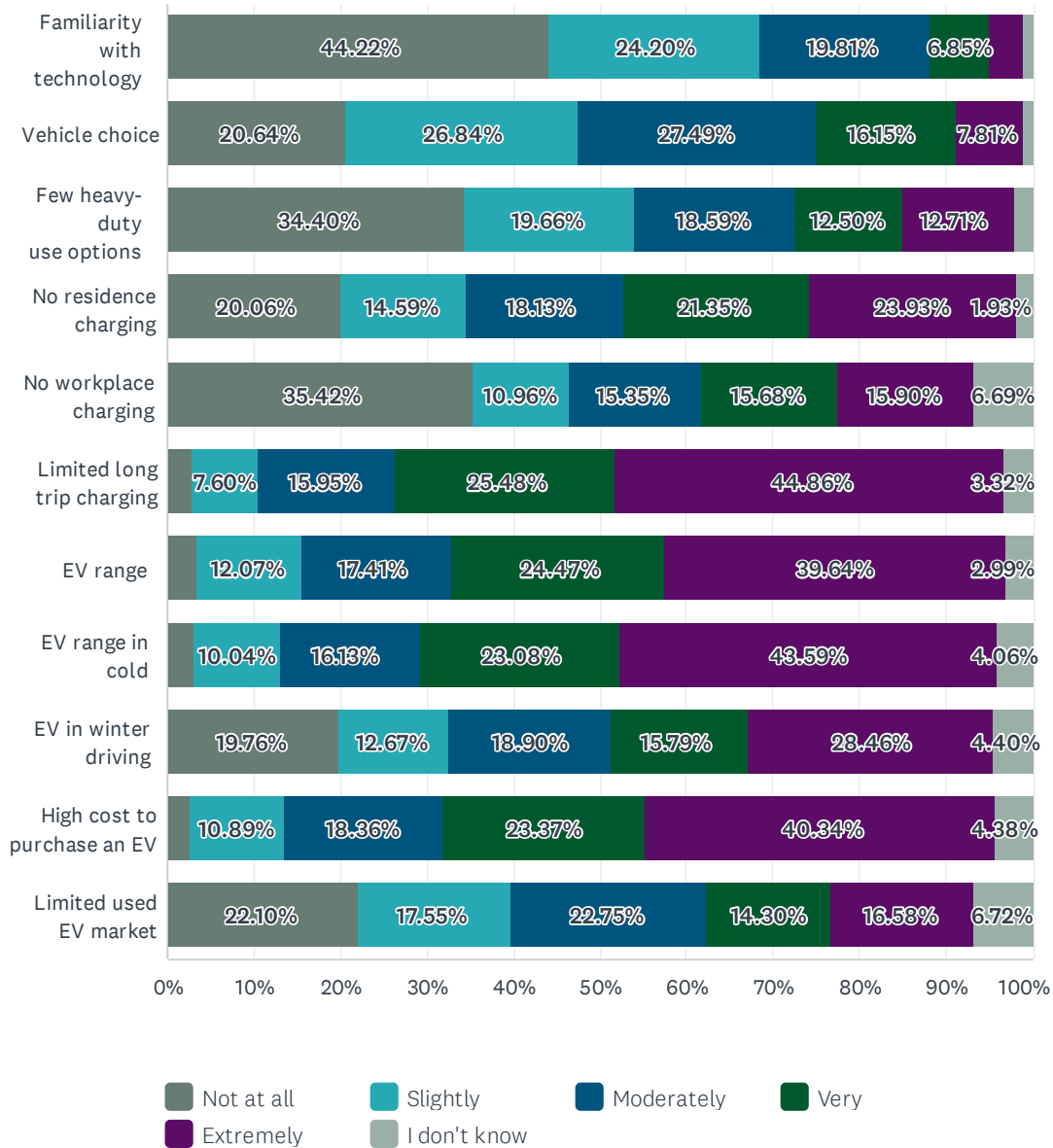
Resident Survey



Q18 Listed below are some of the most common real and perceived barriers to EV adoption. How concerned would you be about the following when purchasing an EV?

Answered: 938 Skipped: 77

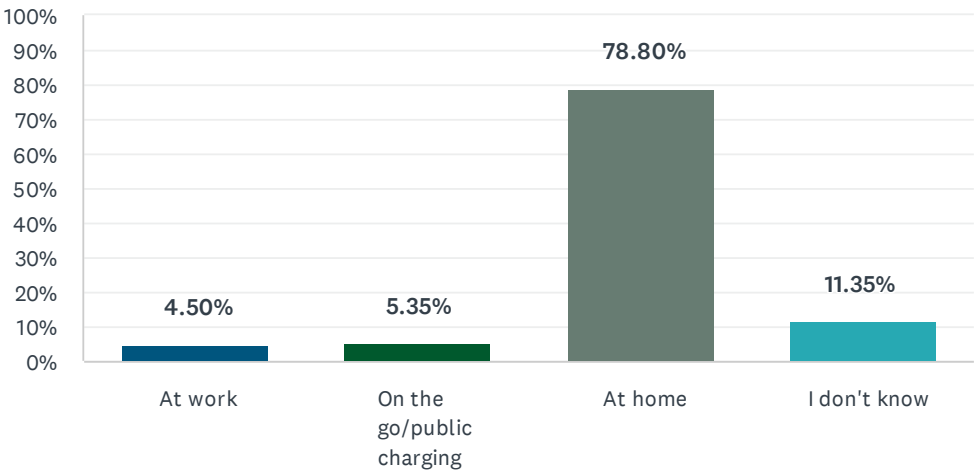
Resident Survey



Q19 If you owned an EV, where might you charge it most often?

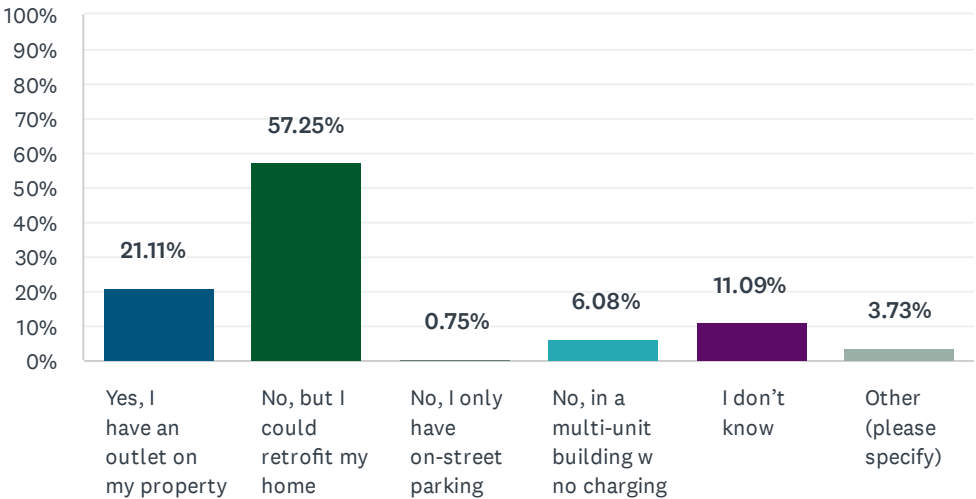
Answered: 934 Skipped: 81

Resident Survey



Q20 Do you have the ability to charge an EV at home?

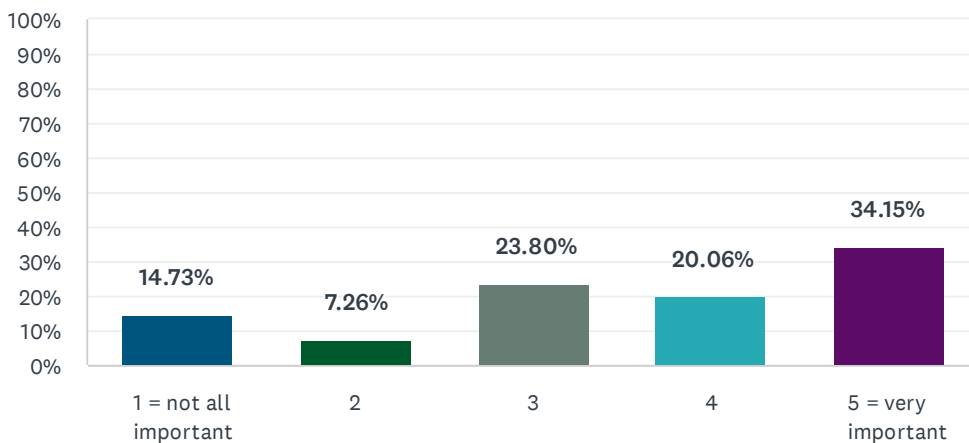
Answered: 938 Skipped: 77



Q21 How important is it that the electricity used in an EV comes from renewable energy?

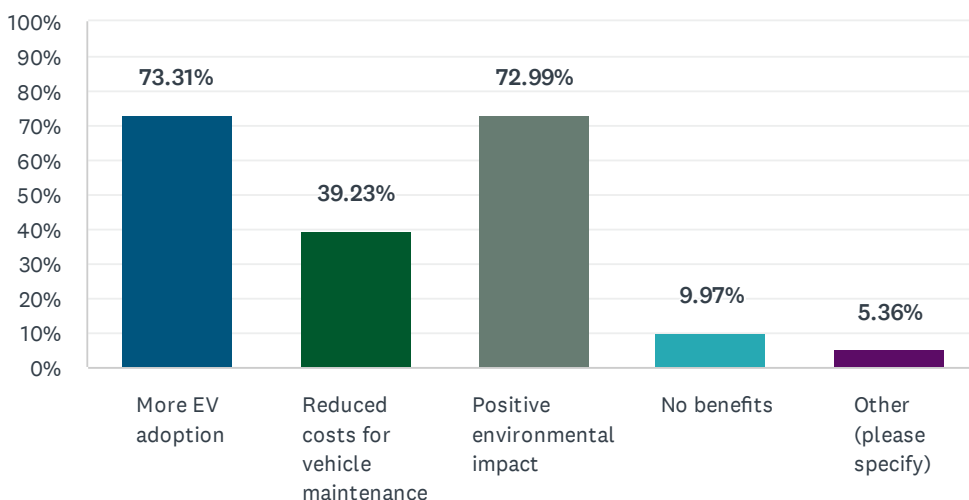
Answered: 937 Skipped: 78

Resident Survey



Q22 What benefits do you think could result from having a more robust EV charger network? Please select all that apply.

Answered: 933 Skipped: 82



Q23 Do you have any other comments or questions?

Answered: 375 Skipped: 640

Q24 Please enter your contact information if you would like to be entered into the draw for prizes:

Answered: 594 Skipped: 421

Appendix 2. Level 3 (DC Fast Charger) EV Stations

The following table summarizes the proposed locations for Level 3 EV stations (both Phase 1 and Phase 2), and potential sites within each locale. The ownership of the site is denoted as county-, municipal- or privately-owned. Additionally, where possible the feedback from the Local Distribution Company as to the technical feasibility (desktop evaluation only) of a proposed site to host both (1) 100 kW charger with the infrastructure and capacity to support the addition of another (1) 100kW or (1) 150kW charger in the future. Proposed sites without 3-Phase power have been highlighted red, they are documented for reference, but they should not be considered for implementation as the cost to bring 3-Phase power to a site is significant and can double or triple the cost to install a station.

A recommended next step is to review the remaining proposed sites against the siting criteria again.

Location	Local Distribution Company	Site	Result of desktop evaluation of technical feasibility	Site Notes (with respect to Siting Criteria)
Tobermory (Phase 1)	Hydro One	7 Nicholas Street (County)	3-Phase power NOT available near the site. System expansion work would need to be performed to bring 3-Phase power to site.	
		22 Bay St. South (County)	Three phase power is available at the back of the parking lot from Head Street but would require a new transformer connection. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Near natural asset (harbour), public restrooms available, amenities nearby. Off the Highway, less visible.
		39 Legion Street (Municipality)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	One block further from the harbour, public restrooms and amenities than 22 Bay St. South location. Off the Highway, less visible.
		On street angle parking on Bay Street NE and SW of Brock Street (Municipal)	3-Phase power NOT available near the site. System expansion work would need to be performed to bring 3-Phase power to site.	

		4 Bay Street (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Near natural asset (harbour), public restrooms available, amenities nearby. Off the highway.
		7468 Highway 6 – Blue Anchor Motel (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Near natural asset (harbour), public restrooms available, amenities nearby. On the highway, may be less ideal for walking to nearby amenities? Highway location is more visible.
		7456 Highway 6 – Blue Heron Cruises (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Near natural asset (harbour), public restrooms available, amenities nearby. On the highway, may be less ideal for walking to nearby amenities? Highway location is more visible
Warton (Phase 1)	Hydro One	268 Berford Street (County)	Existing three phase, 3 x 50kVA pole mount transformers supply this site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Outside of town core. Not as many amenities nearby.
		671 Frank Street – Long Term Care Centre (County)	Existing three phase, 500kVA pad-mount transformer supply this site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Residential neighborhood. No amenities in the region for public use.
		William Street at Berford Street (Municipal)	There is already underground conduit in place from the main transformer for the recommended location, being the William St angle parking located on the northwest side of the intersection of Berford St and William	Close to main street, lots of nearby amenities.

			St. The conduit was installed with two charging stations (each servicing two spaces). This space satisfies the criteria as it is close to downtown shops, banks, hotel/accommodation, and high-density housing and is located immediately adjacent to a high traffic volume corridor (Provincial Highway 6).	
		Louisa Street at William Street (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Close to main street, lots of nearby amenities.
		315 George Street – Town Hall (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Close to main street, lots of nearby amenities.
		578 Brown Street - Library (Municipal)	3-Phase service to existing facility. System and service assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Not as close to main street as other proposed sites. Closer to the waterfront and natural assets.
		402 William Street - Bluewater Park (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Not as close to main street as other proposed sites. Closer to the waterfront and natural assets.
Durham (Phase 1)	Hydro One	Riverside Park, Durham NOG 1R0 (Municipal)	3-Phase power NOT available near the site. System expansion work would need to be performed to bring 3-Phase power to site.	
		185 George Street West NOG 1R0 (Municipal)	No reply provided.	Town hall site with lots of parking but no amenities nearby.

Kincardine (Phase 1)	Westario & ?	529 Gary Street (County)	Not Westario	Close to natural spaces, no amenities nearby.
		601 Durham Street – Davidson Centre (County)	There is 3-phase running down Durham St. across from this address.	In the park, lots of natural spaces. No amenities besides the community centre meaning nothing would be accessible outside of operating hours.
		20 McLaren St. Tiverton - Tiverton Sports Centre (County)	Not Westario	600m walk from town centre and services.
		310 Durham Market St. North – Victoria Park (Municipal)	3-Phase line runs up this road and is underground on the south side. There is an aerial 3-phase line running up along Durham Market Street S.	Situated near main street. Near river and river trail, close to park space.
		1475 Concession 5, Kincardine – Municipal Administration Centre (Municipal)	Not Westario.	Situated outside of town centre. No amenities besides the admin centre meaning nothing would be accessible outside of operating hours.
		870 Saugeen Street - Dunsmore Park (Municipal)	There is a 3-Phase line that runs down Durham that ends in front of the water treatment plant.	Close to natural area (waterfront). Uncertain as to availability of amenities and services nearby.
Shelburne (Phase 1)	Hydro One	151 Centre Street L9V 3R7 – Long Term Care Centre (County)	Existing three phase, 1MVA, customer owned pad-mount transformer supplies this site.	Residential street, amenities are >550m away.
		167 Centre Street L0N 1S4 - Long Term Care Centre (County)	Existing three phase supply to site. Three separate 300kVA, pad-mount transformers supply the Centre. System assessment required to determine if existing	Other side of building. Residential street, amenities are >550m away.

			infrastructure will need to be reconfigured to support any of the installations.	
		203 Main Street East L9V 3K7 – Town Office (Municipal)	3-Phase service to existing facility. 3 x 37.5kVA pole-mount transformers. Service capacity upgrade would be required including incremental load assessment	Close to town centre and amenities. Large parking lot with many stalls available.
		200 Fiddle Park Lane L0N 1S0 - Centre Dufferin Rec Complex (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Situated outside of town centre. No amenities besides the rec complex meaning nothing would be accessible outside of operating hours.
		506269 ON-89 L9V 0N7 (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	On the highway, high visibility. One restaurant and service station nearby. No sidewalks connecting to Boyne Valley Provincial Park? (~800 m away)
Wingham (Phase 1)	Westario	274 Josephine Street - Wingham Town Hall (Municipal)	This address is fed 3-phase from rear lot from Edward St.	Located in town centre, many amenities nearby. Ample size parking lot with several stalls available.
		281 Edward Street - Huron County Library (Municipal)	The 3-phase line dead ends just before this address. It's behind 274 Josephine St.	Further from town centre, not as many amenities in the near vicinity.
		99 Kerr Drive – North Huron Westcast Community Centre (Municipal)	Kerr Drive has 3-phase running along it down to Hwy 86.	Situated outside of town centre. No amenities besides the community centre meaning nothing would be accessible outside of operating hours.
		Parking lot at 55 Josephine Street NOG 2W0 (Private)	The pole line running in the rear lot behind the grocery store is 3-Phase. There is also a	Further out from town centre (850 m) but near natural space

			3-phase Kabar switch across the road if an underground feed is of interest.	and several amenities in the vicinity.
		100 David Street NOG 2W0 (Private)	There is a 3-phase line running through the west side of 100 David Street between David St and Victoria St. East.	Further out from town centre. Not near natural space. A few amenities in the vicinity.
		43 Alfred Street West NOG 2W0 (Private)	There is a 3-phase line running down Alfred across the road from this address.	Further out from town centre. Large parking lot with several parking stalls available. Still walkable to main street and amenities. No amenities at site besides mini-mart.
Listowel (Phase 1)	Hydro One	260 Main Street West – North Perth Public Library (Municipal)	3-Phase service to existing facility. Service capacity upgrade would be required including incremental load assessment	Next to town centre. No amenities at the site but within walking distance.
		330 Wallace Ave N. – North Perth Municipal Office (Municipal)	3-Phase service to existing facility. System and service assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Next to town centre. 450m from natural space and skateboard park. No amenities at the site but within walking distance.
		169 Main Street E. – Ward and Uptigrove Municipal Lot (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Next to town centre. Several businesses in the vicinity. No public restrooms available.
Bluewater (Phase 1)	Hydro One	9 Jane Street, Bayfield (County)	Existing three phase, 3 x 50kVA pole mount transformers supply this site/ system assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Residential area, no amenities nearby.
		4 Jane Street, Bayfield - Bayfield Community	3-Phase power available at the site. System assessment required to determine if existing	Situated outside of town centre. No amenities besides the

		Centre & Arena (Municipal)	infrastructure will need to be reconfigured to support any of the installations.	community centre meaning nothing would be accessible outside of operating hours.
		18 Bayfield Main Street N., Bayfield – Huron County Library (Municipal)	3-Phase service to existing facility. Service capacity upgrade would be required including incremental load assessment	Located in town centre, several amenities, and services in the vicinity.
		14 Mill Ave, Zurich - Bluewater Municipal Office (Municipal)	FESTIVAL	In town centre, mixed use area of residential and businesses. No notable amenities for visitors in direct vicinity of site.
		34023 Mill Road, Bayfield (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Further out from town centre (>1km). Besides gas station no amenities nearby.
		Parking lot at 71 Main St. S, Bayfield (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Further out from town centre. Large parking lot with several parking stalls available. Grocery store at site.
		Parking lot at 2 Main Street S. Bayfield (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Further out from town centre. Minimal sidewalk infrastructure. Limited amenities at site.
Flesherton (Phase 1)	Hydro One	101 Highland Drive – Grey Highlands Municipal Library (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Outside of town centre (600m). Connected by sidewalk infrastructure. No amenities at site beyond Arena and Library meaning nothing would be

				accessible outside of operating hours.
		40 Sydenham Street, Flesherton – South Grey Museum (Municipal)	3-Phase service to existing facility. Service capacity upgrade would be required including incremental load assessment	Outside of town centre but connected by sidewalk infrastructure. Some amenities at site including washrooms and natural spaces.
		1 Toronto Road (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Located in town centre, several amenities nearby.
Thornbury	EPCOR	32 Mill Street, Thornbury, The Blue Mountains – Town of Blue Mountains Municipal Office (Municipal)		Located outside of town centre. Minimal amenities at site.
		41 Bruce Street North, Thornbury – Thornbury Municipal Harbour (Municipal)		Residential area near shoreline. Minimal amenities at site, no food services.
		105 Arthur Street West, Thornbury		Several businesses and services in the vicinity including a grocery store. Sidewalk infrastructure in place connecting different services.
Lucknow (Phase 1)	Westario	550 Willoughby Street (County)	There is a 3-phase primary line running along the length of Willoughby St. This address is serviced with 3-phase power as is the LCBO. There is also a 3-phase line running along Inglis just across from the baseball diamond.	150m from main street. No amenities or services at site.

		662 Campbell Street - Lucknow Arena/Caledonia Park (Municipal)	There is 3-phase power servicing the community centre. It also runs through the property and ties back into the main st.	200m from main street connected via sidewalk infrastructure. No amenities available at site when Arena is not operating.
		560 Willoughby Street (Private)	There is a 3-phase primary line running along the length of Willoughby St. This address is serviced with 3-phase power as is the LCBO. There is also a 3-phase line running along Inglis just across from the baseball diamond.	150m from main street. No amenities or services at site.
		737 Campbell Street (Private)	The run in front of the On the Go station is 3-phase. Mary's (adjacent property) is the limit of Westario's boundary in Lucknow.	Located further out from town centre connected via sidewalk infrastructure.
Paisley (Phase 1)	Hydro One	391 Queen St. North, Paisley – Paisley Arena (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Limited services nearby. Town centre is over the bridge (260 m).
		293 James Street (Municipal)	3-Phase power NOT available near the site. System expansion work would need to be performed to bring 3-Phase power to site.	
		Parking lot at Bruce County Road 3 and Goldie Street (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	
		436 Queen Street North (Private)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Residential area. Grocery store at site. Large parking lot with several parking stalls available.

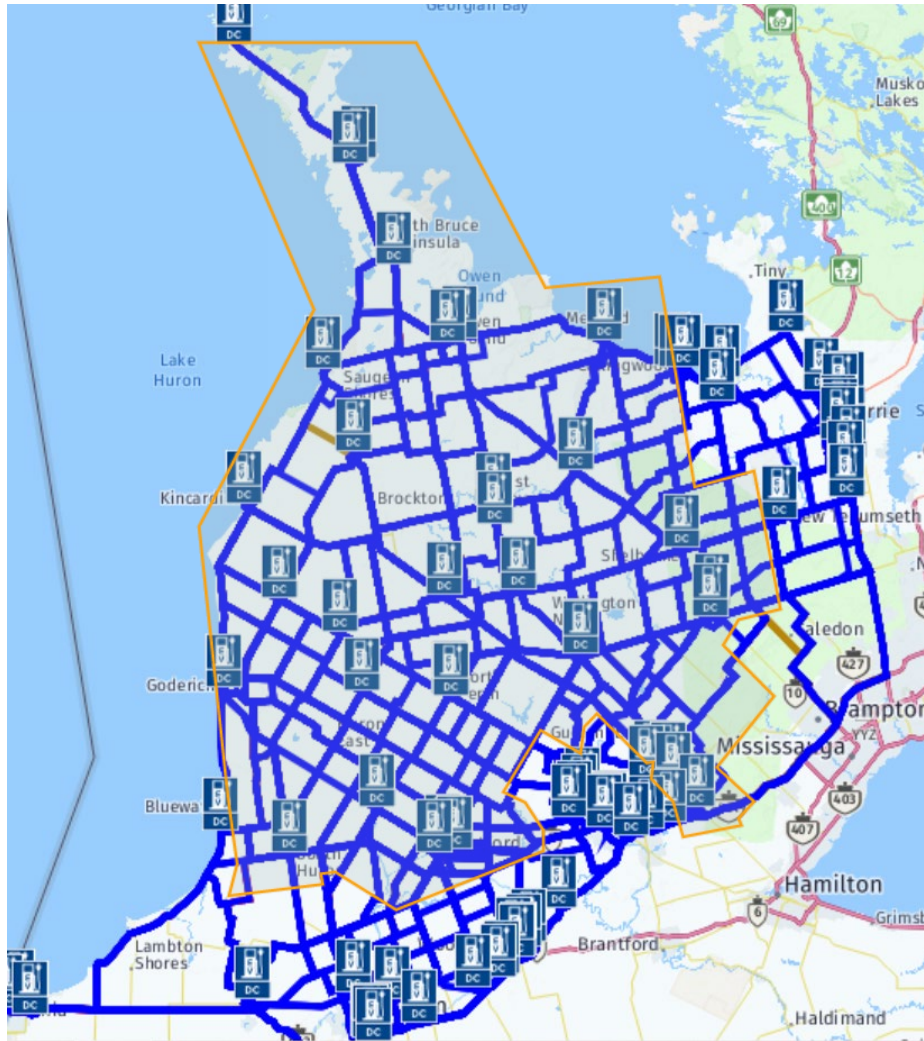
		277 Queen Street North (Municipality)	Existing three phase supply to site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	Located close to town centre. Several amenities nearby.
Mitchell (Phase 2)	ERTH Power Corp?	Parking lot directly east of 55 Montreal Street, Mitchell (Municipal)		220m from town centre. No amenities at site.
		160 Wellington Street, Mitchell – West Perth Municipal Office (Municipal)	Conduit is in place.	Outside town centre. Large parking lot with several stalls available. Activities in the nearby vicinity but no food services.
		80 Ontario Road, Mitchell (Municipal)		Situated in town centre. Several amenities in the vicinity including natural spaces.
		Private parking lot at 145 Ontario Road, Mitchell (Private)		Located just outside town centre. Grocery store at site. No food services. Beginning of residential area.
Seaforth (Phase 2)	Festival?	72 Main Street South (parking lot behind building) – Huron East Town Hall (Municipal)		Located in town centre. Several amenities located in the nearby vicinity.
		108 Main Street S. – Huron East Library (Municipal)		Near town centre. Accessible via sidewalk infrastructure. Grocery store at site.
		122 Duke Street – Seaforth Community Centre (Municipal)		Located outside of town centre in residential neighbourhood. No amenities when the community centre is not operating.
Southampton (Phase 2)	Westario	33 Victoria Street N. (County)	Building has 208V and 600V 3 Phase power.	400m from town centre. Near park and natural spaces. Limited

				services at site. No amenities when the Museum is not operating.
		28 Victoria Street (Municipal)	There is a 3-phase line running down Victoria St. in front of both 28 Victoria Street S. and 28 Victoria Street N.	400m from town centre. Near park and natural spaces. Limited services at site.
		1 Beach Road (Municipal)		On the shoreline. Residential street. Limited parking at site. Outside of town centre. May not be ideal during the winter.
		Street Parking at 58 Morpeth Street (Municipal)		On the shoreline. Residential street. Limited parking at site. Outside of town centre. May not be ideal during the winter.
		328 McNabb Street (Municipal)	There is a 3-phase line running down McNabb Street.	Outside of town centre. Park located at site but no other amenities. May not be ideal during the winter.
		1 Chantry View Drive (Municipal)		On the shoreline. A few amenities at site including natural spaces but no food services. May not be ideal during the winter.
		70 Front Street (Municipal)		On the shoreline. A few amenities at site including natural spaces but no food services. May not be ideal during the winter.
Lion's Head (Phase 2)	Hydro One	4 Tackabury Crescent - Arena (Municipal)	3-Phase power available at the site. System assessment required to determine if existing	Outside of town centre. No amenities at site beyond community centre meaning

			infrastructure will need to be reconfigured to support any of the installations.	nothing would be accessible outside of operating hours.
		1 Forbes Street (Municipal)	3-Phase power available near the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	On the shoreline. A few amenities at site including natural spaces but no food services.
		1 Bruin Street (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	On the shoreline. A few amenities at site including natural spaces but no food services.
Ferndale (Phase 2)	Hydro One	2928 Highway #6, Ferndale – Ferndale Tourism Office (Municipal)	3-Phase power available at the site. System assessment required to determine if existing infrastructure will need to be reconfigured to support any of the installations.	On the highway, highly visible. A few amenities at site but no food services.

Appendix 3. Level 3 (DC Fast Charger) Map After Project Completion

The following image provides a summary of the connectivity between Level 3 (DC Fast Chargers) EV stations across the Study Area and as they connect to stations already existing outside the Study Area (boundary denoted by orange polygon). The blue lines indicate the routes between stations that can be travelled successfully by the modeled EV.



Appendix 4. Environmental Benefits Summary Table

The following table summarizes the modelled environmental co-benefits of the forecasted local adoption of EVs because of this project as well as use of the network by visitors.

	2025	2030	2040
Business As Usual			
Vehicles	420,291	439,548	480,749
Annual new car sales	26,029	27,221	29,773
BAU Gas GJ	7,042,735	6,478,917	2,900,656
BAU GHG	479,605	443,715	213,929
BAU \$	\$407,671,658	\$499,319,764	\$633,797,967
Annual PEV Sales	3,841	16,918	29,773
Cumulative PEV Sales	13,753	65,555	301,676
Project			
PEV Growth rate	65.0%	29.9%	7.4%
Annual PEV Sales	8,174	27,221	29,773
Annual PEV full retirement (15 yr. lifespan)	-	-	8,174
Cumulative PEV Sales	20,965	138,147	408,245
Net new Electricity (kWh)	11,801,060	118,769,516	122,987,970
Electricity cost (\$)	\$1,938,068	\$23,731,197	\$36,375,643
PEV as % new car sales	31.40%	100.00%	100.00%
PEV % of fleet	4.99%	31.43%	84.92%
Savings			
Energy savings gasoline (GJ)	82,469	824,240	853,719
GHG savings from reduced gasoline consumption (tCO ₂ e)	5,801	57,975	60,048
Energy usage electricity (GJ)	20,617	206,060	213,430
GHG's from electricity (tCO ₂)	178	1,680	1,930
Net GHG savings (or increase)	5,623	56,295	58,119
Annual Fuel Cost Savings	\$4,617,524	\$54,048,851	\$64,969,338
Cumulative Fuel Cost Savings	\$6,850,215	\$170,651,510	\$813,956,399
Net Savings			
Net Annual GHG savings (tCO ₂ e/yr)	5,623	56,295	58,119

Net Cumulative GHG savings (tCO ₂ e)	8,433	186,274	802,048
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Air Contaminant Reductions

Particulate Matter - <2.5 microns - PM _{2.5} (ug/m ³)	0.06	0.36	1.02
Nitrous oxide - NO ₂ (ppb)	0.026	0.156	0.442
Carbon monoxide – CO (ppb)	15	90	255
Ozone – O ₃ (ppb)	0.115	0.69	1.955

Appendix 5. Level 2 EV Charging Stations

The following table summarizes the prioritization of proposed locations for banks of level 2 chargers in the Study Area.

	Locale	Physical Street Address	County	Priority 1	Priority 2	Priority 3
				13	10	51
1	Bruce County Museum	33 Victoria St N, Southampton, ON N0H 2L0	Bruce County			
2	Little Cove Adventures (Tobermory);	7111 ON-6, Tobermory, ON N0H 2R0	Bruce County			
3	Bluewater Park Splashpad (Wiarton),	400 William St, Wiarton, ON N0H 2T0	Bruce County			
4	National Park Visitor Centre (Bruce Peninsula National Park and Fathom Five National Marine Park),	120 Chi sin tib dek Rd, Tobermory, ON N0H 2R0	Bruce County			
5	Solways Farm Market and Bakery (Wiarton);	267 ON-6, Wiarton, ON N0H 2T0	Bruce County			
6	Ascent Aerial Park (Sauble Beach)	11 Lakeshore Blvd N, Sauble Beach, ON N0H 2G0	Bruce County			
7	Public parking (Sauble Beach)	5 Lakeshore Blvd N, Sauble Beach, ON N0H 2G0	Bruce County			
8	Blue Mountain Resort	190 Gord Canning Dr, The Blue Mountains, ON L9Y 1C2	Grey County			
9	Plunge Aquatic Centre;	220 Gord Canning Dr Unit AY1, The Blue Mountains, ON L9Y 0V9	Grey County			

10	Scandinave Spa Blue Mountain;	152 Grey County Rd 21, The Blue Mountains, ON L9Y 0K8	Grey County			
11	Scenic Caves Nature Adventures;	260 Scenic Caves Rd, The Blue Mountains, ON L9Y 0P2	Grey County			
12	Craigleith Heritage Dep Museum	113 Lakeshore Rd E, The Blue Mountains, ON L9Y 0N1	Grey County			
13	Owen Sound Parking Lot	1st Avenue East between 8th Street East and 7th Street East, Owen Sound	Grey County			
14	Owen Sound Bayshore Community Centre	2040 3rd Avenue East, Owen Sound	Grey County			
15	Grey Bruce Health Services	1800 8th Street East, Owen Sound	Grey County			
16	YMCA / Regional Recreation Centre	1400 8th Avenue East, Owen Sound	Grey County			
17	Grey Roots Museum and Archives	102599 Grey Road 18, Georgian Bluffs	Grey County			
18	Meaford Hall Arts & Cultural Centre	12 Nelson St E, Meaford, ON N4L 1N6	Grey County			
19	Meaford Arena	151 Collingwood Street, Meaford	Grey County			
20	Markdale Arena	75 Walker Street, Markdale	Grey County			
21	Markdale Parking (potential redevelopment area)	4 Main Street, Markdale	Grey County			
22	Future Markdale Hospital	220 Toronto Street South, Markdale	Grey County			
23	Town Hall and/or Adjacent Parking Lot	At Bridge Street East and Mill Street, Thornbury	Grey County			
24	Thornbury - Hester Street Parking Lot	Corner of Hester Street and Bridge Street East, Thornbury	Grey County			

25	Beaver Valley Community Centre	58 Alfred St W, Thornbury, ON N0H 2P0	Grey County			
26	Durham George Street West Parking Lot	At corner of Garafraxa Street North and George Street West, Durham	Grey County			
27	Durham Arena	451 Saddler Street West, Durham	Grey County			
28	Durham Hospital	320 College Street North, Durham	Grey County			
29	Dundalk Library	80 Dundalk Street, Dundalk	Grey County			
30	Dundalk Arena and Fair Grounds	590 Main Street East, Dundalk	Grey County			
31	Flesherton Library and Arena	101 and 102 Highland Drive, Flesherton	Grey County			
32	Hanover P and H Centre / Slots-Raceway	275 5th Street, Hanover	Grey County			
33	Hanover Hospital	90 7th Avenue, Hanover	Grey County			
34	Hanover Town Hall / Library	341 10th Street, Hanover	Grey County			
35	Neustadt Recreation Centre	210 Forler Street, Neustadt	Grey County			
36	Neustadt Downtown location	456 Jacob Street, Neustadt	Grey County			
37	Cobble Beach Golf and Country Club	221 McLeese Drive, Georgian Bluffs	Grey County			
38	Chatsworth - Future Arena site	5 Toronto Sydenham Street, Chatsworth	Grey County			
39	Bayfield - Clan Gregor Square	6 The Square, Bayfield, ON N0M 1G0	Huron County			
40	Goderich - Main Beach Pavilion	270 Harbour St, Goderich, ON N7A 4J	Huron County			

41	Goderich - Goderich Square - East St.	48 East St #44, Goderich, ON N7A 1N3	Huron County			
42	Goderich - GART Trailhead	Goderich to Auburn Rail Trail, Goderich, ON N7A 3Y2	Huron County			
43	Goderich - Huron Historic Gaol	181 Victoria St N, Goderich, ON N7A 2S9	Huron County			
44	Blyth - Blyth Arena & Community Centre	377 Gypsy Ln, Blyth, ON N0G 2W0	Huron County			
45	Walton - G2G Rail Trailhead	83041 Brussels Line, Walton, ON N0K 1Z0	Huron County			
46	Town Hall Parking Lot	322 Main Street South, Exeter	Huron County			
47	Port Albert Beach	28-20 Huron St N, Goderich, ON N7A 3X9	Huron County			
48	Donnelly Brewing Site	2740 Rd 164, Mitchell, ON N0K 1N0	Huron County			
49	Welcome Centre, Downtown Mitchell	9 Huron Road, Mitchell Ontario	Huron County			
50	Wildwood Conservation Area (Perth South)	3995 Line 9, St. Marys, ON N4X 1C5	Perth County			
51	Learning Hub-Training Centre	Elma Memorial Community Centre at 251 Main Street, Atwood, ON	Perth County			
52	McCully's Hill Farm (Perth South)	4074 Perth Line 9, St. Marys, ON N4X 1C5	Perth County			
53	Community Hub in Listowel	AT the Listowel Library	Perth County			
54	TNT Berries (Perth East)	1904 Line 34, Perth East, ON N0B 2P0	Perth County			

55	G2G Rail Trail, Perth East - Powell Road Kiosk	4693 Powell Rd, Wallenstein, ON N0B 2S0	Perth County			
56	TLC Alpaca (West Perth)	4616 Road 170, Mitchell, ON N0K 1N0	Perth County			
57	Lynn River Farm Store (Perth East)	2529 37 Line, Stratford, ON N5A 6S2	Perth County			
58	Huckleberry Hives (Perth East)	4505 46 Line, Gads Hill, ON N0K 1J0	Perth County			
59	Shakespeare Brewing Company (Perth East)	2178 Line 34, Shakespeare, ON N0B 2P0	Perth County			
60	Roancroft Picture Framing Prints Street Parking	95 Queen St E, St. Marys, ON	Perth County			
61	St. Marys Station Gallery;	5 James St N, St. Marys, ON N4X 1B1	Perth County			
62	Canadian Baseball Hall of Fame and Museum;	386 Church St S, St. Marys, ON N4X 1C2	Perth County			
63	Town Hall Theatre;	175 Queen St E, St. Marys, ON N4X 1C5	Perth County			
64	The Quarry	425 Water St S, St. Marys, ON N4X 1B6	Perth County			
65	The Stratford Perth Museum;	4275 Huron St, Stratford, ON N5A 6S6	Perth South			
66	Hockley Valley Provincial Park - Park in Free BT Lot	Hockley Rd, Mono, ON L9W 2Y8	Shelburne			
67	Dufferin County Forest	937513 Airport Rd, Mansfield, ON L0N 1M0	Shelburne			

68	Mono Cliffs Provincial Park	795086 3rd Line EHS, Shelburne, ON L9W 5Y2	Shelburne			
69	Guelph Grotto	199 Victoria Rd S, Guelph, ON N1E 6T9	Guelph			
70	Puslinch Community Centre	23 Brock Road South, Puslinch	Wellington			
71	Wellington County Museum and Archive	0536 Wellington County Rd 18, Fergus	Wellington			
72	Drayton Municipal Parking lot	14 Main West, Drayton	Wellington			
73	Rockmosa Community Hall	74 Christie St, Rockwood	Wellington			
74	(future) Erin Library	Daniel St, Erin	Wellington			
75	Mount Forest Sports Complex	850 Princess St, Mount Forest	Wellington			
76	Arthur Community Centre	158 Domville St, Arthur	Wellington			

Appendix 6. Current Usage Fee Summary for Level 2 and Level 3 (DC Fast Charging) Stations

CEA completed a scan of current usage fees at Level 3 (DC Fast Charging) and Level 2 EV chargers across Ontario and parts of Quebec. The following table summarizes the findings.

Table 1. 2022 Level 3 and Level 2 EV charger usage fees.

Station	L2 or Fast Charger	Municipality	Prov	Network	Location	Cost
Ivy Dryden	Fast Charger	Dryden	ON	IVY	Commercial complex	\$18/hour + 13% tax
Scotiabank	Fast Charger	Stratford	ON	EV Connect Canada	Commercial Complex	Flat fee: \$3.95 While charging: \$9.60/hr. While parked, not charging: \$9.60/hr.
CF Fairview Park	Fast Charger	Kitchener	ON	FLO	Commercial complex	\$20/hour
Denny's	Fast Charger	Guelph	ON	SWTCH	Restaurant	\$18/hour
Canadian Tire	Fast Charger	Mississauga	ON	FLO	Commercial complex	\$20/hour
Agincourt Canadian Tire	Fast Charger	Scarborough	ON	Electrify Canada	Commercial complex	Pass (Free): (1-90 kW) \$0.27/minute, (1-350 kW) \$0.57/minute Pass+ (\$4.00 Monthly): (1-90 kW) \$0.21/minute, (1-350 kW) \$0.44/minute

Manulife Centre	Fast Charger	Toronto	ON	GE WattStation	Commercial complex	Flat fee: \$3.95 + While charging: \$12.00/hr. + While parked, not charging: \$10.00/hr. after 60 mins
Onroute Innisfil	Fast Charger	Innisfil	ON	IVY	Commercial complex	\$18/hour
Terry Fox Park & Ride	Fast Charger	Kanata	ON	Circuit Electrique	Park & Ride	\$1.75/hour
IVY Temiskaming Shores	Fast Charger	Temiskaming Shores	ON	IVY	Hotel	\$18/hour
Dépanneur Voisin Lou Bell	Fast Charger	Val-d'Or	QC	Circuit Electrique	Gas Station	\$1.75/hourly
Mountain Granite	Fast Charger	Thurso	QC	FLO	Commercial complex	\$12/hour
Marché Maisonneuve	Fast Charger	Montréal	QC	Circuit Electrique	Commercial complex	\$1.75/hour
Prémont Harley-Davidson	Fast Charger	Québec City	QC		Commercial complex	\$4.80/hour
Rôtisserie Fusée	Fast Charger	Donnacona	QC		Commercial complex	\$5/30 minutes
Davy Lake Campground Resort	L2	Ignace	ON		Campground	Website says \$15 for car charging (includes day pass)
Superior Hyundai	L2	Thunder Bay	ON	FLO	Dealership	\$1.50/hour
CF Fairview Park	L2	Kitchener	ON	FLO	Commercial complex	\$1.50/hour
Conestoga Mall	L2	Waterloo	ON	FLO	Commercial complex	\$1.50/hour
Canadian Tire	L2	Mississauga	ON	FLO	Commercial complex	\$1.50/hour

						All Days - \$1.00/hr. Max - \$50.00 per session
Cole St Paring Lot	L2	Toronto	ON	ChargePoint	Commercial complex	Parking - Free for 90 minutes
Holly Community Centre	L2	Barrie	ON	FLO	Community Centre	\$2.50/hour
Performance Court	L2	Ottawa	ON	ChargePoint	Restaurant	\$2.50 session fee, plus parking cost
Terry Fox Park & Ride	L2	Kanata	ON	Circuit Electrique	Park & Ride	\$1/hour
Pembroke and Area Community Access Center	L2	Pembroke	ON	FLO	Community Centre	\$2.50/hour
Site Historique Opémican	L2	Temiscaming	QC		Historic Site	\$2.50 per session
STO - Centre d'entretien et d'exploitation	L2	Gatineau	QC	FLO	Office	\$1/hour
St Hubert Express	L2	Laval	QC	Circuit Electrique	Commercial complex	\$1/hour
Cartier Stationnement / Chargement	L2	Montréal	QC	Circuit Electrique	Commercial complex	\$1/hour
Benny & Co	L2	Bécancour	QC	ChargePoint	Commercial complex	\$1/hour
Hôtel Le Bonne Entente	L2	Québec City	QC	ChargePoint	Hotel	\$20 fee



REPORT TO COMMITTEE

To: Chair Brown & Members of the Infrastructure and Environment Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: Residential Energy Retrofit Pilot Program Design

In Support of Strategic Plan Priorities and Objectives:

Sustainable Environment and Infrastructure (SEI)- protect assets both in the natural and built environment

Economic Vitality - Promote an environment for economic growth and development.

Purpose

The purpose of this report is to provide Committee and Council with a proposed design for a third-party delivery model of a residential energy retrofit pilot program and to seek approval to move the program forward.

Background & Discussion

As of 2016, the residential sector was the second largest source of greenhouse gas (GHG) emissions in Dufferin County representing 22% or 94,440 tonnes per year (see November 26 2020 committee report) of community emissions. Addressing energy use in the residential sector is a key priority of the Dufferin Climate Action Plan, as the County's GHG reduction targets are not achievable without a complete household deep energy retrofit program.

In late Fall 2019, the Clean Air Partnership (CAP) formed the Ontario Consortium (now the BetterHomes Ontario Consortium) with the Association of Municipalities of Ontario (AMO) and the Heating, Refrigeration and Air Conditioning Institute (HRAI) to develop a regional southern-Ontario Property-Assessed Clean Energy (PACE)-style home energy retrofit program. The program would make use of a municipality's ability to attach longer-term, lower interest financing to properties through a Local Improvement Charge (LIC) to encourage homeowners to undertake these retrofits.

In March 2020, the Federation of Canadian Municipalities (FCM) launched their Community Efficiency Financing (CEF) program, a \$300 million fund provided by the Government of Canada to support Canadian municipalities to plan, implement and scale up innovative financing models for residential energy projects. This program involves three streams of funding: Feasibility, Capital and Grants, and Credit Enhancement.

In Fall 2020, the Clean Air Partnership applied for and received FCM CEF program's Feasibility Stream under the BetterHomes Ontario Consortium to work with seven Ontario municipalities to undertake their low-rise residential energy efficiency market analysis and program design – Dufferin County, London, Huntsville, Barrie, Kawartha Lakes, Clarington, and Tay Valley Township. Unlike previous FCM funding programs, this funding stream only required in-kind County staff time contributions to access funding.

The BetterHomes Dufferin County Energy Efficiency Retrofit Program Design Considerations report (attached as Appendix A) prepared by the Clean Air Partnership noted the following:

- Providing support for home energy retrofits would also help address social issues in Dufferin County, such as alleviating “energy poverty”, where lower income residents are paying a particularly high energy burden. The analysis of the report determined that 69 percent of Dufferin homes are above the national median in terms of energy costs, with 4139 households experience high or extreme energy cost burdens. There exists a paradox for many households struggling to pay disproportionately high energy bills relative to their disposable income. The lack of available capital is a significant barrier to making home improvements that would provide long-term utility cost relief and help to address issues of affordability.
- There are also job-creating economic benefits associated home energy retrofits. In the first four years of the program, an estimated 112 to 210 jobs (based on \$ 7 million in loans) could be created from these retrofit projects which will increase as participation grows incrementally over time. This number reflects a multiplier of 16 to 30 jobs for every \$1,000,000 spent on retrofitting as described in *Bridge to the Future: Final Report from the Task Force for a Resilient Recovery*.
- The report concludes that Dufferin County would be an ideal candidate to proceed with the FCM CEF Capital and Grants Stream for home energy upgrades based on the inventory of homes and availability of various energy sources.

The next phase of the project is to determine the financial model for program delivery. This will require consultation with Dufferin's member municipalities on several items to

determine their desired level of participation. This phase will consider items including the following:

1. **Capitalization:** The County must determine if it will provide 20 per cent of total program costs, spread over a four-year period. The 20 per cent will be allocated to loans provided to program participants and as such will be recoverable debt. If so, loan funds could come from capital reserves, be borrowed from Infrastructure Ontario, or be borrowed from private capital. The County must also determine what is the maximum amount of capital that the municipality will contribute. The amount of capital the County is willing to contribute will determine how much incentives can be a part of the program and what the program budget will be. Municipalities applying for this funding will have to commit to funding at least 20 per cent of the program locally (i.e., up to \$2.5 million over a four-year period to match the maximum \$10 million from FCM CEF) which could constitute a combination of municipal and/or private sector financing. These options would be assessed at a future date should the County wish to proceed with its FCM CEF Capital and Grants Stream application.
2. **Financing Mechanism:** As an upper-tier government, the County is not able to enact a local improvement charges (LIC) mechanism. Consultation and participation from member municipalities in using the LIC to support the financing mechanism of the program will be critical to the program's design and success.
3. **Program Delivery Model:** Continue working with BetterHomes Ontario directly to build on existing momentum and capitalize on the existing municipal partnerships as part of the consortium.

Participation in this initiative supports action B1 of the Dufferin Climate Action Plan: *Implement selected municipally-led financing program (e.g. PACE program) for residential deep energy and resiliency retrofits with a strategic lens to address energy poverty.*

Financial, Staffing, Legal, or IT Considerations

A subsequent report will be presented to the next term of Council to consider submitting a FCM CEF Capital and Grants Stream application, which will commit 20% in total project costs.

The proposed Dufferin County Program can, upon a successful FCM CEF proposal submission, bring energy efficiency and GHG reduction capital and grants into the municipality.

Recommendation

THAT Report, Residential Energy Retrofit Pilot Program Design, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT staff be directed to continue working with the BetterHomes Ontario Consortium as third-party delivery agent of a residential energy retrofit program;

AND THAT staff be directed to proceed with the next phase of the program to determine the financial model for program delivery and report back with recommendations to support Dufferin's application to the FCM CEF Capital and Grants Stream.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

Prepared by:
Sara MacRae
Manager of Climate & Energy



BETTERHOMES DUFFERIN COUNTY

ENERGY EFFICIENCY RETROFIT PROGRAM DESIGN

JUNE 2022

ACKNOWLEDGMENTS

Funding for this report came from the Federation of Canadian Municipalities (FCM) Community Efficiency Financing (CEF) Studies stream. The CEF is a \$300 million fund provided by the Government of Canada to support Canadian municipalities to advance energy financing programs for low-rise residential properties. The CEF Studies stream provided funds to Clean Air Partnership to work with 7 Ontario municipalities to undertake their low-rise residential energy efficiency market analysis and program design.

CLEAN AIR PARTNERSHIP

Clean Air Partnership (CAP) is a charitable environmental organization whose vision is that Canadian communities are sustainable, healthy and resilient. CAP was launched in 2000 to enable communities to improve air quality, advance active transportation, and take bold climate action. CAP serves as the facilitator for the Clean Air Council (CAC), which is a staff level network of over 35 municipalities and health units from across Ontario working collaboratively on the development and implementation of clean air, climate change, sustainability and resilience actions.

BETTERHOMES ONTARIO

BetterHomes Ontario was convened to meet the municipal need for a 3rd party retrofit program delivery partner. It is a joint program of the Association of Municipalities of Ontario (AMO), Clean Air Partnership and Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI).

LIGHTSPARK

Lightspark empowers banks, cities and utilities to connect with homeowners to accelerate the transition to Net Zero. They do this through providing a data-rich enabling platform that gives homeowners a carbon and energy credit score and expert tools and recommendations to improve their home.

DUFFERIN COUNTY

Clean Air Partnership would like to thank Sara MacRae, Manager of Climate and Energy for their support in making the market analysis and retrofit program design for Dufferin County possible.

FOR MORE INFORMATION, CONTACT

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EXECUTIVE SUMMARY

Reducing the greenhouse gas emissions (GHG) that cause climate change is a key priority for all orders of government in Canada. Provincially, the heating and cooling of the buildings we live, work and play in contributes about one quarter of all Ontario GHG emissions. Addressing emissions from residential buildings is challenging - we must design and implement energy efficiency retrofit programs that are attractive for homeowners, not overly burdensome for municipalities, and generate the emission reductions we badly need. Individual municipalities have difficulty securing the capital and start-up funds needed to develop these retrofit programs. Achieving scale up regarding energy retrofits in our existing building stock is absolutely critical to the achievement of a community's science based GHG reduction targets.


Responding to this need, the Federation of Canadian Municipalities created the Community Efficiency Financing Program, a \$300m fund capitalized by the Government of Canada. The Program has separate streams, one allowing for feasibility and design studies into energy efficiency programs, and another providing capital and grants to fund these programs based on the research established at the feasibility stage.

Dufferin County joined a feasibility study cohort of seven municipalities managed by Clean Air Partnership and delivered in conjunction with Huntsville, London, Barrie, Clarington, Kawartha Lakes, and Tay Valley Township. Part 2 of this Report details the findings of that feasibility study. Data from the feasibility study is then incorporated into an energy efficiency program design for *BetterHomes Dufferin County*, detailed in Part 3. The final section of this Report maps a pathway for a proposal to consult with the lower tiers in Dufferin County to identify which of the municipalities would be interested in partnering to advance a Federation of Canadian Municipalities proposal to capitalize a *BetterHomes Dufferin County* retrofit program.

Delivering a *BetterHomes Dufferin County* program would see Dufferin County and their local municipalities outperform other communities without community energy efficiency programs, resulting in job creation, local economic development, increased local energy efficiency expertise, reduced energy costs for homeowners, and a significant reduction in the emissions that cause climate change. In a world of turbulent energy prices, Dufferin County could dramatically reduce the number of households experiencing energy poverty, alleviating those living with a high energy cost burden. The community's building stock will improve, with better operating performance, increased asset values, healthier homes, and reduced vulnerability to increasing electricity, gas, oil, and propane costs.

Energy efficiency programs present a great opportunity for a community. We are thankful to be in a position where we have identified significant potential for Dufferin County to act on this opportunity and have a matching funding window where we can capitalize that opportunity using federal funds.

We very much look forward to working with Dufferin County and any local municipalities partnering with Dufferin County on a capital and grants application to FCM should Council approve that direction and would enjoy the opportunity to respond to questions from Staff and Council as required.

A handwritten signature in black ink, appearing to read 'G. Kalapos'.

Gabriella Kalapos, Executive Director, Clean Air Partnership



For Dufferin County to meet its GHG reduction target, emissions from existing buildings will need to be reduced substantially.

Energy retrofit programs play a critical role in reaching the science based GHG reduction targets that are necessary to help avoid catastrophic climate change impacts.

PART 1: PROGRAM RATIONALE AND BACKGROUND

Program Need

There is widespread recognition that climate change is significantly impacting communities around the world and affecting our infrastructure, food production, health and safety. The Intergovernmental Panel on Climate Change (IPCC) stated that limiting global temperature increases to 1.5°C above pre-industrial levels requires expedited and transformational changes to land use, energy, industry, buildings and transportation. The most recent IPCC report released in April 2022 stated that with options for holding global warming to 1.5°C quickly closing, countries must immediately phase down fossil fuel production, embrace practical and affordable low-carbon technologies, mobilize citizens around the benefits of decarbonization, and dramatically increase low-carbon financing. Municipalities are critical leaders in addressing this challenge.

In March of 2022, the Government of Canada introduced Canada's 2030 Emission Reduction Plan, which provides a roadmap for the Canadian economy to achieve a 40–45% emissions reductions below 2005 levels by 2030. In Ontario, buildings contribute 24% of total greenhouse gases (GHGs), following transportation (35%). The residential sector accounts for 22% of Dufferin County's greenhouse gas (GHG) emissions.

Municipalities across the country are acknowledging that they must play a key role in tackling climate change in their jurisdictions. Hundreds of communities across Canada have passed Climate Emergencies and have developed (or are developing) climate action plans or community energy plans. Through climate actions such as building energy efficiency retrofit programs, municipalities can help their residents achieve climate commitments, while also reducing their vulnerabilities to energy and carbon price increases over time and increasing economic development and job creation within their communities.

Municipal climate mitigation plans across Canada commonly address their three main sources of GHGs: transportation, buildings, and waste. The buildings sector includes residential dwellings as well as commercial,



It is estimated that 75% of homes that will exist in 2030 are already built and 50% of existing homes will still be in place by 2050.

Space and water heating is the biggest user of energy in Canadian homes and accounts for approximately 80% of residential energy consumption and 95% of GHG emissions in Ontario homes

industrial, and institutional facilities. For Dufferin County to meet its GHG reduction target, emissions from existing buildings will need to be reduced substantially. Energy retrofit programs play a critical role in reaching the science based GHG reduction targets that are necessary to help avoid catastrophic climate change impacts. This Report summarizes research and consultations undertaken to inform a potential Dufferin County residential energy efficiency retrofit program for the low-rise residential sector. It provides the rationale and opportunity for such a program (Part 1); a summary of the results of the market analysis undertaken to inform and quantify the retrofit opportunity (Part 2); the proposed design considerations (Part 3); and a summary of the decisions that Dufferin County would need to provide guidance on to determine next steps (Part 4).

The initial target market for this program is low-rise residential sector due to the focus of the Federation of Canadian Municipalities' Community Efficiency Financing (FCM CEF) program funded by a \$300 million contribution from the Government of Canada. The FCM CEF program supports municipalities to deliver community level residential energy efficiency financing programs to this underserved sector. This program can be augmented over time to serve other building archetypes (such as the multi-unit residential sector, rental properties and the commercial and industrial sectors). There will also be future opportunities to increase the measures that this program could advance (starting with energy efficiency, fuel-switching, renewables, electric vehicle charging, flood protection) and evolving into providing the necessary foundation that can cost-effectively advance other municipal policy goals (such as aging in place, secondary suites, etc.).

Municipalities have been advancing the energy performance of new buildings through their use of Green Development Standards that drive uptake to sustainability metrics such as energy performance. However, it is estimated that 75% of homes that will exist in 2030 are already built and 50% of existing homes will still be in place by 2050. Therefore, there is the ability and need for municipalities to advance community level retrofit programs within their existing building stock. This can be achieved by advancing programs that address barriers that limit uptake; and gaps in existing national (Greener Homes) and provincial demand side management (DSM) programs.



Dufferin County can achieve GHG reductions, energy cost savings and economic development goals by advancing a residential energy efficiency retrofit program that targets building envelope and equipment improvements in homes with high energy costs and carbon reduction potential.

Many past energy conservation programs have focused on incremental improvements and standalone equipment discounts/rebates. Common examples of these programs are for light bulbs and household appliances such as clothes washers/dryers and dishwashers which typically use around 15% of a home's energy consumption. These programs have not yet advanced a more comprehensive deep energy retrofit approach that treats the home as a whole system, addressing space and water heating. Space and water heating is the biggest user of energy in Canadian homes and accounts for approximately 80% of residential energy consumption and over 95% of GHG emissions in Ontario homes. Dufferin County can achieve GHG reductions, energy cost savings and economic development goals by advancing a residential energy efficiency retrofit program that targets building envelope and equipment improvements in homes with high energy costs and carbon reduction potential. The proposed Dufferin County Program can, upon a successful FCM CEF proposal submission, bring energy efficiency and GHG reduction capital and grants into the municipality. It would increase the capacity of Dufferin County's contractor/renovator sector, and provide property owners access to expertise, financing, and incentives to implement energy efficiency upgrades within their homes.

This proposed Dufferin County program design includes several features that address noted barriers such as lack of upfront capital and knowledge of how to reduce home energy use. Home energy evaluations using the federal EnerGuide Rating System will determine the most effective retrofit measures based on the specific equipment, insulation levels and other relevant conditions of participating homes. An Energy Coach service and other tools to support the retrofit experience are proposed within the Dufferin County Program Design. The goal is that financing will be made available to Dufferin County residents. There is the ability for those loans to be secured to the property making the improvements via the Local Improvement Charge (LIC) mechanism. However, as Dufferin County is the upper-tier government it would need to work in partnership with some or ideally all of your local municipalities to be able to use the LIC authorities.

Dufferin County's Environment and Climate Commitments

In March of 2021 Dufferin County adopted the Dufferin Climate Action Plan that outlines actions towards Dufferin County's net zero GHG emissions by 2050 and increasing resilience to the impacts of climate



The most cost-effective source of a unit of energy in Ontario is the one saved. This is because the cost of conservation is considerably cheaper than the cost of extraction, processing, generation, and distribution of new energy resources.

Therefore, reducing energy demand through building envelope improvements is paramount in any retrofit program design.

change. Action B1 and B2 speaks to the need to promote deep energy retrofit and resilience programs and provide information on resources and financing. Advancing retrofit efforts will be critical to enabling Dufferin County to make progress towards its GHG reduction targets and also help address affordability concerns related to reducing energy costs, especially for those residents whose energy costs account for a higher percentage of their income. This report informs that climate action and presents some decisions points (Part 4) for consideration by Dufferin County council to determine next steps.

Emissions from Residential Energy Use

The most cost-effective source of a unit of energy in Ontario is the one saved (also referred to as a megawatt). This is because the cost of conservation is considerably cheaper than the cost of extraction, processing, generating and distribution of new energy resources. Therefore, reducing energy demand through building envelope improvements is paramount in any retrofit program design. Sequencing building envelope measures at the start of a retrofit is important to avoid oversizing mechanical HVAC/DHW systems and other related equipment and appliances.

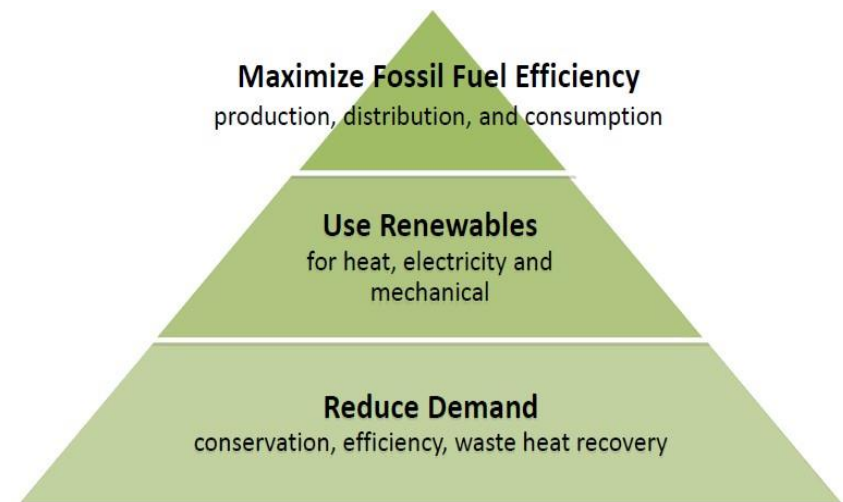


Figure 1: Sustainable Energy Hierarchy for Prioritizing Improvements in Buildings

At home, reducing energy demand could include installing waste-heat recovery units that capture moist warm air exhausted from bathrooms or thermal energy from drain water in showers and kitchens. Improving insulation and windows so that heating and cooling is more effective is

another example of reducing demand that can costs and reduce emissions. Insulating can also reduce the size of heat pumps or furnaces needed based on the more efficient energy demand of the home.

Use of renewable energy such as solar roof-top photovoltaic systems or ground-source heating and cooling systems are growing in demand. However, these systems should be considered only after the home has been made as efficient as possible. Solar thermal energy is another form of utilizing renewables to meet needs for heating water. Again, reducing demand for the volume of hot water should be considered first such as using low flow shower heads and faucet aerators. This will enable the renewable thermal energy system to fulfill a greater proportion of hot water needs.

If fossil fuel systems are used for HVAC/DHW, there are technologies that can improve energy efficiency while reducing GHGs such as electric/hybrid heat pumps compared to conventional natural gas furnaces. From a sustainable energy perspective, homeowners using fuel oil or propane should consider advancing building envelope measures prior to fuel switching to efficient electric geothermal or air source heat pumps (ASHPs). See Figure 2 for more examples of energy efficiency and fuel switching measures.

15 ways to make your home more efficient, resilient and climate friendly.

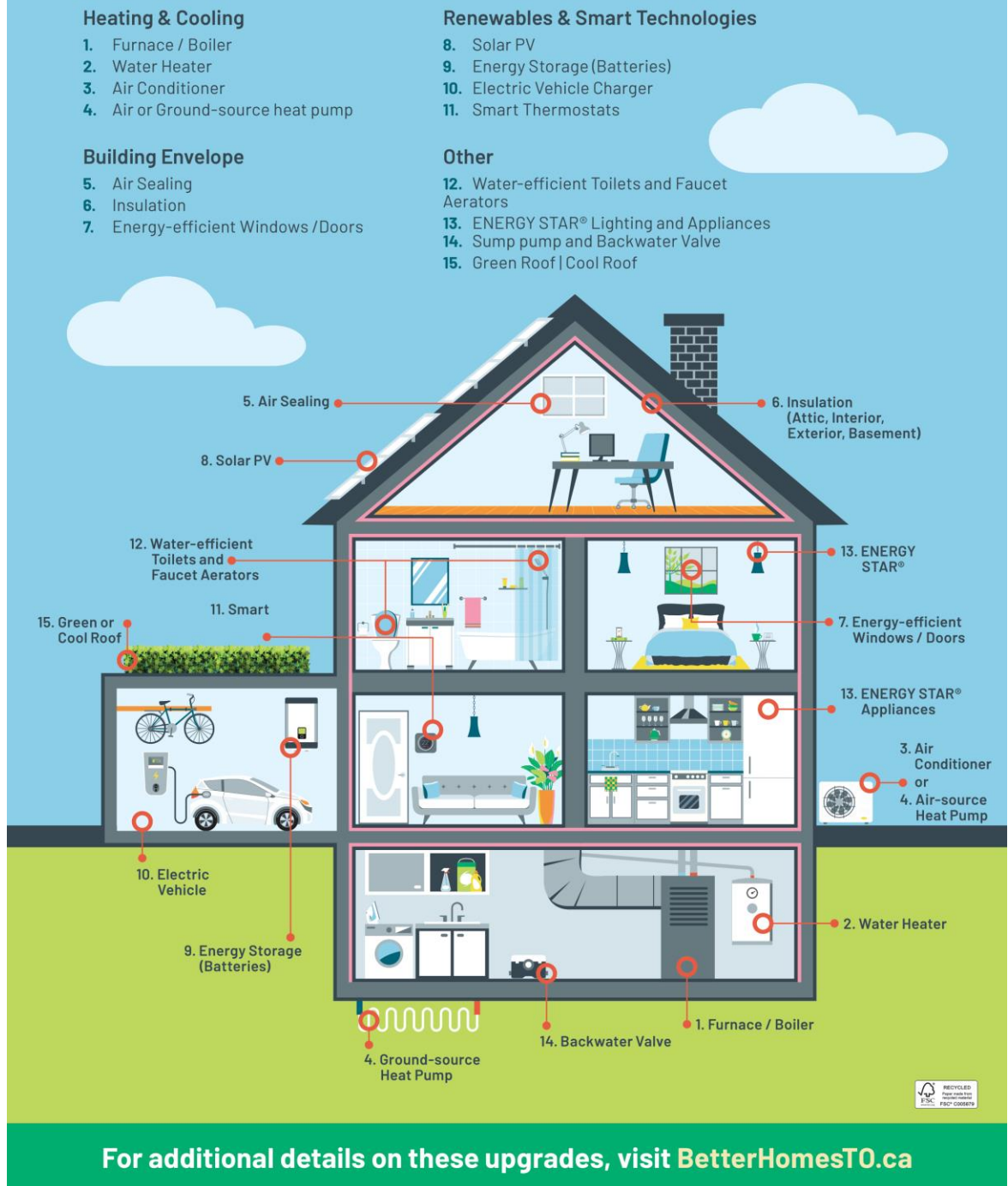


Figure 2: Potential energy efficiency and climate resiliency measures



When Ontario's cap-and-trade program was in effect there were plans to advance a province-wide building retrofit financing program that included financing and homeowner supports. However, when the provincial government changed in 2018, this was scrapped and progress towards a province wide retrofit program stopped.

Ontario's Residential Energy Efficiency Offerings

The Province of Ontario has tasked electrical and gas utilities with targets related to Conservation Demand Management (CDM) and Demand Side Management (DSM). To meet these targets, electrical and gas utilities have focused primarily on the commercial and industrial sectors. This was due to the complexity and costs associated with achieving reductions from the disaggregated residential sector and the larger reductions that can be achieved by individual commercial and industrial sector customers. The residential supports the utilities have advanced often focused on coupon discounts or incentives for more efficient products (e.g., LED light bulbs) or appliances (such as furnaces and hot water heaters), but they have not yet advanced a whole home retrofit program that would work with property owners to undertake a net zero emission roadmap for their property.

When Ontario's cap-and-trade program was in effect there were plans to advance a province-wide building retrofit financing program that included financing and homeowner supports. However, when the provincial government changed in 2018, this was scrapped and progress towards a province wide retrofit program stopped. In addition, CDM programs were drastically curtailed and moved away from utility delivery towards IESO delivery. At present, the IESO does not have any residential energy efficiency programs in market. DSM programs delivered by Enbridge Gas Distribution continued but targets allocated to Enbridge are not aligned with the province's GHG target and certainly not aligned with science based GHG reduction targets.

[Enbridge's Home Efficiency Rebate](#) program provides no financing or customer supports but does provide up to \$5,000 in possible rebates to improve a home's energy efficiency through measures such as increasing the efficiency of the furnace and building envelope improvements. The offering, however, is only available to Enbridge Gas customers.

The federal government's Greener Homes program also doesn't provide financing but does provide incentives up to \$5,000 for building envelope (but does not allow for double-dipping with DSM measures/rebates), renewable, heat pumps, and storage. In 2018 the federal government spoke to a CMHC financing program that would provide \$40,000 in



Implementation of BetterHomes Dufferin County will create demand for energy audit and trades jobs and stimulate local economic activity for the purchase of related products and services.

In the first four years of the program, an estimated 112 to 210 jobs could be created from these retrofit projects which will increase as participation grows over time.

interest free loans for a limited time term, but this program has not been launched yet. In all these programs, customer supports to help homeowners navigate their energy efficiency retrofit is not part of program offerings.

By advancing a Dufferin County retrofit program, the County can address and fill some significant gaps in the existing residential retrofit programs in market such as: Financing: LIC financing that can be attached to the property and not the property owner to enable long term payback and deeper energy and GHG reductions. There is the need for Dufferin County to engage with local municipalities to identify which may be interested in joining a Dufferin County program and make use of the LIC authorities.

- **Lack of customer supports to manage retrofits:** Energy concierge supports significantly impact on improving program uptake and customer experience thereby increasing word of mouth marketing and driving increased uptake to the retrofit program.
- **Additional Incentives:** Dufferin County residents can benefit from additional incentives that speak to the specific goals of a Dufferin County program such as reducing energy costs, driving GHG reduction, and fuel switching from fossil fuels.
- **Building Science Expertise in Contractor/Renovator Sector:** Contractors and renovators need to increase their building science expertise and experience. Advancing training will improve quality assurance of retrofits.
- **Retrofit Ecosystem Advancement:** growing the retrofit market to achieve economic development and GHG reduction targets will require actions such as contractor and realtor engagement and energy labelling. There is the need for retrofit programs to improve the value proposition for energy efficiency and low carbon in the residential sector beyond just cost savings.

Program Opportunity

Implementation of BetterHomes Dufferin County will create demand for energy audit and trades jobs and stimulate local economic activity for the purchase of related products and services. In the first four years of the program, an estimated 112 to 210 jobs (based on \$ 7 million in loans) could be created from these retrofit projects which will increase as participation grows incrementally over time. This number reflects a multiplier of 16 to 30 jobs for every \$1,000,000 spent on retrofitting as

described in [Bridge to the Future: Final Report from the Task Force for a Resilient Recovery](#). Furthermore, the energy savings experienced by homeowners can also have positive impacts on local economic activity since most of the money spent on energy costs leaves the community.

Achieving municipal community energy and GHG reduction goals stimulate climate action that plays a key role in the post-pandemic economic recovery by driving investment into the local economy, creating demand for skilled trades workers and releasing millions of dollars in untapped energy savings. The multiplier effect of households and businesses include having reduced utility expenses, a positive impact on local economies in terms of job creation, value added to local economy from project expenditures as well as energy savings reinvested in the purchase of local goods and services.

In 2018 Clean Energy Canada commissioned a report that indicated economy-wide energy efficiency measures could help reduce our national GHG emissions by 52 million tonnes by 2030 which equates to 25% of Canada's Paris accord commitment. The Report notes that an estimated 118,000 jobs and 1% growth in GDP would be achieved by implementing these measures. The Report flags that if governments across the country adopted aggressive efficiency measures addressing electricity, natural gas and other fossil fuels, the potential impacts are significantly larger at 79 million tonnes of avoided emissions along with almost \$600 billion in net economic activity. Another study estimated that for every dollar spent on energy efficiency GDP increased by \$5 to \$8. Job growth potential in Ontario from investments in energy efficiency are significant.

A long-term retrofit program can support a market transformation of associated trades and audit services as well as related products and equipment as demand continues to build over time as the program is scaled up. Job creation for trades for installation of equipment and residential insulation as well as for home energy assessments are also an opportunity to tap into local post-secondary schools to help grow the labour force to deliver this program to reach thousands of households.

In addition to job creation, enabling deep energy savings can help improve housing affordability in terms of reduced operating expenses which can free up more disposable income of residents for other priorities. By using promotion of a retrofit program to raise energy literacy, informed homeowners can also make better decisions about



Many households are concerned about the affordability of energy improvements even though they may be struggling with high utility bills. Upfront costs for deep retrofits can exceed \$20,000, and although a loan-based retrofit program can help alleviate upfront capital, consumers have come to expect rebates, not financing.

In addition, homeowners need supports to navigate the energy efficiency retrofit process.

their largest investment of their lives – purchasing a home. In the future, mandatory home energy labelling at time of sale could be a useful tool for consumers concerned about operating costs, the indoor air quality and moisture control benefits as well as the environmental improvement from retrofits. This would be like comparing the fuel economy of automobiles for consumers whose operating costs and carbon footprint are important to their purchasing decision making process.

In addition to retrofits reducing energy use and GHG emissions at home, they can also improve resilience to the changing climate, for example using on-site energy storage during weather-related power outages. In addition, better indoor air quality and temperature control from improved air ventilation, air sealing and insulation will make homes more comfortable all year-round while potentially improving the durability of residential buildings by reducing premature degradation of the structure and its operational systems.

Program Barriers

The question remains that if there is such a robust business case associated with each of the low-rise residential archetypes, why has fuel switching not already happened? There are several significant barriers that limit uptake to energy efficiency measures within the residential building stock.

Disruption - undertaking and managing any renovation is a time-consuming and potentially disruptive effort, especially for building envelop measures. For example, insulation, door and window upgrades often require different contractors, thereby increasing the work required on the part of the homeowner to secure quotes, select their contractors and then schedule each of them across different schedules and in the correct sequence.

Cost - many households are concerned about the affordability of energy improvements even though they may be struggling with high utility bills. Upfront costs for deep retrofits can exceed \$20,000, and although a loan-based retrofit program can help alleviate upfront capital, consumers have come to expect rebates, not financing. Inequities are compounded by the fact that those who can access private financing, and pay for measures upfront, are generally those who can access rebates, which require upfront payment before reimbursement.



BetterHomes Ontario was convened to meet the municipal need for a 3rd party retrofit program delivery partner. It is a joint program of the Association of Municipalities of Ontario (AMO), Clean Air Partnership and Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI). The BetterHomes Ontario consortium model provides a 3rd party delivery model for the Dufferin County to consider.

Lack of customer supports – homeowners need supports to navigate the energy efficiency retrofit process. Managing retrofits is time consuming and few property owners (or their contractors and renovators) have knowledge of building science and the business case for GHG reduction opportunities.

Tenure - Some retrofits may have extended 10 to 20-year paybacks which may exceed the homeowner's expected or actual ownership of the building. Therefore, some homeowners may be reluctant to take on such long-term payback projects, which may require using debt financing, as many residents may sell their homes within 5 - 8 years of acquisition.

Education – Most homeowners undervalue energy efficiency and conservation opportunities. It is rarely appreciated that the cheapest unit of energy is the one saved compared to increasing new energy supply, which customers pay for in the end.

Mortgage lender concerns - Concerns from mortgage lenders or existing loan providers on homeowners use for financing has been an issue. The creation of priority liens on a property and homeowner debt capacity are aspects of risk management that need to be addressed in creating a viable financial model for program participation.

Retrofit workforce limitations - Having an adequately sized, engaged and skilled local workforce is a critical success factor to implementing and sustaining long-term retrofit programs. Ensuring that contractors and energy auditors can support the increased demand for home energy retrofits should be addressed within program design.

BetterHomes Ontario

BetterHomes Ontario was convened to meet the municipal need for a 3rd party retrofit program delivery partner. It is a joint program of the Association of Municipalities of Ontario (AMO), Clean Air Partnership (CAP), and the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI). The BetterHomes Ontario consortium model provides a 3rd party delivery model for Dufferin County to consider. Below is a brief description of the overall roles and responsibilities of each of the BetterHomes Ontario Consortium partners.

- Market analysis and feasibility, program design, proposal development (CAP)
- Municipal recruitment, municipal onboarding & support, proposal development (AMO)
- Program administration, marketing and energy concierge (CAP)
- Contractor verification, outreach and training (HRAI)
- Non-contractor community outreach/partnership development (CAP)
- Monitoring, verification, evaluation and program improvements (CAP, AMO)
- Future program offerings (CAP, AMO, HRAI)

The City of Toronto and City of Ottawa programs already use BetterHomesTO and BetterHomes Ottawa branding. We encourage Dufferin County to join this consortium and reap collective promotional and branding opportunities through use of BetterHomes Dufferin County.



The average Ontario household uses about 9,000 kWh of electricity and 2,400 m³ of natural gas each year at a combined average annual cost of \$2,165.

In comparison to the Ontario average, Dufferin County residents pay higher energy costs and present an excellent opportunity for energy cost savings and GHG reductions from the advancement of a retrofit program.

PART 2: RETROFIT MARKET ANALYSIS FCM CEF FEASIBILITY ANALYSIS PROGRAM STREAM

Dufferin County joined a CAP FCM CEF proposal alongside another 6 Ontario municipalities (Huntsville, London, Barrie, Clarington, Kawartha lakes, and Tay Valley Township). CAP worked with Lightspark Inc. on the market analysis and feasibility study to explore and assess options for a financing program for home energy upgrades that can achieve triple-bottom-line (environmental, economic and social) benefits within the community. Undertaking the market analysis and feasibility work through a cohort approach reduces the financial and staff resources required from each municipal participant.

In the Feasibility Analysis, Lightspark used an innovative program design platform using a data model that incorporates energy consumption, housing data and behavioural economics data. These data provide a municipality with an overview of residential building archetypes and the value proposition for energy efficiency improvements for each archetype. Lightspark also undertook preliminary geospatial mapping of archetypes to inform marketing and outreach efforts. This comprehensive view of a community's building stock enables an understanding of the gap between the current state and potential state of improved homes, and the barriers to program uptake. These analyses are then brought into program design to determine priority target audiences for program promotion and incentive design.

Residential Archetypes

The average Ontario household uses about 9,000kWh of electricity and 2,400m³ of natural gas each year at a combined average annual cost of \$2,165. In comparison to the Ontario average, a significant percentage of Dufferin County residents tend to pay higher than average energy costs and present a good opportunity for energy cost savings and GHG reductions from the advancement of a retrofit program.

Home energy consumption varies widely based on factors such as the physical size and condition of the home, the number of people living there,

as well as the type of equipment used to heat and cool the home and its water. Annual variation in temperature also affects residential energy consumption. In more rural areas where there may be no natural gas service available, homes may have higher electricity consumption and may use a heating fuel such as oil, propane, or wood. In general, the more a household spends on energy, the better the economic business case for energy efficiency retrofits.

From the market analysis undertaken by Lightspark there are 7 main low rise residential building archetypes in Dufferin County. Each archetype has been divided into a hot, warm or cool energy efficiency market calculated based on the ability of the property owner to build a business case for retrofitting. Achieving this threshold provides the economic ability to achieve a “free” retrofit in that instead of spending money of energy costs, the property owner can transfer those costs to their LIC loan repayment. Upon the full repayment of the retrofit loan those energy savings would then be accrued by the property owner. In addition, the ability to incorporate renewables into the eligible measures will help address electricity prices whereby those properties appropriately sited for solar can reduce their vulnerability to peak electricity pricing. In addition to identifying the main archetypes, the Dufferin County market analysis also mapped out the archetype distribution. This mapping can inform marketing and outreach efforts for the program.

Dufferin County Archetype	Carbon Score t/CO2/year*	Annual Energy Costs \$	Dwelling Counts	Total Energy Costs \$	Building Envelope Market \$	Fuel Switch Market \$
A	5.53	2,372	13,042	30,935,624	Warm	Cool
B	1.71	4,216	167	704,072	Warm - Hot	Already Mostly Electric
C	12.69	7,701	307	2,364,207	Hot	Hot
D	6.04	5,246	2	10,492	Warm - Hot	Warm - Hot
E	11.73	3,948	1,001	3,951,948	Warm	Warm
F	7.9	2,897	1,214	3,516,958	Warm	Cool
G	7.91	3,556	483	1,717,548	Hot	Hot
Total			16,216	43,200,849		

* Higher the number, higher the GHG emissions

Table 1: Dufferin County Residential Building Archetypes and Economic Potential

Archetype A

These homes have an above average floor area, and are natural gas heated with high efficiency furnaces and use natural gas hot water systems.



- Average annual electricity costs: \$1,229
- Average annual natural gas costs \$ 1,127
- **Average annual energy costs \$ 2,372**

Client Implications: These homes consume 137.3 GJ (0.91 GJ/m²) of energy on average and produce 5.53 tCO₂e (0.037 tCO₂e/m²) on average . They represent 80.8 % of the housing stock and 50.1 % of the dwellings that have been audited in Dufferin County.

Archetype B

These homes have a relatively large floor area, and are electricity heated baseboard / hydronic / plenum (duct) htrs . and use electric hot water systems.



- Average annual electricity costs: \$3,926
- Average annual natural gas costs: \$161
- Average annual propane costs: \$63
- **Average annual energy costs: \$4,216**

Client Implications: These homes consume 126.1 GJ (0.85 GJ/m²) of energy on average and produce 1.71 tCO₂e (0.011 tCO₂e/m²) on average . They represent 0.9 % of the housing stock and 3.6 % of the dwellings that have been audited in Dufferin County.

Archetype C

These homes have a relatively large floor area, and are oil heated with low /mid efficiency furnaces and use electric hot water systems.



- Average annual electricity costs: \$1,680
- Average annual oil costs: \$ 5,951
- **Average annual energy costs: \$ 7,701**

Client Implications: These homes consume 227.9 GJ (1.5 GJ/m²) of energy on average and produce 12.69 tCO₂e (0.083 tCO₂e/m²) on average . They represent 1.8 % of the housing stock and 6.0 % of the dwellings that have been audited in Dufferin County.

Archetype D

These homes have a relatively large floor area, and are wood heated with and use electric hot water systems



- Average annual electricity costs: \$ 2,061
- Average annual wood costs: \$ 3,127
- **Average annual energy costs: \$ 5,246**

Client Implications: These homes consume 283.9 GJ (1 .59 GJ/m²) of energy on average and produce 6.04 tCO₂e (0.034 tCO₂e/m²) on average . They represent 0.0 % of the housing stock and 0.2 % of the dwellings that have been audited in Dufferin County.

Archetype E

These homes have an above average floor area, and are natural gas heated with low / mid efficiency furnaces and use natural gas hot water systems



- Average annual electricity costs: \$1,372
- Average annual natural gas costs: \$2,412
- Average annual propane costs: \$152
- **Average annual energy costs: \$3,948**

Client Implications: These homes consume 264.0 GJ (1.76 GJ/m²) of energy on average and produce 11.73 tCO₂e (0.078 tCO₂e/m²) on average. They represent 6.1 % of the housing stock and 6.0 % of the dwellings that have been audited in Dufferin County.

Archetype F

These homes have a relatively large floor area, and are natural gas heated with low / mid efficiency furnaces and use natural gas hot water systems



- Average annual electricity costs: \$1,228
- Average annual natural gas costs: \$1,657
- **Average annual energy costs: \$2,897**

Client Implications: These homes consume 185.1 GJ (1.27 GJ/m²) of energy on average and produce 7.9 tCO₂e (0.054 tCO₂e/m²) on average. They represent 7.4 % of the housing stock and 32.4 % of the dwellings that have been audited in Dufferin County

Archetype G

These homes have a relatively large floor area, and are propane heated with high efficiency furnaces and use electric hot water systems.



- Average annual electricity costs: \$1,594
- Average annual oil costs: \$264
- Average annual propane costs: \$3,565
- **Average annual energy costs: \$5,531**

Client Implications: These homes consume 168.0 GJ (1.04 GJ/m²) of energy on average and produce 7.91 tCO₂e (0.049 tCO₂e/m²) on average. They represent 2.9 % of the housing stock and 1.7 % of the dwellings that have been audited in Dufferin County.

Energy Burden by Archetype

The Canadian Urban Sustainability Practitioners (CUSP) group developed a database and mapping tool to identify areas experiencing disproportionately high household energy costs. Home energy cost burden is calculated as a percentage of total after-tax household income that is spent on heating and electricity within the home. The median Canadian household spends less than 3% of its after-tax income on home energy. Households that spend more than 6% on home energy experience high home energy cost burdens. For purposes of policy and program development, CUSP uses this 6% threshold of home energy cost burden as high, 10% as very high and 15% as extreme.

There exists a paradox for many households struggling to pay disproportionately high energy bills relative to their disposable income. The lack of available capital is a significant barrier to making home improvements that would provide long-term utility cost relief. The upfront costs to improve energy efficiency is often prohibitive for low-income households. In addition, many low-income households may also not own their home and have no authority to make such improvements that would significantly affect their utility bills.

The market analysis undertaken for Dufferin County has identified that archetypes B, C, D, E and G Dufferin County property owners are experiencing a higher level of energy poverty than the Canadian average (with archetypes C and E experiencing a particularly high energy burden).

Energy Burden Across Archetypes

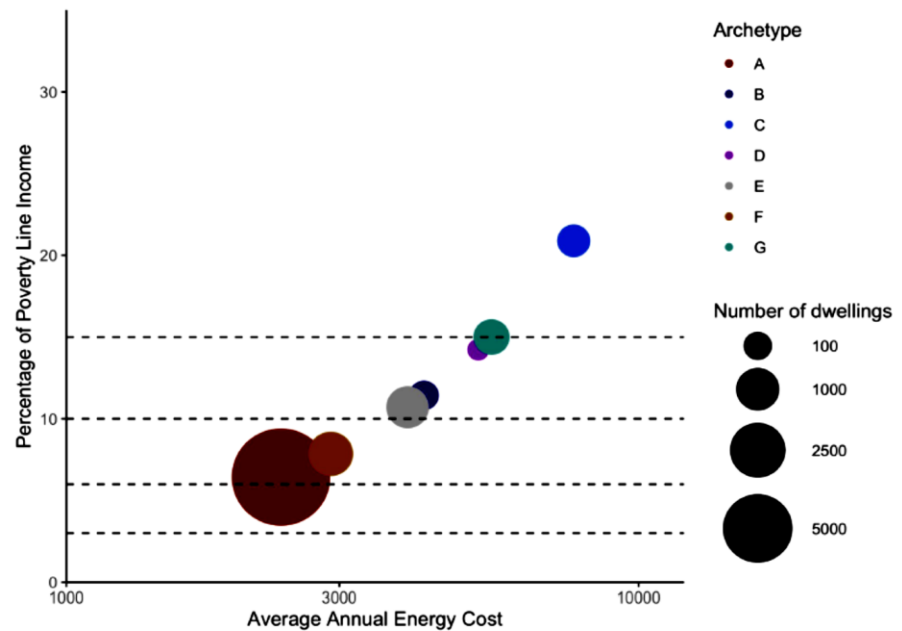


Figure 3: Energy Burden by Archetype

Energy Burden is the percentage of income spent on heating/cooling and electricity. Archetypes C, G, and D have the highest burden. Using a benchmark annual household income of \$ 38, 910, such a household living in a home in Archetype C would be paying 19. 8 % of their income on heating/cooling and electricity. Archetypes G and D spend 14.2 and 13.5 %, respectively, on heating/cooling and electricity. Moreover, B, C, D and E account for 4.7 % (770) of the dwellings.

Archetype by Income Bins

Archetype	# of Dwellings	Low Income	Mid Income	High Income
A	13,042	2,358	4,356	6,328
B	167	47	51	69
C	307	87	95	125
D	2	NA	1	1
E	1,001	371	254	376
F	1,214	226	369	619
G	483	88	139	256
Total	16,216	3,177	5,265	7,774

Table 2 : Archetypes by Income Bins



In addition to undertaking the market analysis of the Dufferin County residential low-rise sector, the feasibility project included the development of a proposed program design based on leading practices, internal municipal consultations, and consultations with those in the retrofit advancement sector.

PART 3: PROGRAM DESIGN

In addition to undertaking the market analysis for Dufferin County's residential low-rise sector, the feasibility project included the development of a proposed program design based on leading practices, internal municipal consultations, and consultations with those in the retrofit advancement sector.

The guiding principles used to design the Dufferin County program design include:

- Be customer oriented to ensure that the program makes for the best customer experience possible
Balance program design flexibility with streamlining and consistency goals across community programs
- Ensure the application of an equity lens to ensure that all residents can benefit from program offerings
- Reduce administration burden on municipalities
- Increase deep energy retrofit uptake
- Advance the financial sustainability of the program over time
- Increase stakeholder awareness and training within renovator sector
- Streamline program outcomes, tracking, evaluation and improvement
- It is important that the Dufferin County program learns from other programs in market. Clean Air Partnership developed the [Accelerating Home Energy Efficiency Retrofits Through Local Improvement Charge Programs Toolkit](#) to provide the top level frameworks and leading practices for program design and delivery. In addition, there is a significant critical mass of retrofit programs coming into market in the near future.

Municipality	Program Status
City of Toronto	Program in market since 2014, moved from pilot to community wide in 2015, recapitalized in 2021 through FCM CEF program.
City of Ottawa	Launched in fall of 2021
Durham Region	Launched in Spring of 2022
City of Kingston	Launched in early 2022

City of Guelph	Secured funding from FCM CEF
Town of Halton Hills	Homeowner engagement, limited customer uptake at pilot stage
Waterloo Region	Program design stage – working across regional municipalities
City of Peterborough	Program design stage
City of Burlington and Hamilton	Program design stage – working in partnership with Mohawk College
Town of Newmarket	Program development for a turn-key option. Serving as general contractor for retrofit customers. Exploring the role of a municipal service corp.
City of Windsor	Program development for a turn-key option. Serving as general contractor for retrofit customers. Exploring the role of a municipal service corp.
City of Thunder Bay	Market analysis and program design stage

Table 3: Status of Municipal Energy Efficiency Programs in Ontario

Ontario's LIC Legislation

As Dufferin County is a County level government it does not have access to LIC authorities to secure retrofit loans to properties. Therefore, there is the need for Dufferin County to engage with its local municipalities to understand their interest/willingness to join a FCM capital and grants application. There is the ability for Dufferin County to advance a retrofit program that does not use the Local Improvement Charges (LICs) mechanism, but that will mean that it is likely that the private capital that is not secured to the property will have a higher interest rate than a program that employs LICs.

About LICs

LICs have been used for decades in Ontario to finance block level improvements such as provision of roads, water and waste-water services. LIC legislation was amended in 2012 to allow for new eligible measures including energy efficiency, renewable energy, or water conservation. Municipalities in Ontario are given

broad legislative authority to use LICs in this manner by creating a program to provide homeowners with a loan to implement these measures on their property. These loans, which are attached to the property and not the owner, can have much longer repayment terms and lower interest rates than conventional forms of borrowing from financial institutions.

Repayment is arranged as an addition to individual property tax payments. The benefit of this is two-fold: a) it can assist homeowners with accessing capital for high upfront costs of retrofits and b) enables transfer of the lien to a new owner in cases where the loan applicant wants to sell their house before the LIC repayment have been made in full. The latter is particularly useful where the retrofits have a long-term payback period.

To meet the requirements of the Ontario regulations for LIC loans, the applicant must meet the following criteria:

- The applicant is the homeowner of the property;
- All property owners' consent to participation in the program; and
- The property is located within the applicable municipality.

The Regulation sets out several requirements for establishing a local improvement charge program to finance energy retrofits, including:

1. The municipality must enact a by-law to authorize the undertaking of energy efficiency works on private residential property as local improvements in accordance with Section 36.5 of the Regulation.
2. Before passing a by-law to undertake work as a local improvement under Section 36.5 of the Regulation, the municipality must give public notice of its intention to pass the by-law.
3. The municipality and the property owner must enter into an agreement in which the owner consents to their lot being specially charged.
4. The municipality must pass a by-law to establish a reserve fund for the local improvement charges.

A summary of the various procedural steps to embed the LIC within the retrofit program is provided below:

1. Council approves the direction to advance a Dufferin County Retrofit Program and develop a CEF proposal to FCM to secure grants and capital for the Program.
2. Council identifies and commits to contributing the 20% of total program costs that must come from non FCM funds. These 20% of non FCM funded program costs can come from municipal capital reserves, Infrastructure Ontario, or 3rd party capital. It is recommended that the County allocates

its portion of total program costs to the capital that will be loaned out to residents to ensure that the municipal funds allocated to the program and therefore will be coming back to the municipality as recoverable debt.

3. For municipalities participating in a Dufferin County program, their Council enacts a by-law authorizing the undertaking of energy efficiency and water conservation works (as it relates to reduced energy for heating water) as local improvements under the residential retrofit program.
4. Following a home energy assessment, the municipality and property owner enter into a Property Owner Agreement (POA) for the homeowner to undertake the retrofits as a local improvement on the benefitting property and to raise the cost of the work by imposing a special charge on the benefitting property.
5. Retrofit work is completed and a post-retrofit home energy assessment is conducted.
6. Local Improvement Roll is prepared setting out the cost of the work, the proposed special charges, when the charges are to be paid, and the lifetime of the work.
7. Municipality gives notice of the proposed Local Improvement Roll to the property owner and the municipal Treasurer certifies the proposed Local Improvement Roll.
8. Municipality enacts by-law providing that the amount specially charged on the lot set out in the roll is sufficient to raise the lot's share of the cost through annual payments and that a special charge will be imposed in each year on the lot equal to the amount payable in that year.
9. By-law is deemed to be repealed on the date that the Treasurer certifies that the special charge has been paid in full.

The following is a list of the various program design components this Design Report covers.

1. Financing
2. Program Administration
3. 3rd Party Delivery
4. Homeowner Supports
5. Incentive Management
6. Contractor Engagement and Training
7. Verification for Program Participation
8. Loan Loss Reserve Fund

Financing

Financing is a critical barrier for retrofit programs. It is recommended that the Dufferin County program work with its local municipalities to have them join the

County program and be willing to use their LIC mechanism to administer the loan securitization. While this does place an administrative burden on the municipal finance department, there is the ability to allocate FCM CEF grant funding towards covering the program's municipal administration costs. Beyond the scope of the 4-year CEF funding there is an opportunity to use administration fees to cover program administration costs. In addition, BetterHomes Ontario is working to find an alternate approach that would enable a 3rd party to manage the LIC administration to reduce the admin burden on municipal finance departments.

Financing Type	Pros	Cons
LIC Attached	<ul style="list-style-type: none"> • Attached to property • Can provide lower interest-rates • Lower risk of defaults • Longer term pay back options • Can be paid back at any time • Can meet the needs of a larger demographic 	<ul style="list-style-type: none"> • Needs to be administered via property tax collection system • Set up/Admin costs
3rd Party	<ul style="list-style-type: none"> • Available in market to select residents – those with home equity or adequate income • Unlikely to support low-income residents experiencing energy poverty, and/or new property owners 	<ul style="list-style-type: none"> • Attached to property owner and not property • Often higher interest rate if unsecured loan • Not available to all residents • Has equity implications
On-Bill Financing	<ul style="list-style-type: none"> • Less utilities than municipalities • Link to energy savings 	<ul style="list-style-type: none"> • Requires partnership with utility to provide financing • Utilities not participating thus far • Interpreted to be attached to property owner • Regulatory challenges

Table 4: Pros and Cons of Different Financing Mechanisms

Administration

One of the barriers limiting the municipal delivery of community retrofit programs has been the concern related to the potential administration to deliver these programs. There is also concern across municipalities related to the potential for duplication and increased costs related to program start up and delivery of individual community-based programs. Municipalities have been seeking partnerships with 3rd party entities who can administer and deliver these retrofits programs. There are several benefits to working with a 3rd party partner to deliver retrofit programs.

- Reduce program costs and administration burden for municipalities, better business case for clients
- Ability to use local, regional and provincial promotional avenues to drive program uptake
- Efficiencies of scale to support market development and capacity building
- Improved customer relations and experience
- Improved consistency and reduced market confusion across jurisdictional boundaries
- Consistent monitoring and evaluation methodologies, with better and broader data access
- Streamlining of contractor engagement, delivery, and training

3rd Party Administration Potential

- Develop program infrastructure: website, connection with other programs in Ontario, online application system, client management system (CMS)
- Fielding applicant questions on program, market offerings, customer handholding to help them determine what program best meets their needs
- Reviewing program applications, finalization of applications to municipality for final review and decision
- Program outreach materials
- Support for municipalities re set up of LIC structure and repayment system.
- Communications with customers re program decision, handholding with customers to support their retrofit process
- Review of documentation for finalization of payments
- Submission of final documentation to municipality

While a 3rd party can significantly reduce the municipal administrative burden, the municipality must be responsible for the following roles should an application to the FCM CEF funding stream be successful.

- Local municipalities participating in the program would need to pass an LIC by-law. A draft LIC by-law template will be provided. FCM CEF program funding criteria requires the municipal council pass a by-law or a council resolution that commits the municipality to using the LIC mechanism prior to applying to the FCM CEF funding stream. The by-law can be updated if program funding is secured.
- Dufferin County must enter into an agreement with FCM if the CEF application is successful.
- While the 3rd party can ensure that the applicant meets all program eligibility requirements, and that the application is full and complete, as the LIC is between the municipality and the property owner, the LIC agreement must be between the municipality and the property owner.
- The municipal finance department must set up the structure to attach the loan to the property tax system, distribute loan payments, and set up recollection process via the tax system.
- Should Dufferin County Council decide that the County would be willing to serve as the aggregator and provide matching capital for a BetterHomes Dufferin County program, the County and CAP can advance local municipal consultations to determine municipal interest in partnering with a Dufferin County FCM CEF application. The consultations with the local municipalities will also identify opportunities to streamline LIC administration.

These components describe the minimum requirements from the LIC legislation and FCM CEF funding stream. A more detailed description of the other suggested program design actions that are recommended for a Dufferin County retrofit program follows. The municipality may undertake any or all the below program components, but it is also possible for the Dufferin County program to allocate all or a selection of these responsibilities to a 3rd party.

Homeowner Supports

Residents require supports to navigate energy efficiency programs, selection of measures, contractor management, and other supports to streamline and improve the retrofit experience. It is, together with financing, one of the primary gaps that a Dufferin County FCM CEF program can help address.

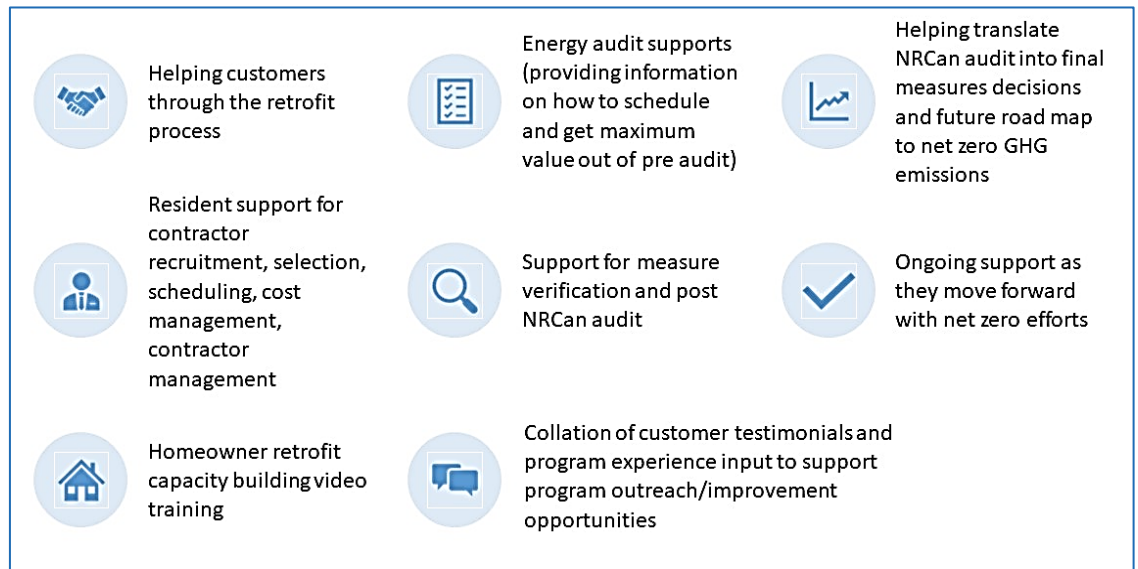


Figure 4: Potential Concierge Supports

Incentive Management

The FCM CEF funding stream can include incentives. The purpose of incentives can include:

- Accelerating program uptake
- Reducing energy poverty
- Driving deep energy retrofits
- Driving fuel switching

There can be trade-offs with these goals (e.g. energy poverty v maximizing GHG reductions). It is therefore important to determine the aspirational outcome of incentive design prior to finalizing design. Incentives can take the form of a maximum allocation for a specific measure (prescriptive, e.g. \$2,500 for an air source heat pump), or a maximum allocation for a specific level of performance (performance, e.g. up to a maximum of \$5,000 written off the loan for a minimum 30% GHG reduction). Some of the design principles that are recommended for a Dufferin County incentive program are:

- Avoid duplication with current available incentives: Use incentives to address market gaps that speak to Dufferin County's building archetypes (incentives to drive uptake and support the business case for fuel switching from fossil fuel heated homes).

Identify the balance in addressing energy poverty and GHG emissions. For example, for electrically heated homes there are significant costs savings from

building envelope measures, however there isn't likely to be significant GHG reductions from electrically heated homes compared to homes heating by fossil fuels.

The municipality can delegate incentive management to a 3rd party. This incentive management would include:

- Providing customers with support on available incentives and coordinating customer applications to existing and future incentives (e.g. Enbridge, Canada Greener Homes, BetterHomes Dufferin County).
- Manage all incentive applications, verifications, payments and reconciliations.

Contractor Engagement and Training

Building the number of and skills of energy efficiency contractors and renovators is a key challenge. There are a limited number of renovators and contractors that can meet even the current demand within the retrofit market. It is recommended that a Dufferin County program engage local contractors so that they can inform their clients and support program awareness and uptake. As the program grows, there are opportunities to increase offerings and drive building science training and general contractor supports. HRAI has played a significant role in contractor verification, outreach and training for utility, GreenON and BetterHomes Toronto and Ottawa programs. Contractor management, engagement and training can include the following goals and actions:

- Contractor verification – rules and minimum requirements for program participation
- Increase awareness amongst contractors so they can promote the program
- Increase the energy efficiency knowledge base amongst contractors
- Use program demand to drive an increase in the number of available contractors
- Build diversity and capacity within contractor trades
- Create transparency around retrofit costs and experience

Loan Loss Reserve

Many stakeholders have concerns about the risks associated with defaults on LIC loan payments. These stakeholders include mortgage lenders, program administrators, third party financiers, and participating municipalities. They are concerned about lost revenues or added program costs from missed or default LIC payments or if a property goes to a tax sale. LIC loans exercise priority liens in the case of a tax sale, but only the payments in arrears are collected. The remaining LIC

still rests with the property and payments on the LIC continue once the new owner takes possession. LIC loans, in general, have a history of very low default rates. These rates are lower than for mortgages and property taxes. Loan loss reserves can address mortgage lender concerns related to the attachment of a LIC to a property with a mortgage attached to it.

The only risk to the mortgage lender stems from the risk of the property selling for less than the mortgage attached to the property. In this circumstance the loan loss reserve can cover the financial liability associated with the LIC payments between the period for when that property went into default, to when the new property owner takes possession and begins making LIC repayments. The use of a loan loss reserve can reduce the concerns of mortgage lenders and streamline application review and processing.

Loan loss reserves are often set up to be 5- 10% of the total amount of capital lent by the program (e.g. for a \$10 million loan amount the loan loss reserve would be 500K at 5%). Loan loss reserves have been set up in several retrofit programs across the United States (e.g. Connecticut, Michigan, and California). To date no claims have been made against loan loss reserves in place.

It is recommended that BetterHomes Dufferin County incorporates a loan loss reserve of 5% of loan capital to streamline application approval and reduce mortgage lender concerns. FCM CEF funding allows for a loan loss reserve to be created for programs via the grant portion of program costs.

Participant Verification

As Dufferin County residents will be borrowing money, there is the need to undertake financial due diligence to reduce the risk of loan defaults. There is no doubt that financial verification is critical, however there is a recognition that the more financial verifications placed on program participation, the greater the drop off between applications and actual retrofits undertaken. It is recommended that BetterHomes Dufferin County use the tax account in good standing financial verification method and incorporate a loan loss reserve fund into program design.

Financial Verification	Notes
Tax Account in Good Standing	Municipality can undertake at no cost and very low admin burden
Utility Account in Good Standing	If a municipality owns the electrical utility, account status can be easily determined.
Credit Check	3 rd party credit checks can be purchased but may limit participation from lower income residents
Mortgage Lender Approval	This may allay mortgage lender concerns, but it is also likely to be a significant barrier to program participation

Table 5: Potential Verification Measures

PART 4: FCM FUNDING APPLICATION

Proposal Development

Dufferin County along with the 6 other cohort municipalities are working to meet the eligibility requirements needed to submit an FCM CEF capital and grants application. A grant stream that can boost project delivery is critical to enabling the startup resources required to develop and deliver these programs. This funding stream was provided to FCM by the federal government to support the ability of municipalities to deliver residential building retrofit financing programs. It targets the low-rise residential sector, which has long been underserved.

The program is a \$300m fund that is available for a 3–4-year period (or until funds are fully allocated). A successful program application can provide up to a maximum of 80% of total program costs. 20% of total program costs need to come from other non-federal funds. There is also a requirement that financing be a core component of the program's design. It is recommended that to reduce the financial burden of these programs on the municipal tax base that the 20% of total program costs being provided by the municipality to the program be allocated to capital for loans to residents. That way there is the ability for municipalities to fully recuperate program funding as loan repayments from participating property owners.

There are a variety of sources for where the 20% of total program costs can come from:

- Municipal capital reserves
- Infrastructure Ontario
- 3rd party private capital that the municipality borrows

Ensuring the longer-term financial sustainability of the program will rely on other revenue sources such as: adding administration fees, reducing marketing and outreach costs for contractors by aggregating demand, bulk purchasing, and other revenue opportunities.

There are several requirements a municipality needs to meet to be considered for a Capital Projects stream.

- Evidence of having completed detailed market analysis and program design work (this report).

- Passing a LIC by-law or similar council resolution that authorizes the use of the LIC mechanism (from participating local municipalities).
- The FCM CEF funding opportunity provides up to a maximum of \$10 million per municipality with grants to support program start up and delivery costs being limited to no more than 50% of total loan amount (and cannot exceed the total program start-up and operating costs).
- The combined loan and grant can cover up to 80% of total eligible program costs. 20% of total program funding needs to be from non FCM capital.
- Municipalities can use their capital reserves or borrow from Infrastructure Ontario or borrow private capital to secure their 20% of total program costs.
- The 20% of non FCM funds can be allocated to the loan portion of the program budget and would thereby not place a financial burden on Dufferin County in that the matching contribution to total program costs would be 100% recoverable via loan repayments.
- The grant funding stream addresses municipal resource constraints as it provides grants for program set up and delivery.

BetterHomes Ontario provides municipalities with support to develop the FCM CEF application. The proposal application can be a time-consuming endeavor. Support in proposal development was identified as a valued support that a 3rd party could provide for municipalities aiming to advance retrofit programs in their community. FCM CEF rules allow for entities to be compensated for proposal development investments in the event of a successful application.

If a FCM CEF proposal is successful there will also be the need for ongoing reporting to FCM on program activities, outputs, and outcomes. Should a municipality be concerned regarding the administrative burden, a 3rd party can manage FCM reporting requirements.

Municipal Capital Contribution

FCM CEF program rules mean that FCM can provide up to a maximum of 80% of total program costs (both loans and grants). As such there is the need to identify where the remaining 20% would be sourced from. Financing for loans can come from municipal capital reserves, green bonds, Infrastructure Ontario loans, or via private sector financing. The goal is that the program can provide attractive interest rates. It is likely that private sector financing will require a higher interest rate than public funds. As the program grows, private sector financing would be incorporated on an ongoing basis into the program. It is important for Dufferin County Council to determine where the 20% of matching contributions would come from prior to applying into the FCM CEF stream.

Risk and Risk Mitigation

All programs have risks associated with their design, development and delivery. Some of the most common risks associated with retrofit programs include:

Administration costs: retrofit programs can be labour intensive due to the setting up of the infrastructure and systems during program establishment. A key benefit of the FCM CEF grant stream is that it mitigates early program set up and administration costs.

Default Risk: due to priority lien status, liability related to defaults rests more with mortgage lenders than with municipalities. Incorporation of a loan loss reserve addresses the concerns of mortgage lenders. The FCM grant funds can be allocated to a loan loss reserve.

Municipal Core Responsibility: Based on municipal consultations there are concerns within the municipality related to the municipality acting as a bank. The issue is that while banks lend money, they do not deliver retrofit programs or address municipally directed priorities such as addressing energy poverty, GHG reduction, or improving housing stock.

Program Longevity: Funds specifically support program establishment and administration for 3–4 years. Beyond that period admin fees, bulk purchasing, marketing cost reductions, etc will support program costs. There is no expectation that property taxes will be allocated to program costs. The goal is that these programs become financially self-sustaining.

Municipal Debt Limits: Ontario municipalities have limited abilities to borrow money due to legislated debt limits. However, funds borrowed to finance retrofit programs do not count towards municipal debt limits because they are repaid as recoverable debt.

Program Scale-Up

Increasing the offerings of retrofit programs in market is a critical factor in growing the retrofit ecosystem. However, that is simply the beginning of the actions needed to achieve the scale up needed in the existing building retrofit market. Single municipal programs functioning in isolation are less likely to achieve the scale up needed to meet our GHG targets. Below are possible interventions and priority actions areas that retrofit program can help support to drive retrofit scale up opportunities.

- **Program availability:** To support the residential sector to undertake energy efficiency retrofits, we need available programs.
- **Customer support:** This is a critical factor in improving the retrofit experience of property owners and thereby enabling past retrofit clients to be spokespeople and promoters for programs.
- **Energy advisor availability:** Ontario needs more energy advisors. This will be achieved by higher orders of government through incentives for training and by building the demand for their services.
- **Contractors as allies:** Engaging this critical stakeholder in retrofit programs will ensure they can be an effective sales force for retrofit programs and measures. [HRAI has undertaken consultations](#) to better understand how retrofit programs can support contractors in scaling up low carbon retrofits.
- **Contractor knowledge:** There is a need to build up the building science and low carbon expertise of contractors. This will be critical to ensuring quality retrofits are undertaken and unintended consequences are minimized.
- **Realtors as allies:** Realtors are ideal in reaching out to property owners at the point of purchase/sale. The realtor network is also critical to driving acceptance of energy labelling to increase transparency related to energy and GHG considerations during purchase decisions.
- **Business case for energy efficiency:** At present the value proposition related to energy efficiency improvements is mainly connected to cost savings. Ideally the goal is to achieve a “free” retrofit, where resulting energy savings are equal to or more than loan repayments. Future carbon price increases and additional value proposition components must also be considered in business case development.
- **Rental market:** It is challenging to deliver energy retrofits in rented homes, especially where the tenant pays for energy, so there is no incentive for the landlord to improve performance.
- **Additional policy goals:** FCM’s CEF program is targeted at the low-rise residential sector. However, once these retrofit programs are in place there is the ability for these programs to not only serve the low-rise residential sector, but also the multi-unit residential sector, the commercial sector and the rental property sector. These programs can also advance additional policy goals such as flood protection, secondary suites, or aging in place. It is recommended that all programs seek to address one or more of these areas, either at start-up, or over time.

Program Budget

To secure program funding for a BetterHomes Dufferin County program there is the opportunity for Dufferin County to submit a capital and grants proposal to the FCM CEF funding stream. BetterHomes Ontario is keen to work with Dufferin County to develop and submit of FCM CEF proposal if Council approves that direction. Below is

a sample example of a possible budget for a BetterHomes Dufferin County program, recognizing that the total budget for such a program would need to be finalized based on the 20% matching contribution requirement.

Expense	FCM	Municipality/Private Sector	Partner/Other
Capital for Loans	\$3,000,000 loan	\$1,500,000 loan	If municipality not willing to use capital reserves, capital can come from 10 or private capital, or (possibly) CMHC.
Start Up Costs (website, CMS, Outreach, contract)	\$300,000 grant	In-kind is possible	In-kind is possible
Admin Costs (for 3rd party and municipality)	\$1,000,000 grant	In-kind is possible	In-kind is possible
New Incentives	\$1,000,000 grant		Other incentives can go towards total program costs
Program Growth & Development	\$200,000 grant	In-kind is possible	In-kind
Total	\$5,500,000	\$1,500,000	TBD

Table 6: Sample Program Budget

Building the financial rationale for residents is critical to enabling these programs to meet community needs and achieve the scale up needed to achieve GHG and economic development goals. The ideal client scenario is a “free” retrofit, whereby the energy cost savings can cover the loan repayments. This is a critical threshold to achieve for lower-income residents especially. For larger homes heated by oil, propane, wood, and electricity, this threshold is much easier to achieve. However, for smaller sized housing archetypes, of a newer building stock and heated by

cheaper natural gas, this financial threshold will often need to include future carbon price increases, a longer-term payback time frame, and a lower interest rate. Below is a sample resident retrofit budget for the most challenging archetype of a newer, natural gas heated home.

Property Owner Loan	Property Owner Repayments	Property Owner Avoided Energy Costs
<ul style="list-style-type: none"> • \$25K Loan – \$7,000 Greener Homes/Enbridge Incentives – possible FCM funded \$3,000 Incentives = \$15K Loan • FCM funded incentives can be specifically targeted to lower income/energy poverty clients • If capital is capped at \$8.5 million, with an average loan of 30K, would allow for 283 loans over the program's 3 – 4 year time frame 	<ul style="list-style-type: none"> • Can select different repayment schedules = 5/10/15/20 year terms (monthly payments of \$272/\$137/\$91/\$45 for 11 months of year) • Longer term pay backs can significantly improve the ability of these programs to meet lower income and energy poverty target audience. • Loans can be paid in full at any time without penalty 	<ul style="list-style-type: none"> • Approx.: \$ 560/year (conservative energy cost savings) • (Does not include escalating carbon price and building envelope savings will be there even beyond the time frame of the loan repayment) • Carbon price increases, increases in natural gas prices will support pay back of retrofit projects

Table 7: Sample Homeowner Budget

Dufferin County Decision Points

Below is a summary of the decisions that Dufferin County Council will need to consider if a BetterHomes Dufferin County program is able to meet the eligibility requirements for a FCM CEF application and the selected program design that would be advanced.

Council Decisions

Capitalization	Will Dufferin County provide 20% of total program costs? The 20% will be allocated to loans and as such will be recoverable debt. If so, will the loan funds come from capital reserves, be borrowed from Infrastructure Ontario, or be borrowed from private capital. The amount of capital the municipality can contribute will determine how much incentives can be a part of the program and what the program budget will be. A loan contribution of \$2 million will enable a full \$10 million application from FCM.
Financing Mechanism	Is Dufferin County willing to engage with its local municipalities to identify which municipalities may be interested in joining a Dufferin County FCM application and if they will be willing to use their LIC authorities' mechanism?
FCM CEF Application	Does Dufferin County Council approve staff to advance a FCM CEF application? Staff can come back to Council with results from the municipal consultations, but those consultations only make sense to advance if Dufferin County is willing to advance a FCM CEF capital and grants application on behalf of the County.
Program Delivery Model	Does Dufferin County want to work with a 3 rd party delivery agent?

Table 8: Dufferin County Council Decisions

Staff Design Decisions

Participant Verification	What level of financial verification will the program require?
Loan Loss Reserve	Will the program incorporate a loan loss reserve fund?
Coverage	Will the program have geographical/archetype eligibility requirements?
Incentives	Will the program provide incentives?
Eligible Measures	What measures will the program cover?

Table 9: Dufferin County Staff Design Decisions

APPENDIX: DUFFERIN COUNTY'S MARKET AND HOUSING ARCHETYPE ANALYSIS

Confidential and Proprietary
For Dufferin County Distribution Only

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Analysis and Mapping of Housing and Energy Data to Inform Policy Development

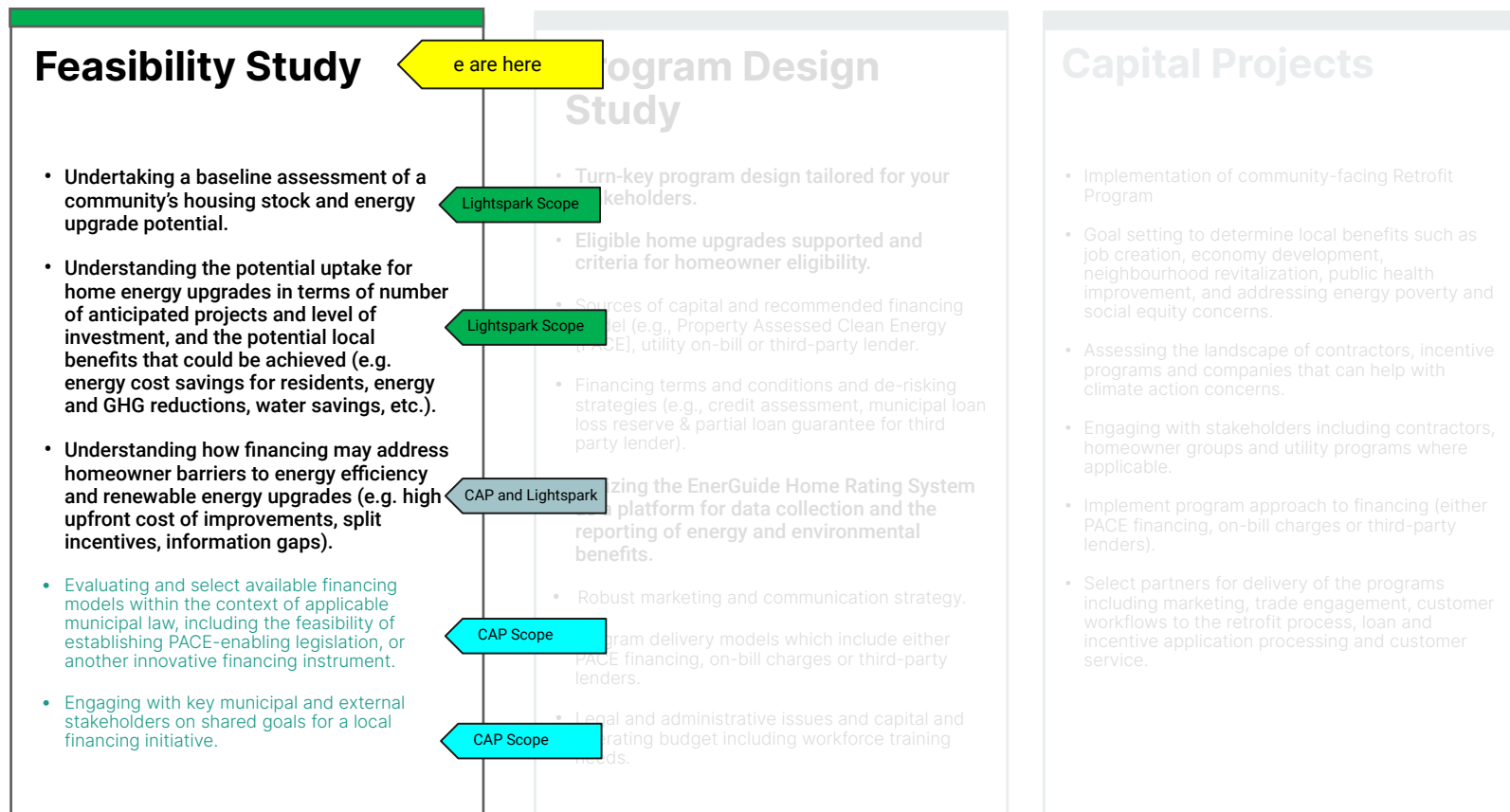
For: Sara Wicks, Dufferin County

By: James Riley & Tim Cashion, Lightspark Software Inc.

Date: 2021-11-29



What are the FCM Requirements in detail?



TOC

Scope of Work

Methodology

Breakdown by FSA

Data Sources

Archetype Definitions

Executive Summary

Lightspark Dufferin
County Map



Executive Summary

Summary Findings



- Our analysis covers 97% of Single Family Dwellings in Dufferin County (16,100 out of 16,900)
- We generated 7 archetypes that model the housing stock of the county
- Archetypes C and E have the highest carbon scores (>10 t CO₂-e annually) using oil and inefficient natural gas based heating systems
- 5 out of 7 archetypes have utility costs (heat and electricity) greater than \$3,000 annually

Carbon Reduction Opportunity

Potential tCO₂e Reduced

1.2%

With the following Archetypes recommendations made, the city's carbon footprint would be reduced by 1,220 tCO₂e (of a total of 100,761 tCO₂e across the City)

Potential GJ Reduced

0.9%

The data shows that *quick win* carbon reduction wins could be found by the following upgrades to 5% of households.

Archetype	Upgrade from Fossil Fuels
C	converting to Air Source Heat Pumps
G	converting to Air Source Heat Pumps

Archetype	Upgrade
A	upgrading ceiling & wall insulation and reducing air leakage

The selected archetypes are found throughout most FSA's and account for 86% of the housing stock and 79% of the tCO₂e emitted by Single-Family homes.

Key Insights: Carbon Reduction

There is a strong opportunity to reduce carbon usage in these key archetypes (C, G, A), across most FSAs by upgrading ceiling & wall insulation and reducing air leakage (A) and converting to Air Source Heat Pumps (C, G, and B). **These archetypes account for the majority of carbon emissions.**

- Current carbon emission (tonnes)

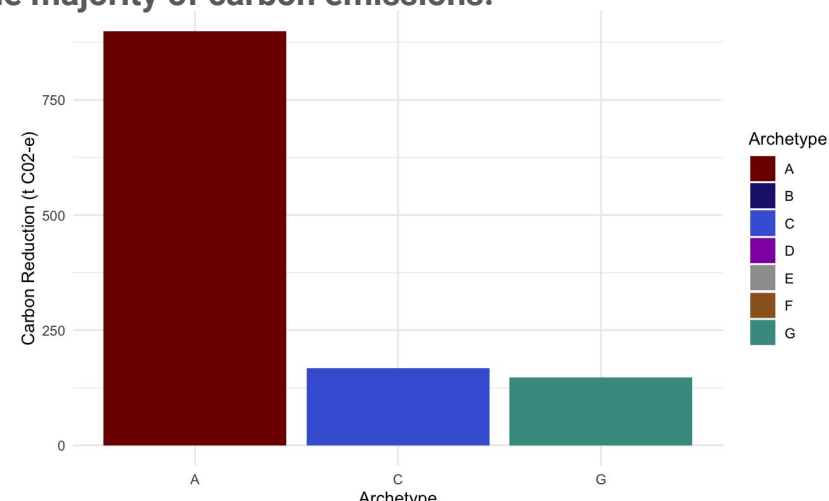
- A - 72,007 tCO₂e
- C - 3,769 tCO₂e
- G - 3,725 tCO₂e

Total emission - 79,501 tCO₂e

- Potential carbon reductions achieved by upgrading archetypes:

- A - 900 tCO₂e
- C - 168 tCO₂e
- G - 148 tCO₂e

Total reduction - 1,220 tCO₂e



Energy Burden Across Archetypes

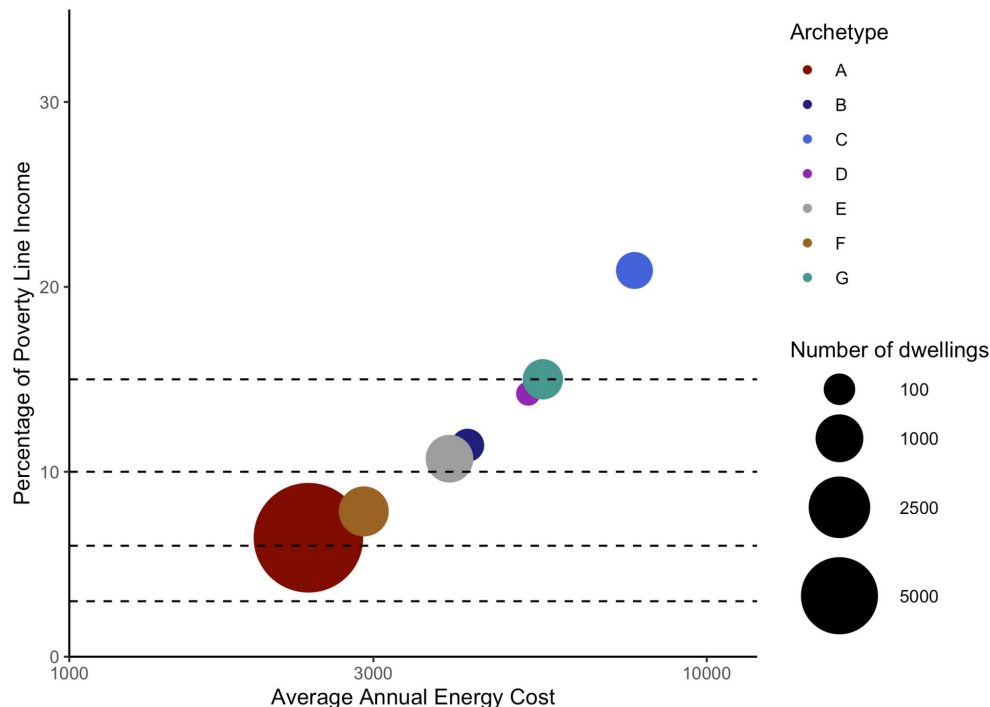
Energy Burden is the percentage of income spent on heating/cooling and electricity

Archetypes C, G, and D have the highest burden.

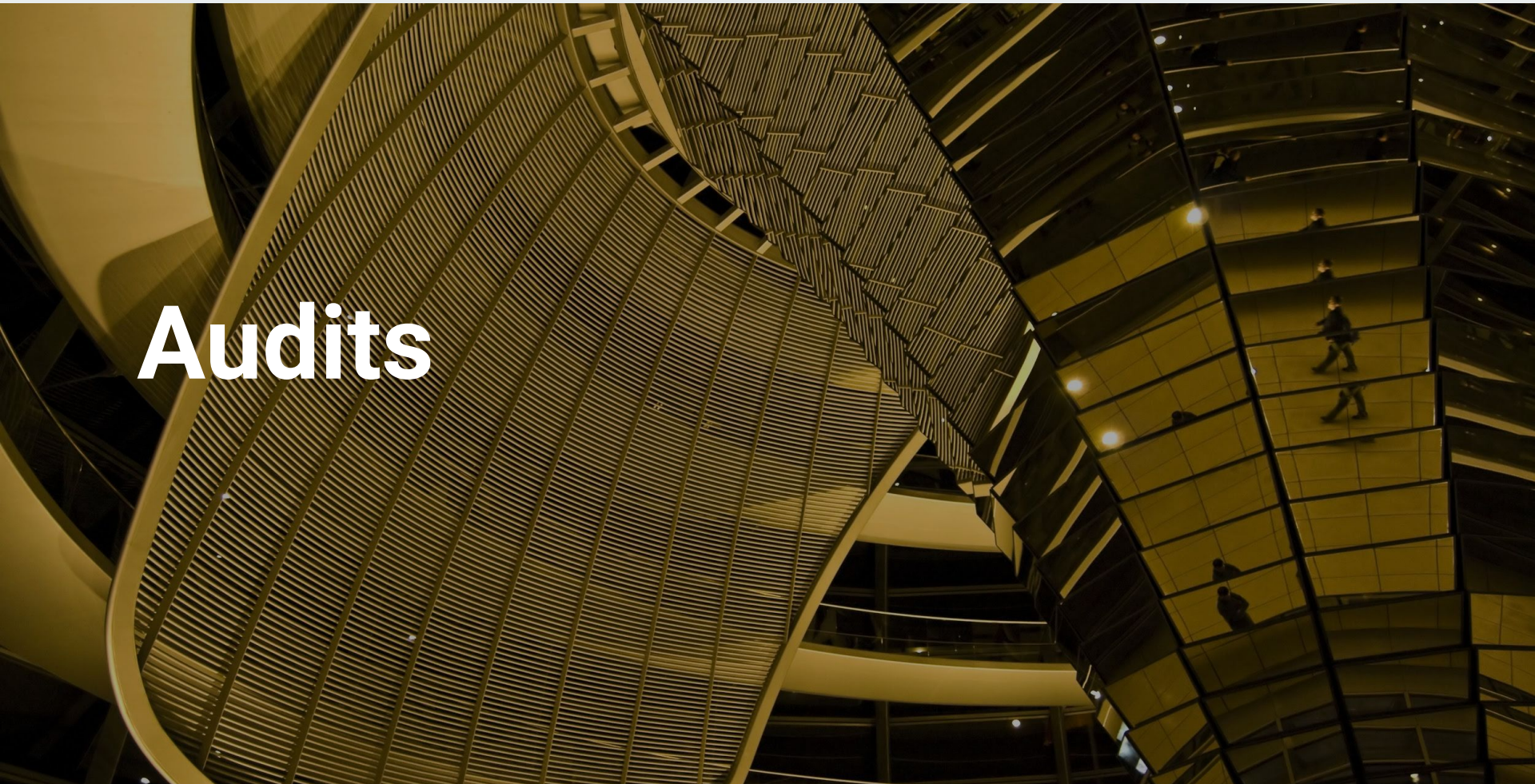
Using a benchmark annual household income of \$38,910, such a household living in a home in Archetype C would be paying 19.8% of their income on heating/cooling and electricity

Archetypes G and D spend 14.2 and 13.5%, respectively, on heating/cooling and electricity.

Moreover B, C, D and E account for 4.7% (770) of the dwellings



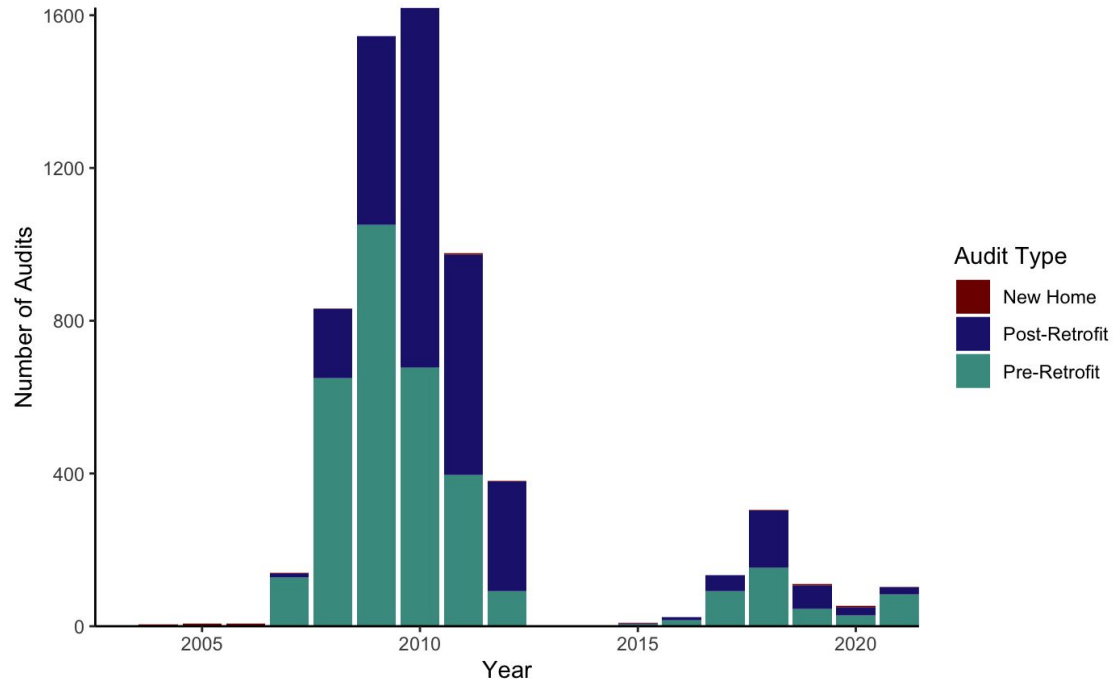
Audits



Audit Breakdown

21% (3,430 out of 16,123) of Single Family Dwellings in Dufferin County have had an EnerGuide audit.

Audit Type	Number of Audits
Pre-Retrofit	3,410
Post-Retrofit	2,799
New Home*	44
Total Audits	6,253



*New homes are homes that were occupied for less than 6 months from the date of the audit.



Methodology and Approach

Scope of Work



1

Executive summary Summary of analysis and recommendations

2

City-Wide analysis and Visualization Use data models to produce key city-wide statistics, representing our Single Family Housing stock

3

Archetype development Represent Dufferin County's existing home stock with representative home types

4

GHG Analysis The Dufferin County can influence GHG emissions, so annual GHG emissions are a key factor for analysis. To answer: how much and how quickly do we need to move to achieve our targets?

Data Sources

1

Energuide Audit Data : Subset of building characteristics, heating systems, energy use in Dufferin County

2

Utility Consumption Data: Household and postal code level Electricity and Gas consumption numbers, respectively. Hydro One, Orangeville Hydro, and Enbridge provided data.

3

Canadian Census: FSA level income, occupancy, ownership

4

Building Footprints : All building shapes in Dufferin County

5

Building Energy Modelling: Iterative modeling of varying conditions and characteristics

6

Property Tax report : All building tax reports in Dufferin County - **Age, address, floor area, parcel identifier.**

Definitions



Archetype A data methodology used to define a grouping of housing types using data science techniques

FSA The first three letters of a postal code, called a “Forward Sortation Area”

Average Annual Energy Costs Average electricity and natural gas usage

tCO2e Tonnes of carbon dioxide equivalent, which is a measure that allows you to compare the emissions of other greenhouse gases relative to one unit of CO₂

GJ Gigajoule a unit of energy for both natural gas and electricity

Lightspark Data Methodology



Through unique approach to data handling and combining modelling techniques, Lightspark is able to represent the distribution and frequency energy and carbon profiles across Dufferin County at the FSA and archetype level.

Every single-family dwelling in Dufferin County is assigned an energy and carbon profile based on its age, size and archetype.

In brief we employ the following methods:

- Combine the data sources into the Lightspark data model
- Using spatial analysis techniques to match data and map data points
- Iterative building energy modelling under varying building characteristics and conditions
- Unsupervised machine learning algorithm used for archetype generation
- Map energy and carbon profiles to every single-family dwelling



Archetype Generation

Key Assumptions Behind Archetype Analysis



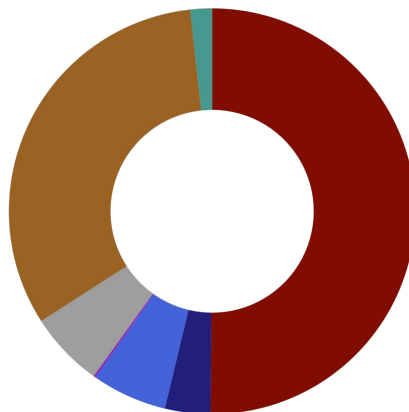
- **Emissions factor:** 12.8 gCO₂e/kWh
- **Electricity cost:** \$0.11601 + Additional Charges
- **Oil cost:** \$1.283/L
- **Propane cost:** \$0.8596/L
- **Natural gas cost*:** \$4.24/GJ + Additional Charges
- **Standard Heat Pump COP_h** = 2.55
- **Recommended windows U-value** = 0.32 BTU/ft².°F.h
- **Recommended wall insulation R-value** = 15.8 ft².°F.h/BTU
- **Poverty line for Dufferin County household of 4:** \$38,910
- Archetype parameters represent average for homes with and without retrofits
- For the home having multiple audits, the latest audit was selected for the analysis

A total of 7 clusters were identified from a total of 1,217 audits of Single Family Dwellings

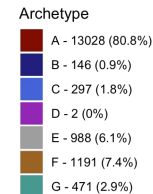
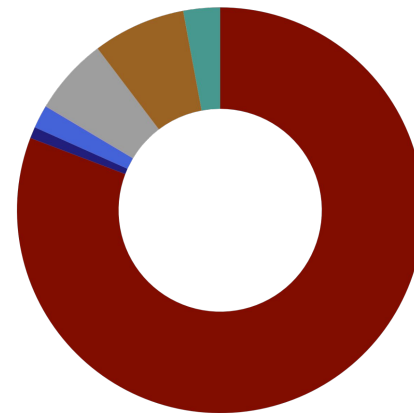
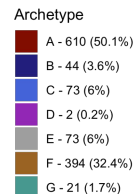
Breakdown of Archetypes



- Archetypes A, F, and E account for 94.3% of the housing stock and 88.5% of the EnerGuide audits of Single-Family homes.
- A higher number of homes (dwellings) with audits increases data accuracy.



Audit Breakdown



Dwelling Breakdown

Total dwellings = 16,123

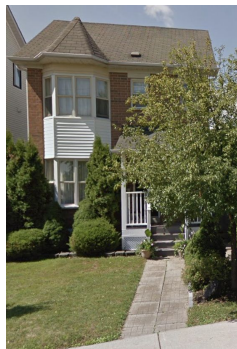
Breakdown of Archetypes - Comparison



Archetype	Year of Construction	Floor Area (m2)	Primary Heat Source	Primary Fuel Type	Hot Water System	Hot Water System Fuel Type	Energy Intensity (GJ/m2)	Carbon Intensity (t CO2-e/m2)
A	1982	235.1	Condensing Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.58	0.02
B	1973	358.6	Baseboards	Electricity	Conventional Tank	Electricity	0.35	0.0
C	1947	310.8	Furnace With Flame Retention Head	Oil	Conventional Tank	Electricity	0.73	0.04
D	1963	310.4	Advanced Airtight Wood Stove	Wood	Conventional Tank	Electricity	0.91	0.02
E	1902	235.0	Condensing Furnace	Natural Gas	Conventional Tank	Natural Gas	1.12	0.05
F	1980	256.9	Furnace With Continuous Pilot	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.72	0.03
G	1959	322.3	Condensing Furnace	Propane	Conventional Tank	Electricity	0.52	0.02

Archetype A

01



These homes have an above average floor area, and are natural gas heated with high efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: \$1,229

Average annual natural gas costs: \$1,127

Average annual energy costs: \$2,372

Client Implications:

These homes consume 137.3 GJ (0.91 GJ/m²) of energy on average and produce 5.53 tCO₂e (0.037 tCO₂e/m²) on average. They represent 80.8% of the housing stock and 50.1% of the dwellings that have been audited in Dufferin County.

Variable	A	ESNH Standard*
Year of Construction	1982	-
Floor Area (m ²)	235.1	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	93.1	96
Heat Pump	No	No
Hot Water System	Conventional Tank (Pilot)	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.6	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	4.32	10.56
Wall Insulation (RSI)	2.31	3.7
Foundation Insulation (RSI)	1.54	3.52
Number of Windows	16	-
Number of Doors	2	-
Electricity Consumption (GJ)	34.0 GJ (9,430.6 kWh)	-
Natural Gas Consumption (GJ)	102.7 GJ (2,753.0 m ³)	-
Energy Score (GJ)	137.35	-
Carbon Score (tCO ₂ e)	5.53	-
Air Tightness (ACH50P)	4.67	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype B

02



These homes have a relatively large floor area, and are electricity heated baseboard/hydronic/plenum(duct) htrs. and use electric hot water systems

Average annual electricity costs: \$3,926

Average annual natural gas costs: \$161

Average annual propane costs: \$63

Average annual energy costs: \$4,216

Client Implications:

These homes consume 126.1 GJ (0.85 GJ/m²) of energy on average and produce 1.71 tCO₂e (0.011 tCO₂e/m²) on average. They represent 0.9% of the housing stock and 3.6% of the dwellings that have been audited in Dufferin County.

Variable	B	ESNH Standard*
Year of Construction	1973	-
Floor Area (m ²)	358.6	-
Primary Heat Source	Baseboard/Hydronic/Plenum(Duct) Htrs.	-
Primary Fuel Type	Electricity	-
Primary Heat Source Efficiency (%)	100.0	96
Heat Pump	Ground	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.71	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	4.46	10.56
Wall Insulation (RSI)	2.49	3.7
Foundation Insulation (RSI)	1.65	3.52
Number of Windows	23	-
Number of Doors	3	-
Electricity Consumption (GJ)	119.3 GJ (33,151.4 kWh)	-
Natural Gas Consumption (GJ)	2.1 GJ (56.6 m ³)	-
Energy Score (GJ)	126.12	-
Carbon Score (tCO ₂ e)	1.71	-
Air Tightness (ACH50P)	4.65	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype C

03



These homes have a relatively large floor area, and are oil heated with low/mid efficiency furnaces and use electric hot water systems

Average annual electricity costs: \$1,680

Average annual oil costs: \$5,951

Average annual energy costs: \$7,701

Client Implications:

These homes consume 227.9 GJ (1.5 GJ/m²) of energy on average and produce 12.69 tCO₂e (0.083 tCO₂e/m²) on average. They represent 1.8% of the housing stock and 6.0% of the dwellings that have been audited in Dufferin County.

Variable	C	ESNH Standard*
Year of Construction	1947	-
Floor Area (m ²)	310.8	-
Primary Heat Source	Furnace With Flame Retention Head	-
Primary Fuel Type	Oil	-
Primary Heat Source Efficiency (%)	79.0	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.69	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.58	10.56
Wall Insulation (RSI)	2.01	3.7
Foundation Insulation (RSI)	1.01	3.52
Number of Windows	20	-
Number of Doors	3	-
Electricity Consumption (GJ)	46.5 GJ (12,904.3 kWh)	-
Natural Gas Consumption (GJ)	1.3 GJ (34.4 m ³)	-
Energy Score (GJ)	227.88	-
Carbon Score (tCO ₂ e)	12.69	-
Air Tightness (ACH50P)	6.94	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype D

04



These homes have a relatively large floor area, and are wood heated with and use electric hot water systems

Average annual electricity costs: \$2,061

Average annual wood costs: \$3,127

Average annual energy costs: \$5,246

Client Implications:

These homes consume 283.9 GJ (1.59 GJ/m²) of energy on average and produce 6.04 tCO₂e (0.034 tCO₂e/m²) on average. They represent 0.0% of the housing stock and 0.2% of the dwellings that have been audited in Dufferin County.

Variable	D	ESNH Standard*
Year of Construction	1963	-
Floor Area (m ²)	310.4	-
Primary Heat Source	Advanced Airtight Wood Stove	-
Primary Fuel Type	Wood	-
Primary Heat Source Efficiency (%)	67.0	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.8	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.47	10.56
Wall Insulation (RSI)	2.04	3.7
Foundation Insulation (RSI)	0.91	3.52
Number of Windows	17	-
Number of Doors	2	-
Electricity Consumption (GJ)	57.1 GJ (15,852.5 kWh)	-
Natural Gas Consumption (GJ)	0.0 GJ (0.0 m ³)	-
Energy Score (GJ)	283.92	-
Carbon Score (tCO ₂ e)	6.04	-
Air Tightness (ACH50P)	5.52	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype E

05



These homes have an above average floor area, and are natural gas heated with low/mid efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: \$1,372

Average annual natural gas costs: \$2,412

Average annual propane costs: \$152

Average annual energy costs: \$3,948

Client Implications:

These homes consume 264.0 GJ (1.76 GJ/m²) of energy on average and produce 11.73 tCO₂e (0.078 tCO₂e/m²) on average. They represent 6.1% of the housing stock and 6.0% of the dwellings that have been audited in Dufferin County.

Variable	E	ESNH Standard*
Year of Construction	1902	-
Floor Area (m ²)	235.0	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	87.5	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.63	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	2.77	10.56
Wall Insulation (RSI)	1.38	3.7
Foundation Insulation (RSI)	0.45	3.52
Number of Windows	18	-
Number of Doors	2	-
Electricity Consumption (GJ)	37.9 GJ (10,530.8 kWh)	-
Natural Gas Consumption (GJ)	222.3 GJ (5,959.4 m ³)	-
Energy Score (GJ)	264.05	-
Carbon Score (tCO ₂ e)	11.73	-
Air Tightness (ACH50P)	11.6	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype F

06



These homes have a relatively large floor area, and are natural gas heated with low/mid efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: \$1,228

Average annual natural gas costs: \$1,657

Average annual energy costs: \$2,897

Client Implications:

These homes consume 185.1 GJ (1.27 GJ/m²) of energy on average and produce 7.9 tCO₂e (0.054 tCO₂e/m²) on average. They represent 7.4% of the housing stock and 32.4% of the dwellings that have been audited in Dufferin County.

Variable	F	ESNH Standard*
Year of Construction	1980	-
Floor Area (m ²)	256.9	-
Primary Heat Source	Furnace With Continuous Pilot	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	79.6	96
Heat Pump	No	No
Hot Water System	Conventional Tank (Pilot)	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.56	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.88	10.56
Wall Insulation (RSI)	2.16	3.7
Foundation Insulation (RSI)	1.3	3.52
Number of Windows	16	-
Number of Doors	2	-
Electricity Consumption (GJ)	34.0 GJ (9,436.8 kWh)	-
Natural Gas Consumption (GJ)	150.4 GJ (4,033.3 m ³)	-
Energy Score (GJ)	185.06	-
Carbon Score (tCO ₂ e)	7.9	-
Air Tightness (ACH50P)	5.34	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype G

07



These homes have a relatively large floor area, and are propane heated with high efficiency furnaces and use electric hot water systems

Average annual electricity costs: \$1,594

Average annual oil costs: \$264

Average annual propane costs: \$3,565

Average annual energy costs: \$5,531

Client Implications:

These homes consume 168.0 GJ (1.04 GJ/m²) of energy on average and produce 7.91 tCO₂e (0.049 tCO₂e/m²) on average. They represent 2.9% of the housing stock and 1.7% of the dwellings that have been audited in Dufferin County.

Variable	G	ESNH Standard*
Year of Construction	1959	-
Floor Area (m ²)	322.3	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Propane	-
Primary Heat Source Efficiency (%)	93.6	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.72	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	4.42	10.56
Wall Insulation (RSI)	2.38	3.7
Foundation Insulation (RSI)	1.62	3.52
Number of Windows	21	-
Number of Doors	3	-
Electricity Consumption (GJ)	44.0 GJ (12,219.4 kWh)	-
Natural Gas Consumption (GJ)	8.3 GJ (221.8 m ³)	-
Energy Score (GJ)	168.05	-
Carbon Score (tCO ₂ e)	7.91	-
Air Tightness (ACH50P)	5.02	2.5+

* Minimum standard based on Energy Star

+ Maximum standard value based on Energy Star

Archetype Carbon Ranking



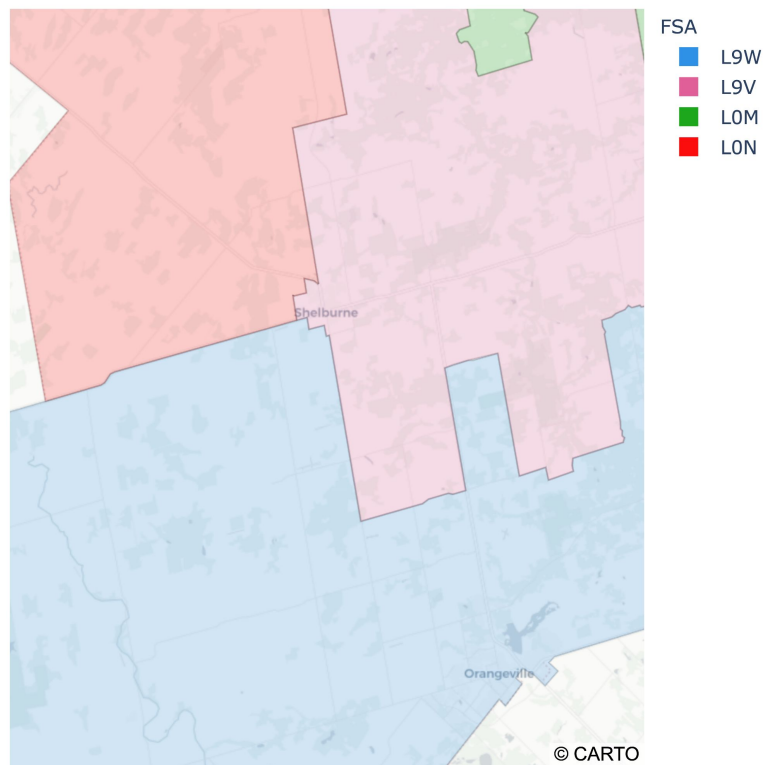
- Archetype C, E, and G are the most carbon intensive homes
- Capturing carbon savings by focusing on these homes is an important first step in decarbonization of the full city stock

Archetype	t CO2-e	GJ	Energy Cost (\$)
C	12.69	228	\$7,701
E	11.73	264	\$3,948
G	7.91	168	\$5,531
F	7.9	185	\$2,897
D	6.04	284	\$5,246
A	5.53	137	\$2,372
B	1.71	126	\$4,215



Forward Sortation Area (FSA) Energy Distribution

Dufferin County FSA Level



Forward sortation areas (FSA) are the first 3 letters of a post code and provide a means to segment the city using a uniform methodology.

Number of FSAs	4
Number of households	16,123
Total Energy Use (GJ)	2,436,495
Total Electricity Use (GJ)	643,078
Total Natural Gas Use (GJ)	1,657,430
Total tCO₂e	100,762

Archetype Distribution

Total number of archetypal single detached dwellings in Dufferin County by FSA.

16,123 Single Family Dwellings

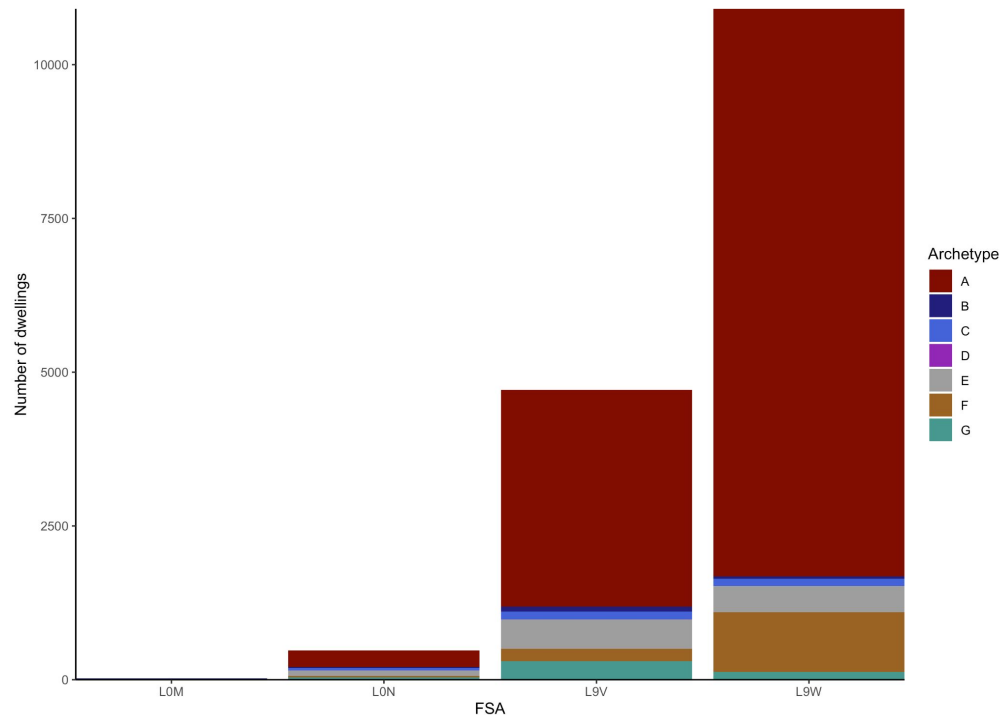
7 Archetypes

Archetype A, F, and E are the most numerous across all FSA's

A - 13,028 dwellings

F - 1,191 dwellings

E - 988 dwellings



Total Energy Distribution



Total GJ by archetype
distributed across FSA's:

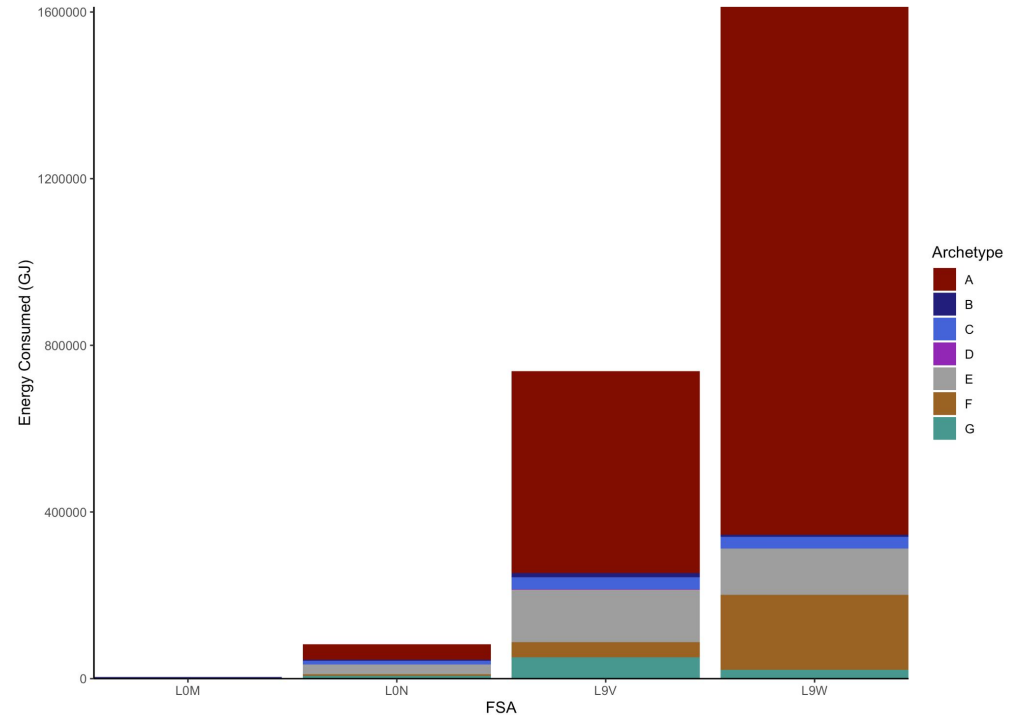
2,436,495 GJ consumed

Archetype A, E, and F
consume the highest
amount of total energy:

A - 1,789,391 GJ

E - 260,879 GJ

F - 220,411 GJ



Total Tonnes CO2e Distribution

Total tCO2e by archetype
distributed across FSA's:

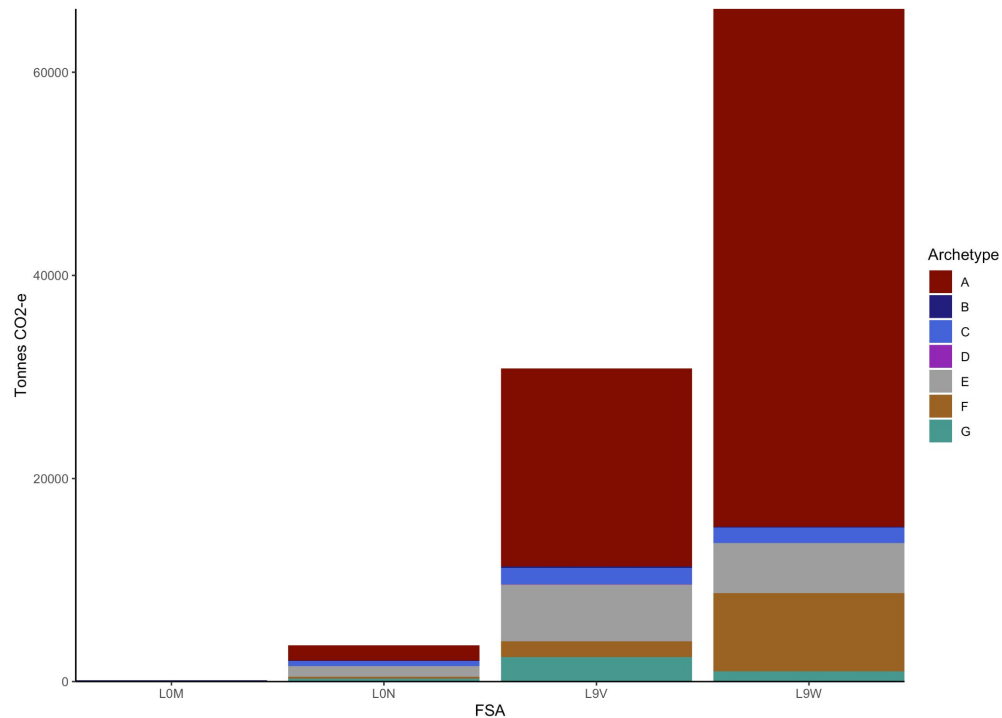
100,762 tCO2e

Archetype A, E, and F
contribute the highest
amount of CO2e:

A - 72,007 CO2-e

E - 11,587 CO2-e

F - 9,413 CO2-e



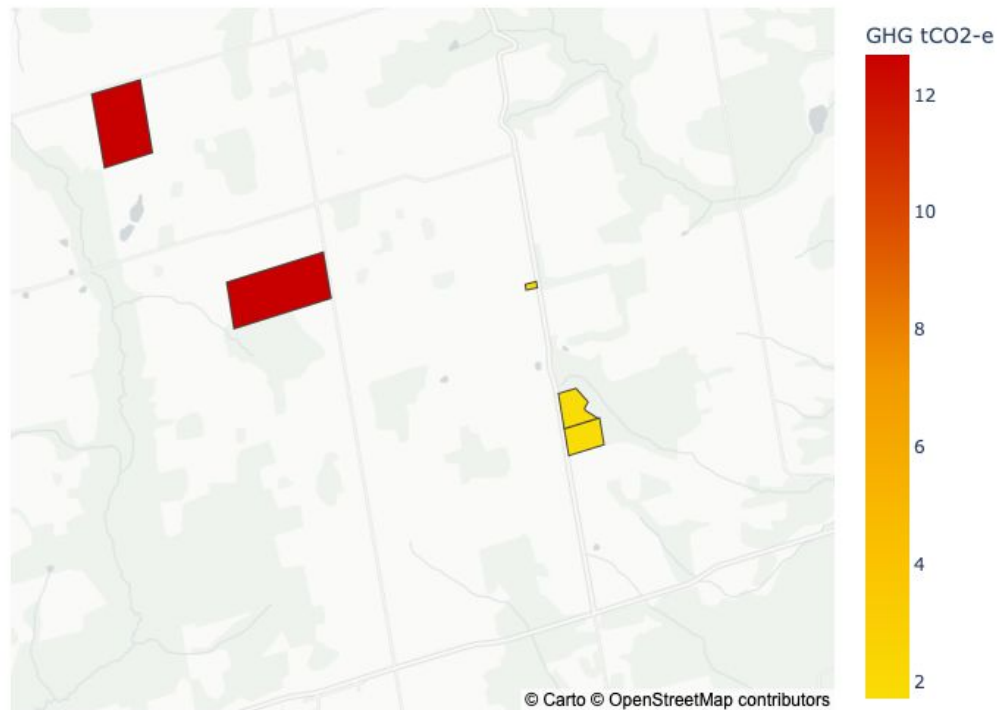


Forward Sortation Area (FSA) Summary Breakdown

LOM Breakdown



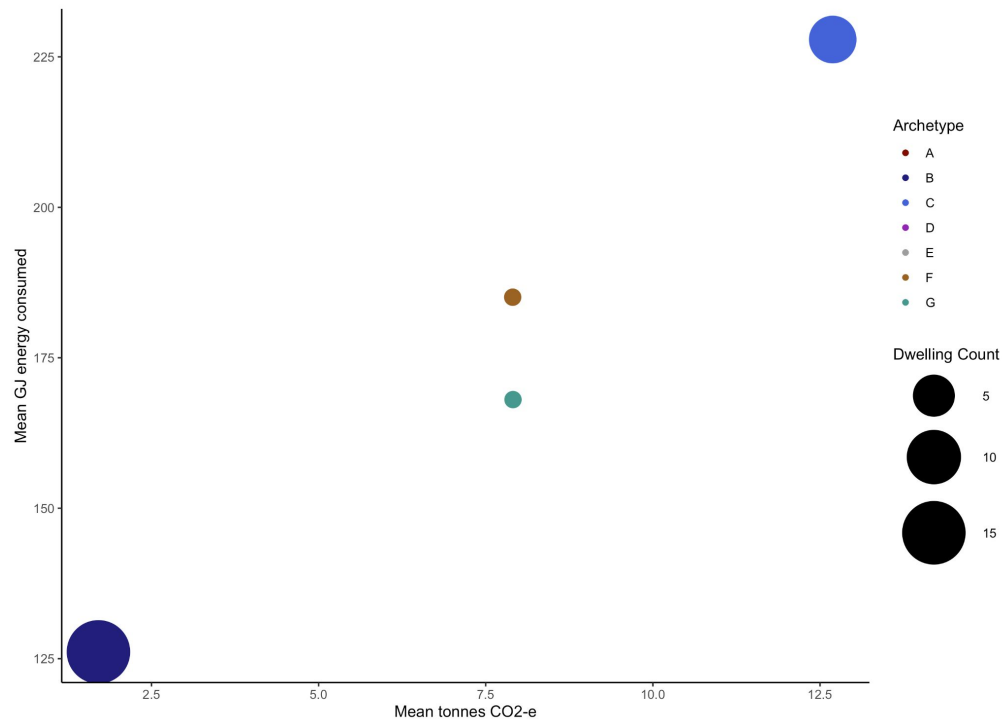
Total number of single family dwellings:	24
Annual median income (\$):	83,937
Average occupancy per dwelling:	2.7
Owner to renter ratio (%):	84
Total Energy Use (GJ):	3,840
Total tCO2e:	130



LOM - Carbon and Energy Average per Archetype

Archetype C accounts for 30% of the dwellings but 68% of the carbon emissions in LOM.

Archetype	Count	Total Energy (GJ)	Total tCO2e
B	15	1,892	26
C	7	1,595	89
F	1	185	8
G	1	168	8
Total	24	3,840	130

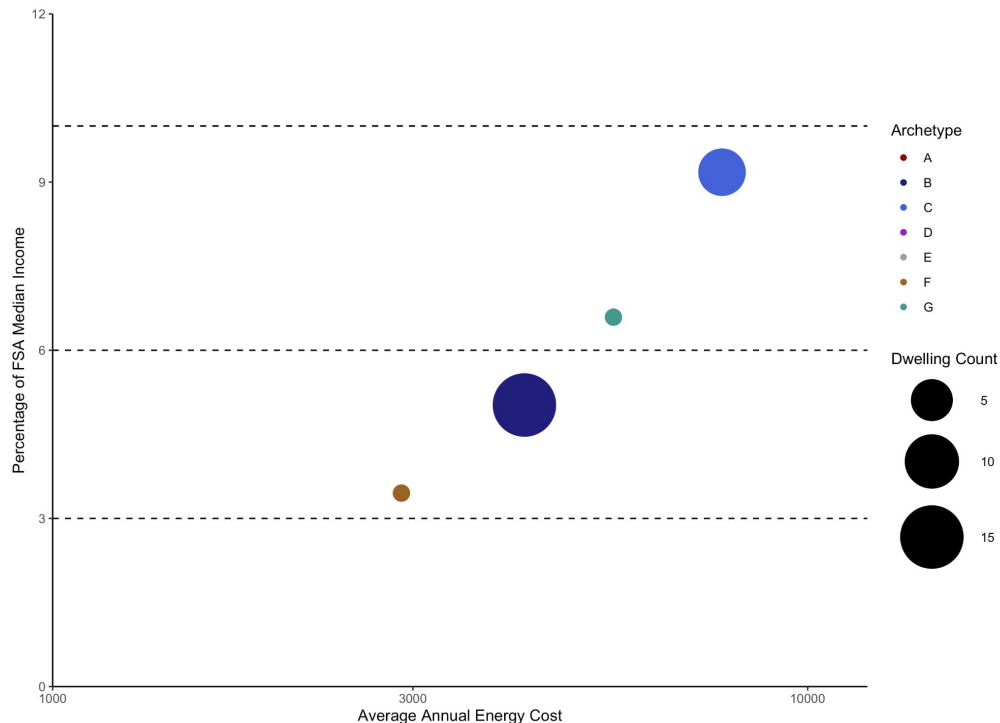


LOM - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line)

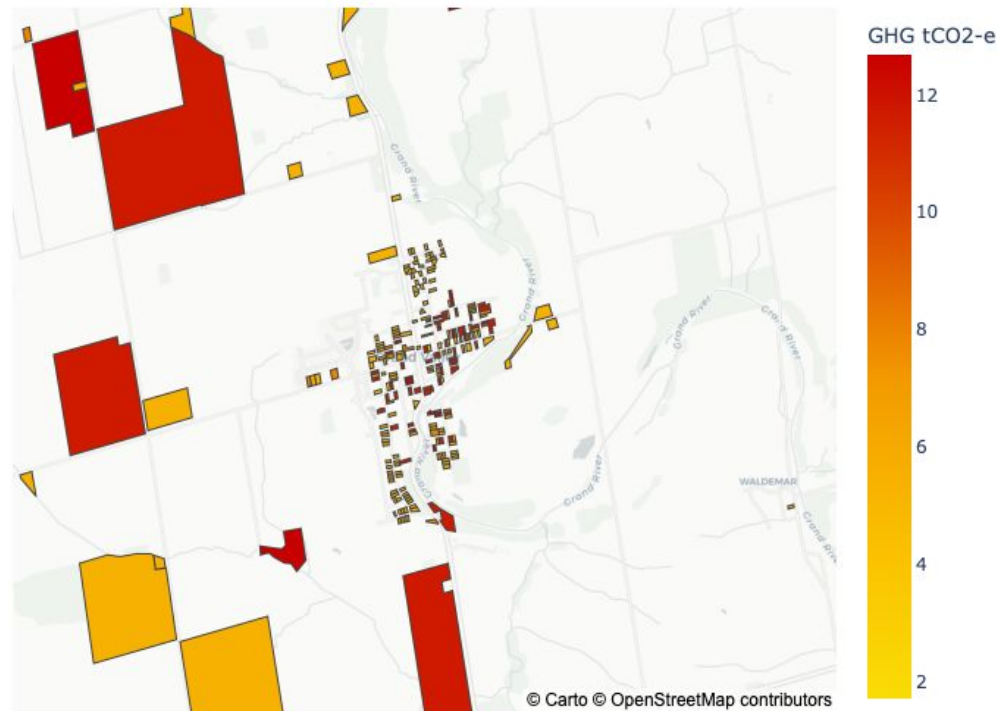
Archetype C has the burden above 3%, and accounts for 9.2% dwellings in LOM



LON Breakdown



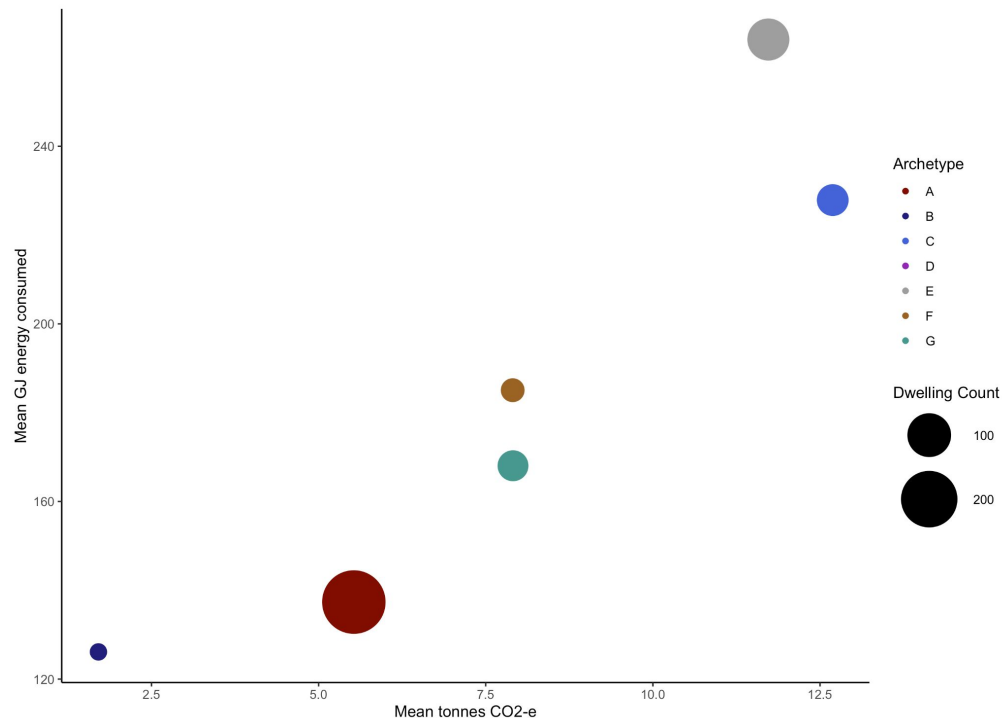
Total number of single family dwellings:	477
Annual median income (\$):	90,010
Average occupancy per dwelling:	2.8
Owner to renter ratio (%):	88
Total Energy Use (GJ):	82,493
Total tCO2e:	3,561



L0N - Carbon and Energy Average per Archetype

Archetype A accounts for 57% of the dwellings but only 42% of the carbon emissions in L0N.

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	272	37,359	1,503
B	16	2,018	27
C	41	9,343	520
E	89	23,500	1,044
F	21	3,886	166
G	38	6,386	300
Total	477	82,493	3,561

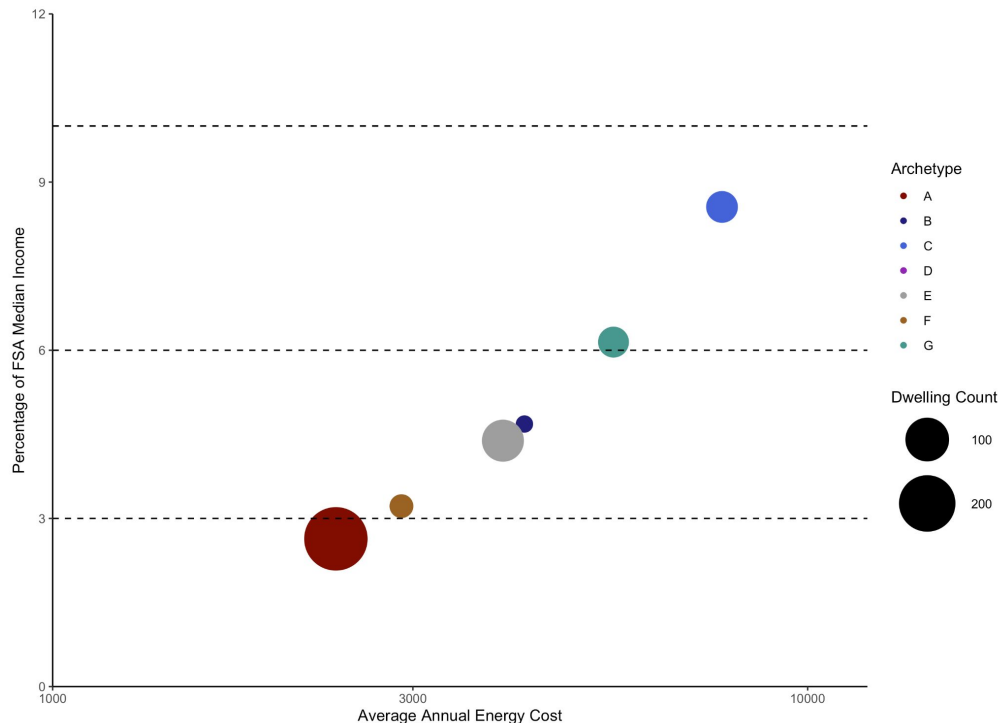


L0N - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line)

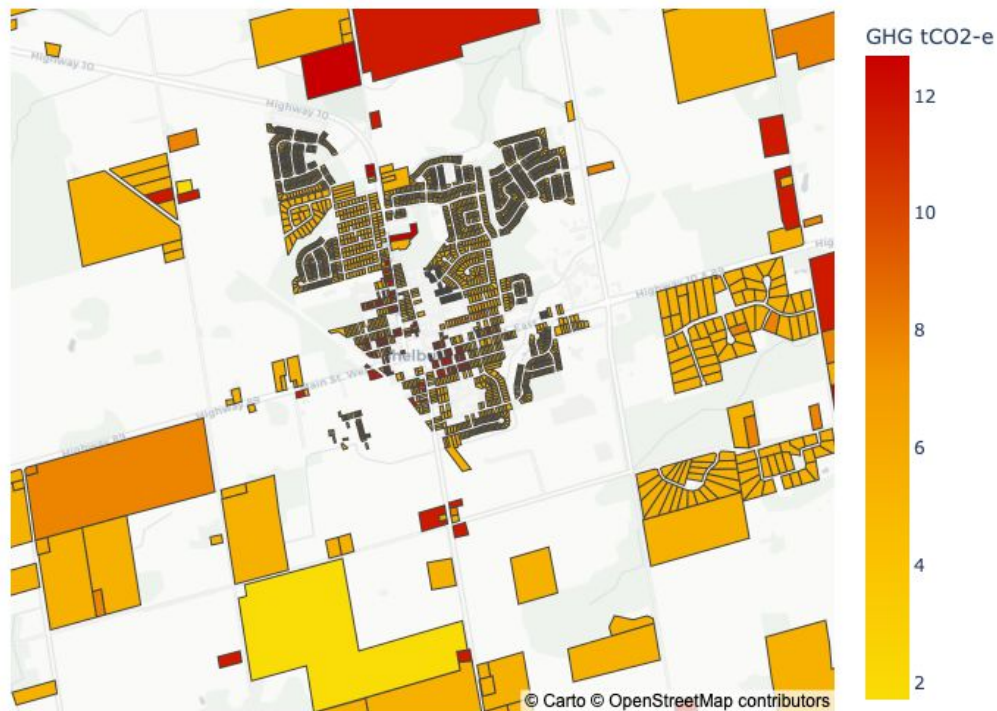
Archetype C has the burden above 3%, and accounts for 9.2% dwellings in L0N



L9V Breakdown



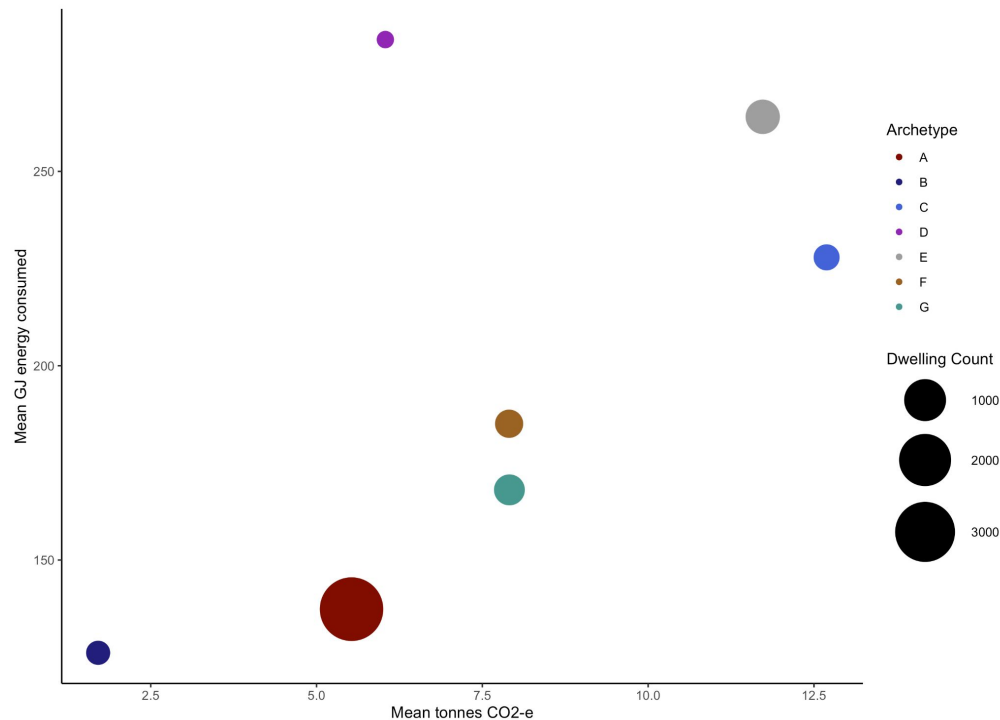
Total number of single family dwellings:	4,715
Annual median income (\$):	86,633
Average occupancy per dwelling:	2.8
Owner to renter ratio (%):	85
Total Energy Use (GJ):	737,812
Total tCO2e:	30,829



L9V - Carbon and Energy Average per Archetype

Archetype E accounts for 17% of the energy consumption in this FSA with only 10% of the dwellings.

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	3,529	484,707	19,505
B	78	9,838	133
C	127	28,941	1,612
D	2	568	12
E	478	126,215	5,606
F	197	36,458	1,557
G	304	51,087	2,404
Total	4,715	737,812	30,829

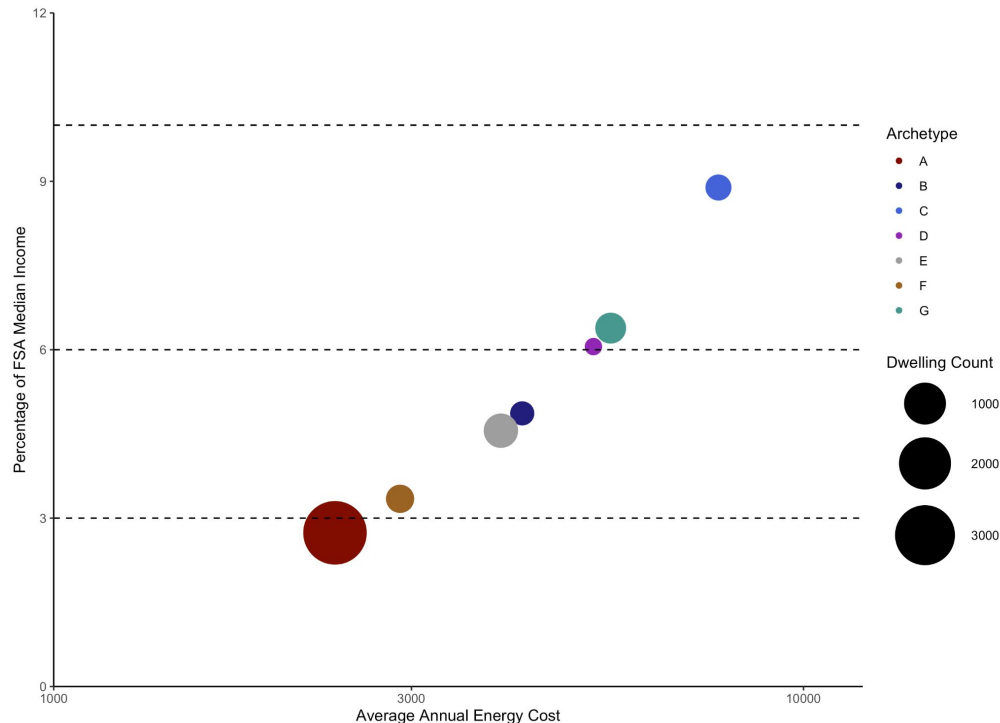


L9V - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line)

Archetype C has the burden above 3%, and accounts for 9.2% dwellings in L9V



L9W Breakdown



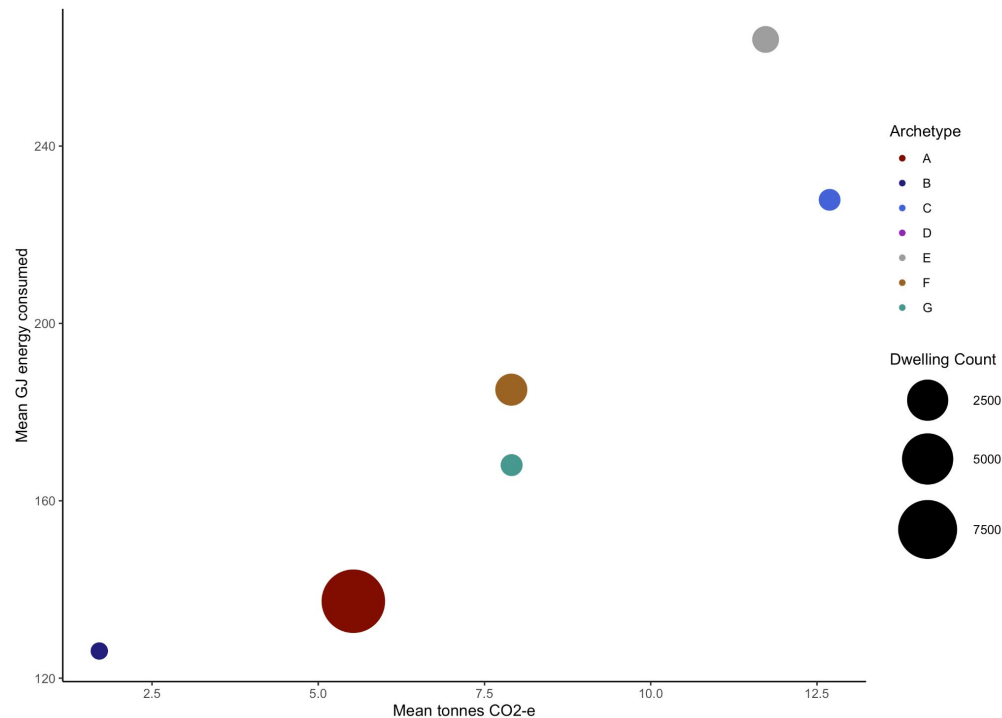
Total number of single family dwellings:	10,907
Annual median income (\$):	91,149
Average occupancy per dwelling:	2.8
Owner to renter ratio (%):	82
Total Energy Use (GJ):	1,612,349
Total tCO2e:	66,241



L9W - Carbon and Energy Average per Archetype

L9W accounts for $\frac{2}{3}$ of the emissions in Dufferin County, with archetype A being the most important.

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	9,227	1,267,325	50,999
B	37	4,667	63
C	122	27,802	1,548
E	421	111,164	4,937
F	972	179,882	7,682
G	128	21,510	1,012
Total	10,907	1,612,349	66,241

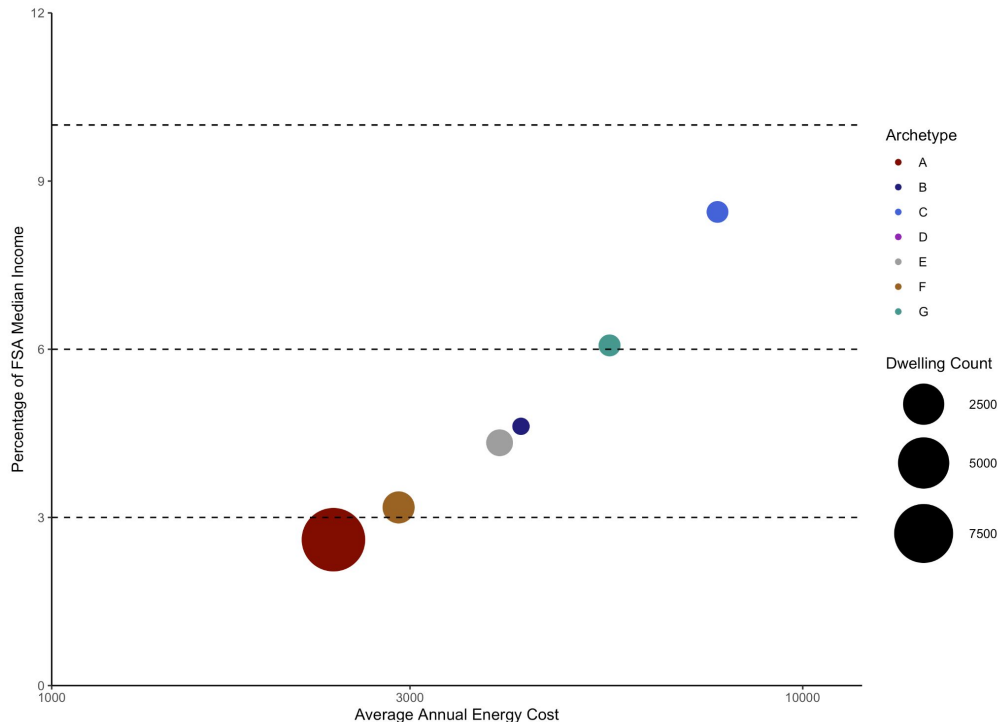


L9W - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line)

Archetype C has the burden above 3%, and accounts for 9.2% dwellings in L9W



References

- Emission factor
- <https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/2017-canadian-renewable-power/canadas-renewable-power-landscape-2017-energy-market-analysis-ghg-emission.html>
- Oil cost
- https://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=7&locationID=2&frequency=M&priceYear=2019&Redisplay=
- Propane cost
- https://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=6&locationID=66&locationID=2&frequency=W&priceYear=2019&Redisplay=
- Recommended R-value and U-value
- <https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about-energy-star-canada/energy-star-announcements/energy-starr-new-homes-standard-version-126/14178#a69>
- Poverty lines for Canadian Cities
- <https://www.canada.ca/en/employment-social-development/programs/poverty-reduction/reports/strategy.html>
-



Next Steps



Thank you.





Contact

James Riley
Lightspark Software
(778) 223-6745

james.riley@lightsparkinc.com



Supporting Slides

FSA Comparison

	L0M	L0N	L9V	L9W
Total number of single family dwellings:	24	477	4,715	10,907
Annual median income (\$):	83,937	90,010	86,633	91,149
Average occupancy per dwelling:	2.7	2.8	2.8	2.8
Owner to renter ratio (%):	84	88	85	82
Total Energy Use (GJ):	3,840	82,493	737,812	1,612,349
Total tCO₂e:	130	3,561	30,829	66,241

REPORT TO COMMITTEE

To: Chair Brown & Members of Infrastructure and Environmental Services Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **Mono Centre No Parking and Community Safety Zone**

In Support of Strategic Plan Priorities:

Good Governance (GG) - ensure transparency, clear communication, prudent financial management

Inclusive and supportive community (ISC) – support efforts to address current and future needs for a livable community

Purpose

The purpose of this report is to seek approval to amend a no parking zone and to include a community safety zone on Dufferin Road 8 for Mono Center in the Consolidated Traffic By-law 2005-32.

Background & Discussion

During the time of COVID-19, many visitors travelled to enjoy what Dufferin has to offer. Mono Center in particular was overwhelmed with visitors. This influx of tourists quickly transitioned into parking issues on Dufferin Road 8 (Mono Centre Road) and Town of Mono's roads around Mono Cliffs Park. Vehicles were parked in areas with very narrow shoulders and steep ditches, limiting the function of 2-way traffic and in some cases reducing roadways to a single lane.

The Consolidated Traffic By-law 2005-32 provides authority to the Director of Public Works to erect emergency No Parking signs in areas deemed appropriate. Over the past several months, this authority was utilized in the area noted above. This temporary measure was refined through active discussion with a Town of Mono working group that

involved Town staff, Park staff, an elected official, OPP, By-law enforcement, etc. The installation of temporary no parking signs was done quickly to help mitigate parking issues and hazards on Dufferin Road 8 around Mono Cliffs Provincial Park.

Parking issues along Dufferin Road 8 in the area being discussed are not solely an issue due to the recent influx of visitors. The same issue typically arises during other peak visitor seasons such as during the fall colours. Vehicles parking in the village have also historically interfered with snowplowing operations when parked along the roadside adjacent to narrow shoulders and snowbanks. This typically results in leaving limited space for snow removal equipment to safely and effectively maneuver.

Staff have monitored the temporary measures and recommend that the zone become permanent and the following no parking area be incorporated into By-law 2005-32.

Dufferin Rd.	From	To
8	A point at the Mono Centre intersection	A point situated 260 m south of the Mono Centre intersection
8	A point 130 m east of Mono Centre intersection	A point 170 m east of 3 rd Line Mono

During the investigation around the no parking zone, it was noted that the Community Safety Zone signs in Mono Centre are not included in the Consolidated Traffic By-Law. This is a housekeeping item as Council approved the Community Safety Zone on November 8, 2012. The currently signed zone continues to logical and it is recommended that this zone formally be added to the Consolidated Traffic By-Law 2005-32.

Dufferin Rd.	From	To
8	A point situated 250m South of the Mono Centre intersection	A point situated 380m east of the Mono Centre intersection.

Financial, Staffing, Legal, or IT Considerations

There are no costs associated with these additions to the consolidated by-law.

Recommendation

THAT Report, No Parking and Community Safety Zone -Mono Centre, dated June 23, 2022, from the Director of Public Works/County Engineer, be received;

AND THAT the Consolidated Traffic By-Law 2005-32, be amended, to include the following:

Schedule A – No Parking

Dufferin Rd.	From	To
8	A point at the Mono Centre intersection	A point situated 260 m south of the Mono Centre intersection
8	A point 130 m east of Mono Centre intersection	A point 170 m east of 3 rd Line Mono

Schedule I – Community Safety Zones

Dufferin Rd.	From	To
8	A point situated 250m South of the Mono Centre intersection	A point situated 380m east of the Mono Centre intersection.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

REPORT TO COMMITTEE

To: Chair Brown and Members of Infrastructure and Environmental Services Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **Orangeville West Environmental Assessment (EA)**

In Support of Strategic Plan Priorities and Objectives:

Sustainable Environment and Infrastructure (SEI)- protect assets both in the natural and built environment

Purpose

The purpose of this report is to update Committee and Council with respect to ongoing work related to the Orangeville West Environmental Assessment (EA).

This EA is related to ongoing development work west of the Town of Orangeville and is discussed in several prior reports to Committee, including: *OP Trust Lands Development – Update and EA*, dated April 28, 2022, and *Township of Amaranth Developments – Work within County Lands*, dated February 24, 2022.

Background & Discussion

As directed by County Council May 12, 2022, staff have been working with WSP Global to finalize terms to complete the necessary EA for the County Road network west of the Town of Orangeville. WSP is completing the County's Municipal Comprehensive Review which includes Dufferin's first Transportation Master Plan. Because of this, they are well positioned to complete the EA within a reasonable timeline that supports development in the study area (see attached study area figure). This project is comprehensive and includes a broad scope of work to be completed by a wide range of disciplines (see attached budget estimate and project task breakdown). All project details align with the requirements of the Municipal Class Environmental Assessment process that is structured to satisfy Ontario Regulation 345/93. The work includes a robust consultation and engagement plan, several areas of detailed environmental review, site specific reviews such as geotechnical investigations and topographic surveys, assessment of traffic

including the determination of all necessary infrastructure solutions, preliminary infrastructure design, etc.

Financial, Staffing, Legal and IT Considerations

The anticipated cost for all works will be funded through Development Charges, which is typical for this type of project. The total cost estimate is \$499,210 excluding taxes (see attached budget estimate and project task breakdown).

Recommendations:

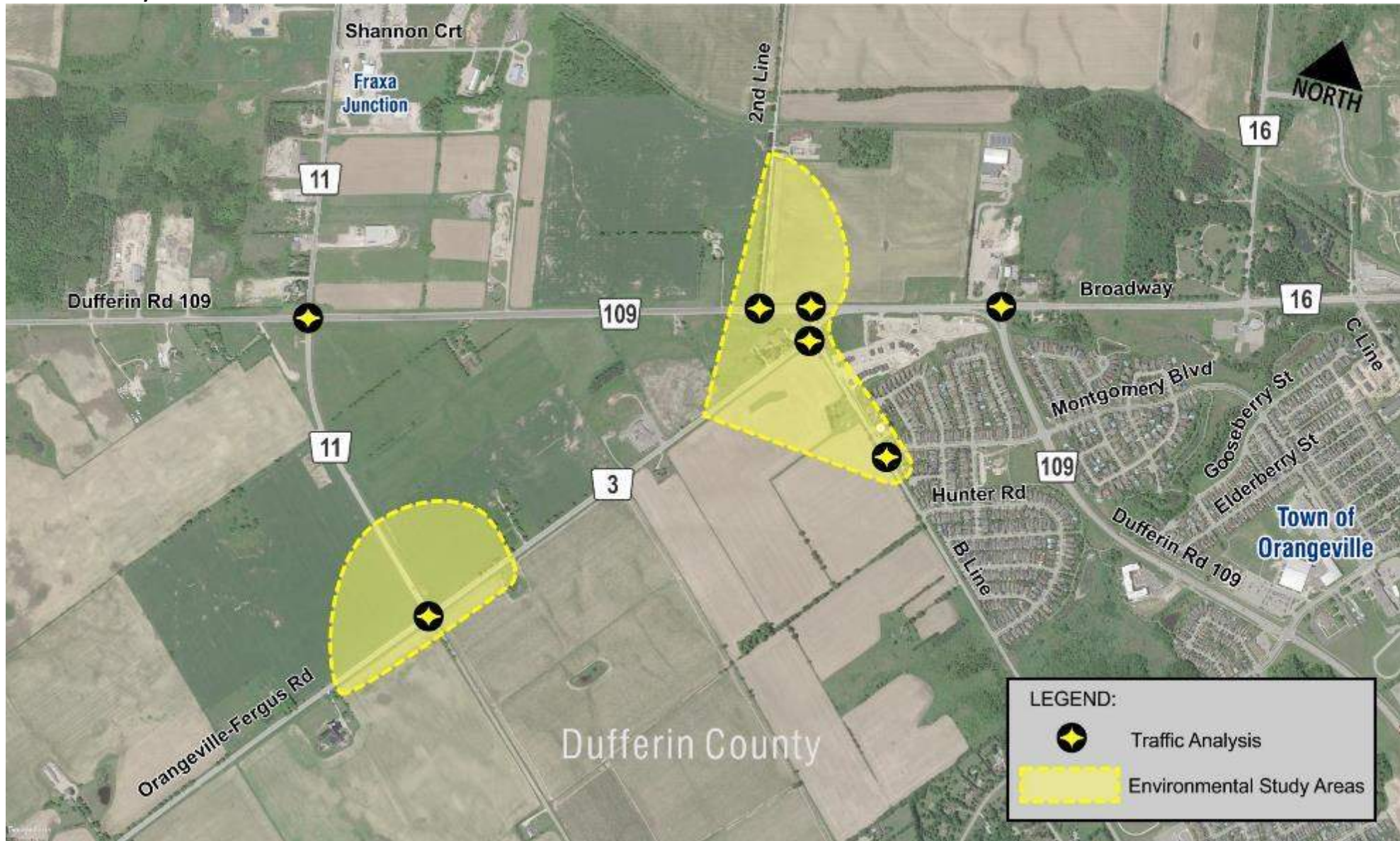
THAT Report, Orangeville West Environmental Assessment, from the Director of Public Works/County Engineer, dated June 23, 2022, be received.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

Attachment: WSP Environmental Assessment Budget Estimate& Project Tasks

Exhibit A – Study Area



5 BUDGET ESTIMATE

For the completion of this project, WSP's fees and expenses should not exceed the sum of **\$499,210** excluding applicable taxes. The budgeted amount does not constitute a fixed or maximum amount, but a budget estimate, and that the invoice will be prepared from the unit rates.

DISCIPLINE	TASK	FEES	EXPENSES	TOTAL
Environmental Planning & Project Management	Project Management and Meetings	\$63,030		\$63,030
	MCEA Process (i.e. Problem and Opportunity Statement, Alternative Solutions Table and Evaluation of Alternatives)	\$12,500		\$12,500
	Consultation Program	\$37,410	\$1,000	\$38,410
	Environmental Study Report	\$23,800		\$23,800
Ecology/Natural Environment	Environmental Impact Assessment Report	\$30,070	\$800	\$30,870
Geotechnical Investigation	Geotechnical Desktop Study Report	\$5,750		\$5,750
Geoscience (Contamination Overview Study)	Contamination Overview Study	\$10,550	\$1,520	\$12,070
Socio-Economic	Socio-Economic Memo	\$8730		\$8730
Archaeology	Stage 1 Archaeology Report	\$5,380	\$120	\$5,500
Cultural Heritage	Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment	\$8,470	\$120	\$8,590
Air Quality	Air Quality Impact Assessment and Emission Summary Dispersion Modelling Report	\$12,180		\$12,180
Noise	Acoustic Assessment Report	\$15,460	\$150	\$15,610
Tree Inventory	Tree Inventory and Assessment and Tree Management Plans	\$8,660	\$300	\$8,960
Hydrogeology / source water protection	Desktop Hydrogeological Assessment Report	\$10,020	\$3,500	\$13,520
Traffic	Traffic Analysis Summary Memo	\$49,620	\$4,000	\$53,620
Utilities (sub consultant)	Utility Drawings & Report – Level C Scope	\$26,000		\$26,000
Agriculture (sub consultant)	Agricultural Impact Assessment	\$19,900		\$19,900
Topographic Survey (sub consultant)	Topographic Plan	\$49,500		\$49,500
Municipal Roads	Preliminary Design Plan	\$67,920	\$200	\$68,120
Drainage	Drainage and Stormwater Management Report	\$22,100	\$450	\$22,550
Total		\$487,050	\$12,160	\$499,210

REPORT TO COMMITTEE

To: Chair Brown and Members of Infrastructure and Environmental Services Committee

From: Scott C. Burns, Director of Public Works/County Engineer

Meeting Date: June 23, 2022

Subject: **Dufferin Courthouse – Historic Courtroom Repairs Update and Costing**

In Support of Strategic Plan Priorities and Objectives:

Good Governance - ensure transparency, clear communication, prudent financial management

Sustainable Environment and Infrastructure (SEI)- protect assets both in the natural and built environment

Purpose

The purpose of this report is to inform Committee and Council of the architectural investigation results, repair recommendations, and opinion of cost to restore the aged plaster and moulding within the historic Courtroom 204 of the County Courthouse.

Background & Discussion

As indicated in a previous report to Committee, *Dufferin Courthouse – Historic Courtroom Repairs*, deteriorated plaster ceilings and mouldings were observed in Courtroom 204. Initial Architectural reviews recommended undertaking detailed investigations.

The detailed investigations included a designated substance survey (DSS) of the existing material compositions and an in-depth architectural review of the existing plaster and moulding conditions.

The DSS was completed by Pinchin Environmental, the results of the DSS indicate the presence of lead within the Courtroom paint finishes. This was anticipated based on the age of the finish and typical methods used during that particular time period. Lead

remediation methodologies and techniques will need to be incorporated in any repair procedure.

VG Architects completed an in-depth Architectural review utilizing three specialized scaffold access towers. A condition assessment was conducted to the underside of the plaster ceiling, perimeter coves, and mouldings.

The review determined the following immediate needs and next steps:

- The “in-fields” or flat plaster ceilings between the decorative beam structures are in various states of complete delamination to some minor cracking. The recommendation is to repair or replace these areas.
- The perimeter coves are all cement plaster on wood lath and at multiple locations plaster deterioration, delamination and cracking has been observed in various states. The recommendation is to replace the plaster cove.
- The decorative perimeter beam at the top of the plaster cove on the upper ceiling are partial plaster (lower section) and partial painted wood (upper section) The plaster portion of this is questionable based on the sections that have come down. The wood sections seem solid. Only minor refinishing is suggested.
- The interior decorative beams are painted wood and seem solid. Only minor refinishing is suggested.
- The plaster recessed cove area behind the judge (at the location of the painted crest) significant cracking / delamination of the plasters was observed. Partial plaster repair / replacement will be required.
- Most of the plaster walls areas, with the exception of some plaster wall & plaster moulding deterioration due to moisture damage, seem solid but do show some sign of age and suggest to re-finish with minor plaster repairs.

As a result of the above recommendations, the development of repair design and construction documents will need to be completed in consultation with the Ontario Heritage Trust. As for estimated costs for the work, VG Architects has provided an opinion of cost that totals \$824,000 excluding taxes. This estimate speaks to several items including all necessary plaster ceiling and cove repair work, scaffolding, a \$100,000 contingency for unanticipated work as well as a designated substance removal cost estimate of \$100,000. It is important to note that the current scope of work and its associated estimated cost of \$824,000 will simply bring the courtroom back to its original state.

Due to the significant estimated cost of the project, staff recommend performing further discussion and review to determine whether other improvements could be made to the space in conjunction with the restoration work. This will involve consultation with stakeholders including leaseholders and the Ontario Heritage Trust. This approach will

aim to facilitate proper budgeting for the project at a future date for further consideration of Council. Following this consultation, staff will work with VG Architects to complete the necessary repair, design, and construction documents.

In the meantime, staff have and will continue working with leaseholders to ensure that interim measures are in place to enable their activities to continue.

Financial, Staffing, Legal, or IT Considerations

Costs related to repair and remediation are not included in the approved budget and are estimated at a cumulated total of \$824,000 for all items described in this report.

Following stakeholder consultation, a final project budget will be prepared. Depending on the final proposed scope of work, cost sharing scenarios with leaseholders may result.

Recommendations:

THAT Report, Dufferin Courthouse – Historic Courtroom Repairs Update and Costing, dated June 23, 2022, from the Director of Public Works/County Engineer, be received.

Respectfully Submitted By:

Scott C. Burns, P.Eng., C.E.T.
Director of Public Works/County Engineer

REPORT TO COMMITTEE

To: Chair Brown and Members of the Infrastructure & Environmental Services Committee

From: Sonya Pritchard, Chief Administrative Officer

Date: June 23, 2022

Subject: **Strategic Action Plan June 23, 2022 Progress Update – IES Objectives**

In support of Strategic Plan Priorities and Objectives

Good Governance - ensure transparency, clear communication, prudent financial management

Purpose

The purpose of this report is to provide committee members with a progress update of the strategic objectives that fall within the oversight of the Infrastructure and Environmental Services Committee and to provide additional detail on the actions planned to achieve those objectives.

Background & Discussion

At the December 17, 2020 Council meeting the Strategic Action Plan 2021-2022 was adopted by Council. This plan identifies 56 specific actions that support the 5 key strategic priorities areas that were adopted in June 2019:

- *Economic Vitality* – promote an environment for economic growth and development;
- *Good Governance* - ensure transparency, clear communication, prudent financial management;
- *Sustainable Environment and Infrastructure* - protect assets both in the natural and built environment;
- *Service Efficiency and Value* - determine the right services for the right price;
- *Inclusive and supportive community* – support efforts to address current and future needs for a livable community

The Director of Public Works is the designated Department Head for 15 specific action items across the key priority areas Sustainable Environment and Infrastructure; Service Efficiency and Value; and Inclusive and supportive community. The attached chart provides a progress update as of June 2022.

There has been significant progress made on a number of the strategic action plan initiatives and work continues on those behind schedule. Many of the delays are as a result of capacity constraints and delays around recruiting. In other instances projects and initiatives have seen less progress as staff pivot to deal with other priorities.

Staffing, IT, and Legal Considerations

Many of the initiatives require support from IT, corporate finance, procurement, and human resources necessitating ongoing planning and collaboration.

Financial Impact

The cost of all the initiatives with a 2022 timeframe have been allocated within the current-year budget.

Recommendation

THAT the report of the Chief Administrative Officer, regarding the Strategic Action Plan – IES Objectives, dated June 23, 2022, be received.

Respectfully submitted,

Sonya Pritchard, CPA, CMA
Chief Administrative Officer

Attachments:

Strategic Action Plan June 2022 Progress Update – IES Chart

Strategic Action Plan June 2022 Update - IES

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
Sustainable Environment and Infrastructure (SEI) - protect assets both in the natural and built environment					
SEI 1 Advancing Climate Change Policies and Planning					
SEI 1.1 Apply a climate lens to all policy and decision making <ul style="list-style-type: none"> Develop guideline document and training for staff to incorporate climate considerations into committee reports; Provide training to staff and Council 	Cost TBD depending on policy to be implemented. Policies that result in meaningful changes and infrastructure upgrades are projected to be significant.	Q2-Q3 2021/ Ongoing	Director of Public Works/Climate staff, inter-department collaboration	TBD	Research ongoing on municipal best practices.
SEI 1.2 Create Corporate Climate Action Plan <ul style="list-style-type: none"> Update and expand existing Energy Conservation & Demand Management Plan 	Minimal – staff time	Ongoing, complete in Q1 2022	Director of Public Works/Climate Staff, Inter-Departmental Climate Change Working Group (IDCCWG), All Staff	Low Cost	Preliminary work being done to acquire Energy Management software to inform the Energy Conservation and Demand Management Plan to begin Q4 2022.
	Within current budget			Medium Impact	

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
<ul style="list-style-type: none">Conduct corporate climate risk assessment					Community Climate Risk and Vulnerability Assessment is complete and will inform Corporate Climate Risk Assessment.
SEI 1.3 Develop Electric Vehicle Policy/bylaw for public, staff and fleet vehicles	Minimal – staff time	Q2-Q3 2021	Director of Public Works/Climate staff, Council	Low Cost	Completed
	<ul style="list-style-type: none">Draft policy and engage staff on local bylaw considerationsPresent and adopt policy and bylaw			Medium Impact	
SEI 2 Invest in Climate Action Education and Engagement Initiatives					
SEI 2.1 Community engagement strategy	\$75,500 (salary, benefits, training, software, etc.)	Develop in 2021, then ongoing	Director of Public Works/Climate Engagement Specialist, community volunteers, IT	Low Cost	Work is ongoing as planned.
<ul style="list-style-type: none">Hire Climate Engagement Specialist (Q1)					Climate Engagement Specialist hired in Q1 2021 and community

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<ul style="list-style-type: none"> Develop targeted sector-specific education initiatives Maintain presence online presence on platforms: social media, website Hold virtual events, exhibits, trainings <ul style="list-style-type: none"> Start community engagement on Climate Action Plan (Q2); Develop targeted trainings/events (Q3); Deliver and revise (Q4) 	Tax Levy			Medium Impact	engagement work ongoing.
SEI 2.2 Develop climate action education strategy for training for staff <ul style="list-style-type: none"> Education on climate change Energy efficiency training 	Staff time, \$10,000 specialized training	2021, then ongoing	Director of Public Works/Climate staff, County Staff, potential paid external training partners	Low Cost	Energy efficiency training with Dufferin County Facilities Staff and local municipal staff complete; Climate Lens work ongoing; training content development for other staff
	Tax Levy			Medium Impact	

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
<ul style="list-style-type: none"> Facility staff training on energy (Q1); Plan expansion to other departments and community (Q2-Q3) 					has begun and expected to roll out in Q4 2022
SEI 3 Implement Dufferin Climate Action Plan Initiatives					
SEI 3.1 Invest in community energy retrofit and efficiency program <ul style="list-style-type: none"> Complete feasibility study regarding housing stock and market analysis for program uptake (Q2) Develop placeholder model LIC (Local Improvement Charge) bylaw (Q2) Evaluate internal capacity and policies to take on program (Q3) 	Initial capital for loans upfront (2022) - \$600,000+ (potential for return on investment)	2021 to 2025	Director of Public Works/Climate staff, local municipalities, FCM, AMO, other external partners,	Medium Cost	Feasibility Study complete. Draft Program design complete. Local municipal engagement work to commence in Q3 2022.
	Tax Levy and/or External Funding			Medium Impact	

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
<ul style="list-style-type: none"> Investigate funding opportunities and external partnerships to ease potential capacity issues (Q3) 					
SEI 3.2 Support electrification of transportation <ul style="list-style-type: none"> Install, <i>Charge Up in Dufferin</i> public EV station network (Q2-Q4) Evaluate and monitor use of EV Stations Explore enhancement of electrical vehicle network within the County and regionally Conversion of fleet to electric vehicles to align with future capital work plan Develop EV educational campaign (Q3) 	\$215,000 for EV stations	2021-2022	Director of Public Works/Public Works, Climate staff, Hydro utilities, partner municipalities	Medium Cost	Installation of EV stations ongoing and on schedule for completion in Q4 2021. Other initiatives ongoing as planned.
	Federal Gas Tax and Government Contributions			Medium Impact	Charge Up in Dufferin network of 24 EV charging stations installed in Q4 2021 and monitoring of station use ongoing. EV education campaign scheduled for Q3 2022 Feasibility Study for regional electric vehicle charging station network with City of Guelph and Counties of Wellington Grey, Perth, Huron and

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					Bruce complete. Design implementation ongoing.
SEI 3.3 Support conservation and rehabilitation of ecological systems <ul style="list-style-type: none"> Develop Natural Asset Inventory (Q1) and valuation of Municipal Natural Assets Support flood mitigation projects <ul style="list-style-type: none"> Investigate development of natural asset management plan (Q2-Q3) 	\$2,500 for Natural Asset Inventory, Staff support	Inventory developed in Q2 2021, then ongoing	Director of Public Works/Climate staff, local municipalities, Conservation Authorities, Municipal Natural Asset Initiative (MNAI), other external partners	Low Cost	Interactive online dashboard complete, with final report from MNAI received in Q3.
	Within current budget			Medium Impact	Next steps include consultation with Finance to incorporate natural assets into existing asset management plans as required by Province by 2024.
SEI 3.4 Develop education partnership with agricultural community/partners to	Minimal (staff time)	Q3 2021, extend to 2022	Director of Public Works/Climate Staff, Headwaters Communities in	Low Cost	Work ongoing further project assessment continues into Q2 2022.

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support long-term climate friendly practices and knowledge sharing <ul style="list-style-type: none"> Partner with community organizations to deliver targeted projects 	Dependent on additional staff		Action (HCIA), Town of Caledon, Conservation Authorities, Academia	Medium Impact	Launched Experimental Acres Farm Pilot in Q1 2022 in collaboration with County of Wellington and Our Food Future. Review of Dufferin Rural Water Quality Program with climate lens scheduled for Q3.
SEI 4 Maintain Infrastructure					
SEI 4.1 Implement Asset Management plan <ul style="list-style-type: none"> Develop inventory of all assets Define roles and responsibilities Update processes to ensure ongoing maintenance and long term replacement of assets 	\$50,000 Asset Management Reserve, Rate Stabilization Reserve	Q2-Q3 2021, extend into 2022	Director of Public Works/Finance, Facilities, Public Works, consultants	Low Cost High Impact	<ul style="list-style-type: none"> Lead by Treasury and consultant is on board. Road/bridge asset inventory complete Facilities asset inventory ongoing through special internal assignment
Service Efficiency and Value (SV) - determine the right services for the right price					

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
SV 3 Improve Fleet Management					
SV 3.1 Consolidate fleet management of all vehicles under Public Works <ul style="list-style-type: none"> • Get staffing in place (see SV4) • Standardize maintenance requirements/schedules <ul style="list-style-type: none"> • Create stakeholder group (Q1) • Develop corporate wide policies (Q2-3) • Coordinate and optimize usage to refine and right-size fleet assets (Q2-4) <ul style="list-style-type: none"> • Assess how and when vehicles are used across the organization 	Minimal upfront. Additional cost for software set up, data collection, policy and procedures	2021, extended into 2022	Director of Public Works/Public Works Staff	Low Cost	Have successfully received funding to assist with the work on fleet management. Timelines have been revised on this project with a projected completion date of December 2022 to respect the February 2023 deadline.
	Within current budget Applied for funding - \$75,000 (65% provincial, 35% municipal cost share)			Medium Impact	

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
<ul style="list-style-type: none"> Identify opportunities for shared vehicles Implement Fleet software <ul style="list-style-type: none"> Install GPS on all vehicles (Q1) <p>Investigate an implement software to track maintenance, inspections, licensing, usage (Q4)</p>					
SV 4 Enhance operations capacity (previously described as optimize Winter Control Resources)					
<p>SV 4.1 Address capacity issues in operations and improve procedures (updated from Hire technician)</p> <ul style="list-style-type: none"> Hire Operations Technician (Q2) (supports SV3.1) Collect and analyze traffic and collision 	\$101,700 includes salary and benefits, training, software, etc.	2021 work extended into 2022	Director of Public Works/Operations Staff, HR	Low Cost	Operations Assistant Manager hired and working to familiarize with general operations and tasks listed.

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data to propose road safety remedies <ul style="list-style-type: none"> • Develop standard procedures to source and collect data (Q 2-3) • Develop procedures to analyze traffic and collision data (Q 2-3) • Contract management of annual contracts <ul style="list-style-type: none"> • Update procedures • Risk management in relation to insurance claims <ul style="list-style-type: none"> • Update procedures • Succession planning for anticipated future retirements 	Tax Levy, over time will produce savings as a result of risk mitigation strategies			Medium Impact	
SV 5 Development of KPIs and SLAs					

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
SV 5.1 Specifically Engineering and Facilities Divisions <ul style="list-style-type: none"> Identify specific areas of focus <ul style="list-style-type: none"> Assemble a team of stakeholders required to define the terms of reference for a Request for Proposal (RFP) that includes developing and tracking KPIs and SLAs. (Q1) Finalize the Request for Proposal (RFP) document. Review submissions and select a Consultant. Timing will be dependent on the availability of Procurement staff (Q2/Q3) 	\$25,000 - \$50,000 staff time or consultant	2021, delayed until 2022	Director of Public Works /consultant, Engineering and Facilities staff	Low Cost	RFP development underway. Completion timeline set for late June 2022.
	Rate Stabilization Reserve			Medium Impact	

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<ul style="list-style-type: none"> • Work with the successful proponent to develop KPIs and SLAs for both the Facilities and Engineering Divisions of Public Works. • Develop indicator concepts (Q3) • Define targets (Q3) • Implement recommendations provided in the Consultants final report. (Q4) • Track progress and report back on results 					
SV 6 Review Facilities Management Service Model					

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
SV 6.1 Review existing scope of services provided and identify which, if any, could be provided through alternative means, allowing Facilities staff to focus on greater value-add services. (To be completed following SV 7 Assessment of Property and Space needs.) Areas of review include: <ul style="list-style-type: none"> • Renovations • Janitorial services • Winter and Summer maintenance • Housing superintendents • Building maintenance • In-Suite & corporation maintenance 	\$25,000 for consultant/ Future impact of service model changes TBD	2022	Director of Public Works /consultant, Facilities staff	Low Cost	Business Management review is complete. In process of reviewing final report and recommendations.
	Rate Stabilization Reserve			Medium Impact	

Item	Estimated Cost/ Funding Source	Timeline	Designated Department Head/Others	Cost/ Impact Evaluation	June 2022 progress update
<ul style="list-style-type: none"> Resident monitoring Asset management Security and monitoring Dufferin Oaks campus reactive vs proactive maintenance 					
Inclusive and supportive community (ISC) – support efforts to address current and future needs for a livable community					
ISC 4 Implement Options for Public Transit Options					
ISC 4.3 Transit Hub Edelbrock Centre <ul style="list-style-type: none"> In consultation with Town of Orangeville Identify issues to be considered when determining design and site location 	None	2021 extended to 2022	Director Public Works/ Director Community Services, Town of Orangeville	Low Cost	Collaboration continues with Town of Oville staff. Awaiting MOU/ground lease document from legal.



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June 7, 2022

RE: ONTARIO CLIMATE CAUCUS

At the meeting held on June 1, 2022, Council of the Township of Mulmur passed the following resolution regarding the Ontario Climate Caucus.

Moved by Boxem and Seconded by Clark

WHEREAS Mulmur has officially joined the Ontario Climate Caucus to gain best practices and access to case studies;

AND WHEREAS Mulmur acknowledges that climate awareness is important to all citizens;

NOW THEREFORE BE IT MOVED that Mulmur encourage all municipalities in Dufferin to consider joining the Ontario Climate Caucus.

AND FURTHER THAT a copy of this resolution be forwarded to all municipalities in Dufferin County.

CARRIED.

Sincerely,

Tracey Atkinson

Tracey Atkinson, CAO/Clerk/Planner
Township of Mulmur