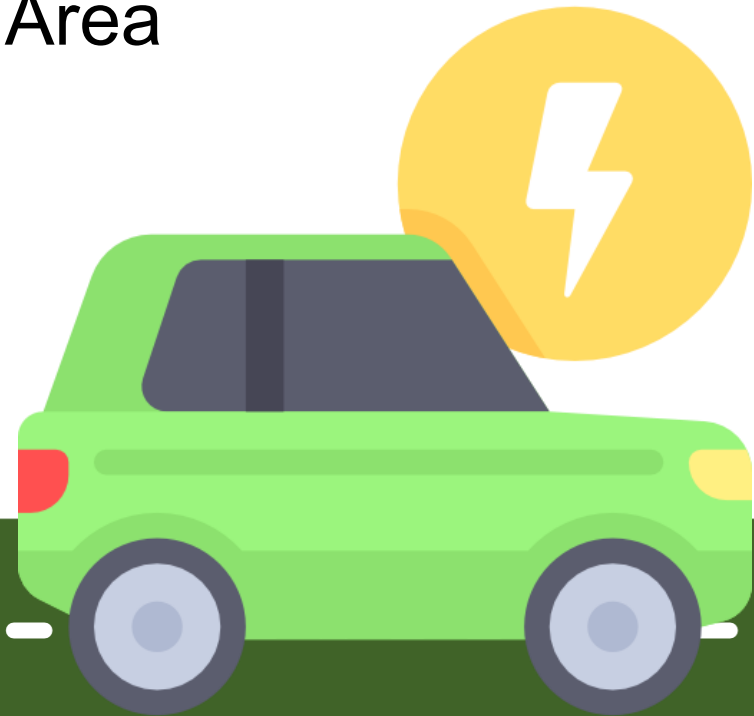


EV Ready Cities: Accelerating the Transition to Electric Mobility

A Greater Toronto Hamilton Area
Case Study



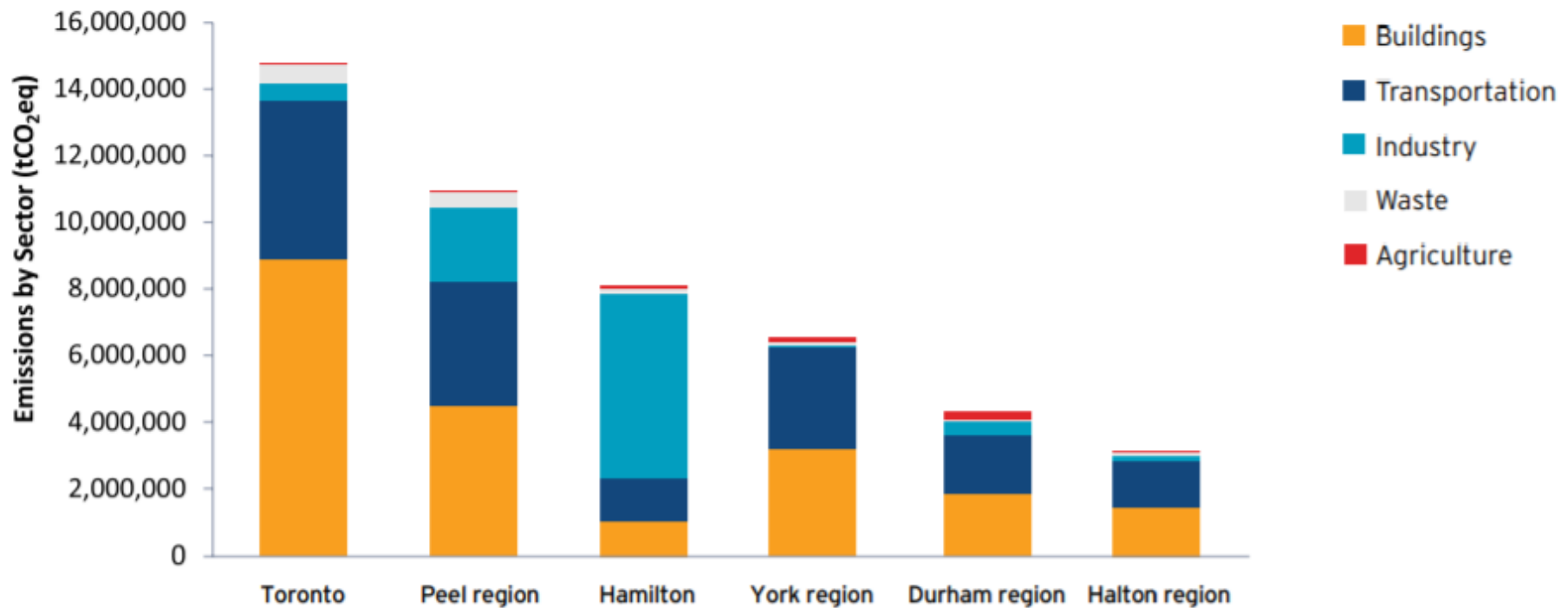
Nathaniel Magder



Jenessa Doherty

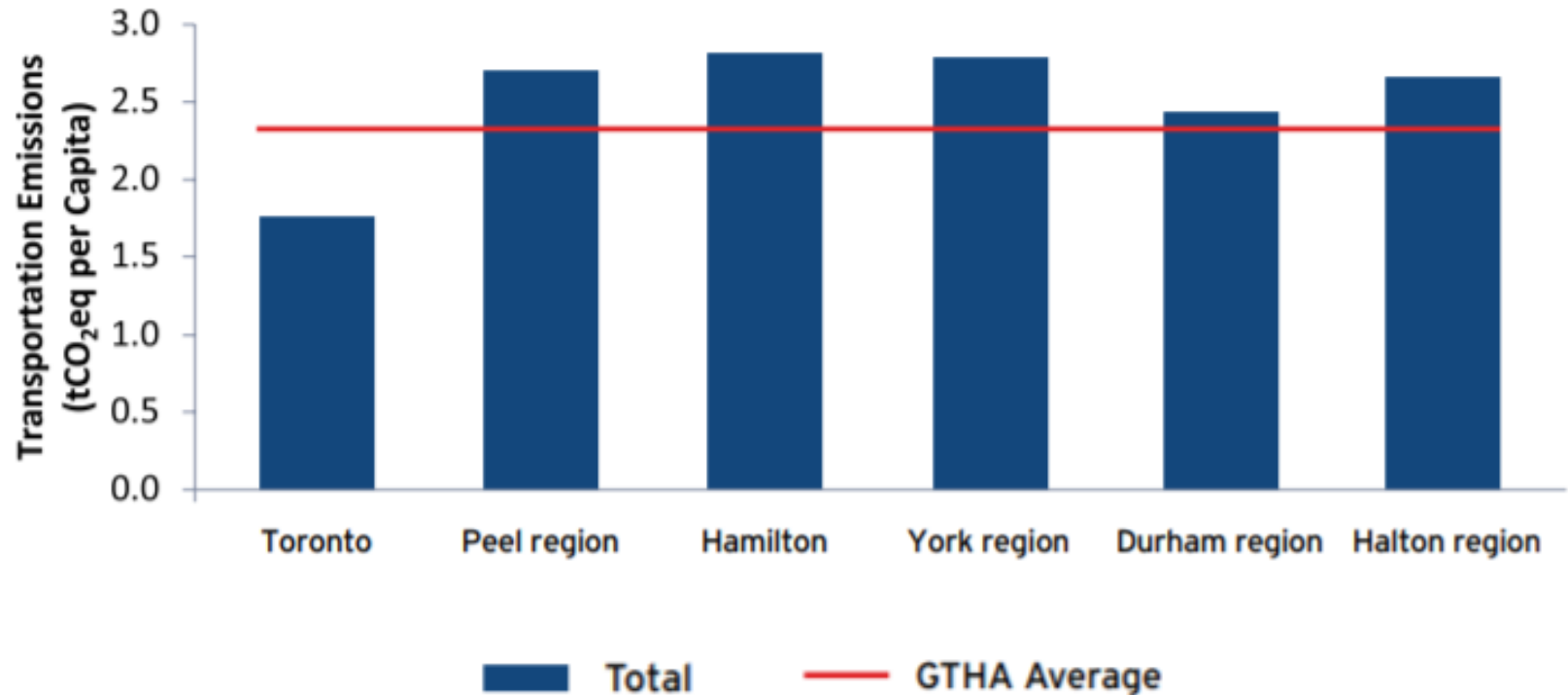


GHG Emissions by Sector and Municipality (2015)



Source: The Atmospheric Fund. (2018, July). Keeping Track: 2015 Carbon Emissions in the Greater Toronto and Hamilton Area

Transportation Emissions per Capita by Municipality



Source: The Atmospheric Fund (2018, July). Keeping Track: 2015 Carbon Emissions in the Greater Toronto and Hamilton Area

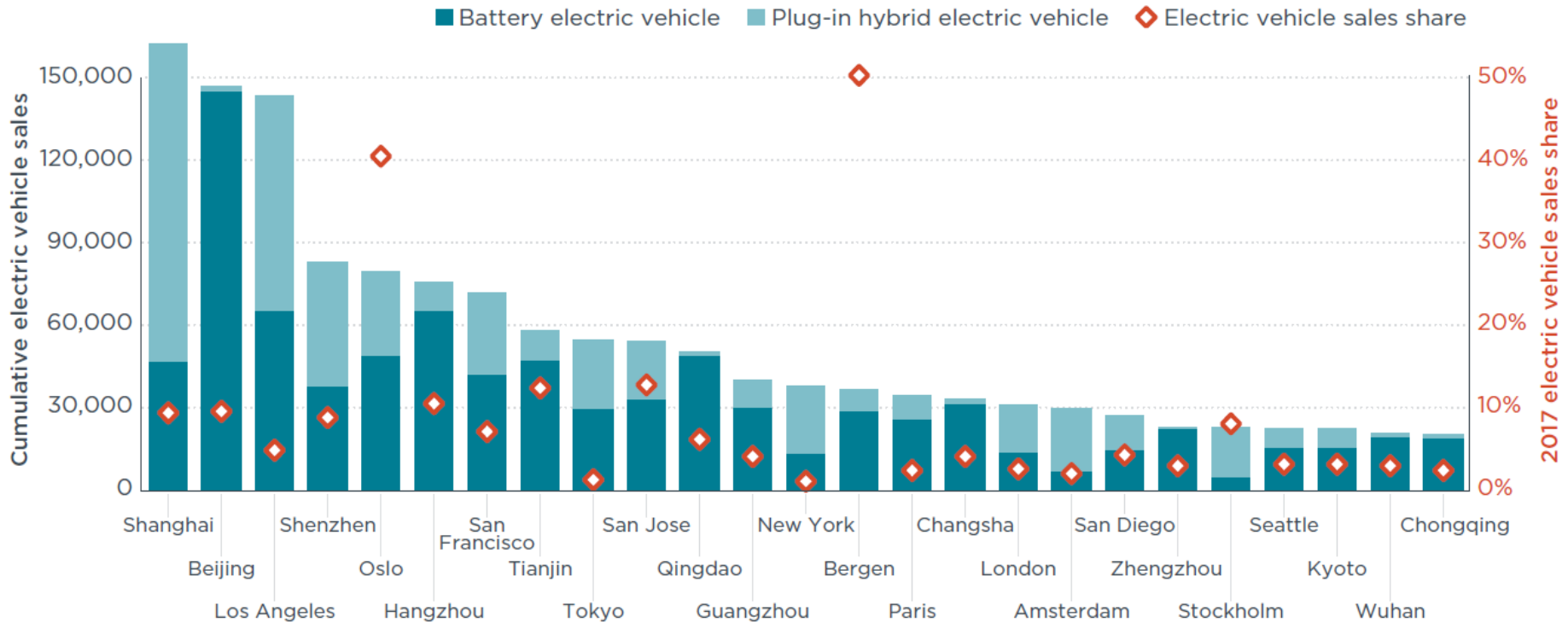
Cities to Learn From



City	Target
Amsterdam	Zero-emissions transport within the city by 2025
London	70,000 ultra-low emission vehicles sold by 2020; 250,000 by 2025
Los Angeles	10% of vehicle stock electric by 2025; 25% electric by 2035
New York City	20% electric vehicle sales share by 2025
Oslo	Zero-emissions transport within the city by 2030
Shenzhen	120,000 new energy vehicles sold by 2020
Tianjin	30,000 new energy vehicles sold by 2020

Source: The International Council on Clean Transportation (Nov. 2017). Electric vehicle capitals of the world: What markets are leading the transition to electric?

TOP 25: Electric Vehicle Sales and Market Sales Shares (2017)



Source: The International Council on Clean Transportation (October, 2018). Electric vehicle capitals: Accelerating the global transition to electric drive

Types of Intervention

- 1) Incentives
- 2) Infrastructure
- 3) Partnerships
- 4) Education/Awareness
- 5) Municipal Fleet



Incentive-Based Intervention



FINANCIAL

- Municipal rebates (Laval)
- Reduced/Free parking fees for EVs (Norway)
- Exemption from toll roads (Norway)

NON-FINANCIAL

- Supporting building/parking codes (London, UK)
- Access to HOV lanes (California)
- Residential parking permit priority for EV users (Amsterdam)
- Enforcement of EV designated spaces

Infrastructure-based Intervention



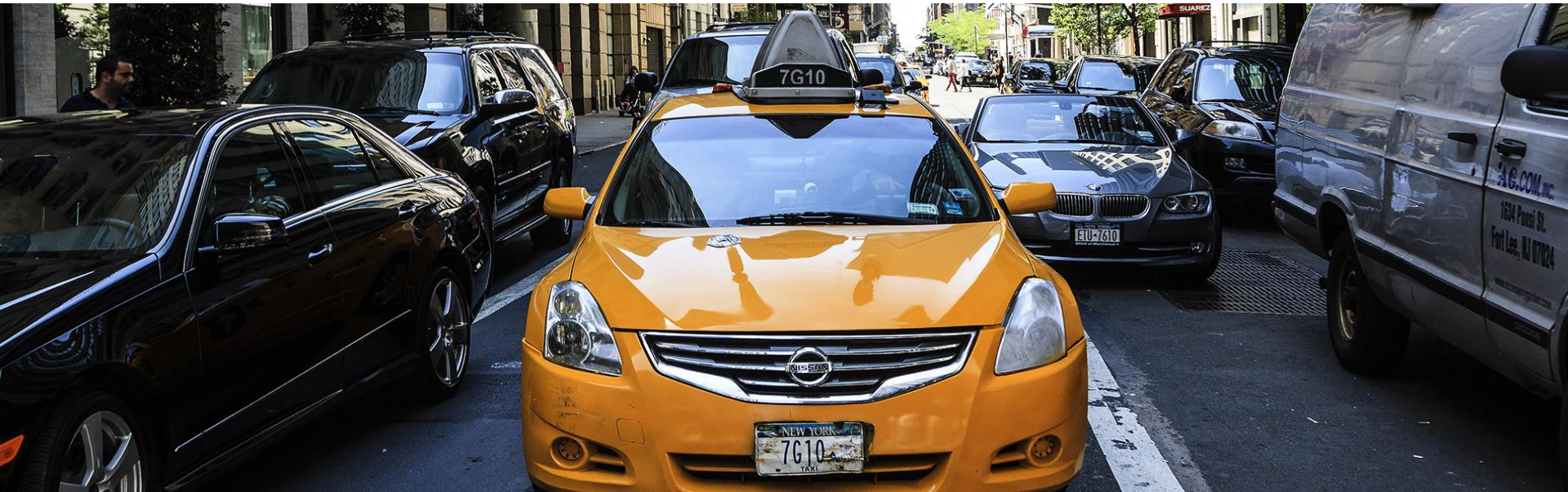
- City property chargers
- Streetlight chargers
- Residential construction and upgrades
- Portable chargers
- Working groups
- **Ex: Amsterdam, Vancouver**



Partnership-based Intervention



- Car-share programs
- City contract preference
- Taxi and ride-share programs
- **Ex: Beijing, London**



Education/Awareness-based Intervention

- Community education and discussion
- Transparency and open dialogue
- Mobile apps (charging station maps, fee trackers, carbon savings)
- Report Cards (assess existing policies,
- **Ex: Vancouver**



Municipal Fleets

- City-owned vehicles (public transportation, city vehicles, parks & rec, etc.)
- Ex: Vancouver



Model Cities' Interventions

Model Cities		Amsterdam	Atlanta	Chicago	Copenhagen	Denver	London	Los Angeles	New York City	Oslo	Paris	Portland	San Diego	Vancouver	Example	
Incentives	Subsidies for the General Public						✓			✓	✓				Paris provides a tax rebate of up to \$2,464 for the installation of a home charger.	
	Subsidies for Business	✓		✓	✓					✓	✓				US \$14 million funded through the Chicago Department of Transportation and resources from the federal Congestion Mitigation Air Quality program to include incentives for business fleets and taxis.	
	Free/Discounted Toll Routes						✓		✓	✓					New York has provided a 10% discount on the E-Z Pass for EVs, used on the city toll ways. The pass also provides access to the fast lane at toll booths.	
	Free/Discounted Parking	✓			✓	✓	✓	✓	✓	✓	✓			✓	London, UK allows free parking for EVs in some areas, other surrounding cities have followed suit, making the BMP more widespread.	
	Residential Parking Permit Priority	✓													Amsterdam has given EV owners priority on the waitlist for parking permits in the city; the waitlist ranges in length from 1-27 months depending on the permit area.	
	Consequences: Tow and Ticket					✓										Denver enforces ticketing and towing of non-EVs parked in EV designated spaces.
	Carpool Lane Access (HOV)		✓				✓	✓	✓	✓	✓				✓	Los Angeles enforces accepting ZEVs into HOV lanes by using decals provided by the state of California, making it easy to differentiate them from conventional vehicles.
	Low Emission Zones (LEZ)	✓			✓	✓	✓	✓			✓	✓			✓	Created an LEZ in the downtown core from which heavy-duty vehicles and delivery trucks older than the year 2000 are restricted entry. The city plans to further restrict access to diesel taxis, coaches, and mopeds in 2018.
Infrastructure	City-Property Charging Stations				✓	✓	✓	✓		✓		✓		✓	Amsterdam installs city-owned charging stations based on public requests, if it is approved the city has a contractor who will install the charger.	
	Expanding the Network: Readily Available Chargers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	In 2009 Amsterdam had 100 public chargers, by 2011 the city had 1,000 public chargers, and a goal has been set to have 4,000 by the end of 2018.	
Infrastructure	Converting City Fleets		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	Oslo has replaced half of its city fleet (1100 cars) and is on its way to replacing the entire fleet.	

Model Cities' Interventions

Model Cities		Amsterdam	Atlanta	Chicago	Copenhagen	Denver	London	Los Angeles	New York City	Oslo	Paris	Portland	San Diego	Vancouver	Example
	Streetlight Charging Integration			✓			✓	✓				✓			London, UK converted their streetlight to LEDs, allowing them to support the extra burden of charging an EV. Drivers sign up for the program and are mailed a charging cord that allows them to plug in.
	Residential Construction and Upgrades		✓				✓	✓				✓		✓	Vancouver mandates all new homes to have conduits for level 2 charging stations and for 20% of all parking spaces to have the ability to support level 2 chargers.
	Portable Charging Stations												✓		San Diego makes use of the local company Mobi which supplies portable charging stations to offices and events that would otherwise not have enough charging stations.
	Electric Vehicle Working Group		✓		✓				✓			✓	✓	✓	New York City has an Electric Vehicle Advisory Committee, which has published a 22-page report of their recommendations for city council regarding supporting EV uptake and charging infrastructure.
Education	Consistent and Thorough Signage											✓		✓	Vancouver standardized all signage to remain consistent, focus on identifying charging spaces.
	Technical Assistance											✓			Portland provides a EV Hotline that provides 24/7 assistance over the phone for concerns regarding charger use, EV incentives, and infrastructure. The city also manages an infrastructure map on ChargeHub .
	Community Outreach			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	Portland made EVs accessible to low-income communities by supporting a car-share program for an affordable price. This allowed members to drive an EV without committing to the financial investment.
Building Stakeholder Relationships	Electrifying Car-Share Programs		✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	Portland made EVs accessible to low-income communities by supporting a car-share program for an affordable price. This allowed members to drive an EV without committing to the financial investment.
	Taxis/ Ride-Share Programs	✓	✓	✓			✓		✓	✓	✓	✓		✓	London electrified a large taxi fleet and installed 150 charging stations, and all taxis are required to be ZEV capable by 2018.
	City Contracts-EV Preference	✓						✓							Amsterdam provides contract preferences to bidders operating an EV fleet.

Local Municipal Policy Initiatives

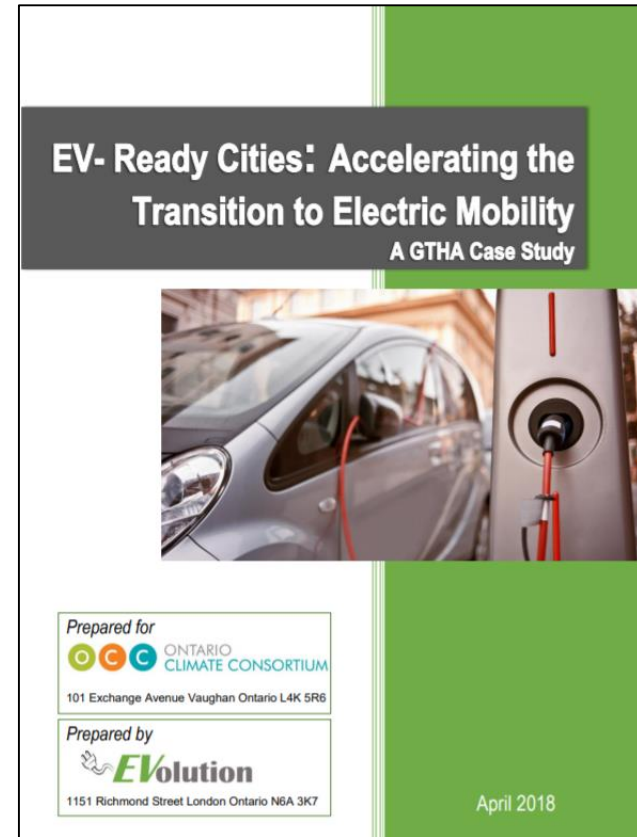
Targets/Goals	Potential Strategies	Example of municipalities implementing these strategies
Improved Air Quality	Shift to Low-Emission Vehicles	✓ Town of Ajax ✓ City of Burlington
	Alternative modes of transportation	✓ City of Mississauga ✓ City of Brampton
Reduced Traffic Congestion	Carpool or car sharing	✓ Town of Caledon ✓ Town of Aurora ✓ City of Brampton
	Promote Active Transportation	✓ City of Markham ✓ City of Vaughan ✓ City of Hamilton
	Promote Public Transportation	✓ Town of Caledon ✓ City of Hamilton
	Increased Pedestrian Areas	✓ City of Markham
Update Transportation Infrastructure	Bike Rack Instalment	✓ Town of Ajax ✓ City of Burlington
	Green City Fleets	✓ Town of Aurora ✓ City of Brampton
	Bike Lanes	✓ City of Markham ✓ City of Brampton
	Improved public transit systems	✓ City of Vaughan ✓ Regional Municipality of Halton
	EV Charging Stations	✓ City of Vaughan
Education about Climate Change regarding transportation	Outreach and community engagement regarding Climate Change	✓ Town of Aurora ✓ Town of Oakville
	Municipal Signage	✓ City of Hamilton
	School Programs	✓ Town of Oakville
	Company and Business Workshops	✓ City of Hamilton
Policy and Bylaw Revisions	Anti-idling policy	✓ City of Vaughan ✓ Town of Oakville
	EV purchase and use incentives	✓ City of Hamilton
	Transportation demand management	✓ City of Mississauga

Read the Report

www.climateconnections.ca

□ “Our Work”

<https://climateconnections.ca/app/uploads/2018/07/Online-Version-Final-Report-EV-Ready-Cities.pdf>



Helpful Documents/Resources

- ❑ The International Council on Clean Transportation. 2018, October. Electric vehicle capitals: Accelerating the global transition to electric drive.
https://www.theicct.org/sites/default/files/publications/EV_Capitals_2018_final_20181029.pdf
- ❑ The International Council on Clean Transportation. 2017, November. Electric vehicle capitals of the world: What markets are leading the transition to electric?
https://www.theicct.org/sites/default/files/publications/World-EV-capitals_ICCT-Briefing_08112017_vF.pdf
- ❑ The Atmospheric Fund. 2018, July. Keeping Track: 2015 Carbon Emissions in the Greater Toronto and Hamilton Area. http://taf.ca/wp-content/uploads/2018/09/TAF_Emissions-Inventory-Report_2018.pdf
- ❑ Transportation Research Board and National Research Council. 2015. Overcoming Barriers to Deployment of Plug-in Electric Vehicles. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/21725>.
- ❑ Sierra Club and Plug in America. June 2018. AchiEVe: Model State & Local Policies to Accelerate Electric Vehicle Adoption.
<https://www.sierraclub.org/sites/www.sierraclub.org/files/blog/EV%20Policy%20Toolkit.pdf>

Action Plan

EV mobility

STEPS TO SUCCESS

1

Review Municipal Policy



2

Research and Review
Best Management
Practices



3

Establish Stakeholder
Communication and
Engagement



4

Develop EV Planning
Strategy



Action Plan

EV mobility

STEPS TO SUCCESS

5

Develop System to Track Progress



7

Apply BMP Projects on Larger Scale



6

Develop Pilot Projects Based on Best Management Practices



8

Education and Outreach



Next Steps: Supporting Region of Peel Municipalities

- Provide background research and a framework for Peel Community Climate Change Partnership
- Primary and secondary research
- Exploring which areas should be key focus specifically suited for Peel demographics
- Exploring potential partnership opportunities

CELEBRATING



YEARS

GTAA

**PARTNERS IN
PROJECT GREEN**

A PEARSON ECO-BUSINESS ZONE

PPG Open EV Network 2015- 2017

Update and Summary of Key Lessons Learned

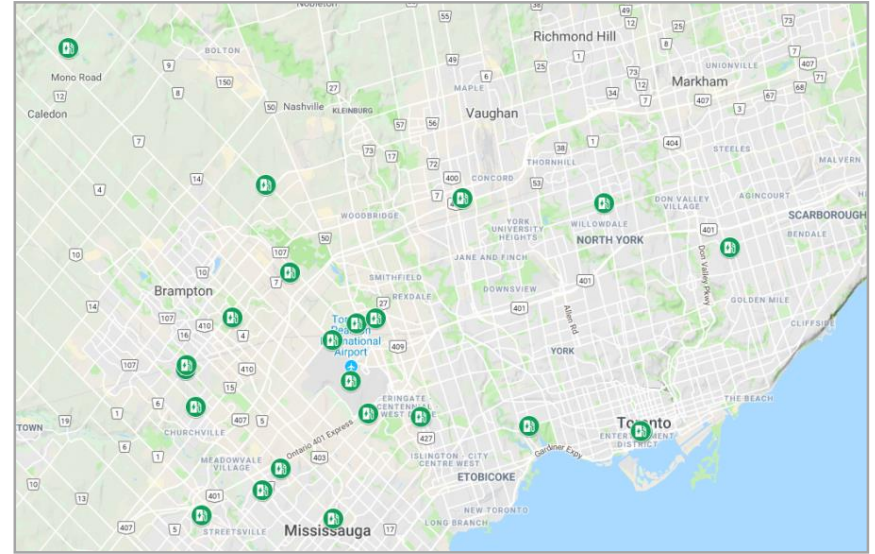
November 21st, 2018



EV Network: Lessons-Learned

Project Overview

- **144** EV charging ports installed
- **18 organizations** both private and municipalities, ~\$660,000 private capital invested
- Includes two of the largest single-location installations in Ontario: Orlando Heartland Town Centre (28 ports) and Toronto Pearson airport (32 ports)
- As of end of 2017: Over 20,000 charging sessions, 840k km of vehicle travel, 206 tonnes eCO2 avoided



EV Network: Lessons-Learned

Average Costs

- \$4,000-\$6000 total installed cost was typical per L2 port
- DCFCs could range from \$40,000-\$100,000+
- No PPG members have installed L1 stations
- Economies of scale less relevant than installation considerations



EV Network: Lessons-Learned



Station Management

- Rare for owner to charge fee for use
- Pricing measures to prevent parking beyond required charging period are effective
- TRCA head office location serves 6 employees and 4 fleet vehicles with 4 ports
- Software solutions such as queuing and billing by kWh can allow for further asset optimization
- Plug-sharing management restrictions include property laws and vehicle alarms

EV Network: Lessons-Learned

EV Policy Example: Pratt & Whitney

- In preparation for WEVCIP, P&WC developed an internal policy to address employee requests for workplace charging
- 10+ EV drivers at facility without workplace stations



EV Network: Lessons-Learned

EV Policy Case Example: Bentall Kennedy

- Install stations upon tenant request
- Seen as increasing asset value, tenant amenity and part BK's green initiatives
- Typically put in motion immediately, though cost considerations can cause delays in smaller facilities to integrate into budget cycles



EV Network: Lessons-Learned

Data Analysis: High-use site

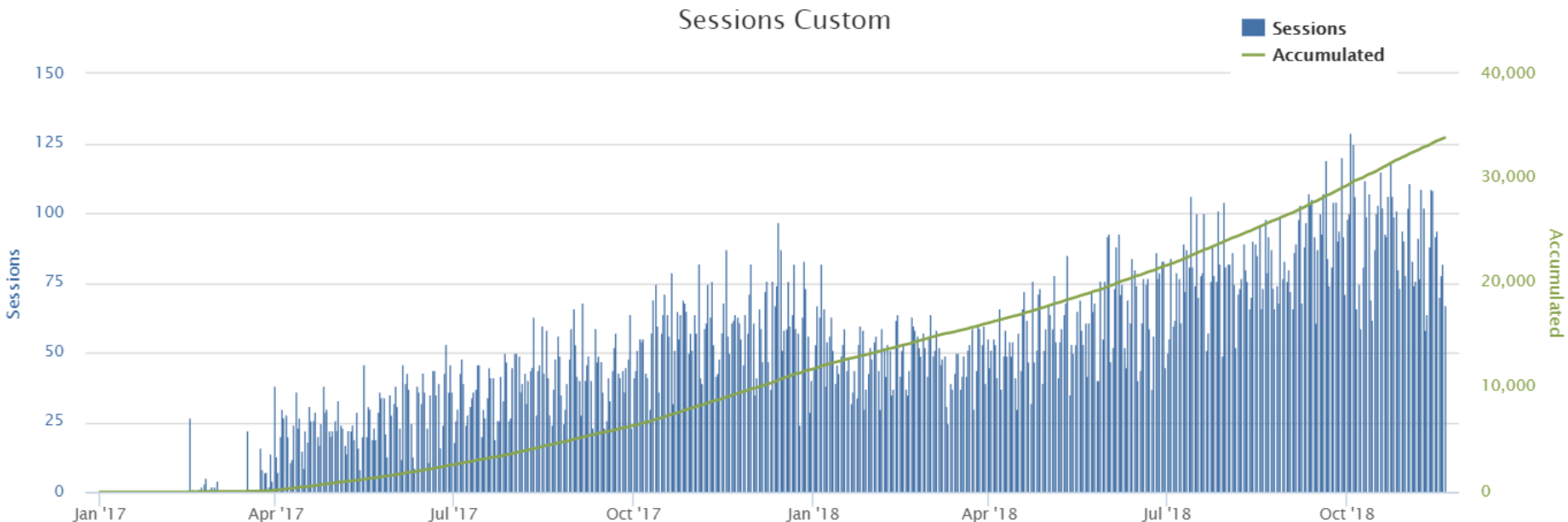
- Pearson Airport is the largest single-site installation in the province (possibly the country)
- 10 DCFCs and 12 L2s for public use



EV Network: Lessons-Learned

Data Analysis: High-use site

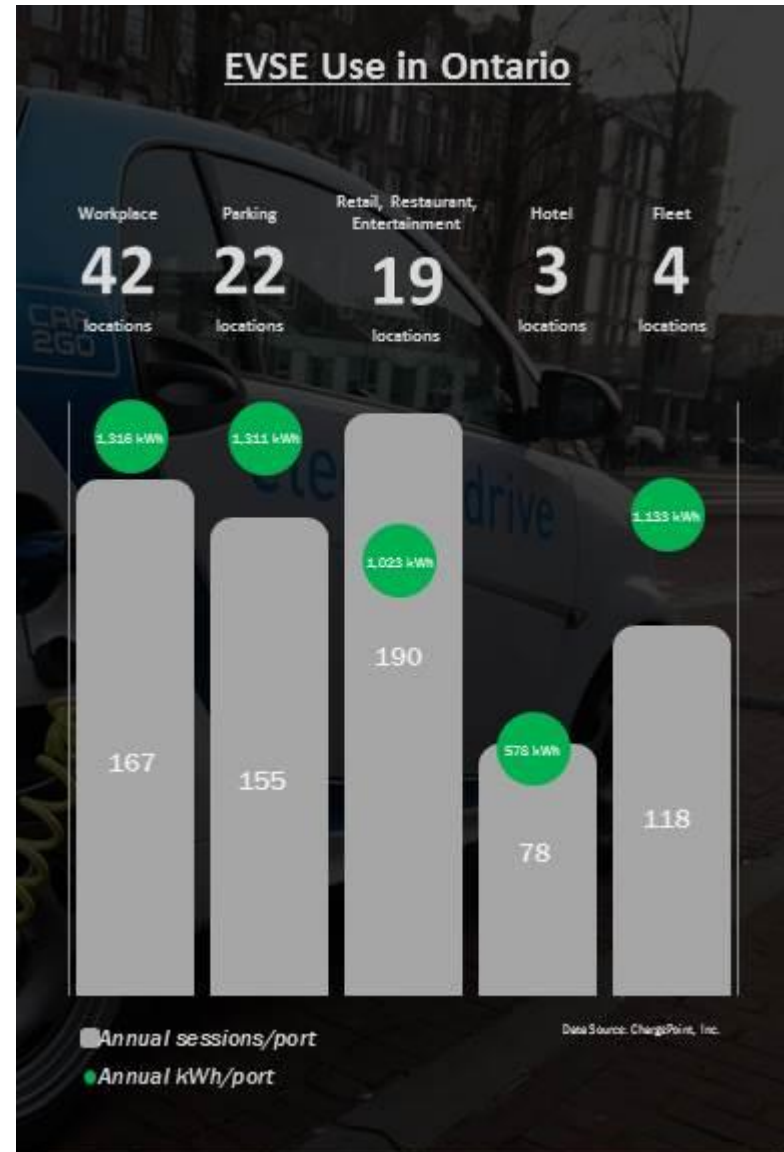
- Sessions: 33,860 cumulative – 129 peak daily – 24,000 in last 12 months
- Unique users: 3,400 in last 12 months
- Lifetime Emissions (Mar 2017-Nov 2018): 395,000 kWh delivered = 396 tCO2 avoided



EV Network: Lessons-Learned

Data Analysis: Ontario-wide

- Provincial data collected from EVSE network operator (Spring 2017)
- Anonymized by postal code and facility type
- Shows opportunity for tracking high use areas at later stages of network development
- Mapping analysis for siting could include: Charging station data, traffic and parking data, grid capacity, etc.



Source: Charge Point

Thank you!

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