

# Supporting EV Charging at Home and on the Go: Best Practices from BC

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WATT Consulting Group

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# Presentation Overview

1. The Electric Vehicle Revolution
2. About the CRD EV / E-Bike Infrastructure Planning Project
  - Online Survey Results
  - Infrastructure Gap Analysis
  - Infrastructure Planning Guide / Recommendations
3. The Larger EV Picture in BC

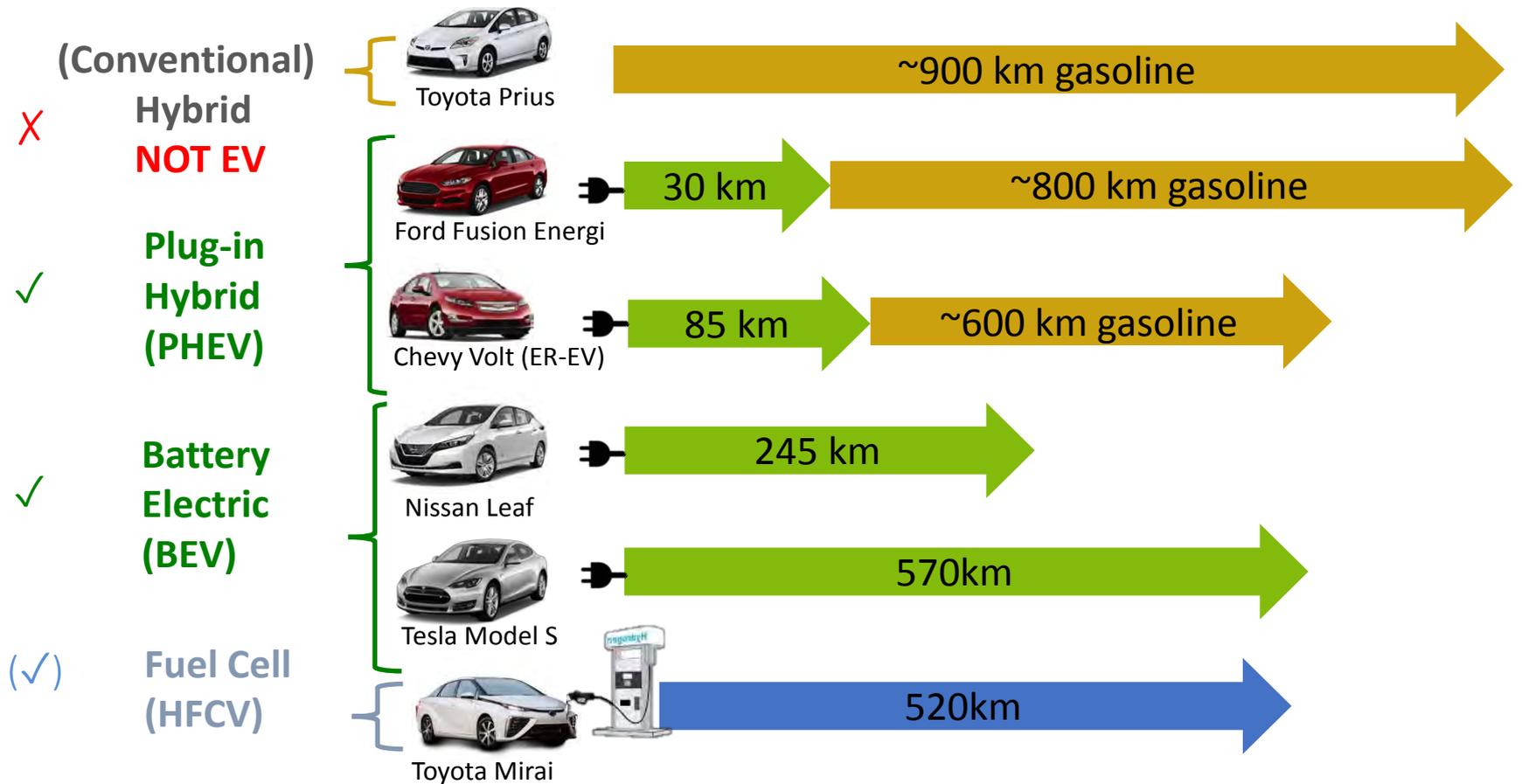
## Section 1

# ELECTRIC VEHICLE REVOLUTION



# The EV Context

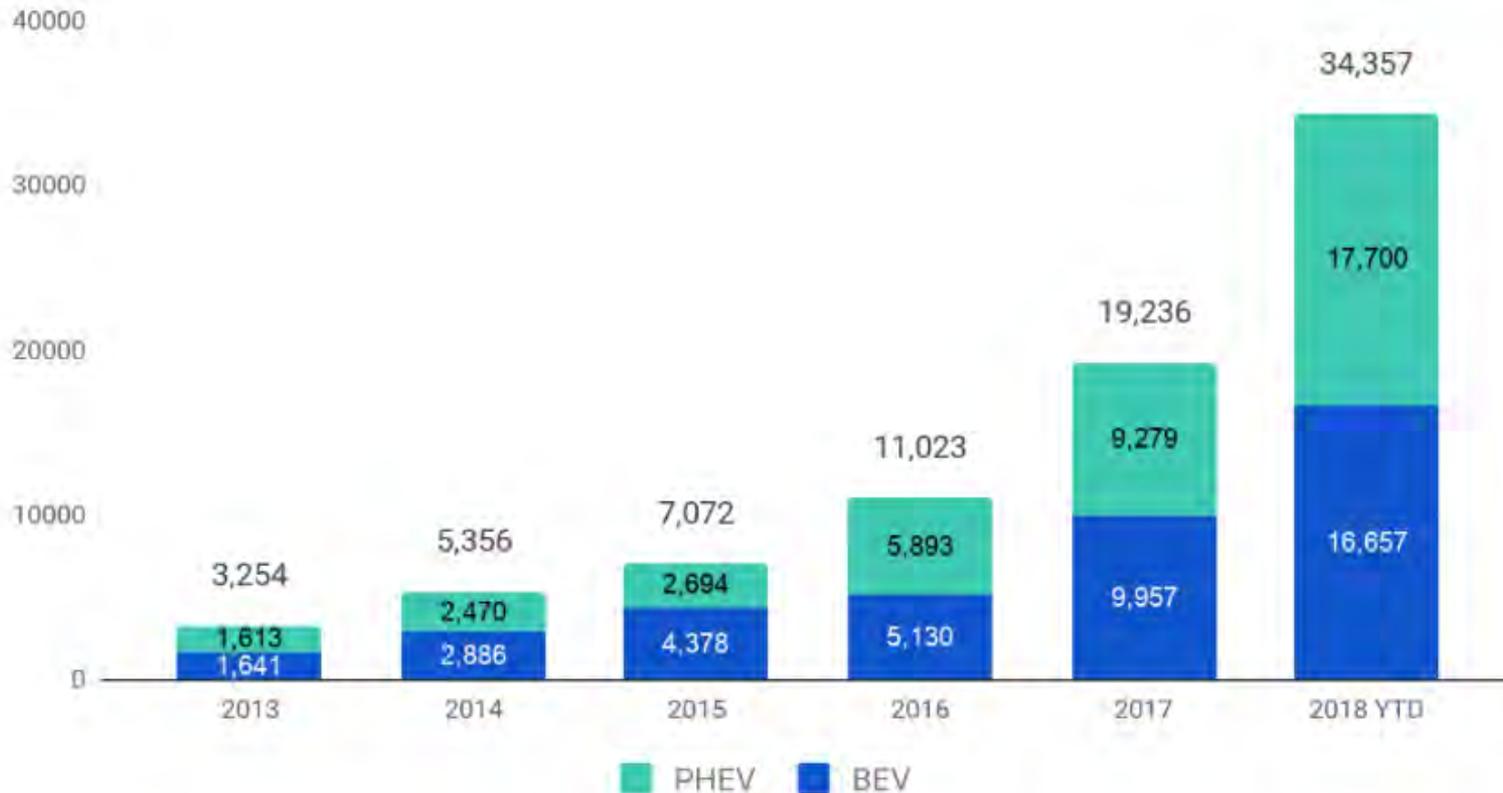
## Definitions – Plug-in Electric Vehicle



Source: PlugIn BC, 2018

# The EV Context

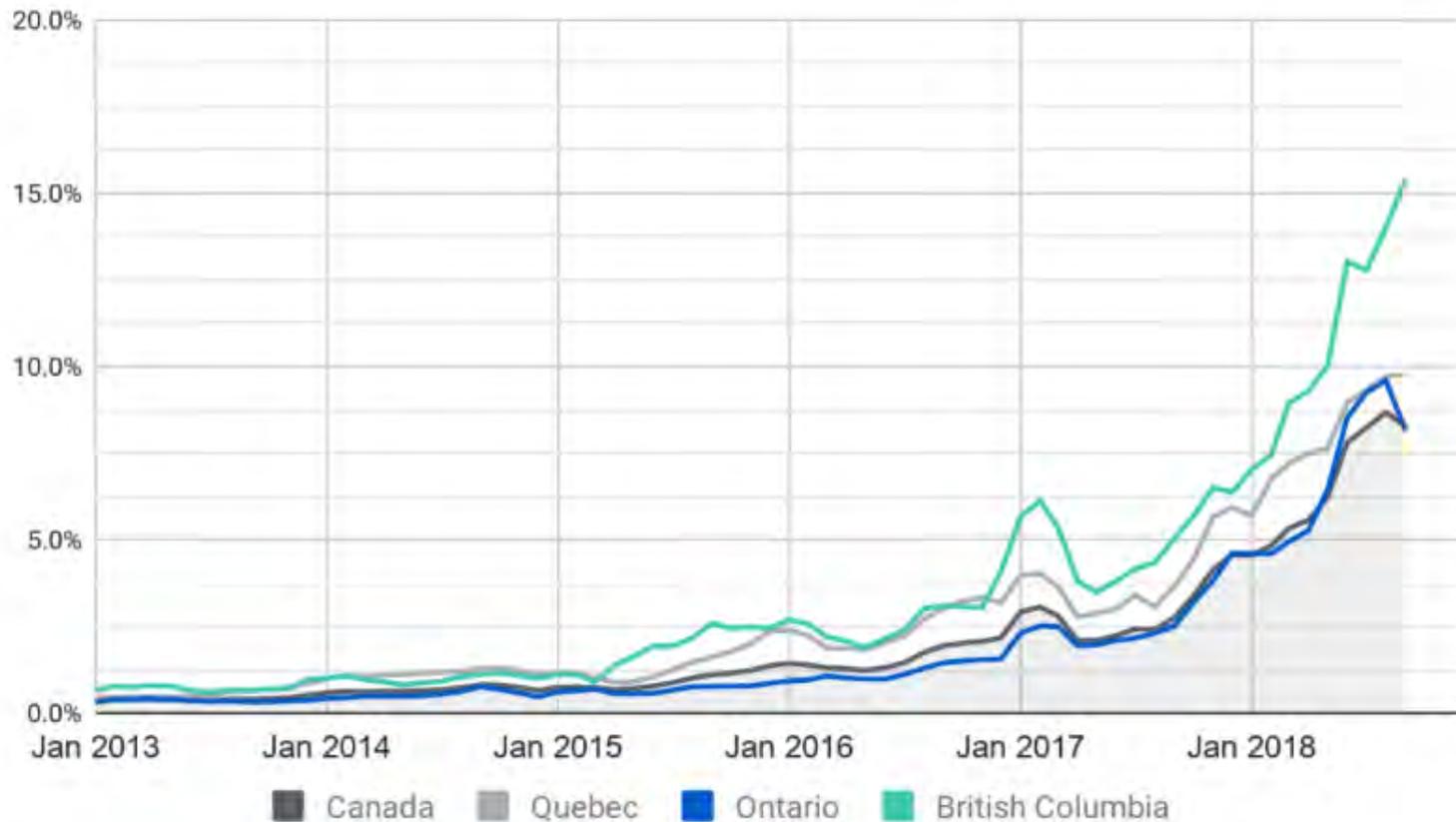
## Annual Canadian EV Sales



Source: PlugIn BC, 2018

## The EV Context

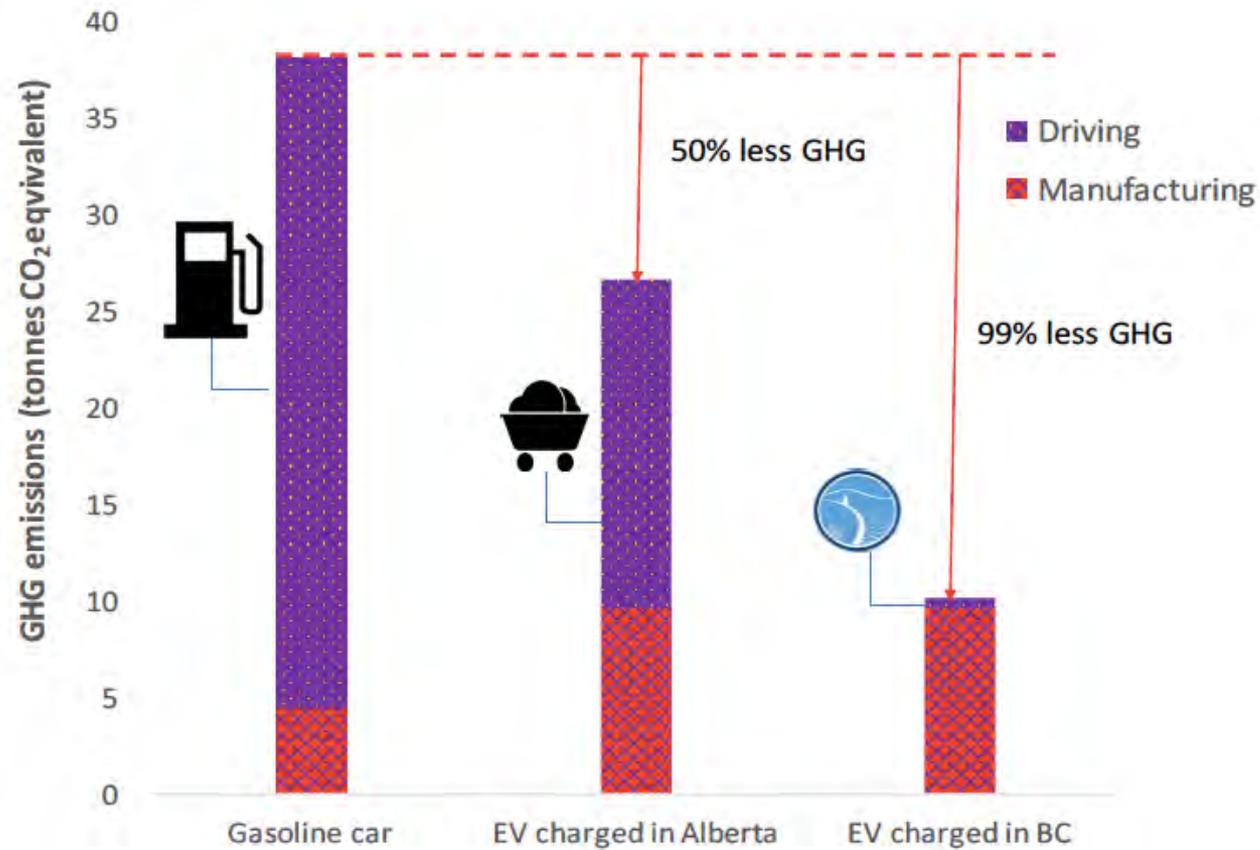
# EV Portion of Passenger Car Sales



Source: PlugIn BC, 2018

# The EV Context

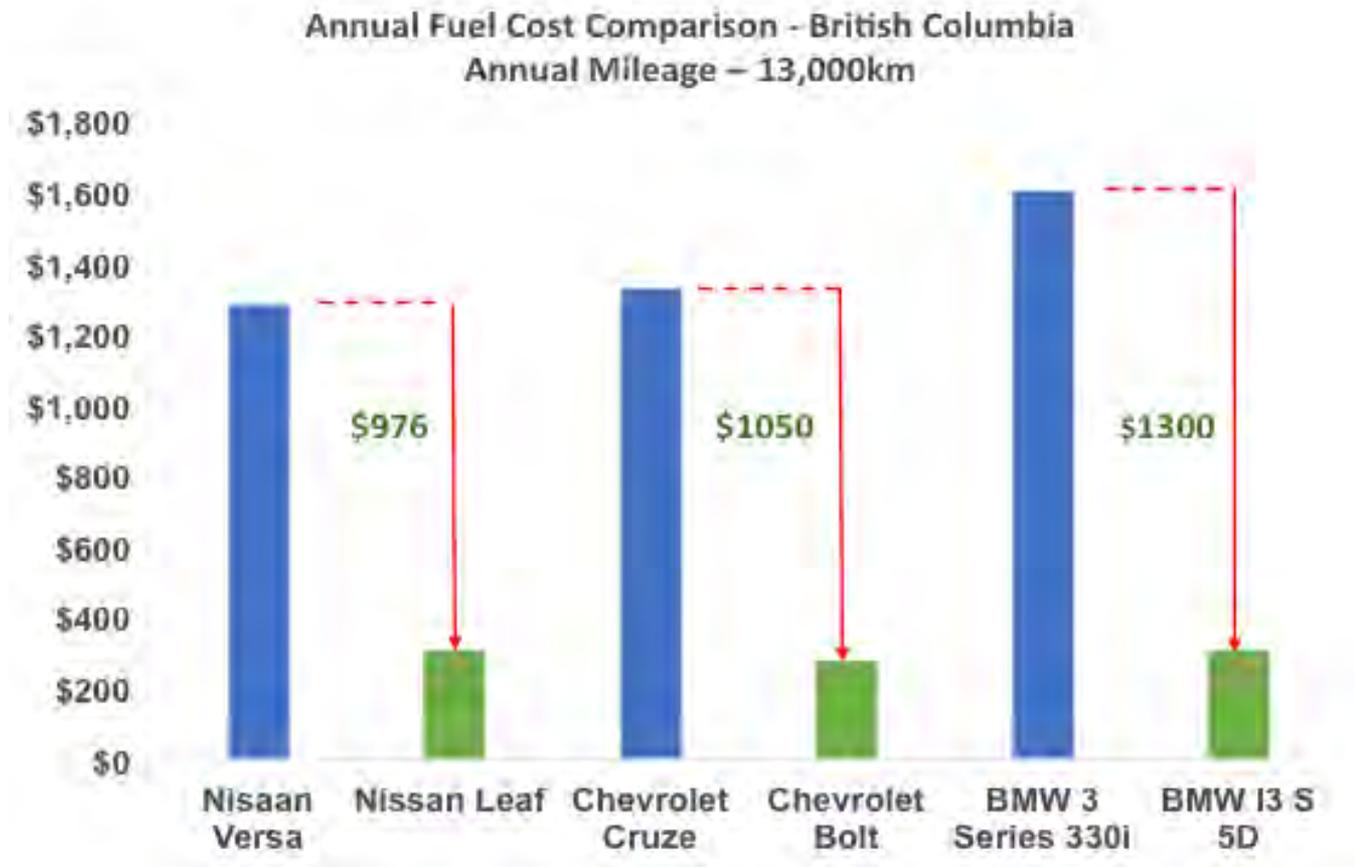
## Lifecycle GHG Emissions



Source: PlugIn BC, 2018

# The EV Context

## Cost Savings



Source: PlugIn BC, 2018

# The EV Context

## Barriers to Uptake

### Key Barriers from Literature

- High purchase price
- Lack of ability to charge at home (i.e., “the garage orphans”)
- Range anxiety – real vs. perceived
- Lack of variety in model types



Source: The Economist, 2009

## Section 2

# ABOUT THE PROJECT



# About the Project

## Acknowledgements

- The **Capital Region Electric Vehicle (“EV”) and Electric Bicycle (“E-Bike”) Infrastructure Planning** project was undertaken by the Capital Regional District (“CRD”) with funding support from BC Hydro Sustainable Communities.
- The CRD Climate Action Inter-Municipal Working Group are acknowledged for input and guidance throughout the process.
- WATT Consulting Group was retained as a consultant.



Salish Sea

Capital Regional District

CANADA

UNITED STATES

# About the Project

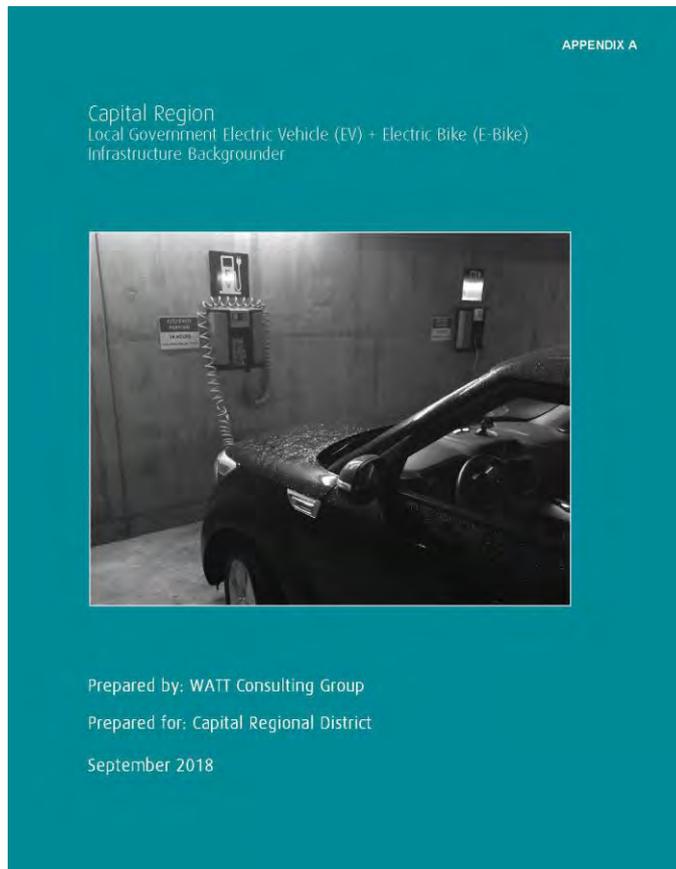
## Project Goals



- Understand the opportunities to advance EV and E-Bike charging infrastructure in public and private locations in the Capital Region
- Identify how local governments could accelerate uptake of EVs & E-Bikes
- Provide baseline information and research for local governments in the region in support of their own EV/E-Bike strategies and efforts

# About the Project

## Backgrounder



- **Feedback** from developers and public to better understand barriers and opportunities for EV and E-Bike charging
- **Lessons learned** from other communities
- **Infrastructure gap analysis** to identify gaps EV charging network

<http://bit.ly/crdevbackgrounder>

# About the Project

## Infrastructure Planning Guide

Capital Region Local Government Electric Vehicle (EV) +  
Electric Bike (E-Bike) Infrastructure Planning Guide



Prepared by: WATT Consulting Group

Prepared for: Capital Regional District

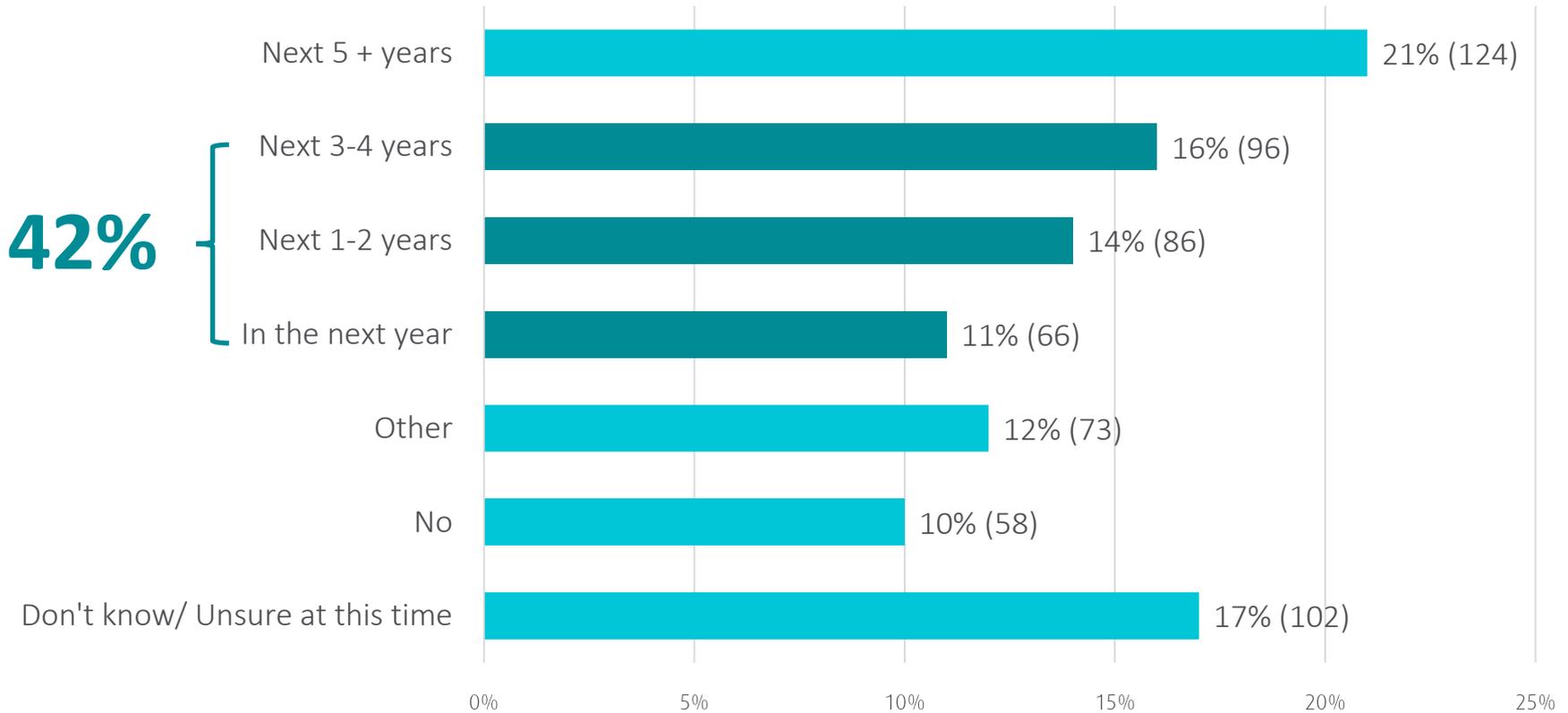
November 2018

- **Priority locations** for new EV charging stations in Capital Region
- **Better management** of public charging infrastructure
- Thoughtful **parking solutions** for E-Bikes
- **Policy options** for local governments

[bit.ly/crdevplanningguide](http://bit.ly/crdevplanningguide)

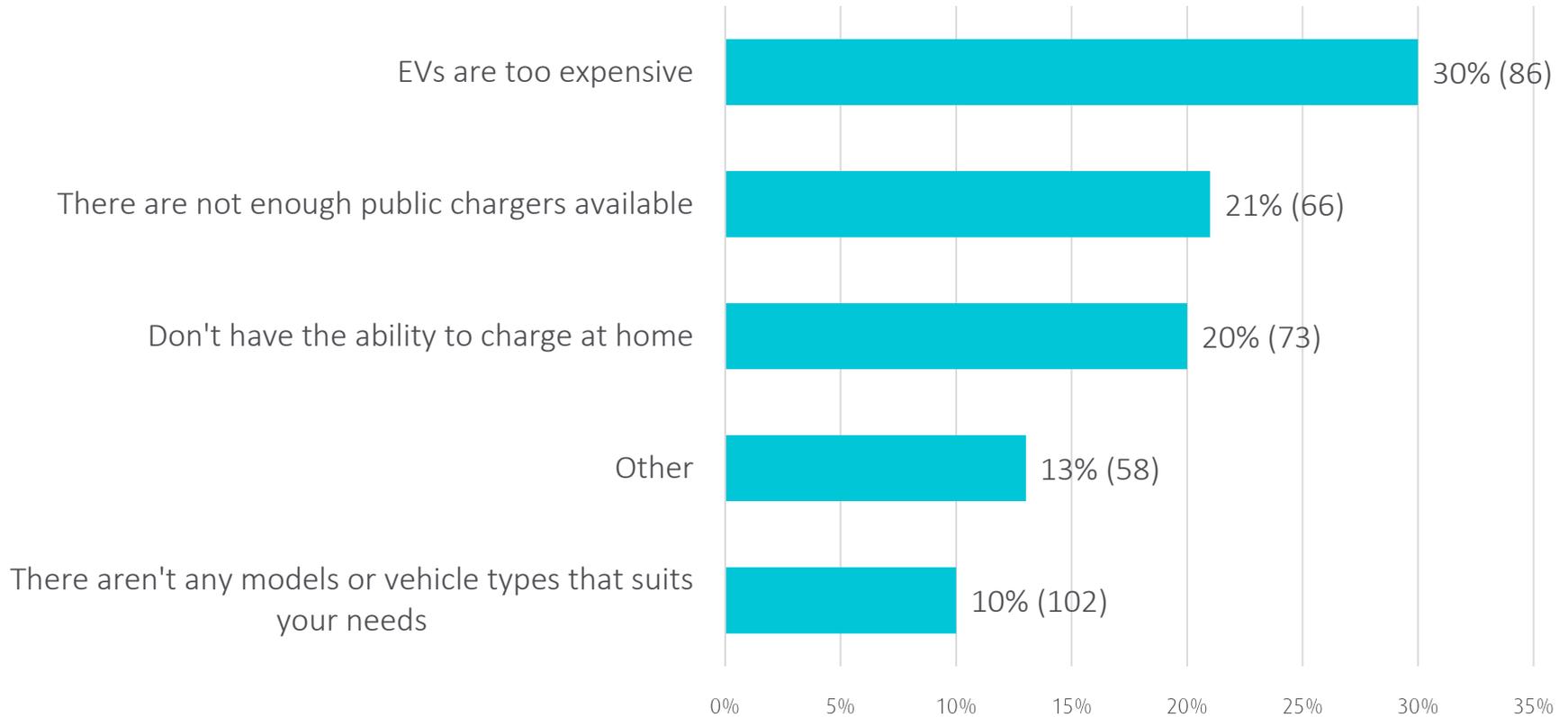
# Public Survey

## Purchasing an EV in the Future



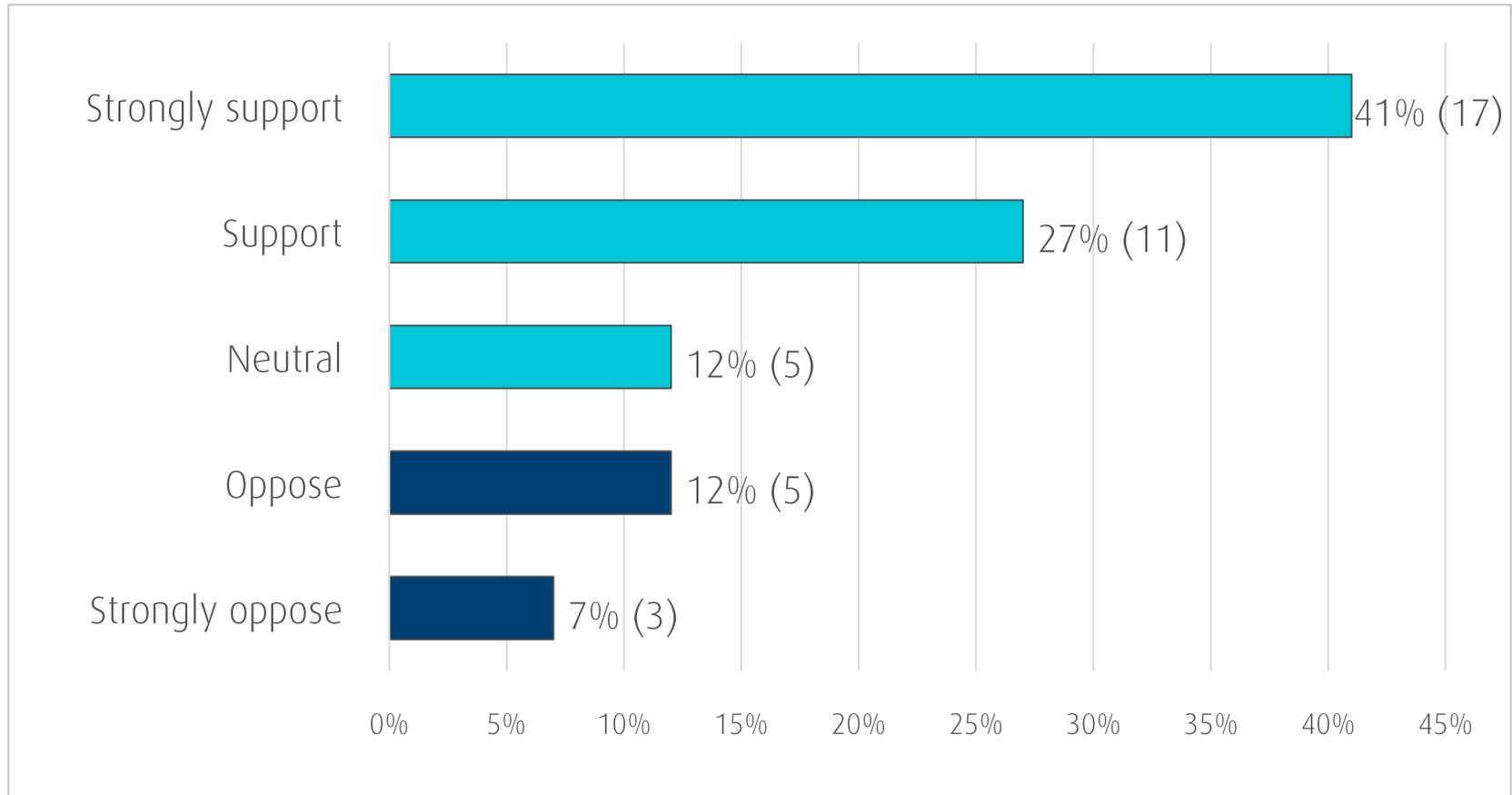
## Public Survey

# Barriers of EV Purchase and Ownership



## Developer Survey

# Level of Support for EV-Ready Regulations



# Infrastructure Gap Analysis

## Public EV Charging Network



**1. Reducing Range Anxiety:** Opportunity for lifeline and “on the go” charging

**2. Increasing Profile of EVs:** Create public awareness and understanding of EVs, and increase exposure and knowledge of EV technology

**3. Accommodating Garage Orphans:** Provide opportunities to EV owners who do not have access to off-street charging opportunities

**4. Equity:** Support equitable access for all income levels and housing types

## Infrastructure Gap Analysis

# Types of EV Charging Stations

Type	Level 1	Level 2	Level 3
<b>Description</b>	Typical household outlets; 120V of AC power	Dedicated household outlet; 240V of AC power	Direct charging to battery
<b>Cost</b>	\$500	\$2,500 to \$15,000+	\$75,000+
<b>Charging Time</b>	8-12 hours	4-6 hours	0.5-1 hour
<b>Charging Use</b>	Home (overnight); work (all day)	Home (overnight); work (all day); parking lots (“on the go”)	“On the go”

# Infrastructure Gap Analysis

## Public Charging Station Siting

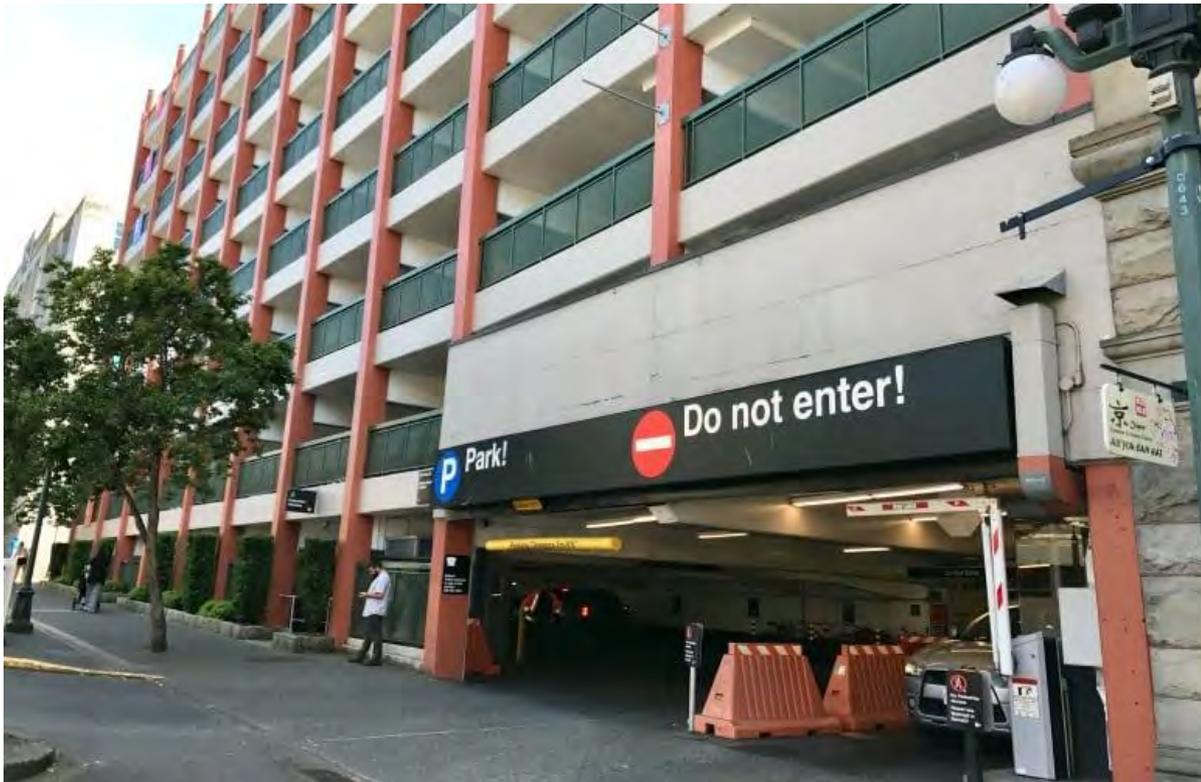
Public survey asked respondents to rank the importance of various public charging station location. Top three results are shown below.

Level 2 Locations (4 to 6 hours charging time)		Level 3 Locations (0.5 to 1 hour charging time)	
1	Public parkades	1	Major roads and highways
2	Community centres	2	Public parkades
3	Major roads and highways	3	On-street parking and downtown areas

# Infrastructure Gap Analysis

## Public Charging Station Siting

### Level 2 Charging: Public Parkades



# Infrastructure Gap Analysis

## Public Charging Station Siting

### Level 3 Charging: Major Roads and



How do we determine where to locate and site EV public charging stations?

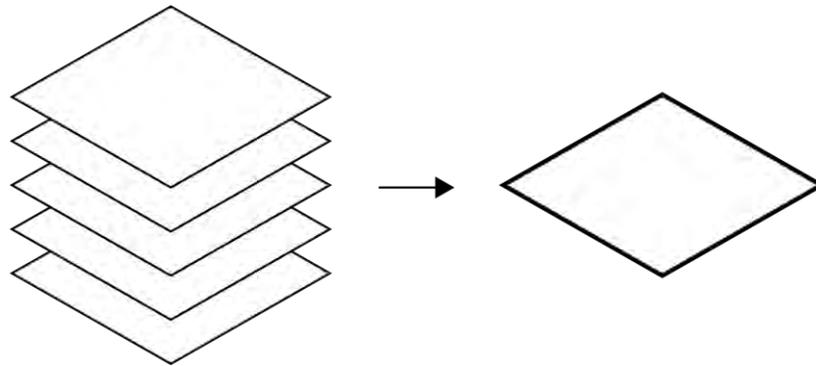
# Infrastructure Gap Analysis

## Spatial Multi-criteria Evaluation Framework

Use various built environment and transportation criteria to evaluate site suitability for EV public charging station siting.

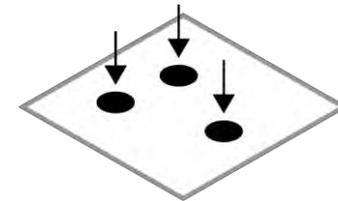
Step 1

**Quantitative Criteria**



Step 2

**Qualitative Criteria**



# Infrastructure Gap Analysis

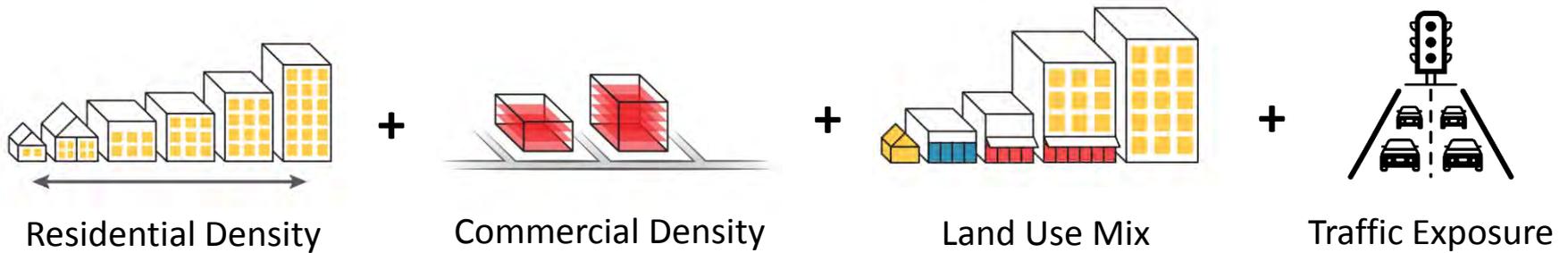
## Multi-criteria Evaluation

**Step 1:** Estimate EV charging station suitability by quantitatively assessing built environment and transportation criteria to create a composite index.

- **Residential density:** number of residential dwellings / residential land area
- **Commercial density:** commercial building floor area / commercial land area
- **Land use mix:** evenness of floor area across multi-family residential, commercial, and office space
- **Traffic exposure:** estimated average daily traffic (ADT)

# Infrastructure Gap Analysis

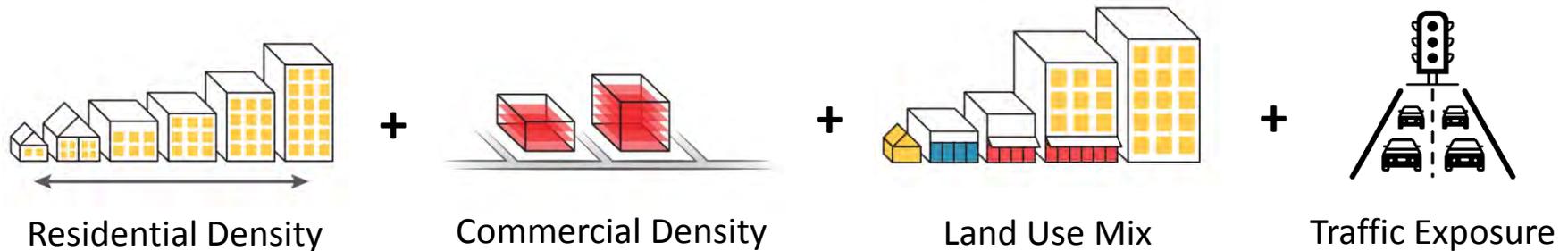
## EV Charging Station Suitability Index



= EV Charging Station Suitability

# Infrastructure Gap Analysis

## EV Charging Station Suitability Index

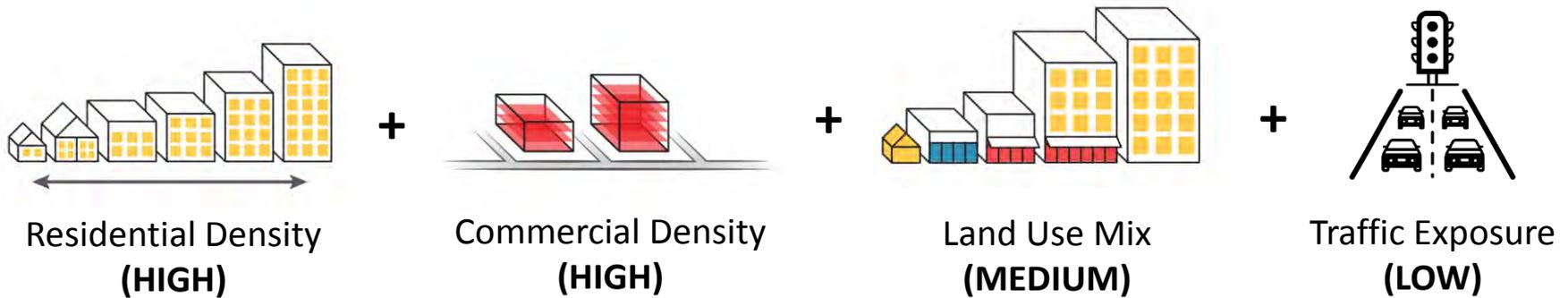


= EV Charging Station Suitability<sub>Level 2</sub>

= EV Charging Station Suitability<sub>Level 3</sub>

# Infrastructure Gap Analysis

## EV Charging Station Suitability Index

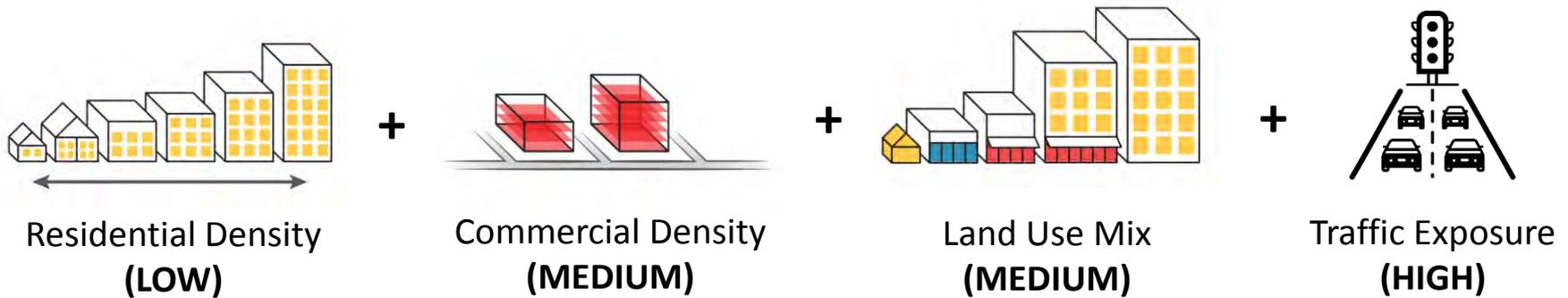


= EV Charging Station Suitability<sub>Level 2</sub>

= EV Charging Station Suitability<sub>Level 3</sub>

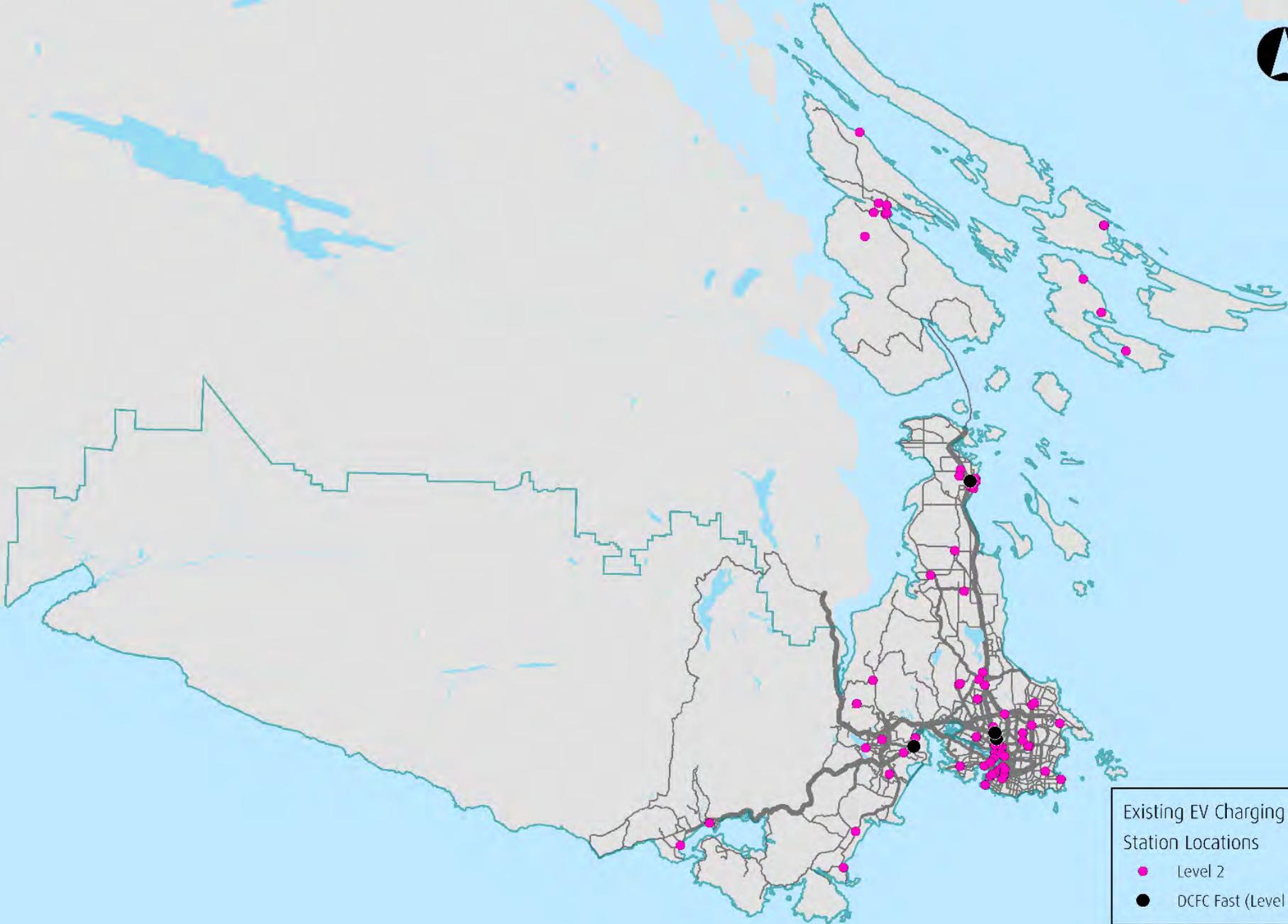
# Infrastructure Gap Analysis

## EV Charging Station Suitability Index



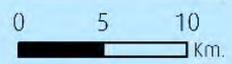
= EV Charging Station Suitability<sub>Level 2</sub>

= **EV Charging Station Suitability<sub>Level 3</sub>**

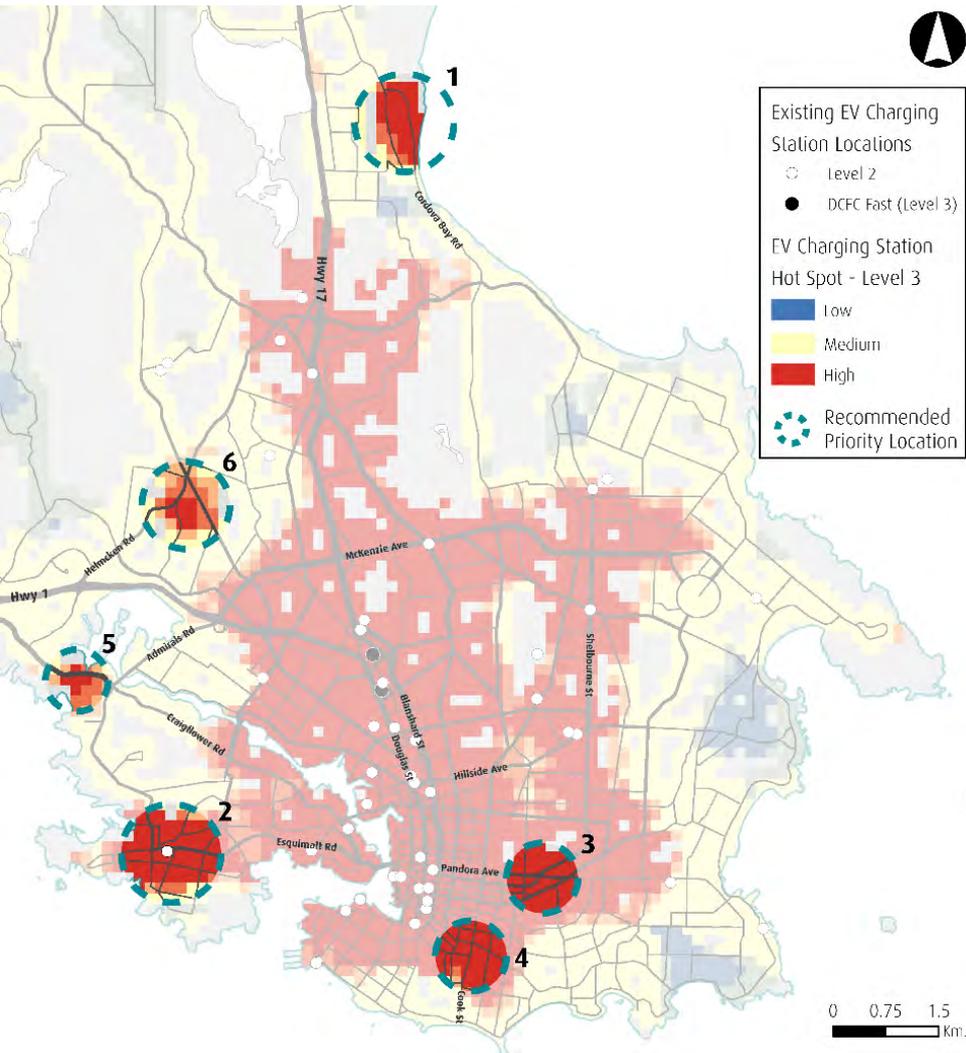


Existing EV Charging  
Station Locations

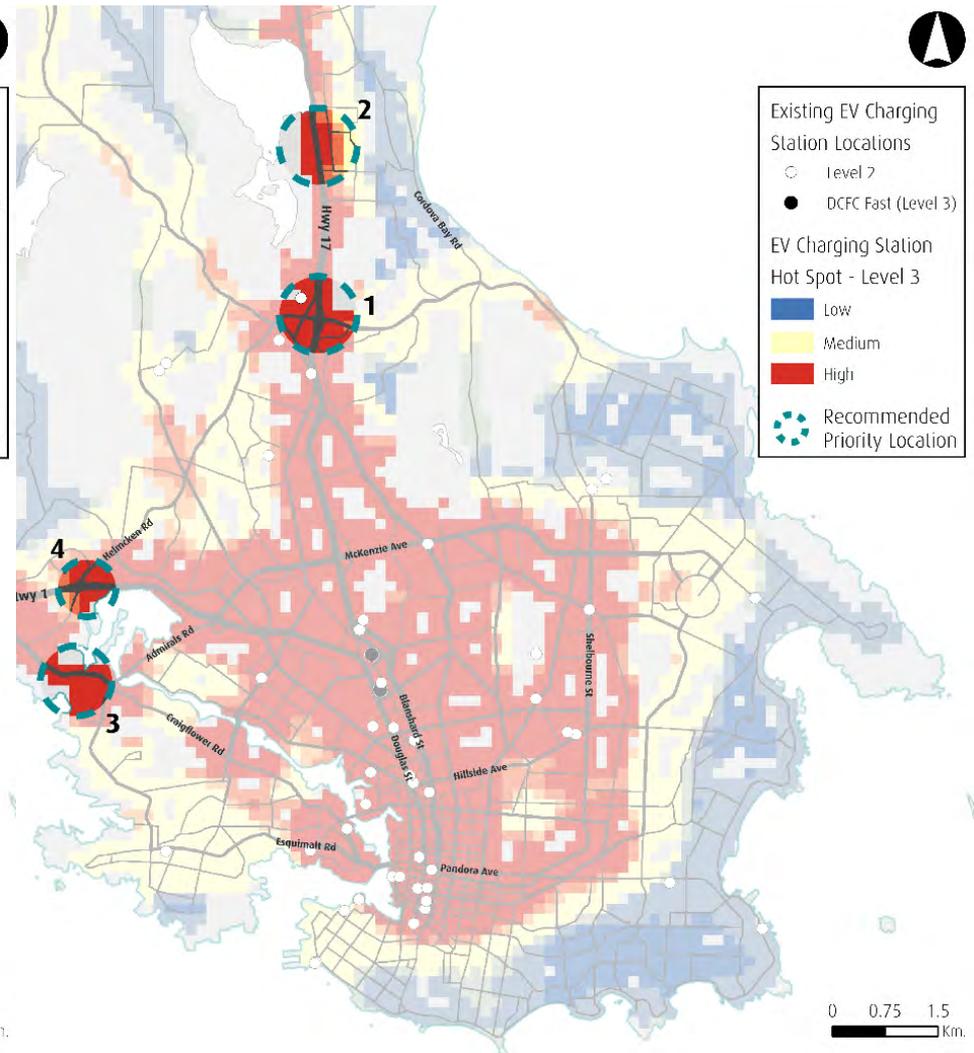
- Level 2
- DCFC Fast (Level 3)



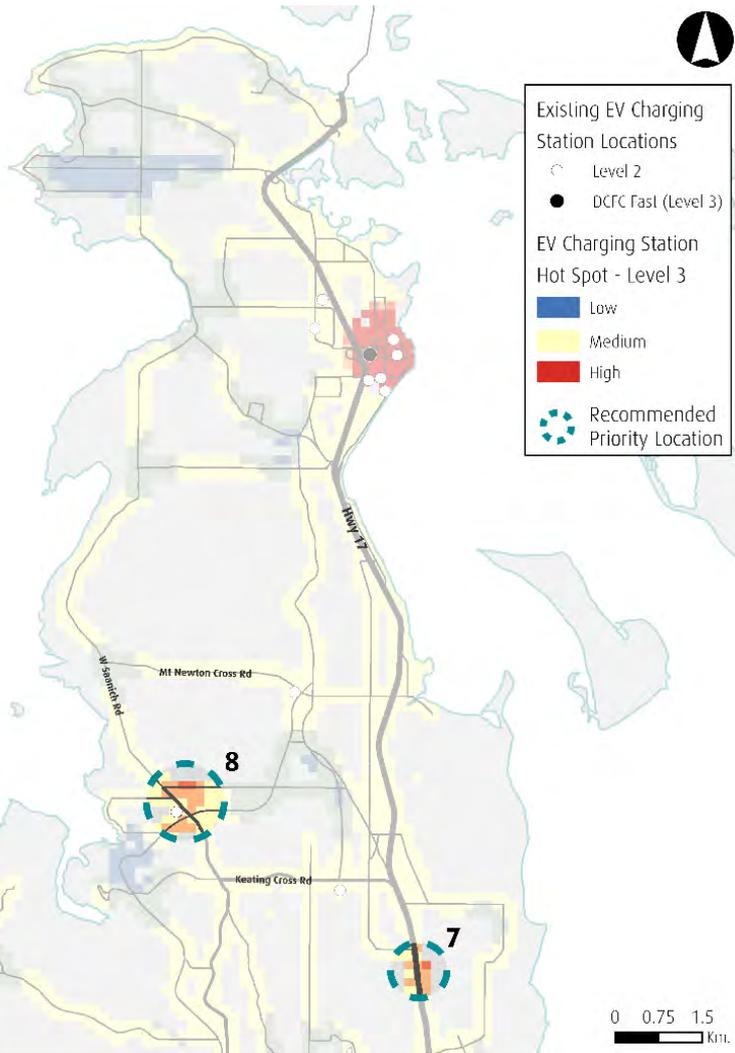
## Level 2



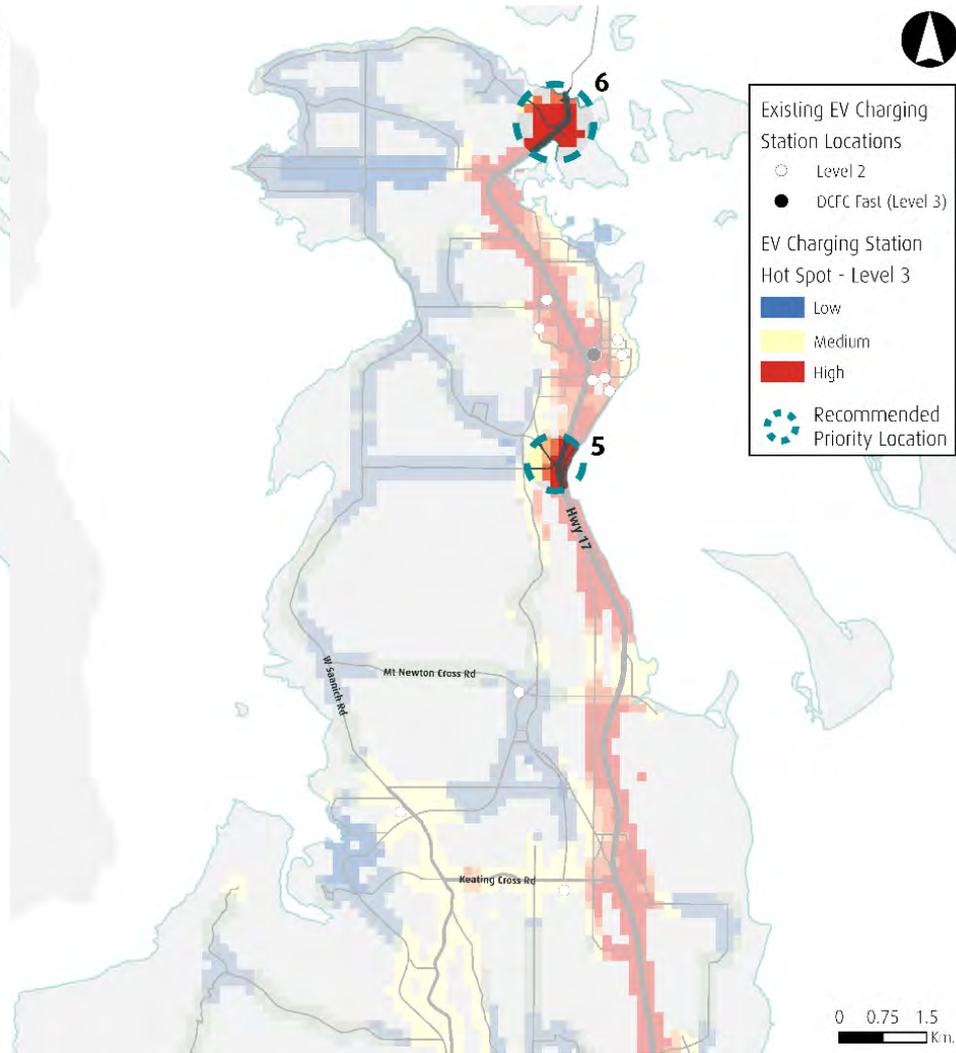
## Level 3



## Level 2



## Level 3



# Infrastructure Planning Guide

## Usage Fees

### Why introduce usage fees?

- Manage increasing demand
- Encourage at-home charging
- Limit length of charging sessions / encourage turnover
- Signal the value associated with electricity

### Recommendation for the Capital Region

- Level 2 Charging Station → \$1 per hour
- Level 3 (DCFC) → \$16 per hour



Photo credit: Hydro-Québec

# Infrastructure Planning Guide

## Usage Fees

Type of Charging	Rate	Cost for 100km (assumes 20kWh/100km)	Equivalent Gas Price (assumes 8L/100km)
Charging at Home	\$0.11/kWh	\$2.20	\$0.28/L
Public Level 2 Charging	\$1/hour	\$3.03 (@6.6kW)	\$0.38/L
Level 3 DCFC 30kW	\$16/hour	\$10.67 (@50kW)	\$1.33/L

Source: Dunsy Energy Consulting, 2018

# Infrastructure Planning Guide

## Policy + Regulation

### Policy & Regulations in the Capital Region

- Seven of 13 municipalities in the CRD were found to contain an EV policy in their OCP
- Two municipalities have direction to expand the public charging network + requiring new developments to be EV-ready and/or provide a charging station
- Not a single community provides policy direction on E-Bikes

# Infrastructure Planning Guide

## Policy + Regulation

### Policy & Regulations in Metro Vancouver

- At least seven municipalities in Metro Vancouver were found to contain EV-ready regulations (Vancouver, Richmond, City of North Vancouver, etc.)
- For Commercial buildings:
  - Level 2 energized outlet for 10% of stalls (Vancouver, District of North Vancouver)
- For Residential buildings:
  - Level 2 energized outlet for 100% of stalls (Richmond, Vancouver)

# Infrastructure Planning Guide

## Policy + Regulation

### EV-Ready Charging Infrastructure

- All new residential → Level 2 energized outlet for 100% of stalls (except visitor)
- New commercial → Level 2 energized outlet for 10% of stalls

# THANK YOU!

  
Small car  
only!  
Max. Length  
4 Metres.

Short-term Parking  
Three-Hour Maximum  
Monday - Friday  
8 a.m. - 4 p.m.

**3** HOUR  
CHARGING  
LIMIT  
YOUR  
STAY

**3** HOUR  
CHARGING  
LIMIT  
YOUR  
STAY

**TIM SHAH** MCIP, RPP, MA (Planning)  
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**Plug In BC**

# **CHARGING AHEAD: BC's Collaboration to Increase ZEV ownership**

Neil MacEachern  
2019-07-05

# British Columbia

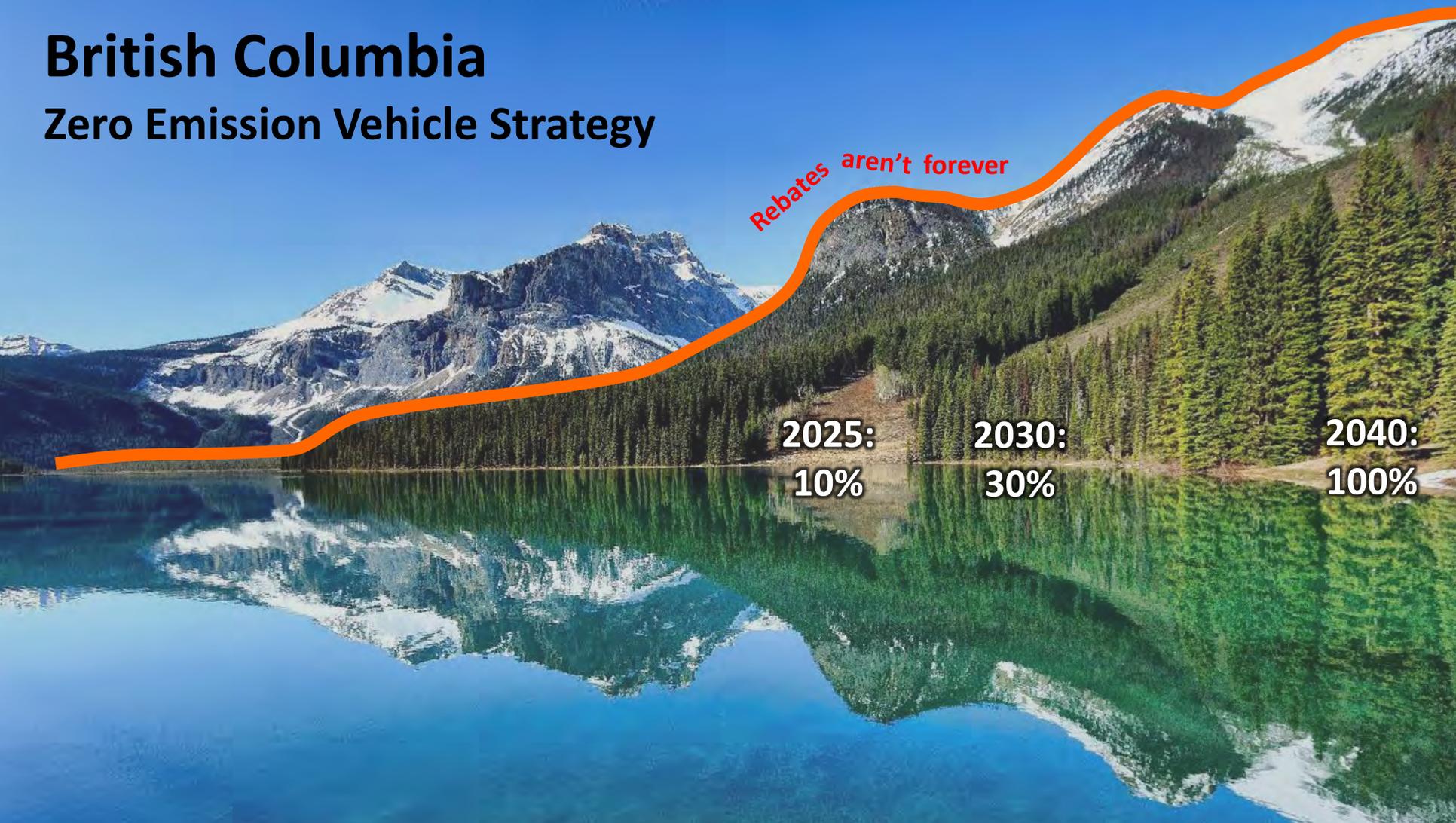
## Zero Emission Vehicle Strategy

*Rebates aren't forever*

**2025:**  
**10%**

**2030:**  
**30%**

**2040:**  
**100%**



# Policy Tools



# Purchase Incentives



## Specialty-Use Vehicles

- \$2,000 to \$50,000

## Passenger Vehicles

\$5,000 (CEV)

\$6,000 (Scrap-it)

+ \$5,000 (Federal)

**\$16,000 Off (!)**

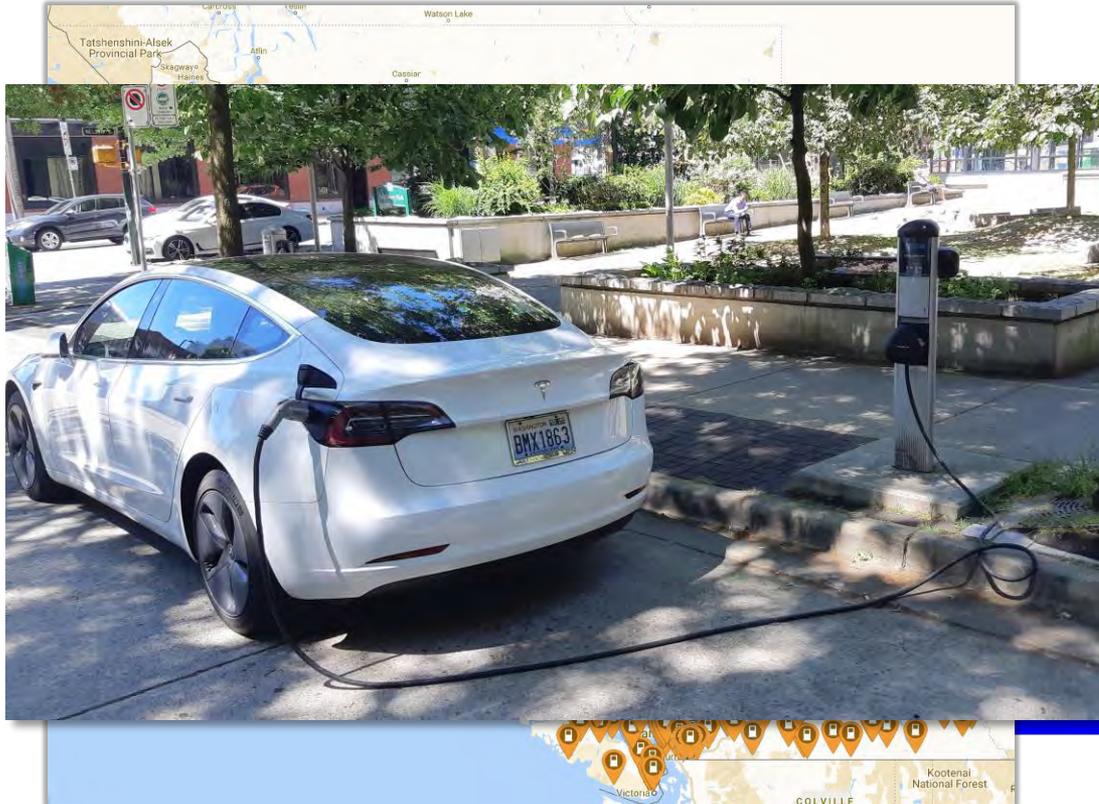
# Charging Incentives

## Infrastructure Rebates:

- 75% (Multi-family)
- 50% (Workplace)



# Charging Network



>1700 public level 2 stations

- Outnumber gas stations

~100 DCFCs

- Continuing north!

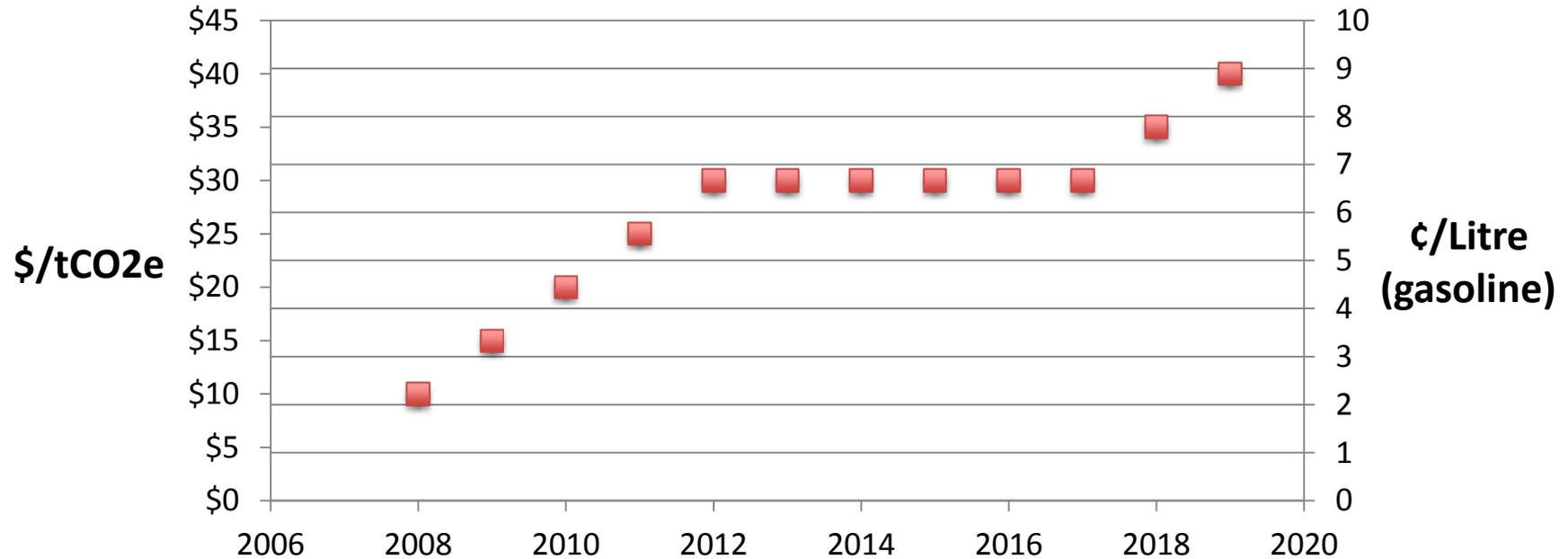
# HOV Access



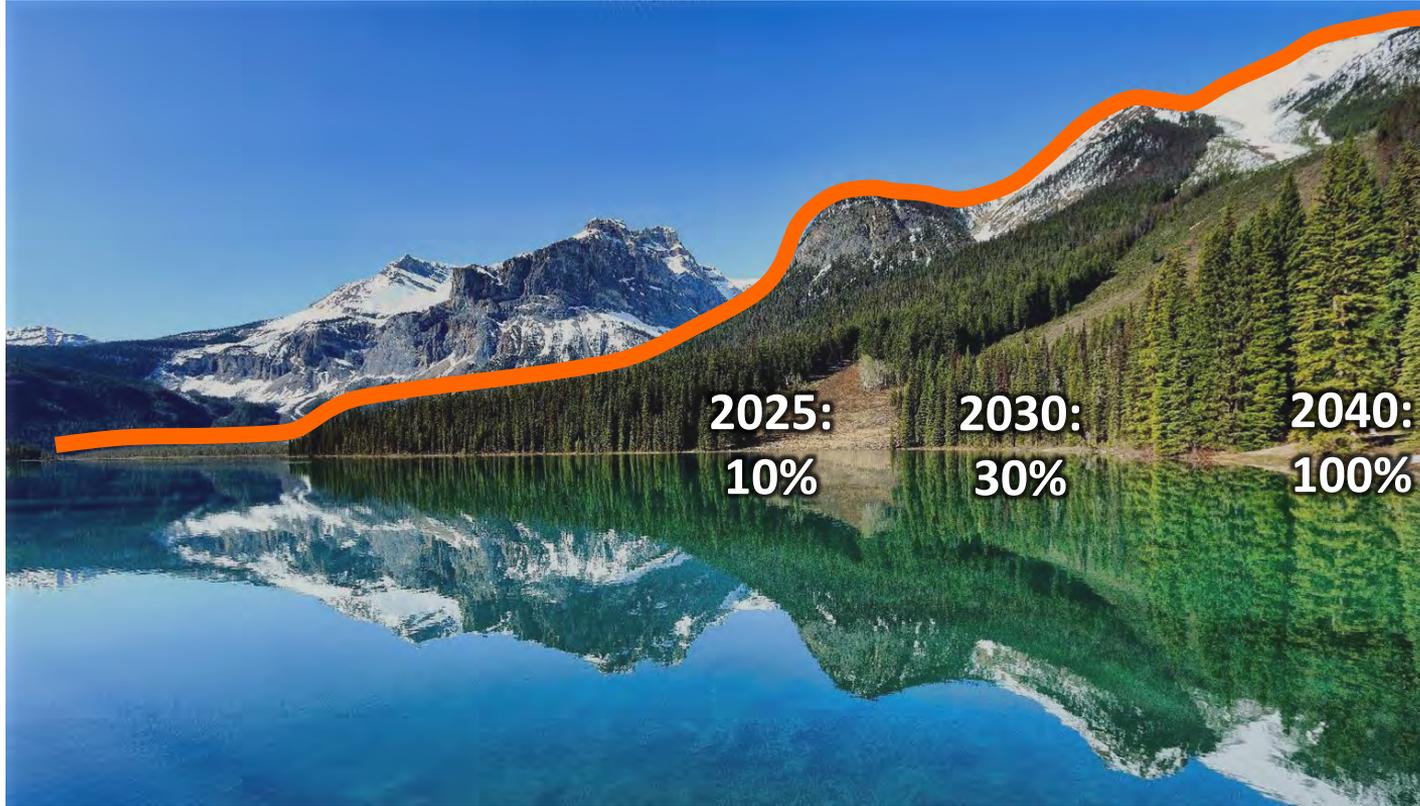
**K**



## BC Carbon Price



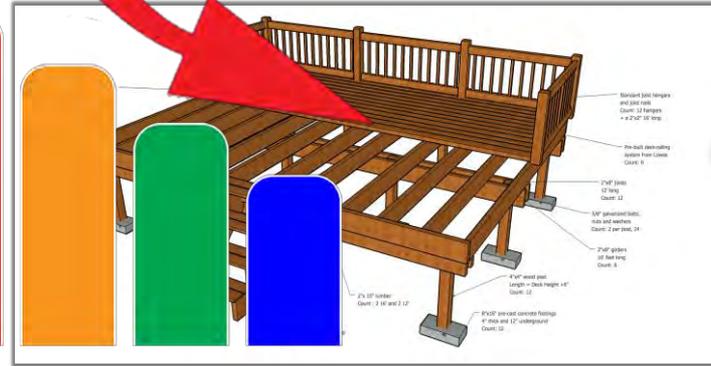
# Zero Emission Vehicle Mandate



# Municipal Context

**LOCAL GOVERNMENT ACT**  
[RSBC 2015] CHAPTER 1

**COMMUNITY CHARTER**  
[SBC 2003] CHAPTER 26





BOWEN ISLAND  
3,680

WEST VANCOUVER  
45,404

Squamish  
19,512

*Under consideration*

NORTH VANCOUVER CITY  
53,474

NORTH VANCOUVER DISTRICT  
87,913

ANMORE  
2,210

BELCARRA  
643

PORT MOODY  
33,551

ELECTORAL AREA A  
16,182

VANCOUVER  
633,138

BURNABY  
232,755

COQUITLAM  
139,338

PORT COQUITLAM  
58,612

PITT MEADOWS  
18,835

*Under consideration*  
MAPLE RIDGE  
82,256

View Royal  
10,408

NEW WESTMINSTER  
70,996

RICHMOND  
198,309

DELTA  
102,248

SURREY  
518,007

LANGLEY CITY  
25,888

*Under consideration*  
LANGLEY TOWNSHIP  
117,890

TSAWWASSEN FIRST NATION  
816

WHITE ROCK  
19,952

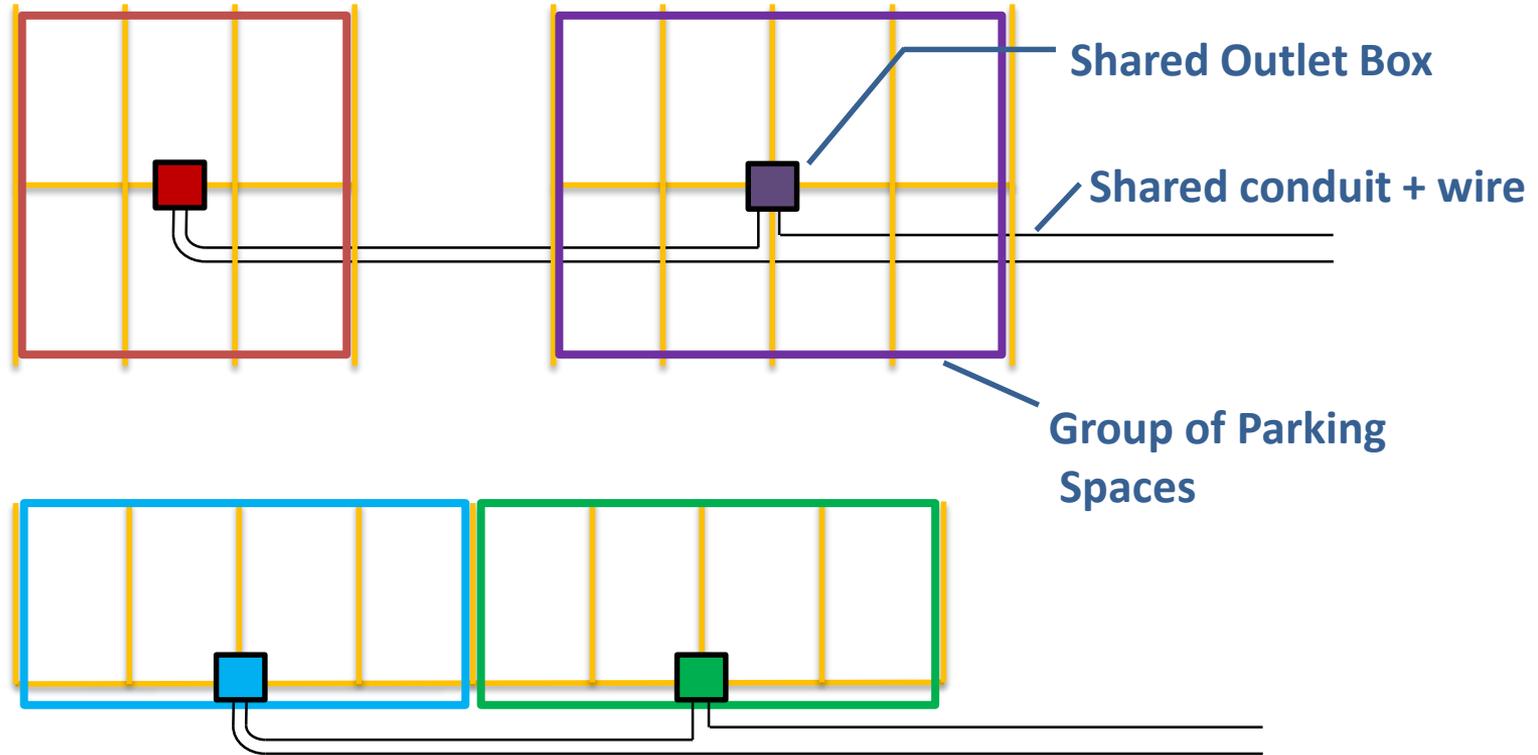


Zoning or Parking bylaw EV charging requirements

# Infrastructure Requirements



# Future Proofing



Introduce Right-to-Charge legislation

UBCM

Union of BC  
Municipalities

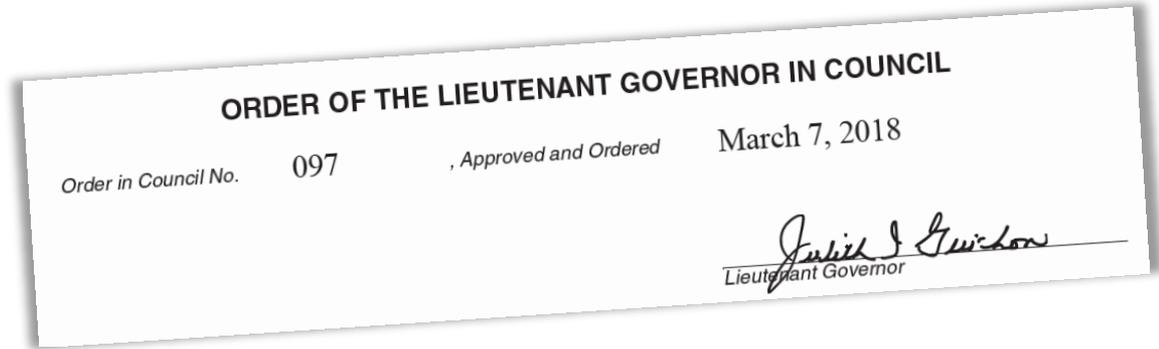


Exempt EV charging from Utilities Commission Act



# Results

- No Right-to-charge (yet), but...

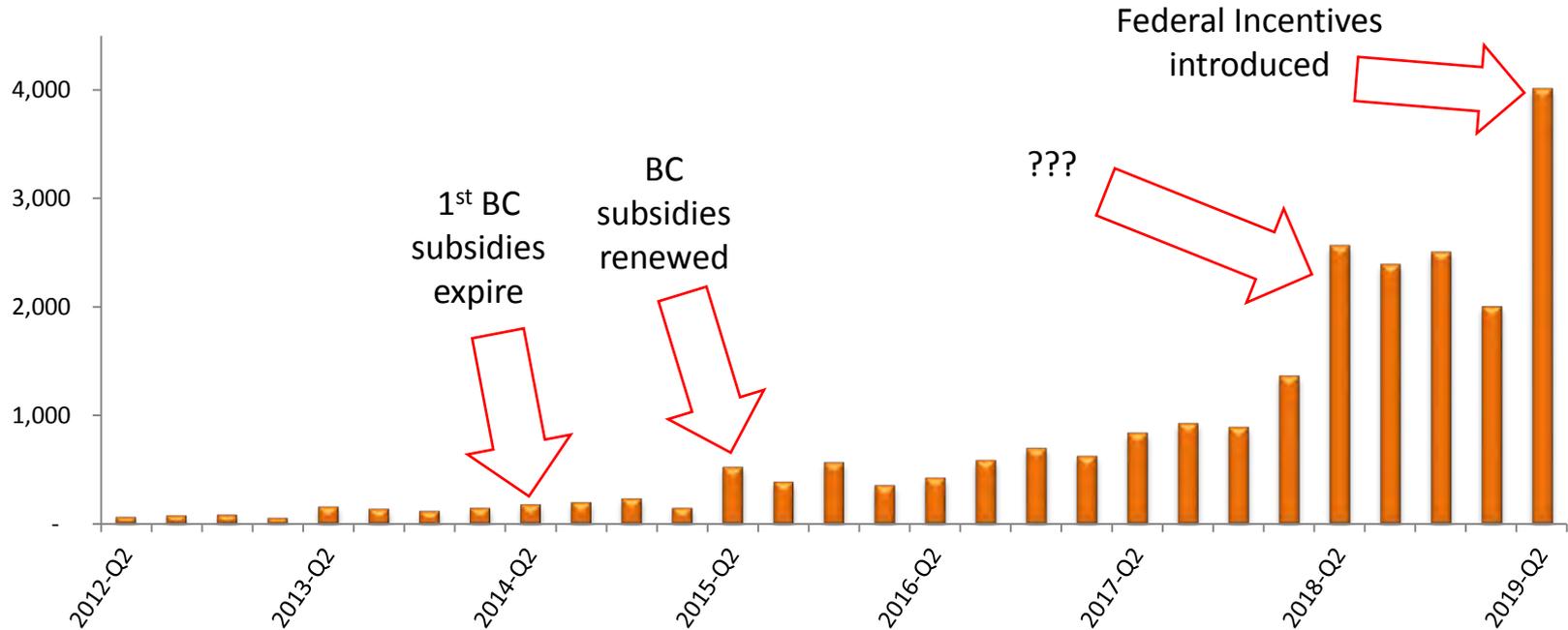


**bcuc**  
British Columbia  
Utilities Commission

Inquiry

# EV Sales Trend

## New Quarterly EV Sales in BC



# Destination 100%





# Plug In BC

[www.pluginbc.ca](http://www.pluginbc.ca)

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