2019 NEG-ECP

Transportation and Air Quality Committee

Report

Conference of The New England Governors

And Eastern Canadian Premiers

September 9, 2019

Saint John, New Brunswick

TABLE OF CONTENTS

PREAMBLE

The Transportation Air Quality Committee (TAQC) is a standing committee of the New England Governors and Eastern Canadian Premiers (NEG/ECP). It was formed in 2007 when the governors and premiers looked to develop transportation policies in order to reduce greenhouse gas (GHG) emissions and to improve air quality. The committee includes both transportation and air quality representatives from each jurisdiction.

The TAQC submitted a Transportation and Air Quality Action Plan (TAQAP) to achieve air quality and other regional goals at the 32nd NEG/ECP Conference in 2008 and updated this plan at the 37th NEG/ECP Conference in 2013. "The principal air quality goal of the Transportation Air Quality Action Plan is to reduce the transportation sector's emission of greenhouse gases in sufficient magnitude to achieve regional targets."[1] The updated TAQAP for 2013-2020 laid out strategies to reduce GHG emissions from the transportation sector, lessen the region's dependence on fossil fuels, and make the region's economy more competitive. In 2015, governors and premiers adopted Resolution 39-1[2], which presented a new regional marker to reduce GHG emissions by at least 35% below 1990 levels by 2030.

These new goals were reflected in the 2017 update of the Regional Climate Change Action Plan (RCCAP), adopted at the 41th NEG-ECP, which is currently being implemented. The plan includes six areas of focus for possible regional actions, including transportation. The transportation component of this plan will explore mode efficiency, intermodality, low-carbon transportation, fuel economy and emissions reductions.

In addition to the RCCAP, the NEG/ECP adopted Resolutions 41-4 and 37-3[3], delegating the TAQC to submit a comprehensive report at the 43rd Annual Conference in 2019. This report references progress in New England and Eastern Canada on the deployment of a regional electric vehicle (EV) fast-charging station road corridor network and on the market penetration of EVs in the region.

The following TAQC report summarizes the collaborative effort of New England and Eastern Canadian jurisdictions' members to identify challenges and opportunities in the deployment of an interoperable EV fast-charging network along highway corridors, maps this progress, and provides EV-related transportation recommendations that help build a collaborative framework that support the deployment of EVs and a reliable EV regional network that provides a consistent and convenient user experience for all EV drivers.

[1] The regional GHG marker are those identified in the Climate Change Action Plan of the NEG-ECP-https://www.coneg.org/wp-content/uploads/2019/01/2017-rccap-final.pdf
[2] Resolution 39-1: Resolution Concerning Climate Change
[3] Resolutions 41-4 and 37-3: Resolution Concerning Transportation

EXECUTIVE SUMMARY

The transportation sector is a significant consumer of fossil fuels and is the New England and Eastern Canada (NE-EC) region's main contributor to GHG emissions, accounting for 40% of the total in 2015.[4] It is also an essential sector to NE-EC as it supports the mobility of the people and goods that travel throughout the region daily.

Governors and premiers, through Resolution 41-4 concerning transportation, have tasked the TAQC with submitting a comprehensive report that discusses the challenges and opportunities associated with deploying a regional EV fast charging station road corridor network and the region's progress in the deployment of EVs including recommendations to reach the 2020 horizon.

EV Profile

The TAQC tracked annual EV registration and sales when calculating the market penetration of alternative fuel vehicles in NE-EC. The number of EVs and fast charging stations across the region has increased drastically from 17,007 to over 87,959 EVs and from 76 to 606 fast-charging stations, between 2015 and 2019. The TAQC will provide the 2020 EV profile at the 45th NEG/ECP conference in 2021.

EV fast-charging station highway road corridors

Direct current (DC) fast-charging stations have been identified across the NE-EC region and mapped. The major travel corridors have been identified on the map, and a growing number of interstate and inter-provincial road corridors provide fast-charging station opportunities for EV travelers. NE-EC jurisdictions will continue to expand and strengthen road corridors to facilitate EV travel within and between states and provinces. The TAQC will continue to update this map, to be used as a tool to identify potential areas for further collaboration to ensure EVs can travel throughout the region.

Recommendations

To increase the market penetration rate of alternative fuel vehicles and to ultimately reduce GHG emissions, the TAQC recommends that the following basic principles guide the action of states and provinces:

- Raising awareness on EVs;
- Making EVs more affordable;
- Ensuring EVs are available;
- Ensuring electric vehicle supply equipment (EVSE) is accessible;
- Putting charging and refueling stations where NE-EC travelers need them; and
- Seizing opportunities for technological advancement, clean jobs and clean growth.

[4] NE-EC GHG inventory 1990-2015

Specific recommendations are grouped under three themes:

1. Interoperability to facilitate the use of EVs and EVSE within and across jurisdictions.
2. Supporting the adoption of EVs and the installation of charging infrastructure.
3. Consistent signage and marketing across jurisdictions.

Next steps

The NE-EC region is progressing toward its goal of increased market penetration rate of alternative fuel vehicles; with coordinated action across jurisdictions, progress can be accelerated. Reducing GHG emissions across the region is a priority for the NEG/ECP, and the TAQC will continue to provide its support to governors and premiers in achieving these goals.

Transportation and Air Quality Committee

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ELECTRIC VEHICLE DEPLOYMENT AND CHARGING STATION CORRIDORS

CONTEXT

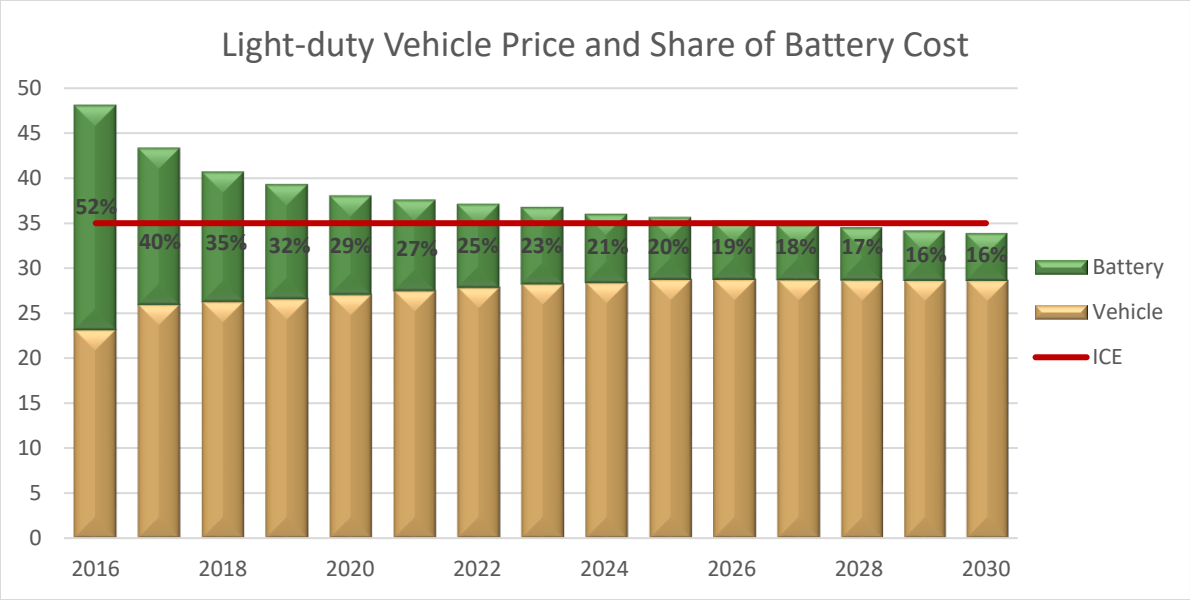
The transportation sector is the largest regional consumer of fossil fuels and is the NE-EC region's main contributor to GHG emissions, accounting for 40% of the total in 2015.[5] It is also an essential sector to NE-EC as it supports the mobility of the people and goods that travel throughout the region daily.

The growth of modern mass-marketed light duty electric vehicles (EVs) is good news for the NE-EC region and for the environment. EVs powered by the grid currently produce 50% less (lifetime) carbon pollution than gasoline cars.[6] Over 50 fully EV models are projected to be on the road by 2020, with many of them traveling within and through the region and into other parts of Canada, and the United States

These trends are being reflected across the globe. The world is transitioning to EVs and zero emission vehicles (ZEVs). Over 200 new models are expected to hit the global market between 2020 and 2022. By 2023, an estimated $255 billion will be invested worldwide by the industry in transitioning to EVs and ZEVs globally.[7]

The price of EVs continues to decline, largely due to battery price reductions, and EVs are expected to reach price parity with internal combustion engine (ICE) vehicles between 2025 and 2027[8].

[5] NE-EC GHG inventory 1990-2015
[6] Union of Concerned Scientists, Cleaner Cars from Cradle to Grave Report, 2015
[7] Alix Partners, Press Release, June 20 2018
[8] Transport Canada



Now more than ever it is paramount that governors and premiers work together to support strategic policies and planning efforts to help build an EV charging network that will meet the region's emerging needs and at the same time work to achieve significant GHG reductions to effectively help combat climate change.

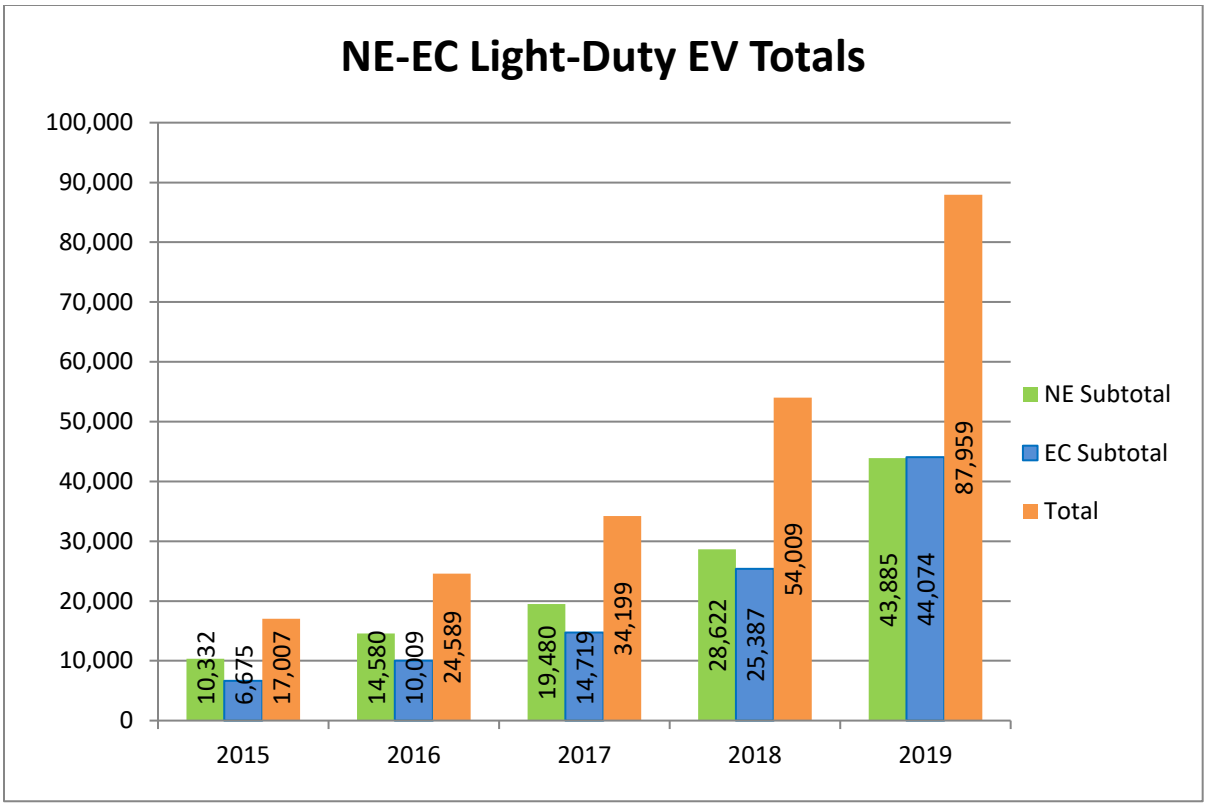
New England and Eastern Canada Electric Vehicle Profiles

The 2013-2020 TAQAP identified a goal of 5% market penetration rate of alternative fuel vehicles by 2020 in the NE-EC region.

The result of the TAQC EV profile data (see Appendix B for specific jurisdictional breakdown) shows that between 2015 and 2019[9] the number of battery electric vehicles (BEVs) and plug-in hybrid vehicles (PHEVs) increased by 417.2% from 17,007 to 87,959 vehicles in the NE-EC region, representing 0.49% in 2019, as a percentage of the total light duty vehicle (LDV) market share.[10]

[9] NE-ECP EV Light-Duty Vehicles as of March 31st, 2019 including 2018 data from Newfoundland and Labrador.

[10] As March 31st, 2019, numbers are estimates, as data comparability is still an issue at the regional level and efforts to standardize it will be ongoing in the years to come.



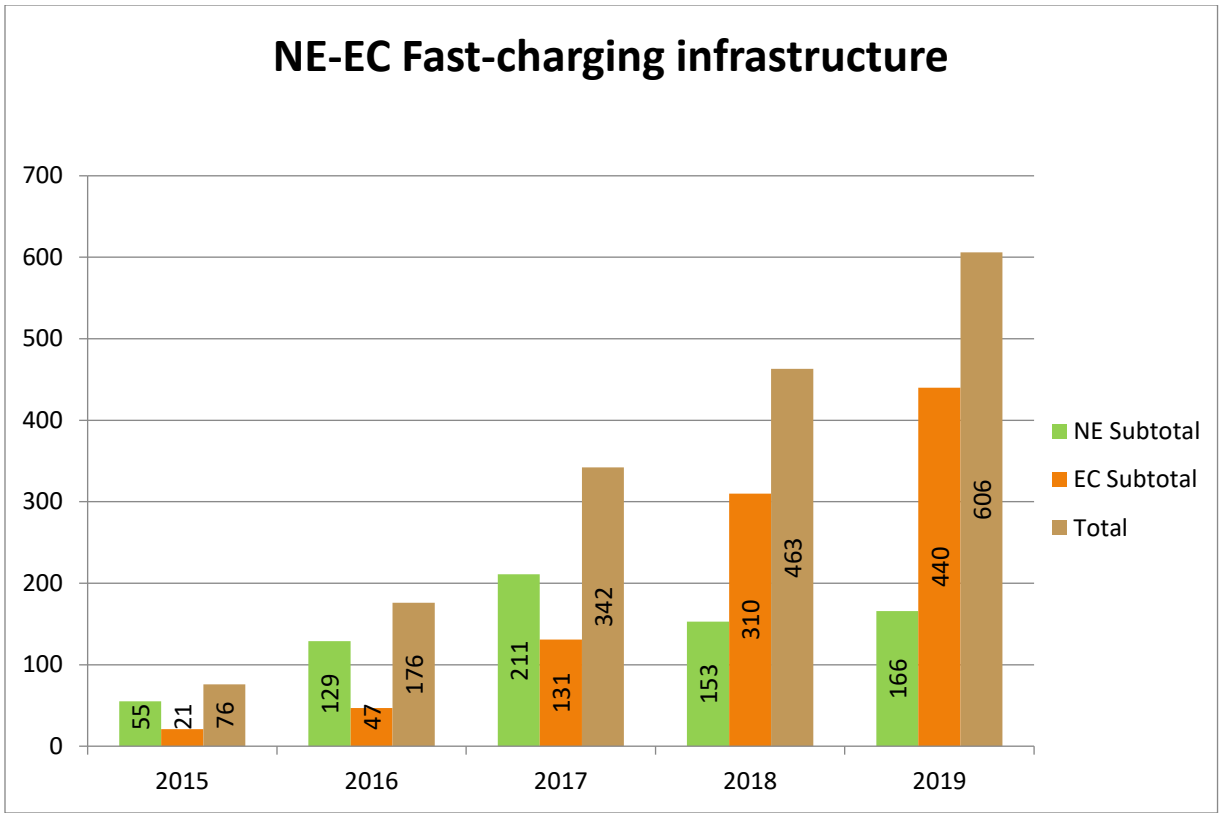
While the region has seen huge steps forward in recent years, more progress will be needed to achieve the 5% market penetration goal set for 2020.

NE-EC Electric Vehicle Charging Station Road Corridor Regional Deployment

As range anxiety is a primary concern for consumers regarding new EV purchases, a strong interconnected network of available charging stations throughout the region has the ability to help instill consumer confidence and encourage EV adoption. While each jurisdiction invests in charging infrastructure that is locally strategic, through TAQC, jurisdictions also consider how electric vehicle supply equipment (EVSE) investments support travel between provinces and states within the region.

The TAQC has identified the following corridor types for early EVSE investment for determining Direct Current fast charging (DCFC) station road corridor locations to facilitate travel within and between jurisdictions:

- Linking major metropolitan centers along high-traffic highways;
- Potential intercity and rural corridor connections; and
- High-density destination and/or tourist locations.



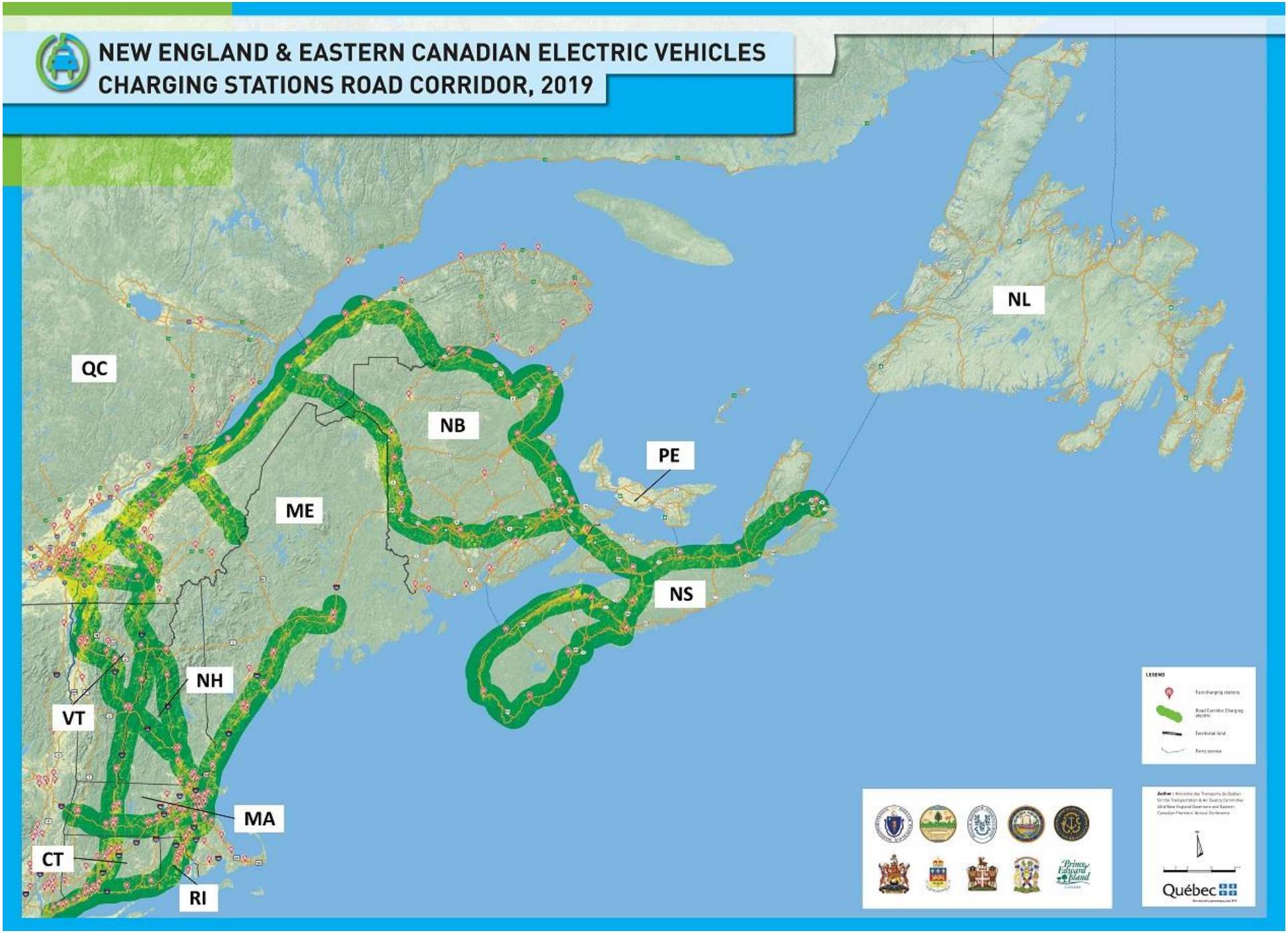
Throughout the NE-EC region, the number of DCFC stations has increased from a total of 76 in 2015 to 606 in 2019.[11]

The locations of these DCFC chargers are included in the "New-England & Eastern Canadian Electric Vehicles Charging Stations Road Corridor" map that can be used as a tool to help identify potential areas for further collaboration to ensure an EV can travel throughout the region with the support of adequate EV fast-charging infrastructure. This map is a living document that was established by the TAQC in response to Resolution 41-4 Concerning Transportation, accepted at the 41st NEG/ECP Conference.

This map provides the deployment status of fast-charging stations on the main New England and Eastern Canada highway road corridors as of March 31st, 2019.[12]

[11] NE-EC EV Fast-charging stations data as of March 31st 2019, including 2018 data from Newfoundland and Labrador.

[12] Source: U.S. Department of Energy: http://www.afdc.energy.gov/locator/stations and CAA: https://www.caa.ca/maintenance/ev-map-fr.htm


NEW ENGLAND & EASTERN CANADIAN ELECTRIC VEHICLES
CHARGING STATIONS ROAD CORRIDOR, 2019
QC
NB
PE
NL
ME
NS
NH
VT
MA
CT
RI
LEGEND
Québec

Challenges, Opportunities and Recommendations to Implementing a Regional Corridor

GUIDING PRINCIPLES

To meet the NEG/ECP goal of 5% market penetration rate of alternative fuel vehicles in 2020, the TAQC recommends that the following basic principles guide the action of states and provinces in the following areas:

Raising awareness of Electric Vehicles

Consumers need to have the facts about EVs before they buy new or used vehicles. Many education and awareness activities are already underway in Canada and the U.S.

Making Electric Vehicles more affordable

Although there has been progress to reduce the cost of EVs and their parts, such as batteries, they still cost more to buy than conventional gasoline vehicles. For more consumers to choose these vehicles, they need to be more affordable.

Ensuring Electric Vehicles are available

The demand for these vehicles is growing. There is a need to have better access to these vehicles and have more models to choose from to suit consumers' needs without long wait times.

Ensuring Electric Vehicle Supply Equipment will be accessible to all

U.S. and Canadian regulations do not currently provide specific accessibility standards for EVSE. Accessibility standards should be considered when planning for future EVSE development.

Putting charging and refueling stations where NE-EC travelers need them

NE-EC jurisdictions should provide infrastructure that is reliable, affordable, and easy for drivers to locate and use, to give travelers the confidence that an EV can provide a similar, if not better, driving experience than a conventional vehicle and is able to get them where they want to go.

Seizing opportunities for technological advancement, clean jobs and clean growth

NE-EC jurisdictions are strategically well-positioned to build on their strengths and expertise to attract EV-related investments. These technologies can bring business and supply chain growth, and offer good job opportunities. This is an opportunity for the region to become recognized as a global leader in zero emission and other innovative vehicle technologies.

Taking actions in all of these areas is vital to meeting the NEG/ECP climate markers, and jurisdictions will need to adapt as the market develops and more EVs are being deployed into LDV fleets. The TAQC will continue to monitor the deployment of EVs across the region and the

growth of DCFC stations along the designated main transportation corridors, and will provide annual reporting and periodic review on regional EV growth.

1. INTEROPERABILITY

Interoperability refers to the ability of different information systems, devices or applications to connect within and across organizational boundaries to access, exchange and cooperatively use data amongst stakeholders. The term "interoperability" within the context of EVSE can refer to multiple issues, including the physical EVSE connectors used to charge EVs, EVSE payment options, communications between EVSEs and charging networks as well as between EVs and EVSEs, communications between EVs and the electric grid, and distance between charging locations.

Additionally, the issue of requiring the use of "open source" systems for communications between EVSE and networks is based on facilitating the ability of EVSE owners to switch networks and preventing EVSE owners from being locked into a specific network. In the U.S. Northeast, this is largely still an unresolved issue.

a. Ensuring functional proximity between charging locations

Development of a network of charging locations, particularly with regards to the development of widespread fast-charging station networks, is generally considered to be critical to the growth of EVSE as a means of addressing "range anxiety" for EV owners.

The U.S. Federal Highway Administration (FHWA), as part of the 2019 FAST Act Alternative Fuel Corridor nominations, established criteria for placement of DCFC EVSE of no more than 50 miles (80.5 km) between stations and no more than five miles (8 km) from the highway. For the development of Maine's DCFC corridor, Efficiency Maine established a similar objective of no more than 50 miles (80.5 km) between fast charging stations. For its EVSE Grant Program, Vermont established criteria to locate new charging facilities within one mile of interstate highway exits.

In Eastern Canada, the DCFC EVSE funded through the Natural Resources Canada's Electric Vehicle and Alternative Fuel Infrastructure Initiative are located approximately 40.4 miles (65 km) apart along highways, and are within 0.6 miles (1 km) of the highway. Typically, jurisdictions aim to locate EVSE less than 62 miles (100 km) apart along highway corridors.

Recommendation: *Establish a maximum 100 km or 62 miles distance between DC fast chargers along the NE-EC highway corridors by 2025.*

b. Ensuring consistent charging equipment

Ensuring charging locations are equipped with compatible EVSE plug connectors will enable EVs to be charged at every location. There are currently a number of different types of EVSE plug connectors in use with universal connectors common to Level 1 and 2 charging systems. Conversely, competing technologies are currently found for fast charging systems. The Society of Automotive Engineers (SAE) "J1771" has generally been established as the standard plug connector for Level 1 and Level 2 charging. For DCFCs (Level 3 charging systems), two plug types, the CHAdeMO and SAE Combined Charging System (CCS), are currently utilized for non-Tesla DCFC systems.

In the U.S. there has been no consensus on establishing one standard plug connector for DCFCs and in some instances that has delayed rollout of the stations. Procurement processes require uniform procedures and without a standard connector agreed upon between utilities, car manufacturers and EVSE suppliers, some states are hesitant to invest large amounts of money into a system that all users would not be able to utilize. These same issues do not exist in Canada. For example, Natural Resources Canada, Hydro-Québec, New Brunswick Power and Nova Scotia Power all have set procurement standards.

The primary charging networks in Eastern Canada have Level 2 and Level 3 fast chargers, which are manufactured with CHAdeMO and SAE Combo duo chargers.

Recommendation: Establish a NE-EC framework where all future government-funded DC fast charging infrastructure along NE-EC highway corridors will be CHAdeMO and SAE CCS.

c. Ensure utility accessibility and supply can accommodate fast charging, and greater loads in the future

To ensure the continued viability of EVSE networks with further technological advances, new investments should be designed to accommodate the development of batteries that can accept faster charges. Within the development of longer-range batteries and faster charger capabilities, the latest technologies include 350 kW stations capable of estimated charging ranges of 20 miles (32 km) per minute. This represents a significant increase over the current norm of 50 kW stations capable of providing a charging rate of about 3 miles (5 km) per minute. Additionally, Level 2 charging should also be considered as a backup to DCFC systems in order to provide available charging for vehicles not equipped with DCFC capabilities.

Recommendation: Ensure that new EVSE investments accommodate to the extent practicable technological advancements, while continuing to consider the needs of all EVSE drivers.

d. Open access and pricing transparency

Open access and pricing transparency for EVSE involves the need for EV drivers to be provided with pricing information in advance of the charging session such as unit of sale, the per unit price and the presence of additional fees. EV drivers should never be stranded at a public charging location where they cannot actually charge or cannot easily determine how much it costs to charge their vehicle. Some states, such as Massachusetts and New Hampshire, have specific laws that prohibit an owner or operator of a public charging station from requiring a membership or subscription fee for use of a charging station, and requires that charging stations support multiple payment options. Additionally, DCFC stations should provide information on the power level of the station. This information can be provided via the station itself or through the charging station website from a smartphone application.

Recommendation: *The NE-EC region will explore collaboration to seek harmonization to access, payment, and pricing transparency at EV charging stations for all EV drivers without restrictions based on network membership or subscription in order to support current or would-be EV drivers.*

2. SUPPORT

a. Supporting the adoption of EVs and the installation of charging infrastructure and identifying funding to support expanding the EV network.

Currently EVs have a relatively small market share, but sales are increasing rapidly, with significant implications affecting consistent and reliable EV travel within states and provinces in the region. According to a recent survey of prospective car buyers in the Northeast U.S., two of the top concerns about EVs are the availability of charging locations and the time to recharge.[13] Many provinces and states are working to meet the projected EV infrastructure demand by leveraging funds and resources from electric utilities to install EV chargers in high traffic areas, along busy transportation corridors and where they believe EV drivers will use them the most. Some states have outlined plans to install charging stations in underserved communities and areas that suffer the highest impact from air pollution—most often low-income areas and minority communities—understanding that equity and access are important principles to bring clean transportation to all.

Recommendation: *States and provinces can help identify sites or site owners to host DC fast chargers along transportation corridors and should consider the role of EV policies and identify EV funding at the local, state/provincial and federal levels to ensure continued acceleration of the EV market. Additional investments from employers, businesses, automakers, EVSE providers and utilities should be pursued and supported by the states and provinces to continue regional EV infrastructure development.*

[13] Edelman Intelligence, Electric Vehicle Audience and Benchmark Survey, January 2017.

b. EV Funding programs (federal, private, provincial/state etc.)

Many states and provinces have implemented financial incentive programs to offset the higher purchase price of EVs and the installation costs of charging stations. The adoption of financial incentives for EVs has a significant effect on total EV sales (Appendix B lists EV incentive programs by jurisdiction).

U.S. Internal Revenue Service: The Internal Revenue Service offers an EV tax credit of $2,500 to $7,500 per new EV purchased in the country. This tax credit is set to phase out for each manufacturer after the company has sold 200,000 EVs. Tesla and General Motors have already hit 200,000 units and unless there is a modification to the policy, the tax credits for EV models from these carmakers will be gradually reduced and possibly eliminated altogether.

Canada's purchase and lease incentives: The Government of Canada provides a point-of-sale incentive of up to $5,000 for consumers to buy or lease an eligible zero-emission vehicle, including battery electric, longer-range plug-in hybrid, and hydrogen fuel cell vehicles.[14]

VW Settlement Funds: In 2017, the U.S. Department of Justice entered into a settlement with Volkswagen (VW) resulting in VW paying $2.7 billion in damages for equipping diesel vehicles with devices that falsified emissions testing. Up to 15 per cent of each state's total settlement funds may be specifically dedicated, at the state level, for expanding EV charging networks. Through its wholly owned subsidiary "Electrify America", VW has also agreed to invest $2 billion over 10 years to support increased use of zero emission vehicle technology in the US, including development, construction, and maintenance of zero emission vehicle-related infrastructure. Electrify America has begun installing Level 2 and DCFC stations throughout many Northeast states and is currently implementing their second phase of investments.

Electric Vehicle and Alternative Fuel Infrastructure Initiative: The Government of Canada is investing $96.4 million in the installation of EV fast charging, natural gas, and hydrogen fuel cell EV stations.[15] The program pays for approximately half of the project cost, to a defined maximum per station type. This program aims to invest in over 900 EV fast chargers, 24 natural gas stations, and 15 hydrogen fuel cell stations. This program contributed to 20 EV stations in NB, 12 in NS and 100 in Québec, with six more planned in PEI by late 2019.

Recommendations:
States and provinces should consider the role of EV policies and EV funding at the local, state/provincial and federal levels to ensure continued acceleration of the EV market.

States and provinces that make direct investments in DCFC deployment along the main transportation corridors should consider targeting locations that are necessary for seamless

[14] Government of Canada. Zero-Emission Vehicles. Retrieved from: http://www.tc.gc.ca/en/services/road/innovative-technologies/zero-emission-vehicles.html
[15] Natural Resources Canada. Electric Vehicle and Alternative Fuel Infrastructure Initiative. Retrieved from: https://www.nrcan.gc.ca/energy/alternative-fuels/fuel-facts/ecoenergy/18352

interstate/interprovincial travel but that are unlikely to attract private or utility investment in the near term. Additional EV investments from employers, businesses, automakers, EVSE providers and utilities should be pursued and supported by the states and provinces to continue the regional development of EV charging infrastructure networks.

3. SIGNAGE AND MARKETING

Appropriate and effective EV signage helps EV drivers navigate to EV charging locations and helps facilitate deployment of EVs by providing visibility for charging infrastructure to prospective EV drivers.

a. Signage to identify EV charging infrastructure

Within the U.S. there is guidance from the FHWA that has been issued regarding signage for alternative fuel corridors and the use of directional wayfinding signage. The white electric gas pump with the blue letters "EV" within the outline of the gas pump is approved by the FHWA and is the most commonly used sign in the U.S. to help identify EV charging stations. FHWA has stated that signs posted on Alternative Fuel Corridors are not required and FHWA has stressed the importance of states working with their state departments of transportation on the development of alternative fuel corridor signage packages. Due to variations in local EV signage regulations, the *U.S. Manual on Uniform Traffic Control Devices for Streets and Highways* has also offered recommendations to help with EV signage continuity. Several Northeastern states have used U.S. federal funding from the Congestion Mitigation and Air Quality Improvement program (CMAQ) to purchase EV corridor designated signs along approved alternative fuel corridors. Without a dedicated funding stream, it has been difficult for many Northeastern states to fund EV corridor wayfinding signs. In addition, several Northeastern states have been hesitant to install EV corridor signage because they believe the signage could be misleading by implying that EVs are not practical unless you are driving on a designated fuel corridor.

New Brunswick uses a bilingual version (EV/VE) of this sign.

Québec has its own distinct signage for EV programs and charging stations as shown below

Recommendation: *States and provinces should continue to deploy effective EV charging station signage along travel corridors, and other locations as needed, to increase range confidence among EV drivers and increase the visibility of EV infrastructure to non-EV drivers.*

b. Marketing the designated EV corridors

The marketing of EV corridors between the Northeastern states and Canadian provinces will help to build consumer confidence in the strength of the region's charging network and attract additional infrastructure demand and investment. Many of the Northeastern states are working with the Northeast States for Coordinated Air Use Management (NESCAUM) on a consumer, brand-neutral EV awareness campaign called *Drive Change. Drive Electric*. It may be cost-effective to take an existing campaign that is fully operational and hand them the tools to market the NEG/ECP regional corridor.

Recommendation: *States and provinces should encourage their Departments of Tourism and Economic Development or other key partners to promote the regional EV corridor.*

NEXT STEPS

The TAQC will continue to monitor the deployment of EVs across the NE-EC region and the growth of DC charging stations along the designated main transportation corridors, and will be able to provide the 2020 EV profile for the 45th NEG/ECP in 2021.

CONCLUSION

The world is transitioning to electric and zero emission vehicles.
The transportation sector is responsible for a large share of the NE-EC region's GHG emissions.
New England Governors and Eastern Canadian Premiers are taking action to reduce GHG emissions by at least 35% below 1990 levels by 2030.

To assist in the fulfillment of this and other NEG/ECP goals, the TAQC has tracked the ever-increasing market penetration of EVs in the region's total LDV fleet from 17,007 in 2015 to 87,959 on March 31st, 2019 and has presented guiding principles and recommendations to further increase the number of alternative fuel vehicles in the region.

TAQC recommendations fall within the themes of:

- Raising awareness of EVs;
- Making EVs more affordable;
- Ensuring EVs are available;
- Ensuring EVSE will be accessible to all;
- Putting charging and refueling stations where NE-EC travelers needs them; and
- Seizing opportunities for technological advancement, clean jobs and clean growth

The TAQC has developed a map of the EV fast charging stations along major highway corridors across the region. The TAQC will continue to update this map, to be used as a tool to identify potential areas for further collaboration to ensure EVs can travel throughout the region.

The TAQC will monitor in the coming years the deployment of EVs in vehicle fleets and the ancillary fast charging stations road corridors, and will provide the 2020 EV profile at the 45th NEG/ECP conference in 2021.

The TAQC will continue to support the NEG/ECP in its collective effort to reduce GHG emissions across the region, and will provide progress and periodic reviews to determine what adjustments may be needed to reach NEG/ECP objectives.

APPENDIX A: ELECTRIC VEHICLE PROFILES 2015-2019 BY JURISDICTION

1. LIGHT-DUTY EV TOTALS

Light-duty fleet (LDF) refers to all on-road vehicles in public, commercial, and government fleets that are under 8500 lbs gross weight vehicle rating, and includes passenger vehicles, vans, and trucks, but excludes mopeds and motorcycles. Light-duty EVs fall under this definition and do not include "Neighborhood Electric Vehicles" or "non-plug-in hybrid vehicles."[16]

Jurisdictions	2015	2016	2017	2018	2019	% growth 2015-2019
CT	2344	4878	5930	7986	9 273[17]	295.6%
ME	757	906	945	1 359	2 897	282.7%
MA	5260	6400	9471	13 491	23 076	338.7%
NH	585	676	809	2 097	3 312	466.2%
RI	444	584	803	1 362	2 342	427.5%
VT	942	1136	1522	2 445	2 985	216.9%
NE Subtotal	**10 332**	**14 580**	**19 480**	**28 622**	**43 885**	**324.7%**
NB	28	48	73	119	178	535.7%
NL	233	316		425	425[18]	82.4%
NS	30	120		133	223	643.3%
PEI		22	22	16	26	2600.0%
QC	6384	9 503	14 624	24 694	43 222	577.0%
EC Subtotal	**6 675**	**10 009**	**14 719**	**25 387**	**44 074**	**560.3%**
Total	**17 007**	**24 589**	**34 199**	**54 009**	**87 959**	**417.2%**

[16] NE-ECP EV Light-Duty Vehicles as of March 31st, 2019 including 2018 Newfoundland and Labrador data.

[17] Connecticut data was revised in 2019 to update historical estimates with quality assured data from the Department of Motor Vehicles.

2. EV FLEET PENETRATION 2019				
Jurisdictions	**EV 2019**	**LDF Total**	**EV% of LDF**	**Population**
CT	9 273	2 622 185	0.35%	3 589 182
ME	2 897	1 060 568	0.27%	1 338 404
MA	23 076	5 031 688	0.46%	6 811 779
NH	3 312	1 315 174	0.25%	1 342 795
RI	2 342	702 916	0.33%	1 099 673
VT	2 985	537 982	0.55%	626 299
NE subtotal	**43 885**	**11 270 513**	**0.39%**	**14 808 132**
NB	178	611 588	0.03%	759 655
NL	425	338 257	0.13%	520 462
NS	223	647 549	0.03%	957 600
PEI	26	29 167	0.09%	151 535
QC	43 222	5 237 572	0.83%	8 390 500
EC subtotal	**44 074**	**6 864 133**	**0.64%**	**10 779 752**
NE-EC Total	**87 959**	**18 134 646**	**0.49%**	**25 587 884**

3. CHARGING INFRASTRUCTURE

The data in this table reflect publicly accessible *unique charging sites* within each jurisdiction, rather than individual ports or connections. A location that has both Level 2 and DC fast charging (Level 3) are recorded in both columns.

Jurisdictions	2015 Level II	2015 Level III	2016 Level II	2016 Level III	2017 Level II	2017 Level III	2018 Level II	2018 Level III	2019 Level II	2019 Level III	% growth Level III 2015-2019
CT	160	13	207	28	277	29	284	38	304	43	230.8%
ME	31	4	64	6	151	32	120	13	145	16	300.0%
MA	298	27	390	46	447	48	503	60	559	63	133.3%
NH	53	3	87	33	107	44	73	10	103	10	233.3%
RI	60	0	73	6	74	11	73	8	79	8	800.0%
VT	47	15	47	15	131	26	138	23	178	26	73.3%
NE Subtotal	**664**	**55**	**871**	**129**	**1 169**	**211**	**1 195**	**153**	**1 367**	**166**	**201.8%**
NB	27	0	46	0	66	0	95	19	95	26	1 900.0%
NL	50	0	60	0			70	0	70	0	0.0%
NS	45	2	78	2			100	14	100	14	600.0%
PEI			21	0	26	0	26	0	28	0	0.0%
QC	446	19	1 015	45	1 713	131	2 947	277	3 874	400	2 005.3%
EC Subtotal	**568**	**21**	**1 220**	**47**	**1 805**	**131**	**3 238**	**310**	**4 167**	**440**	**1 961.9%**
Total	**1 232**	**76**	**2 091**	**176**	**2 974**	**342**	**4 433**	**463**	**5 534**	**606**	**697.4%**

NE-EC EV Fast charging stations data as of March 31st 2019, including Rhode Island and Newfoundland and Labrador 2018 data.

Variations in data collection methods among some NE states account for the sudden decline in 2017-2018 EV Fast charging site totals

Some EV site totals have been updated to reflect quality assured information relating to chargers and associated level of classification

APPENDIX B: ELECTRIC VEHICLE INCENTIVE PROGRAMS IN NEW ENGLAND AND EASTERN CANADA

State/Province	Description	$ Value
Transport Canada	Zero Emission Vehicle Incentive program for EVs or Hydrogen fuel cell vehicles with a manufacturer's suggested retail price lower than $45,000. Program will be effective on May 1st, 2019. Zero emission vehicles (ZEVs), including EVs, are also eligible for a 100% tax write-off to support business adoption as of May 1st, 2019. Eligible ZEVs include battery electric, plug-in hybrid (with a battery capacity of at least 15 kWh) or hydrogen fuel cell vehicles, including light-, medium- and heavy-duty vehicles purchased by a business. Capital costs for eligible zero-emission passenger vehicles (e.g., cars and SUVs) will be deductible up to a limit of $55,000 plus sales tax.	Tax rebate- Up to $5,000
Prince Edward Island	In 2019, Prince Edward Island began offering free vehicle registration for electric and plug-in electric vehicles	Avoided costs for motorists: $80
Connecticut	CT Hydrogen and Electric Vehicle Purchase Rebate (CHEAPR) program	Point of sale rebate up to $5,000 for the purchase or lease of a ZEV: $5,000-any fuel cell electric vehicle; $2,000-BEV with 200 miles or more of range; $1,500-BEV 120-199-mile range; $1,000- PHEV 45 miles or more of range; $500-BEV less than 120 miles and PHEV less than 45 miles of range
Massachusetts	Vehicles: https://www.mass.gov/how-to/apply-for-massevip-fleets-incentives Chargers and EVs: https://www.mass.gov/guides/volksw	For cities/towns/state agencies/public universities: Per Vehicle Incentive BEV Purchase: Up to $7,500 / Lease Up to $5,000

	agen-diesel-settlements-environmental-mitigation	Per Vehicle Incentive PHEV Purchase: Up to $5,000 / Lease: Up to $3,000 Per Vehicle Incentive ZEM Purchase: Up to $750
Vermont	VT Bill H.529, Section 34 contains an EV incentive program requiring VTrans, in consultation with other organizations, to spend at least $1.1 million on EV purchase and lease rebate programs. This program applies to new PEVs and BEVs with base MSRP of $40,000 or less and limited to households at or below 160% of the median household income.	While the VTrans is currently determining the incentive amount, it is anticipated to range from $2,500 to $,5000, depending on income
Québec	Roulez Vert program Budget: $434 Million for 2019-2021 Target: 66 000 EV sales	Up to $8 000 for a maximum $60 000 EV price for 2019-2021 $4 000 for a used EV $600 for a Level II charging stations at home $5 000 for workplace charging stations
U.S. Internal Revenue Service	The Internal Revenue Service offers an EV tax credit of $2,500 to $7,500 per new EV purchased in the country. This tax credit is set to phase out for each manufacturer after the company has sold 200,000 EVs.	Tax credit of $2,500 to $7,500

APPENDIX C: ELECTRIC VEHICLES AND CHARGING STATION DEFINITIONS

- Light-Duty Vehicle (LDV) is a motor vehicle having a gross vehicle weight rating of no more than 8,500 pounds (3,860 kg)

- Types of Electric Vehicles
    - Plug-In Electric Vehicle (PEV) a generic term for any vehicle that uses electricity to power the motor for propulsion including the wiring capacity to recharge from an external source.
    - Battery Electric Vehicle (BEV) powered solely by an electric battery and has an electric motor rather than a conventional internal combustion engine (ICE).
    - Plug-In Hybrid Electric Vehicle (PHEV) combines two propulsion modes in one vehicle – an electric motor that is battery powered and can be plugged in and recharged, and a gasoline engine that can be refueled with gasoline.
    - Zero Emission Vehicle (ZEV) is a vehicle that does not produce tailpipe emissions when it is in operation. Examples include electric vehicles and hydrogen fuel cell electric vehicles, operating either on electricity or hydrogen, respectively.

- Electric Vehicle Supply Equipment (EVSE)-commonly called an electric vehicle charger
    - Level 2 Charger (240-volt outlet)-Chargers are sold separately from the car and are available for home and public stations; is compatible with most commercially available EVs. Charge rate: ~25 miles (40 km)/hour on most vehicles
        - SAE J1772-The most common connector used on Level 2 public charging stations in Canada and the U.S.A; is compatible with all vehicle manufacturers.
    - Direct Current Fast Charger (DCFC) /Level 3 (outlet capacity varies)-Requires dedicated equipment that is capable of handling at least a 480-volt direct current. It is the quickest means to recharge a vehicle but not all EVs can support DC fast charging. DC charge rate: capable of charging up to 80% of EV's battery in ~20 minutes for most vehicles
        - SAE Combo CCS: Compatible with American/European EV models: Chevrolet Bolt, BMW i3, Mercedes EQ, Volkswagen e-Golf etc. Charge rate: ~65 miles (105 km)/20 minutes
        - CHAdeMO: Compatible with Asian EV models: Nissan Leaf, Mitsubishi I-Miev, etc. Charge rate: ~67 miles (107 km)/30 minutes
        - Tesla Supercharger: Proprietary to Tesla vehicles only. Charge rate: ~130 miles (209 km)/20 minutes

- Smart Charging- EVSE equipped with energy data collection and management functionality as well as access control features such as credit card or radio-frequency

identification card activation. Chargers must be equipped with a communications platform, such as cellular or Wi-Fi connectivity.

- Networked Charging- EVSE that is smart and is part of a larger, often subscriber based, network such that EV drivers who are part of the network can access any charging station within the network.