

House of Commons' Standing Committee on Environment and Sustainable Development (ENVI)

Study on Zero Emission Vehicles

The case for EV adoption and a Canadian EV industry

Submission from Electric Mobility Canada

Presented by Daniel Breton

President and CEO

November 25, 2020



Thank you for the opportunity to address your committee on the critically important issue of achieving Canada's zero emission vehicle sales targets.

Founded in 2006, Electric Mobility Canada is a national membership-based not-for-profit organization dedicated exclusively to the advancement of electric mobility as an exciting and promising opportunity to fight climate change, air pollution and stimulate and support the Canadian economy.

EMC is one of the very first organizations dedicated to electric mobility in the world.

EMC has more than 220 member organizations including utilities, vehicle manufacturers, infrastructure providers, tech companies, research centers, governmental departments, cities, universities, fleet managers, unions, environmental NGOs and EV owners' groups.

The EMC team works on electric mobility from bikes to cars, from buses to boats, from trucks to trains and from coast to coast.

Daniel Breton

President and CEO - Président et directeur général

Executive summary

Climate change and EV technology

While the government of Canada has already announced its intention to respect and even surpass its Paris accord target for 2030 (-30% in 2030 from 2005 emissions) and the federal government will soon present a climate plan, GHG emissions in Canada were up 20.9% between 1990 and 2018 and are presently at the same level as 2005.

Between 1990 and 2018, GHG emissions from cars and light trucks went from 64.04 Mt CO₂ eq to 89.26 Mt CO₂ eq, a rise of **40%**. In fact, GHG emissions from transport may soon be **the #1** source of GHG emissions in Canada.

Canada is the **#1 country in the world** for GHG emissions per kilometer driven by its light duty vehicle fleet. So there is a lot of room for improvement.

While GHG emissions from transport are on the rise, GHG emissions from the electricity sector have decreased from 119.33 Mt CO₂ eq. from 2005 to 64.25 Mt CO₂ eq in 2018, a decline of 46%.

EVs are cleaner than gas vehicles everywhere in Canada. During their whole life they emit 35% to 55% fewer GHG emissions than gas vehicles in Québec and 10% to 20% less in Alberta. As Alberta electric grid gets cleaner, the difference between GHG emissions from electric vehicles and gas vehicles will grow larger.

A 40 kWh Nissan Leaf emits 50% less GHG emissions in the US than a 7.2 L/100 km compact car in his lifetime. A Tesla Model 3 Long Range emits 43% less GHG emissions in the US than a 7.2 L/100 km compact car in his lifetime.

Between 2013 and 2019, GHG emissions from battery manufacturing have gone from 175 kg/kWh to an average of 75 kg/kWh, a decline of 60%.

In 2024-2025, new battery technology will make battery prices go down more than 50% while energy density (and range) will go up more than 50%.

Air pollution / health / health costs

According to the WHO, ambient air pollution accounted for an estimated 4.2 million deaths per year in 2018 due to stroke, heart disease, lung cancer and chronic respiratory diseases. Air pollution is the **#1 killer** on the planet... by far.

Health Canada estimates the number of annual mortalities in Canada linked to air pollution from human sources to be **14,600 deaths** per year: **7.5 times** the death toll of motor vehicle accidents.

In 2017, transport represented **53.9%** of the total **carbon monoxide** emissions in Canada. Passengers cars, motorcycles, light trucks, large trucks and buses represented **30.5%** of total emissions. It represented **51.7%** of total nitrogen oxides emissions in Canada. Passengers cars, motorcycles, light trucks, large trucks and buses represented **21.9%** of total carbon nitrogen oxides emissions in Canada.

According to a 2019 report from Health Canada, the total annual economic value of health outcomes associated with air pollution is approximately **\$114 billion a year**.

Jobs & innovation

By 2030, 559,400 clean jobs are expected to be created. Almost 50% of them will be in clean transport.

Companies from BC to Nova Scotia are invested in electric mobility, from cars to buses, from utilities to infrastructure providers, from mining to R & D.

\$190 billions in sales revenue between 2021 and 2030

Between 2021 and 2030, expected revenue from sales of EVs, electric buses, electric trucks, charging infrastructure, electricity, etc. amounts to close to \$190 billions. (For more info, go to the long version of this document)

ZEV mandate

According to the new StatsCan EV sales data, ZEV sales were at 3.5% of all light duty sales for the first half of 2020 in Canada. Canada ZEV sales targets are: 10% by 2025, 30% by 2030 and 100% by 2040. Unless regulation is adopted, Canada won't be able to meet its EV adoption targets. Since Canada wants to be the world leader in clean technology companies, a ZEV mandate is unavoidable to send a clear message to businesses around the world that it wants to support the shift towards EVs, from light to heavy duty.

Despite a federal ZEV purchase incentive in place, it can still be very challenging to find an EV as only **33% of dealers in Canada** have at least one EV in stock. Outside of Quebec, BC and Ontario, fewer than **20% of dealerships** have at least one EV on their lot. So, to their claim, OEMs are **not** responding to consumer demand.

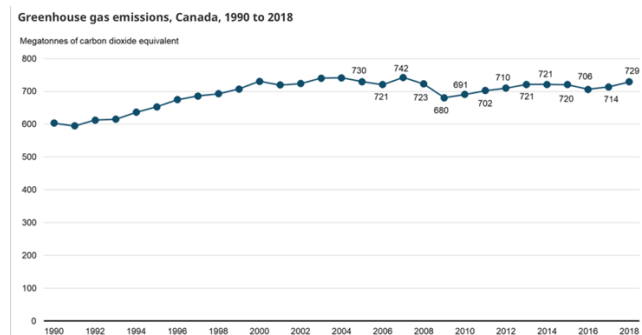
In fact, dealers who want to sell EVs and don't have any in stock end up having to try to dissuade customers in order to meet their sales targets.

Related data, statistics and references

Climate change

1- GHG emissions in Canada: + 20,9% between 1990 and 2018

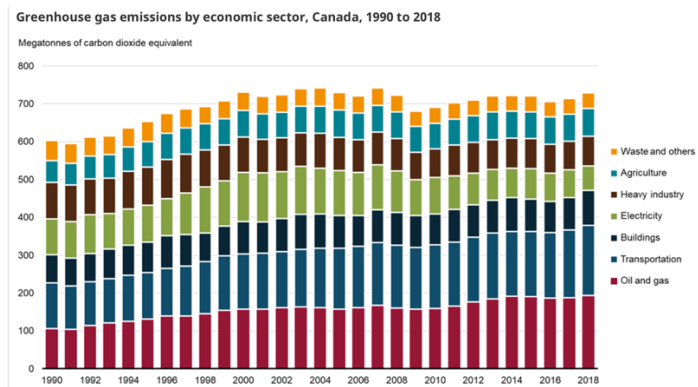
According to Environment and Climate Change Canada, “between 1990 and 2018, emissions increased by 20.9%, or 126 Mt CO₂ eq. Canada's emissions growth over this period was driven primarily by increased emissions from mining and upstream oil and gas production as well as transport.”¹ Between 2005 and 2018, GHG emissions have essentially stayed the same with 730 Mt eq. CO₂ in 2005 and 729 Mt eq. CO₂ in 2018.



2- Transport and oil & gas: 52% of Canada’s GHG emissions

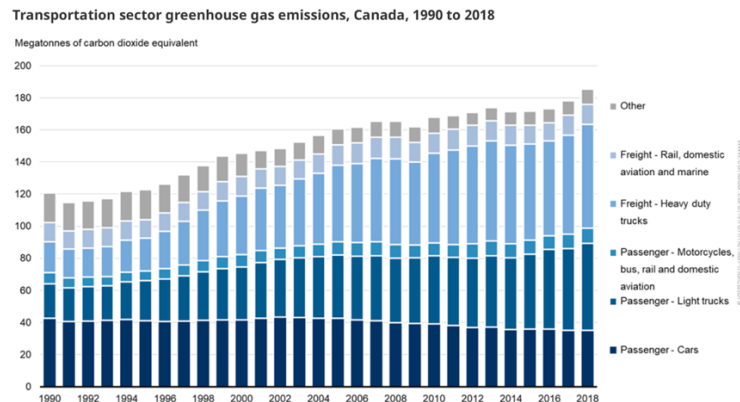
According to ECCC, in 2018, the oil and gas sector and transportation sector were the largest GHG emitters in Canada. Together, they accounted for 52% of total emissions.

In 2018, the oil and gas sector was the largest source of GHG emissions, accounting for 26% of total national emissions at 193 Mt CO₂ eq. In 2018, the transportation sector was the second largest source of GHG emissions, accounting for 25% at 185 Mt CO₂ eq.



3- GHG emissions from the transport sector are increasing

- Between 1990 and 2018, GHG emissions from cars and light trucks went from 64.04 Mt CO₂ eq to 89.26 Mt CO₂ eq, a rise of 40%. While GHG emissions from cars have gone down by 17% during the same period, GHG emissions from light trucks have increased by 150.42%. GHG emissions from heavy duty trucks have also gone up 233.47% between 1990 and 2018



4- Transport may soon become #1 source of GHG emissions in Canada

Between 2017 and 2018, GHG emissions from the transport sector has risen **50%** more quickly the GHG emissions from the oil and gas sector:

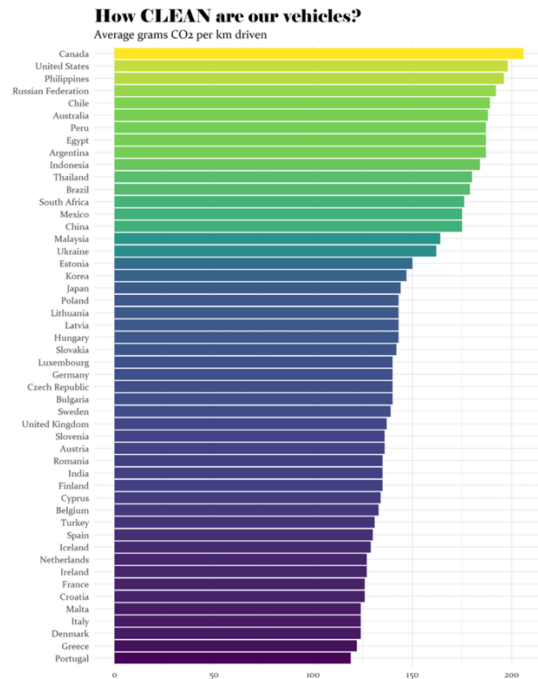
- Transport: from 178.6 Mt (2017) to 185.9 Mt (2018) = + 7.3 Mt or + 4.1%

- Oil and gas: From 188 Mt (2017) to 193.2 Mt (2018) = + 5.2 Mt or + 2.8%

At this rate, we can reasonably expect to see GHG emissions from the transport sector to become the #1 source of emissions in Canada very soon. It's already the case in the USA, in Ontario, Québec and other provinces.

5- Canada: #1 in the world for GHG emissions per kilometer for light duty vehicles

According to a 2019 study by the International Energy Agency⁴, Canada is the #1 country in the world for GHG emissions per kilometer driven by its light duty vehicle fleet, in front of the United States. It's also the largest and the second heaviest in the world.

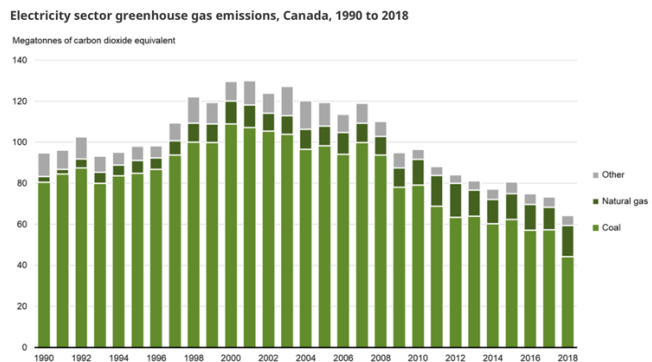


6- GHG emissions from electricity production in Canada are decreasing

While GHG emissions from transport keep going up, it's a whole other story for GHG emissions from the electricity sector in Canada. What this means is that electric vehicles keep getting cleaner and cleaner as the Canadian electric grid gets progressively decarbonized.

According to ECCC

- GHG emissions from the electricity sector has gone from 94.72 Mt CO₂ eq in 1990 to 64.25 Mt CO₂ eq in 2018, a decline of 32%

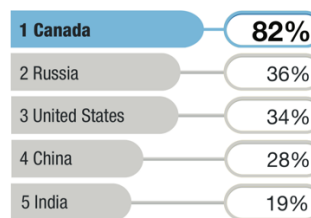


7- GHG emissions from the Canadian electricity sector: one of the cleanest in the world

According to Natural Resources Canada's Energy Fact Book 2020-2021⁵, Canada's electricity production is already one of the cleanest in the world, especially compared to the top 4 electricity generating countries with 82% of electricity in Canada coming from non-GHG emitting sources.

- Hydro made up 60%, nuclear was 15%, and other renewables were the remaining 7%.

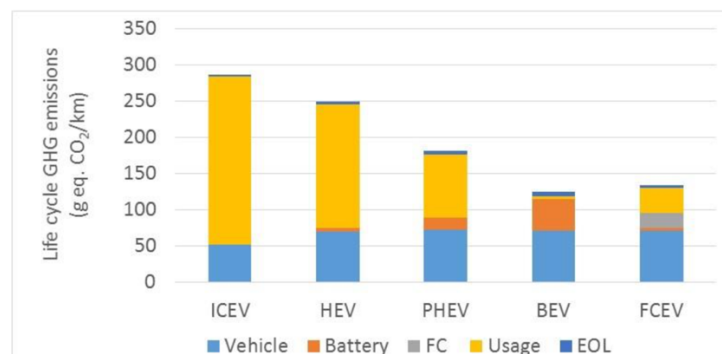
PERCENTAGE OF TOTAL ELECTRICITY FROM NON-EMITTING SOURCES FOR THE TOP FOUR ELECTRICITY-GENERATING COUNTRIES AND CANADA



8- GHG emissions from partial or full electric vehicles: cleaner than gas vehicles... everywhere

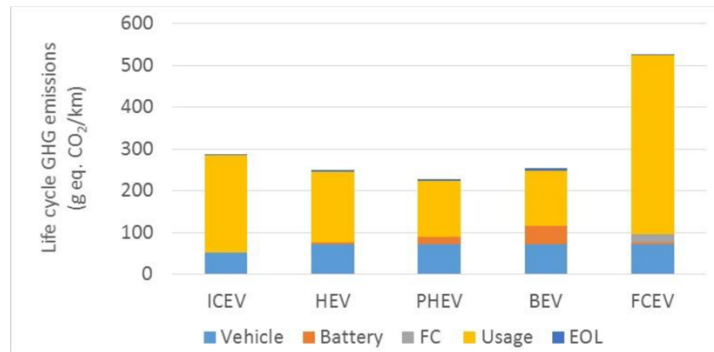
According to a document presented by the National Research Council of Canada during Electric Mobility Canada's annual conference in Nov 2020, GHG emissions from partial or fully electric vehicles during their whole lifecycle (from cradle to grave) are **always** cleaner than those of gas vehicles. The NRC lifecycle analysis demonstrates that GHG emissions of electric vehicles are lower by:

- **Québec: Between 35% and 55% less GHG emissions than ICE vehicles.**
99% of Québec's electricity production is renewable.



- Alberta: Between 10% and 20% less GHG emissions than ICE vehicles.

92% of Alberta’s electricity production came from fossil fuel in 2018: 43% coal & coke + 49% natural gas.⁶ *As Alberta transitions towards cleaner electricity sources of production, the difference between GHG emissions from ICE vehicles and electric vehicles will grow larger.*



Air pollution & health

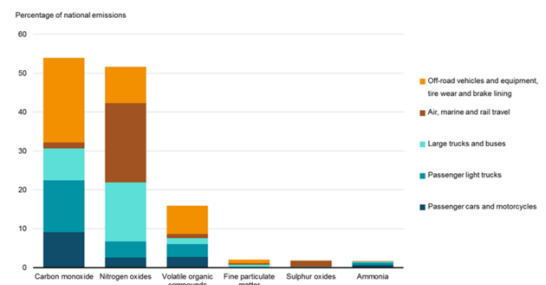
14,600 deaths per year from air pollution in Canada: 7.5 times more than car accidents

According to the latest report published by Health Canada in 2019 titled *Health Impacts of Air Pollution in Canada: Estimates of morbidity and premature mortality outcomes* “Health Canada estimates the number of annual mortalities in Canada that can be attributed to air pollution from human sources in North America to be **14,600 deaths** per year based on 2015 population counts.”¹²

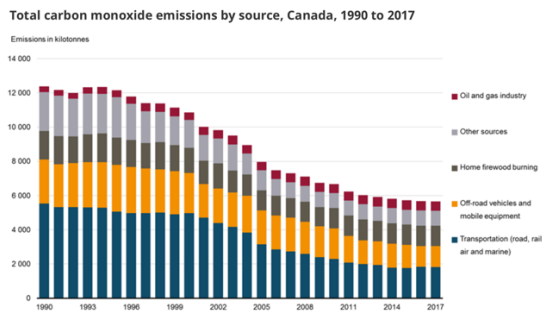
14 600 deaths from air pollution represents **7.5 times** the death toll of motor vehicle accidents, which was 1,922 in 2018.¹³

Latest numbers and statistics on air pollution from the government of Canada¹⁵

Contribution of transportation, off-road vehicles and mobile equipment to total air pollutant emissions by transportation mode, Canada, 2017



- a) **Carbon monoxide (CO):** It is a colorless, odorless, tasteless gas produced by burning gasoline, wood, propane, charcoal or other fuel. In 2017, transportation (road, rail, air and marine) was the largest source of CO emissions in Canada. While carbon monoxide emissions have declined significantly between 1990 and 2014, we have recently witnessed a rise in emissions from transportation, going from 1790.2 Kt in 2014 to 1819.1 Kt in 2017.

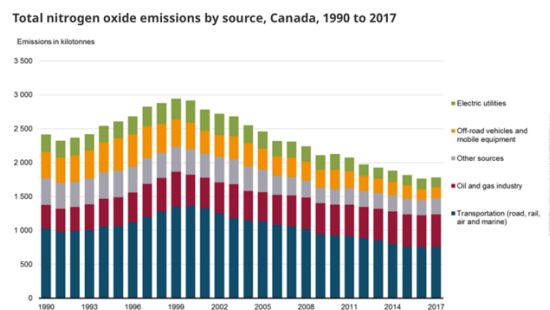


In 2017:

- **53.9%** of the total **carbon monoxide** emissions in Canada came from the transport sector
- Passengers cars, motorcycles, light trucks, large trucks and buses represented **30.5%** of total carbon monoxide emissions in Canada

- b) **Nitrogen oxides:** (NO_x stands for an indeterminate mixture of NO and NO₂) are formed mainly from N₂ and O₂ during high-temperature combustion of fuel in cars. Catalytic converters are used to reduce emissions. Nevertheless, NO causes a reddish-brown haze in city air that contributes to heart and lung problems and may be carcinogenic.

- In 2017, transportation represented **51.7%** of total nitrogen oxides emissions in Canada
- Passengers cars, motorcycles, light trucks, large trucks and buses represented **21.9%** of total carbon nitrogen oxides emissions in Canada.



Economic impact of air pollution in Canada: \$114 billions a year

According to the latest report published by Health Canada in 2019 titled *Health Impacts of Air Pollution in Canada: Estimates of morbidity and premature mortality outcomes*, the “total annual economic value of health outcomes associated with air pollution is approximately **\$114 billion**. This amount primarily reflects premature mortalities valued at \$108 billion. Although the monetary value associated with morbidity endpoints is low (\$5.5B) compared with that associated with mortalities, the morbidity impacts represent a health burden for the Canadian population.”¹²

Table 4. Annual premature deaths attributable to air pollution by province and territory

Region—population	Premature mortality counts ^a					Valuation (\$1,000,000) ^{a,d}	
	per pollutant				per 100,000 population	All ^c	
	NO ₂	PM _{2.5}	O ₃ ^b	All ^c	All ^c	All ^c	All ^c
Canada—35,851,774	940	9,700	4,000	14,600	41	108,000	
Alberta—4,196,457	90	740	400	1,200	29	9,100	
British Columbia—4,683,139	140	980	440	1,600	33	11,500	
Manitoba—1,293,378	30	260	110	400	31	3,000	
New Brunswick—753,871	6	110	64	180	24	1,400	
Newfoundland and Labrador—527,756	1	36	41	79	15	580	
Northwest Territories—44,088	—	5	0	6	13	41	
Nova Scotia—943,002	8	160	93	260	27	1,900	
Nunavut—36,919	—	0	0	0	1	4	
Ontario—13,792,052	400	4,500	1,800	6,700	49	49,700	
Prince Edward Island—146,447	1	19	17	37	25	270	
Québec—8,263,600	260	2,600	910	3,800	46	28,000	
Saskatchewan—1,133,637	16	270	87	380	33	2,800	
Yukon—37,428	—	0	1	1	2	5	

^a Values represent mean estimates of health outcome counts and economic valuation. Values are rounded to the nearest integer and given to a maximum of two significant figures for values below 10,000, and three significant figures for values of 10,000 or more.

^b Acute and chronic exposure premature mortalities combined.

^c NO₂, O₃, and PM_{2.5}; totals may not match because of rounding.

^d Endpoint valuation estimates expressed in Canadian dollars and based on 2015 currency.

EV on the road: Exponential growth ahead

According to the *Electric Vehicle Outlook 2020* from Bloomberg New Energy Finance¹⁸, EV growth will be exponential in the years to come. From passenger cars to light trucks to heavy duty trucks to electric buses, EV sales are on the rise across the globe.

- **EV sales:** “Passenger EV sales jumped from 450 000 in 2015 to 2,1 million in 2019” They are expected to reach 8.5 million in 2025, 26 million by 2030 and 54 million in 2040.

- **EV share:** of new sales should grow from 2.7% in 2020 to 10% in 2025, 28% in 2030 and 58% in 2040.



Oil demand displaced by electric vehicles in 2040

17.6 million barrels per day



Increased electricity demand from EVs in 2040

1,964 TWh

EVs increase electricity demand by 5.2%

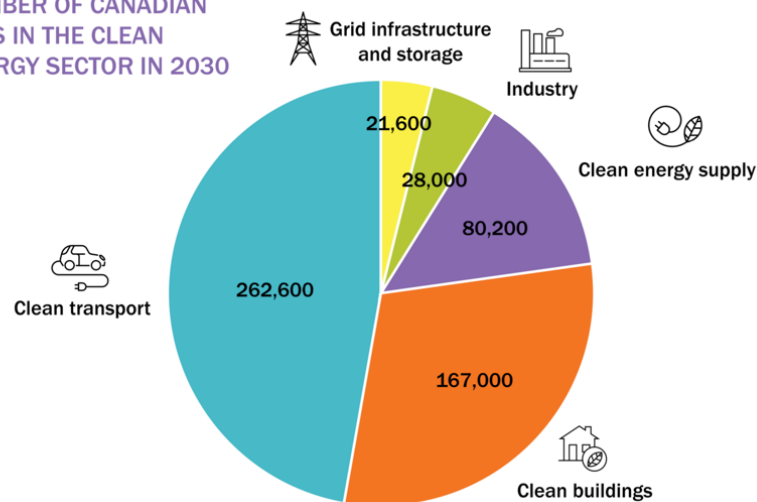
According to the new StatsCan EV sales data¹⁹, ZEV sales were at 3,5% of all light duty sales for the first half of 2020 in Canada. Canada ZEV sales targets 10% by 2025, 30% by 2030 and 100% by 2040.

According to *The Fast Lane, tracking the energy revolution 2019* from Clean Energy Canada, demand for clean energy and clean transportation jobs will keep growing at a very fast rate.

559,400 clean jobs by 2030: Almost 50% in clean transport.

“That’s jobs like manufacturing electric cars, buses, and trucks that are forecast to hit our roads in record numbers. In fact, several transit authorities have committed to buying only electric buses over the next decade”²²

NUMBER OF CANADIAN JOBS IN THE CLEAN ENERGY SECTOR IN 2030



Appendix

- 1 : <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>
- 2 : <https://www.canada.ca/en/privy-council/campaigns/speech-throne/2020/stronger-resilient-canada.html>
- 3 : <https://parl.ca/DocumentViewer/en/43-2/bill/C-12/first-reading>
- 4 : <https://www.iea.org/reports/fuel-economy-in-major-car-markets>
- 5 : https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/energy-factbook-2020-2021-English.pdf
- 6 : <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html>
- 7 : <https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change>
- 8 : https://www.oliver-krischer.eu/wp-content/uploads/2020/08/English_Studie.pdf
- 9 : <https://media.gm.ca/media/ca/en/gm/home.detail.html/content/Pages/news/ca/en/2020/Nov/1119-electric-portfolio.html>
- 10 : <https://tesla-share.thron.com/content/?id=96ea71cf-8fda-4648-a62c-753af436c3b6&pkey=S1dbei4>
- 11 : <https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/ambient-air-pollution>
- 12 : http://publications.gc.ca/collections/collection_2019/sc-hc/H144-51-2019-eng.pdf
- 13 : <https://tc.canada.ca/en/road-transportation/motor-vehicle-safety/canadian-motor-vehicle-traffic-collision-statistics-2018>
- 14 : <https://www.timesnownews.com/health/article/harvard-researchers-establish-link-between-air-pollution-and-covid-19-mortality-rate/678063>
- 15 : <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/air-pollutant-emissions.html#transportation>
- 16 : <http://www.editions-homme.com/auto-electrique/daniel-breton/livre/9782761950459>
- 17 : <https://publichealthmatters.blog.gov.uk/2018/11/14/health-matters-air-pollution-sources-impacts-and-actions/>

18 : <https://about.bnef.com/electric-vehicle-outlook/>

19 : <https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2020077-eng.htm>

20 :

https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/Energy%20Fact%20Book_2019_2020_web-resolution.pdf

21 : <https://www.cbc.ca/news/canada/calgary/calgary-oil-gas-jobs-statscan-covid-oilwell-drilling-employment-1.5737355>

22 : https://cleanenergycanada.org/wp-content/uploads/2019/10/Report_TER2019_CleanJobsFuture_20191002_FINAL-FOR-WEB.pdf

23 : <https://www.aveq.ca/actualiteacutes/statistiques-saaq-aveq-sur-lelectromobilite-au-quebec-en-date-du-30-septembre-2020-infographie>

24 : <https://www.hydroquebec.com/electrification-transport/voitures-electriques/calculer-vos-economies.html>

25 : <https://motorillustrated.com/study-shows-average-new-car-price-in-canada-is-40490/40716/>

26 : <https://driving.ca/toyota/auto-news/news/new-car-sales-in-quebec-mirror-canadas-except-in-the-brands-bought>

27 : <https://www150.statcan.gc.ca/n1/fr/daily-quotidien/181127/dq181127c-fra.pdf?st=UxihDhTG>

28 : https://bdso.gouv.qc.ca/pls/ken/ken213_afich_tabl.page_tabl?p_iden_tran=REPERQFOZFN08-125946758410.V00Q&p_lang=1&p_m_o=SAAQ&p_id_ss_domn=718&p_id_raprt=3628#tri_tertr=00&tri_mun=aaaaa

29 : https://www.dunsky.com/wp-content/uploads/2020/07/DunskyZEVAvailabilityReport_Availability_20200805.pdf

30 : <https://financialpost.com/transportation/autos/ford-unveils-electric-mustang-suv-to-challenge-tesla-dominance>

31 : <https://news.ontario.ca/en/release/19194/ontario-puts-a-charge-into-electric-vehicle-production>

32 : <https://www.krway.com/about/industry-facts/>