



# Canada's Path to Paris Targets

## *The Federal Zero Emissions Vehicle (ZEV) Mandate*

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Tesla Electric passenger car



Ford F150 Electric Truck

# **EXECUTIVE SUMMARY**



# *Sales Data for Passenger Cars and Light Trucks in Canada in 2022 to 2035 Period*

- The federal ZEV mandate can be broken down into two components
  - passenger cars, comprising sales of about 300,000 vehicles per year
  - light trucks (pickup trucks, SUVs, vans and crossover vehicles), comprising sales of 1,250,000 vehicles per year
- The forecast model makes a simplifying assumption that these 300,000 and 1,250,000 sales figure remain constant between 2022 and 2035
- Sales forecasts of these two types of vehicles in 2035 are as follows, based on a bottom up assessment of supply from vehicle manufacturers

## Sales in thousands of vehicles per year

	<u>2022</u>			<u>2035</u>		
	<u>EVs</u>	<u>ICE</u>	<u>Total</u>	<u>EVs</u>	<u>ICE</u>	<u>Total</u>
Passenger Cars	45	255	300	300	0	300
Light Trucks	<u>55</u>	<u>1,195</u>	<u>1,250</u>	<u>320</u>	<u>930</u>	<u>1,250</u>
Total	100	1,450	1,550	620	930	1,550
	6%	94%		40%	60%	

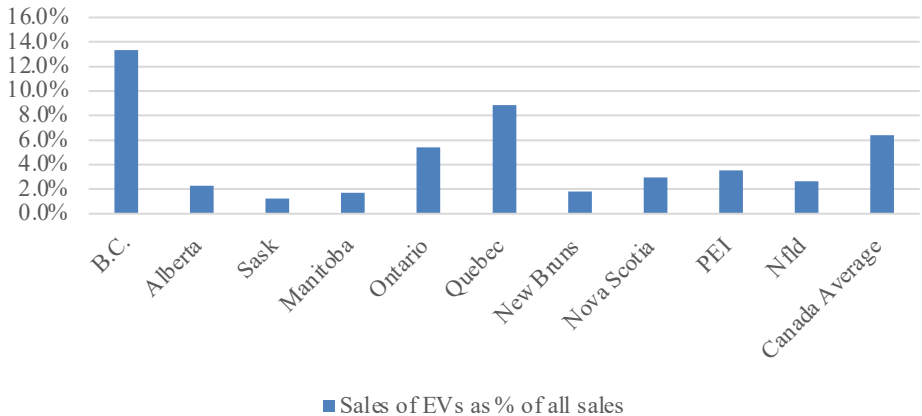
- Supply of passenger car EVs comprising 20% of total vehicle sales **should be sufficient** to meet requirement for 100% of sales of passenger cars in 2035 to be zero emissions vehicles (ZEVs)
  - may still be an issue if certain people want to buy an internal combustion engine (ICE) and therefore challenge the ZEV mandate prohibiting ICE passenger car sales in 2035
- Supply of light trucks (pickups, SUVs, vans and crossovers) comprising 80% of total vehicle sales will **not** be sufficient to meet requirement for 100% of sales in 2035 to be ZEVs
  - **EV sales for light trucks will only be 26%** of total light truck sales in 2035
- **This leaves demand for light trucks with a shortfall of 74%,** which will either
  - be filled by the sale of ICE light trucks, which will contravene the federal ZEV mandate, or
  - result in a prohibition of the sale of light trucks to Canadians who need such light trucks to live their daily lives

# Summary of Findings for Federal ZEV Mandate



- The provinces of British Columbia and Quebec already have provincial ZEV mandates that have similar requirements for 100% ZEV sales by 2035
- Sales figures for EVs by province show that vehicle manufacturers are channelling EV sales to B.C. and Quebec (above the 6% Canada average) and reducing EV sales in the other 8 provinces (below the 6% Canada average)

Sales of EVs as % of all Vehicle sales in 2022



■ Sales of EVs as % of all sales

## *Changes Needed to Achieve Compliance With Federal ZEV Mandate for Light Trucks*

- Supply of EV light trucks would have to increase by almost 4 times (320,000 to 1,250,000) in 2035
- The only way this will occur is if
  - there is a massive increase in the construction of new EV light truck manufacturing facilities, well above the currently announced plans for such facilities

and/or

- there is a massive increase in the importing of EV light trucks from China from such manufacturers such as BYD (Build Your Dream)

# *Possible Decisions to be Made by the Federal and Provincial Governments with ZEV Mandates*

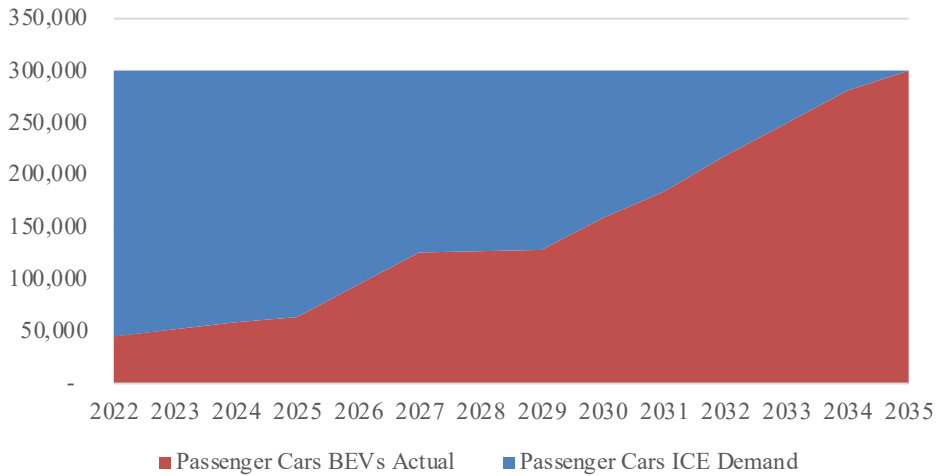
- If, as the forecast shows, there will not be enough EV light trucks to meet demand, governments may have to do one or more of the following:
  - permit the sale of ICE light trucks that use renewable fuels, as the European Union recently decided in March of 2023
  - Permit the importation of ICE light trucks from the United States and other countries
  - Back off on the numbers in the EV Mandates



# Forecast of Actual Sales of Passenger Cars in Canada



Forecast of Actual Passenger Car Sales in Canada

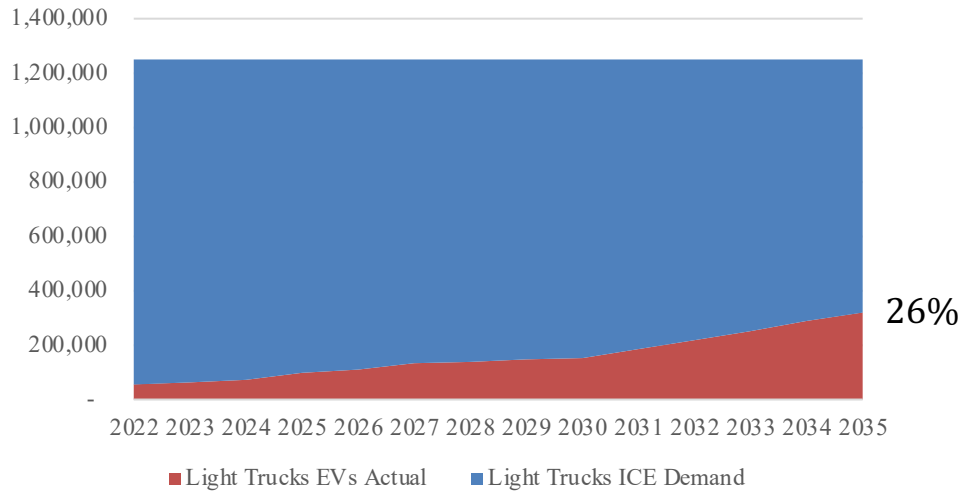


- Forecast of total demand for passenger cars is 300,000 cars per year
- EV annual sales rise from 45,000 in 2022 to 300,000 in 2035 (100%)
- ICE annual sales drop from 255,000 in 2022 to zero (0%) in 2035
- **These numbers show actual forecasted sales should meet the requirements in the federal ZEV legislation for passenger cars**

# Forecast of Actual Sales of Light Trucks in Canada



### Forecast of Light Truck Annual Sales in Canada



- Forecast of total demand for light trucks is 1,250,000 light trucks per year
- EV annual sales rise from 55,000 in 2022 to 320,000 in 2035 (26% of target)
- ICE sales drop from 1,195,000 in 2022 to 930,000 in 2035, well above zero quota
- These numbers show actual forecasted sales will **not** meet requirement in federal ZEV legislation for light trucks

## The Federal ZEV Mandate

Ottawa says 60% of vehicle sales must be electric  
by 2030, 100% by 2035

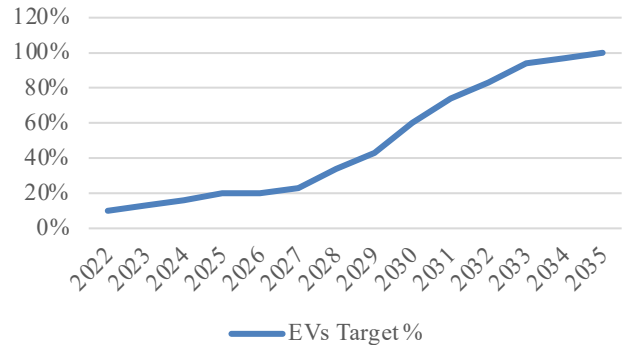
- Globe and Mail, December 21, 2022

- The theory behind a ZEV Mandate is that the requirement to sell a prescribed number of ZEVs will give certainty to vehicle manufacturers that there will be a market for EVs
- This certainty will give the incentive to construct EV manufacturing facilities
- In essence, the ZEV Mandate assumes that
  - the demand for EVs will occur,
  - the supply of EVs will occur, and
  - the demand for ICE vehicles will disappear.
- The ZEV Mandate also assumes that the supply of EVs will increase in line with the numbers prescribed in the legislation

- The federal ZEV mandate is proposed in new regulations to be made under the Canadian Environmental Protection Act (CEPA)
- The ZEV mandate proposes that Canadian companies selling light vehicles (passenger cars and light trucks) in Canada will be required to sell a minimum number of electric vehicles as a percentage of sales as follows:

<u>Year</u>	<u>Percentage</u>
2026	20%
2027	23%
2028	34%
2029	43%
2030	60%
2031	74%
2032	83%
2033	94%
2034	97%
2035 and after	100%

Federal EVs Target % of Sales



## *Prohibition on Sale of Internal Combustion Engine (ICE) Vehicles*

- The corollary to a ZEV Mandate is that there is a prohibition on the sale of ICE vehicles, plus a penalty for contravening this prohibition
- This prohibition is consistent with the underlying constitutional federal power for CEPA, namely the criminal power requiring a prohibition plus penalty
  - the Supreme Court of Canada confirmed in a 1998 case involving Hydro Quebec that CEPA is constitutional using the federal criminal power in the constitution
- The feds might also argue that they have jurisdiction over the attributes of vehicles imported into Canada under the federal Motor Vehicle Safety Act

## *Possible Provincial Challenge to the Federal ZEV Mandate*

- The federal ZEV Mandate regulations might be challenged as invading provincial jurisdiction
  - British Columbia and Quebec already have ZEV Mandate legislation
- Registration, sale and licensing of vehicles is a provincial matter under either the property and civil rights power or the matters of a local or private nature power
- The provincial argument would be that the federal ZEV Mandate is an attempt to regulate a sector of the economy, namely vehicle registration, that is a provincial matter

## Typical Company Selling Vehicles in Canada in 2030

Total Sales	100,000
Required EV sales target	60%
Required EV Sales	60,000
Permitted ICE vehicle sales	40,000 (in effect this is a quota for ICE sales)

- If the company sells more than 40,000 ICE vehicles, then it must, in order to comply with the ZEV Mandate, either
  - buy credits from another company such as Tesla,
  - For each ICE vehicle sale in excess of its' quota, pay \$20,000 to the feds to be used to fund EV infrastructure such as charging units (in effect, a fine)
  - There is a limit on this method of achieving compliance

Note: There are some transitory provisions expiring in 2028 that give some additional credit for the sale of Plug In Hybrid vehicles (PHEV). This additional credit would permit the sale of slightly more ICE vehicles in the period up to 2028.



## *Likely Reactions to the ZEV Mandate of Companies Selling Vehicles in Canada*

- Companies selling vehicles in Canada could have the following concerns
  - Demand for EVs may not be as large as assumed by the ZEV Mandate required percentages
    - Customers have concerns about higher price, range anxiety, lack of charging infrastructure and cold weather performance
  - Supply of EVs may not be sufficient to meet the required percentages
    - There are a finite number of EV manufacturing facilities
    - Ramping up of manufacturing facilities is slow
  - Demand for ICE vehicles may exceed the ICE quota for that company
- Companies will arrange their vehicle sales based on the following
  - Try to sell vehicles as many EVs as possible based on demand and supply
  - Allocate EV sales preferentially to British Columbia and Quebec that already have ZEV Mandates
  - Limit EV sales in provinces that do not have ZEV Mandates such as Ontario, Alberta, Saskatchewan and Manitoba and the Atlantic provinces
  - If sales of ICE vehicles are limited by ICE quota, focus on selling higher priced vehicles with higher profit margin and reduce sales of lower priced vehicles

# Data Regarding Light Vehicles in Canada

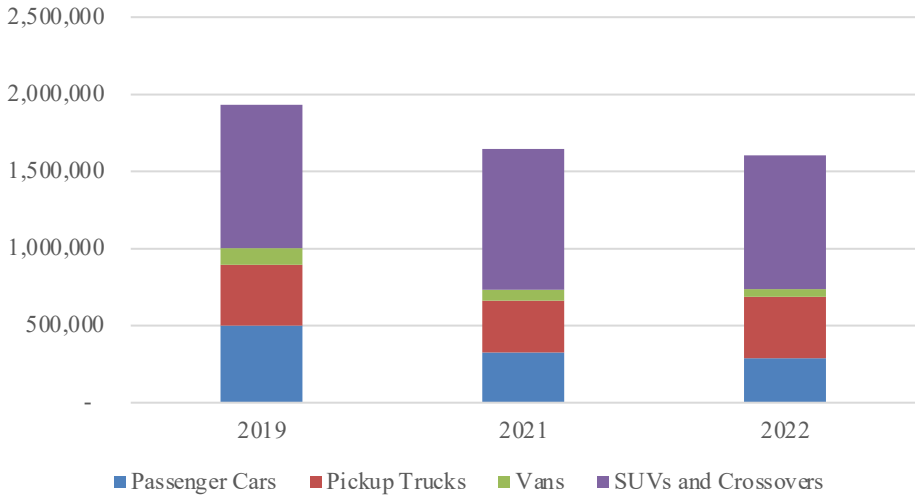
- Light vehicles in Canada consist of passenger cars and light trucks (pickup trucks, SUVs, vans and multi- purpose vehicles such as crossovers)
- In recent years, sales of passengers cars have been dropping (20% of total sales) and sales of light trucks have been increasing (80%)
- This is slowly changing the composition of the overall fleet of vehicles

	<u>Passenger Cars</u>	<u>Light Trucks</u>	<u>Total</u>
Fleet in 2021	9,500,000	14,500,000	24,000,000
Sales in 2022	300,000	1,250,000	1,550,000

Source: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010002401&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=3.1&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2022&cubeTimeFrame.endMonth=10&cubeTimeFrame.endYear=2022&referencePeriods=20220101%2C20221001>

- Total vehicle sales dropped in 2022 to 1.55 million
- Passenger cars only about 300,000 in 2022, less than pickup truck sales and much less than SUV/crossover sales

Vehicle Sales in Canada

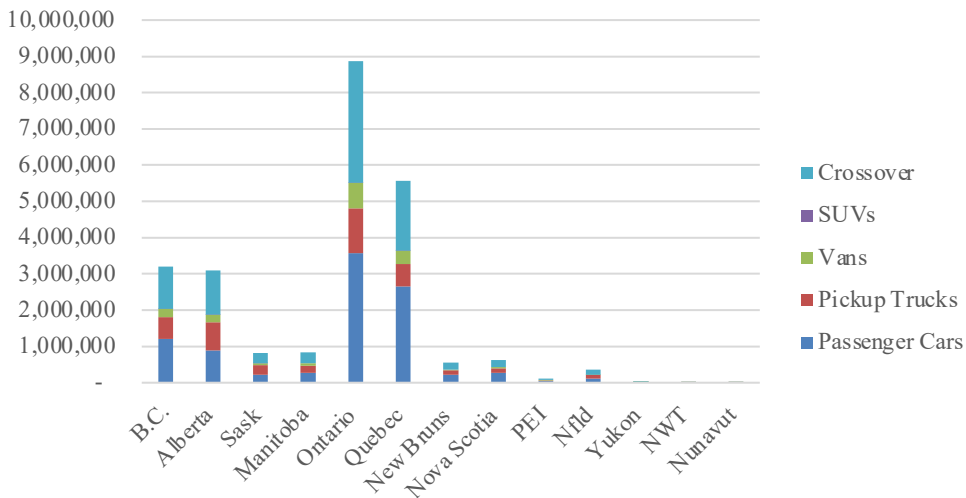


2020 sales left out due to covid

Source: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010002401&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=3.1&cube>

- Total vehicle fleet size in all of Canada for passenger car and light truck fleet is about 24 million vehicles in 2021
- Overall makeup in Canada is 39% passenger cars, 37% crossover, 17% pickups, 7% vans

Distribution of Vehicles by Province in 2021



Source: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310030801&pickMembers%5B0%5D=1.2&cubeTimeFrame.startYear=2021&cubeTimeFrame.endYear=2021&referencePeriods=20210101%2C20210101>

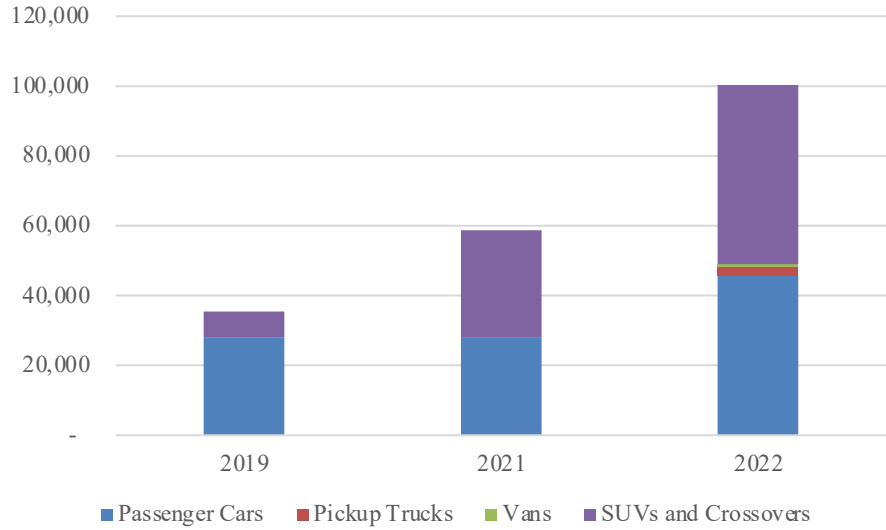
- EV sales of passenger cars (e.g. Tesla Model 3) and crossover vehicles (e.g. Tesla Model Y) have increased in recent years
- EV sales of light trucks have been small to date
- Fleet of EVs is small but growing
  - passenger car fleet will grow more quickly than light truck fleet

	<u>Passenger Cars</u>	<u>Light Trucks</u>	<u>Total</u>
EV Fleet in 2021	110,000 (1.2%)	43,000 (0.3%)	153,000 (0.6%)
EV Sales in 2022	45,000 (15%)	55,000 (4%)	100,000 (6%)

Source: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010002401&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=3.1&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2022&cubeTimeFrame.endMonth=10&cubeTimeFrame.endYear=2022&referencePeriods=20220101%2C20221001>

- Most EV sales are either passenger cars or SUVs/crossovers
- EV Pickup truck sales are very small

### BEV Sales in Canada



2020 sales left out due to covid

Source: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010002401&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=3.1&cube>

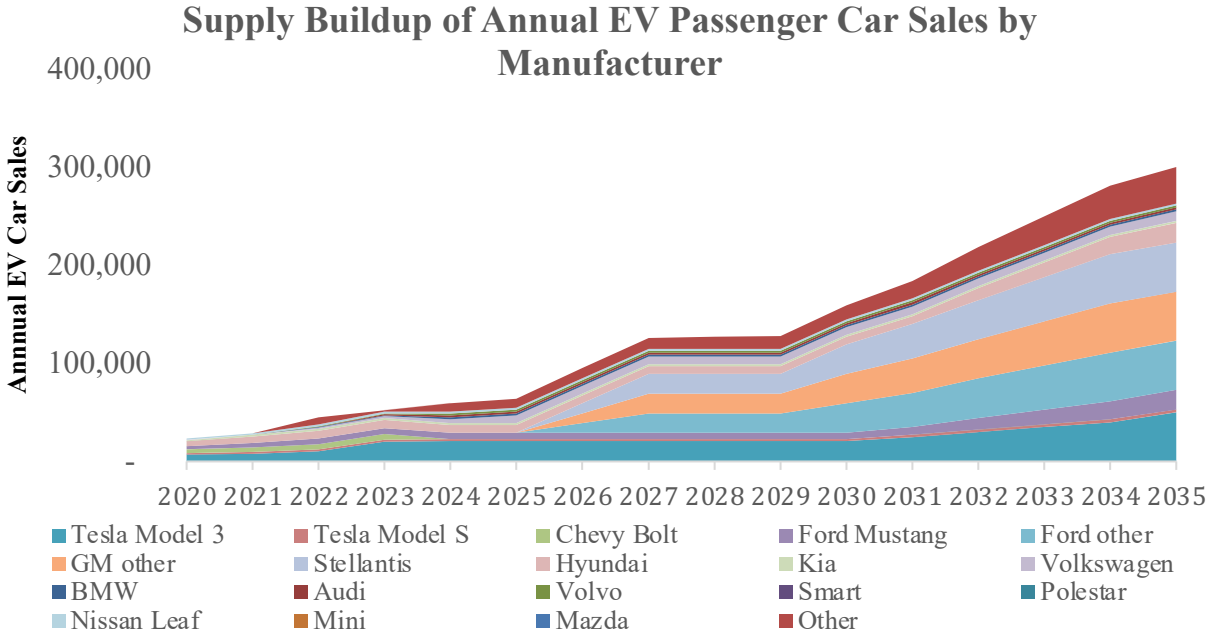
# Forecast of Light Vehicle Sales in Canada in 2020 to 2035 Period



# Forecast of EV Passenger Car Sales in Canada in 2020 to 2035 Period



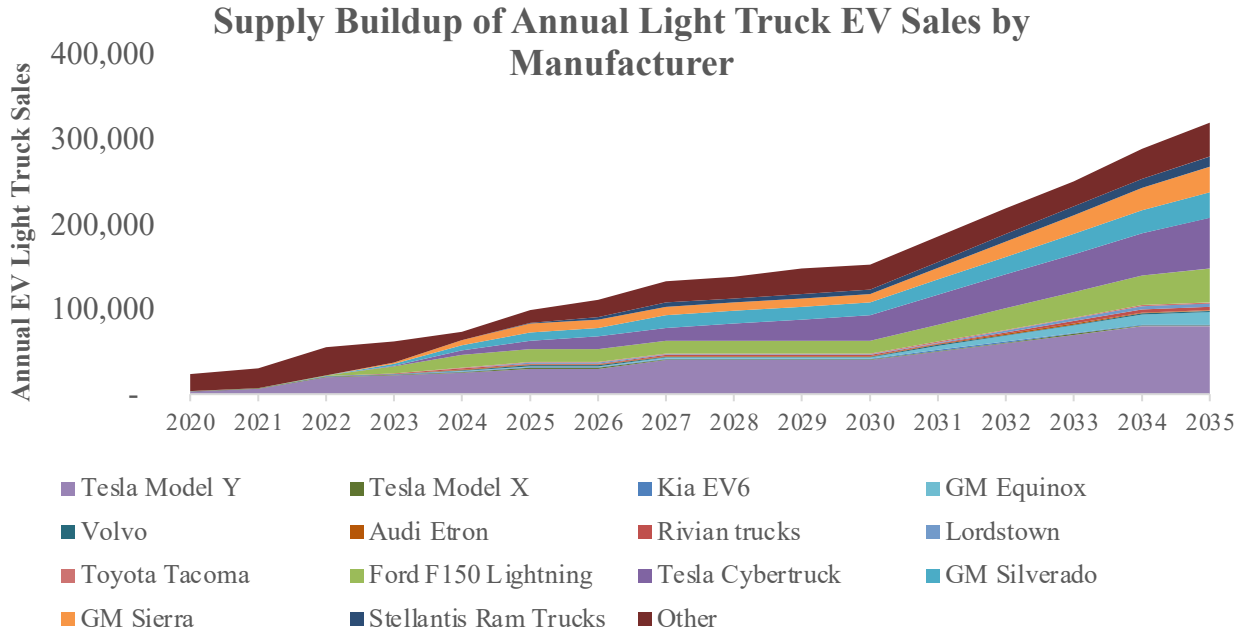
- Work done in 2022 made a forecast of the number of passenger car that will be available for sale in the 2020 to 2035 period
- Chart shows buildup of various EV manufacturers, totaling 300,000 EVs in 2035



# Forecast of EV Light Truck Sales in Canada in 2020 to 2035 Period

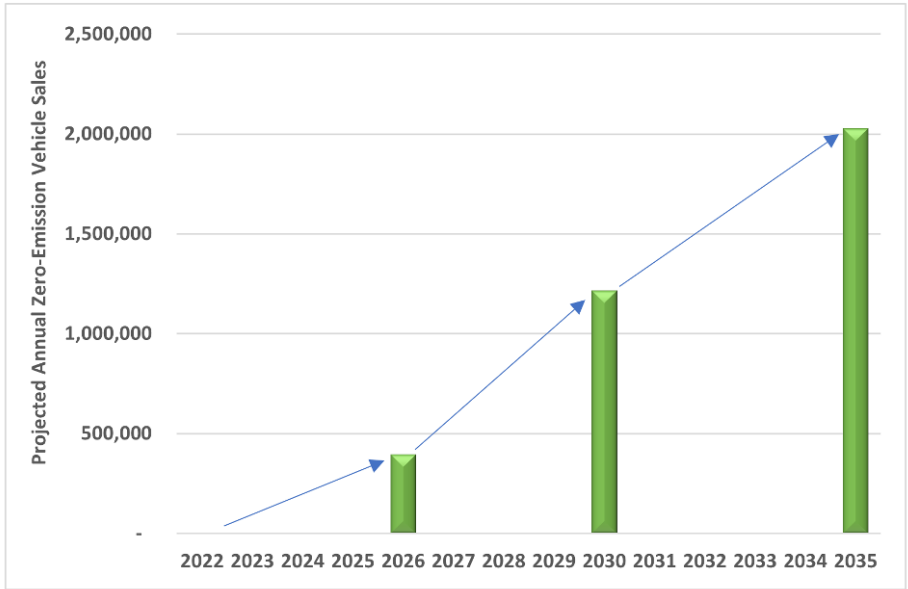


- Work done in 2022 made a forecast of the number of light trucks that will be available for sale in the 2020 to 2035 period
- Chart shows buildup of various EV manufacturers, totaling 320,000 EVs in 2035



# Transport Canada Forecast of EV Sales in Canada from 2022 to 2035

## Transport Canada's Projected Annual New Zero-Emission Vehicles Sales (as of early 2022)

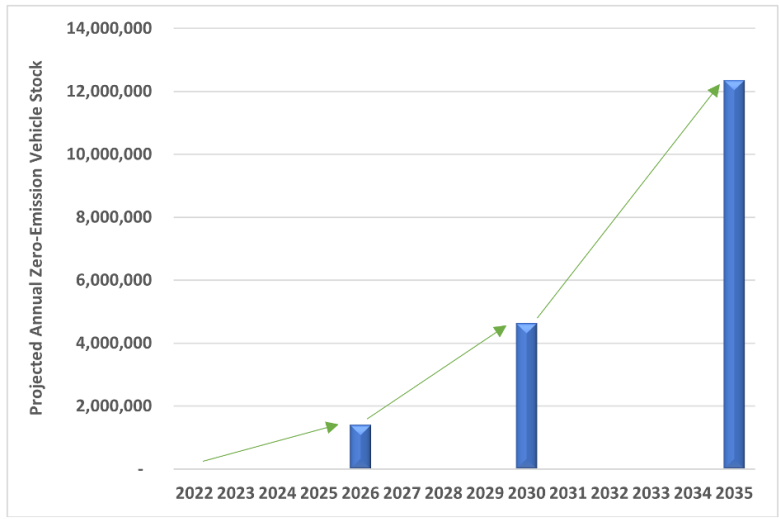


These numbers have nothing to back up where the supply of EV vehicles will come from to support this 26% exponential growth. Note that the 2 million sales figure in 2035 exceeds the entire light vehicle sales in 2022 of about 1.55 million, as well as the 100,000 EV light vehicle sales in 2022.

# Transport Canada Forecast Number of EV Light Vehicles in Fleet in Canada in 2022 to 2035



Transport Canada's Projected Annual Zero-Emission Vehicles Stock (as of early 2022)

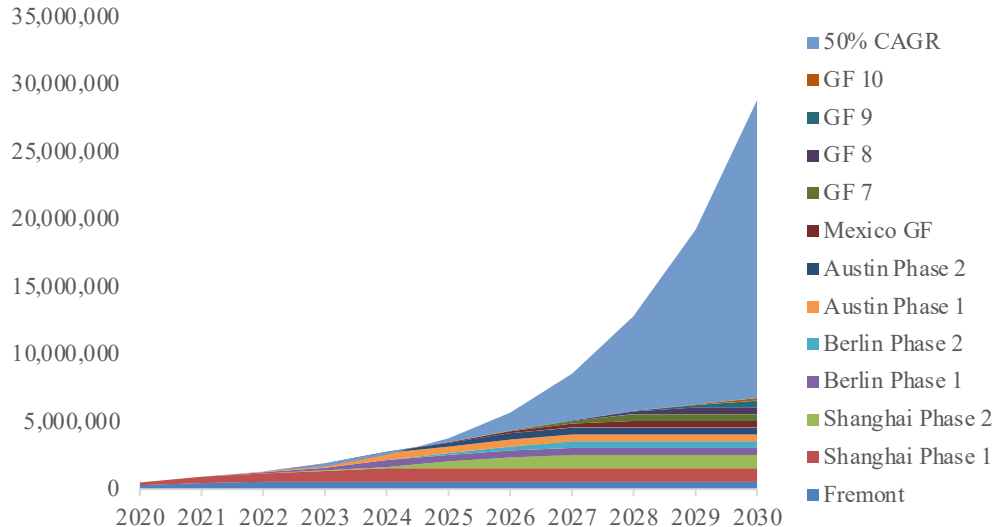


These numbers have nothing to back up where the supply of EV vehicles will come from. Note that the 12 million EVs in the light vehicle fleet in 2035 is about 50 times the 250,000 EV light vehicle in the light vehicle fleet in 2022. This implies an exponential growth rate of 35% per year.

# Forecast of Production Capacity of Tesla from 2020 to 2030

- Numbers for 2020 to 2022 are actual, from 2023 to 2030 are forecast
- Forecast shows production from Tesla of about 6 million in 2030, far below the 20 million predicted by Elon Musk and the 30 million based on 50% CAGR from 2020

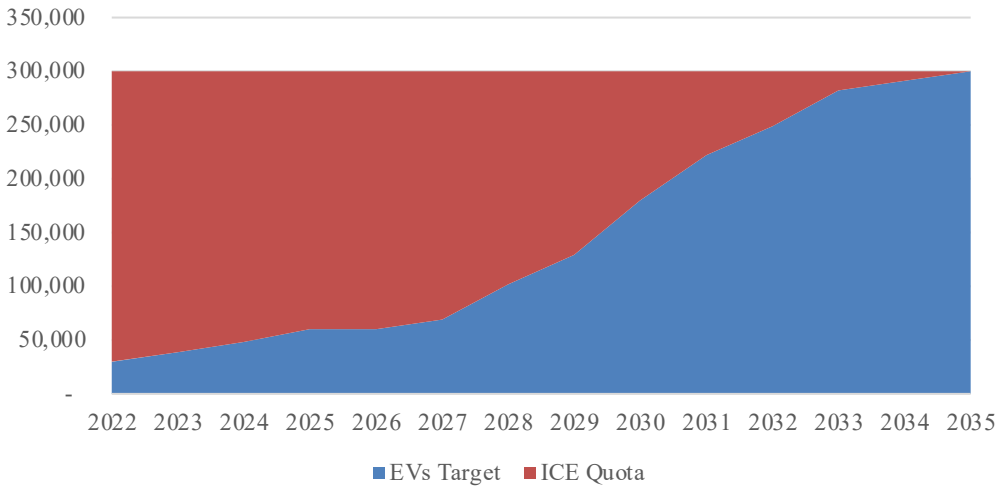
Build Up of Tesla Capacity



# Passenger Car Numbers in Canada

# *ZEV Requirements for Annual Sales of EV and ICE Passenger Cars in Canada*

ZEV Requirement for Passenger Car Sales in Canada

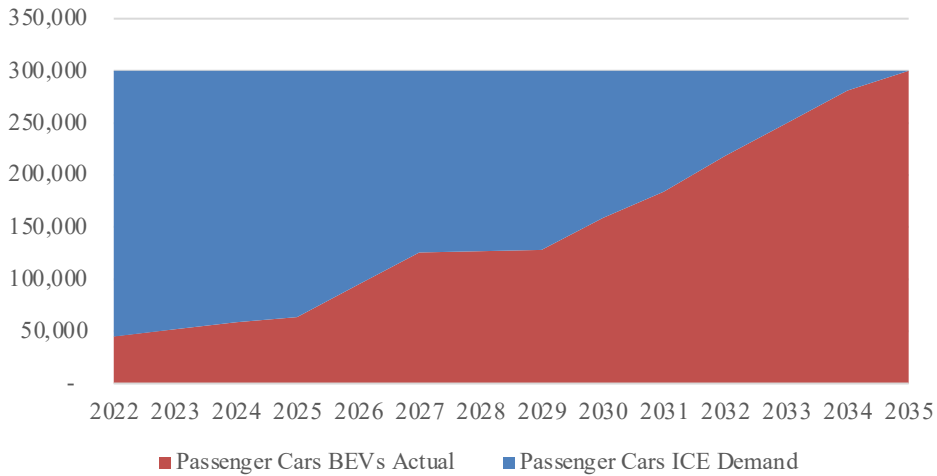


- Chart assumes total demand for passenger cars remains constant at 300,000 cars per year
- EV annual target rises from 30,000 in 2022 to 300,000 in 2035 (100%)
- ICE annual supply quota drops from 270,000 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the federal ZEV legislation

# Forecast of Actual Sales of Passenger Cars in Canada



Forecast of Actual Passenger Car Sales in Canada



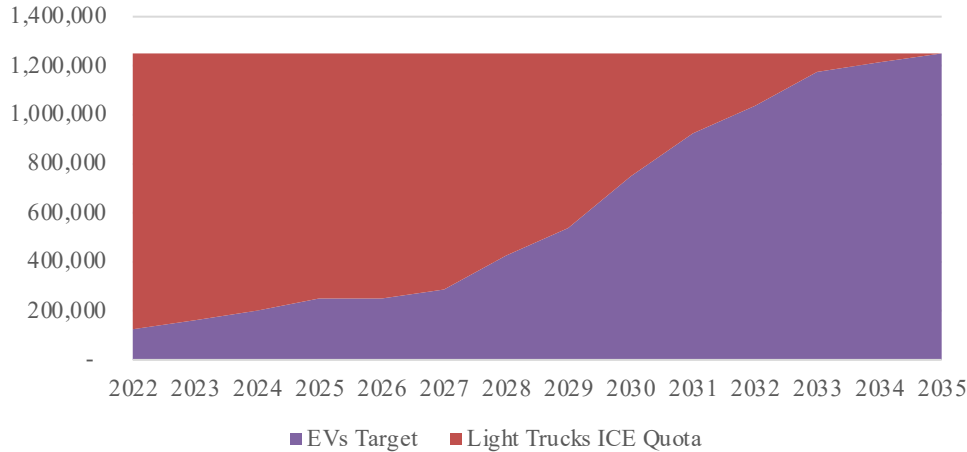
- Forecast of total demand for passenger cars is 300,000 cars per year
- EV annual sales rise from 45,000 in 2022 to 300,000 in 2035 (100%)
- ICE annual sales drop from 255,000 in 2022 to zero (0%) in 2035
- **These numbers show actual forecasted sales should meet the requirements in the federal ZEV legislation for passenger cars**



# Light Truck Numbers in Canada

# ZEV Requirements for Annual Sales of EV and ICE Light Trucks in Canada

## ZEV Requirements for Light Truck Sales in Canada

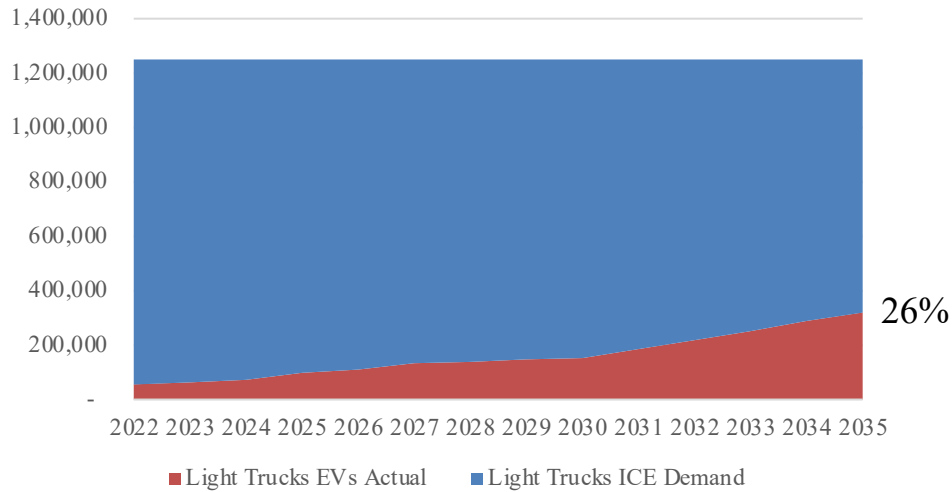


- Chart assumes total demand for light trucks remains constant at 1,250,000 cars per year
- EV annual target rises from 125,000 in 2022 to 1,250,000 in 2035 (100%)
- ICE annual supply quota drops from 1,125,000 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the federal ZEV legislation

# Forecast of Actual Sales of Light Trucks in Canada



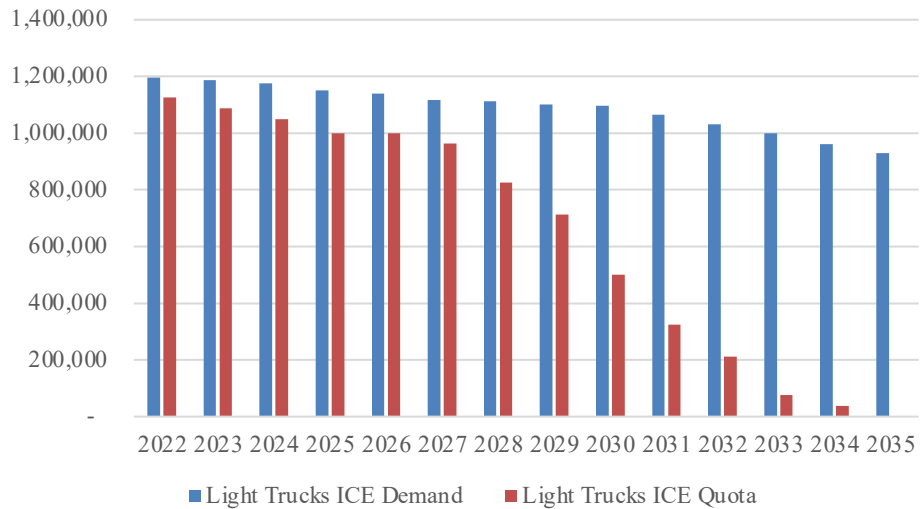
### Forecast of Light Truck Annual Sales in Canada



- Forecast of total demand for light trucks is 1,250,000 light trucks per year
- EV annual sales rise from 55,000 in 2022 to 320,000 in 2035 (26% of target)
- ICE sales drop from 1,195,000 in 2022 to 930,000 in 2035, well above zero quota
- These numbers show actual forecasted sales will **not** meet requirement in federal ZEV legislation for light trucks

# Forecast of Demand for Light Trucks Exceeding ICE Light Truck Quota

Light Trucks ICE Demand Versus Quota



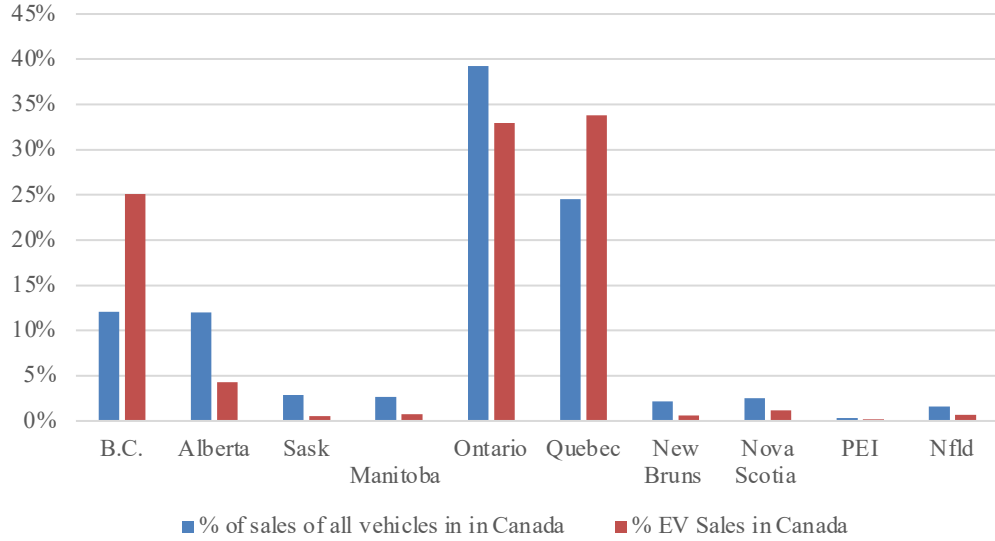
- This chart shows the increasing gap between demand for ICE light trucks (blue bar) versus the light trucks ICE quota (red bar) (116,250 in 2026, rising to 930,000 in 2035)
- This gap means that people wanting to buy a light truck will not be able to buy an EV (supply limited) and will **not** be able to buy an ICE light truck (demand exceeds ICE quota under federal ZEV legislation)

# Channeling Effect of Provincial Mandates



- The ZEV mandates in B.C. and Quebec have channeled EV sales into those two provinces and reduced EV sales to the other 8 provinces. As a result, the percentage sales of EVs in those two provinces (red bar) are higher than the percentage sales of vehicles in those two provinces (blue bar).

% sales of all Vehicles and EVs in Canada in 2022

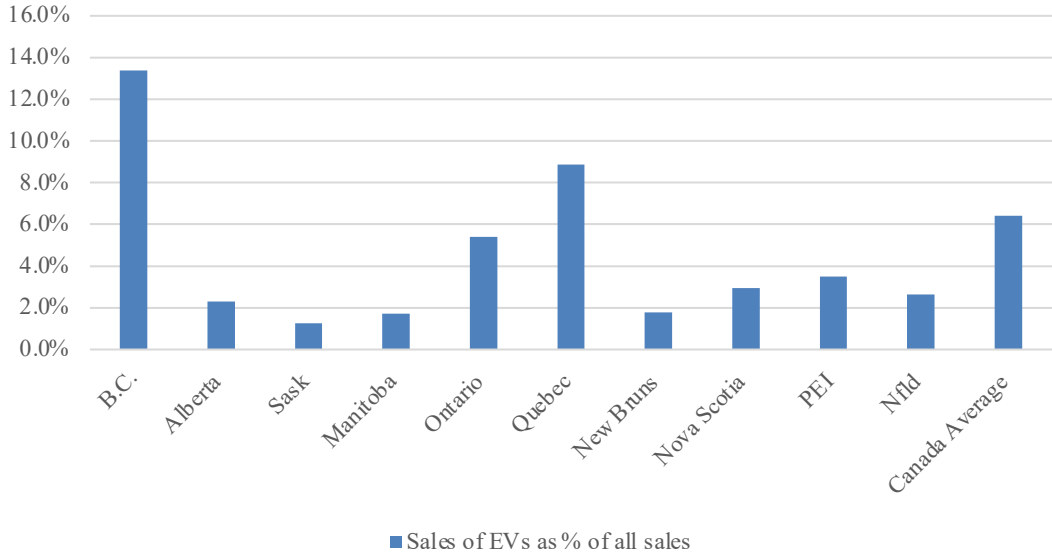


# Channeling Effect of Provincial Mandates



- Consequently, the percentage sales of EV vehicles (passenger cars and light trucks) in B.C. and Quebec are higher than the Canada average.

Sales of EVs in 2022 as % of all Vehicle sales



# *Conclusions About federal ZEV Mandate for Passenger Cars*

## Passenger Cars

- For passenger cars, a smaller demand and early focus on creating the manufacturing capacity to build EV passenger cars should mean that the federal ZEV Mandate of 100% EV and 0% ICE passenger cars by 2035 **should be achieved**
- 100% targets will be achieved in B.C. and Quebec before 2035 due to channeling effect of ZEV mandates in those provinces
- Other 8 provinces will catch up to 100% by 2035
- This outcome assumes that every buyer of passenger cars in 2035 is prepared to buy an EV passenger car that will be available for purchase, and will not demand to buy an ICE passenger car in contravention of the ZEV Mandate

# *Conclusions About federal ZEV Mandate for Light Trucks*

## Light Trucks

- The story for light trucks is very different.
  - a larger demand and delayed creation of manufacturing capacity to build EV light trucks means that there will be a large and growing shortfall of light trucks needed to satisfy demand
  - The shortfall is caused by
    - Insufficient EV light truck supply
    - Prohibition of sale of ICE light trucks
- This inability of hundreds of thousands of Canadians to buy the light trucks they need will likely cause a large amount of anger for Canadians



# The British Columbia ZEV Mandate

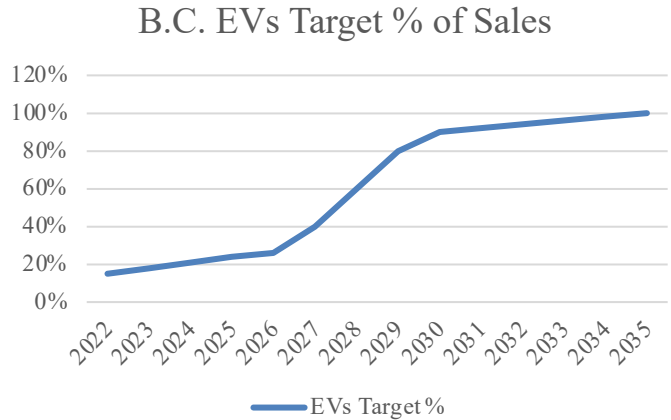
- British Columbia has taken several steps to encourage the sale of EVs
  - It gives purchase incentives of up to \$4,000 in addition to the federal \$5,000 purchase incentive
  - It has encouraged the installation of charging infrastructure
  - It has created a ZEV mandate
- As a result, the sales of EVs in British Columbia are higher (about 13% of sales) than the Canadian EV sales (about 6%)
- The belief is that vehicle companies are channeling EV sales to B.C. to meet this increased demand and to comply with the ZEV mandate requirements

## Data from 2022

- British Columbia had 190,000 light vehicle sales (12% of total Canadian sales), but 25,000 EV light vehicle sales (25% of total Canadian EV sales, broken down 26% of car sales and 24% of light truck sales)

- The British Columbia ZEV Mandate is more aggressive than the federal ZEV Mandate, and is as follows:

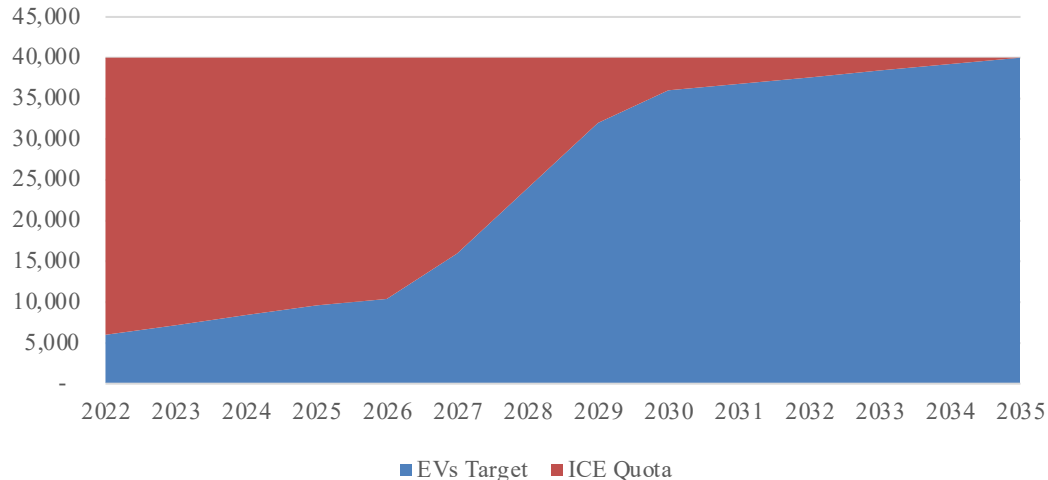
<u>Year</u>	<u>Percentage</u>
2026	26%
2027	40%
2028	60%
2029	80%
2030	90%
2031	92%
2032	94%
2033	96%
2034	98%
2035 and after	100%



## Passenger Car Numbers in B.C.

# ZEV Requirements for Annual Sales of EV and ICE Passenger Cars in British Columbia

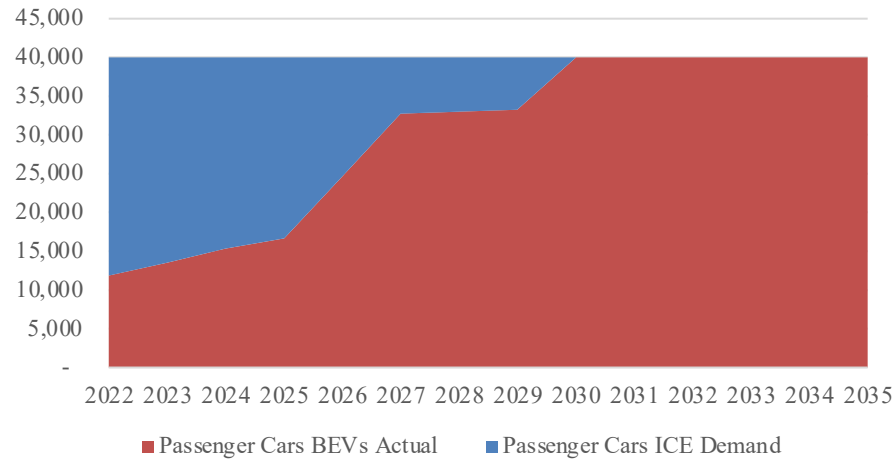
## ZEV Requirement for Passenger Car Sales in B.C.



- Chart assumes total demand for passenger cars remains constant at 40,000 cars per year
- EV annual target rises from 6,000 in 2022 to 40,000 in 2035 (100%)
- ICE annual supply quota drops from 34,000 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the B.C. ZEV legislation

# Forecast of Actual Sales of Passenger Cars in British Columbia

Forecast of Actual Passenger Car Sales in B.C.



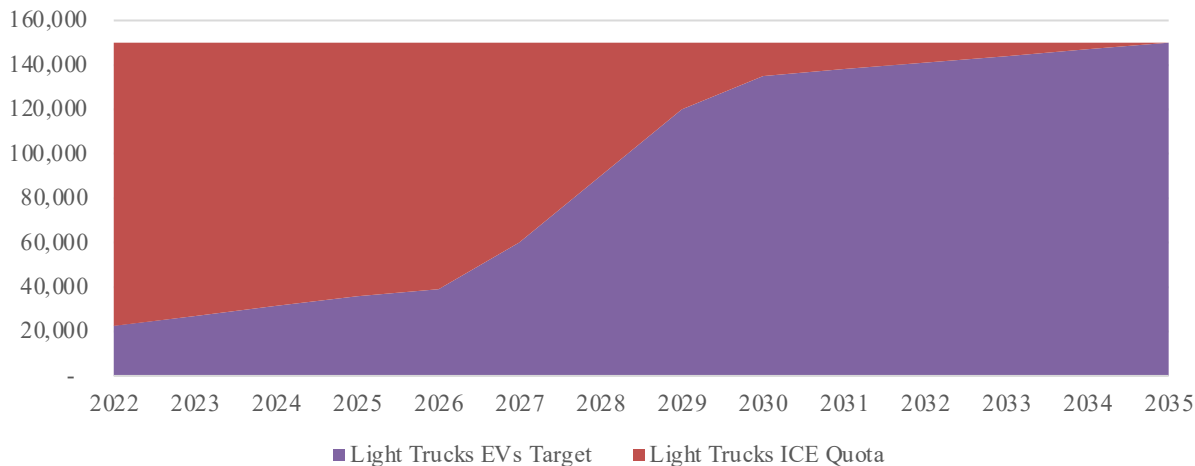
Assumption is that B.C. takes 25% of EV sales in Canada

- Forecast of total demand for passenger cars is 40,000 cars per year
- EV annual sales rise from 12,000 in 2022 to 40,000 in 2030 (100%), 5 years before 2035 target date due to channeling of EV sales to B.C.
- ICE annual sales drop from 28,000 in 2022 to zero (0%) in 2035
- **These numbers show actual forecasted sales should meet the requirements in the B.C. ZEV legislation for passenger cars**

# Light Truck Numbers in B.C.

# ZEV Requirements for Annual Sales of EV and ICE Light Trucks in B.C.

## ZEV Requirements for Light Truck Sales in B.C.



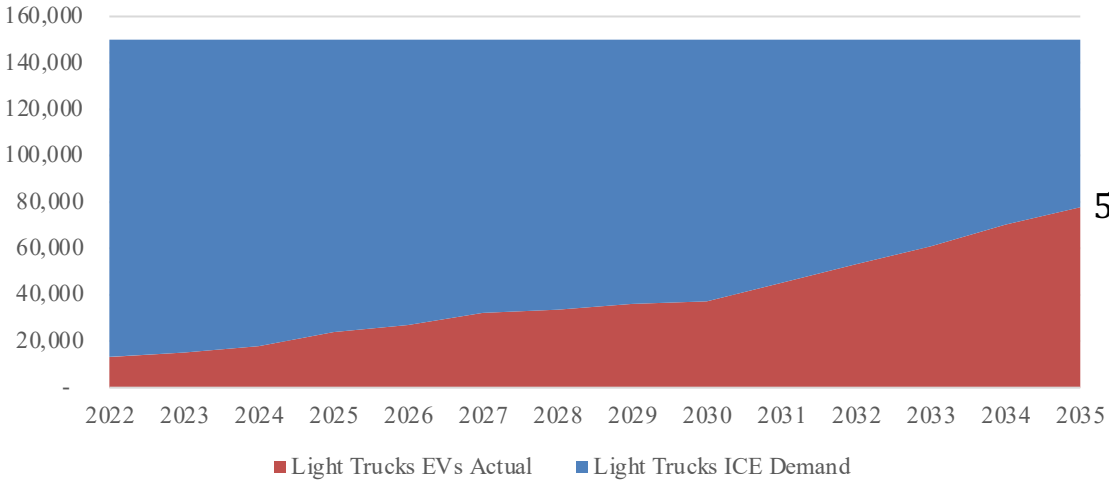
- Chart assumes total demand for light trucks remains constant at 150,000 light trucks per year
- EV annual target rises from 22,500 in 2022 to 150,000 in 2035 (100%)
- ICE annual supply quota drops from 127,500 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the B.C. ZEV legislation



# Forecast of Actual Sales of Light Trucks in B.C.



## Forecast of Light Truck Annual Sales in B.C.



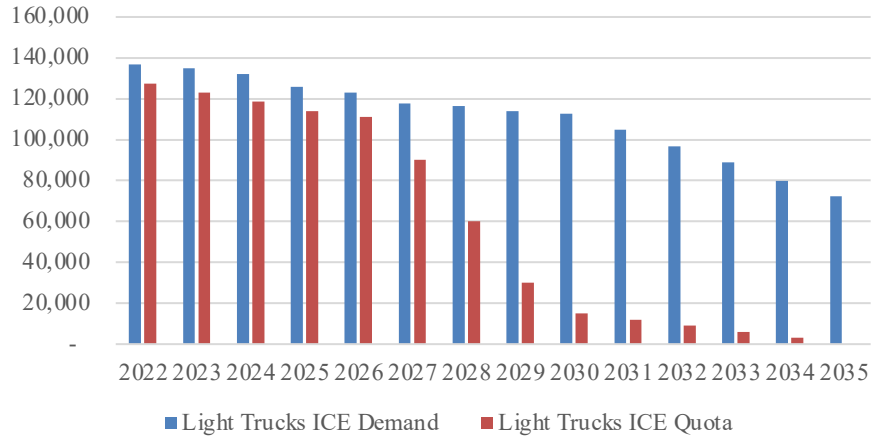
52%  
Assumption is that B.C. takes 25% of EV sales in Canada

- Forecast of total demand for light trucks is 150,000 light trucks per year
- EV annual sales rise from 13,000 in 2022 to 78,000 in 2035 (52% of target)
- ICE sales drop from 137,000 in 2022 to 72,000 in 2035, well above zero quota
- These numbers show actual forecasted sales will **not** meet requirement in B.C. ZEV legislation for light trucks, even with channeling of EV sales to B.C.

# Forecast of Demand for Light Trucks Exceeding ICE Light Truck Quota in B.C.



Light Trucks ICE Demand Versus Quota in B.C.



- This chart shows the increasing gap between demand for ICE light trucks (blue bar) versus the light trucks ICE quota (red bar) (11,250 in 2026, rising to 70,000 in 2035)
- This gap means that people wanting to buy a light truck will not be able to buy an EV (supply limited) and will **not** be able to buy an ICE light truck (demand exceeds ICE quota under B.C. ZEV legislation)

# Forecast of Passenger Car and Light Truck EV Numbers for Quebec, Alberta and Ontario

- Quebec has taken several steps to encourage the sale of EVs
  - It gives purchase incentives of up to \$7,000 in addition to the federal \$5,000 purchase incentive
  - It has encouraged the installation of charging infrastructure
  - It has created a ZEV mandate
- As a result, the sales of EVs in Quebec are higher (about 9% of sales) than the Canadian EV sales (about 6%)

## Data from 2022

- Quebec had 380,000 light vehicle sales (25% of total Canadian sales), but 33,000 EV light vehicle sales (33% of total Canadian EV sales, broken down 36% of car sales and 32% of light truck sales)

- The belief is that vehicle companies are channeling EV sales to Quebec to meet this increased demand and to comply with the ZEV mandate requirements

## Quotes from Quebec Government Document Discussing ZEV Mandate

<https://www.environnement.gouv.qc.ca/changementsclimatiques/vze/rapport-mise-oeuvre-2018-2020-en.pdf>

“Some motor vehicle manufacturers have clearly stated that they are prioritizing Québec within the Canadian market due to the ZEV standard.”

“It is highly likely that the July 2018 decision by Ontario to end incentives had a positive impact on the number of vehicles available at motor vehicle dealerships in Québec.”

“According to a study estimating the availability of plug-in vehicles at dealerships in Canada, Québec had the biggest inventory in the country, with 57% of the total in stock (February 2020)<sup>12</sup>. One of the reasons suggested to explain this situation is the Québec ZEV standard. “

**Table 7**

Electric vehicle (EV) fleets and share of totals, by province, as of December 31, 2020

Numbers include BEVs, hybrids and plug in hybrids

Province/Territory	Approximate EV registration	Vehicles on the road	EV share
Alberta	3,700	3,105,000	0.1%
BC	38,000	3,068,000	1.2%
Manitoba	700	803,000	0.1%
NB	350	550,000	0.1%
N-L	100	354,000	0.0%
NT	10	23,600	0.0%
Nova Scotia	400	616,000	0.1%
Nunavut	1	4,900	0.0%
Ontario	45,000	8,358,000	0.5%
PEI	90	100,000	0.1%
Québec	70,500	5,310,000	1.3%
Saskatchewan	400	811,000	0.0%
Yukon	12	35,000	0.0%
<b>Canada (total)</b>	<b>159,000</b>	<b>23,137,000</b>	<b>0.7%</b>

Source: Electric Mobility Canada, May 2020.

The figures were rounded by the source; Canadian total of provincial data might not add up.

**Figure 5**  
 Electric range and most affordable price among the five most registered electric vehicles in Québec, model years 2015, 2017 and 2019



Sources: AVEQ, *Guide de l'auto*, 2015-2020.

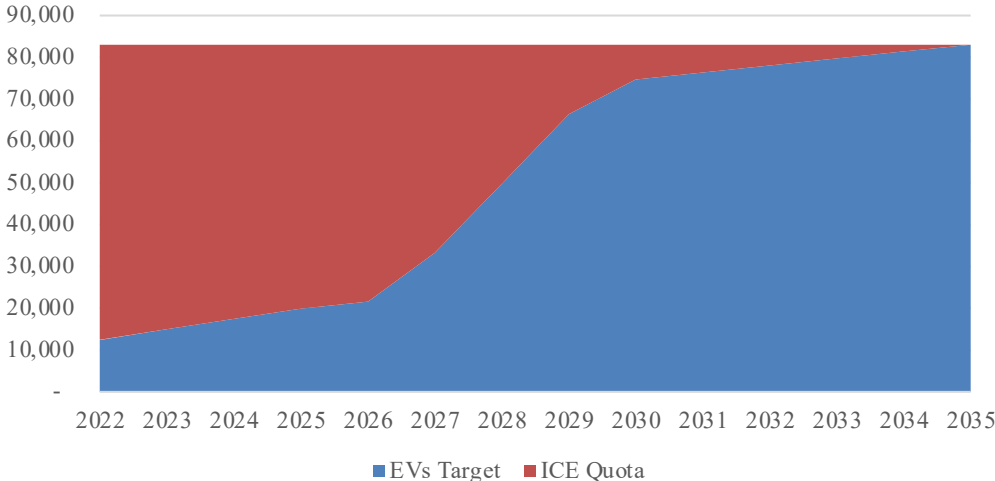
# Passenger Car Numbers for Quebec



# ZEV Requirements for Annual Sales of EV and ICE Passenger Cars in Quebec



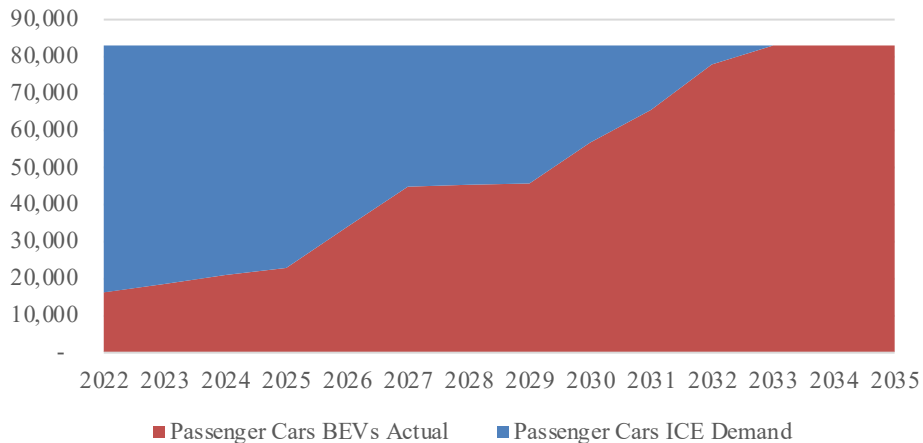
### ZEV Requirement for Passenger Car Sales in Quebec



- Chart assumes total demand for passenger cars remains constant at 80,000 cars per year
- EV annual target rises from 12,500 in 2022 to 83,000 in 2035 (100%)
- ICE annual supply quota drops from 70,500 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the Quebec ZEV legislation

# Forecast of Actual Sales of Passenger Cars in Quebec

## Forecast of Actual Passenger Car Sales in Quebec

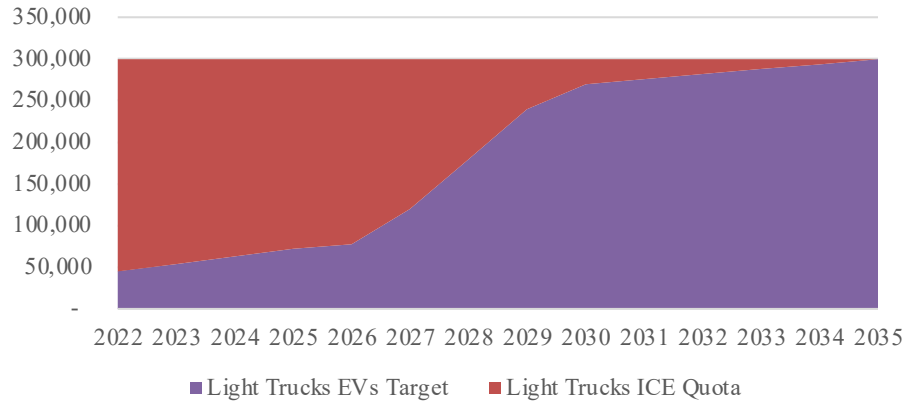


Assumption is that Quebec takes 36% of EV car sales in Canada

- Forecast of total demand for passenger cars is 83,000 cars per year
- EV annual sales rise from 16,300 in 2022 to 83,000 in 2033 (100%), 2 years before 2035 target date due to channeling of EV sales to Quebec
- ICE annual sales drop from 66,700 in 2022 to zero (0%) in 2033
- **These numbers show actual forecasted sales should meet the requirements in the Quebec ZEV legislation for passenger cars**

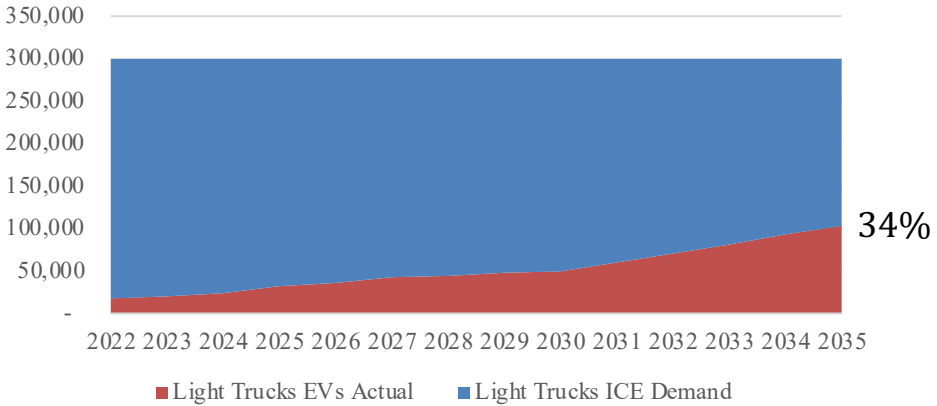
# Light Truck Numbers in Quebec

## ZEV Requirements for Light Truck Sales in Quebec



- Chart assumes total demand for light trucks remains constant at 300,000 light trucks per year
- EV annual target rises from 45,000 in 2022 to 300,000 in 2035 (100%)
- ICE annual supply quota drops from 255,000 in 2022 to zero (0%) in 2035
- These numbers show the requirements in the Quebec ZEV legislation

## Forecast of Light Truck Annual Sales in Quebec

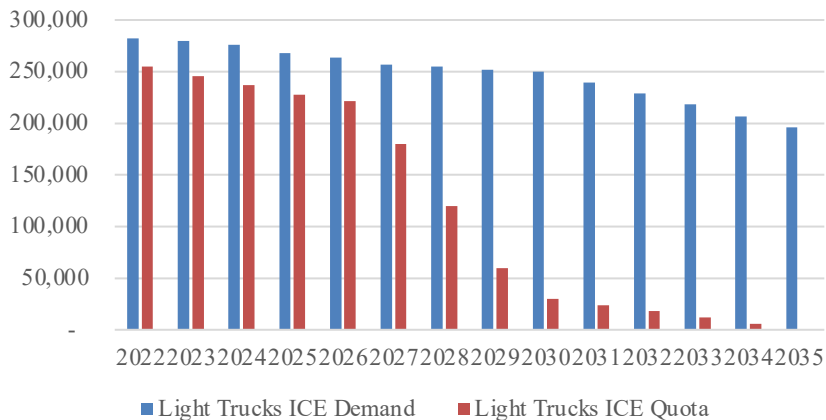


Assumption is that Quebec takes 32% of light truck EV sales in Canada.

- Forecast of total demand for light trucks is 300,000 light trucks per year
- EV annual sales rise from 18,000 in 2022 to 103,000 in 2035 (34% of target)
- ICE sales drop from 282,000 in 2022 to 197,000 in 2035, well above zero quota
- These numbers show actual forecasted sales will **not** meet requirement in Quebec ZEV legislation for light trucks, even with channeling of EV sales to Quebec

# Forecast of Demand for Light Trucks Exceeding ICE Light Truck Quota in Quebec

Light Trucks ICE Demand Versus Quota in Quebec



- This chart shows the increasing gap between demand for ICE light trucks (blue bar) versus the light trucks ICE quota (red bar) (52,000 in 2026, rising to 197,000 in 2035)
- This gap means that people wanting to buy a light truck will not be able to buy an EV (supply limited) and will **not** be able to buy an ICE light truck (demand exceeds ICE quota under Quebec ZEV legislation)

# Numbers for Alberta

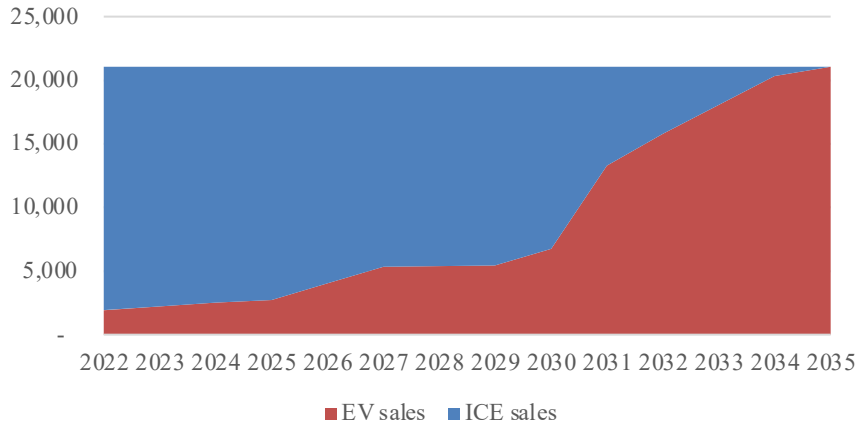
- Alberta has no express policy to encourage EVs
  - No purchase incentives
  - No program to encourage the installation of charging infrastructure
  - No ZEV mandate
- As a result, the sales of EVs in Alberta are lower (about 2.3% of sales) than the Canadian EV sales (about 6%)
- The belief is that vehicle companies are channeling EV sales away from Alberta due to lower demand

## Data from 2022

- Alberta had 190,000 light vehicle sales (12% of total Canadian sales), but only 4,300 EV light vehicle sales (4.3% of total Canadian EV sales, broken down 4.2% of car sales and 4.3% of light truck sales)



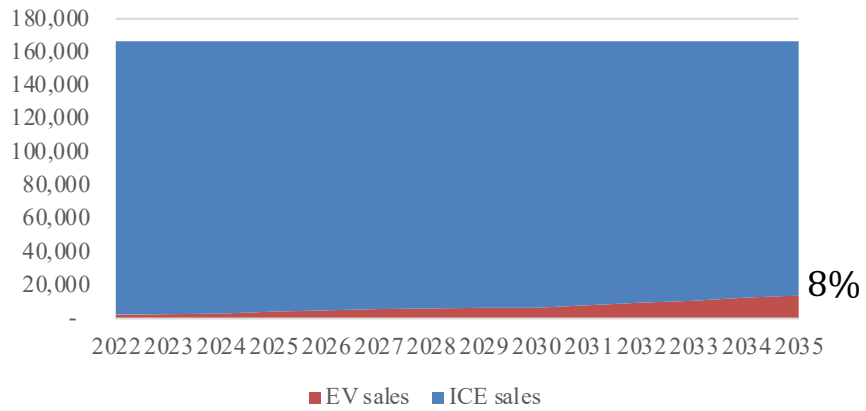
## Forecast of Passenger Car Annual Sales in Alberta



Assumption is that Alberta takes 4.2% of car EV sales in Canada up to 2030, and 7.2% from 2030 to 2035.

- Forecast of total demand for passenger cars is 21,000 per year
- EV annual sales rise from 1,900 in 2022 to 21,000 in 2035 (100% of target)
- ICE sales drop from 19,100 in 2022 to zero (0%) in 2035
- **These numbers show actual forecasted sales should meet the requirements in the federal ZEV legislation for passenger cars in Alberta**

## Forecast of Light Truck Annual Sales in Alberta



Assumption is that Alberta takes 4.3% of light truck EV sales in Canada.

- Forecast of total demand for light trucks is 166,500 light trucks per year
- EV annual sales rise from 2,400 in 2022 to 13,800 in 2035 (8% of target)
- ICE sales drop from 164,100 in 2022 to 152,700 in 2035, well above zero quota
- These numbers show actual forecasted EV sales will result in huge shortfall and will **not** meet requirement in federal ZEV legislation for light trucks in Alberta

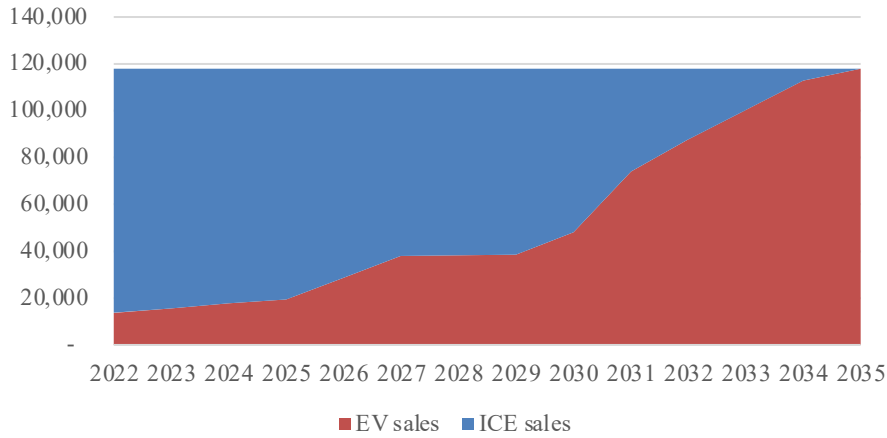
# Numbers for Ontario

- Ontario has no express policy to encourage EVs
  - No purchase incentives
  - No program to encourage the installation of charging infrastructure
  - No ZEV mandate
- As a result, the sales of EVs in Ontario are lower (about 5.4% of sales) than the Canadian EV sales (about 6%)
- The belief is that vehicle companies are channeling EV sales away from Ontario due to lower demand

## Data from 2022

- Ontario had 610,000 light vehicle sales (39% of total Canadian sales), but only 33,000 EV light vehicle sales (33% of total Canadian EV sales, broken down 30% of car sales and 35% of light truck sales)

## Forecast of Passenger Car Annual Sales in Ontario



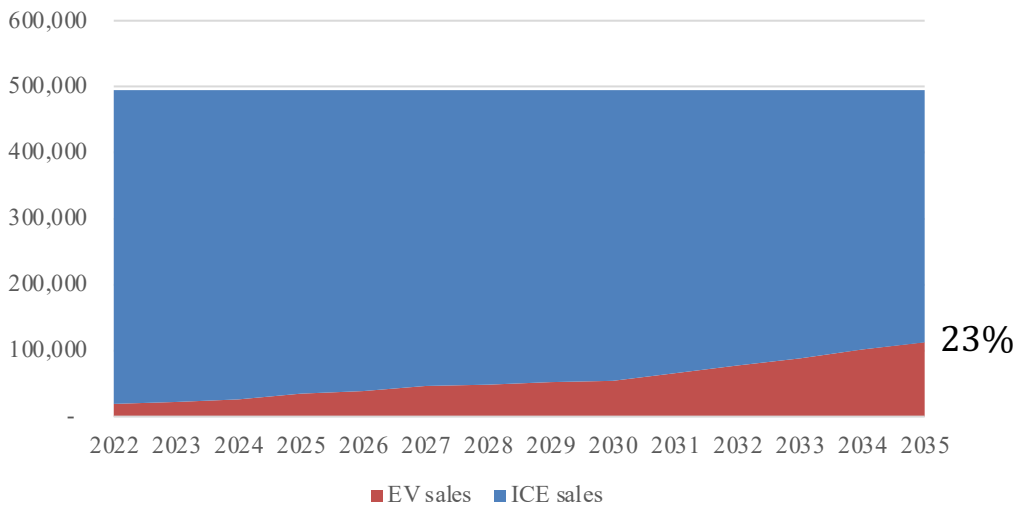
Assumption is that Ontario takes 30% of car EV sales in Canada up to 2030, and 40% from 2030 to 2035.

- Forecast of total demand for passenger cars is 118,000 per year
- EV annual sales rise from 13,800 in 2022 to 118,000 in 2035 (100% of target)
- ICE sales drop from 104,200 in 2022 to zero (0%) in 2035
- **These numbers show actual forecasted sales should meet the requirements in the federal ZEV legislation for passenger cars in Ontario**

# Forecast of Actual Sales of Light Trucks in Alberta



## Forecast of Light Truck Annual Sales in Ontario



Assumption is that Ontario takes 35% of light truck EV sales in Canada.

- Forecast of total demand for light trucks is 495,000 light trucks per year
- EV annual sales rise from 19,000 in 2022 to 113,000 in 2035 (23% of target)
- ICE sales drop from 476,000 in 2022 to 382,000 in 2035, well above zero quota
- These numbers show actual forecasted EV sales will result in huge shortfall and will **not** meet requirement in federal ZEV legislation for light trucks in Ontario

# Conclusions

- Supply of passenger car EVs comprising 20% of total vehicle sales **should be sufficient** to meet requirement for 100% of sales of passenger cars in 2035 to be zero emissions vehicles (ZEVs)
  - may still be an issue if certain people want to buy an internal combustion engine (ICE) and therefore challenge the ZEV mandate prohibiting ICE passenger car sales in 2035
- B.C. and Quebec should reach this 100% EV target before 2035, due to existing purchase incentives and ZEV mandates
- Other 8 provinces will only reach 100% target in 2035



- Supply of light trucks (pickups, SUVs, vans and crossovers) comprising 80% of total vehicle sales will **not** be sufficient to meet requirement for 100% of sales in 2035 to be ZEVs
  - **EV sales for light trucks will only be 26%** of total light truck sales in 2035
- **This leaves demand for light trucks with a shortfall of 74%,** which will either
  - be filled by the sale of ICE light trucks, which will contravene the federal ZEV mandate, or
  - result in a prohibition of the sale of light trucks to Canadians who need such light trucks to live their daily lives
- B.C. (52%) and Quebec (34%) will come closest to light truck ZEV mandate targets
  - other provinces will be much lower versus target, e.g. Ontario 23%, Alberta 8%