Technical Annex to the *Economic Note*

"Are Electric Vehicle Subsidies Efficient?"

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Endnote 21: Cost of electric vehicle subsidies for the Ontario government from now until 2030.

Using the growth rate of sales of new vehicles in Ontario during the 2000-2016 period (1.37%) and the number of vehicles sold (821,762) in 2016,[1] we can estimate the number of new vehicles sold in Ontario between 2016 and 2020, and up until 2030.

Assuming that the target of 5% of new vehicle sales set by the Ontario government will be reached in 2020 and that the increase in sales of electric vehicles will be constant from now until then, approximately 116,000 electric vehicles will have been sold between 2016 and 2020. The expenditure for the government would thus be from $980 million to $1.7 billion, since the average subsidy oscillates between $8,480 and $14,750. These amounts represent the lower and upper bounds of subsidies for the purchase of an electric vehicle in Ontario, which range from $7,730 to $14,000 for most models, plus the maximum subsidy of $750 for the purchase of a charging station.

For the estimate of the number of electric vehicles sold until 2030 in order to calculate the costs for the government, we selected a conservative scenario, namely that the share of electric vehicles in sales of new vehicles would remain at 5%. The approximately 584,000 new electric vehicles sold over the entire period would entail an expenditure of from $4.9 billion to $8.6 billion. If the share of fully electric or rechargeable hybrid vehicles sold exceeds 5%, which is likely, the cost for the Ontario government will be higher.

Endnote 22: How high should electric vehicle subsidies be?

Another way of evaluating the efficiency of the Quebec and Ontario subsidy programs is to measure how high the subsidies would be if they were calculated using the price per tonne of GHGs, as set by the carbon market or by the future federal tax. The amount of the subsidy would then have a connection with the goal achieved, i.e., the quantity of

[1] Statistics Canada, CANSIM Table 079-0003: New motor vehicle sales, Canada, provinces and territories, annual, 2000-2016; Statistics Canada, CANSIM Table 405-0004: Vehicle registrations, annual (number), 2000-2015.

GHG emissions avoided. The price of a tonne of GHGs is $18.08 on the Ontario market and $18.51 on the Quebec-California market, while the federal tax will be $10 in 2018 and will gradually climb to $50 by 2022.

For Ontario, given that the replacement of a gasoline-powered vehicle by an electric vehicle represents 28.2 tonnes of GHGs avoided, the amount of the subsidy should be $282 according to the level of the federal tax in 2018, or $509.86 using the carbon market price as a reference. Using the level of the federal tax in 2022, the subsidy would be $1,410.

For Quebec, given that the emissions avoided by replacing a gasoline-powered vehicle amount to 29.9 tonnes of GHGs, the amounts are $299 using the federal tax in 2018, $533.42 using the carbon market price, and $1,495 using the federal tax in 2022.

A more economically defensible subsidy would thus have been from $282 to $1,410 per electric vehicle for Ontario, and from $299 to $1,495 for Quebec. Currently, they are typically $14,750 and $8,600, respectively.

Endnote 25: How many tonnes of GHGs would be eliminated if the government targets were attained?

In the case of Quebec, the replacement of a gasoline-powered vehicle by an electric vehicle leads to the elimination of 29.9 tonnes of GHGs over 10 years, or 2.99 tonnes annually. Multiplying the quantity of GHGs eliminated annually per vehicle by 1 million, the government's target for 2030, the result is 2.99 million tonnes (Mt) of GHGs avoided annually. Given that Quebec currently emits 82.1 Mt of GHGs according to the latest survey (2014), the annual gain from the replacement of 1 million conventional cars by electric vehicles would be around 3.6%

In the case of Ontario, the replacement of a gasoline-powered vehicle by an electric vehicle leads to the elimination of 28.2 tonnes of GHGs over 10 years, or 2.82 tonnes annually. Multiplying the quantity of GHGs eliminated annually per vehicle by 1.44 million, namely the estimated number of electric vehicles on the road in 2030 that would be proportional to the Quebec target, the result is 4.1 million tonnes (Mt) of GHGs avoided annually. Given that Ontario emits 170.2 MT of GHGs, the annual gain for 1.44 million electric vehicles would thus be, at best, some 2.4%.