ENERGY & ENVIRONMENTAL POLICY TRENDS

May 2019

WILL ELECTRIC VEHICLE REBATES SPUR WIDESPREAD ADOPTION?

By Blake Shaffer

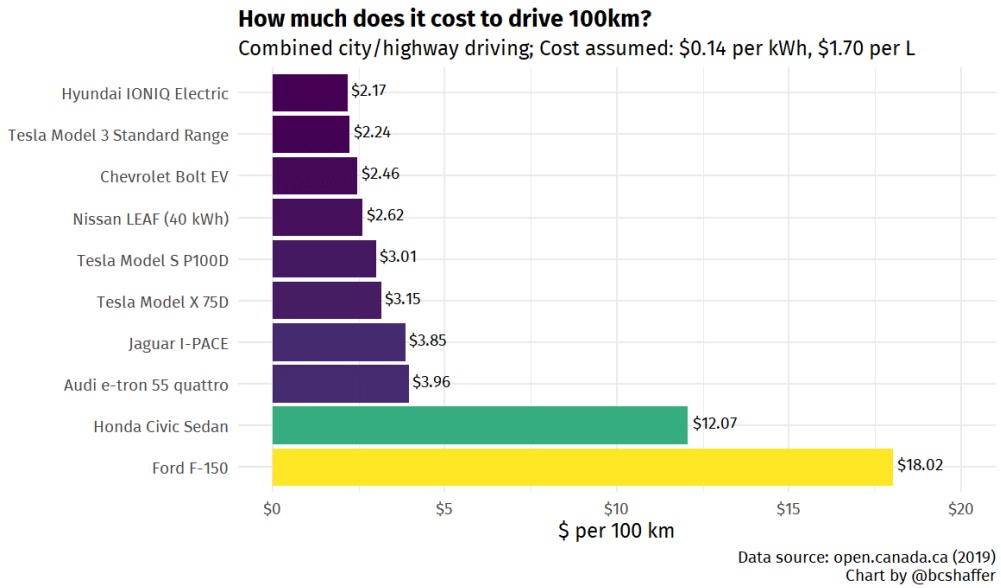
On May 1st, the Federal government rebate payment for electric vehicle (EV) purchases came into effect. The program offers buyers of EVs a $5,000 credit, or $2,500 for the purchase of a short range plug-in hybrid vehicle. And these can be stacked on a $5,000 credit in B.C. and an $8,000 credit in Quebec.

The new EV rebate programs raises several questions. Chief among them is whether or not the government should be subsidizing electric vehicles at all?

Equity: Concerns are often raised that EV subsidies are a transfer to wealthy households. And for good reason. In a study of the US EV tax credit, Severin Borenstein and Lucas Davis (2016) found the top income quintile received 90% of the benefits. The Canadian government has taken some measures to mitigate this concern by restricting eligibility to vehicles under $45,000 ($55,000 for vehicles with 7 seats or more). It could go further by making the rebate a taxable benefit, imposing a larger cost on higher income bracket households.

Efficiency: As a way to reduce GHG emissions, EV rebates have been criticized for their cost effectiveness. Estimates of the implied cost of GHG reductions from EV subsidies ranges from $395 (Ecofiscal, 2017) to nearly $1,000 per tonne (Rivers and Wigle, 2018)—a full order of magnitude higher than a carbon tax. This, of course, can differ based on the emissions intensity of regional power grids.

Yet, part of the higher cost may be justified by spillover benefits in the form of greater shared infrastructure, cost declines in the production of EVs, and network or cohort effects from early EV adoption. Further,



as noted by Holland et. al. (2017), even where CO2 savings aren't large, EVs can help reduce harmful local air pollution from the tailpipe in densely populated urban areas.

Regardless of whether one is satisfied that government spending on EV subsidies is efficient and equitable, one thing is clear: the subsidies are likely to be effective in increasing EV market share, especially in British Columbia. With gasoline hitting $1.70/L in B.C., the case for an electric vehicle on purely economic grounds is strengthening – with or without rebates.

Using publicly available data from Natural Resources Canada on fuel economy for EVs (in kilowatt-hour per 100km) and internal combustion engine (ICE) vehicles (in L per 100km), I am able to calculate the cost to drive 100km for a variety of top-selling EVs and the two most popular ICE vehicles – the Ford F-150 and Honda Civic.

Using current B.C. gas prices ($1.70/L) and the Tier 2 rate for electricity ($0.14 per kWh), most EVs cost only $2 to $4 to drive 100km. This compares to $12 in the Civic, and $18 for the F-150. For a household driving 16,000km per year, the choice of an EV over a comparably-sized ICE car results in roughly $1,600 of annual savings.

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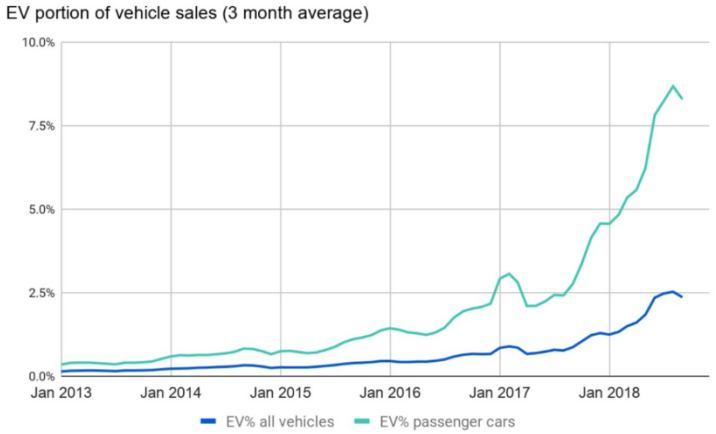
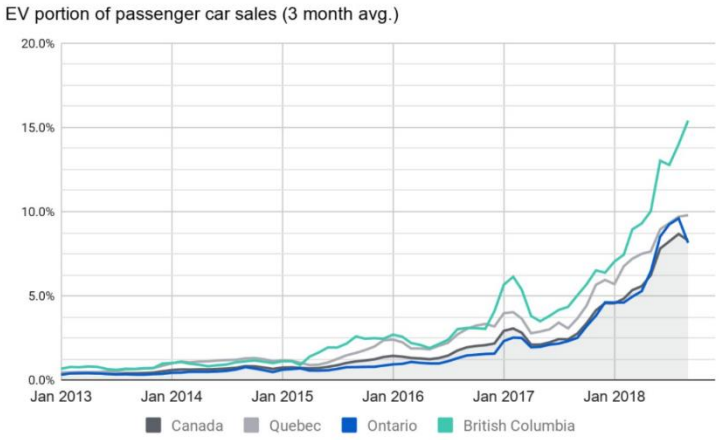
The large fuel cost savings makes the payback period to cover the higher cost of an EV only 2 years with the rebates, or 8 years without. In Alberta, lower gas prices increase the payback period to 8 and 15 years with and without the Federal rebate.





Charts from fleetcarma.com

Whether or not government should be subsidizing EVs remains open to question. But as prices for new EVs fall while gas prices remain high, the private economics are improving. The current market share of EVs is roughly 2.5% of all vehicles sold in Canada. Within the car class alone, the share is closer to 8%. This national average masks considerable regional heterogeneity. In B.C., the EV market share of cars has already passed 15% and given the province's currently high gas prices and generous EV incentives, we should expect to see share climb in the years ahead.

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Data:

Fuel consumption ratings: https://open.canada.ca/data/en/dataset/98f1a129-f628-4ce4-b24d-6f16bf24dd64

BC Hydro residential electricity rate: https://app.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html

Payback period calculator:

I made an app for that! You can try it here: https://blakeshaffer.shinyapps.io/app_ev

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