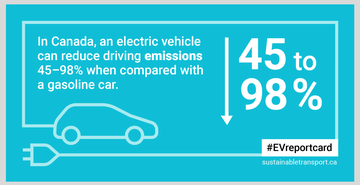
Electric Vehicle Policy Report Card: Evaluating electric vehicle policies in 10 Canadian provinces

Noel Melton (Partner, Navius Research), Dr. Jonn Axsen (Associate Professor) & Suzanne Goldberg (Adjunct Professor), Sustainable Transportation Action Research Team, Vancouver, Canada

Background: Electric Vehicles in Canada

Reducing greenhouse gas emissions from Canada's transportation sector will be essential in meeting federal and provincial emissions targets. Electric vehicles are likely to be a key component in the transition to a lower emissions transportation system, as they can reduce emissions 45% to 98% compared to a gasoline vehicle with Canada's current electricity grid.



In Canada, the market for electric vehicles has been growing, but remains small. In 2015, electric vehicles made up about 1% of new light-duty passenger vehicle sales in Canada. Research shows there is significant interest in electric vehicles among Canadian consumers, but this interest is constrained by a range of factors such as limited awareness, home recharge access and electric vehicle model variety.

Research Objective

To evaluate the effectiveness of electric vehicle supportive policies in Canada's 10 provinces toward achieving significant long-term electric vehicle adoption.

Policy Goal

Research indicates that widespread adoption of electric vehicles will likely be necessary to meet longer-term climate targets. The International Energy Agency suggests that 40% of new passenger vehicle sales must be electric by 2040 to limit global warming to 2 degrees C; studies in Canada suggest that even greater adoption may be needed.

We frame our evaluation around the level of electric vehicle adoption likely needed to meet deep greenhouse gas reductions, using the goal of **40% new vehicle sales or "market share" by 2040**.

Electric vehicle supportive policies

Research and real-world experience demonstrate that strong electric vehicle supportive policy can encourage sales. Policies that stimulate uptake can be categorized as demand-focused or supply-focused.

Demand-focused policies aim to support or encourage consumer demand for electric vehicles by, for example, offering financial incentives or providing charging infrastructure.

Supply-focused policies encourage or require suppliers such as auto manufacturers and dealerships, to develop and sell electric vehicles by, for example, specifying that a certain share of vehicles sold in a jurisdiction have zero tailpipe emissions, or through support for research and development.

Our Method

1 Identify electric vehicle supportive policies

2 Evaluate the effectiveness of each policy

3 Assign letter grades to each province (based on the effectiveness of their policies)

We evaluate each policy against a "policy benchmark", which reflects the maximum stringency (how strong the policy is) and duration (how long the policy is intended to be in place for) of a specific policy type that is likely to be politically acceptable in North America. Our evaluation framework considers eight types of policies.

Policy evaluation benchmarks and estimated market share impacts

Policy	Policy Benchmark, (i.e. maximum stringency and duration likely being politically acceptable in North America)	Equivalent purchase subsidy ($CAD 2016 value)	Estimated impact on 2040 electric vehicle market share
Demand-side policies			
Financial incentives	$12,000 per vehicle for 15 years.	$12,000	10% (5%-15%)*
HOV lane access	100% of congested highways have HOV lane access for PEVs.	Varies by region (e.g. $165 per vehicle in Toronto and $30 per vehicle in Calgary)	0%-0.1%
Public charging deployment	One public charger for every two gas stations (sufficient charger density to equate with gasoline refueling).	$3,800	3.2% (1.6%-4.8%)*
Building regulations	100% of population has level 2 home charging access (i.e., total building stock).	$9,600	8% (4%-12%)*
Carbon price	Carbon price or electricity subsidy on track to meet $150/tonne CO_2e by 2030.	$18,000	15% (7.5%-22.5%)*
Supply-side policy			
ZEV mandate	California's ZEV mandate (requiring 2025 ZEV credits equivalent to 9 to 21% PEV sales).	$18,000	15% (9%-21%)*
Vehicle emissions standards	Fuel economy standards with PEV credits reaching 98g CO_2e/100 km by 2025.	$2,400	2% (1%-3%)*
Low carbon fuel standards	Low carbon fuel standard requiring a 10% reduction in carbon intensity by 2020, with PEV credits.	$1,200	1% (0.5%-1.5%)*

*Benchmark market share range with uncertainty

We draw on the literature to estimate the impact of each policy benchmark on electric vehicle market share in 2040. In some cases, policy benchmarks are based on actual policies implemented around the world, while other benchmarks are based on stronger policies indicated in the electric vehicle literature. To evaluate the impact of a policy, we compare the stringency and duration of that policy to its policy benchmark.

Limitations

1. Policy impacts in the literature are uncertain, much research into policy impacts remains to be done.
2. We assume that anticipated policy impacts for other jurisdictions (e.g. the US) will similarly apply to Canada.
3. Our framework deals with policies individually and doesn't account for interactions among them.
4. We don't account for all policies, specifically, research and development programs and information campaigns because impacts are uncertain and difficult to quantify.

Grading Policy

For a province to achieve an "A" they need to have policies in place that put them on track for an electric vehicle market share of 40% by 2040.

We add up the estimated market shares of all evaluated electric vehicle policies in each province to determine overall impact and then translate impacts into a letter grade.*

*This summation is simplistic in that we do not account for potential interactions among policies.

Grade	Estimated market share in 2040	Policy performance
A	35%+	Excellent performance: Initiatives are likely to meet or exceed target
B	20–35%	Moderate performance: Initiatives are likely to boost the adoption of electric vehicles but not achieve target
C	10–20%	Marginal performance: Initiatives are likely to achieve somewhat limited adoption of electric vehicles
D	5–10%	Poor performance: Initiatives are likely to achieve very limited adoption of electric vehicles
F	0–5%	Unsatisfactory performance: Initiatives, if any, are likely to induce insubstantial adoption of electric vehicles

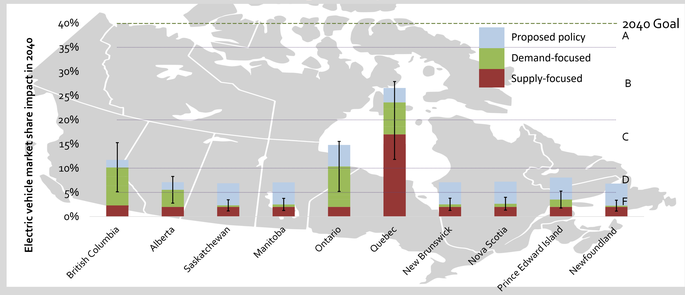
With similar policies to Norway and California, provinces' grades improve to As and Bs

Electric Vehicle Policies in Canada

We identify 96 policies in total, of which 80% were demand-focused. The most common policies are financial incentives for vehicles and chargers (20), public charging deployment (15), and information campaigns (14). Of these policies 80% are from three provinces (Ontario, Quebec and British Columbia).

Based on the policies we evaluate, no province receives an "A": six receive "Ds", two receive "Cs" and one receives a "B".

Estimated market share impact and grade of provinces' electric vehicle policies



	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Demand-focused policies										
Financial incentives	2%				5%	4%				
HOV lane access	0.01%	0.5%			0.03%	0.03%				
Public (non-home) charging	2%		0.3%	0.5%	0.5%	1%	0.5%	0.7%	2%	0.3%
Building codes	1%				0.9%					
Carbon price	3%	3%			2%	2%				
Total demand-focused policies	8%	4%	0.3%	0.5%	8%	7%	0.5%	0.7%	2%	0.3%
Supply-focused policies										
ZEV mandate						15%				
Fuel economy standards	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Fuel standards	1%									
Total supply-focused policies	3%	2%	2%	2%	2%	17%	2%	2%	2%	2%
PEV market share impact in 2040 and grades based on current policies										
Market share impact	11%	6%	2%	3%	10%	24%	3%	3%	4%	2%
Uncertainty low value	5%	3%	1%	1%	5%	12%	1%	1%	2%	1%
Uncertainty high value	16%	8%	4%	4%	16%	28%	4%	4%	5%	3%
Current policies	C-	D	F	F	C-	B-	F	F	F	F
Grades based on proposed policies										
Proposed policies	C-	D	D	D	C	B	D	D	D	D
Grades based on Norway and California-like policies										
With Norway-like policies	B	B	B	B	B	A	B	B	B	B
With California-like policies	B+	B+	B+	B+	B+	B+	B+	B+	B+	B+

Most effective

Key Policy Implications

1. The majority of provinces have undertaken little or no substantive efforts to boost PEV adoption. Three provinces account for 80% of policies identified in Canada.
2. No province is on track to meet the policy goal of 40% PEV market share by 2040. Additional and stronger policies are needed.
3. The most effective current policies include a Zero Emission Vehicle mandate, strong and long-duration financial incentives, and strong tax on gasoline or carbon pricing.
4. Different combinations of stringent policy can be used to achieve an "A" in our framework. Policymakers will want to determine which effective policies are best suited for their region.
5. The Canadian government could raise the grades of all provinces to "A's" and "B's" with effective federal-level policies.

SFU FACULTY OF ENVIRONMENT
SFU START www.sustainabletransport.ca
navius research
Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada
Canada
METCALF FOUNDATION

Citation: Axsen, J., Goldberg, S., & Melton, N. (2016). *Canada's Electric Vehicle Report Card*. Available from: https://sustainabletransport.ca/ev_report_card/