

Electric Vehicles – Financial Outlook

MnDOT is evaluating the potential revenue implications from an increase in electric vehicles (EVs). MnDOT is particularly focused on battery-electric vehicles (BEVs) that only use electricity as fuel, so they do not pay gas taxes. Gas taxes make up about half of total transportation revenue in Minnesota.

The discussion below does not include benefits of EVs that are harder to monetize, which include less air pollution, fewer greenhouse gas emissions, and benefits to the electric grid and utility customers.

EVs in Minnesota today

In 2017, 0.6% of new car sales in Minnesota were electric. About 3,000 cars were BEVs and 3,000 were plug-in hybrid electric vehicles (PHEVs) that can operate only on electricity or switch to gasoline power.

National Trends

- EV sales have grown annually, but were still only 1.2% of new car sales in 2017¹
- BEVs make up about 75% of new EV sales.
- In 2018, 20% of Americans said their next car will be electric, up from 15% in 2017²
- 2/3 of potential EV-owners said long-term cost savings will influence their decision.
- Non-plug in hybrids sales (e.g. Toyota Prius) declined from 3.0% to 1.9% in 2017.
- Bloomberg forecasts worldwide EV sales will increase from 1.1 million in 2017, to 11 million in 2025, and 30 million by 2030 as battery prices decrease.

EV Impacts to Transportation Funding

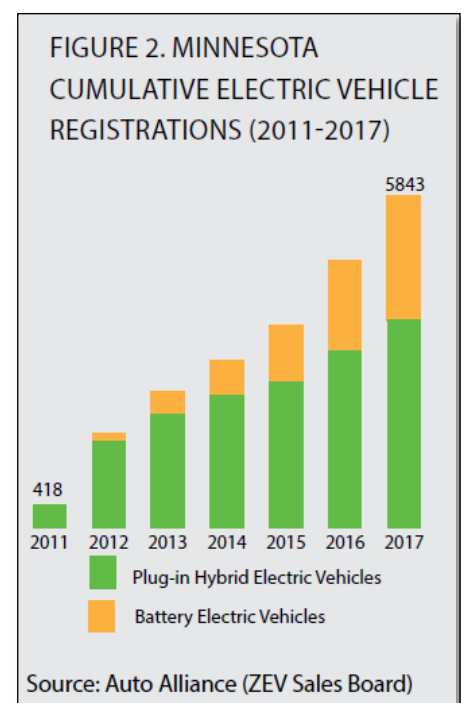
Current Law

Transportation funding is from three primary sources in Minnesota: the Motor Vehicle Sales Tax (MVST), annual motor vehicle registration taxes, and the motor fuel excise tax (gas tax). Gas taxes are the largest funding source with 45% of total funding. MVST and registration taxes are based on the retail value of the vehicle which is often higher for EVs than for internal combustion engine vehicles (ICEVs). BEVs also pay an annual \$75 registration tax.

Since EVs don't pay gas taxes, there are questions about their contribution to the Highway User Tax Distribution Fund (HUTD) fund. The table below

¹ <http://evadoption.com/ev-market-share/ev-market-share-state/>

² <http://fortune.com/2018/05/08/americans-next-car-electric-aaa-survey/>



compares transportation revenue over 12 years from a Ford Focus that offered a BEV and ICEV versions in model year 2018. The comparison assumes an average of 15,000 miles traveled at 35 miles-per-gallon. A 12-year time horizon is based on average vehicle life in Minnesota

Senate Proposal

Senate File 1093 proposes new taxes for EVs in Minnesota: \$200 for BEVs and \$100 for PHEVs and a \$0.05 per kilowatt hour (kWh) charge on public charging (or \$200 tax per charger if the owner is unable to assess the tax on users).

The table below includes two sets of comparisons of HUTD revenue generated over 10-years between two sets of vehicles.

1. 2018 Ford Fusion that has ICE, conventional hybrid, and BEV powertrain options
2. 2018 models of three comparable luxury vehicles with ICE, PHEV, and BEV powertrains

ICEs, PHEVs and BEVs 10-Year Tax Estimator

Year	Make/ Model	Type	MSRP	MPG	Current Law: 10-year					Proposed Law: 10-year			
					Gas Tax	MVST & Tab Fees	BEV Tax	HUTD Revenue	+EV Funding	EV Tax	\$0.05 per kWh tax	HUTD Revenue	+EV Funding
2018	Ford Focus	ICE	\$17,950	30	\$1,425	\$2,401	\$0	\$3,826	-	\$0	\$0	\$3,826	-
2018	Ford Focus	HEV	\$25,390	41	\$1,043	\$3,396	\$0	\$4,439	116%	\$0	\$0	\$4,439	116%
2018	Ford Focus	BEV	\$29,120	-	\$0	\$3,895	\$750	\$4,644.80	121%	\$2,000	\$500	\$6,395	167%
2018	Lexus LS 460	ICE	\$75,000	33	\$1,295	\$10,031	\$0	\$11,327	-	\$0	\$0	\$11,327	-
2018	Cadillac CT6	PHEV	\$77,000	62	\$690	\$10,299	\$0	\$10,988	97%	\$1,000	\$500	\$11,488	101%
2018	Tesla Model S	BEV	\$85,000	-	\$0	\$11,369	\$750	\$12,119	107%	\$2,000	\$500	\$13,869	122%

The table shows that EVs contribute more the HUTD fund currently and will contribute far more than their ICE counterparts under proposed SF 1093. Also notable is that some hybrid vehicles (HEV) disproportionately contribute the HUTD under the current tax scheme as fuel efficiency benefits do not outweigh the added cost. While the vehicles above are examples, every effort was made to find vehicles representative of the broader market, with a bias towards lower relative cost vehicles to avoid unfairly skewing the analysis. For example, the lowest cost Tesla Model S was used, instead of the performance version with a list price of \$99,000, which would contribute almost \$16,000 to the HUTD.

Future Transportation Revenue Implications from EVs

MnDOT modeled funding scenarios to evaluate potential future impacts of BEVs to state transportation funding over time if people chose to replace their ICEV with an EV. The analysis begins in 2030 and assumes the following:

- 20% of the pickup/passenger vehicle (light duty vehicles) fleet would be EVs
- More than 60% of new vehicle sales are EVs
- Revenue impacts are based on the current 10-year tax structure applied to years 2030-2039. This includes MVST, gas tax (\$0.285), and registration taxes, including the \$75 BEV tax.

MVST, registration and license fees

MnDOT compared EV prices to ICEVs. EVs generally cost between \$16,000 more and \$8,000 less than comparable models. The higher the “EV price premium,” the more an EV will pay in MVST, registration, and license fees, not including the \$75 BEV registration fee.

Gas taxes

MnDOT also considered the trade-off in gas taxes that would come from replacing a non-EV with an EV, based on the fuel efficiency of the ICEV being replaced. ICEVs with lower miles-per-gallon (MPG) (e.g., 26 MPG) pay more gas taxes while higher MPGs (e.g., 50 MPG) pay less gas taxes. Therefore, replacing a Toyota Prius (50 mpg) with an EV will have less impact on gas tax revenue than replacing a Dodge Charger (22 MPG) with an EV.

Modeled Funding Scenarios

		Avg MPG: non-EVs displaced by EVs						
		26	30	34	38	42	46	50
EV price premium	\$16,000	20%	23%	25%	27%	29%	30%	31%
	\$12,000	13%	16%	18%	20%	21%	23%	24%
	\$8,000	6%	9%	11%	13%	14%	15%	17%
	\$4,000	(0%)	2%	4%	6%	7%	8%	9%
	\$0	(7%)	(5%)	(3%)	(1%)	0%	1%	2%
	(\$4,000)	(14%)	(11%)	(10%)	(8%)	(7%)	(6%)	(5%)
	(\$8,000)	(20%)	(18%)	(17%)	(15%)	(14%)	(13%)	(12%)

- Green colored cells indicate additional transportation revenue with an EV.
- The highest revenue producing scenarios are when there is a high EV price premium and/or where EVs are replacing non-EVs with high MPG.
- Even a small (\$4,000) EV price premium would keep revenues neutral or positive in all scenarios.

Future uncertainty/risk

The higher purchase price of EVs is the primary contributor to the higher HUTD revenue of EVs compared to ICEVs. Some forecasts suggests that EVs could become less expensive than their ICEV counterparts by 2025, if the cost of batteries continues to fall³. If ICEVs cost the same or more than EVs, transportation revenues could be negatively affected.

³ <https://www.bloomberg.com/news/articles/2018-03-22/electric-cars-may-be-cheaper-than-gas-guzzlers-in-seven-years>