VINCENTRIC
2023 CANADIAN ELECTRIC VEHICLE COST OF OWNERSHIP ANALYSIS

CANADIAN MARKET
DECEMBER 2023

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INTRODUCTION

Electric Vehicles (EVs) continue to grow in popularity due to their environmental benefits and well-known fuel cost savings. However, since EVs typically cost more to purchase than Internal Combustion Engine (ICE) vehicles, many buyers may be uncertain if an EV's well-known fuel cost savings will be enough to actually save them money.

As an automotive research organization with nearly 20 years of experience in measuring and analyzing the cost to own and operate vehicles in the United States and Canada, Vincentric set out to uncover answers to common questions that Canadian consumers may have about EVs:

- ***How cost-effective are EVs compared to ICE vehicles in Canada?***
- ***Can Canadian EV buyers expect ownership cost savings beyond only fuel costs? If so, where?***
- ***What is the environmental impact of powering a vehicle using electricity rather than gasoline in Canada?***
- ***Will EVs in Canada recoup their Purchase Price premium through fuel, maintenance, and other savings? And if so, after how long?***

The set of vehicles analyzed in this study are fully electric vehicles (EVs), sometimes called Battery Electric Vehicles (BEVs), along with ICE vehicles. This analysis does not include any plug-in hybrid electric vehicles (PHEVs) or hybrid electric vehicles (HEVs).

The insights in this analysis can provide guidance to Canadian buyers who are considering the transition to an electric vehicle, enabling them to make an informed decision about whether an EV is the right choice for them.

EXECUTIVE SUMMARY

Vincentric used its Dynamic Cost to Own™ technology to produce the data necessary to analyze the total cost of ownership, often called TCO, of 40 model year 2023 fully electric vehicles (EVs) in Canada versus comparable ICE alternatives and found that 38 of 40 EVs (95%) had lower total ownership costs than their gasoline counterparts. This analysis focused on Battery Electric Vehicles (BEVs) and did not include Plug-In Hybrid Electric Vehicles (PHEVs) or Hybrid Electric Vehicles (HEVs).

The results showed that Fuel and Maintenance were the two areas where EVs generated the strongest cost savings. ***All 40 EVs had lower Fuel costs*** than their ICE alternatives, and ***34 of 40 EVs had lower Maintenance costs***.

Depreciation was the biggest detriment to EVs. While 14 of 40 EVs had lower Depreciation than their ICE alternative (driven primarily by the higher Purchase Price of the EVs), for the 26 EVs that did not, their Depreciation costs were an average of over $9,000 higher than their ICE alternatives.

All results in the analysis incorporate the $5,000 federal point-of-sale rebate, which reduced the market price of the 23 qualifying EVs by $5,000. Once this rebate was applied, all 23 EVs that qualified had lower ownership costs than their ICE alternative. Even if the federal rebate did not exist, 18 of those 23 qualifying EVs would still have lower ownership costs.

The analysis also investigated the Payback Period to determine which EVs would recoup their price premium through cost of ownership savings. Of the 31 EVs that had a higher purchase price, five EVs recouped their price premium within the first year of ownership, while an additional six EVs had a Payback Period within five years.

On the environmental side, ***all 40 EVs generated fewer greenhouse gas emissions than their ICE counterparts*** over five years, with an average reduction in CO_2 eq emissions of over 5.7 metric tons for EVs. Because EVs do not produce tailpipe emissions, EV emissions were calculated based on the pollutants generated when producing the electricity needed to power the vehicle over 125,000 kilometers.

Even though EVs had an average purchase price of approximately $11,000 more than a comparable ICE vehicle, they also had an average of over $15,000 in ownership cost savings. Overall, these results show that a Canadian EV's price premium is typically more than recouped within a five-year timeframe and suggest that there can be significant financial and environmental benefits to choosing an EV.

Vincentric Dynamic Cost to Own technology provides automotive cost of ownership insights to the new, used, and fleet markets in the US & Canada.

METHODOLOGY OVERVIEW

Only fully electric vehicles (EVs), sometimes called BEVs, were considered in this analysis. Plug-in hybrid electric vehicles (PHEVs) and hybrid electric vehicles (HEVs) were not included.

To perform this study, Vincentric first matched 40 model year 2023 EVs currently available in the Vincentric Canadian new vehicle database to comparable ICE alternative vehicles. These pairs were matched based on similar specifications and the availability of key data points such as residual values and vehicle pricing.

When selecting EVs, the lowest MSRP/base trim for each model was chosen unless it was not available on the Vincentric database, in which case the next lowest price available trim was used. The data analysts at Vincentric then reviewed over 2,800 vehicle configurations to identify similarly equipped ICE vehicles for comparison. When possible, the same make and a similar body style were selected for the ICE comparison model.

The analysis assumes that all vehicles analyzed will be driven 25,000 kilometers per year over the next five years, laying an equal foundation for each comparison. Canadian national averages are used for all cost inputs including labor rate, fuel (both gasoline and electricity), and fees & taxes. Provincial and local incentives were not taken into account, although federal EV rebates are considered as a reduction to market price for qualifying EVs.

More detail on the methodology used in this analysis can be found in Appendix A.

95%

of **EVs** had **LOWER TOTAL COST OF OWNERSHIP** than their **ICE** alternative

TOTAL COST OF OWNERSHIP COMPARISON

Vincentric used its Dynamic Cost to Own™ technology to calculate the total ownership costs of all 80 vehicles in the study. The analysis found that 95% (38 of 40) of EVs analyzed had lower ownership costs over five years than their comparable ICE alternative.

The following chart ranks the Top 5 EVs in Canada with the greatest cost savings compared to their ICE counterpart.

TOP 5 COST-EFFECTIVE CANADIAN EVs COMPARED TO ICE VEHICLES

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	TOTAL OWNERSHIP COSTS OVER 5 YEARS	EV COST OF OWNERSHIP SAVINGS vs ICE ALTERNATIVE
1ST	**Porsche Taycan 4S 4D Sedan**	**EV**	**$121,070**	**$113,236**	**$63,639**
	BMW 8 Series M850i xDrive 4D Gran Coupe	ICE	$115,016	$176,875	
2ND	**BMW i7 xDrive60 4D Sedan**	**EV**	**$144,629**	**$163,015**	**$44,141**
	BMW 7 Series 760i xDrive 4D Sedan	ICE	$144,629	$207,156	
3RD	**Mercedes-Benz EQS-Class EQS450 4D Sedan 4MATIC**	**EV**	**$134,335**	**$164,494**	**$31,914**
	Mercedes-Benz S-Class S500 4D Sedan 4MATIC	ICE	$141,143	$196,408	
4TH	**Tesla Model Y Long Range 4D Utility AWD**	**EV**	**$66,870**	**$71,298**	**$31,716**
	BMW X3 xDrive30i 4D Utility	ICE	$55,178	$103,014	
5TH	**Ford F-150 Lightning Pro Supercrew SWB 4WD**	**EV**	**$56,095**	**56,668**	**$31,344**
	Ford F-150 XL 2.7L EcoBoost Supercrew SWB 4WD	ICE	$56,451	$88,012	

A full list showing the Market Price (also known as the Estimated Purchase Price) and total cost of ownership results of all 40 analyzed EVs versus their ICE alternative is shown in Appendix B.

TOTAL COST OF OWNERSHIP COMPARISON

CONTINUED

For consumers looking to save on costs, Vincentric ranked all 40 EVs to determine which models cost the least to own over five years.

Below are the rankings of Top 10 EVs from model year 2023 with the lowest cost of ownership in Canada.

TOP 10 LOWEST COST TO OWN EVs IN CANADA

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
1ST	Volkswagen ID.4 Base 4D Utility RWD	$43,477
2ND	Nissan LEAF SV 5D Hatchback	$47,466
3RD	Kia Soul EV Premium 5D Hatchback at	$47,616
4TH	Chevrolet Bolt LT 5D Hatchback	$49,622
5TH	Hyundai Kona EV Preferred 4D Utility	$50,507
6TH	Kia EV6 Standard Range 4D Utility RWD	$50,907
7TH	Mini Cooper EV SE 3D Hatchback	$50,989
8TH	Chevrolet Bolt EUV LT 5D Hatchback	$51,870
9TH	Kia Niro EV Premium 4D Utility	$52,218
10TH	Toyota bZ4X L 4D Utility FWD	$52,892

*A ranking of **all 40** EVs by their total five-year ownership cost results is shown in **Appendix C**.*

TOTAL COST OF OWNERSHIP COMPARISON

CONCLUDED

Electric Vehicle incentives are designed to entice consumers to choose an EV, and they are typically an enticing benefit over gasoline-powered alternatives. At the time this study was conducted, 23 of the 40 EVs analyzed qualified for a $5,000 federal point-of-sales rebate that reduced the EV's market price. Including this rebate, all 23 qualifying EVs had lower ownership costs than their ICE alternatives.

To investigate whether qualifying for the federal rebate was a make-or-break factor of an EV costing less to own, Vincentric also analyzed the total ownership costs for all 23 qualifying EVs without the rebate applied. Results showed that 18 of them still had lower ownership costs than their ICE alternatives. This demonstrates that ***qualifying for the federal rebate is not a requirement for EVs to save their buyers money.***

With an average purchase price premium of $11,355, only 8 of 40 EVs analyzed had a lower market price than their gasoline counterparts, and that's with the federal rebate included.

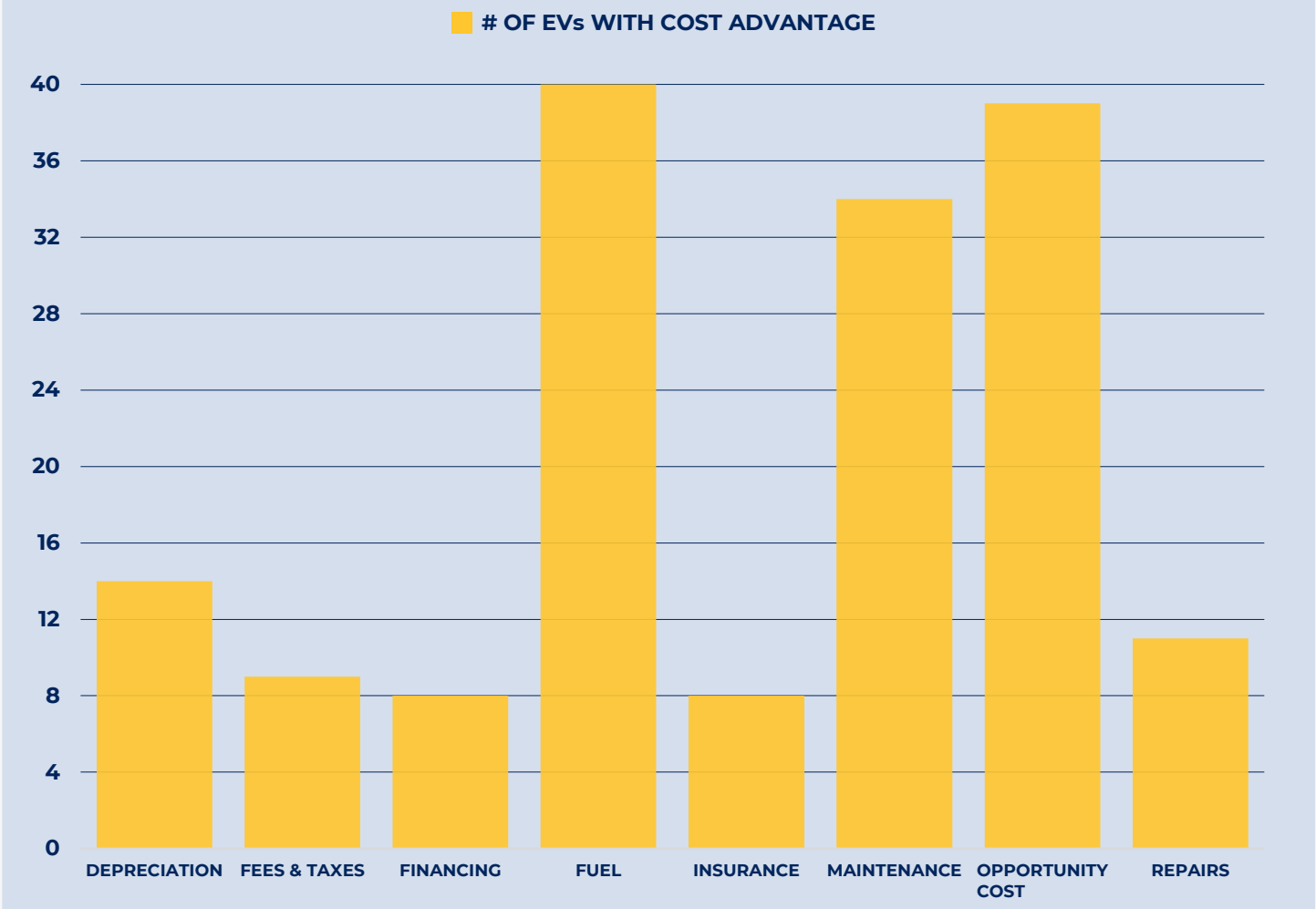
Overall, the analysis shows that ***while EVs in Canada typically cost more to purchase, the vast majority (approximately 95%) will cost their buyers less to own and operate over five years.***

COST FACTORS

To determine which areas of automotive cost of ownership may be strengths for EVs, this analysis considered eight different cost factors: depreciation, fees & taxes, financing, fuel, insurance, maintenance, opportunity cost, and repairs. To identify the strengths and weaknesses of EVs, the study measured each of these factors in comparison to their ICE alternatives and tallied how often the EV had a cost advantage in each of the 40 vehicle comparisons

The chart below shows the number of EVs with a cost advantage versus their ICE alternative for each cost factor.

 # OF CANADIAN EVs WITH COST ADVANTAGE VS ICE ALTERNATIVE
(OUT OF 40 EVs ANALYZED)



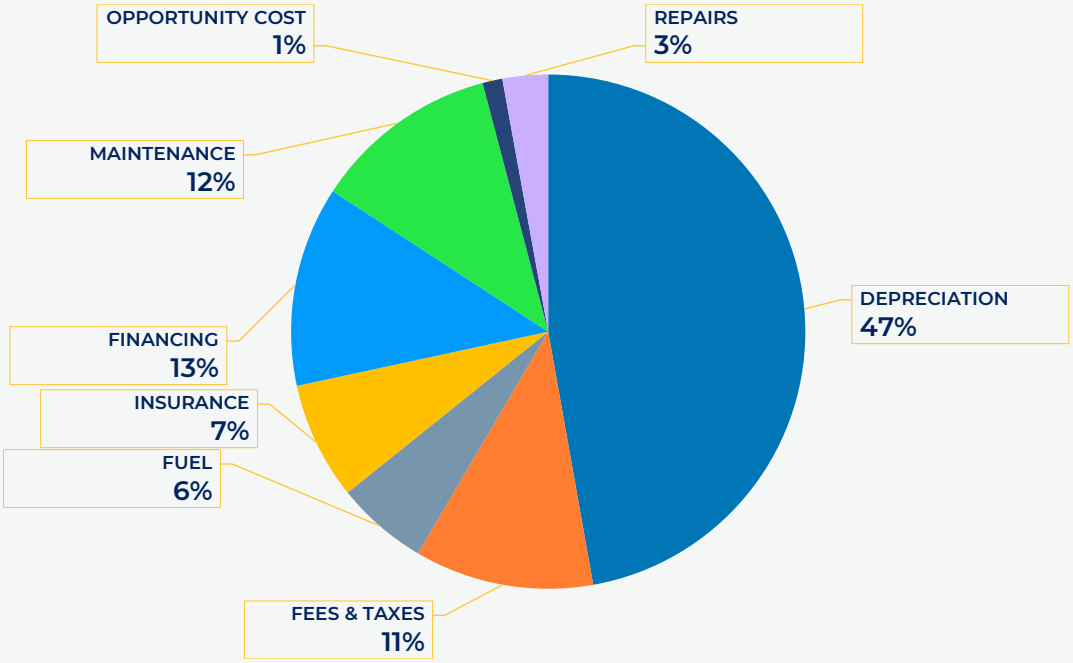
The above chart shows that Fuel, Maintenance, and Opportunity Costs were the biggest advantages for EVs. Following that, 35% of the EVs analyzed also had an advantage when it comes to Depreciation. Detailed results for these cost factors are described in the following sections, along with additional cost factor results.

COST FACTORS

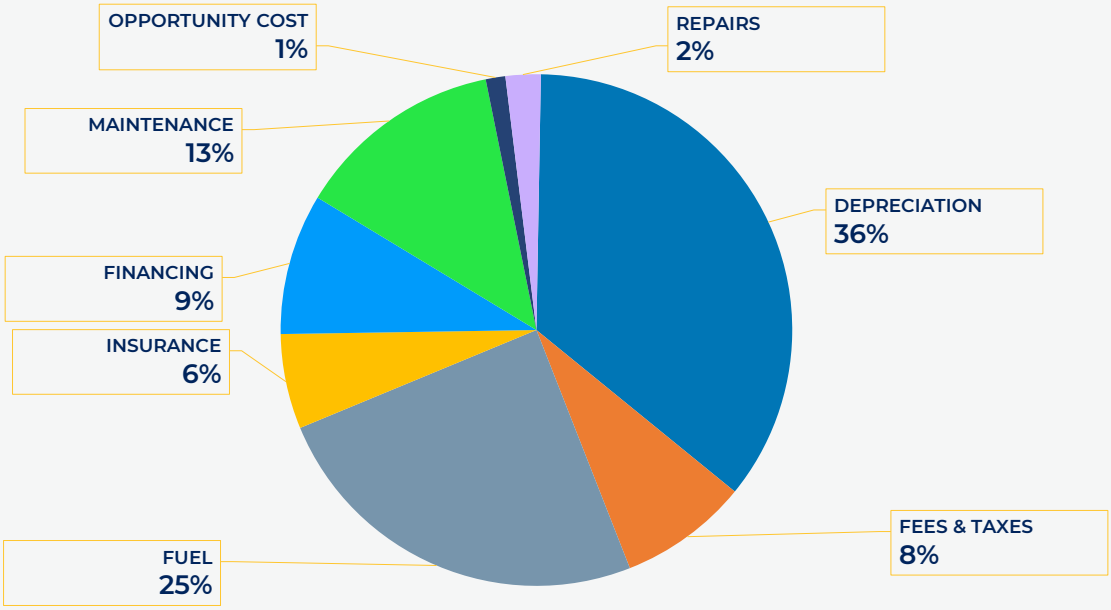
CONCLUDED

Depreciation is the most significant cost factor in a vehicle's cost of ownership, accounting for over 47% for EVs and over 35% for ICE vehicles. The charts below show the average share of total cost represented by each of the eight individual cost factors studied as part of this analysis

PERCENTAGE OF CANADIAN EV TOTAL OWNERSHIP COSTS



PERCENTAGE OF CANADIAN ICE TOTAL OWNERSHIP COSTS



FUEL COSTS

It's no surprise that one of the biggest areas for savings with an EV is in Fuel costs. On average, the EVs studied had Fuel cost savings of a whopping $19,353 over their ICE counterparts.

Over five years, EV Fuel cost savings ranged from $13,306 for the Hyundai Kona EV, to $31,697 for the Tesla Model X. With all 40 EVs saving buyers thousands of dollars in Fuel costs, these substantial savings can be a motivator in switching to electric even for consumers who are wary of higher sticker prices.

In addition, of the 31 EVs with a higher market price than their ICE alternative, 22 of them had high enough Fuel cost savings to recoup their entire price premium in Fuel savings alone.

ALL of the EVs had LOWER FUEL COSTS than their ICE alternative.

MAINTENANCE COSTS

The analysis found that EVs typically save money on Maintenance over their gas-powered counterparts. Since the electric motors that power EVs have fewer components and moving parts than internal combustion engines, this typically leads to Maintenance cost savings for EVs, which is proven by the 34 of 40 EVs analyzed that had lower Maintenance costs than their ICE alternatives.

Maintenance cost savings ranged from $122 for the Chevrolet Bolt EUV to $13,508 for the BMW i7. Vincentric Maintenance cost calculations are based on OEM recommended maintenance scheduled, as well as unscheduled maintenance items such as tires and batteries that need to be replaced due to normal wear-and-tear.

However, it's important to note that *Vincentric maintenance costs do not take into account replacing the lithium-ion battery (or any other type of battery that charges the electric motor) for EVs because available data on EVs does not show that these batteries need to be replaced within the five-year timeframe covered in the analysis*.

The vehicles that had higher Maintenance costs than their gasoline counterparts were the Audi e-tron, Audi Q4 e-tron, Mercedes-Benz EQE, Mercedes-Benz EQS, Mercedes-Benz EQB, and the Jaguar I-Pace. For these six EVs, the cost savings from having fewer maintenance services than their ICE counterparts are negated by those services occurring more frequently and/or costing more than the ICE model.

OPPORTUNITY COSTS

Opportunity Cost is one of the most overlooked costs of owning a car, largely because it isn't paid directly by the vehicle owner. Opportunity Cost accounts for the interest that could have been earned if a buyer had invested their out-of-pocket vehicle expenses into a savings account. Essentially, Opportunity Cost is the interest earnings buyers had the "opportunity" to earn, but missed out on because they chose to purchase and operate a vehicle.

To calculate Opportunity Cost, Vincentric used the combined cost of Fees & Taxes, Finance, Fuel, Insurance, Maintenance, and Repairs (considered out-of-pocket expenses) over the five years of the study to determine the amount of Interest Earnings that could have been earned had the money been invested in a savings account. Opportunity Cost accounts for just over 1% of total cost of ownership for both EVs and ICE vehicles.

In dollar amounts, the average Opportunity Cost of the ICE vehicles studied was $1,208, while the average Opportunity Cost of the EVs studied was $1,025. This isn't surprising given that most EVs have a lower fuel expense, and fuel is one of the out-of-pocket costs of owning a vehicle that is accounted for when calculating opportunity cost.

The EV with the lowest Opportunity Cost was the Mini Cooper EV at $606 compared to the lowest ICE, which was the Hyundai Kona at $728.

DEPRECIATION COSTS

For many buyers, it's disheartening to realize that a new car is often worth a fraction of its purchase price the moment it leaves the dealership. This study found that only 14 of 40 EVs analyzed, or 35%, had lower depreciation costs than their ICE alternatives. Of course, means that 65% of the ICE vehicles outperformed the EVs in this cost category.

While other cost factors saw fewer EVs outperforming their ICE counterparts, the substantial cost associated with Depreciation makes it the biggest strike against EVs. The 26 EVs that did not outperform their ICE counterparts in this area had an average of approximately $9,660 higher Depreciation costs, which most consumers would likely consider to be a significant expense.

The table below shows the Top 10 EVs with the lowest depreciation over five years regardless of how their costs compared to their ICE alternative.

TOP 10 CANADIAN EVs WITH LOWEST DEPRECIATION COST

RANK	VEHICLE	DEPRECIATION COST OVER 5 YEARS
1ST	Volkswagen ID.4 Base 4D Utility RWD	$11,092
2ND	Chevrolet Bolt LT 5D Hatchback	$17,423
3RD	Nissan LEAF SV 5D Hatchback	$17,486
4TH	Toyota bZ4X L 4D Utility FWD	$17,844
5TH	Chevrolet Bolt EUV LT 5D Hatchback	$18,694
6TH	Ford F-150 Lightning Pro Supercrew SWB 4WD	$19,145
7TH	Kia Soul EV Premium 5D Hatchback at	$19,232
8TH	Kia EV6 Standard Range 4D Utility RWD	$19,610
9TH	Mini Cooper EV SE 3D Hatchback	$21,069
10TH	Hyundai Kona EV Preferred 4D Utility	$21,322

DEPRECIATION RATES

Despite the higher Depreciation cost for most EVs overall, the results did show that 27 of 40 EVs analyzed had lower depreciation rates than their ICE alternative. The depreciation rate indicates the percentage of the vehicle's Market Price that was lost over the five years in the study.

Although the depreciation rate is not directly used to measure total cost of ownership, it does provide insight that may help buyers understand which EVs best hold their value.

The table below shows the five EVs with the lowest depreciation rate over five years.

TOP 5 CANADIAN EVs WITH LOWEST DEPRECIATION RATE

RANK	VEHICLE	DEPRECIATION RATE AFTER 5 YEARS
1ST	Volkswagen ID.4 Base 4D Utility RWD	26.29%
2ND	Mercedes-Benz EQS SUV-Class EQS450 4D Utility	29.98%
3RD	Ford F-150 Lightning Pro Supercrew SWB 4WD	34.13%
4TH	Porsche Taycan 4S 4D Sedan	41.10%
5TH	Toyota bZ4X L 4D Utility FWD	41.79%

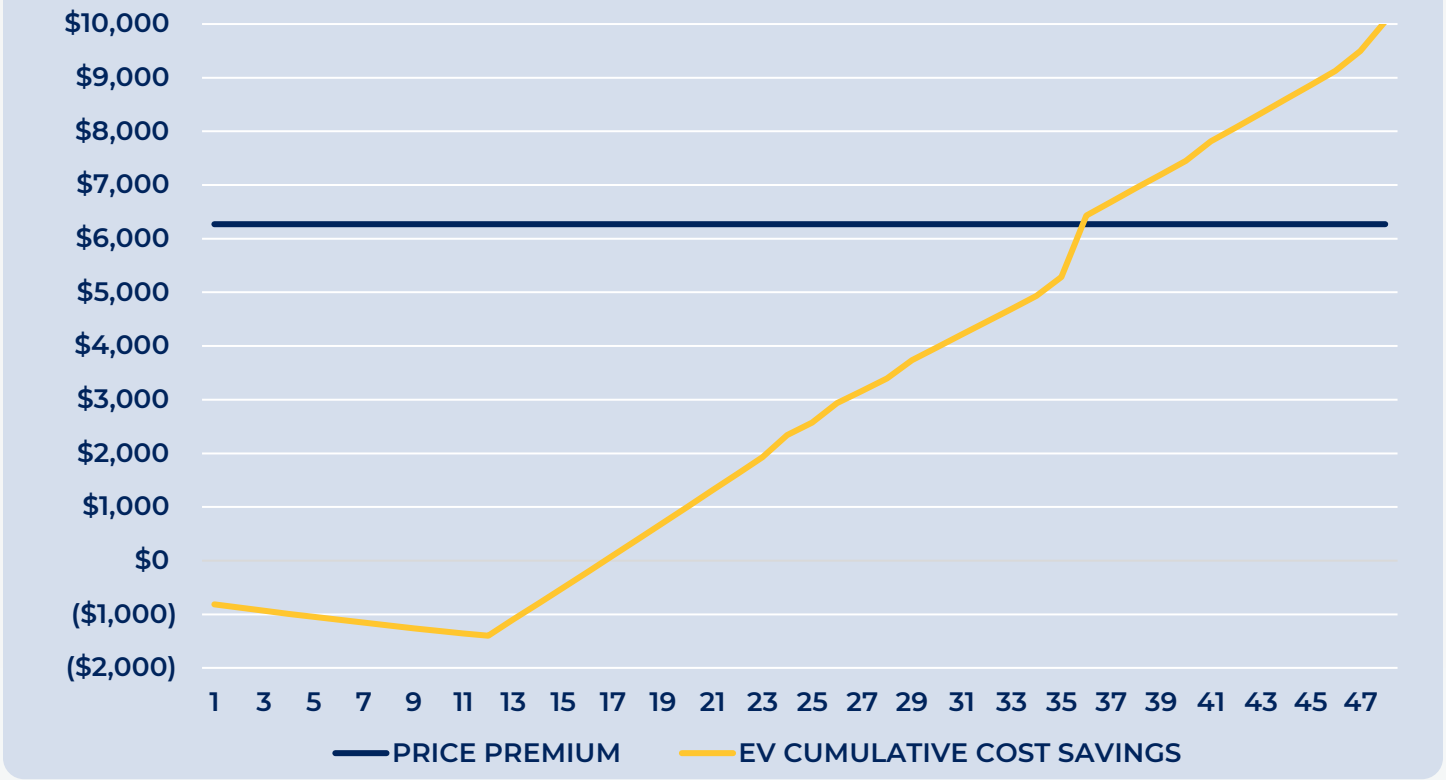
EV PAYBACK PERIOD

Many consumers struggle to look beyond the typically higher purchase price of an EV despite its potential for long-term savings. When an EV costs over $11,000 more to buy on average than a similarly equipped gasoline vehicle, that sticker shock can be a deal-breaker. That's why it's important for buyers to understand when they can expect their electric vehicle to recoup that additional purchasing cost through savings in Fuel, Maintenance, and other areas.

This analysis determined if the EVs studied would recoup their higher purchase price, and, for those that do, how long it would take. The "Payback Period" is the amount of time it takes for the cost savings of an EV to match the market price differential of its ICE counterpart.

As an example, the Mini Cooper EV costs $6,268 more to purchase than its ICE alternative, the Mini Cooper S. To determine this EV's Payback Period, Vincentric measured the cumulative cost savings to calculate how many months it would take to recoup that $6,268 through ownership savings and determined that a Mini Cooper EV owner would wait until month 36 of ownership. The chart below shows that the Mini Cooper EV loses money over the first year, then steadily accrues cost savings until it completes its Payback Period during month 36 of ownership.

PAYBACK PERIOD FOR 2023 MINI COOPER EV



CONCLUSION: *The Payback Period for the 2023 Mini Cooper EV occurs during month 36 of ownership.*

EV PAYBACK PERIOD

CONTINUED

There were 8 EVs that had a lower initial market price than their ICE alternatives, which meant that it was not necessary to calculate a Payback Period for them. ***The table shows these 8 EVs ranked by their immediate cost savings compared to their ICE alternatives.*** One EV, the BMW i7, had the same market price as its ICE counterpart, the BMW 7 Series, at $144,629.

CANADIAN EVs WITH LOWER MARKET PRICE THAN ICE ALTERNATIVES

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	EV PURCHASE PRICE SAVINGS vs ICE ALTERNATIVE
1ST	**Mercedes-Benz EQS-Class EQS450 4D Sedan 4MATIC**	**EV**	**$134,335**	**$6,808**
	Mercedes-Benz S-Class S500 4D Sedan 4MATIC	ICE	$141,143	
2ND	**BMW i4 eDrive35 4D Sedan RWD**	**EV**	**$50,593**	**$4,309**
	BMW 4 Series 430i xDrive 2D Coupe	ICE	$55,102	
3RD	**Polestar Polestar 2 Long Rge Single Mtr 5D Hatchback**	**EV**	**$51,250**	**$3,345**
	Audi A5 Komfort 45 4D Sportback	ICE	$54,595	
4TH	**Tesla Model 3 Standard Range Plus 4D Sedan RWD**	**EV**	**$51,870**	**$1,804**
	BMW 3 Series 330i xDrive 4D Sedan AWD	ICE	$53,674	

Table continues on the following page.

EV PAYBACK PERIOD

CONTINUED

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CANADIAN EVs WITH LOWER MARKET PRICE THAN ICE ALTERNATIVES

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	EV PURCHASE PRICE SAVINGS vs ICE ALTERNATIVE
5TH	**BMW iX xDrive40e 4D Utility AWD**	**EV**	**$79,485**	**$1,193**
	BMW X5 xDrive40i 4D Utility	ICE	$80,678	
6TH	**Audi e-tron Progressiv 55 4D Utility AWD**	**EV**	**$87,422**	**$1,026**
	Audi Q8 Progressiv 55 4D Utility	ICE	$88,448	
7TH	**Audi Q4 e-tron 50 4D Utility**	**EV**	**$55,852**	**$974**
	Audi Q5 Progressiv 45 4D Utility	ICE	$56,826	
8TH	**Ford F-150 Lightning Pro Supercrew SWB 4WD**	**EV**	**$56,095**	**$356**
	Ford F-150 XL 2.7L EcoBoost Supercrew SWB 4WD	ICE	$56,451	

***A full list** showing the Market Price (also known as the Estimated Purchase Price) and total cost of ownership results of all 40 analyzed EVs versus their ICE alternative is shown in **Appendix B**.*

EV PAYBACK PERIOD

CONTINUED

In addition, there were 5 EVs that recouped their price premium within the first year of ownership, and an additional 6 EVs that recouped their price premium within the first five years. Vincentric analysts then extended the forecast out to seven years to see if any additional EVs recouped their higher purchase price in years 6-7 and found that 6 more EVs reached their Payback Period in that timeframe.

The table on the following page shows the top 10 EVs with the shortest Payback Period, not including the 8 EVs with a lower purchase price shown in the previous table.

The remaining EVs in the analysis did not complete their Payback Period within seven years but may still breakeven later in their lifetimes.

It's important to note that a motorist's individual driving habits can make an impact on the EV's Payback Period. For example, if a motorist drives more or less than the 25,000 annual kilometers used in this study, their EV's Payback Period could increase or decrease.

Although the Payback Period results in this study were limited to the 40 EVs and their chosen ICE alternatives, the Vincentric Dynamic Cost to Own™ technology provides the data necessary for users to calculate Payback Period for any set of vehicles and any annual driving distance. Contact us for more information.

TWENTY OF 40 EVs analyzed had a **PAYBACK PERIOD** within **5** years

EV PAYBACK PERIOD

CONCLUDED

TOP 10 CANADIAN EVs WITH SHORTEST PAYBACK PERIOD

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
1ST	Porsche Taycan 4S 4D Base	3
2ND	Volkswagen ID.4 Base 4D Utility RWD	3
3RD	Chevrolet Bolt LT 5D Hatchback	6
4TH	Nissan LEAF SV 5D Hatchback	6
5TH	Tesla Model Y Long Range 4D Utility AWD	12
6TH	Toyota bZ4X L 4D Utility FWD	24
7TH	Mini Cooper EV SE 3D Hatchback	36
8TH	Genesis GV60 Advanced 4D Utility AWD	52
9TH	Volvo C40 Recharge Core 4D Coupe	56
10TH	Kia Soul EV Premium 5D Hatchback at	58

*A **full list** of the Payback Period for **all 40 EVs** analyzed is shown in **Appendix D**.*

ENVIRONMENTAL COST OF OWNERSHIP™ OVERVIEW

For many buyers, environmental considerations weigh heavily in the decision to go electric. More and more consumers are putting high importance on the question of "how much better is an EV for the environment?" instead of simply asking "can an EV save me money?" This is why understanding the Environmental Cost of Ownership of a vehicle is critical when analyzing EVs.

Tailpipe emissions from gasoline-powered vehicles are a major contributor to greenhouse gas emissions, and because EVs don't use gasoline, it's common for buyers to consider EVs to be "emissions free."

Although it's true that EVs don't generate tailpipe emissions, their use of electricity means that driving an EV typically results in greenhouse gas emissions because the process of generating the electricity that powers EVs normally creates greenhouse gas emissions.

On average, the **EVs** analyzed **REDUCED GREENHOUSE GAS EMISSIONS** by **OVER**

5

METRIC TONS

ENVIRONMENTAL COST OF OWNERSHIP™ OVERVIEW

CONCLUDED

Vincentric measures three types of greenhouse gas emissions to determine Environmental Cost of Ownership: Carbon Dioxide, Volatile Organic Compounds, and Nitrogen Oxide. Vincentric uses the CO_2 equivalent (CO_2 eq) to give a common metric for comparing these different greenhouse gases. This metric allows a comparison of the emissions from various greenhouse gases on the basis of their global warming potential by converting amounts of other gases to the equivalent amount of CO_2 with the same global warming potential.

These measurements are based solely on the amount of fuel/electricity necessary to operate the vehicle. The emissions produced by building vehicle components or any other part of the manufacturing process are not considered in this analysis. The emissions created when generating electricity are also dependent on the type of electrical power plants used, which vary throughout Canada.

More details about the Environmental Cost of Ownership methodology can be found in Appendix E.

ENVIRONMENTAL COST OF OWNERSHIP™ RESULTS

After measuring the emissions generated based on the fuel or electricity used to drive a total of 125,000 kilometers over five years, the available Vincentric data found that all 40 EVs analyzed had lower greenhouse gas emissions than their ICE alternative. As a result, the study showed that all 40 EVs are a more environmentally friendly choice for consumers than their ICE counterparts.

The following chart shows the Top 10 EVs with the greatest reduction in CO2 eq emissions compared to their ICE alternatives over 5 years.

TOP 10 EVs WITH GREATEST CO_2 eq EMISSIONS REDUCTION COMPARED TO ICE OVER 5 YEARS

RANK	VEHICLE	REDUCTION IN CO_2 eq EMISSIONS VS. ICE ALTERNATIVE IN METRIC TONS
1ST	Tesla Model X Long Range 4D Utility AWD	-8.58
2ND	Genesis Electrified G80 4D Sedan AWD	-7.58
3RD	Porsche Taycan 4S 4D Sedan	-7.22
4TH	Audi e-tron Progressiv 55 4D Utility AWD	-7.03
5TH	Genesis Electrified GV70 4D Utility	-7.02
6TH	Mercedes-Benz EQS SUV-Class EQS450 4D Utility	-6.88
7TH	Ford F-150 Lightning Pro Supercrew SWB 4WD	-6.73
8TH	BMW i7 xDrive60 4D Sedan	-6.57
9TH	Mercedes-Benz EQE SUV-Class EQE350 4D Utility	-6.52
10TH	Jaguar I-Pace HSE 4D Utility AWD	-6.35

ENVIRONMENTAL COST OF OWNERSHIP™ RESULTS

CONCLUDED

For buyers who want to go as green as possible, *the below Top 10 list shows EVs with the lowest CO_2 eq emissions.*

The lowest emissions ICE vehicle was the Mini Cooper S 3D Hatchback with over 5 metric tons of CO2 emissions. With its comparative EV, the Mini Cooper EV SE 3D Hatchback, only totaling 0.7 metric tons of CO2 eq emissions, the difference in Environmental Cost of Ownership between electric and gasoline-powered vehicles in Canada is substantial.

TOP 10 LOWEST EMISSIONS EVs OVER 5 YEARS IN CANADA

RANK	VEHICLE	CO_2 eq EMISSIONS IN METRIC TONS
1ST	Hyundai Ioniq 6 Preferred 4D Sedan RWD	0.58
2ND	Tesla Model 3 Standard Range Plus 4D Sedan RWD	0.6
3RD	Tesla Model Y Long Range 4D Utility AWD	0.65
3RD	Tesla Model S Long Range 4D Sedan AWD	0.68
3RD	BMW i4 eDrive35 4D Sedan RWD	0.68
3RD	Chevrolet Bolt LT 5D Hatchback	0.68
3RD	Hyundai Kona EV Preferred 4D Utility	0.68
3RD	Kia Soul EV Premium 5D Hatchback at	0.68
3RD	Kia EV6 Standard Range 4D Utility RWD	0.68
3RD	Toyota bZ4X L 4D Utility FWD	0.68

CONCLUSION

The 2023 Vincentric Canadian EV Cost of Ownership Analysis set out to identify the pros and cons of choosing an EV over an ICE vehicle for Canadian shoppers from both a financial and environmental standpoint. What can buyers learn from these results to guide their future vehicle purchase decisions and help them decide if one of the 40 EVs included in this study is right for them?

From a financial perspective, current data shows that an EV will typically cost more to purchase but spending that extra cash upfront can often save buyers thousands in ownership costs, with the biggest savings coming from lower Fuel and Maintenance expenses. A typical EV will depreciate more in value, but overall cost savings can help reduce the sting of higher Depreciation.

From an environmental standpoint, current data shows that driving an EV will reduce emissions compared to an ICE vehicle, even though EVs are not emissions-free. Compared to its ICE alternative, every EV analyzed will reduce the driver's environmental footprint. It's worth keeping in mind that the emissions created when generating electricity depend on the type of electrical power plants used, which vary throughout Canada.

Many consumers struggle to say with confidence that an EV is practical for their lifestyle and budget. Regardless of the hurdles that EVs still face, this latest analysis of Canadian data from Vincentric shows that, while EVs don't have lower costs than gas-powered vehicles in every area, 95% of the EVs analyzed in Canada will help buyers reduce their overall cost of owning a vehicle and the environmental impact of driving.

It is also important to acknowledge that the results in this analysis will fluctuate depending on current market conditions, whether it be changes to labor rates, fuel prices, OEM pricing strategies, government regulations, or incentives for EVs. Because of these marketplace fluctuations, ***this study will be updated on a periodic basis*** to provide guidance to the automotive industry, and to buyers and sellers in the Canadian consumer market, fleet and commercial market, and automotive rental market. To be notified of future Vincentric analyses, ***subscribe to Vincentric News Updates***..

The vehicles analyzed in this study are fully electric vehicles (EVs), sometimes called Battery Electric Vehicles (BEVs), and ICE vehicles. This analysis does not include any plug-in hybrid electric vehicles (PHEVs) or hybrid electric vehicles (HEVs).

ABOUT VINCENTRIC

Vincentric provides data, knowledge, and insight to the automotive industry by identifying and applying the many aspects of automotive value. Vincentric, LLC is a privately held automotive data research organization headquartered in Bingham Farms, Michigan.

Each month the organization measures cost of ownership, including depreciation, fees & taxes, financing, fuel, insurance, maintenance, opportunity cost, and repairs, for over 75,000 vehicle configurations for vehicles from 2008-2024 model years in the US and 2010-2024 model years in Canada. Vincentric data is published on major websites and used by a wide variety of organizations, including Volkswagen Canada, the Canadian Automobile Association, Automotive Fleet Magazine, and many others.

Vincentric data is available to its client base through a variety of Application Program Interfaces (API), including the New Vehicle API, Used Vehicle API, Fleet Vehicle API, and EV API. In addition, each year the company announces the Vincentric Best Value awards in the United States and Canada for both the Fleet and Consumer markets to help buyers with their vehicle purchase decisions.

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APPENDICES

VINCENTRIC 2023 CANADIAN ELECTRIC VEHICLE COST OF OWNERSHIP ANALYSIS

CANADIAN MARKET
DECEMBER 2023

APPENDIX [A] ANALYSIS METHODOLOGY

To perform this study, Vincentric first matched 40 model year 2023 EVs currently available in the Vincentric Canadian database to comparable ICE alternative vehicles. These pairs were matched based on similar specifications and the availability of key data points such as residual values and vehicle pricing. Only fully electric vehicles (EVs), sometimes called BEVs, were considered in this analysis. Plug-in hybrid electric vehicles (PHEVs) and hybrid electric vehicles (HEVs) were not included.

When selecting EVs, the lowest MSRP/base trim for each model was chosen unless it was not available on the Vincentric database, in which case the next available trim was used. ***Vincentric data analysts reviewed over 2,800 vehicle configurations to identify similarly equipped ICE vehicles for comparison***. When possible, the same manufacturer and a similar body style were selected for the ICE comparison model. In some cases, the most similarly equipped ICE vehicle was not the base trim.

It's important to acknowledge that, in some cases, it may have been reasonable to choose an alternative ICE vehicle for comparison, which could have affected whether the EV it is compared to was cost-effective. However, Vincentric is confident that a fair and reasonable methodology was used to select the ICE comparison vehicles with the intent of creating an unbiased study.

CONTINUED

APPENDIX [A] ANALYSIS METHODOLOGY

The results of this analysis assume that all vehicles will be driven 25,000 km per year over the next five years. Canadian averages are used for all cost inputs including labor rate, fuel (both gasoline and electricity), and fees & taxes. Because this analysis was conducted at a national level, it does not consider any provincial-level or local incentives, although federal EV rebates are considered as a reduction to market price for qualifying EVs.

When measuring automotive cost of ownership, ***Vincentric starts by estimating each vehicle's Market Price, also known as the Estimated Purchase Price***, in an effort to determine the typical price a Canadian consumer pays for the vehicle in the current market. The Vincentric Market Price calculations factor in the invoice price, manufacturer's suggested retail price, and OEM national consumer rebates.

The eight cost factors are described on the following page and are broken out into Fixed and Variable Costs.

CONCLUDED

APPENDIX [A] ANALYSIS METHODOLOGY

FIXED COSTS: Fixed costs are the cost components that have minimal variance due to the distance driven, and typically consist of the following components:

1. DEPRECIATION
The decrease in a vehicle's overall value over time, considering the vehicle's estimated Market Price and the future (residual) value of the vehicle.

2. FEES & TAXES
The cost of sales tax, registration and title fees, and local and provincial taxes. Provincial and local electric vehicle tax credits are not considered in this analysis.

3. FINANCING
The amount it costs to borrow money for a vehicle purchase, including down payment, loan term, and interest rate. This study assumed a 15% down payment.

4. OPPORTUNITY COST
The amount of interest that could have been earned if the out-of-pocket expenses incurred by owning and operating a vehicle had been invested in a savings account.

5. INSURANCE
The cost of keeping the vehicle insured using a standardized driver profile that assumes they are under 65 years of age, have 15 years of driving experience with no accidents, and live in a suburban/urban location. Standardized deductible and coverage amounts are also used.

VARIABLE COSTS: Variable costs are the cost components that will change based on the distance driven:

1. FUEL
The cost of the gasoline or electricity needed to power the vehicle

2. MAINTENANCE
The cost of keeping the vehicle in driving condition, assuming the manufacturer's recommended scheduled maintenance is followed and assuming replacement of normal wear-items such as tires and brakes. ***The cost of replacing the lithium-ion battery (or any other type of battery that charges the electric motor) in EVs was not included because current data does not show a need to replace these batteries during the study's five-year timeframe***. All manufacturer free-maintenance programs are also considered, as well as vehicle-specific parts pricing, service schedules, and labor times.

3. REPAIRS
The estimated cost of repairing malfunctions to a vehicle, while taking into account manufacturer warranties. A zero deductible extended warranty is used as the foundation for repair cost estimates.

Together, ***these cost factors combine into a vehicle's total cost of ownership***, often called TCO. The cost of adding a dedicated Home EV charging system, such as a Level 2 or a Common Charging System, was not included in the study. Although many buyers may consider this a necessity, vehicle buyers living in rental homes or apartments, and those with a dedicated charging system at their work location, will not incur that expense.

APPENDIX [B] OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES

The following chart shows the market price and total cost of ownership differentials for all 40 studied EVs compared to their ICE alternative.

In the "EV Cost of Ownership vs ICE Alternative" column, a negative value indicates the dollar amount by which the EV's total cost of ownership was less expensive. A positive value indicates the dollar amount by which the EV's total cost of ownership was more expensive than the ICE alternative.

OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES (PAGE 1 OF 3)

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	TOTAL COST OF OWNERSHIP OVER 5 YEARS	EV TOTAL COST OF OWNERSHIP VS ICE ALTERNATIVE
1ST	**Porsche Taycan 4S 4D Sedan**	**EV**	**$121,070**	**$113,236**	- $63,639
	BMW 8 Series M850i xDrive 4D Gran Coupe	ICE	$115,016	$176,875	
2ND	**BMW i7 xDrive60 4D Sedan**	**EV**	**$144,629**	**$163,015**	- $44,141
	BMW 7 Series 760i xDrive 4D Sedan	ICE	$144,629	$207,156	
3RD	**Mercedes-Benz EQS-Class EQS450 4D Sedan 4MATIC**	**EV**	**$134,335**	**$164,494**	- $31,914
	Mercedes-Benz S-Class S500 4D Sedan 4MATIC	ICE	$141,143	$196,408	
4TH	**Tesla Model Y Long Range 4D Utility AWD**	**EV**	**$66,870**	**$71,298**	- $31,716
	BMW X3 xDrive30i 4D Utility	ICE	$55,178	$103,014	
5TH	**Ford F-150 Lightning Pro Supercrew SWB 4WD**	**EV**	**$56,095**	**56,668**	- $31,344
	Ford F-150 XL 2.7L EcoBoost Supercrew SWB 4WD	ICE	$56,451	$88,012	
6TH	**Volkswagen ID.4 Base 4D Utility RWD**	**EV**	**$42,190**	**$43,477**	- $30,951
	Volkswagen Tiguan Comfortline 4D Utility 4Motion	ICE	$39,185	$74,428	
7TH	**BMW iX xDrive40e 4D Utility AWD**	**EV**	**$79,485**	**$96,746**	- $30,720
	BMW X5 xDrive40i 4D Utility	ICE	$80,678	$127,466	
8TH	**Tesla Model 3 Standard Range Plus 4D Sedan RWD**	**EV**	**$51,870**	**$63,802**	- $28,781
	BMW 3 Series 330i xDrive 4D Sedan AWD	ICE	$53,674	$92,583	
9TH	**Polestar Polestar 2 Long Rge Single Mtr 5D Hatchback**	**EV**	**$51,250**	**$63,460**	- $27,728
	Audi A5 Komfort 45 4D Sportback	ICE	$54,595	$91,188	
10TH	**BMW i4 eDrive35 4D Sedan RWD**	**EV**	**$50,793**	**$71,694**	- $26,175
	BMW 4 Series 430i xDrive 2D Coupe	ICE	$55,102	$97,869	
11TH	**Audi e-tron Progressiv 55 4D Utility AWD**	**EV**	**$87,422**	**$103,902**	- $26,016
	Audi Q8 Progressiv 55 4D Utility	ICE	$88,448	$129,918	
12TH	**Audi Q4 e-tron 5- 4D Utility**	**EV**	**$55,852**	**$71,496**	- $25,676
	Audi Q5 Progressiv 45 4D Utility	ICE	$56,826	$97,172	

CONTINUED

APPENDIX [B] OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES

OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES (PAGE 2 OF 3)

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	TOTAL COST OF OWNERSHIP OVER 5 YEARS	EV TOTAL COST OF OWNERSHIP VS ICE ALTERNATIVE
13TH	**Nissan LEAF SV 5D Hatchback**	**EV**	**$36,285**	**$47,466**	- $19,009
	Nissan Altima S 4D Sedan AWD	ICE	$31,811	$66,475	
14TH	**Chevrolet Bolt LT 5D Hatchback**	**EV**	**$34,425**	**$49,622**	- $17,614
	Chevrolet Malibu 1LT 4D Sedan	ICE	$30,918	$67,236	
15TH	**Volvo XC40 EV Recharge Core 4D Utility**	**EV**	**$54,847**	**$65,400**	- $14,360
	Volvo XC40 Core B4 4D Utility AWD	ICE	$42,677	$79,760	
16TH	**Toyota bZ4X L 4D Utility FWD**	**EV**	**$42,696**	**$52,892**	- $14,222
	Toyota RAV4 XLE 4D Utility AWD	ICE	$36,654	$67,114	
17TH	**Genesis GV60 Advanced 4D Utility AWD**	**EV**	**$69,083**	**$76,411**	- $13,692
	Genesis GV70 Advanced Plut 2.5T 4D Utility	ICE	$59,840	$90,103	
18TH	**Volvo C40 Recharge Core 4D Coupe**	**EV**	**$56,645**	**$69,407**	- $13,623
	Volvo XC40 Core B5 4D Utility AWD	ICE	$46,073	$83,030	
19TH	**Mini Cooper EV SE 3D Hatchback**	**EV**	**$36,719**	**$50,989**	- $13,375
	Mini Cooper S 3D Hatchback at	ICE	$30,451	$64,364	
20TH	**Mercedes-Benz EQE SUV-Class EQE350 4D Utility**	**EV**	**$94,365**	**$103,780**	- $12,630
	Mercedes-Benz GLE-Class CLE350 4D Utility	ICE	$75,791	$116,410	
21ST	**Kia EV6 Standard Range 4D Utility RWD**	**EV**	**$43,760**	**$50,907**	- $12,401
	Kia Sportage LX 4D Utility FWD	ICE	$30,119	$63,308	
22ND	**Mercedes-Benz EQE-Class EQE350 4MATIC Sedan**	**EV**	**$85,321**	**$109,211**	- $11,925
	Mercedes-Benz E-Class E350 4D Sedan 4MATIC	ICE	$69,296	$121,136	
23RD	**Genesis Electrified GV70 4D Utility**	**EV**	**$85,000**	**$90,559**	- $11,557
	Genesis GV70 Sport 3,5T 4D Utility	ICE	$68,561	$102,116	
24TH	**Kia Soul EV Premium 5D Hatchback at**	**EV**	**$39,330**	**$47,616**	- $11,411
	Kia Soul EX Premium 5D Hatchback at	ICE	$28,383	$59,027	
25TH	**Mercedes-Benz EQS SUV-Class EQS450 4D Utility**	**EV**	**$134,335**	**$113,118**	- $9,759
	Mercedes-Benz GLS-Class GLS450 4D Utility	ICE	$109,050	$122,877	
26TH	**Subaru Solterra Base 4D Utility AWD**	**EV**	**$50,204**	**$56,453**	- $8,178
	Subaru Forester 2,5i Touring 4D Utility at	ICE	$36,649	$64,631	
27TH	**Kia Niro EV Premium 4D Utility**	**EV**	**$41,170**	**$52,218**	- $7,067
	Kia Seltos EX 4D Utility FWD	ICE	$27,390	$59,285	

CONCLUDED

APPENDIX [B] OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES

OWNERSHIP COST SAVINGS OF 40 CANADIAN EVs VS ICE VEHICLES (PAGE 3 OF 3)

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	TOTAL COST OF OWNERSHIP OVER 5 YEARS	EV TOTAL COST OF OWNERSHIP VS ICE ALTERNATIVE
28TH	**Hyundai Kona EV Preferred 4D Utility**	**EV**	**$40,621**	**$50,507**	- $6,551
	Hyundai Kona Preferred 4D Utility FWD	ICE	$26,274	$57,058	
29TH	**Hyundai Ioniq 5 Preferred 4D Utility RWD**	**EV**	**$45,824**	**$53,495**	- $6,258
	Hyundai Tucson Preferred 4D Utility FWD	ICE	$32,106	$59,753	
30TH	**Chevrolet Bolt EUV LT 5D Hatchback**	**EV**	**$36,395**	**$51,870**	- $5,516
	Chevrolet Trailblazer LT 4D Utility FWD	ICE	$27,332	$57,386	
31ST	**Hyundai Ioniq 6 Preferred 4D Sedan RWD**	**EV**	**$51,924**	**$59,295**	- $4,991
	Hyundai Sonata Preferred 4D Sedan 2.5	ICE	$30,291	$64,286	
32ND	**Mazda MX-30 GS 4D Utility FWD**	**EV**	**$39,453**	**$57,067**	- $4,030
	Mazda CX-30 GS 4D Utility AWD	ICE	$31,530	$61,097	
33RD	**Cadillac Lyriq Luxury 350 4D Utility RWD**	**EV**	**$68,206**	**$84,235**	- $3,833
	Cadillac XT5 Luxury 4D Utility FWD	ICE	$45,978	$88,086	
34TH	**Ford Mustang Mach-E Select 4D Utility RWD**	**EV**	**$54,090**	**$67,063**	- $2,984
	Ford Edge SEL 4D Utility AWD	ICE	$39,920	$70,047	
35TH	**Tesla Model X Long Range 4D Utility AWD**	**EV**	**$137,870**	**$138,389**	- $2,838
	Audi SQ8 Base 4D Utility	ICE	$115,123	$141,227	
36TH	**Tesla Model S Long Range 4D Sedan AWD**	**EV**	**$124,870**	**$125,883**	- $1,441
	Audi A7 Technik 55 4D Sportback	ICE	$92,037	$127,324	
37TH	**Genesis Electrified G80 4D Sedan AWD**	**EV**	**$105,000**	**$119,275**	- $1,251
	Genesis G80 Sport 3.5T 4D Sedan AWD	ICE	$73,644	$120,526	
38TH	**Audi e-tron GT Base 4D Sedan Qtro**	**EV**	**$132,632**	**$141,277**	- $453
	Audi S7 Base 4D Sportback Qtro	ICE	$105,035	$141,730	
39TH	**Mercedes-Benz EQB-Class 350 4D Utility 4MATIC**	**EV**	**$75,693**	**$94,277**	+ $6,868
	Mercedes-Benz GLB-Class GLB250 4D Utility 4MATIC	ICE	$49,630	$87,409	
40TH	**Jaguar I-Pace HSE 4D Utility AWD**	**EV**	**$103,108**	**$125,827**	+ $7,499
	Jaguar F-Pace P400 R-Dynamic S 4D Utility	ICE	$74,018	$118,328	

APPENDIX [C] CANADIAN EV 5-YEAR TOTAL COST OF OWNERSHIP RANKINGS

The following chart shows the ranking of all 40 EVs studied from lowest to highest total ownership cost results over five years of ownership. The Canadian federal point-of-sales rebate for EVs is included in the calculations of these values.

RANKED CANADIAN EV TOTAL COST OF OWNERSHIP RESULTS (PAGE 1 OF 3)

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
1ST	Volkswagen ID.4 Base 4D Utility RWD	$43,477
2ND	Nissan LEAF SV 5D Hatchback	$47,466
3RD	Kia Soul EV Premium 5D Hatchback at	$47,616
4TH	Chevrolet Bolt LT 5D Hatchback	$49,622
5TH	Hyundai Kona EV Preferred 4D Utility	$50,507
6TH	Kia EV6 Standard Range 4D Utility RWD	$50,907
7TH	Mini Cooper EV SE 3D Hatchback	$50,989
8TH	Chevrolet Bolt EUV LT 5D Hatchback	$51,870
9TH	Kia Niro EV Premium 4D Utility	$52,218
10TH	Toyota bZ4X L 4D Utility FWD	$52,892
11TH	Hyundai Ioniq 5 Preferred 4D Utility RWD	$53,495
12TH	Subaru Solterra Base 4D Utility AWD	$56,453
13TH	Ford F-150 Lightning Pro Supercrew SWB 4WD	$56,668
14TH	Mazda MX-30 GS 4D Utility FWD	$57,067

CONTINUED

APPENDIX [C] CANADIAN EV 5-YEAR TOTAL COST OF OWNERSHIP RANKINGS

RANKED CANADIAN EV TOTAL COST OF OWNERSHIP RESULTS (PAGE 2 OF 3)

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
15TH	Hyundai Ioniq 6 Preferred 4D Sedan RWD	$59,295
16TH	Polestar Polestar 2 Long Rge Single Mtr 5D Hatchback	$63,460
17TH	Tesla Model 3 Standard Range Plus 4D Sedan RWD	$63,802
18TH	Volvo XC40 EV Recharge Core 4D Utility	$65,400
19TH	Ford Mustang Mach-E Select 4D Utility RWD	$67,063
20TH	Volvo C40 Recharge Core 4D Coupe	$69,407
21ST	Tesla Model Y Long Range 4D Utility AWD	$71,298
22ND	Audi Q4 e-tron 50 4D Utility	$71,496
23RD	BMW i4 eDrive35 4D Sedan RWD	$71,694
24TH	Genesis GV60 Advanced 4D Utility AWD	$76,411
25TH	Cadillac Lyriq Luxury 350 4D Utility RWD	$84,235
26TH	Genesis Electrified GV70 4D Utility	$90,559
27TH	Mercedes-Benz EQB-Class 350 4D Utility RWD	$94,277

CONCLUDED

APPENDIX [C] CANADIAN EV 5-YEAR TOTAL COST OF OWNERSHIP RANKINGS

RANKED CANADIAN EV TOTAL COST OF OWNERSHIP RESULTS (PAGE 3 OF 3)

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
28TH	BMW iX xDrive40e 4D Utility AWD	$96,746
29TH	Mercedes-Benz EQE SUV-Class EQE350 4D Utility	$103,780
30TH	Audi e-tron Progressiv 55 4D Utility AWD	$103,902
31ST	Mercedes-Benz EQE-Class EQE350 4MATIC Sedan	$109,211
32ND	Mercedes-Benz EQS SUV-Class EQS450 4D Utility	$113,118
33RD	Porsche Taycan 4S 4D Sedan	$113,236
34TH	Genesis Electrified G80 4D Sedan AWD	$119,275
35TH	Jaguar I-Pace HSE 4D Utility AWD	$125,827
36TH	Tesla Model S Long Range 4D Sedan AWD	$125,883
37TH	Tesla Model X Long Range 4D Utility AWD	$138,389
38TH	Audi e-tron GT Base 4D Sedan Qtro	$141,277
39TH	BMW i7 xDrive60 4D Sedan	$163,015
40TH	Mercedes-Benz EQS-Class EQS450 4D Sedan 4MATIC	$164,494

APPENDIX [D] CANADIAN EV PAYBACK PERIOD RESULTS

The following table shows the Payback Period of all 40 EVs studied, up to 84 months. EVs that had a lower or equivalent Market Price to their ICE alternative are represented with a value of "0". EVs that did not complete their Payback Period within the seven years analyzed are represented with a value of "84+" in the table below and are listed in alphabetical order due to their tied ranking.

CANADIAN EV PAYBACK PERIOD RESULTS (PAGE 1 OF 2)

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
1ST	Audi e-tron Progressiv 55 4D Utility AWD	0
1ST	Audi Q4 e-tron 50 4D Utility	0
1ST	BMW i4 eDrive35 4D Sedan RWD	0
1ST	BMW i7 xDrive60 4D Sedan	0
1ST	BMW iX xDrive40e 4D Utility AWD	0
1ST	Ford F-150 Lightning Pro Supercrew SWB 4WD	0
1ST	Mercedes-Benz EQS-Class EQS450 4D Sedan 4MATIC	0
1ST	Polestar Polestar 2 Long Rge Single Mtr 5D Hatchback	0
1ST	Tesla Model 3 Standard Range Plus 4D Sedan RWD	0
10TH	Porsche Taycan 4S 4D Sedan	3
10TH	Volkswagen ID.4 Base 4D Utility RWD	3
12TH	Chevrolet Bolt LT 5D Hatchback	6
12TH	Nissan LEAF SV 5D Hatchback	6
14TH	Tesla Model Y Long Range 4D Utility AWD	12
15TH	Toyota bZ4X L 4D Utility FWD	24
16TH	Mini Cooper EV SE 3D Hatchback	36
17TH	Genesis GV60 Advanced 4D Utility AWD	52
18TH	Volvo C40 Recharge Core 4D Coupe	56
19TH	Kia Soul EV Premium 5D Hatchback at	58
20TH	Volvo XC40 EV Recharge Core 4D Utility	59
21ST	Kia EV6 Standard Range 4D Utility RWD	66
22ND	Genesis Electrified GV70 4D Utility	70
23RD	Mazda MX-30 GS 4D Utility FWD	72
23RD	Mercedes-Benz EQE-Class EQE350 4MATIC Sedan	72
25TH	Mercedes-Benz EQE SUV-Class EQE350 4D Utility	74
26TH	Chevrolet Bolt EUV LT 5D Hatchback	75
27TH	Audi e-tron GT Base 4D Sedan Qtro	84+

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APPENDIX [D] CANADIAN EV PAYBACK PERIOD RESULTS

CANADIAN EV PAYBACK PERIOD RESULTS (PAGE 2 OF 2)

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
27TH	Cadillac Lyriq Luxury 350 4D Utility RWD	84+
27TH	Ford Mustang Mach-E Select 4D Utility RWD	84+
27TH	Genesis Electrified G80 4D Sedan AWD	84+
27TH	Hyundai Ioniq 5 Preferred 4D Utility RWD	84+
27TH	Hyundai Ioniq 6 Preferred 4D Sedan RWD	84+
27TH	Hyundai Kona EV Preferred 4D Utility	84+
27TH	Jaguar I-Pace HSE 4D Utility AWD	84+
27TH	Kia Niro EV Premium 4D Utility	84+
27TH	Mercedes-Benz EQB-Class 350 4D Utility 4MATIC	84+
27TH	Mercedes-Benz EQS SUV-Class EQS450 4D Utility	84+
27TH	Subaru Solterra Base 4D Utility AWD	84+
27TH	Tesla Model S Long Range 4D Sedan AWD	84+
27TH	Tesla Model X Long Range 4D Utility AWD	84+

APPENDIX [E] ENVIRONMENTAL COST OF OWNERSHIP™ METHODOLOGY

To determine the Environmental Cost of Ownership (ECO), Vincentric calculates three types of greenhouse gas emissions: Carbon Dioxide (CO_2), Volatile Organic Compounds (VOC), and Nitrogen Oxide (NOX). These measurements are based strictly on the amount of fuel and/or electricity that is used to operate the vehicle. They do not take into account the emissions produced by building an internal combustion engine, creating a lithium-ion battery, manufacturing tires, or any other component of the vehicle manufacturing process. Details on each type of greenhouse gas are found below.

1. Carbon Dioxide (CO_2): This is the most commonly known of the three greenhouse gases. Just as each person reading this analysis emits CO_2 through breathing, a portion of what cars emit through the exhaust pipe is also CO_2. Vincentric measures the CO_2 equivalent (CO_2 eq), which is a measurement used to compare the emissions from various greenhouse gases based on their global-warming potential by converting amounts of other gases to the equivalent amount of CO_2 with the same global warming potential.

According to the United States Environmental Protection Agency (EPA), a typical passenger vehicle emits about 4.6 metric tons of CO_2 per year[1]. This study's results found that, on average, the EVs in the study indirectly emitted just over 2 metric tons of CO_2 eq, while ICE vehicles emitted over 6.5 metric tons of CO_2 on average over the five-year period of the analysis. The EPA is an organization dedicated to protecting human health and the environment.

2.Volatile Organic Compounds (VOC): Most VOCs are human-made chemicals that are used and produced in the manufacture and use of paints, pharmaceuticals, and refrigerants, according to the EPA[2].

Automobiles give off two different types of VOC emissions: tailpipe emissions, and evaporative components that vaporize into the atmosphere. Because this analysis only measured the impact of driving a vehicle, evaporative components of VOC emissions were not included. VOCs are also produced by electrical power plants.

3. Nitrogen Oxide (NO_x): This is a highly reactive gas that, when it combines with the chemicals in the air, can create acid rain. Vehicle emissions are the primary source of NOX in the air, and it can also be generated by electrical power plants[3].

REFERENCES

[1] https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

[2] https://www.epa.gov/indoor-air-quality-iaq/what-are-volatile-organic-compounds-vocs

[3] https://www.epa.gov/no2-pollution/basic-information-about-no2

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APPENDIX [E] ENVIRONMENTAL COST OF OWNERSHIP™ METHODOLOGY

To measure emissions, Vincentric used the following types of measurements for these greenhouse gases.

FOR ICE VEHICLES

- **Well-to-Tank Emissions**: The emissions resulting from the production and distribution of a fuel, from the extraction of the raw resources from the ground to processing, production, and transport to gas stations. The fuel amount is based on the gallons of gasoline burned during 25,000 kilometers of driving over five years for each ICE vehicle in the study.

- **Tank-to-Wheel Emissions:** The emissions resulting from the process of a vehicle consuming the fuel, which, for this study, is based on the gallons of gasoline burned during 25,000 kilometers of driving over five years for each ICE vehicle in the study. This measurement is only calculated for CO_2 emissions.

FOR ELECTRIC VEHICLES

- **Electric Generation Emissions:** The emissions resulting from the generation of electricity used to power the EV. Vincentric used data in 11 regions across Canada to calculate the number of kilowatt hours of electricity required to drive 25,000 kilometers over five years for each EV in the study.