VINCENTRIC
2024 US ELECTRIC VEHICLE COST OF OWNERSHIP ANALYSIS

US MARKET
APRIL 2024

TABLE OF CONTENTS

INTRODUCTION

Understanding both the financial and environmental cost of owning an electric vehicle versus a traditional, gasoline-powered vehicle can help buyers make an informed decision on which type of vehicle will best meet their needs.

As an automotive research organization with over 20 years of experience in measuring the cost to own and operate vehicles in the United States and Canada, Vincentric is well positioned to uncover answers to common questions many buyers may have about EVs:

- ***How cost-effective are EVs compared to ICE vehicles?***
- ***Can EV buyers expect ownership cost savings beyond the gas pump? And if so, where?***
- ***How often is an EV's ownership cost savings worth the higher Purchase Price? Will EVs recoup their Purchase Price premium through fuel, maintenance, and other savings, and if so, how long will it take?***
- ***What is the environmental impact of powering a vehicle using electricity instead of gasoline?***

The results of this analysis can help provide guidance to buyers who are uncertain if choosing an electric vehicle is a viable financial choice. This analysis will also periodically reference a similar study performed by Vincentric in 2023 to help the reader understand changes that have occurred in the last year.

EXECUTIVE SUMMARY

Vincentric used its Dynamic Cost to Own™ technology to analyze the total cost of ownership, often called TCO, of 41 EVs versus comparable ICE alternatives and found that 20 of 41 EVs (49%) had lower total ownership costs than their gasoline counterparts. This analysis focused on Battery Electric Vehicles (BEVs) and did not include Plug-In Hybrid (PHEVs) or other Hybrid Electric Vehicles (HEVs).

Comparatively, the 2023 Vincentric study of EVs vs ICE vehicles in the US found that 52% of EVs had lower ownership costs. The percentage of EVs with lower total cost of ownership decreased slightly over the past year, largely due to the discontinuation of electric vehicle tax credits and the low number of EVs that qualified for the federal rebate that replaced them.

Fuel and Maintenance costs were the biggest strengths for EVs. ***All 41 EVs analyzed had lower Fuel costs*** than their ICE alternatives and ***37 of 41 EVs analyzed had lower Maintenance costs.*** For the purposes of this analysis, the term "Fuel" includes both the cost of gasoline for ICE vehicles, and the cost of electricity for EVs.

Depreciation proved to be a major detriment to EVs. Only 10 of 41 EVs analyzed had lower Depreciation costs than their ICE alternatives.

Consumer incentives for purchasing EVs have shifted to a $7,500 federal point-of-sale rebate that is applied as a reduction to Market Price. While the rebate is intended to be a benefit for EVs, it comes with strict criteria that only allowed 3 of the 41 EVs analyzed to qualify. Vincentric analyzed the ownership costs of those three EVs without the rebate applied and found that two still had lower ownership costs than their ICE alternative, while one EV had higher ownership costs without the boon of the rebate.

The analysis also investigated the Payback Period for all 41 EVs to determine how soon each would recoup its price premium through ownership cost savings. The study found that 8 EVs had a lower purchase price than their comparable ICE vehicle, while an additional 11 EVs recouped their higher purchase price within 7 years.

This result, in which 19 of 41 electric vehicles (46%) recouped their higher purchase price within 7 years, is similar to last year's study in which 44% of vehicles had a Payback Period within 7 years.

Even though EVs had an average purchase price of approximately $8,000 higher than a comparable ICE vehicle, they also had an average of over $8,000 in Fuel cost savings, plus an average of over $1,300 in TCO savings.

For environmental impact, ***all 41 EVs were shown to generate fewer greenhouse gas emissions than their ICE counterparts*** over five years, even after taking into account the pollutants generated when producing electricity.

Overall, these results suggest that there can be significant financial and environmental benefits to choosing an EV.

METHODOLOGY OVERVIEW

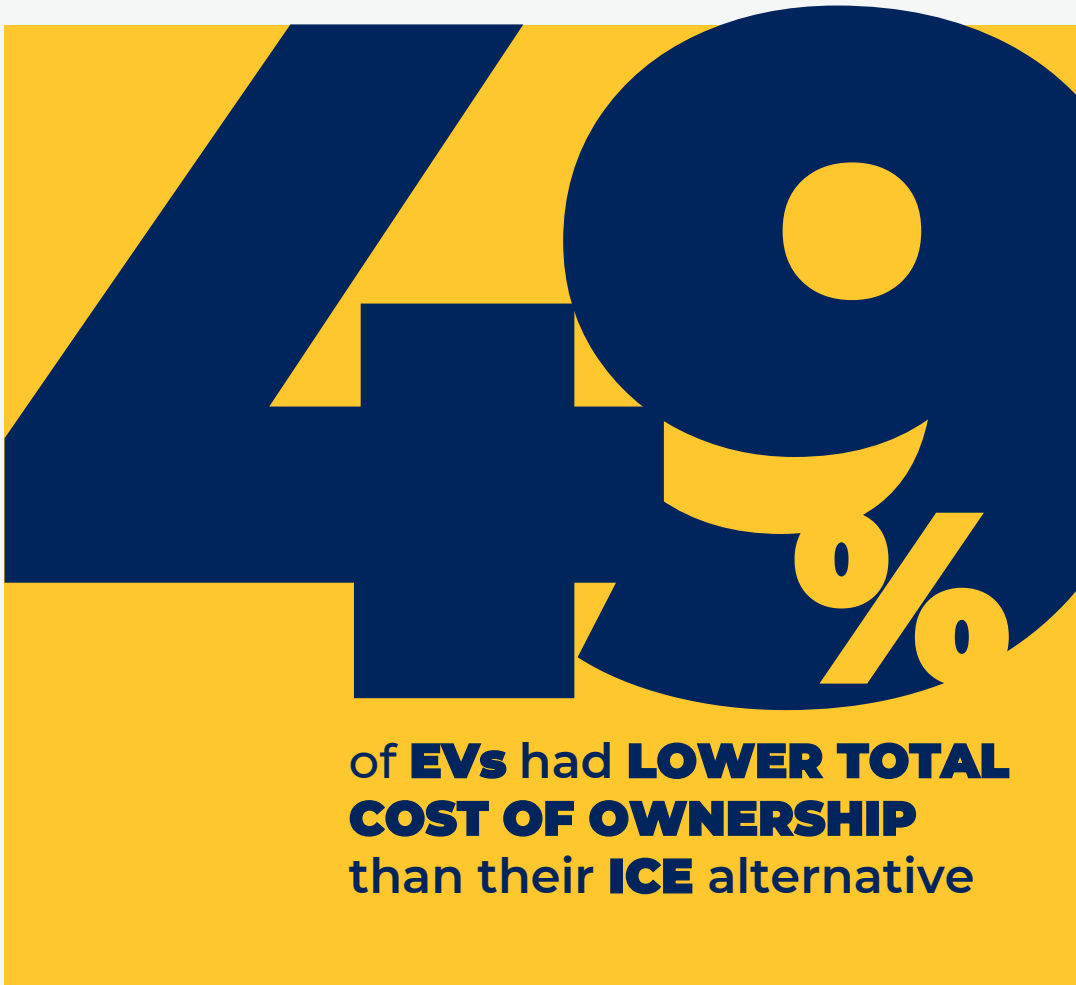
For the purposes of this analysis, the term "EV" only includes Battery Electric Vehicles (BEVs). Plug-In Hybrid Electric Vehicles (PHEVs) and Hybrid Electric Vehicles (HEVs) were not included.

To perform this study, Vincentric matched 41 EVs currently available in the Vincentric US 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.

The data analysts at Vincentric reviewed over 5,300 vehicle configurations to identify similarly equipped ICE vehicles for comparison. When possible, the same make and similar body style were selected for the ICE comparison vehicle. 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.

The analysis assumes that all vehicles will be driven 15,000 miles per year over the next five years. US averages are used for all cost inputs including labor rate, fuel (both gasoline and electricity), and fees & taxes. Because fees & taxes data is based on a national average, this analysis does not consider any state or local EV incentives. Federal point-of-sale rebates are considered as a reduction to market price for qualifying EVs.

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



TOTAL COST OF OWNERSHIP COMPARISON

Vincentric used its Dynamic Cost to Own™ technology to calculate the total ownership costs of all 82 vehicles in the study. The analysis found that just under half of the EVs analyzed (20 of 41) had lower ownership costs than their comparable ICE alternative over five years.

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

TOP 5 COST-EFFECTIVE 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	**2023 Tesla Model S Long Range 4D Sedan AWD**	**EV**	**$91,190**	**$106,271**	**$28,159**
	2023 BMW 7-Series 740i 4D Sedan	ICE	$94,295	$134,430	
2ND	**2023 Porsche Taycan Base 4D Sedan**	**EV**	**$88,150**	**$105,226**	**$22,263**
	2023 Porsche Panamera Base 4D Sedan	ICE	$93,850	$127,489	
3RD	**2023 Mercedes-Benz EQS Class EQS450+ 4D Sedan**	**EV**	**$105,550**	**$137,869**	**$20,708**
	2023 Mercedes-Benz S Class S500 4D Sedan 4MATIC	ICE	$115,650	$158,577	
4TH	**2023 Tesla Model Y Standard Range 4D SUV**	**EV**	**$41,630**	**$59,406**	**$19,894**
	2023 BMW X3 sDrive30i 4D SAV	ICE	$47,195	$79,300	
5TH	**2023 Ford F-150 Lightning Pro Supercrew 4WD**	**EV**	**$44,490**	**$56,238**	**$16,231**
	2023 Ford F-150 XL 2.7L Ecoboost Supercrew 4WD 145	ICE	$47,990	$72,469	

A full list showing the Market Price (also known as the Estimated Purchase Price) and total cost of ownership results of all 41 analyzed EVs versus their ICE alternative is shown in Appendix B.

TOTAL COST OF OWNERSHIP COMPARISON

CONTINUED

With inflation and the rising cost of living a concern for many in the US, it's common for consumers to look for ways to get the most value for their money. Vincentric ranked the total cost of ownership for all 41 EVs to determine which models will cost consumers the least to own over five years.

Below are the rankings of the Top 10 lowest cost to own EVs.

TOP 10 LOWEST COST TO OWN EVs IN THE US

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
1ST	2024 Nissan LEAF S 4D Hatchback	$46,916
2ND	2023 Volkswagen ID.4 Standard 4D SUV	$49,733
3RD	2024 Kia Niro EV Wind 4D SUV	$50,903
4TH	2023 Mini Cooper Electric SE 2D Hatchback	$51,942
5TH	2023 Hyundai Kona Electric SE 4D SUV FWD	$52,957
6TH	2024 Kia EV6 Light 4D SUV RWD	$56,003
7TH	2024 Hyundai Ioniq 5 SE Standard Range 4D SUV RWD	$56,100
8TH	2023 Ford F-150 Lightning Pro Supercrew 4WD	$56,238
9TH	2023 Hyundai Ioniq 6 SE Standard Range 4D Sedan RWD	$58,828
10TH	2023 Tesla Model Y Standard Range 4D SUV	$59,406

*A ranking of **all 41** EVs by their total five-year ownership cost results is shown in **Appendix C**.*

TOTAL COST OF OWNERSHIP COMPARISON

CONCLUDED

As of January 2024, EV incentives have shifted from federal tax credits to federal point-of-sale rebates that lower the purchase price of electric vehicles. This change came with much stricter qualification requirements, which cut down the number of qualifiable EVs considerably. In addition to income requirements for buyers, new regulations mandate that a vehicle must have final assembly in North America, follow strict critical minerals sourcing and battery component sourcing requirements, and not exceed a certain MSRP in order to qualify for the $7,500 rebate.

Of the 41 EVs analyzed, the 2023 Ford F-150 Lightning, the 2023 Tesla Model Y, and the 2023 Volkswagen ID.4 were the only three qualifying EVs. Of them, the F-150 Lightning and the Tesla Model Y maintained their overall TCO advantage over their ICE alternatives even after removing the $7,500 rebate. However, the Volkswagen ID.4 needed the federal rebate to have lower ownership costs.

Considering that 17 EVs still had lower ownership costs than their gasoline counterparts even without qualifying for the federal rebate, ***that qualification is not a requirement for EVs to save buyers money.***

The analysis confirmed that it's common for EVs to have a higher purchase price than gasoline-powered vehicles. Only 8 of 41 EVs analyzed had a lower Market Price than their gasoline counterparts, and that's with the federal rebate included. On average, EVs had a price premium of $8,166.

Overall, these results show that ***although EVs typically cost more to purchase, nearly half of the time, they will cost their buyers less to own and operate over the first five years.***

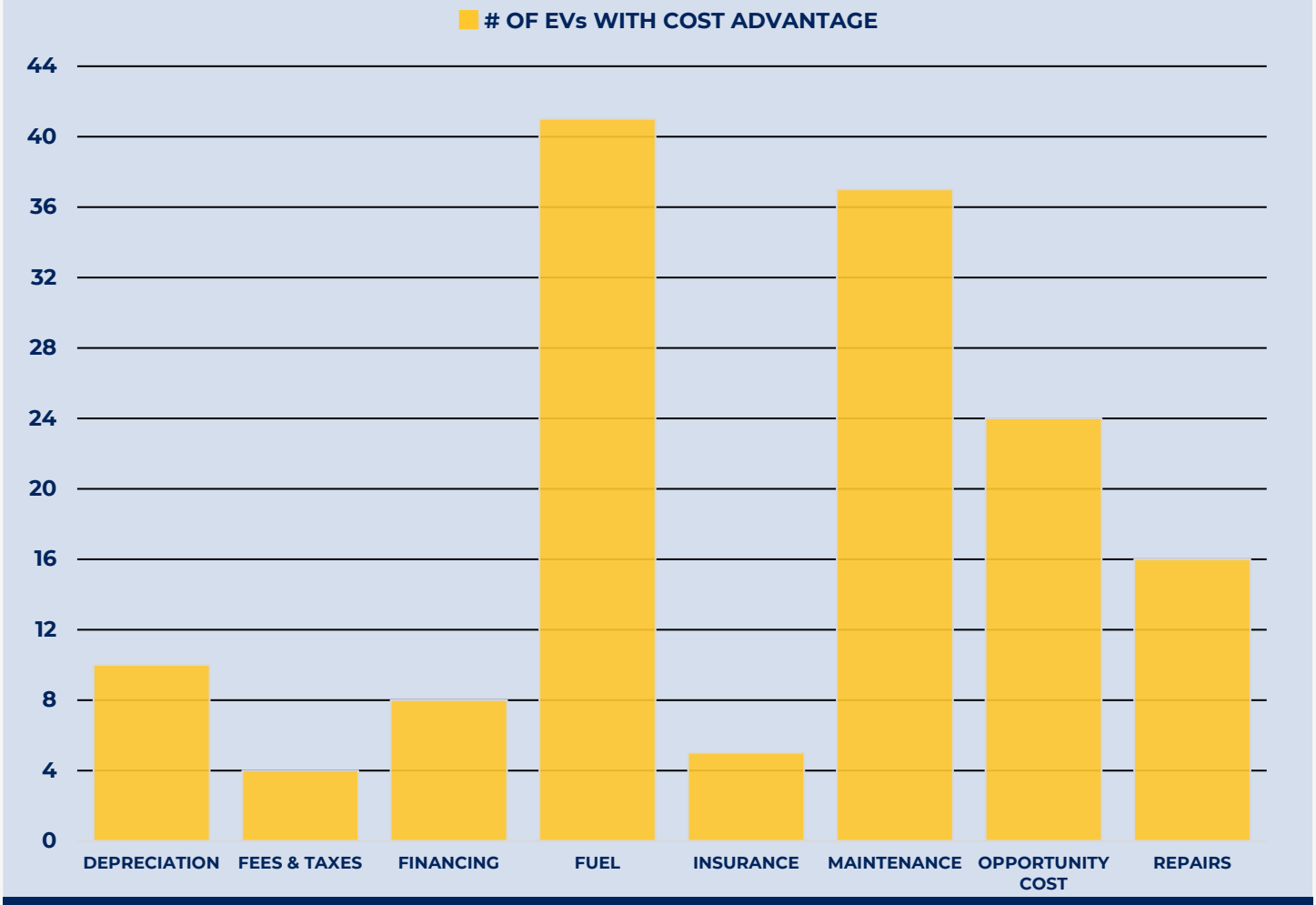
COST FACTORS

There are many more costs involved in owning a car than the price consumers pay to drive it off the dealership lot. One of the goals of this analysis was to identify specific areas of automotive cost of ownership that might be strengths for EVs.

To identify the strengths and weaknesses of EVs, the study investigated eight individual factors that comprise the total cost of ownership (TCO), then identified how often the EV had a cost advantage in each of the 41 vehicle comparisons.

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

 # OF US EVs WITH COST ADVANTAGE VS ICE ALTERNATIVE
(OUT OF 41 EVs ANALYZED)



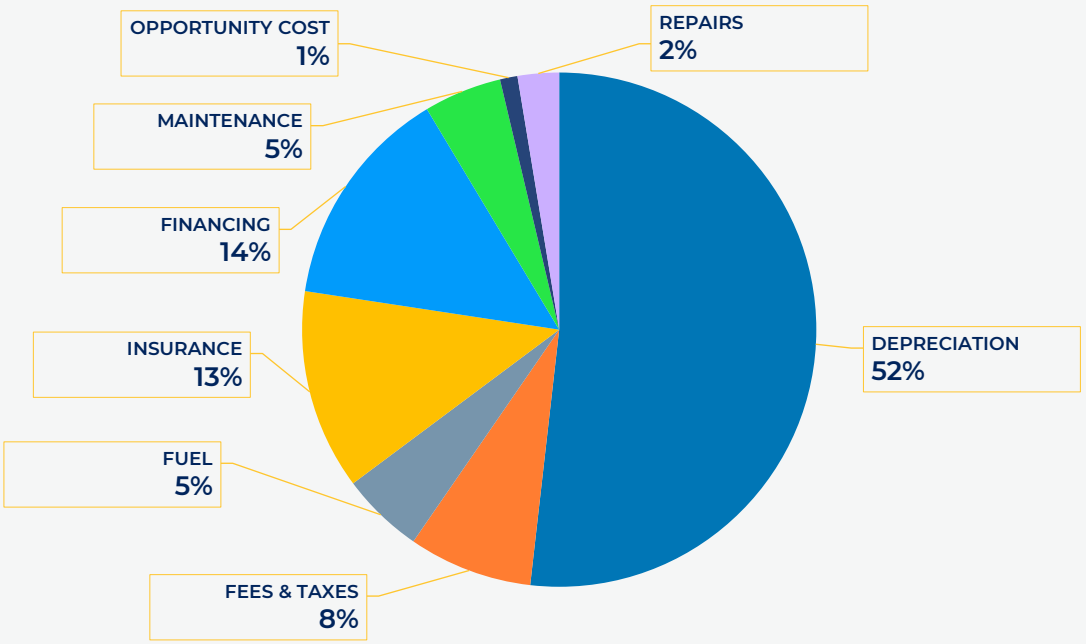
The above chart shows that there were three cost areas in which EVs had a consistent cost advantage: Fuel, Maintenance, and Opportunity Cost. Detailed results for these cost factors are described in the following sections.

COST FACTORS

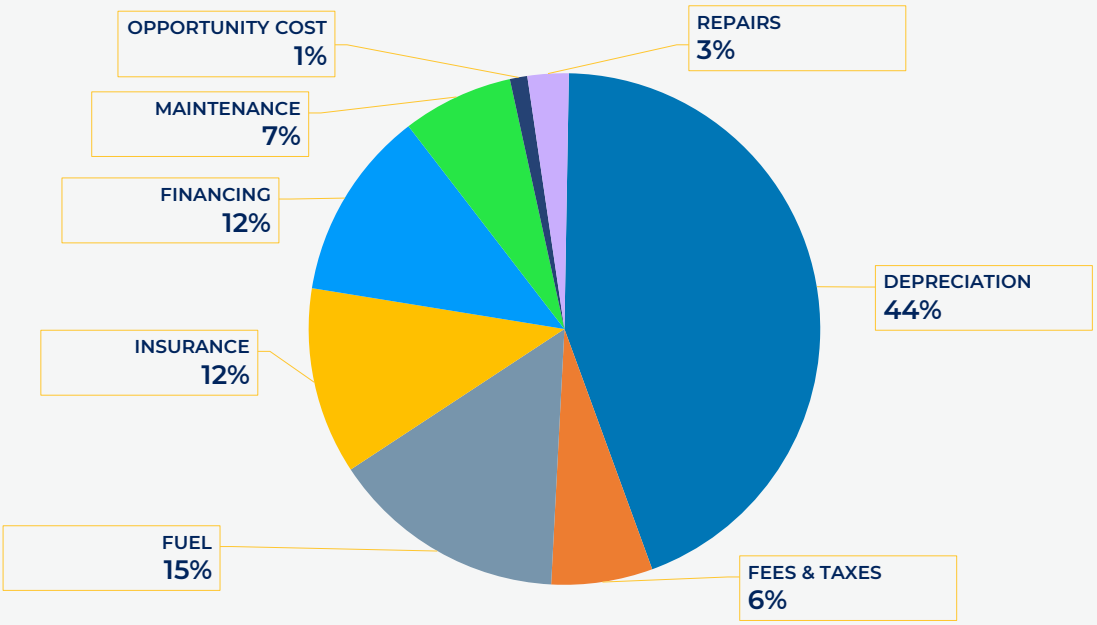
CONCLUDED

The most significant cost factor in a vehicle's cost of ownership is Depreciation. On average, Depreciation accounts for 52% of total ownership costs for EVs and 44% of total ownership costs for ICE vehicles. The charts below show the average share of TCO represented by each of the eight cost factors studied for EVs and ICE vehicles.

PERCENTAGE OF EV TOTAL OWNERSHIP COSTS



PERCENTAGE OF ICE TOTAL OWNERSHIP COSTS

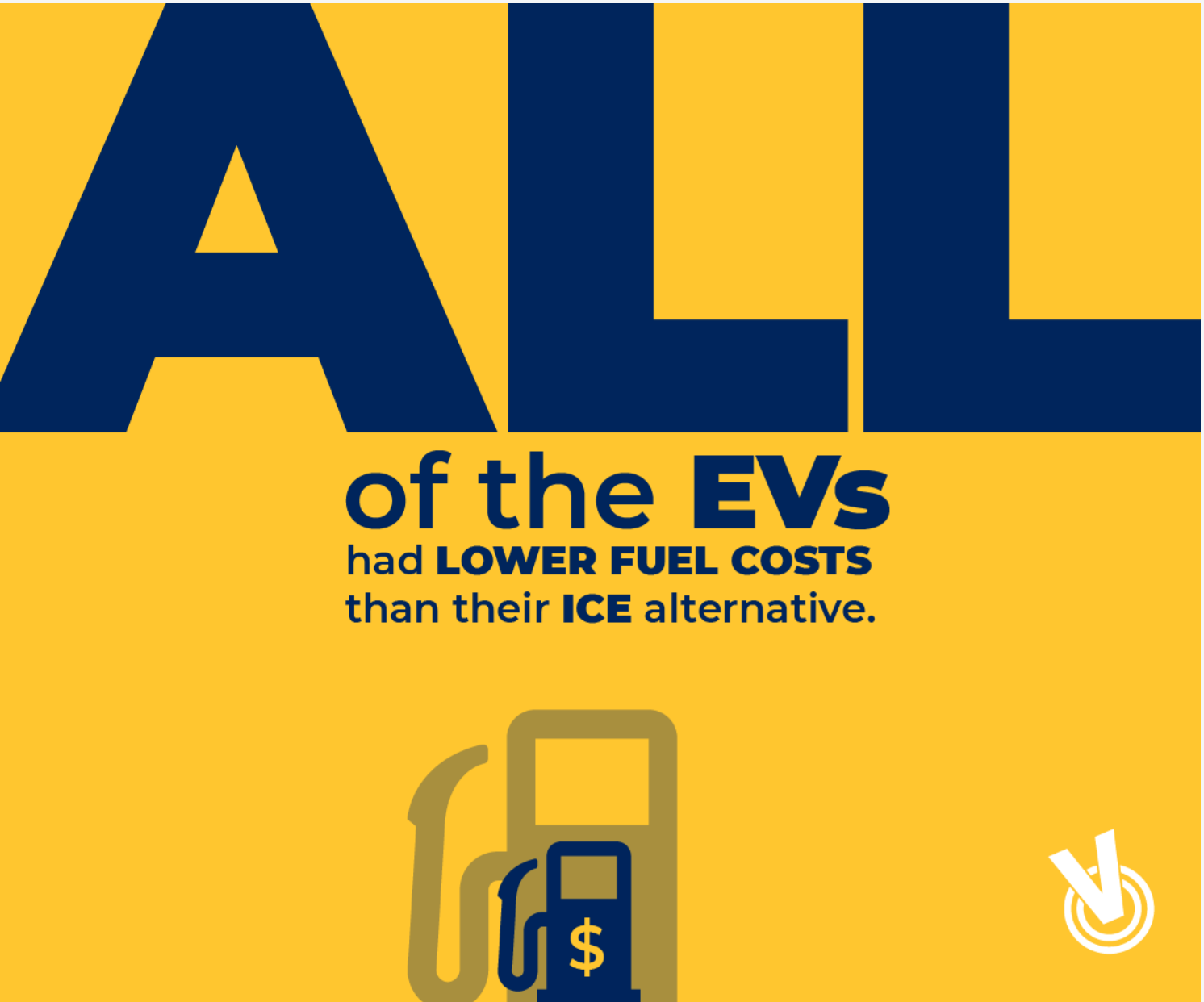


FUEL COSTS

If there's one thing that most consumers know with confidence when it comes to EVs, it's their potential for fuel cost savings. For the purposes of this analysis, the term "Fuel" includes both gasoline costs for ICE vehicles, and electricity costs for electric vehicles.

On average, the EVs studied saved $8,165 in fuel costs compared to gasoline vehicles, with savings ranging from $3,912 for the 2023 Nissan Ariya, to an outstanding $14,051 for the 2024 Audi SQ8 e-tron.

Fuel cost savings are such a significant strength for EVs that, of the 33 EVs that had a higher purchase price than their ICE alternative, ***eleven of them had high enough fuel cost savings to completely recover their greater purchase price.***



MAINTENANCE COSTS

The analysis also found that electric vehicles typically save money on Maintenance over their ICE counterparts. The electric motors that power EVs have fewer components and moving parts than internal combustion engines, which helps reduce routine Maintenance costs.

Vincentric maintenance cost calculations are based on OEM recommended maintenance schedules, as well as unscheduled maintenance items such as tires and batteries that need to be replaced on both EVs and ICEs due to normal wear-and-tear. However, ***Vincentric maintenance costs do not take into account replacing the lithium-ion battery for EVs. This is because available data on EVs does not show that the lithium-ion battery needs to be replaced within the five-year timeframe covered in this analysis.***

The analysis found that 37 of 41 EVs analyzed had lower Maintenance costs than their ICE alternative, with Maintenance cost savings ranging from $269 for the 2024 Audi e-tron GT, to $4,596 for the 2023 Mercedes-Benz EQS Class. The only EVs that had higher maintenance costs than their gasoline counterparts were the 2024 Audi Q4 e-tron, the 2024 Audi Q8 e-tron, the 2024 Jaguar I-Pace, and the 2023 Lucid Air.

The Audi Q4 and Q8 have higher tire prices compared to their gasoline alternatives, as opposed to the other two Audi EV models analyzed, the e-tron GT and the SQ8 e-tron, which have lower-priced tires than their ICE alternatives.

Both the Jaguar I-Pace and its ICE competitor, the Jaguar F-Pace, have scheduled maintenance services that only occur in Year 5. However, the I-Pace's services are more expensive than the F-Pace's services.

The Lucid Air's ICE comparison vehicle is the BMW 7-Series, which receives complementary maintenance for select services for 3 years/36,000 miles.

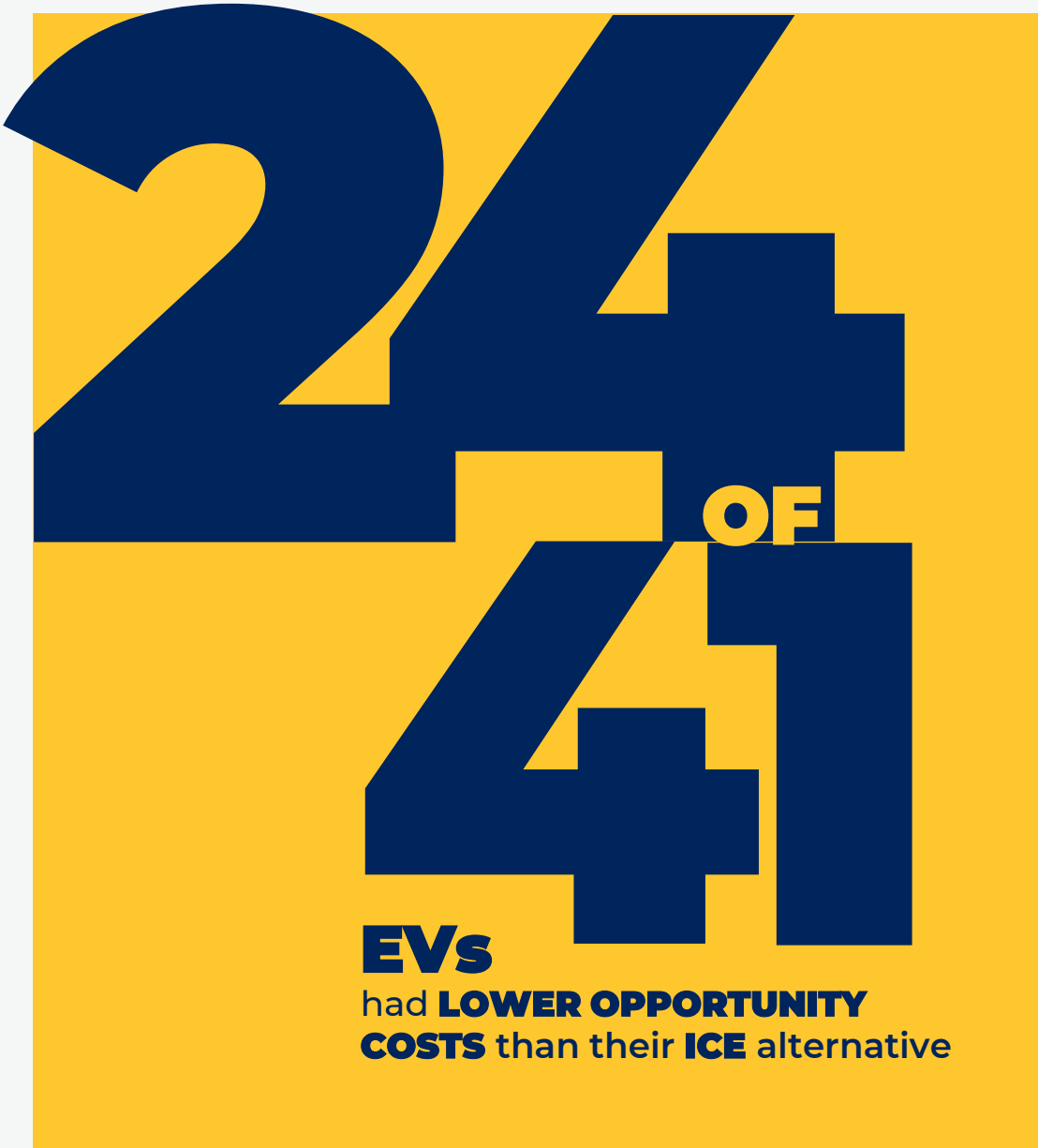
OPPORTUNITY COSTS

Opportunity Cost is one of the most overlooked costs of owning a car, largely because it isn't an expense that comes due at the same time each month or even makes buyers reach for their wallets. Opportunity Cost accounts for the interest that could have been accrued if a buyer had invested their out-of-pocket vehicle expenses into a savings account. Essentially, Opportunity Cost is the money buyers had the opportunity to earn but missed out on by choosing to purchase a vehicle instead.

Opportunity Cost is a relatively minor expense that only accounts for approximately 1% of total ownership costs for both EVs and ICEs. Even so, the average Opportunity Cost of the 41 EVs analyzed was just over $916, which many buyers would likely consider a significant expense.

Despite being a relatively small percentage of total ownership costs, Vincentric measures total cost of ownership, which is why Opportunity Cost is included.

The study found that 24 of 41 EVs analyzed had lower Opportunity Cost than their ICE alternative. The EV with the lowest Opportunity Cost was the 2024 Nissan LEAF at $508, while the 2023 Mercedes-Benz EQs SUV Class had the highest at $1,399.



DEPRECIATION COSTS

Depreciation is consistently a major hit against many EVs. For consumers, the realization that a newly purchased car is often only worth a fraction of its purchase price the moment it leaves the dealership lot can be disheartening. Depreciation is also the most significant factor in a vehicle's cost of ownership, accounting for approximately 52% of ownership costs for EVs and 44% for ICEs.

Only 24% of the EVs analyzed (10 of 41) had lower Depreciation costs than their ICE alternative. However, it's worth noting that this is still a significant improvement from the 2023 Vincentric US EV Cost of Ownership Analysis conducted last year, in which only 15% of the 27 analyzed EVs had lower Depreciation. The 2024 Nissan LEAF was the EV with the lowest Depreciation at $21,860, which is still a hefty sum, especially when compared to the lowest Depreciation cost ICE vehicle, which was the 2023 Subaru Forester with Depreciation of $15,368.

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 EVs WITH LOWEST DEPRECIATION COST

RANK	VEHICLE	DEPRECIATION COST OVER 5 YEARS
1ST	2024 Nissan LEAF S 4D Hatchback	$21,860
2ND	2024 Kia Niro EV Wind 4D SUV	$22,202
3RD	2023 Volkswagen ID.4 Standard 4D SUV	$22,216
4TH	2023 Ford F-150 Lightning Pro Supercrew 4WD	$22,788
5TH	2023 Mini Cooper Electric SE 2D Hatchback	$25,051
6TH	2023 Tesla Model Y Standard Range 4D SUV	$25,331
7TH	2024 Kia EV6 Light 4D SUV RWD	$26,430
8TH	2023 Hyundai Kona Electric SE 4D SUV FWD	$26,432
9TH	2024 Hyundai Ioniq 5 SE Standard Range 4D SUV RWD	$27,161
10TH	2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD	$28,555

DEPRECIATION RATES

Despite higher Depreciation costs for most EVs in the study, the results showed that a much higher 41% (17 of 41) of EVs analyzed had a lower depreciation rate than their ICE alternative. The depreciation rate indicates the percentage of the vehicle's Market Price that was lost over the five years of the study.

Although 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. There isn't a way for consumers to avoid their vehicle's depreciation, but choosing a vehicle with a better depreciation rate can help minimize the value lost.

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

TOP 5 EVs WITH LOWEST DEPRECIATION RATE

RANK	VEHICLE	DEPRECIATION RATE OVER 5 YEARS
1ST	2024 GMC Hummer EV SUT 2X Crew Cab 4WD	47.75%
2ND	2023 Ford F-150 Lightning Pro Supercrew 4WD	51.22%
3RD	2024 Chevrolet Silverado EV 3WT Crew Cab e4WD	54.21%
4TH	2024 BMW i7 eDrive50 4D Sedan	58.95%
5TH	2023 Tesla Model Y Standard Range 4D SUV	60.85%

COMPARING 2024 vs 2023 RESULTS

With the Vincentric US EV Cost of Ownership Analysis in its second year, many consumers may be wondering: are EVs becoming more cost-effective? And if so, should I wait another year to buy an EV?

When looking at the percentage of EVs that had lower total ownership costs than their ICE competitors, the 2024 analysis saw a 3 percentage-point decrease, from 52% of analyzed EVs in 2023, to 49% in 2024.

Drilling down into individual costs, the biggest step backwards for EVs from last year was a massive 23 percentage-point decrease in the number of EVs with lower Fees & Taxes than their ICE alternatives. This is primarily because of the shift from federal EV tax credits to much more stringent point-of-sales rebates. This change went into effect at the start of 2024, and 38 of the 41 EVs analyzed did not qualify.

There were multiple cost areas where EVs saw positive improvement from the 2023 study, such as a 9 percentage-point increase in EVs with lower Depreciation costs.

While 9 percentage points isn't a huge change, since Depreciation is the most significant cost associated with automotive TCO, it's a positive step for more EVs to perform strongly for such an impactful cost.

Additionally, there was a 6 percentage-point increase in EVs with lower Repair costs than their ICE alternative, and a 5 percentage-point increase in EVs with a lower starting Marketing Price than their ICE counterparts.

Overall, while the percentage of EVs with a lower total cost of ownership than their ICE alternatives decreased slightly from 2023, the analysis results show that EVs are still cost-effective approximately half of the time.

However, any consumers who want even more cost-effective EV model options to choose from may want to hold off on an EV purchase until more models qualify for the federal rebate.

Since the **2023 STUDY,** the percentage of EVs with a **LOWER TCO** than their **ICE** alternative **DROPPED** from **52%** **TO** **49%**

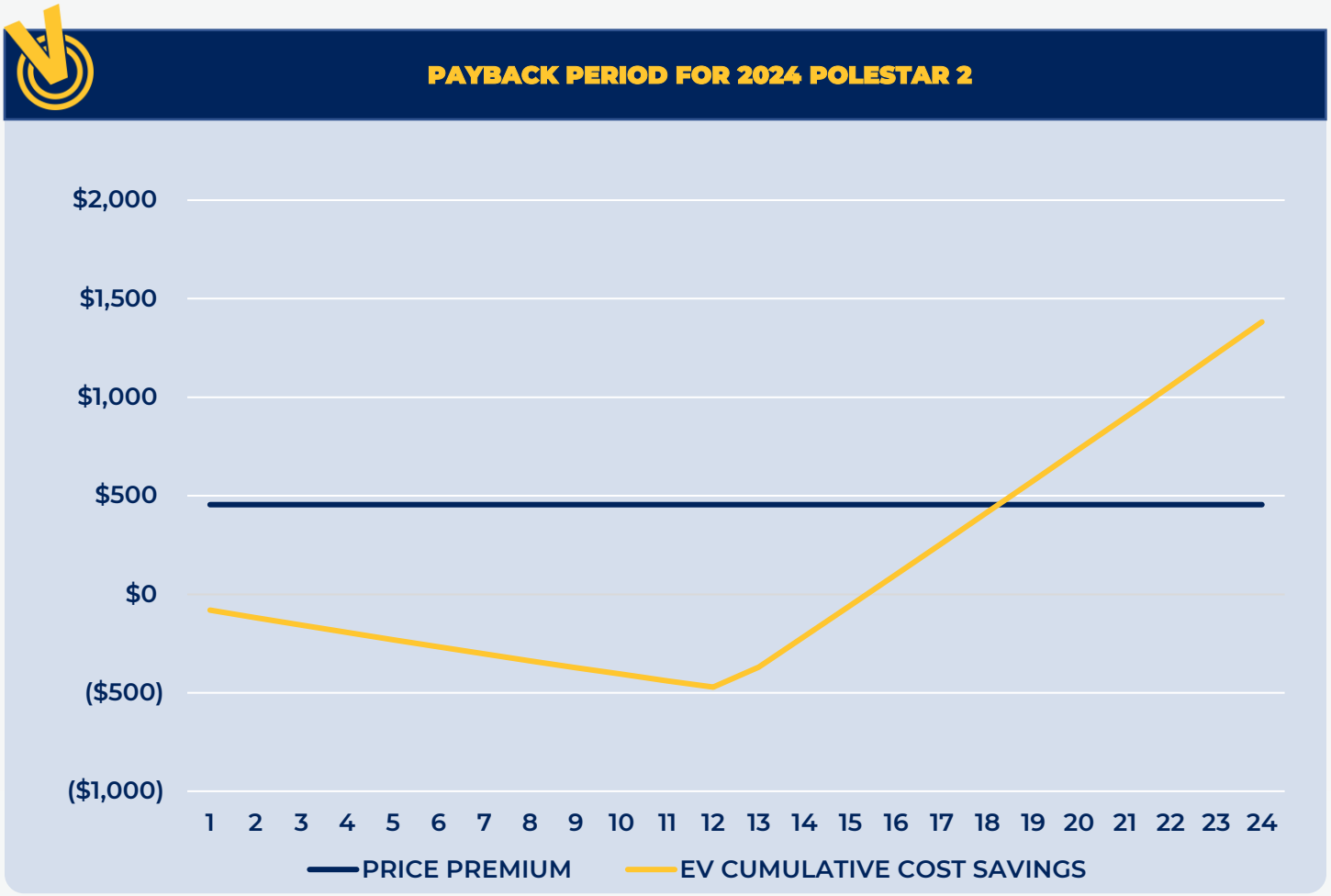
EV PAYBACK PERIOD

For some consumers, the higher Purchase Price of EVs can cause hesitation to make the switch. With an average Purchase Price premium of over $8,000 to buy an EV versus a similarly equipped ICE vehicle, it's no surprise that consumers want to understand if shelling out that extra cash will be worthwhile.

This analysis determined if the EVs in this study would recoup their higher Purchase Price through ownership cost savings, and, for those that do, how long it would take for buyers to get their money back. ***This "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 alternative.***

As an example, the 2024 Polestar 2 cost $455 more to purchase than its ICE alternative, the 2024 Volvo S60. To determine this EV's Payback Period, Vincentric measured the cumulative cost savings to calculate how many months it would take to recoup that $455 through ownership savings and determined that a Polestar 2 owner would wait until month 19 to earn back the $455 price premium.

The chart below shows that, while the Polestar 2 will have ownership costs that are higher than the ICE alternative over the first twelve months, it will start to show cost savings in month thirteen and continue over time until it completes its Payback Period during month 19 of ownership.



CONCLUSION: *The Payback Period for the 2024 Polestar 2 occurs during month 19 of ownership.*

EV PAYBACK PERIOD

CONTINUED

There were 8 EVs that had a lower initial Market Price than their ICE alternatives. Because these EVs had immediate savings compared to their ICE counterpart, 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.***

EVs WITH LOWER MARKET PRICE THAN ICE ALTERNATIVES

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	EV PURCHASE PRICE SAVINGS vs ICE ALTERNATIVE
1ST	**2023 Mercedes-Benz EQS Class EQS450+ 4D Sedan**	**EV**	**$105,550**	**$10,100**
	2023 Mercedes-Benz S Class S500 4D Sedan 4MATIC	ICE	$115,650	
2ND	**2023 Porsche Taycan Base 4D Sedan**	**EV**	**$88,150**	**$5,700**
	2023 Porsche Panamera Base 4D Sedan	ICE	$93,850	
3RD	**2023 Tesla Model Y Standard Range 4D SUV**	**EV**	**$41,630**	**$5,565**
	2023 BMW X3 sDrive30i 4D SAV	ICE	$47,195	
4TH	**2023 Ford F-150 Lightning Pro Supercrew 4WD**	**EV**	**$44,490**	**$3,500**
	2023 Ford F-150 XL 2.7L Ecoboost Supercrew 4WD 145	ICE	$47,990	

Table continues on the following page.

EV PAYBACK PERIOD

CONTINUED

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EVs WITH LOWER MARKET PRICE THAN ICE ALTERNATIVES

RANK	VEHICLE	FUEL TYPE	ESTIMATED PURCHASE PRICE	EV PURCHASE PRICE SAVINGS vs ICE ALTERNATIVE
5TH	**2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD**	**EV**	**$41,630**	**$3,165**
	2023 BMW 3-Series 330i 4D Sedan	ICE	$44,795	
6TH	**2023 Tesla Model S Long Range 4D Sedan AWD**	**EV**	**$91,190**	**$3,105**
	2023 BMW 7-Series 740i 4D Sedan	ICE	$94,295	
7TH	**2024 Audi SQ8 e-tron Premium Plus 4D SUV Qtro**	**EV**	**$85,995**	**$3,100**
	2024 Audi SQ7 Premium Plus 4D SUV Qtro	ICE	$89,095	
8TH	**2023 Mini Cooper Electric SE 2D Hatchback**	**EV**	**$34,750**	**$1,000**
	2023 Mini Cooper S Iconic 2D Hatchback	ICE	$35,750	

EV PAYBACK PERIOD

CONTINUED

There were 7 additional EVs that recouped their price premium within the first five years of ownership. 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 4 more EVs reached their Payback Period in that timeframe.

The table on the following page shows these 11 EVs, 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 15,000 miles per year assumed by this study, their EV's Payback Period could increase or decrease.

Although the Payback Period results in this study were limited to the 41 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.

11 OF 41 EVs reached their **PAYBACK PERIOD** within **7 YEARS**

EV PAYBACK PERIOD

CONCLUDED

11 EVs WITH A PAYBACK PERIOD WITHIN 7 YEARS

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
1ST	2024 Polestar 2 Base 5D Hatchback RWD	19
2ND	2024 BMW i4 eDrive35 4D Gran Coupe	30
3RD	2024 BMW i7 eDrive50 4D Sedan	34
4TH	2023 Lucid Air Pure 4D Sedan AWD	38
5TH	2024 Audi Q8 e-tron Premium 4D SUV Qtro	47
6TH	2023 Genesis Electrified G80 4D Sedan	55
7TH	2024 Nissan LEAF S 4D Hatchback	57
8TH	2024 Genesis GV60 EV Standard 4D SUV RWD	68
9TH	2023 Volkswagen ID.4 Standard 4D SUV	72
10TH	2024 Jaguar I-Pace R-Dynamic HSE EV400 4D SUV AWD	81
11TH	2023 Lexus RZ 450e Premium 4D SUV	84

A full list of the Payback Period for all 41 EVs analyzed is shown in Appendix D.

ENVIRONMENTAL COST OF OWNERSHIP™ OVERVIEW

The environmental benefits of electric vehicles are seen as a considerable advantage by many buyers. More and more consumers are putting equal weight on the question of "how much better is an EV for the environment?" as the question of "can an EV save me money?" That is why understanding the Environmental Cost of Ownership, or ECO, of a vehicle is critical when analyzing EVs.

Tailpipe emissions from gasoline-powered vehicles are a major contributor to greenhouse gas emissions. Because EVs don't use gasoline, it's common for buyers to incorrectly 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 nearly

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 strictly 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 taken into account in this analysis.

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

ENVIRONMENTAL COST OF OWNERSHIP™ RESULTS

After measuring the emissions generated based on the fuel and electricity used to drive a total of 75,000 miles over five years, Vincentric found that all 41 EVs analyzed had lower greenhouse gas emissions than their ICE alternative. As a result, all 41 EVs in this study are a more environmentally friendly choice for consumers than their ICE alternative.

The following chart shows the Top 10 EVs with the greatest reduction in CO_2 eq emissions compared to their ICE counterparts 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	2024 Audi SQ8 e-tron Premium Plus 4D SUV Qtro	-7.19
2ND	2024 GMC Hummer EV SUT 2X Crew Cab 4WD	-6.78
3RD	2023 Genesis Electrified G80 4D Sedan	-6.36
4TH	2024 Chevrolet Silverado EV 3WT Crew Cab e4WD	-6.31
5TH	2024 Audi Q8 e-tron Premium 4D SUV Qtro	-5.72
6TH	2023 Mercedes-Benz EQS SUV Class EQS450+ Premium 4D SUV	-5.70
7TH	2023 Porsche Taycan Base 4D Sedan	-5.49
8TH	2024 Jaguar I-Pace R-Dynamic HSE EV400 4D SUV AWD	-5.19
9TH	2023 Tesla Model X Long Range 4D SUV AWD	-5.13
10TH	2023 Ford F-150 Lightning Pro Supercrew 4WD	-4.97

ENVIRONMENTAL COST OF OWNERSHIP™ RESULTS

CONCLUDED

The lowest emissions ICE vehicle was the 2023 Nissan Rogue with just under 5 metric tons of CO_2 emissions. With its comparative EV, the 2023 Nissan Ariya, only totaling 2.06 metric tons of CO_2 emissions, it's easy to see the substantial difference that EVs make for Environmental Cost of Ownership.

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

TOP 10 EVs WITH LOWEST EMISSIONS OVER 5 YEARS

RANK	VEHICLE	CO_2 eq EMISSIONS IN METRIC TONS
1ST	2023 Lucid Air Pure 4D Sedan AWD	1.49
2ND	2023 Hyundai Ioniq 6 SE Standard Range 4D Sedan RWD	1.55
3RD	2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD	1.59
4TH	2023 Tesla Model Y Standard Range 4D SUV	1.71
5TH	2024 BMW i4 eDrive35 4D Gran Coupe	1.74
6TH	2023 Hyundai Kona Electric SE 4D SUV FWD	1.76
6TH	2023 Tesla Model S Long Range 4D Sedan AWD	1.76
6TH	2023 Toyota bZ4X XLE 4D SUV FWD	1.76
9TH	2024 Kia EV6 Light 4D SUV RWD	1.79
10TH	2024 Kia Niro EV Wind 4D SUV	1.85

CONCLUSION

The 2024 Vincentric US EV Cost of Ownership Analysis set out to identify the pros and cons of choosing an EV over an ICE vehicle for consumers in the US from both a financial and environmental standpoint. What can buyers learn from these results to guide their future vehicle purchase decisions and to help them decide if one of the 41 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 that spending that extra cash upfront can save buyers thousands of dollars in ownership costs down the line***, 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 that sting.

From an environmental standpoint, current data shows that driving an EV will reduce emissions compared to an ICE vehicle, even though, for most buyers, EVs are not emissions-free. ***Compared to its ICE alternative, every EV analyzed will reduce the driver's environmental footprint by cutting back on emissions.*** However, it's important to keep in mind that the emissions created when generating electricity depend on the type of electrical power plants used, which vary throughout the US.

It's also important to acknowledge that ***the results in this analysis can fluctuate positively or negatively with current market conditions***, such as changing labor rates, fuel prices, and government regulations for EV incentives. Compared to the 2023 analysis of EVs in the US, the percentage of EVs that had lower ownership costs than their ICE counterparts in 2024 decreased slightly. The most significant change from last year was a 23 percentage-point drop in EVs with lower Fees & Taxes costs due to the elimination of federal EV tax credits.

Because the marketplace is constantly in flux, ***this study is expected to be updated on a periodic basis*** to provide guidance to the automotive industry, as well as to buyers in the consumer market, fleet and commercial market, and automotive rental market. To be notified of future Vincentric analyses, ***subscribe to Vincentric News Updates***.

The decision of whether an electric vehicle is suitable for their lifestyle will always be up to the individual consumer. But with the financial and environmental benefits of many EVs, in some cases, transitioning to an electric vehicle can have a positive impact on both a buyer's wallet and the environment.

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 Bloomfield Hills, 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 Autoblog, Automotive Fleet Magazine, AAA 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, EV API, and Total Cost of Leasing API. In addition, each year the company announces the Vincentric Best Value awards in the United States and Canda for both Fleet and Consumer markets to help buyers with their vehicle purchase decisions.

Concept & design assembled by **EYEDIOM marketing design**

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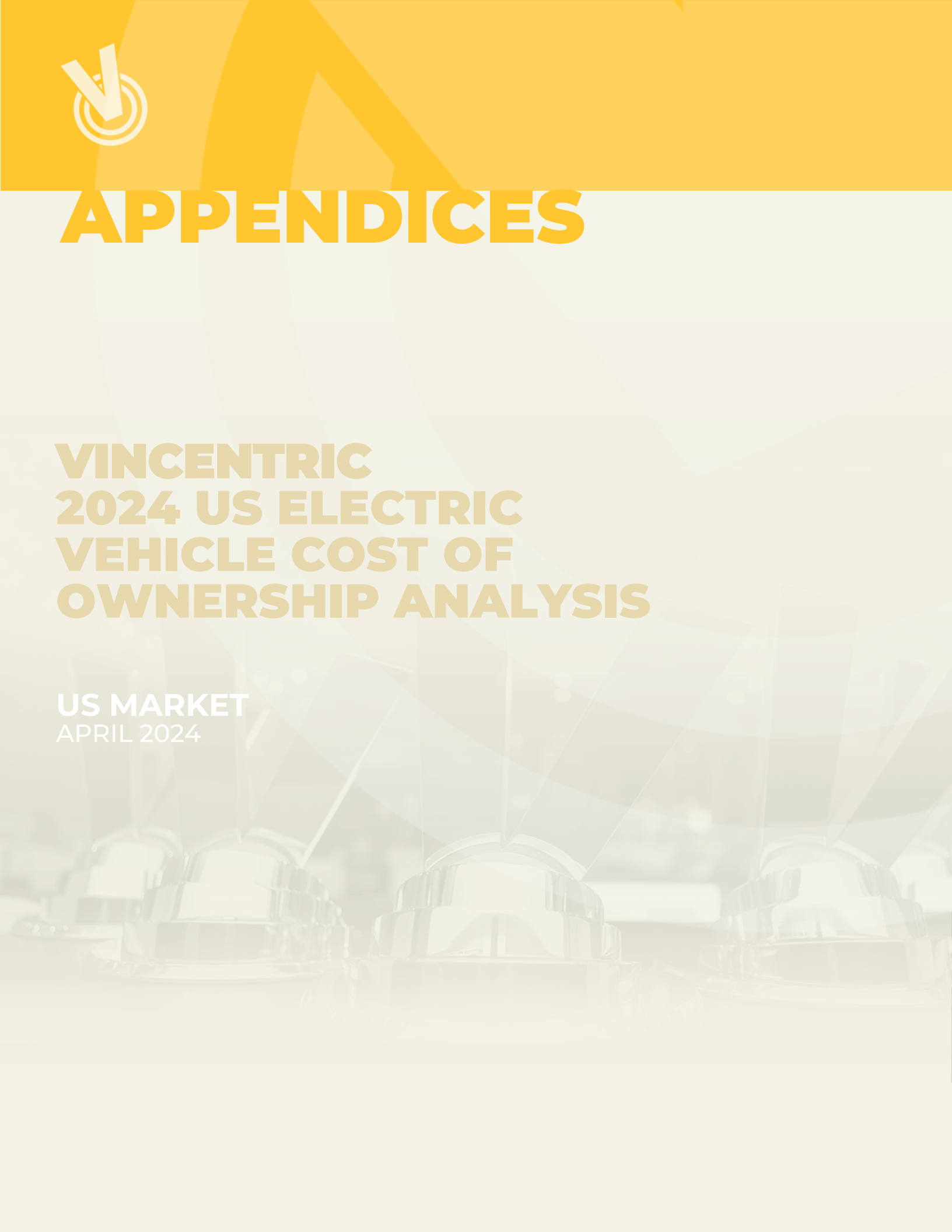
APPENDICES

VINCENTRIC 2024 US ELECTRIC VEHICLE COST OF OWNERSHIP ANALYSIS

US MARKET
APRIL 2024



APPENDIX [A] ANALYSIS METHODOLOGY

To perform this study, Vincentric first matched 41 model year 2024 and model year 2023 EVs currently available in the Vincentric US database to comparable ICE alternative vehicles. These vehicle pairs were matched based on similar specifications and the availability of key data points such as residual values and vehicle pricing. For the purpose of this analysis, the term "EV" only included Battery Electric Vehicles (BEVs) and did not include Plug-In Hybrid Electric Vehicles (PHEVs) or Hybrid Electric Vehicles (HEVs).

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. Once the EV trims were determined, ***Vincentric data analysts reviewed over 5,300 vehicle configurations from the 2024 and 2023 model years on the Vincentric database 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 15,000 miles per year over the next five years. US averages are used for all cost inputs including labor rate, fuel (both gasoline and electricity), fees & taxes, and others. Because this analysis was conducted at a national level, it does not consider any state or local EV 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 consumer pays for the vehicle in the current market. The Vincentric Market Price calculations factor in the invoice price, manufacturer's suggested retail price, the listing price (which is the price at which dealers are offering the vehicle for sale), and OEM national consumer rebates.

Having an accurate Market Price is important because it will impact many of the eight cost factors that comprise total cost of ownership.

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 state taxes.

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 41 EVs VS ICE VEHICLES

The following chart shows the market price and total cost of ownership differentials for all 41 studied EVs compared to their ICE alternative.

In the "EV Total 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 41 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	**2023 Tesla Model S Long Range 4D Sedan AWD**	**EV**	**$91,190**	**$106,271**	**- $28,159**
	2023 BMW 7-Series 740i 4D Sedan	ICE	$94,295	$134,430	
2ND	**2023 Porsche Taycan Base 4D Sedan**	**EV**	**$88,150**	**$105,226**	**- $22,263**
	2023 Porsche Panamera Base 4D Sedan	ICE	$93,850	$127,489	
3RD	**2023 Mercedes-Benz EQS Class EQS450+ 4D Sedan**	**EV**	**$105,550**	**$137,869**	**- $20,708**
	2023 Mercedes-Benz S Class S500 4D Sedan 4MATIC	ICE	$115,650	$158,577	
4TH	**2023 Tesla Model Y Standard Range 4D SUV**	**EV**	**$41,630**	**$59,406**	**- $19,894**
	2023 BMW X3 sDrive30i 4D SAV	ICE	$47,195	$79,300	
5TH	**2023 Ford F-150 Lightning Pro Supercrew 4WD**	**EV**	**$44,490**	**$56,238**	**- $16,231**
	2023 Ford F-150 XL 2.7L Ecoboost Supercrew 4WD 145	ICE	$47,990	$72,469	
6TH	**2024 BMW i7 eDrive50 4D Sedan**	**EV**	**$106,695**	**$117,262**	**- $15,631**
	2024 BMW 7-Series 740i 4D Sedan	ICE	$97,395	$132,893	
7TH	**2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD**	**EV**	**$41,630**	**$60,127**	**- $13,929**
	2023 BMW 3-Series 330i 4D Sedan	ICE	$44,795	$74,056	
8TH	**2024 Audi SQ8 e-tron Premium Plus 4D SUV Qtro**	**EV**	**$85,995**	**$104,810**	**- $13,399**
	2024 Audi SQ7 Premium Plus 4D SUV Qtro	ICE	$89,095	$118,209	
9TH	**2023 Lucid Air Pure 4D Sedan AWD**	**EV**	**$94,550**	**$122,245**	**- $12,185**
	2023 BMW 7-Series 740i 4D Sedan	ICE	$94,295	$134,430	
10TH	**2023 Genesis Electrified G80 4D Sedan**	**EV**	**$80,950**	**$99,869**	**- $9,986**
	2023 Genesis G80 3.5T Sport Prestige 4D Sedan AWD	ICE	$72,875	$109,855	
11TH	**2024 BMW i4 eDrive35 4D Gran Coupe**	**EV**	**$53,195**	**$70,953**	**- $9,604**
	2024 BMW 4-Series 430i 4D Gran Coupe	ICE	$49,295	$80,557	
12TH	**2023 Mini Cooper Electric SE 2D Hatchback**	**EV**	**$34,750**	**$51,942**	**- $8,788**
	2023 Mini Cooper S Iconic 2D Hatchback at	ICE	$35,750	$60,730	

CONTINUED

APPENDIX [B] OWNERSHIP COST SAVINGS OF 41 EVs VS ICE VEHICLES

OWNERSHIP COST SAVINGS OF 41 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	**2024 Audi Q8 e-tron Premium 4D SUV Qtro**	**EV**	**$70,595**	**$89,528**	**- $8,768**
	2024 Audi Q7 Premium 55 4D SUV Qtro 3.0T	ICE	$64,695	$98,296	
14TH	**2024 Polestar 2 Base 5D Hatchback RWD**	**EV**	**$51,300**	**$72,504**	**- $7,699**
	2024 Volvo S60 B5 Ultimate 4D Sedan AWD	ICE	$50,845	$80,203	
15TH	**2024 BMW i5 eDrive40 4D Sedan**	**EV**	**$67,795**	**$84,052**	**- $3,778**
	2024 BMW 5-Series 530i 4D Sedan	ICE	$58,895	$87,830	
16TH	**2024 Genesis GV60 EV Standard 4D SUV RWD**	**EV**	**$53,195**	**$72,847**	**- $2,925**
	2024 Genesis GV70 2.5T 4D SUV AWD	ICE	$46,345	$75,772	
17TH	**2024 Nissan LEAF S 4D Hatchback**	**EV**	**$28,235**	**$46,916**	**- $1,534**
	2024 Nissan Altima S 4D Sedan 2.5	ICE	$27,095	$48,450	
18TH	**2024 Jaguar I-Pace R-Dynamic HSE EV400 4D SUV AWD**	**EV**	**$73,275**	**$93,956**	**- $1,171**
	2024 Jaguar F-Pace P400 R-Dynamic S 4D SUV	ICE	$67,775	$95,127	
19TH	**2024 Kia Niro EV Wind 4D SUV**	**EV**	**$35,925**	**$50,903**	**- $388**
	2024 Kia Seltos EX 4D SUV FWD	ICE	$27,215	$51,291	
20TH	**2023 Volkswagen ID.4 Standard 4D SUV**	**EV**	**$31,290**	**$49,733**	**- $99**
	2023 Volkswagen Tiguan S 4D SUV FWD	ICE	$28,245	$49,832	
21ST	**2023 Lexus RZ 450e Premium 4D SUV**	**EV**	**$59,650**	**$76,862**	**+ $339**
	2023 Lexus RX 350 Premium 4D SUV AWD	ICE	$52,150	$76,523	
22ND	**2023 Cadillac Lyriq Luxury 4D SUV**	**EV**	**$62,990**	**$80,440**	**+ $909**
	2023 Cadillac XT5 Premium Luxury 4D SUV FWD	ICE	$51,390	$79,531	
23RD	**2024 Chevrolet Silverado EV 3WT Crew Cab e4WD**	**EV**	**$74,800**	**$86,869**	**+ $2,402**
	2024 Chevrolet Silverado 1500 LTZ Crew Cab 4WD SWB	ICE	$59,745	$84,467	
24TH	**2024 Kia EV6 Light 4D SUV RWD**	**EV**	**$38,925**	**$56,003**	**+ $3,341**
	2024 Kia Sportage LX 4D SUV FWD	ICE	$28,515	$52,662	
25TH	**2024 GMC Hummer EV SUT 2X Crew Cab 4WD**	**EV**	**$98,845**	**$102,872**	**+ $3,937**
	2024 GMC Sierra 1500 AT4 6.2L V8 Crew Cab 4WD SWB	ICE	$69,890	$98,935	
26TH	**2023 Hyundai Kona Electric SE 4D SUV FWD**	**EV**	**$34,885**	**$52,957**	**+ $4,625**
	2023 Hyundai Kona SE 4D SUV AWD 2.0L	ICE	$24,975	$48,332	
27TH	**2024 Hyundai Ioniq 5 SE Standard Range 4D SUV RWD**	**EV**	**$35,635**	**$56,100**	**+ $5,229**
	2024 Hyundai Tucson SE 4D SUV FWD	ICE	$27,335	$50,871	

CONCLUDED

APPENDIX [B] OWNERSHIP COST SAVINGS OF 41 EVs VS ICE VEHICLES

OWNERSHIP COST SAVINGS OF 41 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	**2023 Ford Mustang Mach-E Select 4D SUV RWD**	**EV**	**$48,195**	**$71,802**	**+ $5,299**
	2023 Ford Edge SE 4D SUV AWD	ICE	$39,440	$66,503	
29TH	**2024 Volvo C40 Recharge Core 4D SUV eRWD**	**EV**	**$54,695**	**$74,095**	**+ $5,849**
	2024 Volvo XC40 B5 Core 4D SUV AWD	ICE	$41,295	$68,246	
30TH	**2024 Audi Q4 e-tron Premium 40 4D SUV RWD**	**EV**	**$50,995**	**$79,178**	**+ $6,914**
	2024 Audi Q5 Premium 40 4D SUV 2.0T	ICE	$43,295	$72,264	
31ST	**2023 Tesla Model X Long Range 4D SUV AWD**	**EV**	**$101,190**	**$116,573**	**+ $8,531**
	2023 BMW X7 xDrive40i 4D SUV	ICE	$78,845	$108,042	
32ND	**2023 Genesis Electrified GV70 Advanced 4D SUV AWD**	**EV**	**$66,975**	**$82,976**	**+ $8,616**
	2023 Genesis GV70 2.5T 4D SUV AWD	ICE	$44,275	$74,360	
33RD	**2024 BMW iX xDrive50 4D SAV**	**EV**	**$88,095**	**$105,664**	**+ $9,992**
	2024 BMW X5 xDrive40i 4D SAV	ICE	$68,495	$95,672	
34TH	**2023 Volvo XC40 EV Recharge Core 4D SUV eAWD**	**EV**	**$54,645**	**$75,348**	**+ $10,005**
	2023 Volvo XC40 B5 Core 4D SUV AWD	ICE	$38,845	$65,343	
35TH	**2023 Nissan Ariya Engage 4D SUV FWD**	**EV**	**$44,525**	**$64,650**	**+ $10,588**
	2023 Nissan Rogue SV 4D SUV FWD	ICE	$30,935	$54,062	
36TH	**2023 Hyundai Ioniq 6 SE Standard Range 4D Sedan RWD**	**EV**	**$42,715**	**$58,828**	**+ $10,924**
	2023 Hyundai Sonata SE 4D Sedan	ICE	$25,565	$47,904	
37TH	**2023 Mercedes-Benz EQS SUV Class EQS450+ Premium 4D SUV**	**EV**	**$105,550**	**$130,585**	**+ $11,210**
	2023 Mercedes-Benz GLS Class GLS450 4D SUV 4MATIC	ICE	$82,950	$119,375	
38TH	**2023 Toyota bZ4X XLE 4D SUV FWD**	**EV**	**$43,215**	**$62,692**	**+ $11,272**
	2023 Toyota RAV4 XLE Premium 4D SUV FWD	ICE	$34,010	$51,420	
39TH	**2024 Chevrolet Blazer EV 2LT 4D SUV AWD**	**EV**	**$53,195**	**$77,291**	**+ $11,296**
	2024 Chevrolet Blazer 2LT 4D SUV AWD	ICE	$38,495	$65,995	
40TH	**2024 Audi e-tron GT Premium Plus 4D Sedan Qtro**	**EV**	**$90,495**	**$111,789**	**+ $12,875**
	2024 Audi A7 Premium Plus 55 4D Sportback Qtro 3.0T	ICE	$77,045	$98,914	
41ST	**2023 Subaru Solterra Premium 4D SUV AWD**	**EV**	**$46,220**	**$65,855**	**+ $16,334**
	2023 Subaru Forester 2.5i Premium 4D SUV at	ICE	$30,920	$49,521	

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

The following chart shows the ranking of all 41 EVs studied from lowest to highest total ownership cost results over five years of ownership. The US federal point-of-sales rebate for EVs is included in the calculations of these values.

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

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
1ST	2024 Nissan LEAF S 4D Hatchback	$46,916
2ND	2023 Volkswagen ID.4 Standard 4D SUV	$49,733
3RD	2024 Kia Niro EV Wind 4D SUV	$50,903
4TH	2023 Mini Cooper Electric SE 2D Hatchback	$51,942
5TH	2023 Hyundai Kona Electric SE 4D SUV FWD	$52,957
6TH	2024 Kia EV6 Light 4D SUV RWD	$56,003
7TH	2024 Hyundai Ioniq 5 SE Standard Range 4D SUV RWD	$56,100
8TH	2023 Ford F-150 Lightning Pro Supercrew 4WD	$56,238
9TH	2023 Hyundai Ioniq 6 SE Standard Range 4D Sedan RWD	$58,828
10TH	2023 Tesla Model Y Standard Range 4D SUV	$59,406
11TH	2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD	$60,127
12TH	2023 Toyota bZ4X XLE 4D SUV FWD	$62,692
13TH	2023 Nissan Ariya Engage 4D SUV FWD	$64,650
14TH	2023 Subaru Solterra Premium 4D SUV AWD	$65,855

CONTINUED

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

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

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
15TH	2024 BMW i4 eDrive35 4D Gran Coupe	$70,953
16TH	2023 Ford Mustang Mach-E Select 4D SUV RWD	$71,802
17TH	2024 Polestar 2 Base 5D Hatchback RWD	$72,504
18TH	2024 Genesis GV60 EV Standard 4D SUV RWD	$72,847
19TH	2024 Volvo C40 Recharge Core 4D SUV eRWD	$74,095
20TH	2023 Volvo XC40 EV Recharge Core 4D SUV eAWD	$75,348
21ST	2023 Lexus RZ 450e Premium 4D SUV	$76,862
22ND	2024 Chevrolet Blazer EV 2LT 4D SUV AWD	$77,291
23RD	2024 Audi Q4 e-tron Premium 40 4D SUV RWD	$79,178
24TH	2023 Cadillac Lyriq Luxury 4D SUV	$80,440
25TH	2023 Genesis Electrified GV70 Advanced 4D SUV AWD	$82,976
26TH	2024 BMW i5 eDrive40 4D Sedan	$84,052
27TH	2024 Chevrolet Silverado EV 3WT Crew Cab e4WD	$86,869

CONCLUDED

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

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

RANK	VEHICLE	TOTAL OWNERSHIP COSTS OVER 5 YEARS
28TH	2024 Audi Q8 e-tron Premium 4D SUV Qtro	$89,528
29TH	2024 Jaguar I-Pace R-Dynamic HSE EV400 4D SUV AWD	$93,956
30TH	2023 Genesis Electrified G80 4D Sedan	$99,869
31ST	2024 GMC Hummer EV SUT 2X Crew Cab 4WD	$102,872
32ND	2024 Audi SQ8 e-tron Premium Plus 4D SUV Qtro	$104,810
33RD	2023 Porsche Taycan Base 4D Sedan	$105,226
34TH	2024 BMW iX xDrive50 4D SAV	$105,664
35TH	2023 Tesla Model S Long Range 4D Sedan AWD	$106,271
36TH	2024 Audi e-tron GT Premium Plus 4D Sedan Qtro	$111,789
37TH	2023 Tesla Model X Long Range 4D SUV AWD	$116,573
38TH	2024 BMW i7 eDrive50 4D Sedan	$117,262
39TH	2023 Lucid Air Pure 4D Sedan AWD	$122,245
40TH	2023 Mercedes-Benz EQS SUV Class EQS450+ Premium 4D SUV	$130,585
41ST	2023 Mercedes-Benz EQS Class EQS450+ 4D Sedan	$137,869

APPENDIX [D] EV PAYBACK PERIOD RESULTS

The following table shows the Payback Period of all 41 EVs studied, up to 84 months. EVs that had a lower Market Price than 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.

EV PAYBACK PERIOD RESULTS (PAGE 1 OF 2)

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
1st	2024 Audi SQ8 e-tron Premium Plus 4D SUV Qtro	0
1st	2023 Ford F-150 Lightning Pro Supercrew 4WD	0
1st	2023 Mercedes-Benz EQS Class EQS450+ 4D Sedan	0
1st	2023 Mini Cooper Electric SE 4D Hatchback	0
1st	2023 Porsche Taycan Base 4D Sedan	0
1st	2023 Tesla Model 3 Standard Range Plus 4D Sedan RWD	0
1st	2023 Tesla Model S Long Range 4D Sedan AWD	0
1st	2023 Tesla Model Y Standard Range 4D SUV	0
9th	2024 Polestar 2 Base 5D Hatchback RWD	19
10th	2024 BMW i4 eDrive35 4D Gran Coupe	30
11th	2024 BMW i7 eDrive50 4D Sedan	34
12th	2023 Lucid Air Pure 4D Sedan AWD	38
13th	2024 Audi Q8 e-tron Premium 4D SUV Qtro	47
14th	2023 Genesis Electrified G80 4D Sedan	55
15th	2024 Nissan LEAF S 4D Hatchback	57
16th	2024 Genesis GV60 EV Standard 4D SUV RWD	68
17th	2023 Volkswagen ID.4 Standard 4D SUV	72
18th	2024 Jaguar I-Pace R-Dynamic HSE EV400 4D SUV AWD	81
19th	2023 Lexus RZ 450e Premium 4D SUV	84
20th	2024 Audi e-tron GT Premium Plus 4D Sedan Qtro	84+

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APPENDIX [D] EV PAYBACK PERIOD RESULTS

EV PAYBACK PERIOD RESULTS (PAGE 2 OF 2)

RANK	VEHICLE	PAYBACK PERIOD IN MONTHS
20th	2024 Audi Q4 e-tron Premium 40 4D SUV RWD	84+
20th	2024 BMW i5 eDrive40 4D Sedan	84+
20th	2024 iX xDrive50 4D SAV	84+
20th	2023 Cadillac Lyriq Luxury 4D SUV	84+
20th	2024 Chevrolet Blazer EV 2LT 4D SUV AWD	84+
20th	2024 Chevrolet Silverado EV 3WT Crew Cab e4WD	84+
20th	2023 Ford Mustang Mach-E Select 4D SUV RWD	84+
20th	2023 Genesis Electrified GV70 Advanced 4D SUV AWD	84+
20th	2024 GMC Hummer EV SUT 2X Crew Cab 4WD	84+
20th	2024 Hyundai Ioniq 5 SE Standard Range 4D SUV RWD	84+
20th	2023 Hyundai Ioniq 6 SE Standard Range 4D Sedan RWD	84+
20th	2023 Hyundai Kona Electric SE 4D SUV FWD	84+
20th	2024 Kia EV6 Light 4D SUV RWD	84+
20th	2024 Kia Niro EV Wind 4D SUV	84+
20th	2023 Mercedes-Benz EQS SUV Class EQS450+ Premium 4D SUV	84+
20th	2023 Nissan Ariya Engage 4D SUV FWD	84+
20th	2023 Subaru Solterra Premium 4D SUV AWD	84+
20th	2023 Tesla Model X Long Range 4D SUV AWD	84+
20th	2023 Toyota bZ4X XLE 4D SUV FWD	84+
20th	2024 Volvo C40 Recharge Core 4D SUV eRWD	84+
20th	2023 Volvo XC40 EV Recharge Core 4D SUV eAWD	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 (NO_X). 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 6.7 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 NO_X 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

CONCLUDED

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 15,000 miles 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 15,000 miles of driving over five years for each ICE vehicle in the study.

FOR ELECTRIC VEHICLES

- **Electric Generation Emissions:** The emissions resulting from the generation of electricity used to power the EV. Vincentric used data in 24 regions across the US to calculate the number of kilowatt hours of electricity required to drive 15,000 miles over five years for each EV in the study.