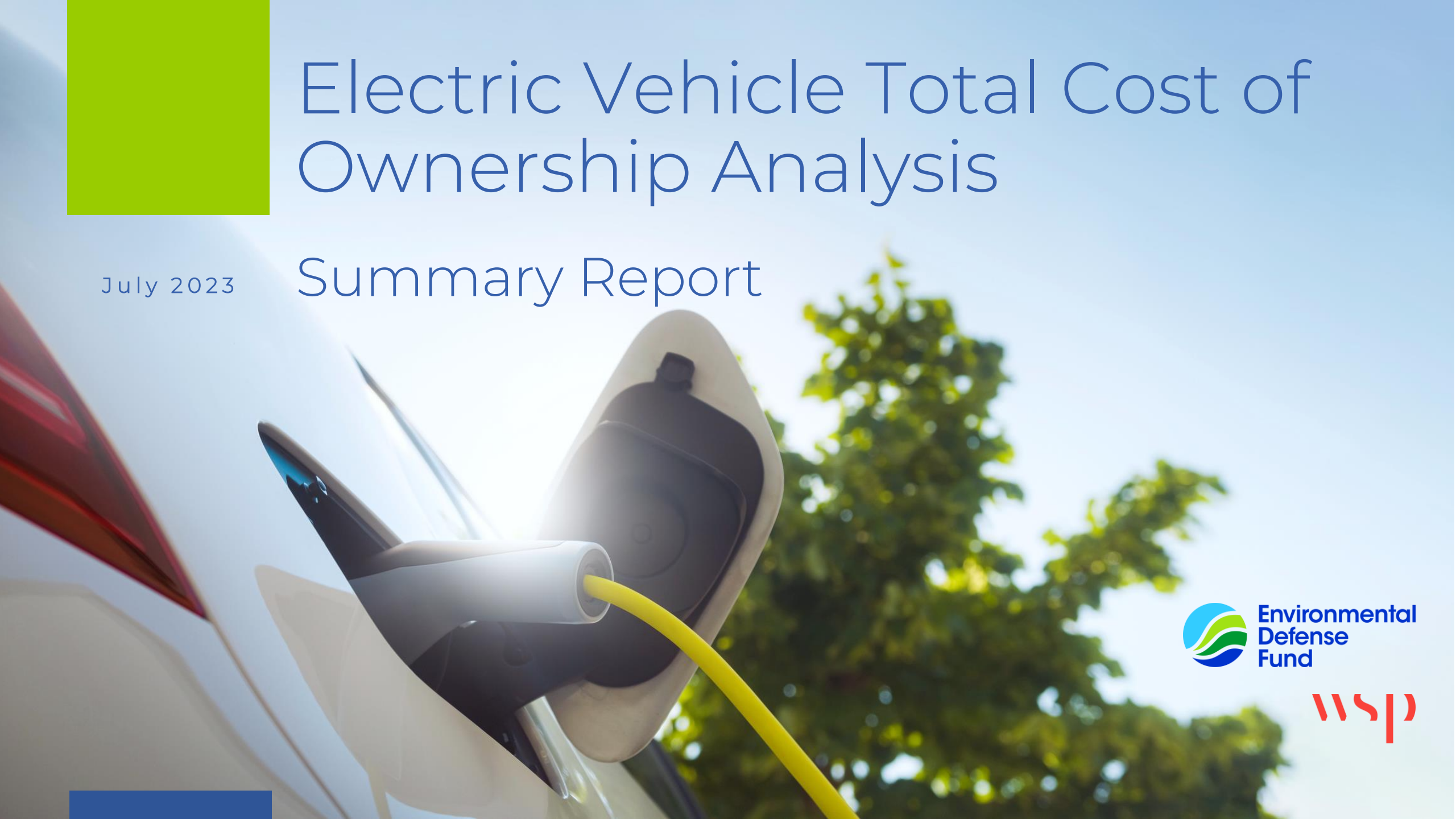
Electric Vehicle Total Cost of Ownership Analysis

Summary Report

July 2023



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Purpose of the TCO Analysis

Goal: Compare the Total Cost of Ownership for currently available EVs to similar gasoline vehicles

- This analysis compares the lifetime costs - over 10 years - of owning and operating selected EVs to the cost of comparable gasoline vehicles
- Costs include purchase of vehicle and home charger (for EVs), annual vehicle registration, maintenance, insurance, and fuel costs
- Assumed annual miles driven and driving style represent an "average" case for consumers in the United States.

Driving Miles	Driving Style	EV Charging	Financing
US Average 12,395 mi/yr	EPA Combined MPG (City/Highway)	90% at Home 10% Public DCFC	5-yr Auto Loan

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Vehicle Comparisons

Electric Vehicles	Gasoline Vehicles	EPA Size Class
Chevrolet Equinox EV	Chevrolet Equinox RS	Small SUV 2WD
Volkswagen ID.4 Pro (82kWh)	Volkswagen Tiguan SE	Small SUV 2WD
Ford Mustang Mach-E Premium	Ford Edge ST-Line	Small SUV 4WD
Ford F-150 Lightning XLT	Ford F-150 XLT	Standard Pickup Truck

Comparison gasoline vehicles are comparable to EVs in terms of size, style, function, and performance

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Electric Vehicle TCO Cost Inputs

Policy Incentives

Federal EV tax credit
Federal EVSE tax credit

Fuel Costs

Gasoline
Electricity – home charging
Electricity – public charging

Purchase + Financing Costs

MSRP+ Sales tax, net of trade-in
5-year loan financing costs
Home charger (EVSE)

Maintenance Costs

Scheduled maintenance

Insurance Costs

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Key Takeaways

- Over 10 years, all of the studied EVs are estimated to be the same or less expensive to own and operate than the comparison gasoline vehicle
  - Life-time savings of up to $18,440
- Electric Vehicles have higher upfront purchase costs and insurance costs, but these are more than offset by fuel and maintenance cost savings - which make EVs more cost-effective over their life
- Federal & State EV tax credits are significant in reducing the upfront cost of Electric Vehicles
  - Federal tax credits range from $3,750 to $7,500

- *State tax credits can be as high as $3,500, which would increase EV savings compared to this analysis*
- *As production prices continue to decline over time due to falling battery prices and production economies of scale, the savings EVs enjoy over gasoline vehicles will increase*

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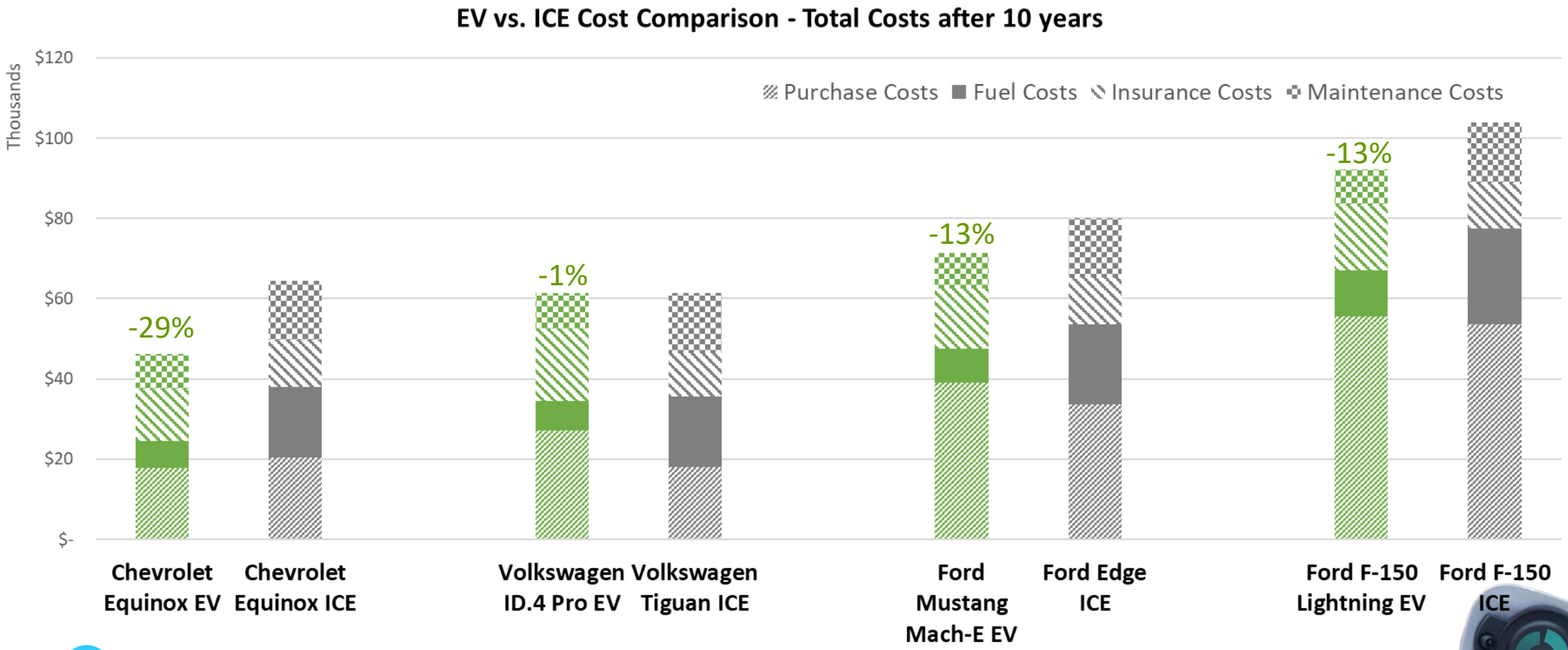
Life-time Cost Comparison



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Analysis Methodology & Assumptions

Vehicle Costs

Cost Category	Source
New Vehicle MSRP	OEM website “Build & Price” tools
Value of Trade In Vehicle	Kelly Blue Book; Trade in of a 5-year-old gasoline vehicle with 60k miles. *Assume comparison gasoline vehicle trade-in*
Federal & State EV Incentives	WSP State EV Incentives Landscape Analysis
Auto Loan Interest	Q1 2023 Equifax State of the Automotive Finance Market Report • *Prime Credit Score APR of 6.40%*
Vehicle Registration Fees & EV Fees	State Departments of Motor Vehicles
Home Charger Purchase + Install Costs	EPA Draft RIA – *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium Duty Vehicles*

Vehicle Costs – EV Tax Credits

Federal

	Federal EV Purchase Tax Credits	Home Charger Purchase + Installation Credit
Chevrolet Equinox EV	$7,500	30% of the cost of Purchase & Installation
Volkswagen ID.4 Pro	$7,500	
Ford Mustang Mach-E	$3,750	
Ford F-150 Lightning	$7,500	

State & Local

- State & Local Tax credits and purchase incentives were not included in this analysis
- State tax credits can be as high as $3,500, which would increase EV savings compared to this analysis
- Some local municipalities also offer incentives for home charging infrastructure

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Vehicle Costs

	MSRP	Sales Tax (US Avg. = 4.99%)	Financing Costs (Interest)	Registration Fees (over 10 years)	Home Charger Costs†	Trade In	EV Tax Credit	Home Charger Tax Credit	Total
Chevrolet Equinox EV	$34,624	$1,727	$2,340	$500	$1,500	($15,181)	($7,500)	($450)	$17,560
Volkswagen ID.4 Pro 82kWh RWD EV	$43,995	$2,195	$3,700	$500	$1,500	($17,069)	($7,500)	($450)	$26,872
Ford Mustang Mach-E Premium EV	$49,995	$2,494	$5,447	$500	$1,500	($16,913)	($3,750)	($450)	$38,824
Ford F-150 Lightning EV*	$67,514	$3,368	$7,851	$500	$1,500	($17,508)	($7,500)	($450)	$55,276
Chevrolet Equinox RS ICE	$30,700	$1,531	$2,918	$500	-	($15,181)	-	-	$20,469
Volkswagen Tiguan SE ICE	$30,580	$1,525	$2,573	$500	-	($17,069)	-	-	$18,110
Ford Edge ST-Line ICE	$43,100	$2,150	$4,850	$500	-	($16,913)	-	-	$33,687
Ford F-150 ICE**	$59,800	$2,984	$7,749	$500	-	($17,508)	-	-	$53,525

- Trade In: this analysis applies the same trade-in value to the EV and ICE vehicle purchase. The analysis assumes a 5-year-old version of the gasoline model with 60,000 miles in good condition
- MSRP prices are for the mid-trim level of each vehicle

† Includes both purchase and installation costs for an L2 charger

**XLT Dual eMotor, Standard Battery*

*** XLT mid Supercab, 4WD, 3.5L Powerboost Hybrid, Sport appearance package*

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Fuel Costs

Cost Category	Data Source
Motor Gasoline & Residential Electricity	US Energy Information Administration (Annual Energy Outlook 2023 Reference Case)
Public Charging Station Electricity	Electrify America, EVGo and Tesla public charging networks published prices
Annual Mileage Traveled	2017 National Household Travel Survey
Vehicle Fuel Economy Ratings	Fuel Economy . Gov • *Gasoline – MPG* • *EV – kWh per 100 miles*

Fuel Economy and Costs

Fuel Economy – Electric Vehicles			
kWh / 100 miles	**City**	**Highway**	**Combined**
Chevrolet Equinox EV	26.7	32.2	29.3
Volkswagen ID.4 Pro	29.3	34.39	31.5
Ford Mustang Mach-E	34.0	39.2	36.2
Ford F-150 Lightning	44.3	55.2	49.6

Fuel Economy – Gasoline Vehicles			
Miles per Gallon	**City**	**Highway**	**Combined**
Chevrolet Equinox ICE	24	30	26
Volkswagen Tiguan ICE	23	30	26
Ford Edge ICE	21	28	23
Ford F-150 ICE	17	23	19

Energy Prices						
$ / Gallon	**2022**	**2023**	**2024**	**2025**	**2030**	**2032**
Motor Gasoline	4.24	3.87	3.60	3.43	3.78	3.97
Cents / kWh	**2022**	**2023**	**2024**	**2025**	**2030**	**2032**
Residential Electricity	15.12	15.29	15.33	15.99	16.23	17.15
Public Level 2	24.00	24.72	25.46	26.23	30.40	32.25
Public DCFC Charging	36.00	37.08	38.19	39.34	45.60	48.38

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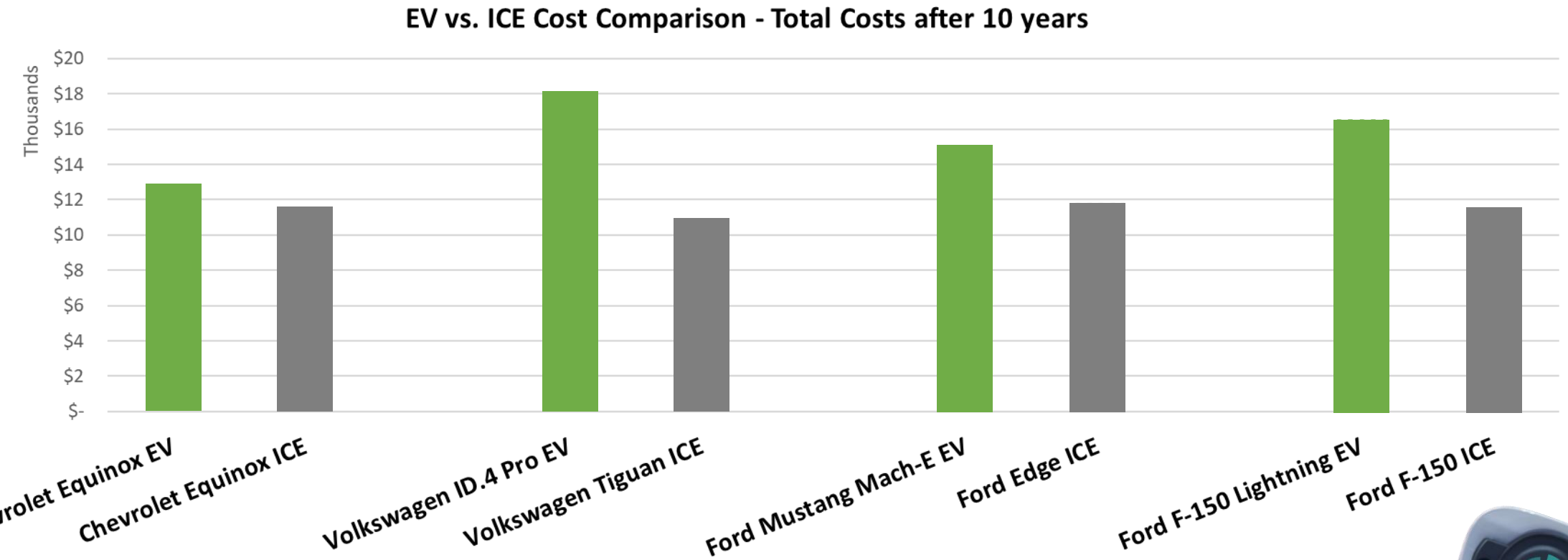
Insurance Costs

Insurance Costs are estimated using the Edmunds Total Cost of Ownership tool. The tool provides insurance cost data by vehicle make, model, year, and state of registration.



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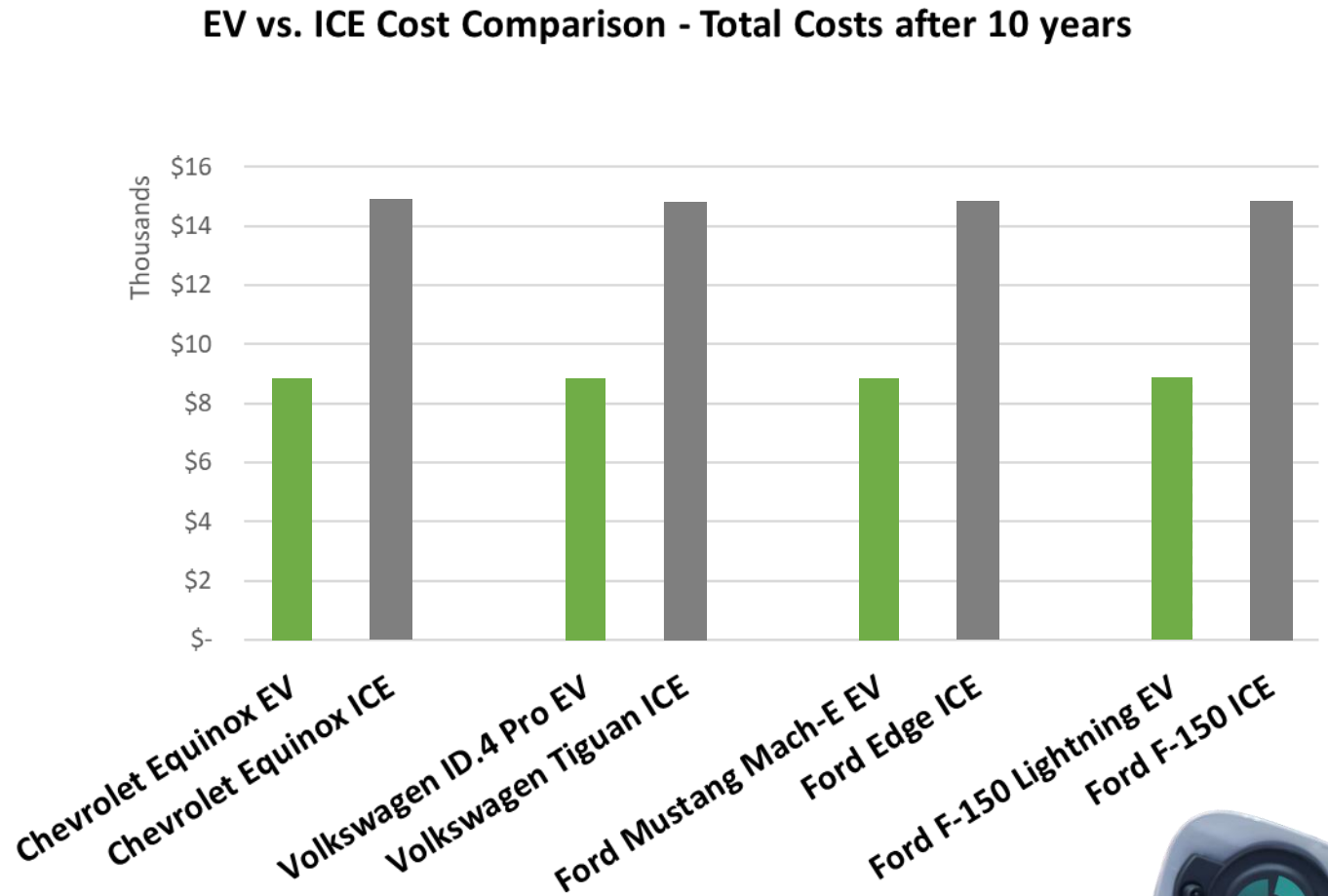
Maintenance Costs

- Maintenance Costs are estimated using research conducted by the Argonne National Laboratory Energy Systems Division (ANL).
- The ANL assigns an average value for maintenance costs of:

$ 0.101 per mile for gasoline vehicles

$ 0.060 per mile for EVs



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Additional Scenarios

- The Total Cost of Ownership Analysis includes analysis of different vehicle usage patterns. These scenarios simulate Rural and Urban driving patterns.
- In these scenarios, the analysis assumes these vehicle usage pattern values

Case Name	Mileage	Driving Style	Charging	Financing
Rural	75th Percentile State/Region	80% Highway & 20% Combined	90% Home 10% Public DCFC	5-yr Auto Loan
Urban	25th Percentile State/Region	80% City & 20% Combined	25% Public L2 75% Public DCFC	5-yr Auto Loan

- Even under diverse driving conditions, owning an EV is similar to or less expensive than owning a gasoline powered vehicle over the analysis period

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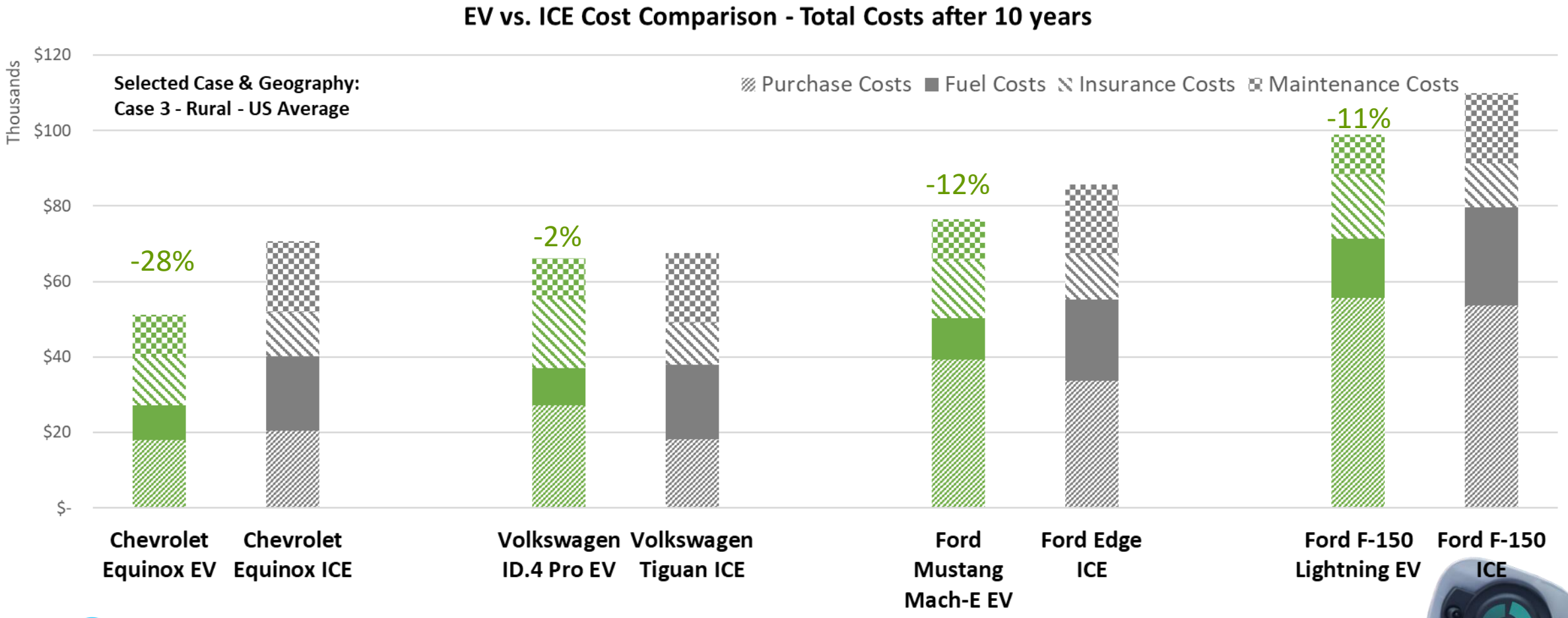
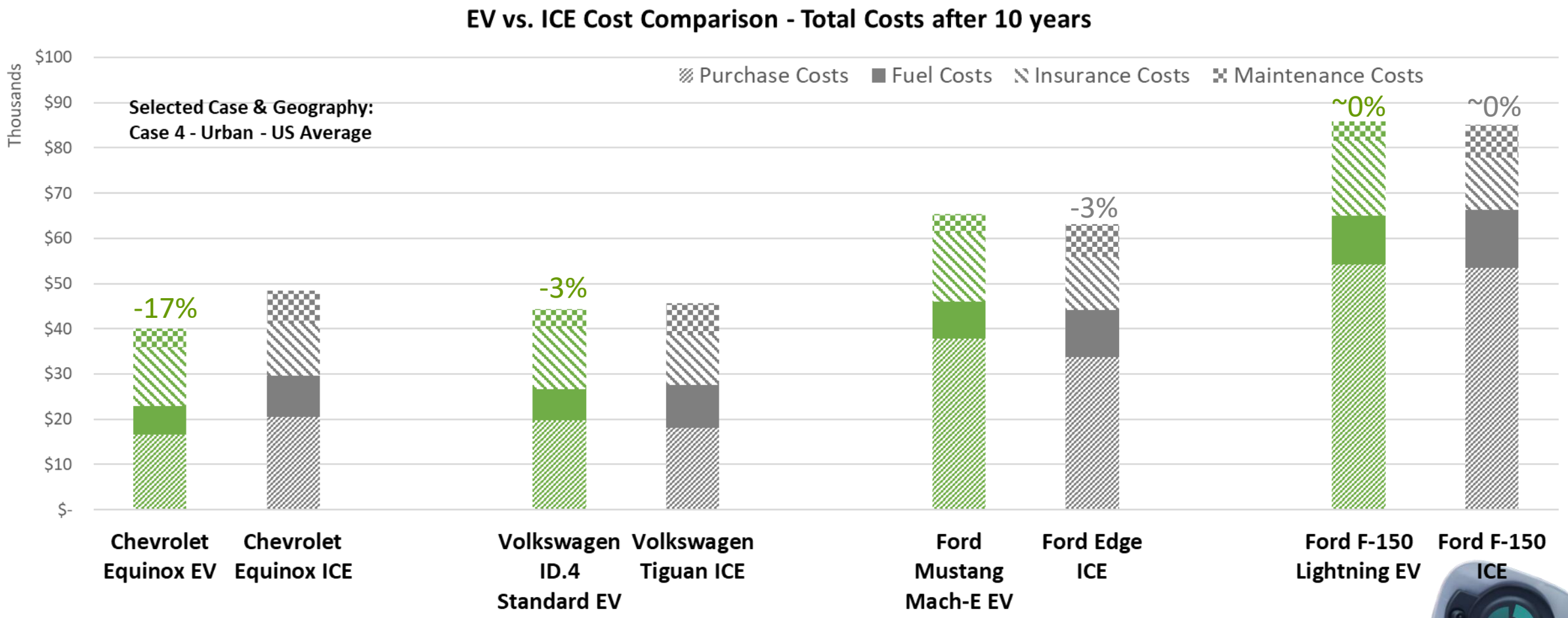
Rural Scenario TCO Comparison



Urban Scenario TCO Comparison



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