



FLEET PROCUREMENT ANALYSIS TOOL USER GUIDE

A TOOL DESIGNED TO EVALUATE THE FINANCIAL VIABILITY AND
ENVIRONMENTAL IMPACT OF LIGHT-DUTY FLEET VEHICLE
PROCUREMENTS

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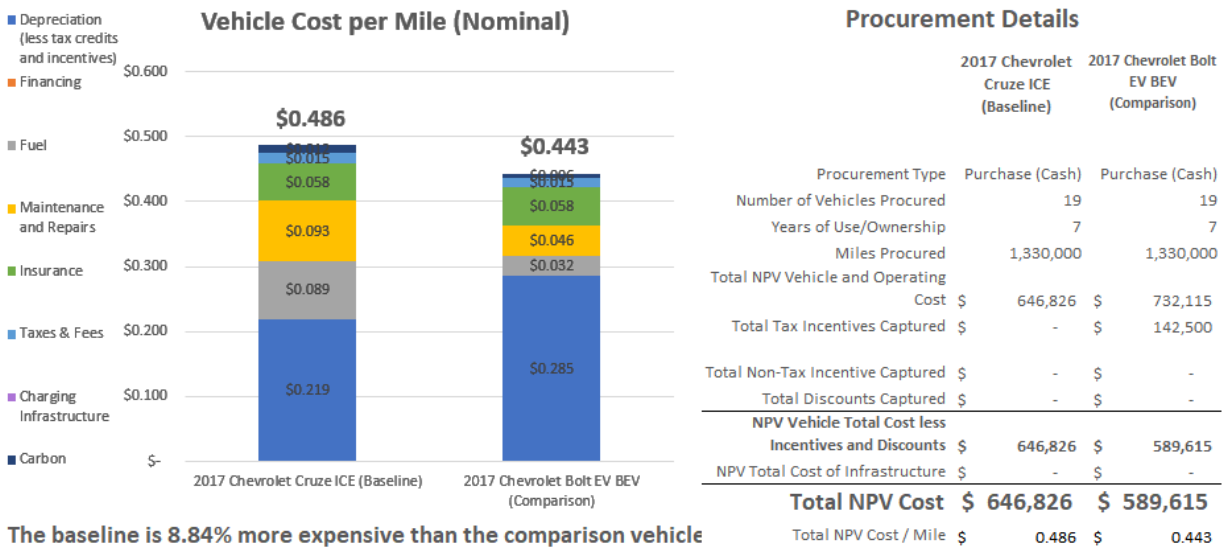
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ABOUT THE FLEET PROCUREMENT ANALYSIS TOOL

The Fleet Procurement Analysis Tool equips users with decision-relevant information on the financial viability and environmental impact of light-duty vehicle fleet procurements. The Microsoft Excel-based tool can evaluate a variety of procurement ownership structures, vehicle types, and procurement scenarios. The tool compares procurements side-by-side on a cost-per-mile basis and provides an analysis of cash flows and location-specific lifecycle emissions. The tool is highly flexible, supports customizable sensitivity variables, and produces user-friendly results summaries as shown below.

Procurement Summary



The tool was built as part of EV Smart Fleets, an initiative to implement a multi-state aggregated electric vehicle procurement for public fleets. EV Smart Fleets seeks to accelerate electric vehicle adoption by public fleets, lower the purchase price of electric vehicles for public fleets, and increase access to a wider range of electric vehicle models. The Department of Energy’s Clean Cities program has provided funding for this effort as part of their work with nearly 100 coalitions nationwide to decrease the use of petroleum in transportation.

Below is the contact information for all contributors to the design and development of the Fleet Procurement Analysis Tool.

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OVERVIEW OF THE TOOL STRUCTURE

The Fleet Procurement Analysis Tool was built using Microsoft Excel and is contained in a standalone Excel workbook. It is divided into five functional areas, as follows:

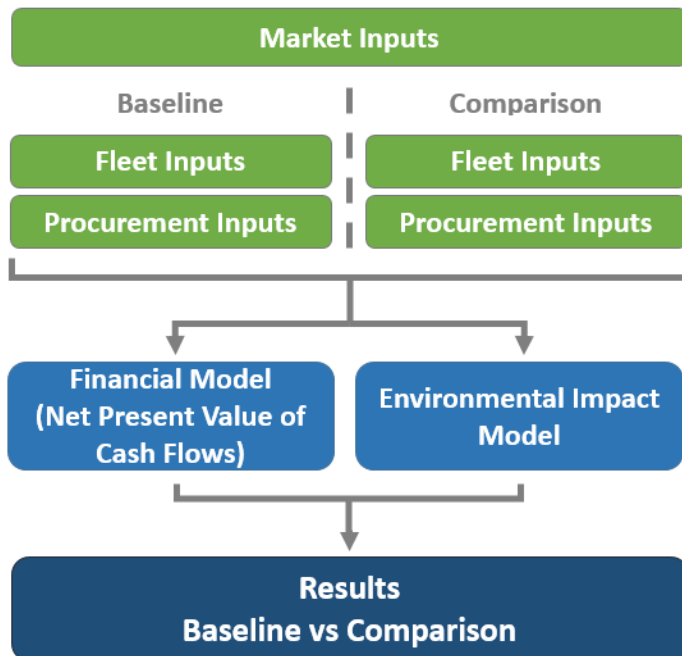
- **Initial Settings** (Grey tab)
- **Inputs** (Green tab)
- **Results** (Dark blue tab)
- **Financial Model** (Light blue tab)
- **Environmental Model** (Light blue tab)

User inputs in the *Initial Settings* and *Inputs* sections are color-coded as follows:

-  User-entered inputs
-  Default assumptions that can be overridden by user
-  Calculations or assumptions that cannot be altered

Information flows from the *Inputs* section, through the *Financial Model* and *Environmental Model*, to the *Results*, as shown in the diagram on the *Instructions* tab in the tool and presented below.

FIGURE 1: STRUCTURE OF THE FLEET PROCUREMENT ANALYSIS TOOL



ADVANCED PROCUREMENT COMPARISON ANALYSIS

The tool analyzes a potential vehicle procurement and compares it side-by-side with a baseline procurement. This way, you can assess the viability of a future procurement by comparing it to a past or alternative procurement. The tool supports the financial analysis of several ownership structures, from basic cash or loan purchases to sophisticated leasing structures.

More information on leasing structures can be found online at <http://www.investopedia.com/terms/c/capitalleasemethod.asp>.

The following are the ownership structures that the tool supports:

- **Purchase (Cash):** Vehicles purchased with cash
- **Purchase (Loan):** Vehicles purchased with debt financing
- **FMV (Closed-End) Lease:** Vehicles leased with Fair Market Value lease structure. Vehicles not purchased at end of lease term.
- **FMV (Closed-End) Lease w/ Cash Purchase:** Vehicles leased with Fair Market Value lease structure. Vehicles purchased at end of lease term with cash.
- **FMV (Closed-End) Lease w/ Loan Purchase:** Vehicles leased with Fair Market Value lease structure. Vehicles purchased at end of lease term with debt financing.
- **TRAC (Open-End) Lease:** Vehicles leased with Terminal Rental Adjustment Clause lease structure. Vehicles not purchased at end of lease term.
- **TRAC (Open-End) Lease w/ Cash Purchase:** Vehicles leased with Terminal Rental Adjustment Clause lease structure. Vehicles purchased at end of lease term with cash.
- **TRAC (Open-End) Lease w/ Loan Purchase:** Vehicles leased with Terminal Rental Adjustment Clause lease structure. Vehicles purchased at end of lease term with debt financing.
- **Tax-Exempt Lease Purchase (Cash):** Vehicles leased with tax-exempt lease-purchase structure. Vehicles purchased at end of lease term with cash, typically a nominal amount (\$1).

In addition to choosing an ownership structure, you can also customize inputs to incorporate fleet specific usage and costs, the vehicle pricing structure, incentives and discounts, and optional electric vehicle charging infrastructure.

GETTING STARTED

STEP 1: OPENING THE TOOL

To open the tool, double click on the file entitled “Fleet Procurement Analysis Tool.xlsm” Make sure to enable macros by clicking the “Enable Content” button that appears in the yellow bar at the top of the screen. Enabling macros is essential for the tool to behave as designed.

STEP 2: INITIAL SETTINGS TAB

Initial Settings

The “Initial Settings” tab enables you to name a procurement, to import and export input settings, and to adjust input variable settings for the sensitivity analysis. This section should be filled out before going ahead to the other tabs.

SAVE/LOAD SETTINGS

The *Initial Settings* tab includes buttons that allow you to save or “export” all of the user inputs to an external file. The format of this file allows it to be read in any text editor, including Microsoft Notepad or Word. These saved inputs can be reloaded later or shared with other users of the tool. If you have received a user inputs file from another user or if you have previously exported a file, you can reload them into the tool by clicking the “Open” button and selecting the previously saved file.

Note: Loading inputs from an external file will overwrite any existing inputs in the tool.

TIP: To save inputs specific to your procurement, simply use the save function on the ‘Initial Settings’ tab. This way, you can manage multiple analyses with a single copy of the tool.

Save/Load

The screenshot shows a section titled "Save/Load" with a text input field labeled "Procurement Name" containing the text "Scenario 1". Below this are two buttons: "Load" and "Save". The "Load" button is associated with the text "Load values from external file" and the "Save" button is associated with the text "Save all current user inputs to an external file".

SENSITIVITY SETTINGS

The tool allows you to conduct sensitivity analyses on up to four user inputs. For each sensitivity variable, you can select any of the input fields via a dropdown menu selection. You can also set the minimum and maximum values for the sensitivity analysis. The minimum and maximum values must be compatible with the input field. For example, the minimum and maximum values must be evenly divisible by 10 for whole number input fields. The results of the sensitivity analysis are found in the *Results* tab.

You can adjust sensitivity settings at any point in time. To improve performance, you can set Excel to disable automatic calculations for data tables. In this case, you must select the “Update” button for the results to reflect the current sensitivity variables and settings.

Sensitivity Settings

Update sensitivity analysis results if Calculation Options is set to *Manual* or *Automatic* **Update**
Excerpt for Tables

Variable	Input Field	Min Value	Max Value	Current Value	Valid
1	Electricity Cost (\$/kWh)	0.00	2.00	0.1048	OK
2	Cost of Carbon (\$/Ton)	0.00	150.00	36	OK
3	Gasoline Cost (\$/Gallon)	0.00	10.00	2.417	OK
4	Inflation Rate (Excluding Fuel) (%/Year)	0.00	0.10	0.02	OK

STEP 3: INPUTS TAB

Inputs

In this section, you can enter inputs for the financial and environmental analyses. Inputs are grouped in four categories as follows:

- Market Inputs
- Vehicle Inputs
- Vehicle Procurement Inputs
- EV Infrastructure Inputs

MARKET INPUTS

In the Market Inputs section shown below, you can start by entering your ZIP code. Changing the ZIP code will then alter the assumptions for gasoline, electricity costs, and electrical grid emissions. Any of the input fields highlighted in green can be overwritten to reflect more recent or accurate information for your procurement. You can also include the cost of carbon in the financial analysis. The default cost of carbon is the social cost of carbon as defined by the U.S. federal government in 2016.¹ The default inflation rate is based on the Federal Reserve’s medium term target as of 2015.²

Market Inputs

ZIP Code	<input type="text" value="32789"/>	Gasoline Cost (\$/Gallon)	<input style="background-color: #90EE90;" type="text" value="\$ 2.42"/>	PADD Region	<input type="text" value="1c"/>	Include Cost of Carbon?	<input type="text" value="Yes"/>
State	<input type="text" value="FL"/>	Electricity Cost (\$/kWh)	<input style="background-color: #90EE90;" type="text" value="\$ 0.1048"/>	Egrid Region	<input type="text" value="FRCC"/>	Cost of Carbon (\$/Ton)	<input style="background-color: #90EE90;" type="text" value="\$ 36.00"/>
Inflation Rate (Excluding Fuel) (%/Year)		<input style="background-color: #90EE90;" type="text" value="2.00%"/>					

VEHICLE INPUTS

In this section, you can select vehicles to procure and edit vehicle procurement costs. The tool automatically loads inputs for each vehicle type. You can also select from the ‘*Custom Vehicle’ selections if the vehicles you’re interested in are not listed in the dropdown selection menu. Any of the inputs in

¹ More information is available at <https://www.epa.gov/climatechange/social-cost-carbon>.

² More information is available at https://www.federalreserve.gov/faqs/economy_14400.htm.

green cells can be edited. Vehicle costs (Insurance, Maintenance, and Repairs) are currently populated based on data for a single ZIP code and can be edited to reflect local costs, if possible. You can find out more about the vehicle you've selected on www.fueleconomy.gov by clicking the link at the bottom of the Vehicle Inputs box.

Procurement 1 (Baseline)		Procurement 2 (Comparison)	
Vehicle Drivetrain Type	ICE	Vehicle Drivetrain Type	BEV
Vehicle Year	2017	Vehicle Year	2017
Vehicle Make	Chevrolet	Vehicle Make	Chevrolet
Vehicle Model	Cruze	Vehicle Model	Bolt EV
Fuel Economy Gas City (MPG)	30.0	Fuel Economy Gas City (MPG)	-
Fuel Economy Gas Highway (MPG)	40.0	Fuel Economy Gas Highway (MPG)	-
Fuel Economy Electric City (MPGe)	-	Fuel Economy Electric City (MPGe)	128.0
Fuel Economy Electric Highway (MPGe)	-	Fuel Economy Electric Highway (MPGe)	110.0
Expected Years of Use/Ownership (Years)	7	Expected Years of Use/Ownership (Years)	7
Annual Vehicle Mileage (VMT/Year)	15,000	Annual Vehicle Mileage (VMT/Year)	15,000
% of Annual Miles on Gasoline	100%	% of Annual Miles on Gasoline	0%
% of Annual Miles City Driving	55%	% of Annual Miles City Driving	55%
Cost to Insure (\$/Year)	\$ 1,222	Cost to Insure (\$/Year)	\$ 1,222
Use Drivetrain Default Maintenance and Repair Costs?	Yes	Use Drivetrain Default Maintenance and Repair Costs?	Yes
Maintenance and Repair Cost - Years 1 - 5 (\$/Mile)	\$ 0.0900	Maintenance and Repair Cost - Years 1 - 5 (\$/Mile)	\$ 0.0490
Maintenance and Repair Cost - Years 5+ (\$/Mile)	\$ 0.1040	Maintenance and Repair Cost - Years 5+ (\$/Mile)	\$ 0.0520
Recurring Taxes and Fees (\$/Year)	\$ 10	Recurring Taxes and Fees (\$/Year)	\$ 10
Vehicle details from fueleconomy.gov		Vehicle details from fueleconomy.gov	

VEHICLE PROCUREMENT INPUTS

This section enables you to customize the details and terms of the procurement. As shown below, you can select the number of vehicles that will be procured, adjust vehicle prices, select an ownership structure, define a pricing approach, and incorporate any incentives or discounts. Two options are available for the pricing approach ('MSRP less discounts' and 'Dealer cost plus markup').

Fields that are not relevant for the current input selections are disabled, which are denoted by the cells formatted with a crosshatch in the graphic below. For example, if 'Purchase (Cash)' is selected as the vehicle ownership structure, then the tool will automatically disable options to customize 'Lease' and 'Loan' inputs.

Procurement 1 (Baseline)		Procurement 2 (Comparison)	
Discount Rate for NPV Calculations (%)	0.00%	Discount Rate for NPV Calculations (%)	0.00%
Number of Vehicles to Procure (#)	19	Number of Vehicles to Procure (#)	19
Pricing Approach (select one)	Dealer Cost Plus Markup	Pricing Approach (select one)	Dealer Cost Plus Markup
MSRP (\$/Vehicle)	\$ 16,975	MSRP (\$)	\$ 36,620
Value of Negotiated Discounts off MSRP (\$/Vehicle)	\$ -	Value of Negotiated Discounts off MSRP (\$/Vehicle)	\$ -
Dealer Triple Net Price (\$/Vehicle)	\$ 18,024	Dealer List Price (\$)	\$ 33,226
Dealer Markup (\$/Vehicle)	\$ 200	Markup (\$)	\$ 300
Total Base Price	\$ 18,224	Total Base Price	\$ 33,526
Value of Federal Tax Incentives (\$/Vehicle)	\$ -	Value of Federal Tax Credits (\$/Vehicle)	\$ 7,500
Value of State Tax Incentives (\$/Vehicle)	\$ -	Value of State Tax Incentives (\$/Vehicle)	\$ -
State Tax Incentive Cap (\$)	\$ -	State Tax Incentive Cap (\$)	\$ -
Value of Non-tax Incentives (\$/Vehicle)	\$ -	Value of Non-tax Incentives (\$/Vehicle)	\$ -
Initial Tax, Title, and Registration Cost (\$/Vehicle)	\$ 1,000	Initial Tax, Title, and Registration Cost (\$/Vehicle)	\$ 1,000
Initial Fee as Percent of Vehicle Base Price (%)	0%	Initial Fee as Percent of Vehicle Base Price (%)	0%
Ownership Structure	Purchase (Cash)	Ownership Structure	Purchase (Cash)
Tax Credits Can Be Monetized? (Y/N)	Yes	Tax Credits Can Be Monetized? (Y/N)	Yes
Down Payment (\$/Vehicle)	\$ -	Down Payment (\$/Vehicle)	\$ -
Lease		Lease	
Lease Term (Years)	3	Lease Term (Years)	0
Interest Rate (APR - %)	10.00%	Interest Rate (APR - %)	0.00%
OR		OR	
Money Factor (#)	0.0042	Money Factor (#)	-
Acquisition Fee (\$/Vehicle)	\$ -	Acquisition Fee (\$/Vehicle)	\$ -
Disposition Charge (\$/Vehicle)	\$ -	Disposition Charge (\$/Vehicle)	\$ -
Residual Value (\$/Vehicle)	\$ 17,000	Negotiated Residual Value (\$/Vehicle)	\$ -
Mileage Included (Closed-End Only)	-	Mileage Included (Closed-End Only)	-
Excess Mileage Cost (\$/Mile)	\$ -	Excess Mileage Cost (\$/Mile)	\$ -
Loan		Loan	
Loan Term (Years)	4	Loan Term (Years)	4
Interest Rate (APR - %)	5.00%	Interest Rate (APR - %)	5.00%

EV INFRASTRUCTURE INPUTS

This section allows you to include or exclude EV charging infrastructure costs from the procurement cost comparison analysis. You might exclude infrastructure if your site already has sufficient charging access, or if you do not wish to consider these costs when comparing the costs of an alternative procurement. The charging infrastructure ownership structure can be modeled as a cash- or debt-funded purchase. As with vehicle procurement inputs, the tool will automatically disable user inputs that are not needed given the current procurement configuration.

EV Infrastructure Inputs	
Procurement 1 (Baseline)	
Procurement Includes EV Charging?	No
Number of Level 2 EV Stations Needed (#)	-
Equipment and Installation Cost (\$/Station)	\$ -
Maintenance Cost (\$/Station/Year)	\$ -
Ownership Structure	Purchase (Cash)
Loan	
Cash Upfront / Down Payment (\$)	\$ -
Loan Term (Years)	0
Interest Rate (APR - %)	0.00%

Procurement 2 (Comparison)	
Procurement Includes EV Charging?	No
Number of Level 2 EV Stations Needed (#)	-
Equipment and Installation Cost (\$/Station)	\$ -
Maintenance Cost (\$/Station/Year)	\$ -
Ownership Structure	Purchase (Cash)
Loan	
Cash Upfront / Down Payment (\$)	\$ -
Loan Term (Years)	0
Interest Rate (APR - %)	0.00%

STEP 4: RESULTS TAB

Results

This section presents a dashboard report that includes a procurement summary, societal benefit summary, and sensitivity analysis.

PROCUREMENT SUMMARY

This section summarizes the financial performance calculations from the *Financial Model* tab. The figure below displays a dashboard with key financial metrics for you to easily assess the difference between the baseline and comparison procurements.

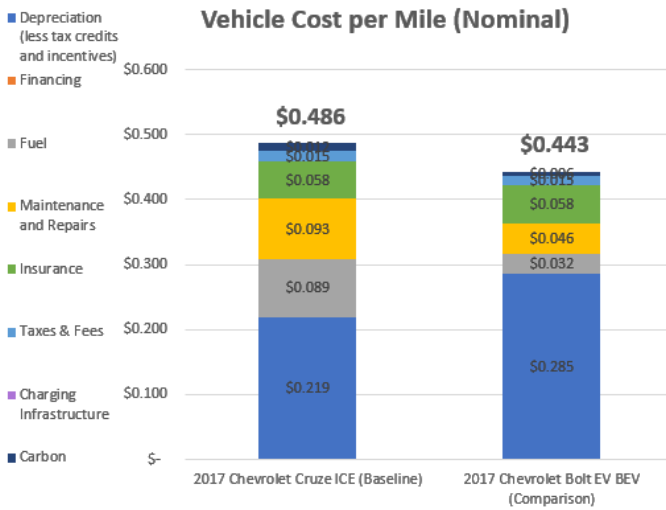
The financial metrics include:

- **Vehicle Cost per Mile (Nominal):** Shows the cost per mile for each vehicle procured, which is the sum costs from charging infrastructure, social cost of carbon, taxes and fees, insurance, repairs, maintenance, fuel, financing, and depreciation (see Box 1).
- **Procurement Details:** Displays a breakdown of the major cost categories for both procurements and the total net present value (NPV) cost, which incorporates the time value of money.

Box 1. Depreciation and Residual Value

The tool used a hedonic pricing model (HPM) to estimate used vehicle sales prices. HPMs deconstruct the price of an asset into component parts, using an ordinary least square regression to examine how each piece uniquely contributes to the overall value. For the tool, the predicted variable is used car sales price and the explanatory variables include MSRP, age of vehicle, age of vehicle squared, fuel economy, and all-electric range. The coefficients from the regressions can be interpreted as the change in sale prices per unit change in the explanatory variable. Hedonic models are common in economic literature and have been used to estimate how consumers value characteristics of vehicles (e.g., Espey, M., and S. Nair, 2005, "Automobile Fuel Economy: What is it Worth?," *Contemporary Economic Policy*, 23(3), 317–323). The data for the regressions came from www.autotrader.com. The regression was performed in STATA/IC, v14.

Procurement Summary



Procurement Details

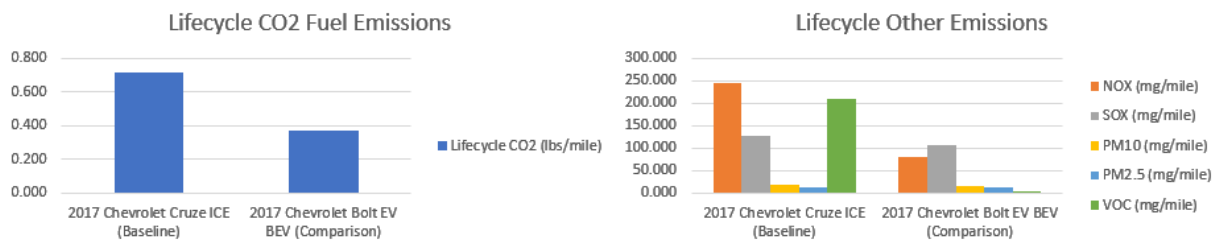
	2017 Chevrolet Cruze ICE (Baseline)	2017 Chevrolet Bolt EV BEV (Comparison)
Procurement Type	Purchase (Cash)	Purchase (Cash)
Number of Vehicles Procured	19	19
Years of Use/Ownership	7	7
Miles Procured	1,330,000	1,330,000
Total NPV Vehicle and Operating Cost	\$ 646,826	\$ 732,115
Total Tax Incentives Captured	\$ -	\$ 142,500
Total Non-Tax Incentive Captured	\$ -	\$ -
Total Discounts Captured	\$ -	\$ -
NPV Vehicle Total Cost less Incentives and Discounts	\$ 646,826	\$ 589,615
NPV Total Cost of Infrastructure	\$ -	\$ -
Total NPV Cost	\$ 646,826	\$ 589,615
Total NPV Cost / Mile	\$ 0.486	\$ 0.443

The baseline is 8.84% more expensive than the comparison vehicle

SOCIETAL BENEFIT SUMMARY

This section summarizes the environmental impact calculations in the *Environmental Model* tab. These include a comparison of lifecycle emissions for each of the procurements on a per-vehicle basis, with carbon dioxide emissions highlighted. Also, included in this section is a comparison of total fleet gasoline consumption for each of the procurements.

Societal Benefit Summary



Fleet Gasoline Use (Total All Vehicles)

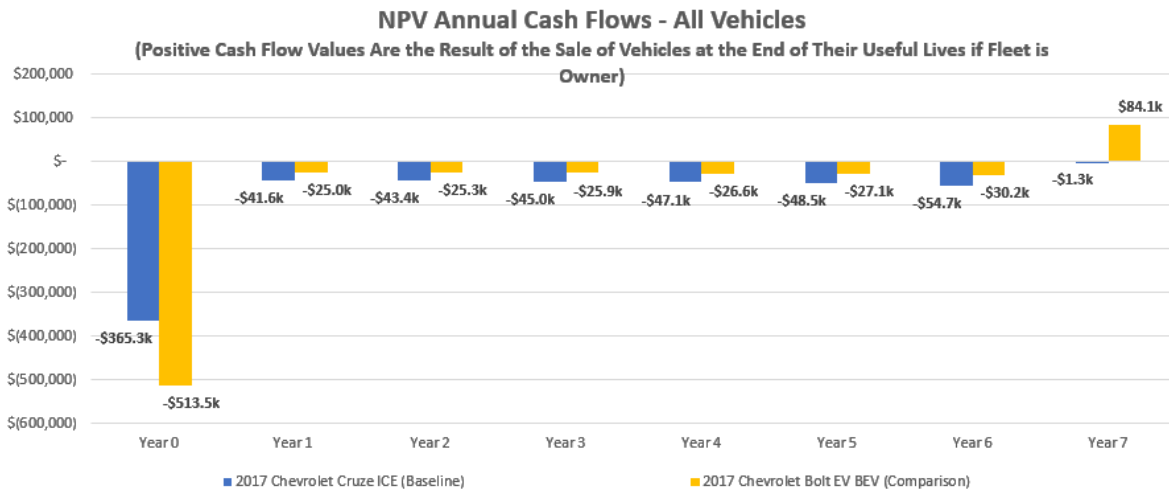
2017 Chevrolet Cruze ICE Based Fleet **VS** 2017 Chevrolet Bolt EV BEV Based Fleet = **The baseline fleet uses 39,346 more gallons of gasoline than the comparison fleet**

39,346 gallons **VS** 0 gallons

CASH FLOW SUMMARY

The summary tab also shows the cost comparison of the two procurements by summing incoming and outgoing cash flows over the life of the vehicles and adjusting for the time value of money. A positive cash flow value at the end of the timeframe is from the sale of vehicles at the end of their useful lives, if the fleet owns the vehicles.

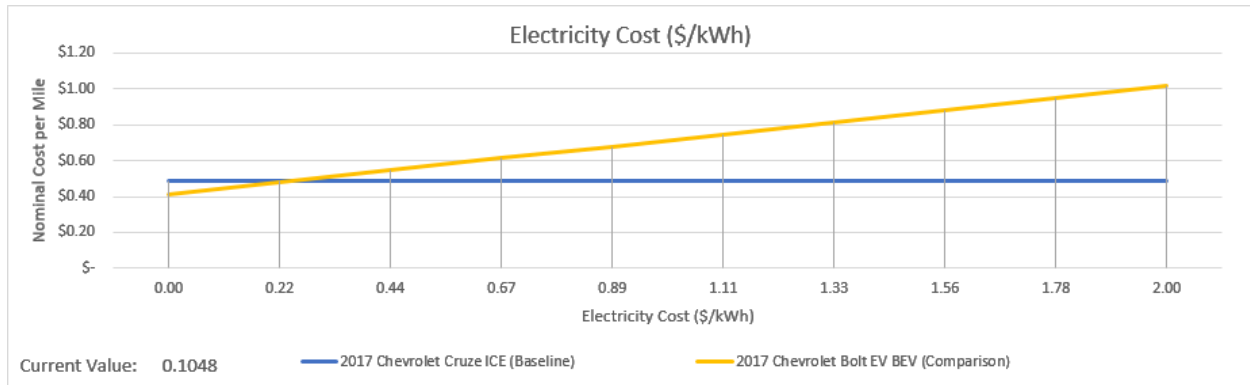
Cash Flow Summary



SENSITIVITY ANALYSIS

The figure below shows an example sensitivity analysis demonstrating how changes in the electricity cost (\$/kilowatt-hour) affect the procurement’s nominal cost per mile on per-vehicle basis. The ‘Current Value’ for each selected variable in the procurement (e.g., the input value for electricity cost) is shown in the *Initial Settings* tab.

You can adjust the assumptions for up to four sensitivity analyses at a time in the *Initial Settings* tab. Both the input variables and the minimum and maximum for the sensitivity analysis range can be adjusted.



STEP 5: FINANCIAL AND ENVIRONMENTAL MODELLING

Financial Model

Environmental Model

The modelling tabs show the detailed financial and environmental analyses that is condensed and presented in the *Results* tab. These tabs do not include any user inputs.

Financial Model: The data in this tab gives users detailed year by year evaluations of procurement costs. The tab details discounted costs, vehicle depreciation calculations,³ capital and financing costs, fuel and operating costs, and infrastructure-related costs from the time of vehicle acquisition through a maximum of 25 years of use. Results for both the baseline and comparison procurement is provided, and is distilled and presented in the *Results* tab.

Environmental Model: The data in this tab gives users detailed mile by mile procurement emissions. The tab compares fuel economy and energy consumption metrics between the baseline and comparison procurement based on annual vehicle miles travelled and local cost assumptions. From this information, carbon dioxide emissions and other lifecycle emissions are assessed on a weight and mass per-mile basis, respectively. Data for both the baseline and comparison procurement is provided, and is distilled and presented in the *Results* tab.

³ For the first five years of ownership, depreciation was modeled using a regression analysis of available data. Beginning in year six, the model uses a standard annual percent reduction in value based on the final year reduction, as calculated by the regression analysis. This carries through the out years until a vehicle hits “scrap value,” which is \$300.

DATA MANAGEMENT

Data

The *Data* tab contains the source data for all fields automatically populated in the tool. None of this data is updated automatically. The tool directly references cells in this tab and you should use caution when editing these data. Editing default data fields, which are shaded in light green, is best done directly on the *Inputs* tab. Data will be updated in the tool whenever possible.

Appendix A: Input Fields Descriptions

This appendix describes each user input field. The Fleet Procurement Analysis Tool has four categories of inputs: Market Inputs, Vehicle Inputs, Vehicle Procurement Inputs, and EV Infrastructure Inputs. Inputs can be either directly entered by the user or automatically filled out by the tool, as denoted in the tables below by User and Default, respectively. For inputs automatically filled out by the tool, users can customize the value for more accurate results.

MARKET INPUTS

Input Field	Type	Description
ZIP Code	Default	Any U.S. ZIP code. Default values for electricity and gasoline prices, emissions factors, and EV state incentives depend on the ZIP code. Enter 00000 for the national average.
Gasoline Cost (\$/Gallon)	Default	Default gasoline cost is average price for last year available from U.S. Energy Information Administration and set based on ZIP code. Some prices are available at state level, while others are available at regional level (PADD).
Electricity Cost (\$/kWh)	Default	Default electricity cost is aggregated by state and the price is calculated based on revenue and energy delivered for commercial customers for last year available from U.S. Energy Information Administration's survey of electric utilities (EIA-861M).
Inflation Rate (Excluding Fuel) (%/Year)	Default	Inflation rate is used for maintenance and other operating costs, excluding fuel. Default inflation rate is based on Federal Reserve's medium term target (2015). Inflation for fuel is based on data from U.S. Energy Information Administration.
Include Cost of Carbon?	User	Optionally include a cost of carbon in the financial analysis.
Cost of Carbon (\$/Ton)	Default	The default cost of carbon is the social cost of carbon using a 3% discount rate, as defined by the U.S. federal government in 2016 .

VEHICLE INPUTS

Input Field	Type	Description
Type of Vehicle	User	Database of vehicles includes battery size; electric range; fuel economy; MSRP; and insurance, maintenance, and repair costs. The tool also allows users to specify a "custom" vehicle. Users can enter custom values for more precise results.

Input Field	Type	Description
Fuel Economy Gas City (MPG)	Default	The default value is the city fuel economy when powered by gasoline for the selected vehicle from www.fueleconomy.gov . This field is not relevant for battery electric vehicles.
Fuel Economy Gas Highway (MPG)	Default	The default value is the highway fuel economy when powered by gasoline for the selected vehicle from www.fueleconomy.gov . This field is not relevant for battery electric vehicles.
Fuel Economy Electric City (MPGe)	Default	The default value is the city fuel economy when powered by batteries for the selected vehicle from www.fueleconomy.gov . This field is not relevant for gasoline vehicles.
Fuel Economy Electric Highway (MPGe)	Default	The default value is the highway fuel economy when powered by batteries for the selected vehicle from www.fueleconomy.gov . This field is not relevant for gasoline vehicles.
Expected Years of Use/Ownership (Years)	Default	The default value is seven and users can customize this value to their expected years of vehicle use and ownership.
Annual Vehicle Mileage (VMT/Year)	Default	The default value is 15,000 and users can customize this value to their expected number of miles traveled per year. The 15,000 value for annual vehicle mileage is the assumption used by Edmunds True Cost to Own calculator.
% of Annual Miles on Gasoline	Default	Default value is 100% for gasoline vehicles and 0% for battery electric vehicles. For plug-in hybrids, value is a function of electric range and expected daily vehicle miles traveled. It is assumed the vehicle only charges once per day.
% of Annual Miles City Driving	Default	The default value is 55%, based on the U.S. Environmental Protection Agency's method for calculating fuel economy.
Cost to Insure (\$/Year)	Default	Default costs are from Edmunds True Cost to Own for Springfield, IL (ZIP code 62701) for the vehicle selected for first five years. Estimates were derived based on available data. Users can set custom values that are more accurate.
Recurring Taxes and Fees (\$/Year)	User	Annual taxes or other recurring fees for vehicle ownership, such as vehicle registration fees.
Use Drivetrain Default Maintenance and Repair Costs?	User	Whether to use the default maintenance costs for the selected drivetrain as defined in the database. Select "No" to use custom values.
Maintenance and Repair Cost- Years 1 - 5 (\$/Mile)	Default	Default costs for the first five years of use are based on vehicle drivetrain. Users can set custom values that are more accurate.

Input Field	Type	Description
Maintenance and Repair Cost- Years 5+ (\$/Mile)	Default	Default costs after year five of use, based on vehicle drivetrain. Users can set custom values that are more accurate.

VEHICLE PROCUREMENT INPUTS

Input Field	Type	Description
Discount Rate for NPV Calculations (%)	User	The time value of money used for financial calculations.
Number of Vehicles to Procure (#)	User	The total number of vehicles to acquire.
Pricing Approach (select one)	User	Vehicle pricing could be from the “MSRP down” or the “dealer cost up.” MSRP pricing could include a discount and dealer cost (also known a triple net) could include a dealer markup.
MSRP (\$/Vehicle)	Default	The price per vehicle. The default depends on the vehicle selection and users can set a custom value to reflect local pricing.
Value of Negotiated Discounts off MSRP (\$/Vehicle)	User	Per vehicle discount from automaker, auto dealer, or other party in the procurement. This field is only valid when using the “MSRP down” pricing approach.
Dealer Triple Net Price (\$/Vehicle)	User	The price per vehicle. The triple-net price is the auto dealer invoice price minus any benefits that the dealer receives from the automaker when buying the vehicles.
Dealer Markup (\$/Vehicle)	User	A markup above the triple-net price intended to be passed on to the auto dealer. This field is only valid when using the “dealer cost up” pricing approach.
Value of Federal Tax Incentives (\$/Vehicle)	Default	Federal electric vehicle tax credit set based on the vehicle selection. The user can overwrite this value if only a portion of the benefit is being captured in the procurement.
Value of State Tax Incentives (\$/Vehicle)	Default	State electric vehicle incentives for public fleets, set based on the vehicle selection and state. The user can overwrite this value if only a portion of the benefit is being captured in the procurement.
State Tax Incentive Cap (\$)	User	The maximum funding amount of a state incentive that can be used by a fleet in a procurement.
Value of Non-tax Incentives (\$/Vehicle)	User	Value of other per-vehicle incentives, such as state grants or incentives from an automaker or third-party.

Input Field	Type	Description
Initial Tax, Title, and Registration Cost (\$/Vehicle)	User	Upfront fixed fees for vehicle purchase, which can vary locally.
Initial Fee as Percent of Vehicle Base Price (%)	User	Upfront fee as a percentage of the vehicle Base Price, such as a sales tax.
Ownership Structure	User	Ownership structure selection, including various leasing and purchasing options. Fields will be enabled depending on the user's selection. Detailed descriptions of each ownership structure are found in the <i>Instructions</i> tab of the tool.
Tax Credits Can Be Monetized? (Y/N)	User	Setting this value to "Yes" will pass along the state and federal tax credits to the fleet as part of the procurement.
Down Payment (\$/Vehicle)	User	Down payment in cash for each vehicle.
Lease Term (Years)	User	Lease and/or loan term cannot exceed the expected years of ownership. For tax-exempt lease-purchase or leases where the purchase option is not pursued, the lease term must equal the years of ownership.
Interest Rate (APR - %)	User	Interest for leases is often discussed in a format call "Money Factor," which is the annual percentage rate (APR) divided by 2,400. Users can input either APR or money factor and the tool will automatically calculate the other.
Money Factor (#)	User	
Acquisition Fee (\$/Vehicle)	User	An acquisition fee is also known as an initiation fee or a bank fee if the lessor is a bank rather than a dealer.
Disposition Charge (\$/Vehicle)	User	Fee to cover the expense of cleaning up and selling the car after it is returned at the end of the lease.
Negotiated Residual Value (\$/Vehicle)	User	Value of the vehicle at the end of the lease term. For a Tax-Exempt Lease Purchase, the residual value must equal \$1.
Mileage Included (Closed-End Only)	User	Annual mileage allowed for in the lease agreement.
Excess Mileage Cost (\$/Mile)	User	Cost per mile above the mileage included in the lease agreement.
Loan Term (Years)	User	Lease and/or loan term cannot exceed the expected years of ownership. For tax-exempt lease-purchase or leases where the purchase option is not pursued, the lease term must equal the years of ownership.
Interest Rate (APR - %)	User	Annual interest rate for the lease.

EV INFRASTRUCTURE INPUTS

Input Field	Type	Description
Procurement Includes EV Charging?	User	Whether EV charging stations should be included in the financial calculations of the procurement.
Number of Level 2 EV Stations Needed (#)	Default	The total number of Level 2 charging stations. The default value is half the number of vehicles in the procurement.
Equipment and Installation Cost (\$/Station)	Default	The equipment and installation cost per station. The default value is \$5,000, which assumes \$2,000 for equipment and \$3,000 for installation. Costs are site-specific and it is recommended to investigate local costs and use more accurate cost figures here.
Maintenance Cost (\$/Station/Year)	Default	The annual maintenance cost per year for station upkeep. The default value is \$75 per year, or 3% of the equipment cost.
Ownership Structure	User	Setting to either pay for the charging stations through a cash purchase or loan.
Cash Upfront / Down Payment (\$)	User	The down payment on the loan for the charging stations.
Loan Term (Years)	User	Length of loan in years.
Interest Rate (APR - %)	User	Annual interest rate for the loan.

Appendix B: Version History

Version	Date	Author	Organization	Revisions
1.00	5/30/2017	Philip Quebe	The Cadmus Group, Inc.	First launch
1.05	6/1/2017	Philip Quebe	The Cadmus Group, Inc.	Minor bug fixes: sensitivity analysis and EV infrastructure inputs
1.06	7/3/2017	Nick Nigro	Atlas Public Policy	Added support for U.S. average emissions and fuel prices. Use ZIP Code 00000 to set to U.S. average. Added support for more comprehensive vehicle selection and vehicle incentives. Improved robustness of some table lookup calculations. Added link to vehicle details on fueleconomy.gov.
1.07	9/5/2017	Nick Nigro	Atlas Public Policy	Fix to allow users to add custom vehicles to "DB_Vehicles" table.



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