



Dallas-Fort Worth
CLEAN CITIES

Electric Vehicle Mapping Tool User Guide



North Central Texas
Council of Governments



Electric Vehicle Mapping Tool User Guide



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About the Electric Vehicle Mapping Tool

The Electric Vehicle Mapping Tool displays electric vehicle registration and associated infrastructure in a geographic setting. Dallas-Fort Worth Clean Cities (DFWCC) developed the tool to support the Texas and North Texas Electric Vehicle Registration Microsoft Power BI tools. The Microsoft Power BI tools have functionality that allows users to see how electric vehicle registration differs by vehicle model, model year, electric vehicle penetration, and a tabular form of the geographies in which the vehicles are in. Where the Electric Vehicle Mapping Tool differs is in its utilization of the geographic spread of electric vehicles across the state of Texas and the North Texas region. Both tools have differing use-cases based on the desired results. The Electric Vehicle Mapping Tool focuses on displaying the results of how electric vehicles are growing and where this growth is taking place.

The growth of electric vehicles has been significant over the past decade. The technology has seen exponential growth and is projected to continue to grow as more people adopt electric vehicles. This growth and spread are seen in the Electric Vehicle Mapping Tool. As an increase in electric vehicle adoption continues, so too does the demand for associated infrastructure such as charging stations. These charging stations provide access to charging electric vehicles outside of the home setting to provide a convenient way to recharge. Therefore, many of the elements that are associated with electric vehicles have been included in the Electric Vehicle Mapping Tool as to better understand the relationship between them. Understanding the relationship between electric vehicle registration, associated electric vehicle infrastructure, and geography is at the core of why the Electric Vehicle Mapping Tool was created.

Layout of the Mapping Tool

The Tool is split into two different maps: North Texas and Statewide. One focuses on the spread of electric vehicles across the state of Texas and the other across the North Texas region. While both maps include the same data, the North Texas region map has more granular data, including electric vehicle registration at the census tract and block group levels.

The Texas and North Texas profiles are comprised of two main sections: the map and the header. The map, as seen in Figure 1, has many basic elements that a standard static map would have, including the map itself and a legend. However, other elements are included that allow for more interactivity. This includes many of the buttons along the edges of the map:

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	The home button returns the map to its default position. If you are anywhere without data or zoomed in/out too far you can use this button to automatically return to how the map opened
	The search button allows you to search any address in the world and be taken straight to there. This can help with zooming into your area of interest to better pinpoint the data you need
	The basemap button allows you to change the background of the map that is behind the data. This can help if you prefer a different style or can't see the data as clearly
	The measure button lets you measure distance or area. This can be helpful for determining how far from a site you need to analyze
	The menu guide allows you to move between the different maps and the user guide. The North Texas map has more region-specific data while the Statewide map has more generalized data
	The clear results button only appears on the bottom right of the map whenever a query is run on the map. This button will allow you to delete queries you have run on the data

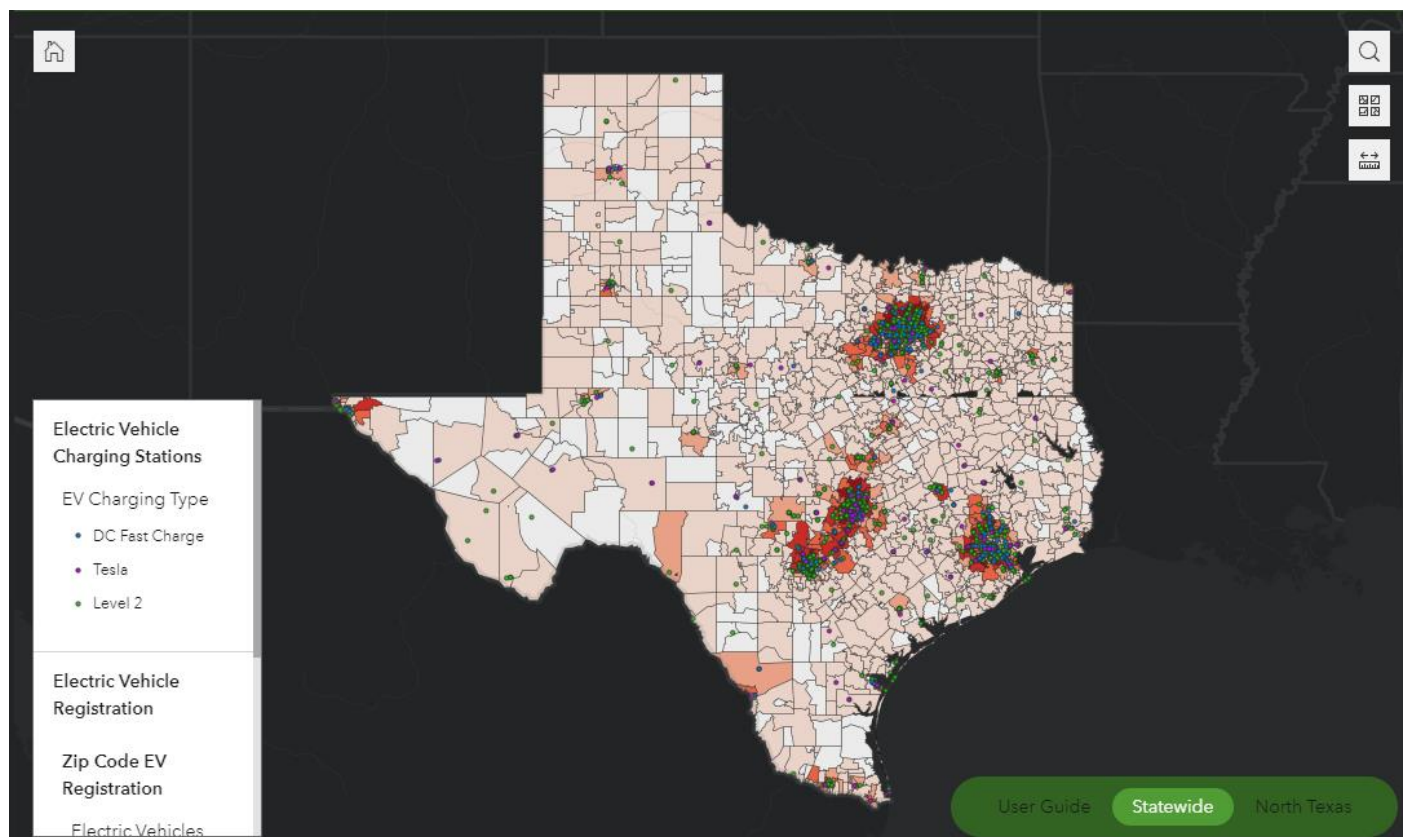


Figure 1: Map section of the layout

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Along with the buttons, the map also allows you to click the data itself to learn more about it. A small attribute table is brought up that displays information about the feature of the dataset. For example, DFW International Airport's zip code displays the range of electric vehicles and when the data was last updated in Figure 2. If multiple features are clicked simultaneously, you are able to toggle through them.

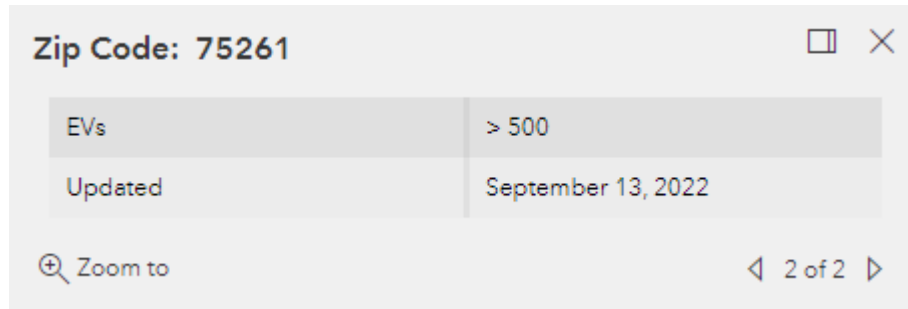


Figure 2: Attribute table brought up when clicking on a feature



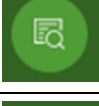



Finally, within the layout of the map is the header section. The header section has the maps title, a DFWCC logo that links to our website, and the toolbox. The toolbox, as discussed in greater detail in the next section, houses most of the functionality that manipulates the map to output unique results

Tools and Other Functionality

The Electric Vehicle Mapping Tool's main functionality comes from the tools that can be found in the toolbox. The toolbox, as seen in Figure 3, contains numerous tools and other widgets. These tools manipulate the data to display new outputs, query the data for download, and more:



Figure 3: Toolbox in the header

	The map layers tool allows you to add in or remove data from the map. Other data layers, such as other geographies of electric vehicle registration, can only be accessed by turning them on here. You can turn on the data layers by changing the eye icon on the left
	The filter data tool has numerous options to filter data within the map to display new results. You can use this tool to better conceptualize how data is spread geographically
	The query data tool queries data to become a downloadable file. You are able to set different filters as well as draw your area of interest for any of the data you are seeking to download
	The contact widget displays information about how to contact DFWCC or reach out if there are any technical issues about the application. As well, it links to our user feedback form
	The share widget allows you to share the Electric Vehicle Mapping Tool to social media or even embed it into a website
	The data and links widget contains numerous links about our organization and where data in the Tool comes from or how the data is made

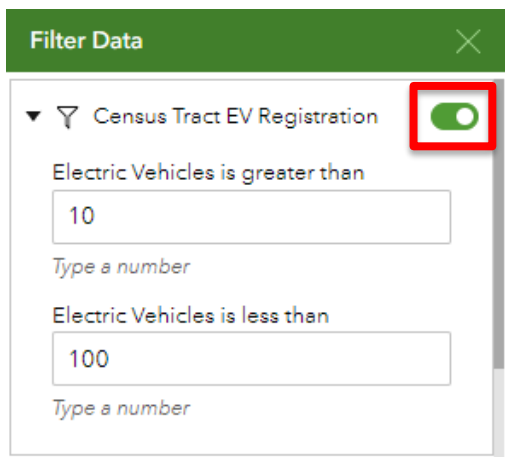
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Filtering and Querying Data

The filter data and query data tools both have increased functionality that enhances how data in the map can be interacted with. In the filter data tool, you can expand out the different filters to fill them in based on their parameters. To turn on the filter, toggle the switch in the top right of the filter, as seen in Figure 4. Make sure the data layer is also turned on in the map layers so that you can see your filter.



Within the query data tool, you can expand the different queries to select specific data within the map. You can enter parameters and/or draw a graphic to define an area of interest, as seen in Figure 5. Entering parameters and drawing a graphic can be used separately to query data; however, you can further refine the range of data you are looking for and where you are interested by using them together. To query by an attribute, set lower and/or upper limits. To query by a graphic, select one of the below shapes and draw directly onto the map.

However, not all the queries have these same options. To apply your query, hit the apply button and a list of results is returned. For some results, you can expand the results from the selected features to learn more about the data.

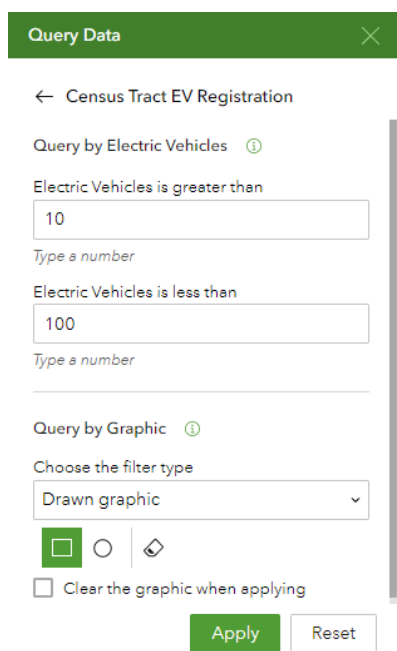


Figure 5: Parameters within query data tool

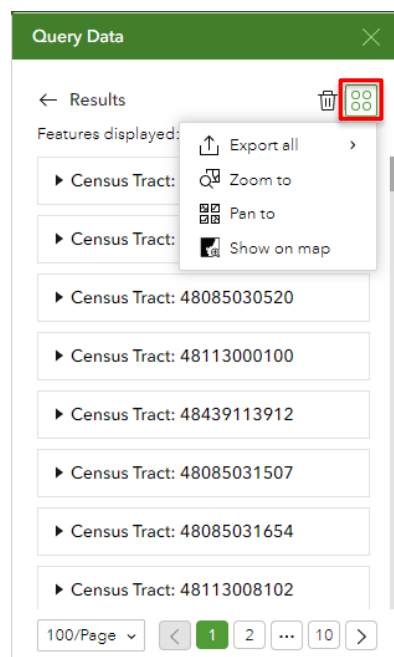






Figure 6: Options within results of query data tool

Within the results menu of queried data, you are also able to download and map your results. As seen in Figure 6, these options are available by pressing the actions button:

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 Export all	The export all button will export your queried data as either a CSV, JSON, or GeoJSON file. For importing to Excel, a CSV file is most appropriate
 Zoom to	The zoom to button will zoom into your queried data
 Pan to	The pan to button will pan to your queried data
 Show on map	The show on map button will display your selected data on the map. To display all your data, click through each results page and click the show on map button. For future queries, use the clear results button on the bottom right of the map to delete the features highlighted on the map

Applications of the Mapping Tool

Numerous workflows and other applications can be completed with the Electric Vehicle Mapping Tool. While not a completely encompassing GIS, the tool does have some spatial analysis capabilities with a greater capacity to allow you to manipulate the data yourself if you choose to download it. The tool's main spatial analysis attributes come from the three tools in its toolbox: the map layers, filter data, and query data tools.

Visualizing Interactions Between Data

Visualizing data in the Electric Vehicle Mapping Tool is the Tool's greatest strength compared to a typical GIS workflow. In a typical workflow, data would need to be downloaded, manipulated, uploaded, and then could be visualized. By having this tool, we hope to have helped remove these steps so that data can be more easily visualized and constantly updated. As electric vehicle registration and infrastructure continue to increase, having a tool with consistently updated data is crucial to meeting the demands of electric vehicles.

To meet the demands of electric vehicles, other data layers have been added to the tool to better understand the interactions between electric vehicle registration and its associated infrastructure. Some of the main data layers we have included are electric vehicle charging stations, Federal Highway Administration's designated electric alternative fuel corridors, and nonattainment counties for the EPA's criteria pollutants. We have included these layers so that they may stand together to show how they interact with one another. By using the map layers tool, you can make conclusions about how electric vehicle charging stations and electric vehicle registration influence each other, how electric corridors can be filled out to provide long distance journeys for electric vehicle owners, and how air quality can potentially be affected by the growth of electric vehicles. Utilizing these layers and more can help gain a better visual understanding of the state of electric vehicles.

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Specializing Data to Your Community

The Electric Vehicle Mapping Tool is great for looking at an overview of Texas or North Texas as the data has been created for these extents. However, data is not limited to these broad regions. Utilizing the tool to assess your community is essential to understand current and future implications of electric vehicles within your specified region. If your community resides in the North Texas area, there is a greater amount of data that can be extracted within this profile. However, if you are outside of the North Texas area, there is still a plethora of more generalized data to utilize.

To specialize the data to your community, you can utilize the filter data and query data tools. While these tools do manipulate the data for the whole map, you can use the search button to zoom in on your community and ignore any data that may fall outside of its bounds. The filter data tool can be used to understand the range of electric vehicles and where there are concentrations in your community. For some communities, these concentrations of electric vehicles may mean that many individuals are charging their vehicles at home. However, if there are electric vehicle charging stations nearby this may mean that these stations are what draw people to purchase electric vehicles as they know they have access to charging. By narrowing the range of the filter data tool, many results can be visualized in your community.

The query data tool can be used in a similar capacity as the filter data tool. However, this data can also be downloaded and further analyzed within Excel or other applications. Queries can be even further specialized by drawing the extent you are interested in on the map with the query by graphic option. This can help to analyze potentially even subareas within your community and understand more granularly how electric vehicles impact an area.

Increasing Awareness of Electric Vehicles

To increase awareness of the benefits and current status of electric vehicles, you can share this tool out to your community through your website or other platforms. The Electric Vehicle Mapping Tool can be embedded directly into your website and even have its extent and other elements changed so that it automatically loads to your community. If you are looking for more benefits of electric vehicles, how the technology works, and how to receive incentives for purchasing electric vehicles, please visit the other webpages on our DFW Clean Cities website.

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Data Sources



Data	Source
Electric Vehicle Registration	Texas Department of Motor Vehicles and Atlas EV Hub VIN Decoder
Electric Vehicle Charging Stations	Alternative Fuels Data Center Station Locator
Designated Electric Corridors	Federal Highway Administration Alternative Fuel Corridors
EPA Criteria Pollutants	Texas Commission on Environmental Quality
Environmental Justice Index	Environmental Justice at NCTCOG