



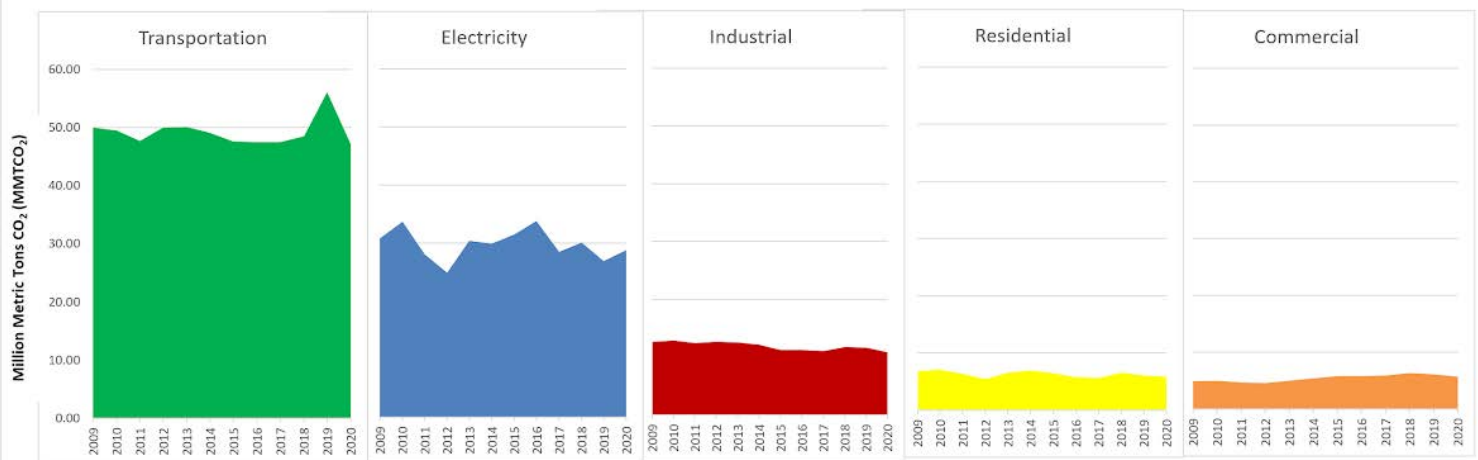
Virginia Alternative Transportation Fuels Report 2022

Prepared by Virginia Clean Cities (VCC) for Virginia Energy on February 10, 2023

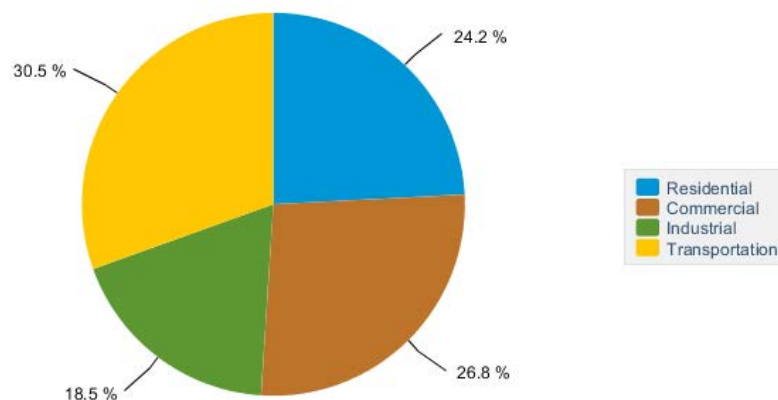
Transportation forms an integral part of Virginia's economy and environment and the transportation sector is the largest end-use energy-consuming sector in the Commonwealth according to the U.S. Department of Energy, Energy Information Administration (EIA) and the U.S. Environmental Protection Agency.

VCC connects with voluntary fleet leaders, biofuel producers, and station operators to present this status of fleets, fuel production, and stations in the transition to cleaner, domestic and/or renewable fuels. Data was collected by VCC staff through infrastructure development, emails and phone from January 1, 2022 to December 31, 2022.

Virginia Carbon Dioxide Emissions by Fossil Fuel Combustion Sector 2009-2020



Virginia Energy Consumption by End-Use Sector, 2020



Front page graphics are most recent available info from Energy Information Administration [eia.gov](https://www.eia.gov)

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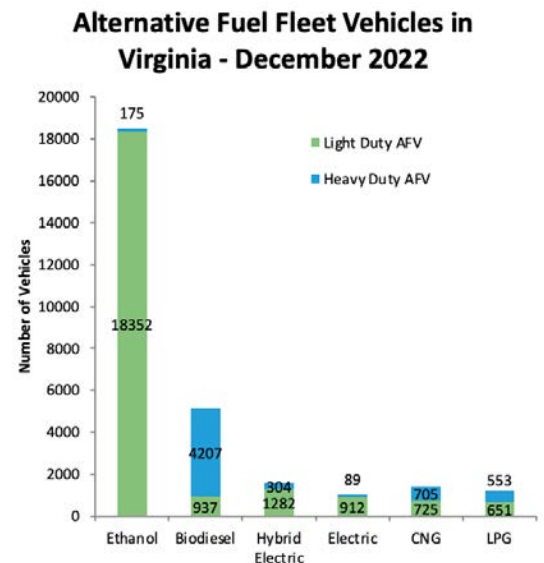
SECTION I: ALTERNATIVE FUEL FLEET VEHICLES SUMMARY

For the year ending December 31, 2022, there were 28,892 vehicles in 101 green fleets, the current percentage of alternative fuel vehicles used in tracked clean fuel Virginia fleets is 44.3 percent of their vehicles. Compressed Natural Gas (CNG), Ethanol (E85), and biodiesel (BD) made no reported net additional vehicle gains, hybrid-electric (HEV) and electric vehicles made minor net gains in the past year, while no technology decreases were reported. The vehicles reported are in service with clean fleets, designated by operating five or more clean fuel vehicles, and include business fleets and local, state, and federal government fleets. Vehicles are voluntarily reported for light and for heavy duty vehicles in voluntary and regulated fleets.

Table 1-1 and Figure 1-1. Alternative Fuel Fleet Vehicles: 2022

Fuel Type	CNG	E85	HEV	ELEC	BD	LPG	AFV Total
2021 Totals	1430	18527	1569	968	5144	1183	28821
2022 Totals	1430	18527	1586	1001	5144	1204	28892
1-Year Difference	0	0	17	33	0	21	71
% Growth	0.0%	0.0%	1.1%	3.4%	0.0%	1.8%	0.2%

The graph to the right shows the total alternative fuel fleet vehicles broken into light and heavy-duty classifications. A light duty vehicle is considered to be a class 1 through class 3 vehicles while a heavy-duty vehicle is class 4 through class 8. Note: Some electric school buses are not yet tracked in inventory due to delivery timeline and 2023 arrivals.



SECTION II: RENEWABLE BIOFUEL PRODUCTION SUMMARY

Virginia is host to a rich agricultural economy and numerous corporations and entrepreneurs developing biofuels from plant or recycled materials as a replacement for or mixture with traditional transportation fuels of gasoline or diesel. Virginia research universities like Virginia Tech have developed advanced biofuels technologies. Biofuels commodities are available throughout the U.S. Market. Currently there is one biodiesel facility in operation in Virginia, which produced approximately 927,000 gallons. The U.S. Energy Information Administration (EIA) estimates Virginia produced 0.5 trillion Btu of biofuel energy in 2020, EIA reports no Virginia oil energy production.

For reporting periods ahead, availability and access to renewable natural gas is likely to increase as innovative production from captured methane in Virginia increases. Renewable natural gas is a resource generated from landfill, wastewater, and agricultural sources where methane is captured for reuse.

SECTION III: ALTERNATIVE FUEL STATION SUMMARY

The total number of alternative fuel station locations reported for the Commonwealth of Virginia in 2022 is 1,113. Of those stations, 899 are public and 181 are private access stations such as individual fleet facilities.

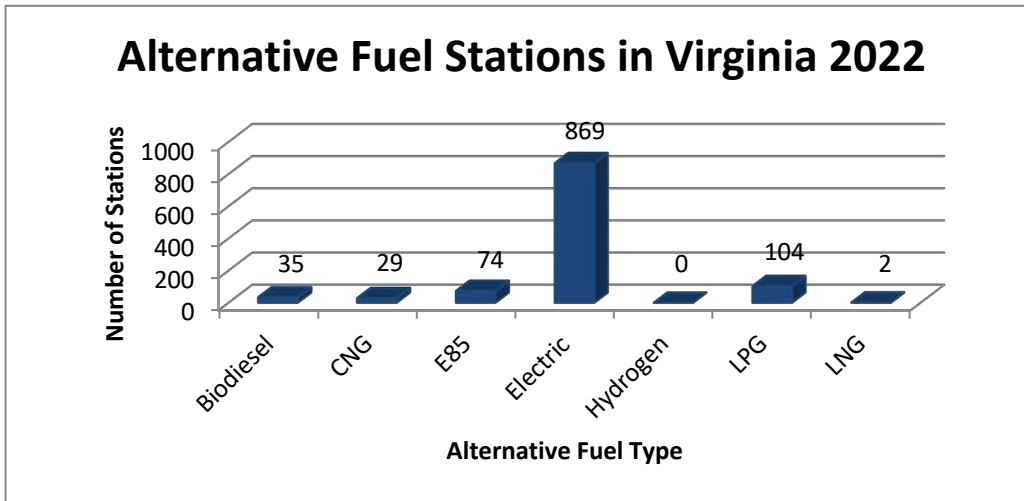


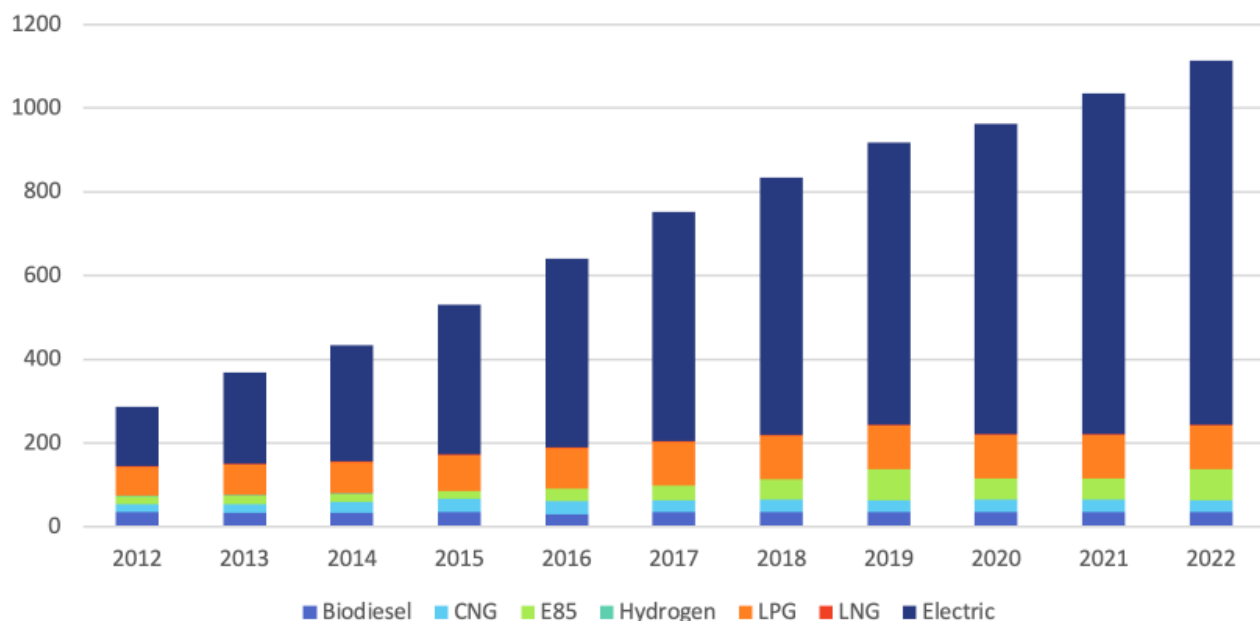
Figure 3-1. Alternative Fuel Stations in Virginia:

Year	B5-B20	CNG	E85	EV	H2	LPG	LNG	Total
2021	35	30	74	821	0	104	2	1059
2022	35	29	74	869	0	104	2	1113
Growth	0	-3.33%	40	6.76%	0%	0%	0%	5.10%

Table 3-1. Alternative Fuel Station Growth in Virginia:

Although some fuel types showed no growth, the net total number of alternative fuel stations in Virginia increased by around 5% over the last year, electric vehicle charging stations have exhibited the largest growth and have become the most prevalent alternative fuel station in Virginia. Overall, the total number of alternative fuel stations in Virginia has continued to increase as alternative fuel use continues to expand, as seen in Figure 3-2 below.

Figure 3-2. Growth Total of Virginia Alternative Fuel Stations by Fuel Type:



SECTION IV: ALTERNATIVE FUEL STATION LOCATIONS

In order to observe the geographic distribution of these stations, clean fuel infrastructure maps are presented below. This map reflects planned and current stations that are both public and private. This map shows only stations with biodiesel blends with at least 20% biodiesel. The station totals presented in this report include all blends of biodiesel. This interactive mapping tool is hosted by the Department of Energy and can be found at the alternative fuel data center and at afdc.energy.gov/stations#/ with data submitted throughout the year by Virginia Clean Cities.

Figure 4-1. Biodiesel (B20) and Ethanol (E85) Stations



Figure 4-2. Electric and Hydrogen Fueling Stations

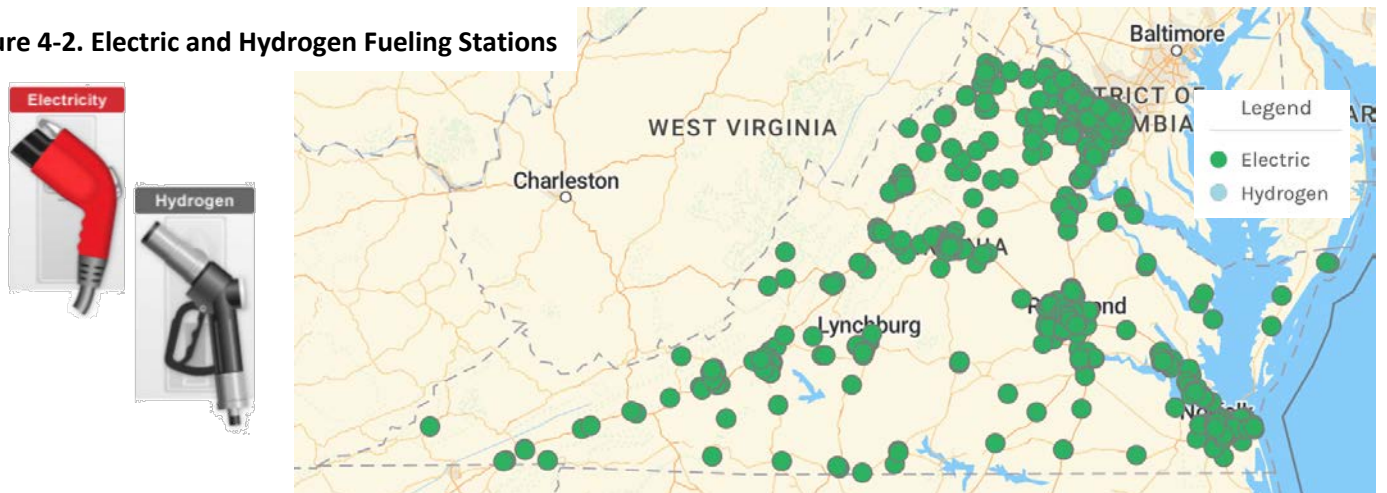
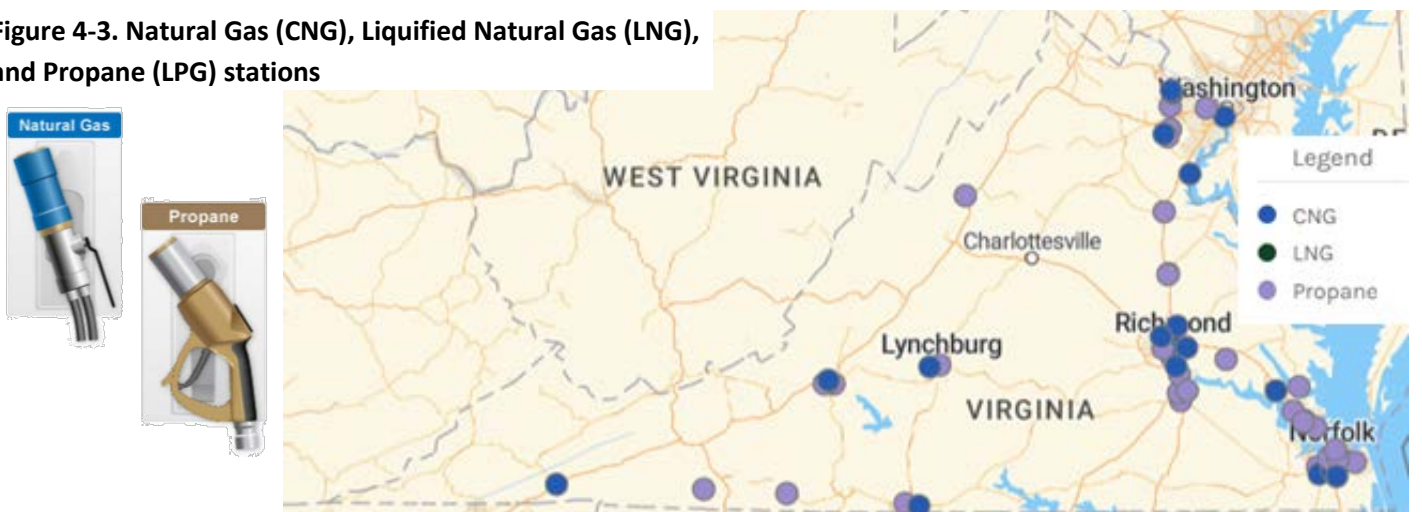


Figure 4-3. Natural Gas (CNG), Liquefied Natural Gas (LNG), and Propane (LPG) stations



SECTION V: ALTERNATIVE FUEL CORRIDORS

In 2016, the Department of Transportation and the Federal Highway Administration (FHWA) announced their designated Alternative Fuel Corridors under the Fixing America’s Surface Transportation (FAST) Act. The cumulative designations (Rounds 1-5) for propane, electric and compressed natural gas in Virginia are submitted by Virginia Energy and detailed in the maps below. The green lines indicate signage ready corridors which are corridors that have sufficient alternative fuel facilities to warrant highway signage. https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

Figure 5-1. Electric Vehicle Charging Station READY Corridors (Pending is Dashed Line)



Figure 5-2. Propane Fueling Station READY Corridors.



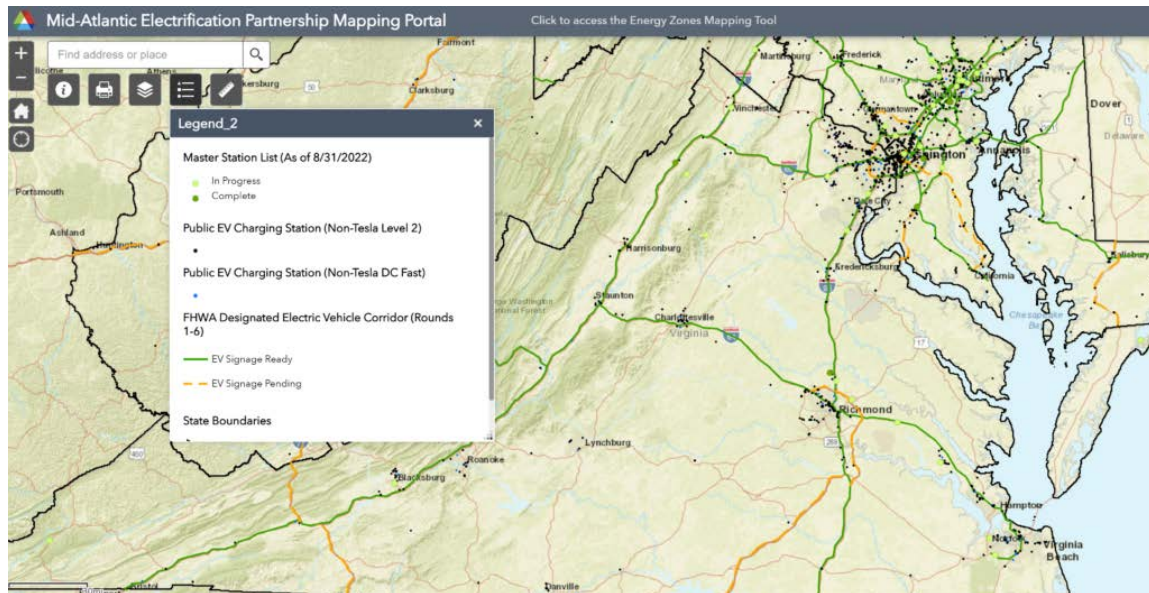
Figure 5-3. Natural Gas Fueling Station READY Corridors



SECTION VI: VIRGINIA ENERGY MID-ATLANTIC ELECTRIFICATION EFFORTS

The Mid Atlantic Electrification Partnership Project led by Virginia Energy supports a regional electric vehicle (EV) ecosystem in Virginia, the District of Columbia, Maryland, and West Virginia. This program will deploy 375 charging stations and 175 electric vehicles and has facilitated improvements from Argonne National Laboratory to the *Energy Zone Mapping Tool* adding dozens of layers to the tool for transportation energy planners now with 360+ layers. Argonne national laboratory assisted with this graphics and maps for this project. <https://ezmt.anl.gov/>

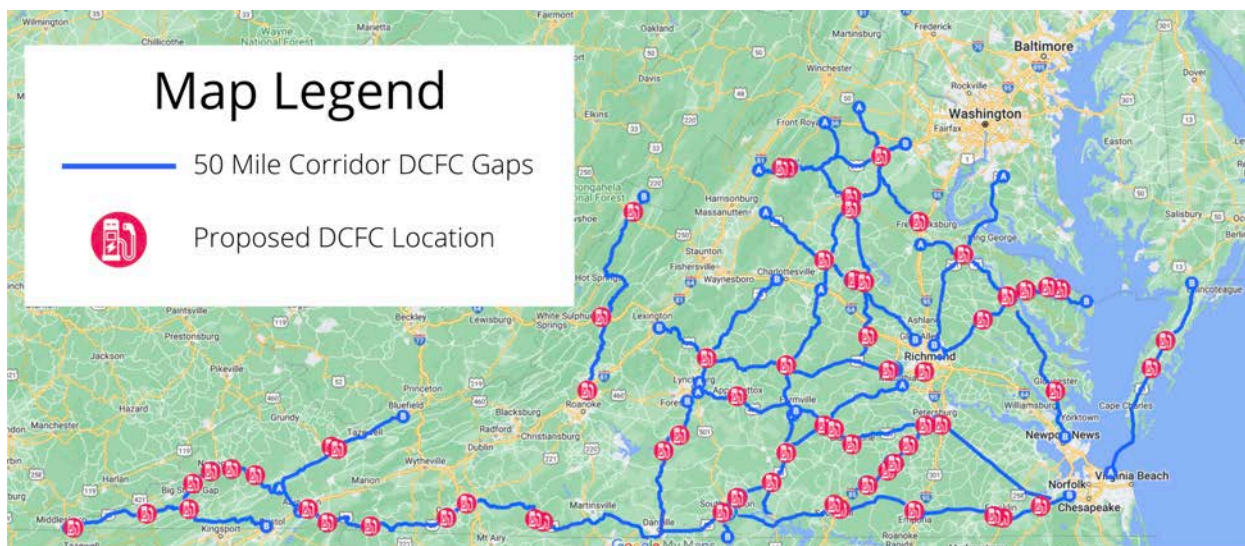
Figure 6-1. Energy Zone Mapping Tool Example Overlay: Vehicle Charging Locations and planned stations.



SECTION VII: SUGGESTED EV CHARGING COMMUNITY LOCATIONS

Based on the projected growth of electric vehicle adoption, it will be necessary to extend supporting infrastructure beyond designated highway alternative fuel corridors and onto internal state route corridors. This map below illustrates additional gaps on corridors of statewide significance that could better serve with powerful sets of fast chargers every 50 miles. This builds additional routes from the 5-1 map. Virginia Clean Cities recommends filling these gaps.

Figure 7-1. Suggested EV Charging Locations for Filling Internal Gaps Beyond Initial Highway Corridors

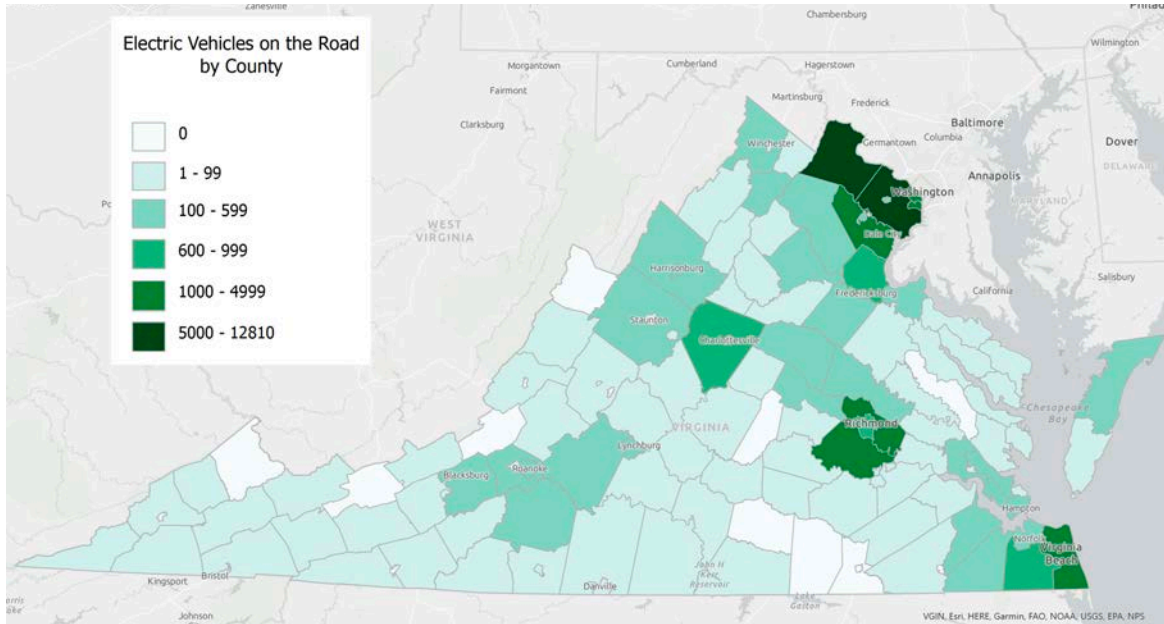


Community Charging Locations Continued: Over the summer 2022, Virginia Clean Cities worked with Cadmus Group on a series of electric vehicle projections leading to 2045, these details are presented below.

SECTION IX: CONSUMER ELECTRIC VEHICLE DATA

Electric vehicles are deployed widely across the Commonwealth. Virginia Clean Cities has worked to secure data and seeks to present information to the public at www.driveelectricva.org. Below is a graphic of electric vehicle deployment based on registrations per locality. Virginia will work to secure more frequent vehicle data.

Figure 9-1. Electric Vehicle Registration Data End of Year 2021



Over the summer 2022, Virginia Clean Cities worked with Cadmus Group on a series of projections leading to 2045 – this adoption curve is detailed below and shows even in high adoption scenarios and purchases that a wide number of internal combustion vehicles will operate on the Commonwealth’s roads through mid-century.

Figure 9-2. Electric Vehicle Adoption Curves and Percentage of Vehicle Stock Through 2045

