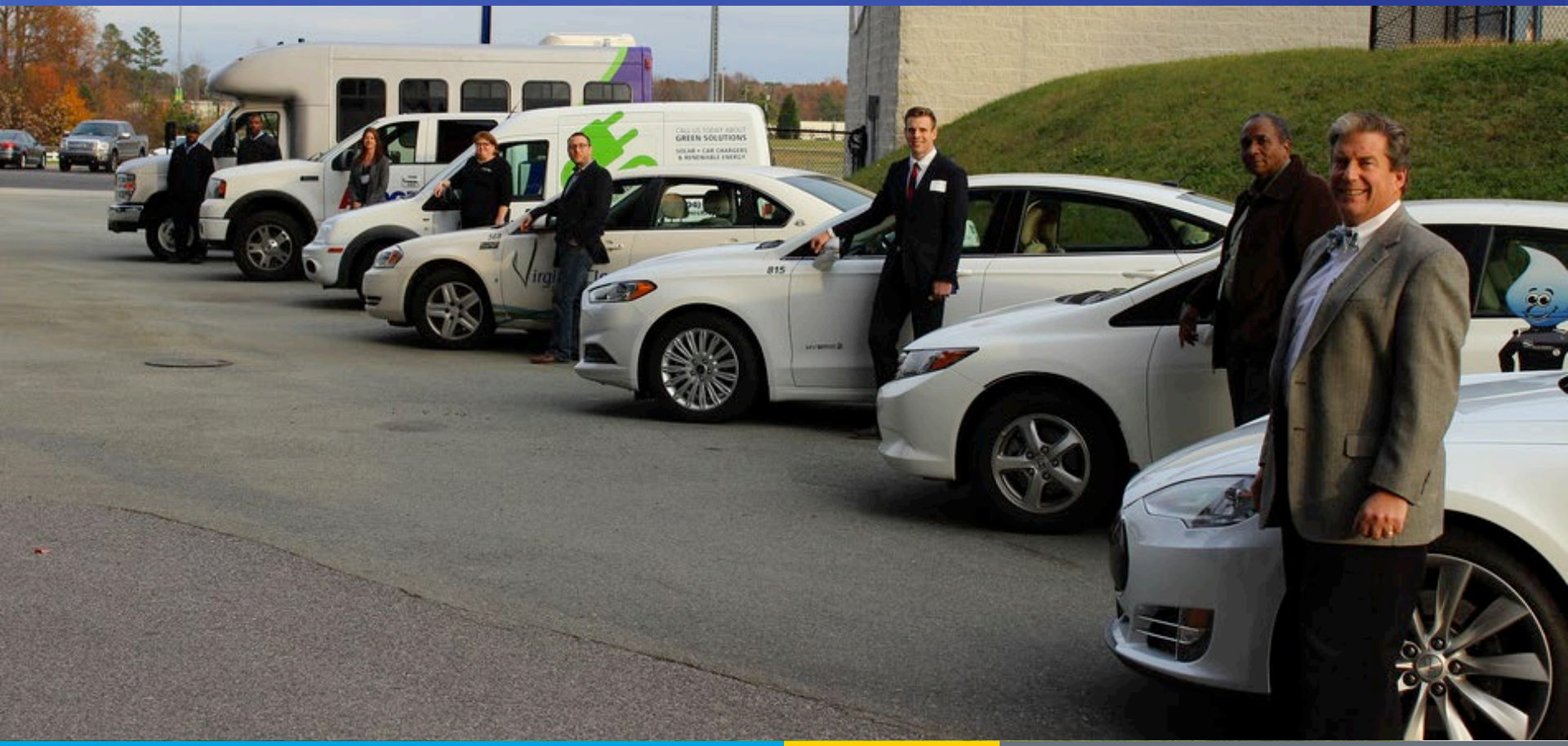
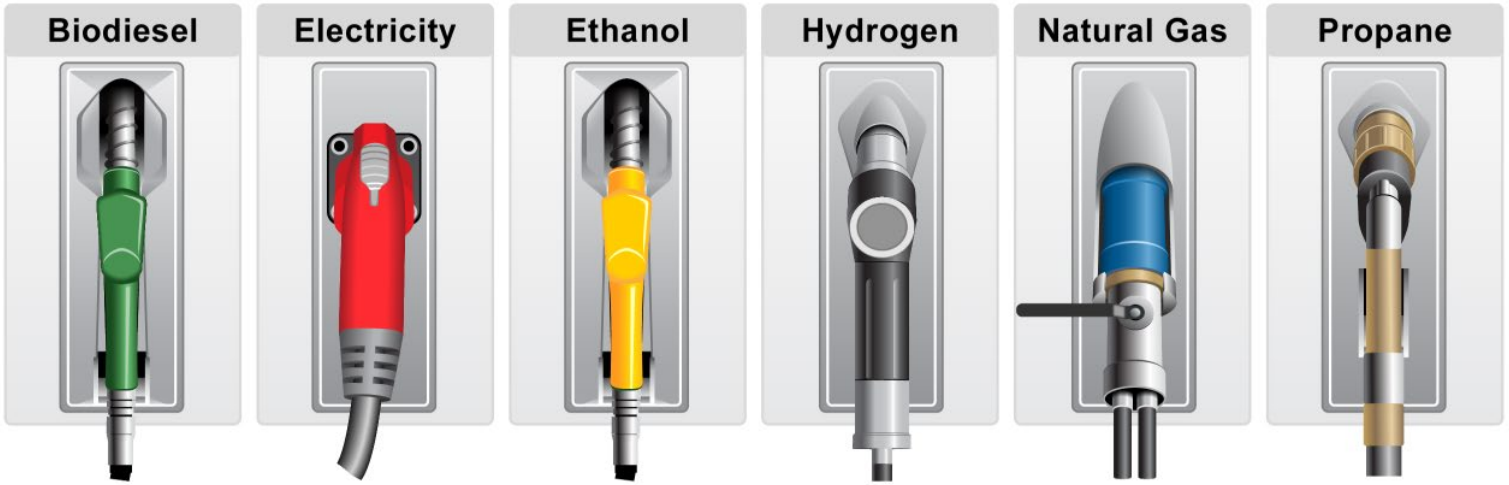


Transportation Infrastructure Goes High Tech

Alleyn Harned Virginia Clean Cities
540-568-8896
aharned@vacleancities.org
Calendly.com/alleyn

Virginia Clean Cities at JMU

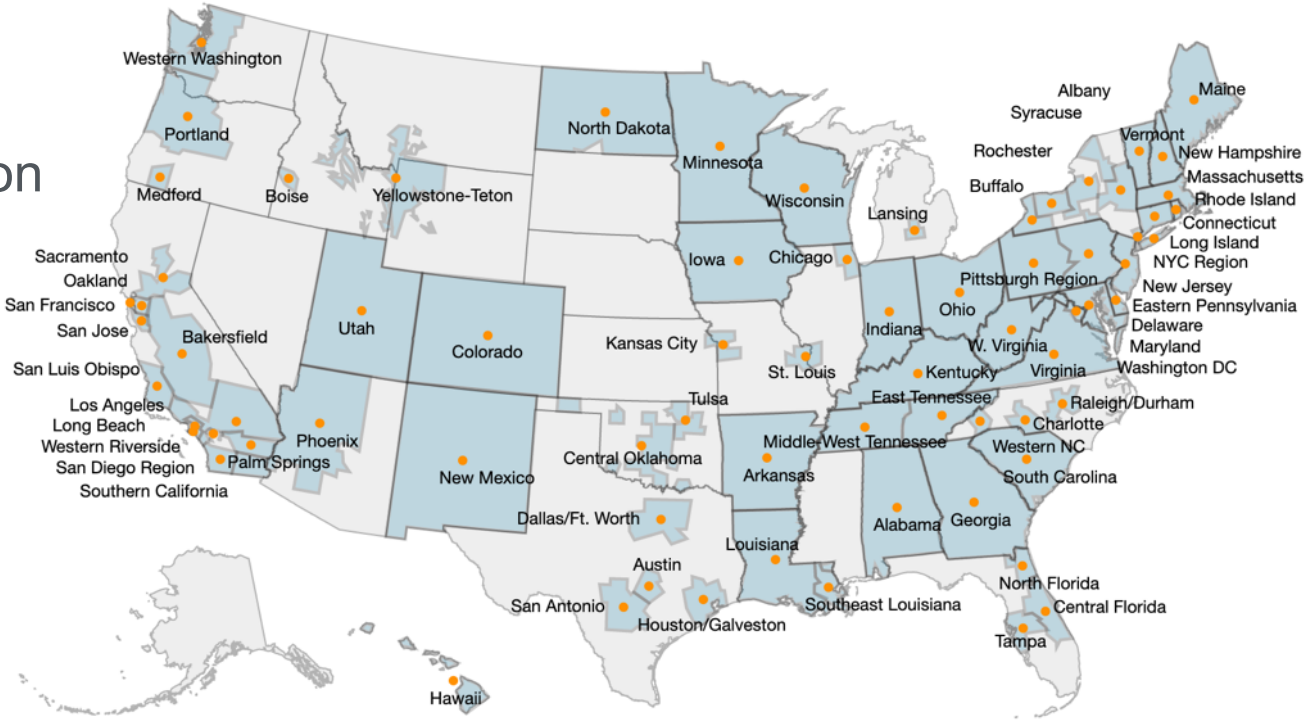
- Vehicles and Driver Choices that Increase Fuel Economy
  - Right-size, Idle Reduction – Bikes, Land Use, Transit
- Advanced Vehicles (e.g., HEVs, PHEVs)
- Alternative (non-petroleum) Fuels & Vehicles



- Lower fuel use $33 million to $15 million per day
- Lower cost fuels at scale $3.50 Gasoline to $1 Renewable Fuel
- Fuel our economy $20 million recirculating – daily

Local Partnerships: Clean Cities Coalitions

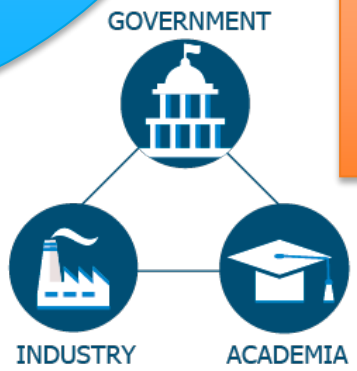
- National network of nearly **75 local coalitions**
- **82% of the total U.S. population** lives inside coalition boundaries
- **500,000 alternative fuel vehicles (AFVs)**
- **VA Coalition DC Coalition** MD, WV, VA closely aligned with energy offices



Why Clean Cities?

Clean Cities

advances the energy, economic, and environmental security of the United States by supporting local actions to cut petroleum use in transportation.



- **Reduced petroleum consumption**
- **Reduced greenhouse gas (GHG) emissions**
- **Reduced dependence on imported petroleum**

Charging EVs and PHEVs

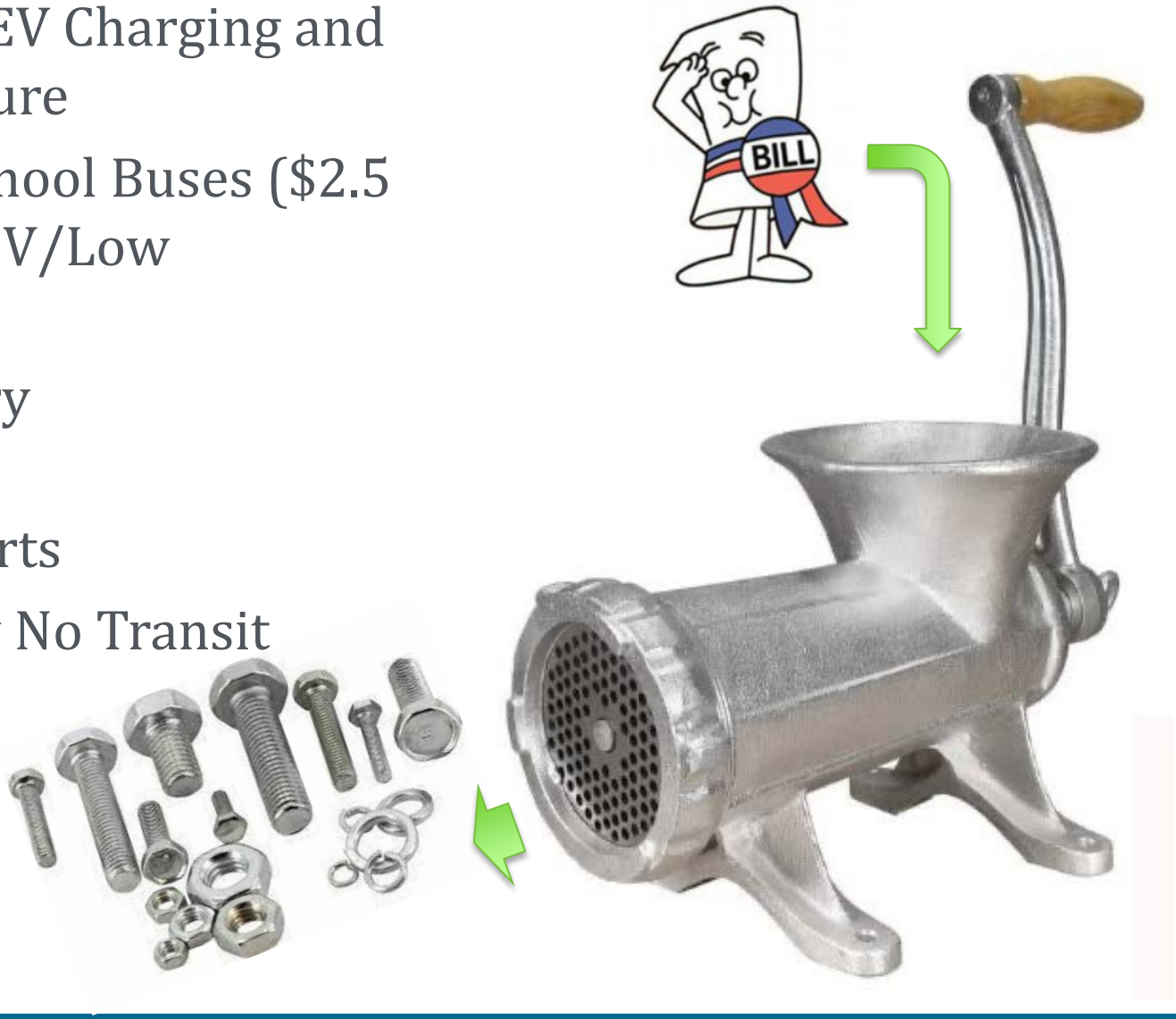
	Current Type	Voltage (V)	Charging Time	Primary Use	Connector
Level 1	Alternating Current (AC)	120V	2-5 miles of range per hour of charging $	Residential	
Level 2	AC	208-240V	10-80 miles of range per hour of charging $-$$$	Residential Commercial	
DC Fast	Direct Current (DC)	208-480V	60-400 miles of range per 20 minutes of charging $$$$$	Commercial	
Wireless	AC	240V	10-20 miles of range per hour of charging	Residential Commercial	

Some Funding Right Now!

- Electrify America – Diesel settlement
- EVgo and DEQ 80-100 new charger sites $16m
  - State settlement funded program still underway
- Blink 200 19.2 kWh L2 chargers
  - U.S. Department of Energy, State Dept of Energy Award
- Greenspot E-mobility hub curbside 6 L2 chargers 24 hubs
  - Highly visible, State Dept of Energy Award
- Dominion Workplace Charging
- Volta free charging stations at shopping centers
- Virginia Clean Cities fleet vehicle pilot
  - Single J1772 L2 charger from state contract bid

Infrastructure Bill

- $7.5 Billion for EV Charging and AFV Infrastructure
- $5 billion for School Buses ($2.5 Electric + $2.5 EV/Low Emission)
- $6 billion battery manufacturing
- $250 million Ports
- $5.6 billion Low No Transit
- +++



Infrastructure Bill FHWA Corridors

- FHWA Formula: $5 Billion for EV Charging on Corridors
  - DOT and DOE Collaboration
  - State Plans, 5 years, VA is $106 Million
  - Corridor emphasis

- FHWA Competitive $2.5 Billion Alt Fuel Communities
  - EV, H2, CNG/LNG, LPG
  - 50% set aside for community grants
  - 50% Set aside for corridors Competitive
- DOT Rural Transportation Grant Program $2 B set aside
- CMAQ can fund clean fuel vehicles and infrastructure
- DOT State Carbon Reduction Program Formula (33 million)

Infrastructure Bill - Transit

- FTA Buses and Bus Facilities Formula:
  - $ 3.2B
- FTA Transit Accessibility Formula
  - $ 2.2 Billion
- FTA Competitive Bus and Bus Facilities:
  - $ 2B
- FTA Low and No Emission Competitive
  - $ 5.625 Billion

Funding Opportunities

DOT FUNDING AND FINANCING PROGRAMS WITH EV ELIGIBILITIES*

LEGEND

Construction and installation of EV charging infrastructure including parking facilities and utilities.	Workforce development and training related to EV infrastructure.	EV acquisitions and engine conversions - cars or trucks.	Planning for EV charging infrastructure and related projects.	Construction and installation of EV charging infrastructure to support operational, resiliency, national energy security, environmental, and community goals for freight transportation.	Installation of EV charging infrastructure as part of transit capital projects eligible under chapter 53 of title 49, United States Code.

	FY 2022[1] AMOUNT						
FORMULA PROGRAMS							
National Highway Performance Program (NHPP)	$28.4 B[2]	✓	✓				✓
Surface Transportation Block Grant Program (STBG)	$12.5 B[2,3]	✓	✓		✓	✓	✓
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	$2.5 B[2]	✓	✓	✓		✓	✓
National Highway Freight Program (NHFP)	$1.4 B[2]			✓	✓	✓	
State Planning and Research (SPR)	$983.3 M[4]				✓		
Metropolitan Planning (PL)	$438.1 M[2]				✓		
Carbon Reduction Program	$1.2 B[2,5]	✓	✓	✓	✓	✓	✓
National Electric Vehicle (NEVI) Formula Program	$685 M[2,5,6]	✓	✓		✓	✓	✓

Funding Opportunities

DISCRETIONARY PROGRAMS							
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) (formerly known as BUILD)	$1.5 B	✓			✓	✓	✓
Infrastructure for Rebuilding America (INFRA) Grant Program	$1.64 B[2,7]	✓			✓	✓	
Advanced Transportation and Technologies and Innovative Mobility Deployment	$60 M[2]	✓					✓
Discretionary Grant Program for Charging and Fueling Infrastructure	$300 M[2,5]	✓	✓		✓	✓	✓
Rural Surface Transportation Grant Program	$300 M[2,5]	✓	✓		✓	✓	✓
Reduction of Truck Emissions at Port Facilities Program	$80 M[2,5,7]	✓		✓		✓	
OTHER ALLOCATED PROGRAMS							
Federal Lands and Tribal Transportation Program (FLTTP)	$1.3 B[2,8]	✓	✓	✓	✓	✓	✓
Puerto Rico Highway Program (PRHP)	$173 M[2]	✓	✓	✓	✓	✓	✓
Territorial Highway Program (THP)	$46 M[2]	✓	✓		✓	✓	✓
INNOVATIVE FINANCE PROGRAMS							
State Infrastructure Banks (SIBs)	Varies	✓	✓	✓	✓	✓	✓
Transportation Infrastructure Financing and Innovation Act (TIFIA)	$250 M[2]	✓	✓	✓	✓	✓	✓

Infrastructure Bill – EPA School Buses

- EPA: $5 Billion for Clean School Buses
  - $2.5 Billion Dedicated to Electric School Buses
    - Program offered Environmental Justice communities $300,000 per bus, now $500 million - $375,000 w/ $20,000 infrastructure
      - Roanoke City, Covington City, Craig County
    - $250,000 per bus $13,000 per charger
    - “SIMPLE” WEB FORM – Contact info, vehicle detail old diesel
  - $2.5 Billion Low Emission (electric, propane, natural gas renewables)
  - 5 year program is $1B Annual funding each year 22-26
- EPA : Diesel Emissions Reduction Act 25-60% funding

FIGURE 1
On-road vehicle ecosystem[3]

Louisa County Virginia- Rural Electric School Buses

2 Electric School Buses operating since January 2021

Dominion Energy's Electric School Bus Program

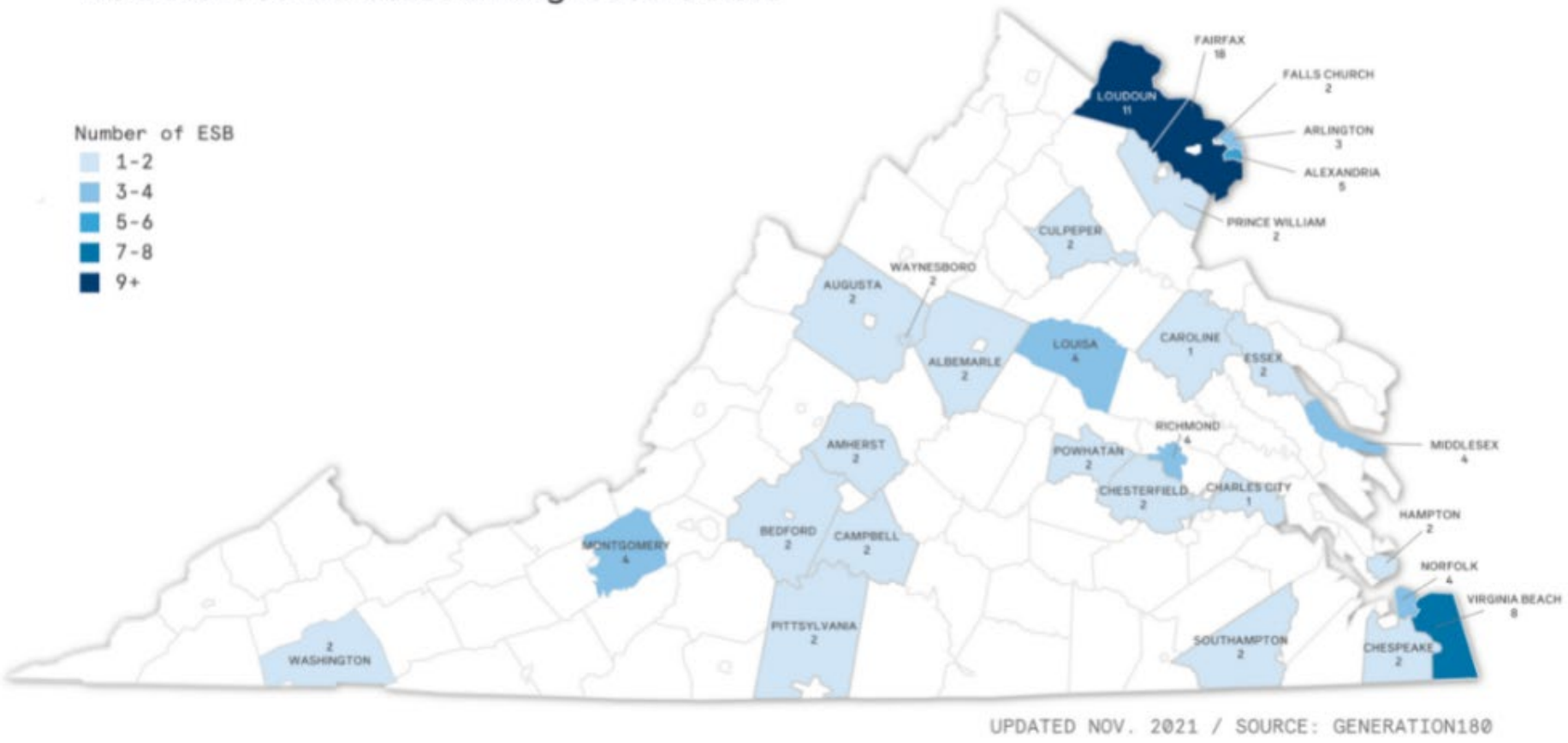
2 Electric school buses awarded in the first round of the DEQ's Clean School Bus Program announced August 2021

Keeping track of their performance data

Buses frequently returned with 65% charge remaining while running the heat and 80% remaining charge when not running the heat

ELECTRIC SCHOOL BUSES IN VIRGINIA

29 school districts are deploying
102 electric school buses throughout the state



UPDATED NOV. 2021 / SOURCE: GENERATION180

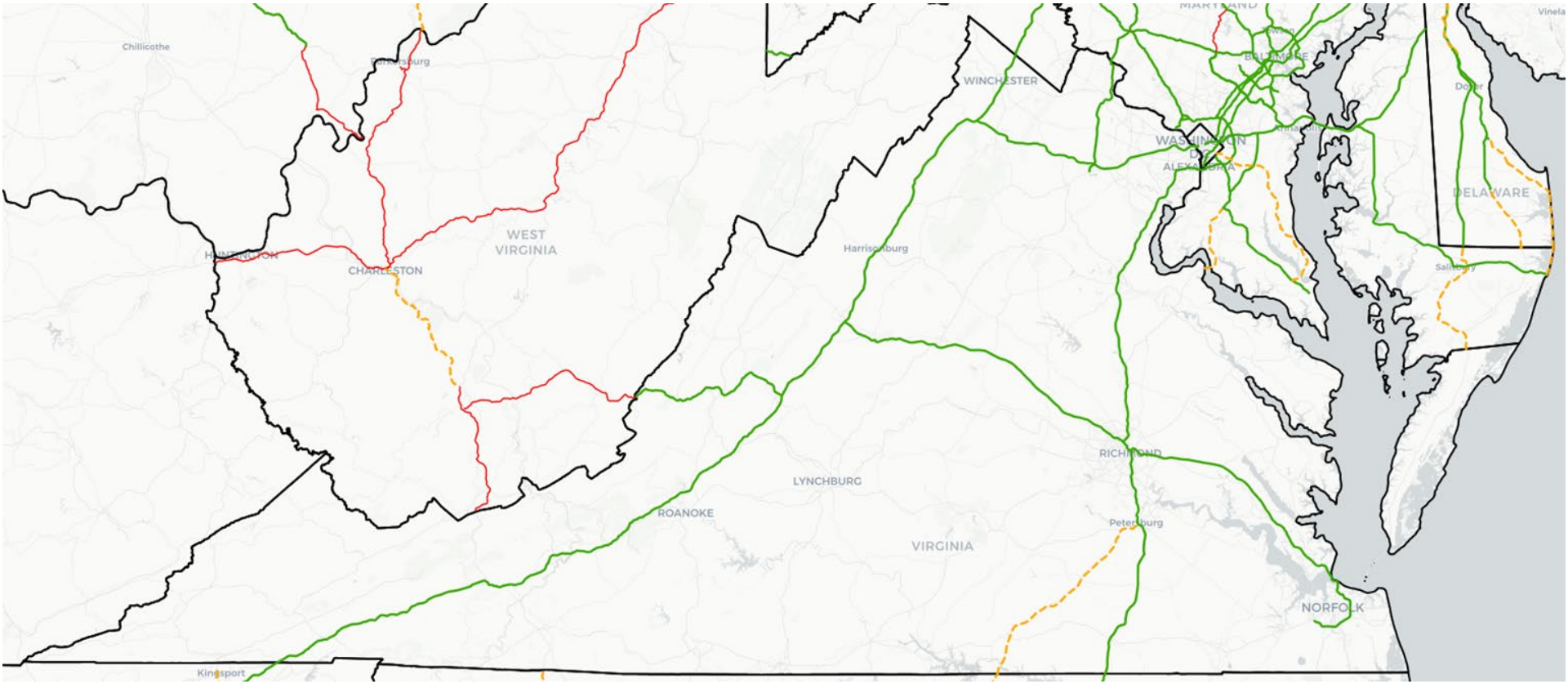
Infrastructure Bill – Energy Office

- State Energy Offices $250 Million for states to offer loans and grants through State Energy Program
- $500 Million State Energy Program can now fund alternative fuel vehicles and infrastructure
- Weatherization Assistance
  - $3.5 billion (can AFV infrastructure be eligible energy savings measure)
- Public School Energy Program $500m
  - (includes AFV fueling charging including school, students, or public)
- Energy conservation at federal facilities $250 M
- Energy conservation Block Grants
  - $550m for local govt energy efficiency including renewable energy and AFVs/EVs

Infrastructure Bill R&D Programs

- Clean Hydrogen Hubs
  - $8 Billion for Four Hubs
- Pumped Storage Hydropower Wind and Solar Integration and System Reliability Initiative
  - $2 million
- Office of Clean Energy Demonstration
  - $21.46 Billion for states / tribes
- Grid Reliability and Resilience
  - DOE $5 billion for states etc to demonstrate innovative approaches to transmission storage and hardened infrastructure
- Deployment technologies to enhance grid flexibility –
  - DOE $3 billion for reliability resilience and smart grid investments
- Vehicle Technologies Office Pilots often 50% cost share

Designated Alternative Fuel Corridors



EVSE Tesla L2, DCFC & non-tesla L2 and DCFC & planned stations

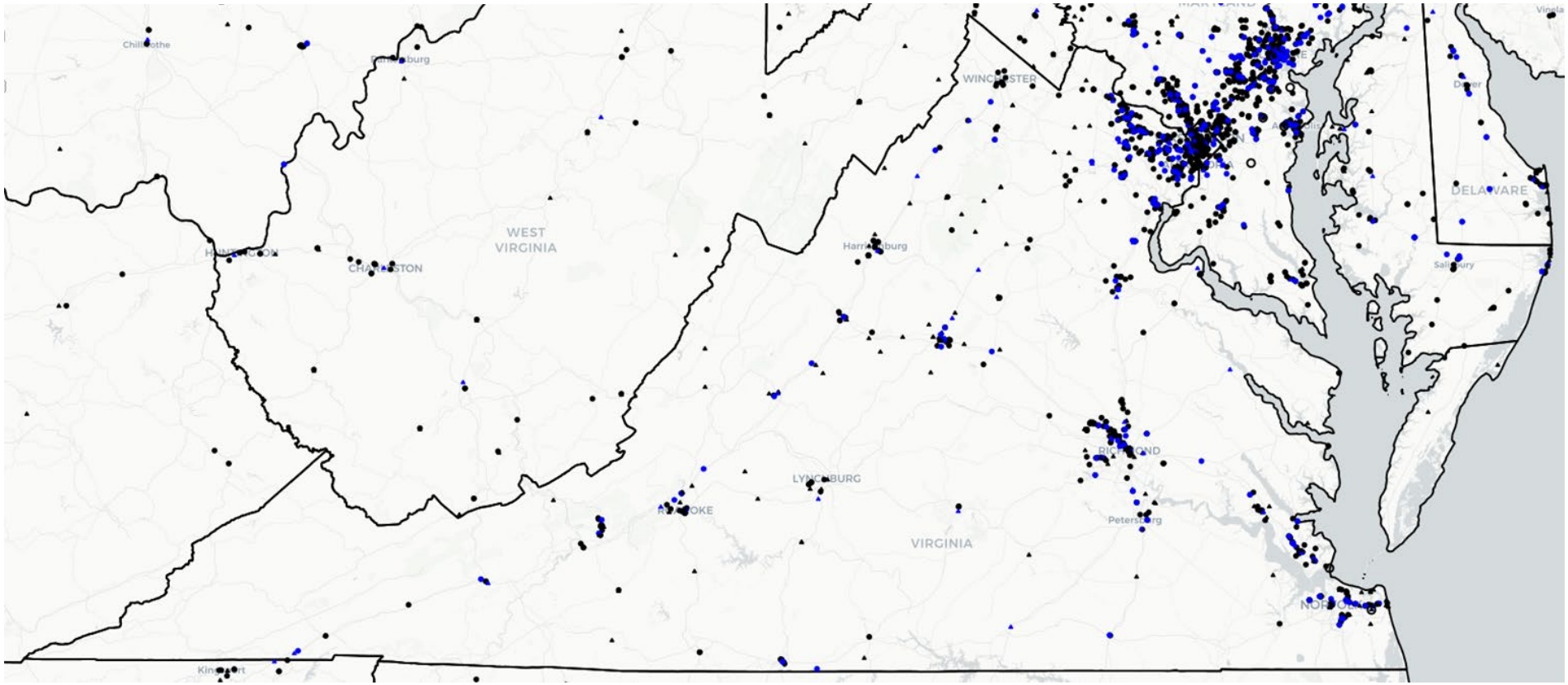
Electric Vehicle Charging Stations (Planned)

Electric Vehicle Charging Stations (Non-Tesla DC Fast)

Electric Vehicle Charging Stations (Tesla DC Fast)

Electric Vehicle Charging Stations (Non-Tesla Level 2)

Electric Vehicle Charging Stations (Tesla Level 2)

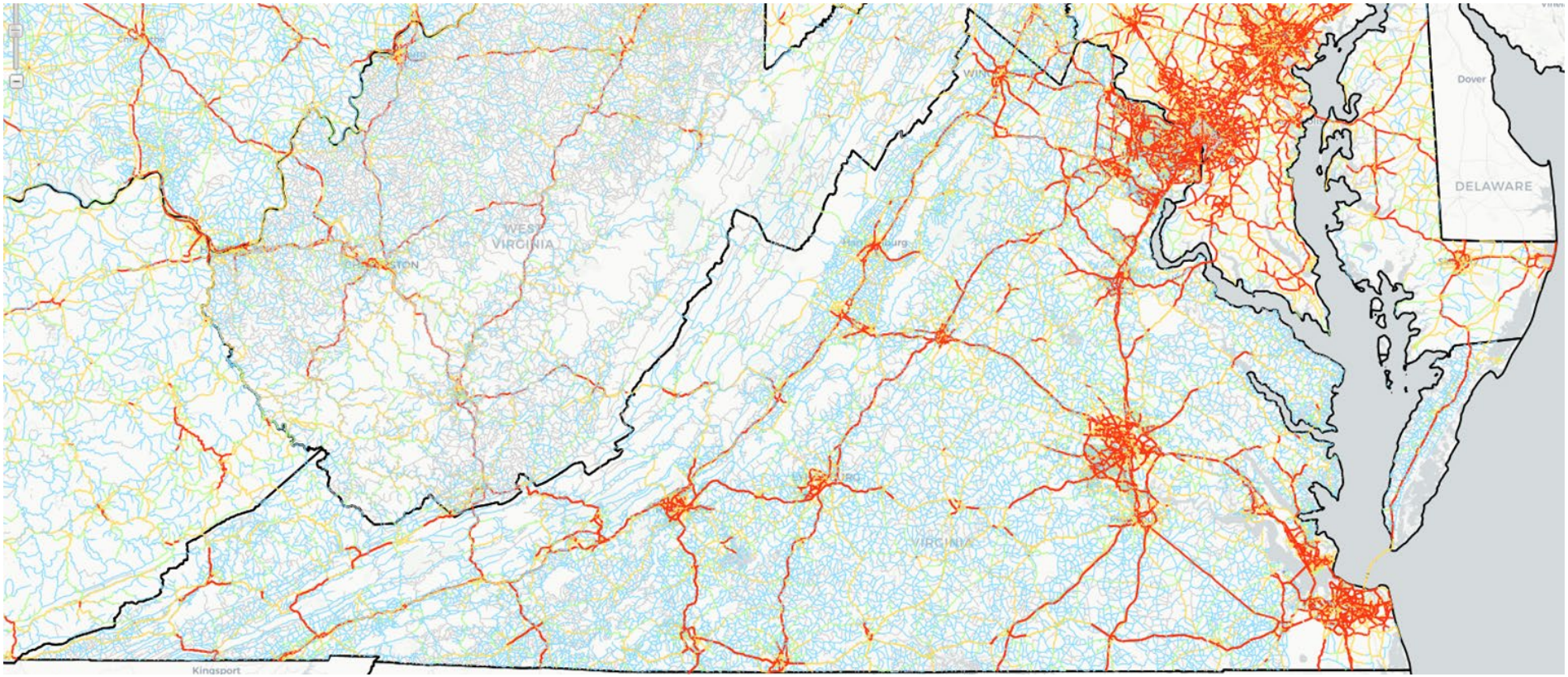


Roads with Average Annual Daily Vehicle Traffic

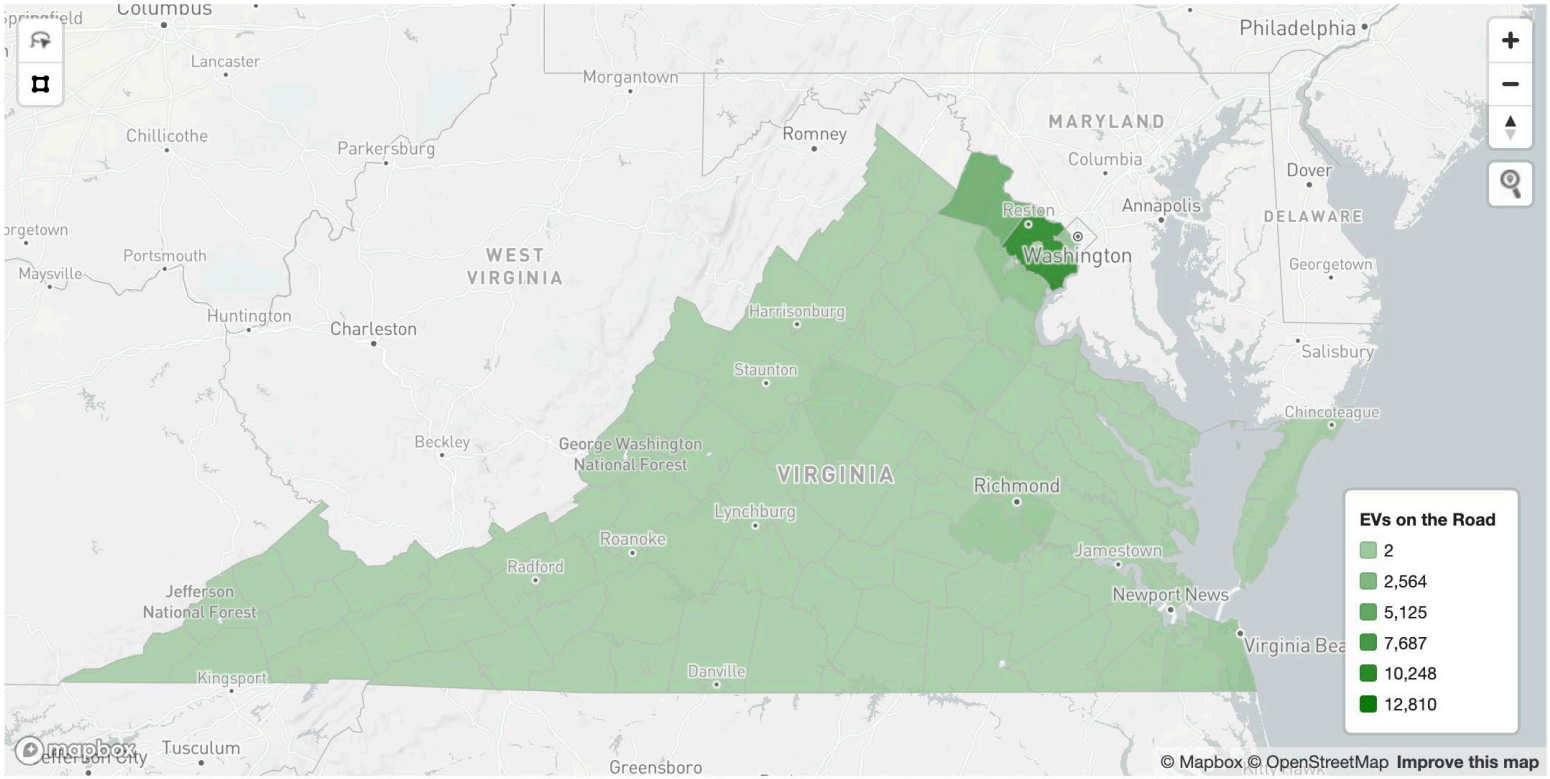
Roads, with Average Annual Daily Vehicle Traffic

Average Annual Traffic Volume

- 0 - 100
- 101 - 1000
- 1001 - 2000
- 2001 - 10000
- 10,000 - 420,000



EVs on the Road by County



Key Statistics

44,344
EVs on the Road

29,106
BEVs on the Road

15,236
PHEVs on the Road

3.44
BEVs per 1k People

1.80
PHEVs per 1k People

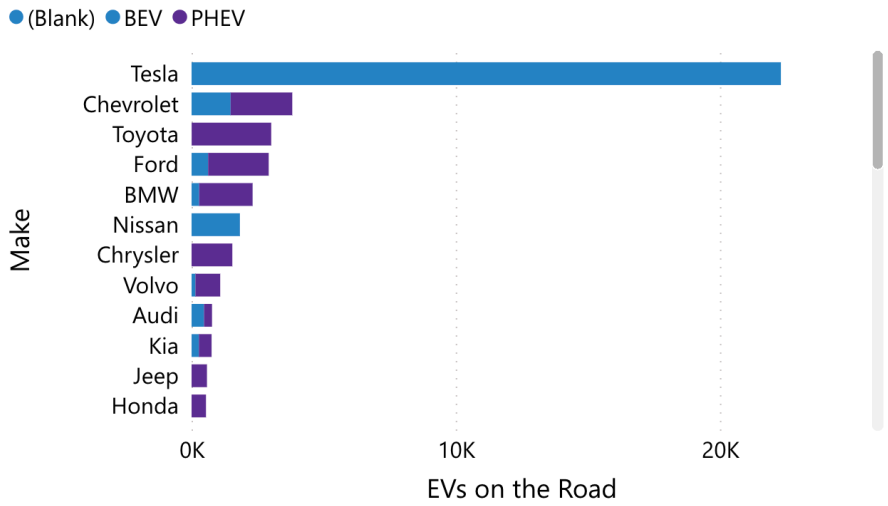
38.35
BEVS per DCFC Ports

18.77
EVs per Level 2 Port

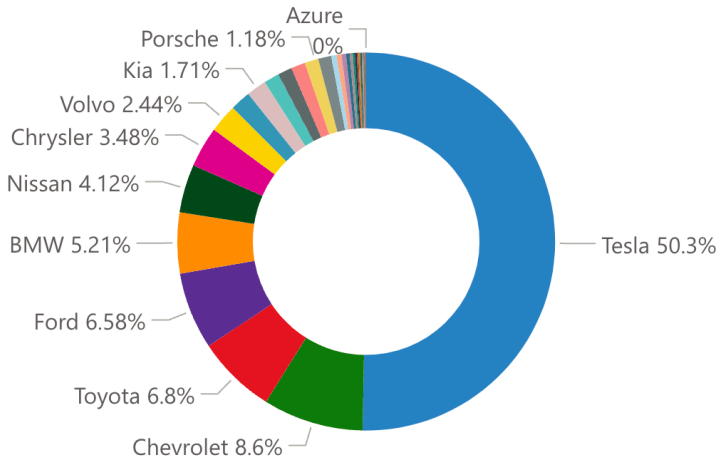
37
Vehicle Makes

96
Vehicle Models

EVs on the Road by Vehicle Make and Model



Market Share by Vehicle Make



Locality Reports

Blacksburg-Area-EV-Charging-Report Download

Bristol-Area-EV-Charging-Report Download

Charlottesville-Area-EV-Charging-Report Download

Fredericksburg-Area-EV-Charging-Report Download

Harrisonburg-Area-EV-Charging-Report Download

Lynchburg-Area-EV-Charging-Report Download

Richmond-Area-EV-Charginc

Roanoke-Area-EV-Charging-I

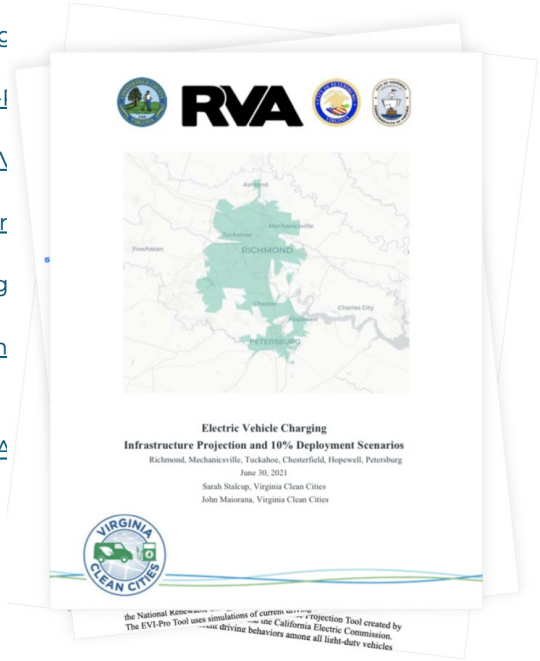
Stauton.Waynesboro-Area-EV

Virginia-Beach-Area-EV-Char

Williamsburg-Area-EV-Charg

Winchester-Area-EV-Chargin

UPDATED: Washington-DC-A



EVI Pro Tool Lite – 10% 7650 Staunton/Waynesboro. EVI PRO LITE

In the Staunton-Waynesboro area, to support 7,650 plug-in electric vehicles you would need:

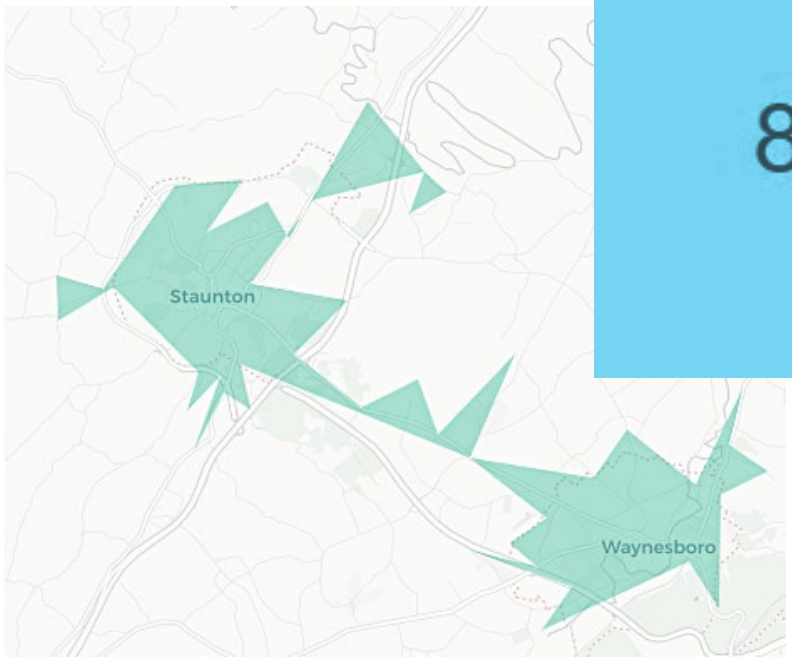
1,037 Workplace Level 2 Charging Plugs

642 Public Level 2 Charging Plugs

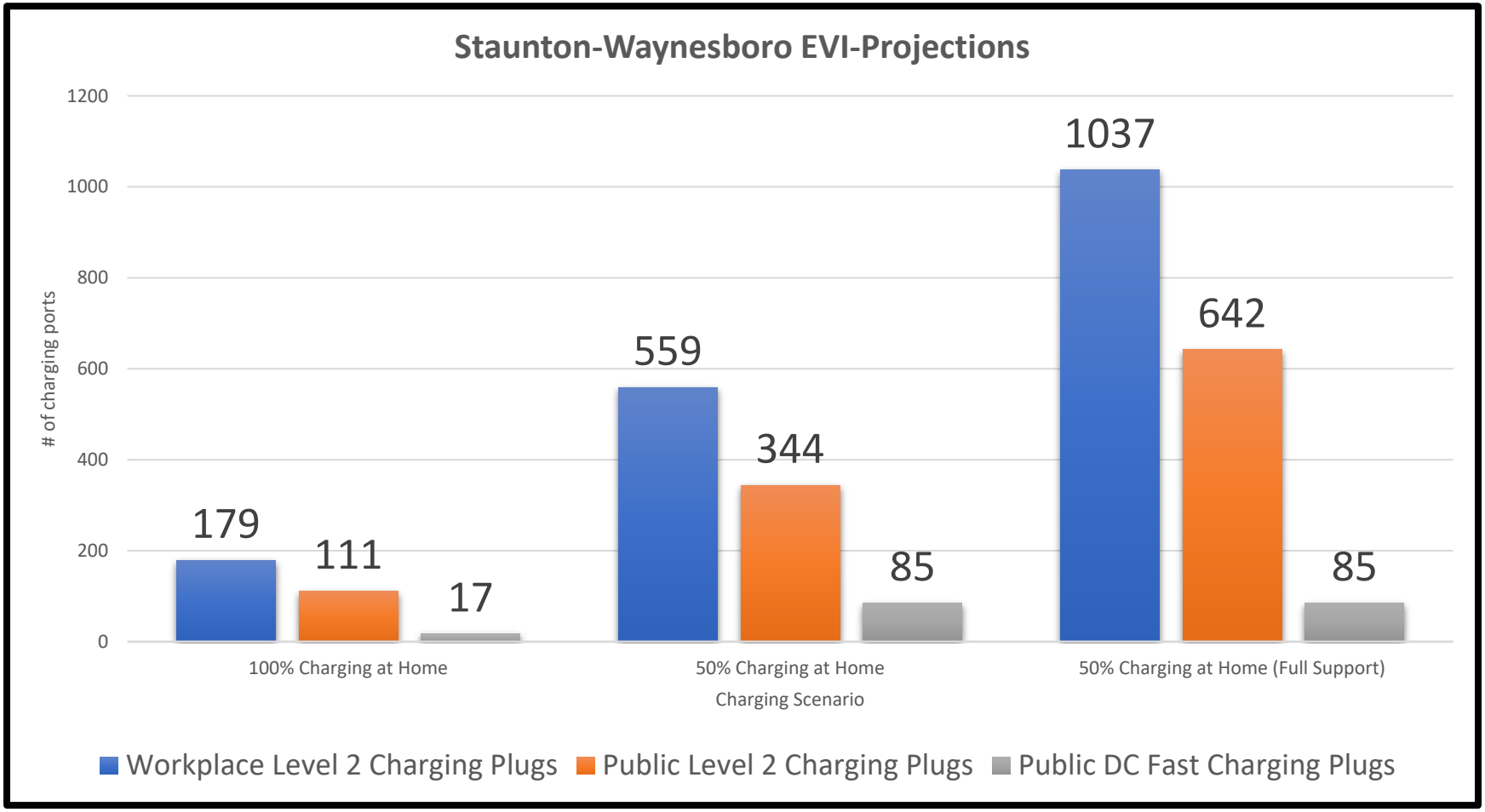
There are currently 16 plugs with an average of 2.7 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.

85 Public DC Fast Charging Plugs

There are currently 12 plugs with an average of 6.0 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.

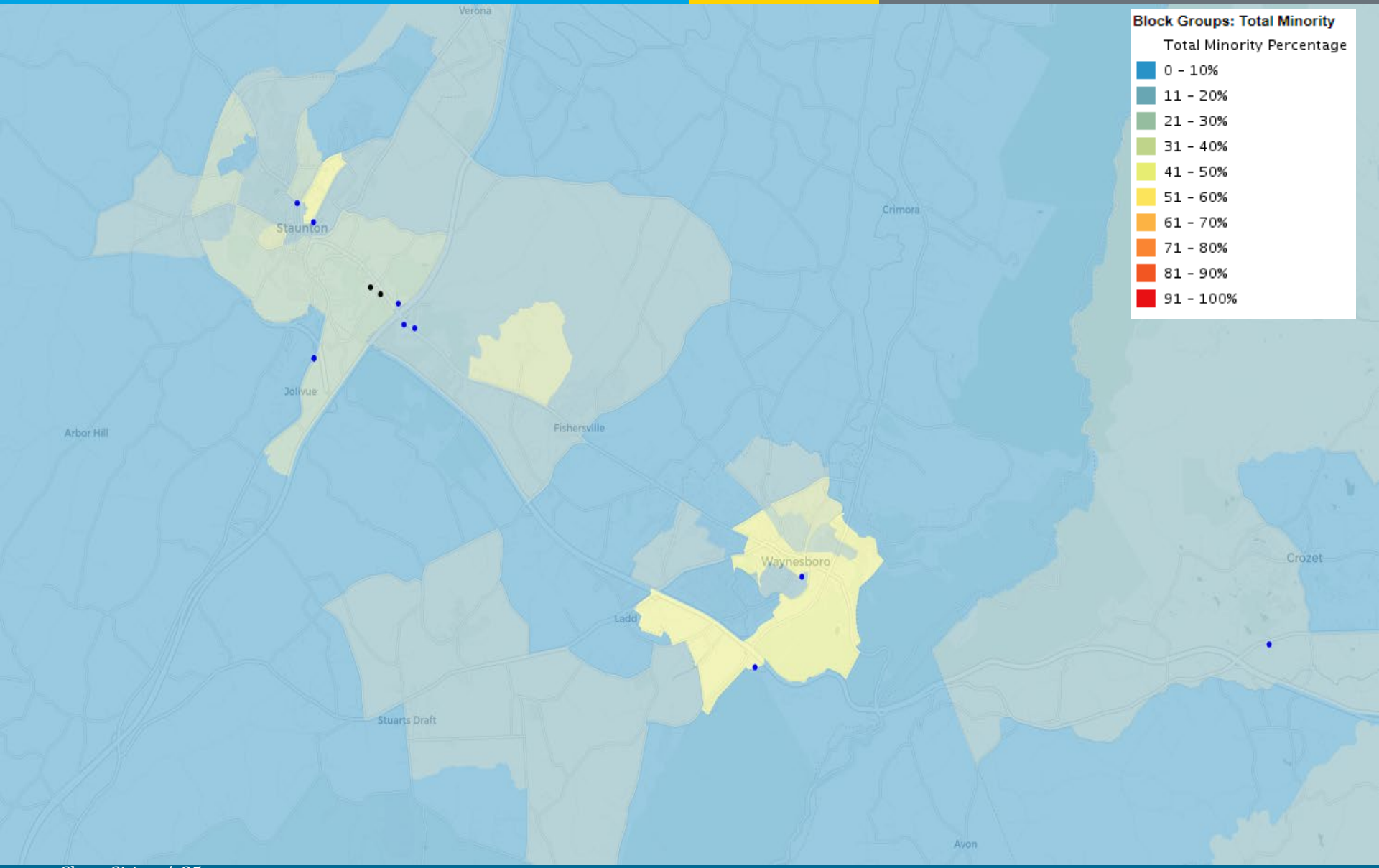


Planning for the Right Projection EVI PRO LITE

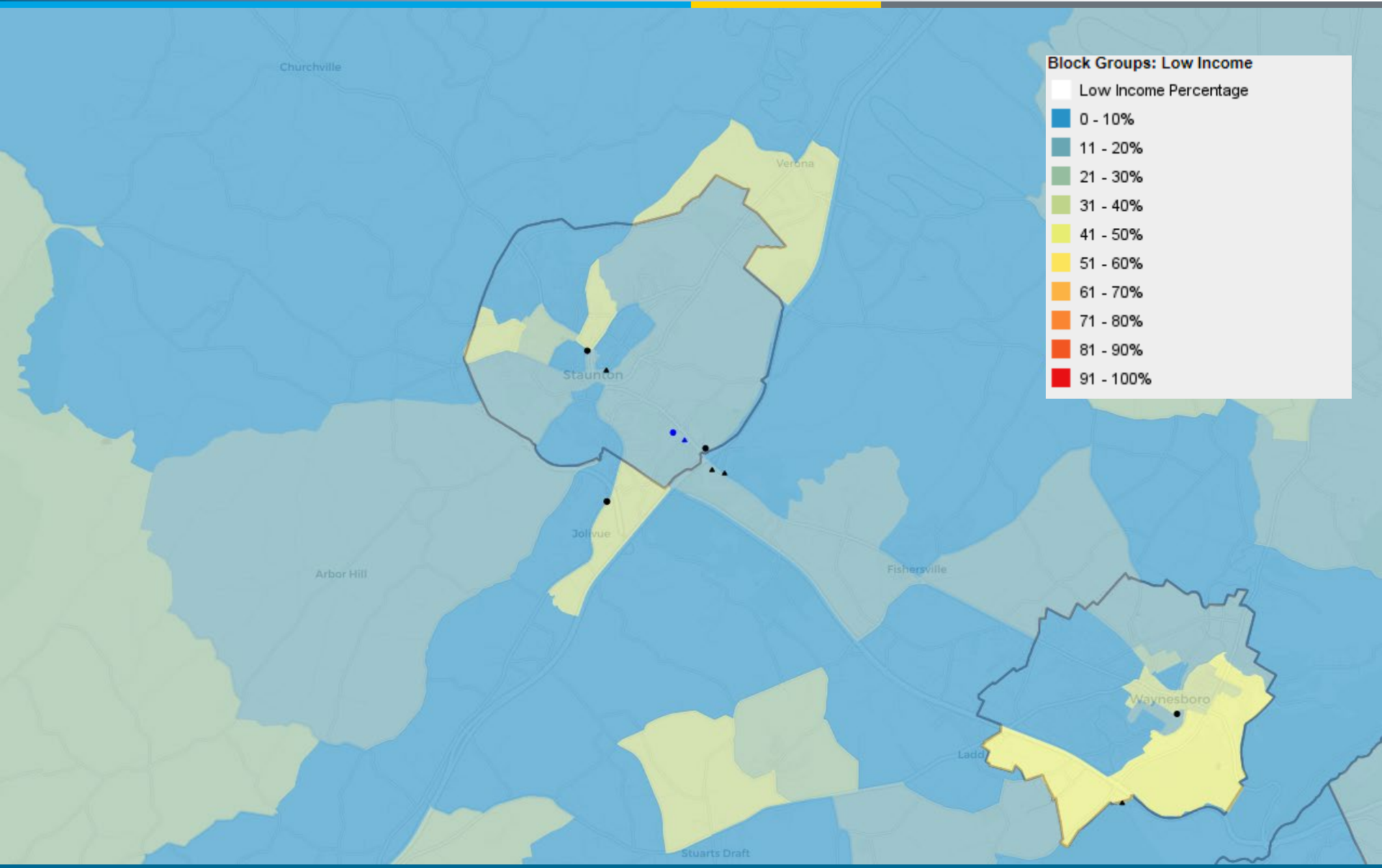


Additionally, we can project that Staunton-Waynesboro area would need 3,040 single home L1 or L2 charging plugs and 760 Multi-Unit Dwelling and or curbside level 2 charging plugs

Equity of Access – Minority Population. EZMT



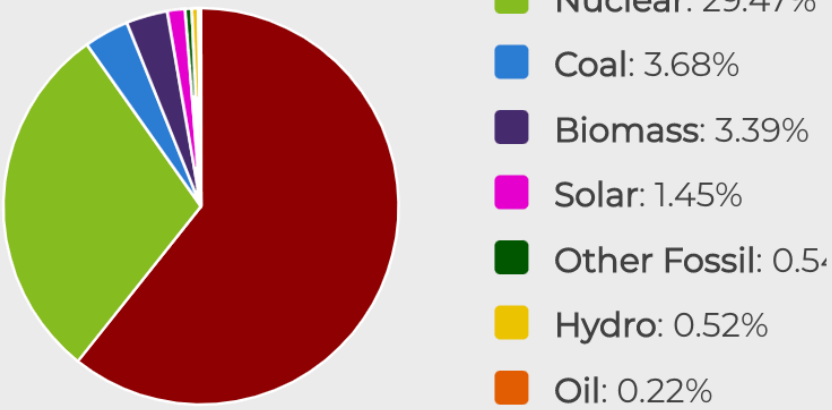
Equity of Access – Low Income Communities. EZMT



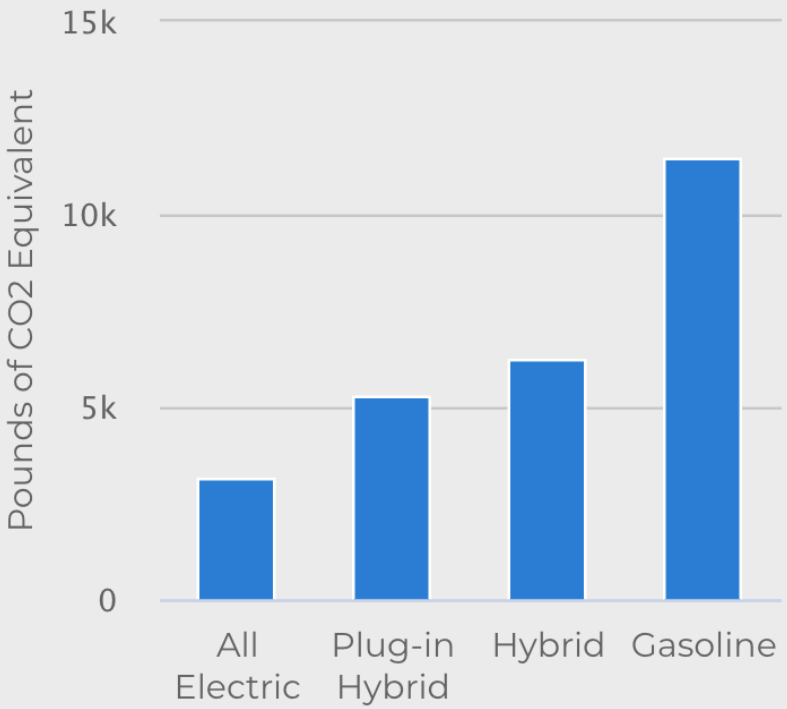
Reduced Emissions On VA Grid

State Averages for Virginia

Electricity Sources



Annual Emissions per Vehicle



Current Market

- Total cost of ownership for lower cost domestic fuels
- Jobs and health
- More infrastructure needed than federal funding available

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

www.fueleconomy.gov

the official U.S. government source for fuel economy information

Find a Car | Save Money & Fuel | Benefits | My MPG | Advanced Vehicles & Fuels | About F

You are here: Find a Car Home > Compare Side-by-Side

Compare Side-by-Side

Fuel Economy | Energy and Environment | Safety | Specs

	2022 Chevrolet Tahoe 4WD X	2022 Chevrolet Bolt EUV X
Personalize	Gasoline Vehicle 	Electric Vehicle 
	6.2 L, 8 cyl, Automatic 10-spd	Automatic (variable gear ratios)
	MSRP: $52,700 - $73,000	MSRP: $33,000 - $37,500
EPA Fuel Economy 1 gallon of gasoline=33.7 kWh Show electric charging stations near me	**Premium Gasoline** 16 MPG combined city/highway; 14 city 19 highway; 6.2 gal/100mi	**Electricity** 115 MPGe combined city/highway; 125 city 104 highway; 29 kWh/100 mi
	Gasoline 384 miles Total Range	Electricity 247 miles Total Range
		About All-Electric Cars
Unofficial MPG Estimates from Vehicle Owners Learn more about "My MPG" Disclaimer	User MPG estimates are not yet available for this vehicle	User MPG estimates are not yet available for this vehicle
You save or spend* Note: The average 2022 vehicle gets 27 MPG	**You SPEND $12,500** more in fuel costs over 5 years compared to the average new vehicle	**You SAVE $10,750** in fuel costs over 5 years compared to the average new vehicle
Annual Fuel Cost*	$5,100	$450
Cost to Drive 25 Miles	$8.50	$0.74