

REGIONAL ELECTRIC BUS OVERVIEW

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TPB Technical Committee
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CONTENTS

1. CONTEXT

1. Growth of e-buses in the US
2. GHG emissions and climate goals

2. METHODOLOGY

1. E-bus data collection

3. FINDINGS

1. Regional e-buses: by count, mode, % of agency fleet, and by year

4. PROCUREMENT CONCERNS

5. NEXT STEPS

1. Regional coordination talking points

6. APPENDIX

1. Additional graphics
2. Sources for reports
3. New article links
4. General information



CONTEXT growth of e-buses in the US



PRESS RELEASES | OCTOBER 17, 2019

US Zero-Emission Bus Fleet Grows Nearly 37 Percent Over Previous Year

California, Washington, Florida, Colorado, Illinois, North Carolina Lead Adoption

Source: Mixed: Clean Transit Innovation Network referencing CALSTART'S Zeroing in on ZEBs: The Advanced Technology Transit Bus Index (2019)

Clean Energy

U.S. Electric Bus Demand Outpaces Production as Cities Add to Their Fleets

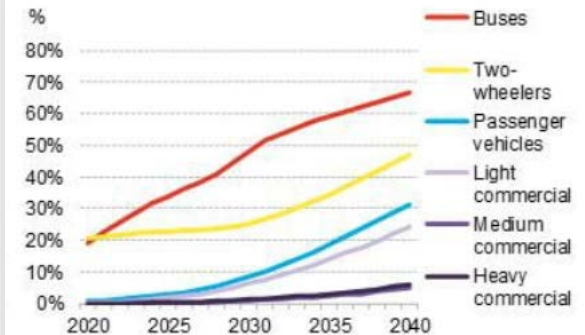
Source: Inside Climate News

E-buses to surge even faster than EVs as conventional vehicles fade



Bloomberg NEF July 12, 2018

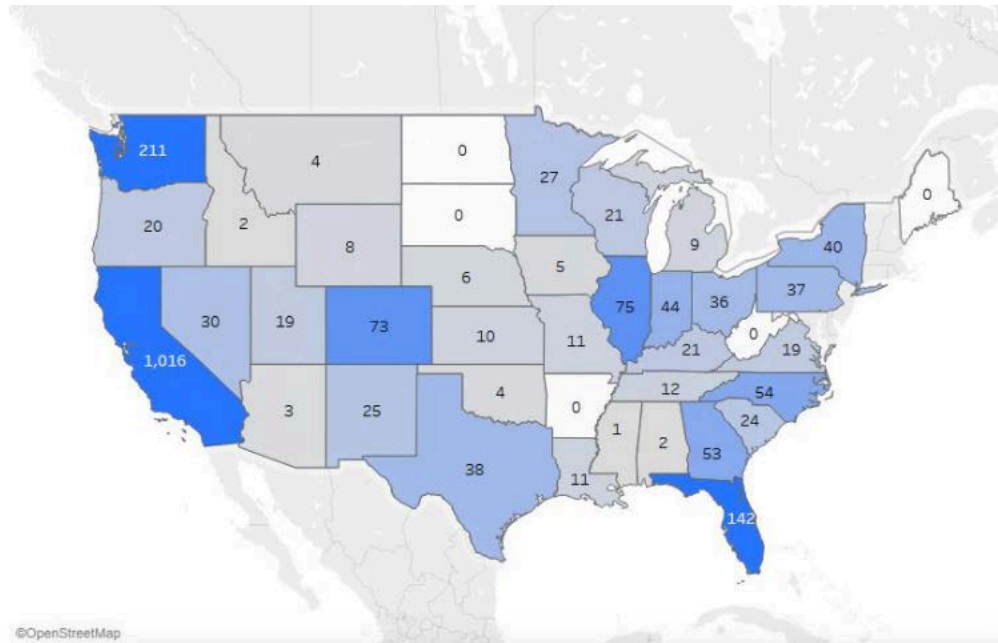
Figure 16: EV share of global vehicle fleet by segment



Source: BNEF.

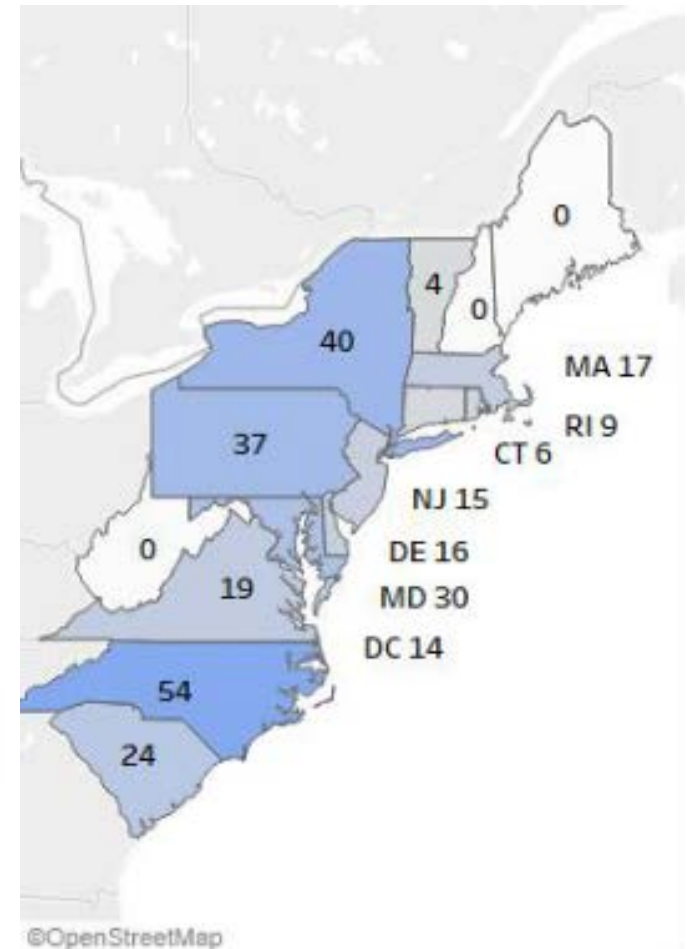


CONTEXT growth of e-buses in the US



Battery and Fuel Cell Electric Transit Buses Currently Deployed, On Order, or Soon To Be On Order Within the United States of America

Last Updated: September 27, 2019



Source: CalStart - Zeroing in on ZEBS, 2019



CONTEXT GHG emissions and climate goals

NEWS RELEASE

Officials approve new 2030 regional greenhouse gas emissions reduction goal

Oct 14, 2020



Carbon Free DC

Help shape our path to an equitable, healthy, and resilient city by 2050

Climate Solutions

Virginia becomes the first Southern state with a goal of carbon-free energy

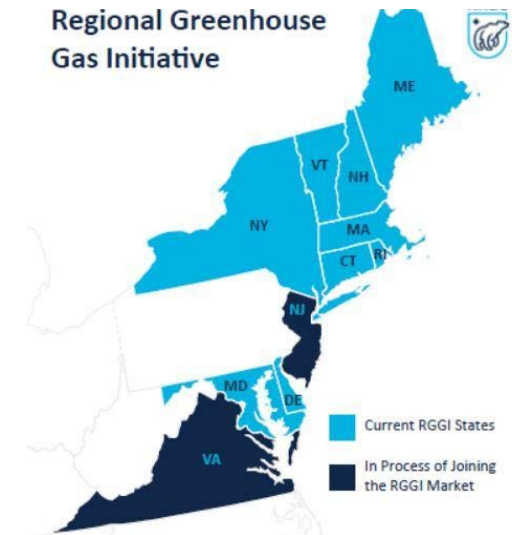
Maryland Politics

Maryland sets bolder target for cutting greenhouse gas emissions



TRANSPORTATION & CLIMATE INITIATIVE
Of the Northeast and Mid-Atlantic States

Regional Greenhouse Gas Initiative



CONTEXT

REGIONAL AGENCY INITIATIVES:

- Metro is piloting 14 zero emission buses and working on regional electric bus coalition (planning coordination for fleet / infrastructure procurement, harmonized energy rates)
- DASH completed Zero Emission Bus Feasibility Study end of 2019
- More agencies have plans to procure e-buses in capital plans / TDP
- Practically all agencies or their region have a long-term goal for decarbonizing

Service Provider	Metro Bus	Transit	DASH	DC Circulator / Street Car	MTA Commuter Bus	Connector	RideOn	ART	CUE	Omni Ride	Loudoun County Transit	The Bus	Van Go
E-Bus Initiatives / Plans	Y	Y	Y	Y	Y	Y	Y						
Name	Zero-Emission Bus Update	Annual Transportation Needs and Priorities Review (1.1.2020)	Zero Emission Bus Feasibility Study - 12/6/2019	DC Circulator Electric Bus Program	Conversion to Zero-Emission Buses (Zero Emission Bus Transition Act) MD HB334	Joint Environment Task Force	MCDOTs Green Initiatives						
Carbon Goals	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Name	Clean Energy DC Act	Resolution of the County Council of Frederick County, Maryland Re: Climate Emergency	City of Alexandria Environmental Action Plan 2040	Clean Energy DC Act	Greenhouse Gas Emissions Reduction Act Draft Plan	Joint Environment Task Force	Montgomery County Climate Action Plan	Community Energy Plan: Policy 4.1	Virginia Clean Economy Act	Virginia Clean Economy Act	Virginia Clean Economy Act	Greenhouse Gas Emissions Reduction Act Draft Plan	Greenhouse Gas Emissions Reduction Act Draft Plan

Source: COG/TPB: Compilation of local reports



METHODOLOGY e-bus data

- NTD Data: Agency Profiles; Revenue Vehicle Inventory (Years 2016-2019)
- Review of presentations and reports from service providers and non-profits (for 2020/21 data)
- Review of regional news articles mentioning e-bus procurement (for 2020/21 data)



Source: Proterra



METHODOLOGY regional e-buses in the news

DASH Adds Electric Buses to Fleet

Three electric buses are in road testing now, and three more will arrive in January.

OCT. 06, 2020 7:48 A.M.

Montgomery County Rolls Out First Four Electric Buses on Ride On; Accelerates Efforts to Reduce Transportation Emissions

For Immediate Release: Thursday, September 3, 2020

LOCAL NEWS

After a \$2.2 million government grant, electric buses will soon come to PG County

Rina Torchinsky · September 20, 2019

Maryland County Shows Off Electric Bus Fleet to Congress

Frederick County, Md., local government officials had the opportunity to show off their electric bus fleet and solar array at the county landfill to Congressmen from both coasts late last week.

BY STEVE BOHNEL, THE FREDERICK NEWS-POST / MARCH 3, 2020

14 electric vehicles will join D.C. Circulator fleet on May 1

D.C. is getting greener

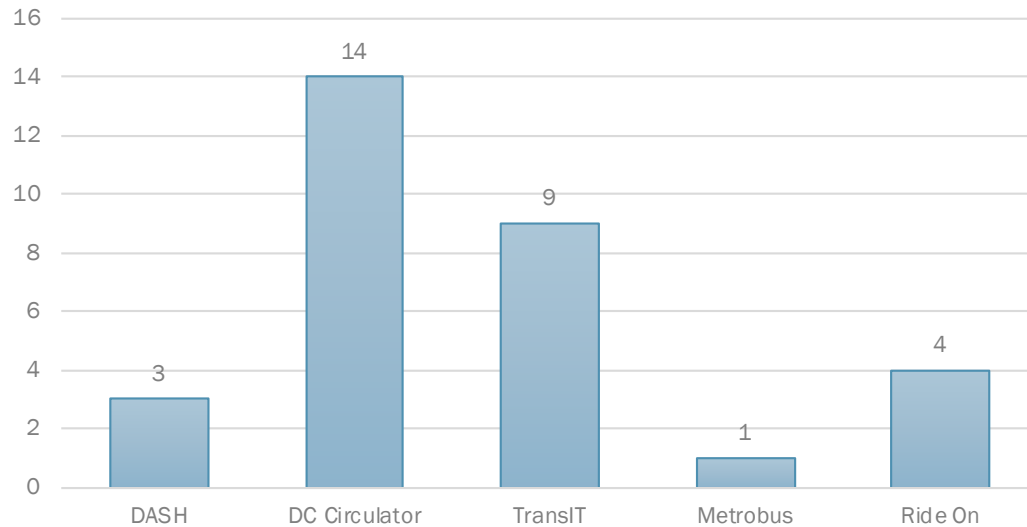
By Michelle Goldchain | @goldchainam | Apr 20, 2018, 9:45am EDT

Sources (L>R): Alexandria Living Magazine, Montgomery County MD – press detail, DBK News, Govtech, DC Curbed

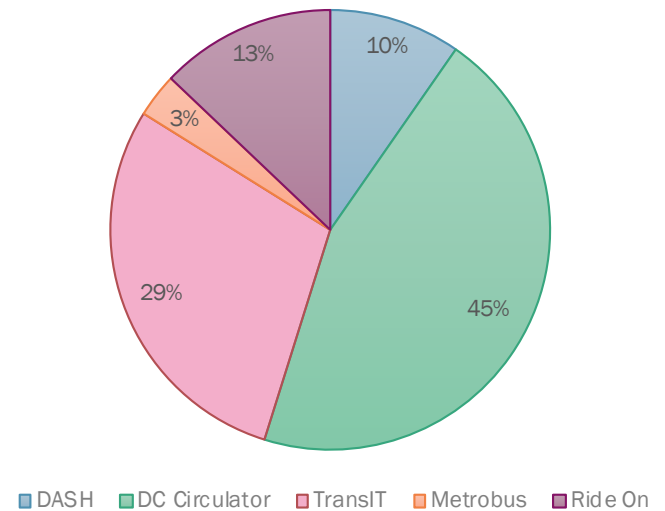


FINDINGS regional e-bus fleet by count & percent

2020 Total Count of E-Buses by Agency: Total 31



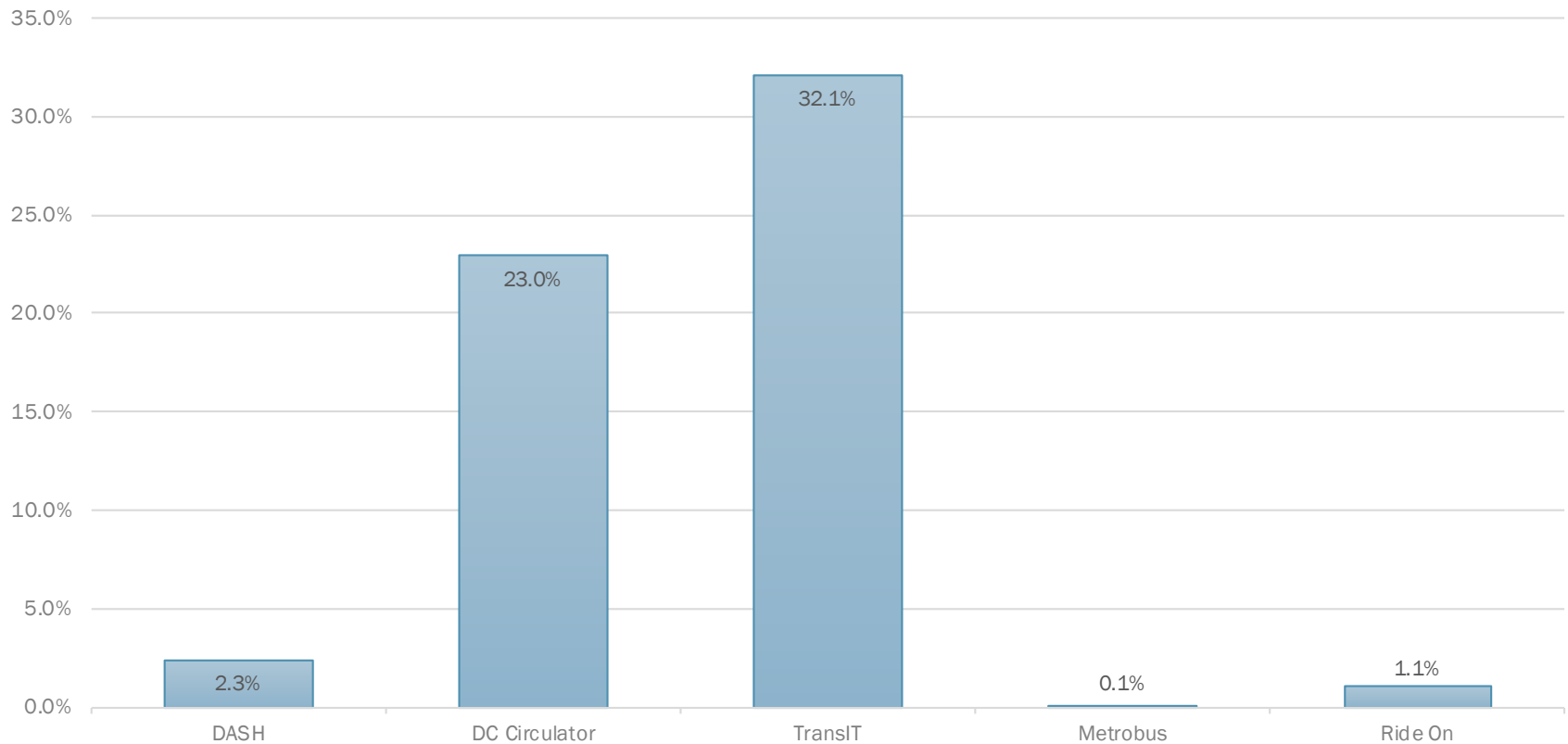
2020 Regional E-Bus fleet (by agency)



Source: Mixed: NTD RVI & review of local reports / articles



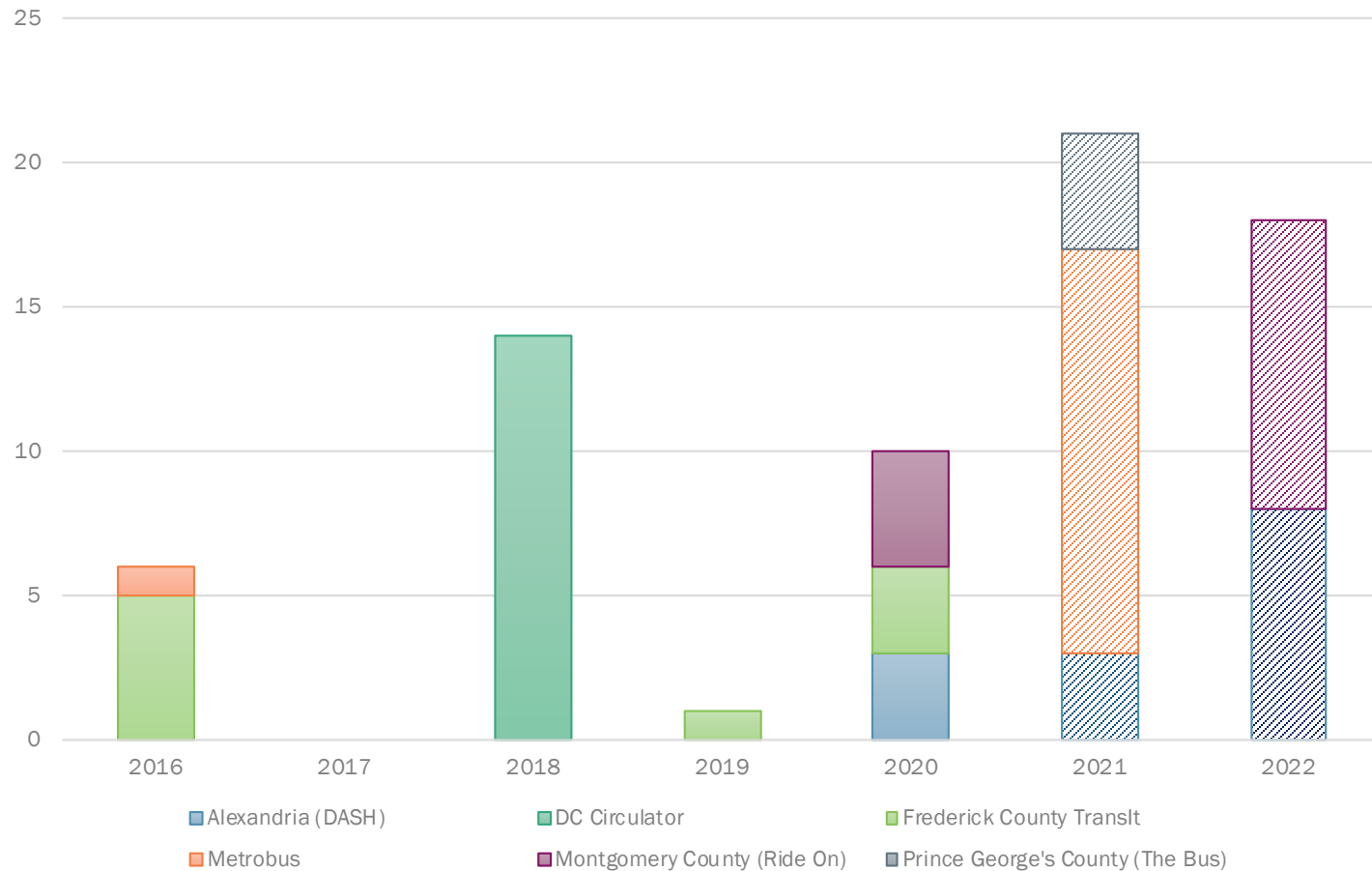
FINDINGS e-buses as % of agency fleet (2020)



Source: Mixed: NTD RVI & review of local reports / articles



FINDINGS regional e-bus procurement by year



Source: Mixed: NTDRVI & review of local reports / articles



PROCUREMENT CONCERNS

COMMON E-BUS CONCERNS

- Buy America & e-buses
- Performance of e-buses
- Associated costs
- Managing expectations of e-bus deployment and impacts

Set a goal that all new American-built buses be zero-emissions by 2030, which will create significant demand for the manufacturing of new, clean American-built buses utilizing American-manufactured inputs – and accelerate the progress by converting all 500,000 school buses in our country – including diesel – to zero emissions. Biden will ensure that the existing – and future – workforce is trained and able to operate and maintain this 21st century infrastructure.

Source: President Joe Biden’s Build Back Better Plan – Clean Energy

Table 12: Proposed solutions to e-bus barriers common in all archetypes

Barriers	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	
Fleet operations	Uncertain residual value	Guaranteed loans	Regulation on used batteries disposal	Battery lease	Extended manufacturer warranty	Extended lease or loan for the vehicle
	Cold weather – higher energy consumption	Renewable biofuel powered generators	Heat pumps	Trial bus in winter to understand additional power needed for heating		
Vehicle	Capital costs	Capital or operational lease	Battery lease	Joint purchase agreements	Extended lease or loan for the vehicle	
	Underdeveloped supply chain	Fleet electrification targets can send clear signal to bus manufacturers				
Battery	Unclear end-of-life options	Battery lease	Extended manufacturer warranty	Extended lease or loan for the vehicle	Regulation on used battery disposal	
	Falling battery prices	Vehicle lease				
Charging infrastructure	Capital cost	Standardization	Bundling the price of a charger with the price of a bus during the tendering process	Partnership with utilities		
	Installation costs	Standardization	Partnership with utilities			
	Public perception and space restrictions	Education	Re-locate bus stops			
Electricity supply and grid issues	Location of electricity supply	Partnership with utilities	Consider new depot in new location	Solar panels at depot		
	Constrained grid areas	Batteries assisted chargers		Solar panels and depot		
Financing	Uncertainty for finance companies	Bus manufacturers could take on the role of financing companies	Government guaranteed loans	Involve finance companies in long term strategy		
Government support	Lack of indirect support measures (low emissions zone)	Involve national governments in e-bus deployments	City authorities explore introducing such policies			

Source: Bloomberg: Electric Buses in Cities Driving Towards Cleaner Air and Co2



NEXT STEPS discussion

Regional Coordination:

- Energy infrastructure investments
- Training programs / workforce development
- Harmonized policies and utility rate structures
- Additional funding for e-bus and facility conversion
- Fleet lifecycles / replacement timelines



Source: Transportation and Climate Initiative



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Metropolitan Washington Council of Governments

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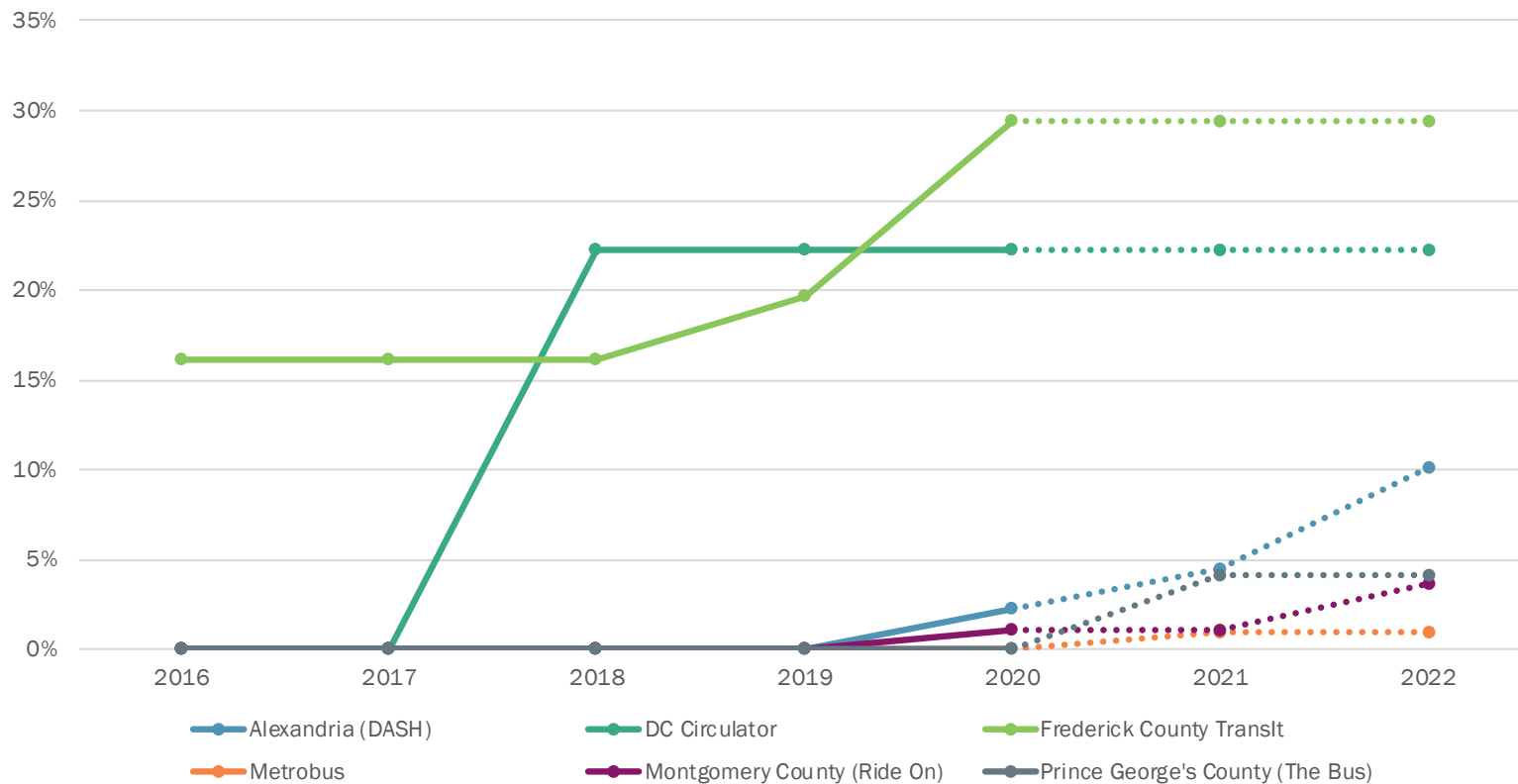
Washington, DC 20002



National Capital Region
Transportation Planning Board

APPENDIX fig. 1

Fleet Conversion (%) to Ebus (By Agency)

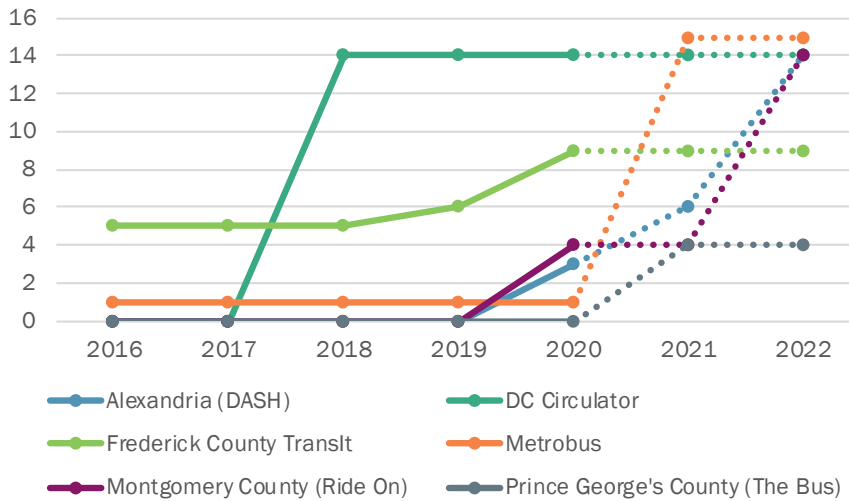


Source: Mixed: NTD RVI & review of local reports / articles

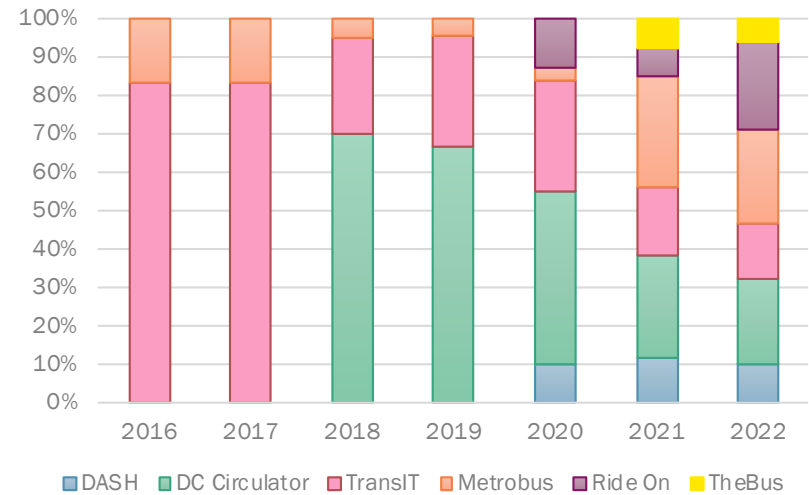


APPENDIX fig. 2 & 3

Regional E Bus Fleet (By Agency)



Agency % of regional e-bus fleet

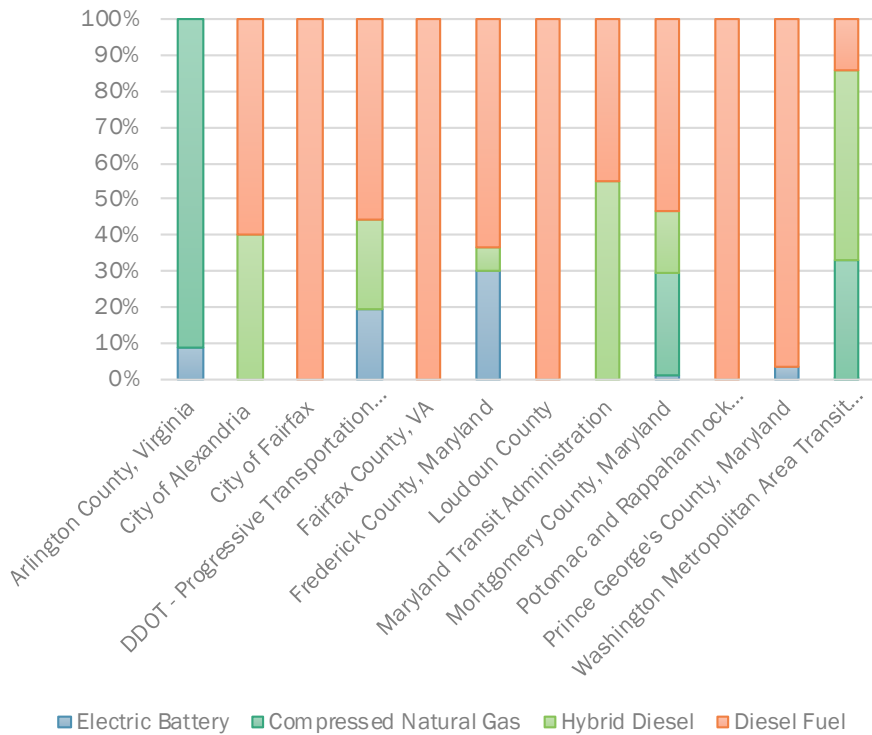


Source: Mixed: NTD RVI & review of local reports / articles



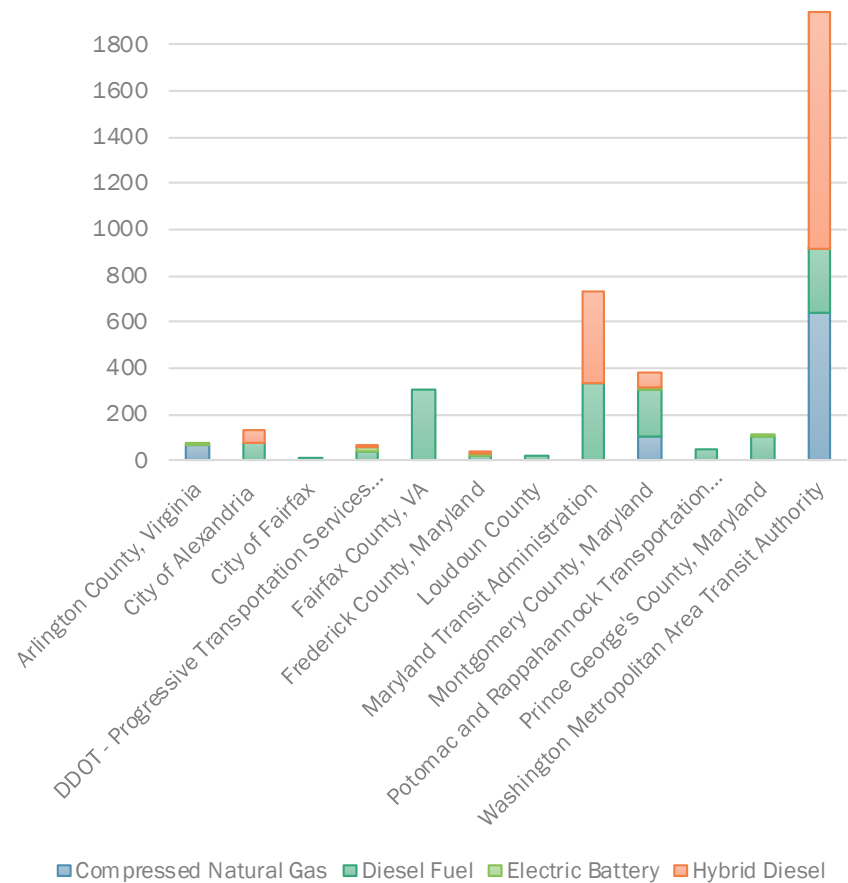
APPENDIX fig. 4 & 5

Regional Bus Fleet (%) by Fuel Type



Source: NTD RVI

Regional Bus Fleet (by Fuel Type)



APPENDIX table 1: NTD agency profiles (2019) + 2020 e-bus updates

Agency	NTDID	# of E-Buses	Total Fleet (VAMS)	% of total fleet
Alexandria DASH	30071	3	128	2.3%
DC Circulator	30112	14	61	23.0%
Frederick County Translt	30072	9	28	32.1%
Metrobus	30030	1	1558	0.1%
Montgomery County Ride On	30051	4	369	1.1%
Prince George 's County The Bus	30085	0	93	0.0%
		31	2237	1.4%
Agencies w/o E Bus Fleet				
Arlington Transit (ART)	30080	0	78	0.0%
City of Fairfax CUE	30058	0	12	0.0%
Fairfax Connector	30068	0	308	0.0%
Loudoun Commuter Transit	30081	0	30	0.0%
PRTC Omni Ride	30070	0	49	0.0%

Source: NTD Agency Profiles



APPENDIX tables 2 & 3:

e-bus procurement by year / VAMS by year

Year	Alexandria (DASH)	DC Circulator	Frederick County Translt	Metrobus	Montgomery County (Ride On)	Prince George 's County (The Bus)
2016	0	0	5	1	0	0
2017	0	0	0	0	0	0
2018	0	14	0	0	0	0
2019	0	0	1	0	0	0
2020	3	0	3	0	4	0
2021	3	0	0	14		4
2022	8	0	0	0	10	0

AGENCY VAMS *assumes 2020-2022 projection growth is only via increase in e-bus procurement and no other buses

Year	Alexandria (DASH)	DC Circulator	Frederick County Translt	Metrobus	Montgomery County (Ride On)	Prince George 's County (The Bus)
2016	85	67	31	1503	338	93
2017	85	67	31	1488	344	93
2018	86	63	25	1478	369	93
2019	128	61	28	1558	369	93
2020	131	61	31	1558	373	93
2021	134	61	31	1572	373	97
2022	142	61	31	1572	383	97

Source: Mixed: NTD RVI & review of local reports / articles



APPENDIX tables 4:

NCR E-Bus Plans / Carbon Goals by Agency

Service Provider	Metro Bus	Transit	DASH	DC Circulator / Street Car	MTA Commuter Bus	Connector	RideOn	ART	CUE	Omni Ride	Loudoun County Transit	The Bus	Van Go
E-Bus Initiatives / Plans	Y	Y	Y	Y	Y	Y	Y						
Name	Zero-Emission Bus Update	Annual Transportation Needs and Priorities Review (1.1.2020)	Zero Emission Bus Feasibility Study - 12/6/2019	DC Circulator Electric Bus Program	Conversion to Zero-Emission Buses (Zero Emission Bus Transition Act) MD HB334	Joint Environment Task Force	MCDOT's Green Initiatives						
Notes	Working to coordinate regional energy fare structure and procurement for e-buses and infrastructure	Bus Replacement includes purchasing 3-4 large all electric buses over each of the next 3 years. Allocating \$543,000 per bus	2 part study looked at the feasibility of transitioning to ZEB fleet and a draft scope of work for an implementation plan.	"Substantial completion on 4.14.2018" "Electric Bus Service Began 5.1.2018)	Legislative Bill would prohibit starting FY23 MTA from purchasing buses that are non ZEBs as well as regularly report to General Assembly on the schedule to fleet conversion and plan for transition of adversely affected state employees. Sponsored by Marc Korman; Last Action- 2/12 hearing (environment and transportation)	Fairfax County Connector bus fleet should be transitioned to electric (or other non-carbon emitting) alternatives by 2030, and the FCPS fleet by 2035. All non-bus fleet vehicles that have electric alternatives should be transitioned by 2035.	Includes electric buses in green travel options.						
Carbon Goals	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Name	Clean Energy DC Act	Resolution of the County Council of Frederick County, Maryland Re: Climate Emergency	City of Alexandria Environmental Action Plan 2040	Clean Energy DC Act	Greenhouse Gas Emissions Reduction Act Draft Plan	Joint Environment Task Force	Montgomery County Climate Action Plan	Community Energy Plan: Policy 4.1	Virginia Clean Economy Act	Virginia Clean Economy Act	Virginia Clean Economy Act	Greenhouse Gas Emissions Reduction Act Draft Plan	Greenhouse Gas Emissions Reduction Act Draft Plan
Notes	"Fully Electric Fleet by 2045, 50% by 2030"	"Reduce county-wide greenhouse gas emissions 50% from 2010 levels by 2030 and 100% no later than 2050"	"The City target is to reduce emissions by 50 percent by 2030 (base year 2005) and to approach net zero or carbon neutral, an 80-100 percent reduction by 2050."		"50% Zero Emission by 2030"	"Connect bus fleet all electric by 2030; FCPS fleet by 2035, all other 2035"	"to reduce our community-wide greenhouse gas emissions 80% by 2027 and 100% by 2035"	"Reduce the amount of carbon produced from transportation to 0.5mt CO2e/capita/year by 2050. Milestones include (vs. 3.7 mt in 2007):o2020: 2.7 mt CO2e/capita/year 2030: 1.7mt CO2e/capita/year 2040: 0.8mt CO2e/capita/year"	"mandates that the state's biggest utility, Dominion Energy, switch to renewable energy by 2045. Appalachian Power, which serves far southwest Virginia, must go carbon-free by 2050."	"mandates that the state's biggest utility, Dominion Energy, switch to renewable energy by 2045. Appalachian Power, which serves far southwest Virginia, must go carbon-free by 2050."			

Source: COG/TPB: Compilation of local reports



APPENDIX links

Sources

Context Source Links

<https://www.cleantansitnetwork.org/us-zero-emission-bus-fleet-grows-nearly-37-percent-over-previous-year/>
<https://insideclimatenews.org/news/14112019/electric-bus-cost-savings-health-fuel-charging/>
<https://bnef.turtl.co/story/evo-2020/page/4/1?teaser=yes>
<https://about.bnef.com/electric-vehicle-outlook/>
<https://www.bloomberg.com/professional/blog/e-buses-surge-even-faster-evs-conventional-vehicles-fade/>
<https://www.transit.dot.gov/ntd/data-product/2019-annual-database-revenue-vehicle-inventory>

Methodology Source Links

<https://alexandrialivingmagazine.com/news/dash-adds-electric-buses-to-fleet/>
<https://www.proterra.com/press-release/washington-d-c-circulator-deploys-proterra-battery-electric-buses-across-nations-capital/>
<https://dc.curbed.com/2018/4/20/17261378/dc-circulator-electric-proterra>
<https://www.govtech.com/transportation/Maryland-County-Shows-Off-Electric-Bus-Fleet-to-Congress.html>
https://www.sierraclub.org/sites/www.sierraclub.org/files/press-room/WMATAReport_Web.pdf
https://www2.montgomerycountymd.gov/mcgportalapps/Press_Detail.aspx?Item_ID=26756
<https://content.govdelivery.com/accounts/MDPGC/bulletins/2a5ae3d>
<https://dbknews.com/2019/09/20/umd-college-park-electric-buses-pg-county/>

