

Energy Infrastructure and Data Centers



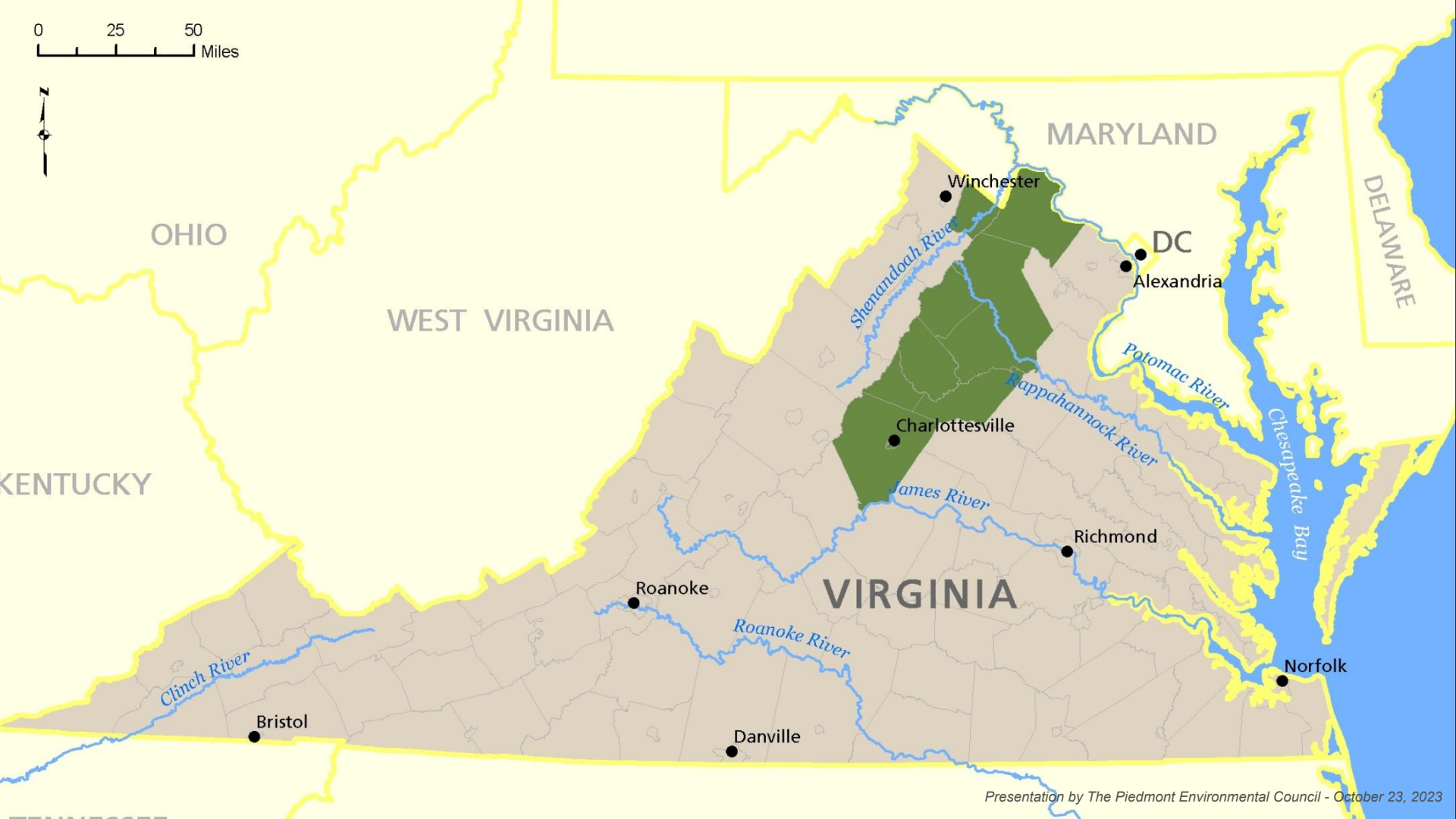
Piedmont
Environmental
Council

Our Mission

Protect and restore the lands and waters of the Virginia Piedmont, while building stronger, more sustainable communities.



0 25 50 Miles



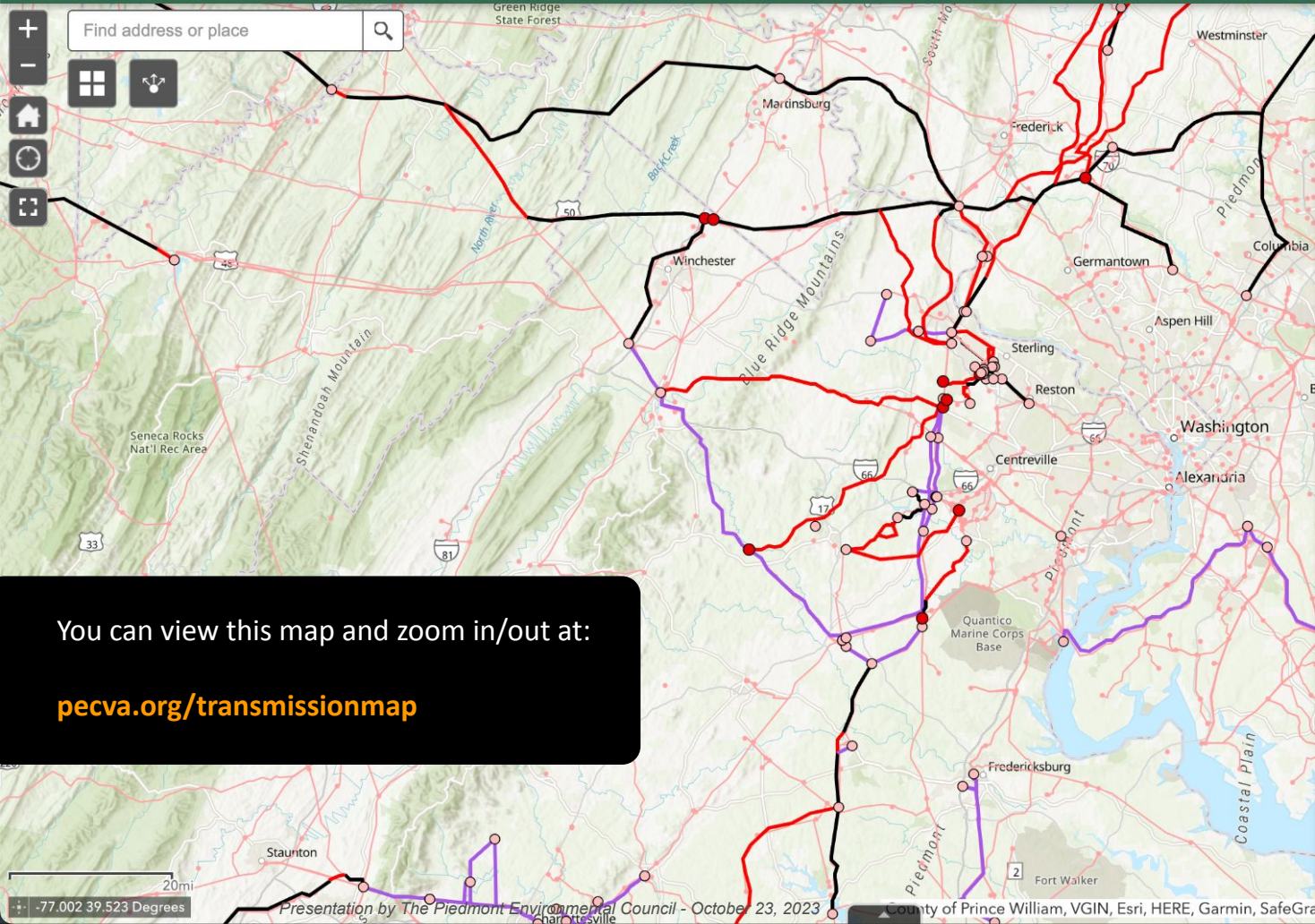


We're part of a growing coalition...

Presentation by The Piedmont Environmental Council - October 23, 2023



Protect ~~F~~auquier

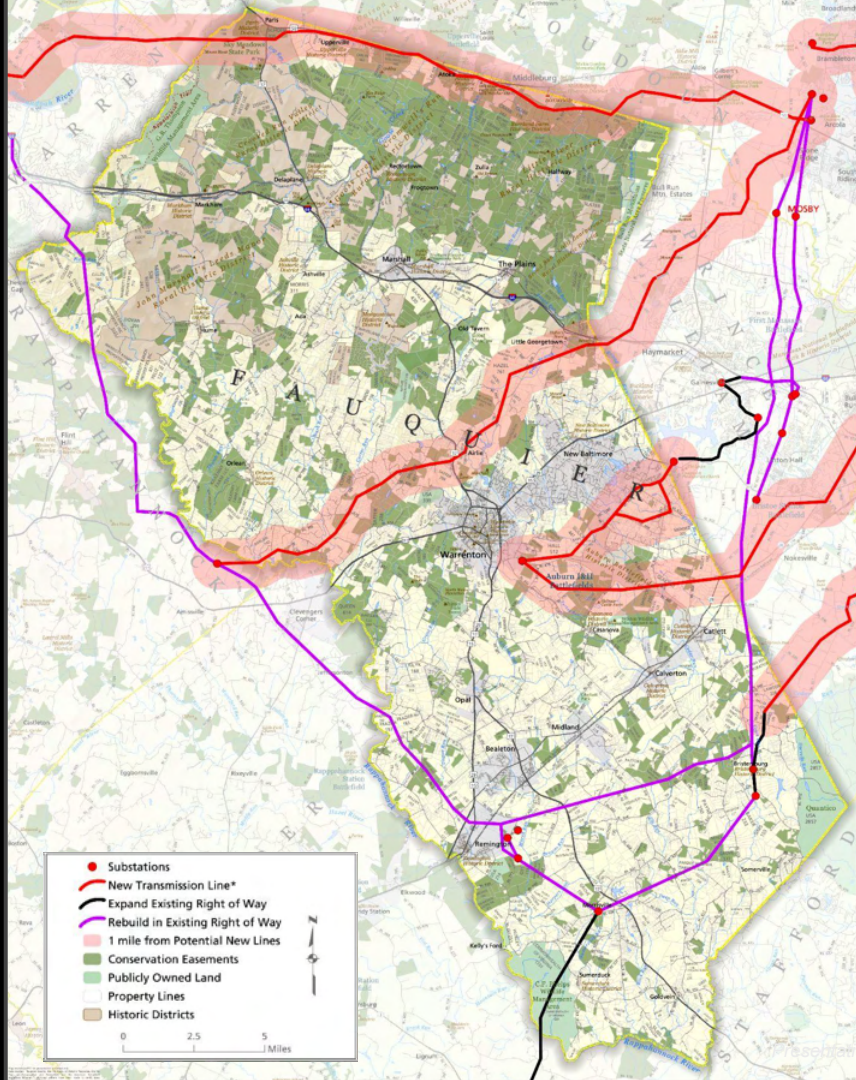


Layer List










Layers

- Sketch
- Proposed New and Upgraded Substations
 - Proposed New Substation
 - Proposed Upgraded Substations
- Proposed New and Upgraded Transmission Lines up to 500 kV
 - New Transmission Line
 - Expand Existing Right of Way
 - Rebuild in Existing Right of Way
- Electric Transmission Lines
- PJM Short List Projects
- Substations
- USA_Wetlands
- Virginia Senate Districts
- Virginia House Districts
- Protected Areas Database of the United States (PAD-US) v3.0
- NewTransLine_Buffer1 mile
- Maryland Historic Districts

You can view this map and zoom in/out at:
pecva.org/transmissionmap

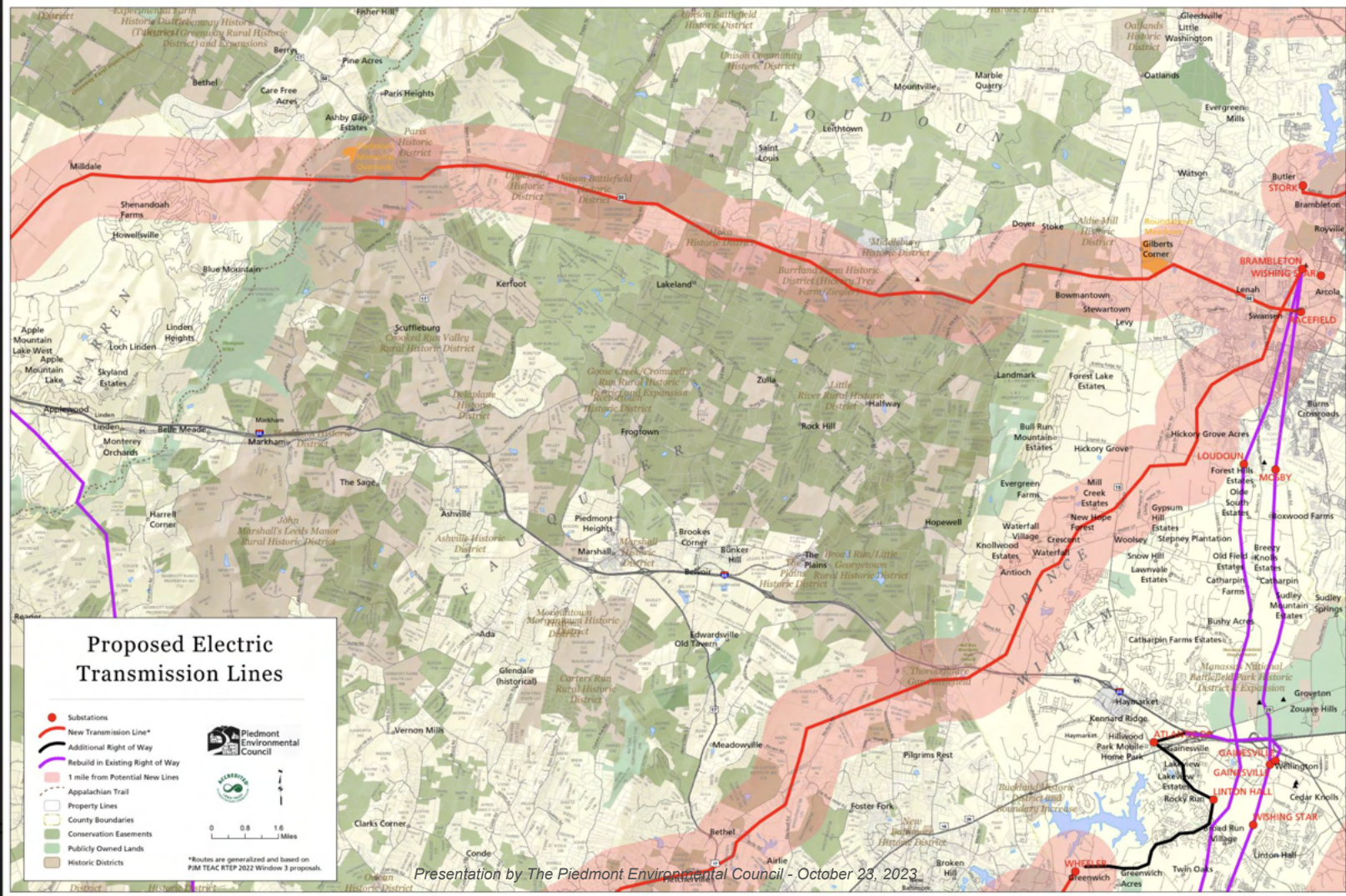


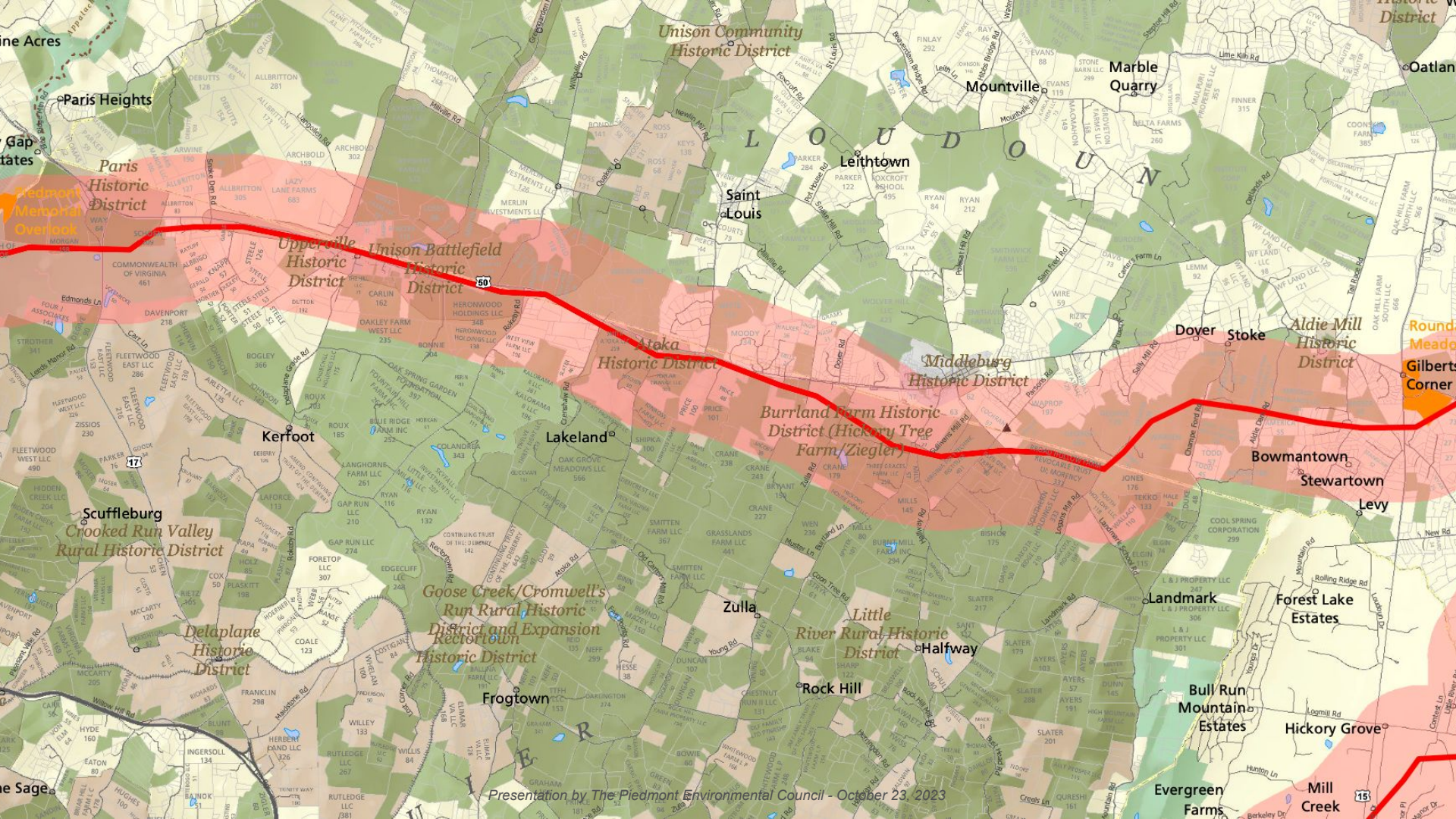
Proposed Electric Transmission Lines

-  Substations
-  New Transmission Line*
-  Additional Right of Way
-  Rebuild in Existing Right of Way
-  1 mile from Potential New Lines
-  Appalachian Trail
-  Property Lines
-  County Boundaries
-  Conservation Easements
-  Publicly Owned Lands
-  Historic Districts



*Routes are generalized and based on PJM TEAC RTP 2022 Window 3 proposals.





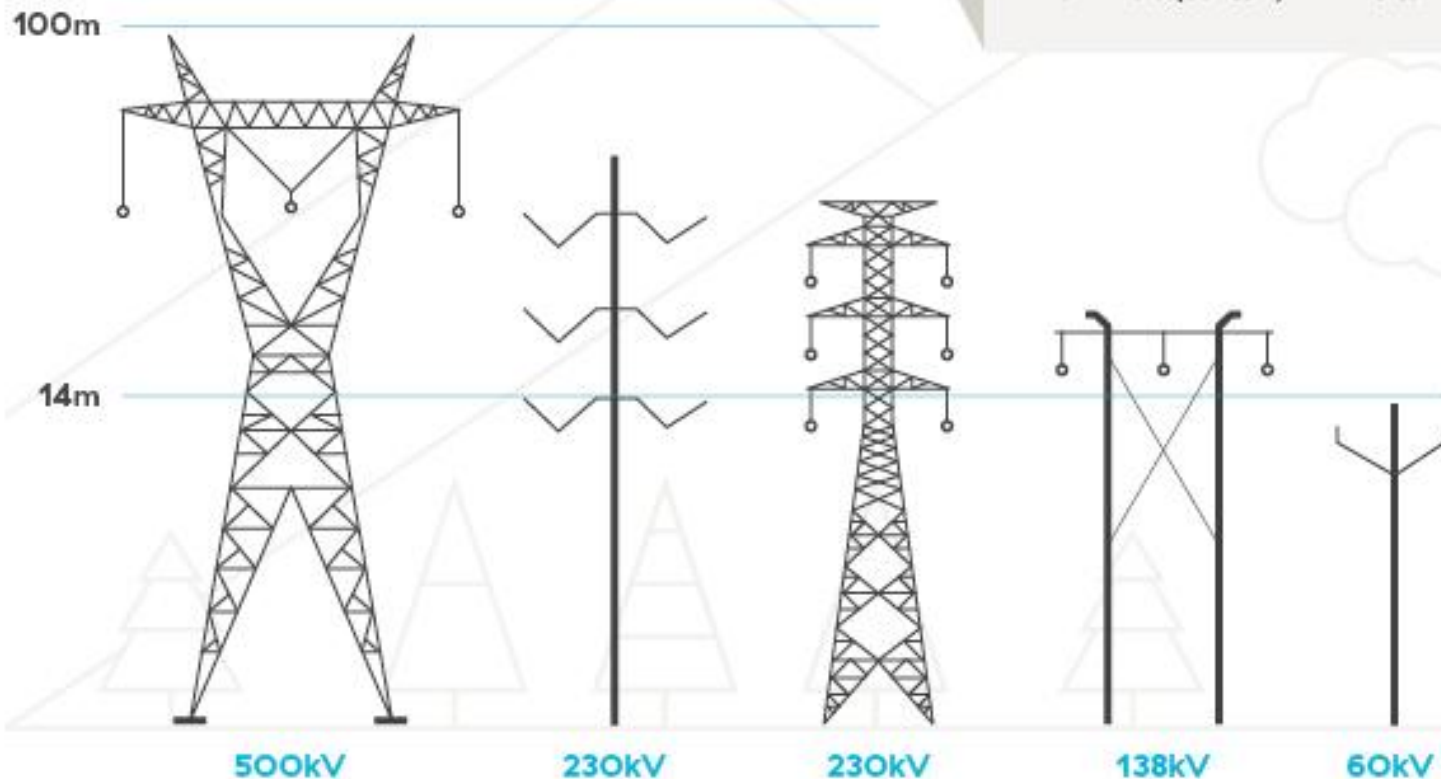


Transmission lines

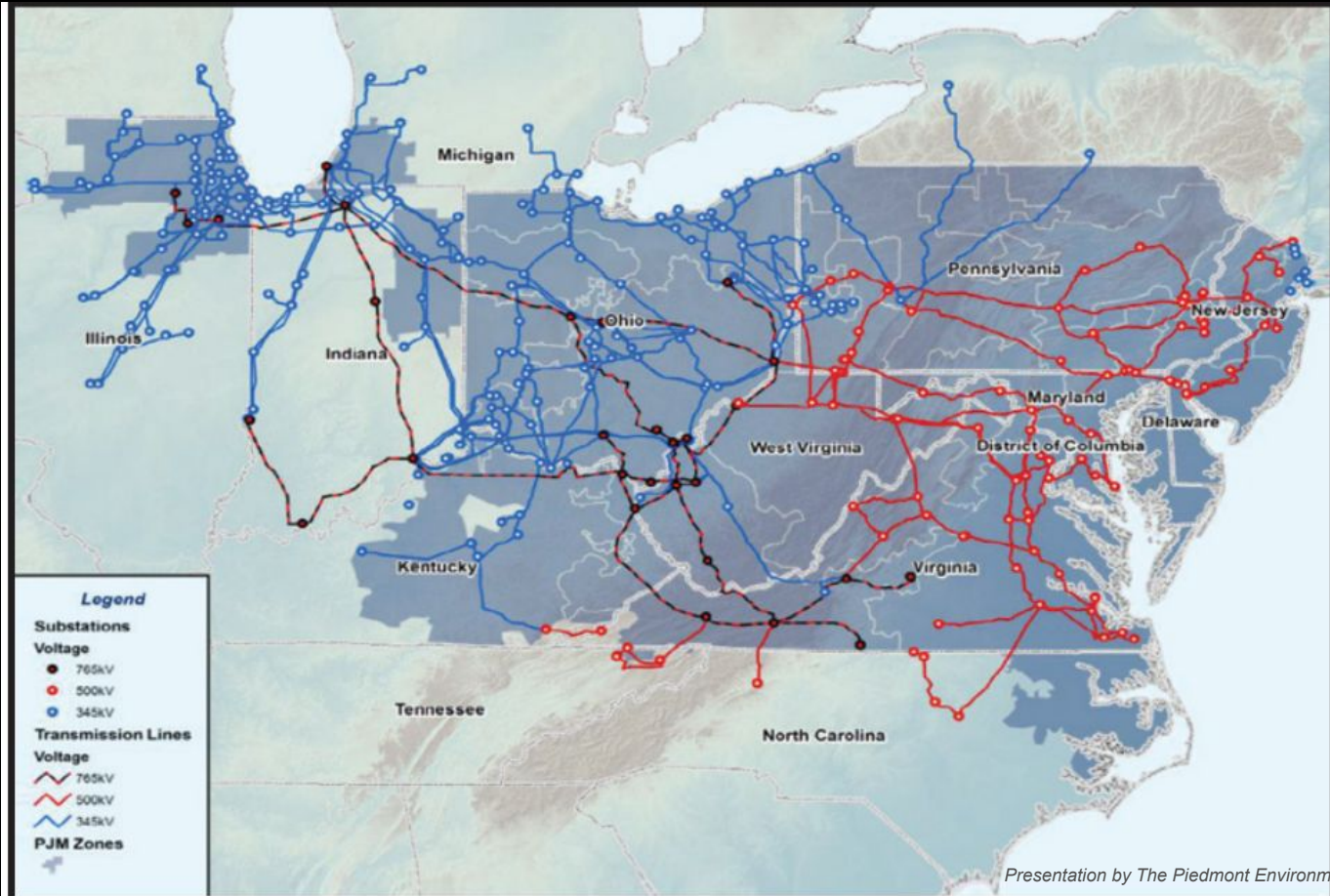
Transmission lines are the big, high voltage power lines that bring electricity from where it's made at our generating stations to substations near communities across B.C.

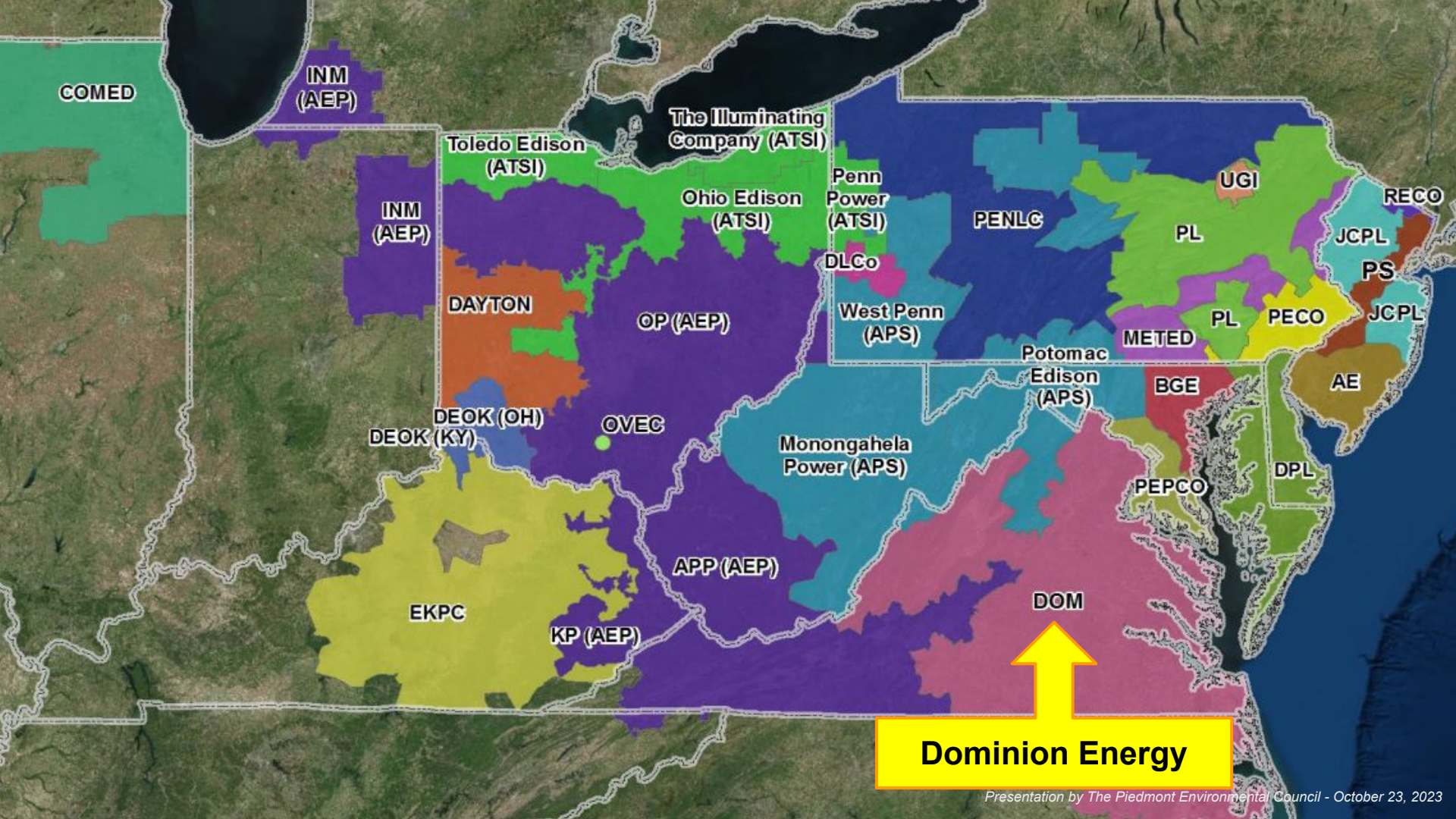
What's a kV?

kV stands for kilovolt, which is a unit of potential energy. One kV is equal to 1,000 volts.



Regional Transmission Operator - PJM



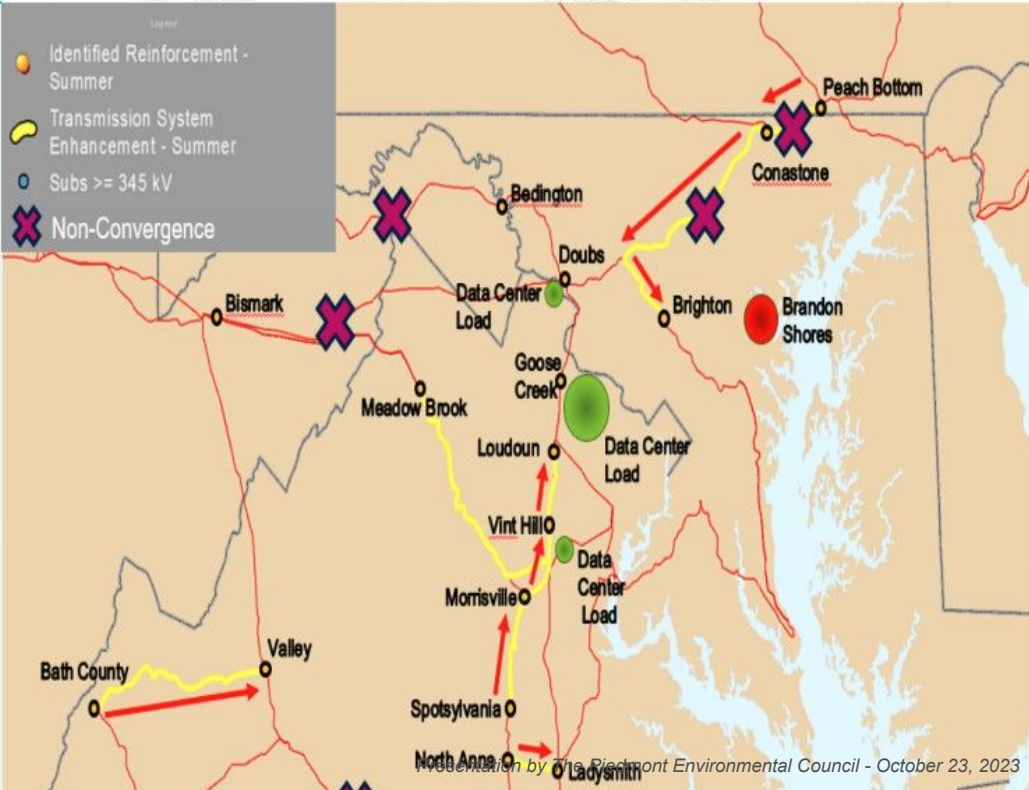


PJM's rationale:



2022W3 RTEP- Summary of Drivers/Needs

- PJM has had unprecedented data center load growth (up to ~7,500 MW) currently forecasted by 2027- 28 in Dominion (Northern Virginia) and APS (Doubs)
- 11,100 MW of announced deactivations to the west and south of Conastone
 - Approximately 5,300 MW occurring after the 2022 RTEP 2027 case was created
- The vast majority of the new generation with signed ISAs has been solar
 - Solar has low availability during the winter period
- The replacement generation is coming from the region to the east of Peach Bottom as well as west of Doubs to meet projected load growth.
- PJM has implemented a new block dispatch procedure
 - The old dispatch procedure maintained historical intraregional transfers, dispatching most of the generators in the Dominion zone at 100%



DRAFT 10/5/2023 Proposed Transmission Lines to Serve Data Centers



PEC Service Area

Electric Transmission Lines

Proposed Transmission Lines up to 500 kV

New Transmission Line

Expand Existing Right of Way

Rebuild in Existing Right of Way

Short List Projects 10-3-23

Substations

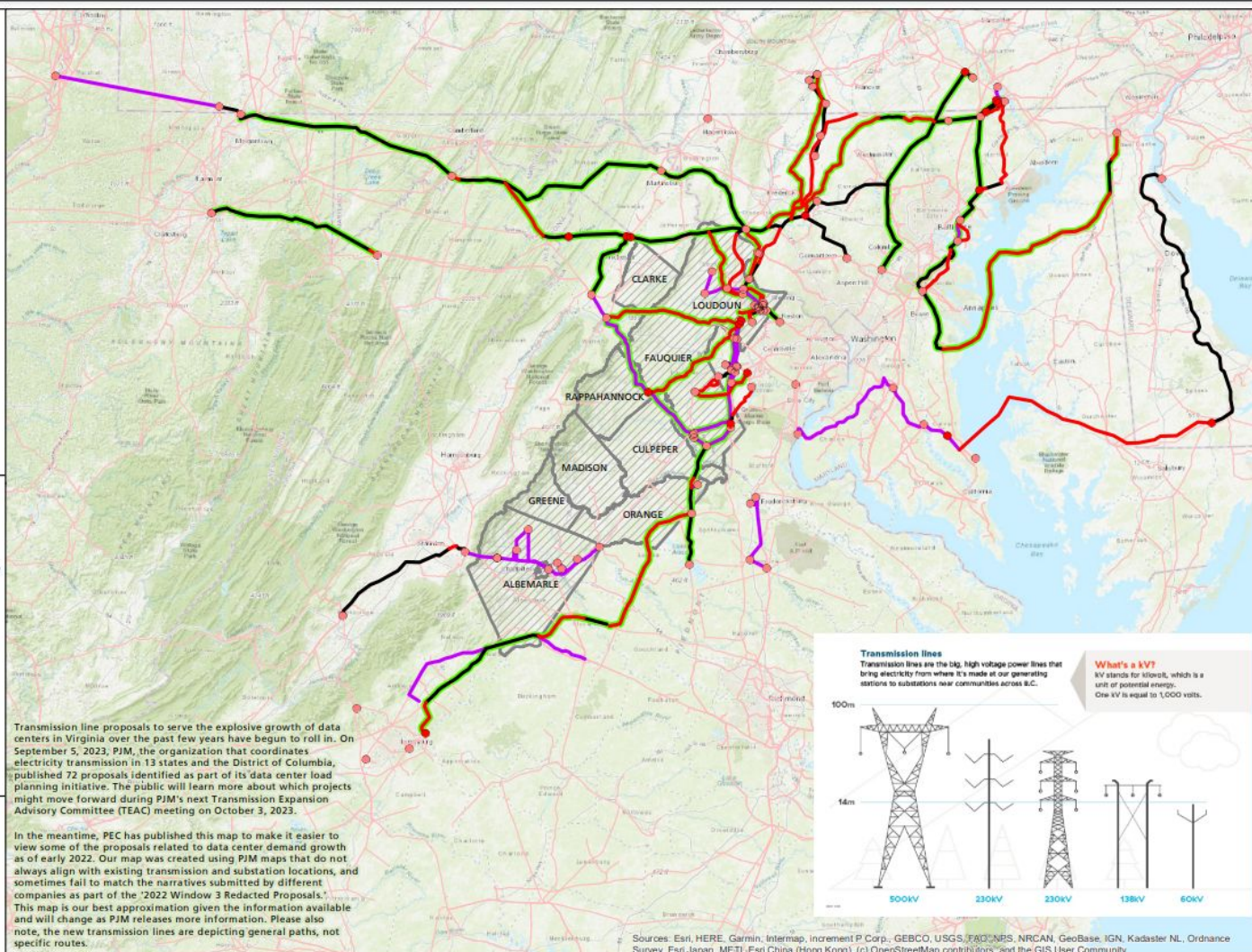
New Substations

Expanded Substation

0 10 20 Miles



Map created by PEC for presentation purposes only. Data Source: PJM TEAC RTP 2022 Window 3 proposals, not all transmission proposals are shown. Although efforts have been made to verify data, accuracy is not guaranteed. For more information please visit pecva.org. 9/21/2023 | Watson Randolph



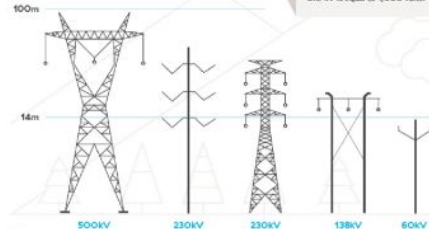
Transmission line proposals to serve the explosive growth of data centers in Virginia over the past few years have begun to roll in. On September 5, 2023, PJM, the organization that coordinates electricity transmission in 13 states and the District of Columbia, published 72 proposals identified as part of its data center load planning initiative. The public will learn more about which projects might move forward during PJM's next Transmission Expansion Advisory Committee (TEAC) meeting on October 3, 2023.

In the meantime, PEC has published this map to make it easier to view some of the proposals related to data center demand growth as of early 2022. Our map was created using PJM maps that do not always align with existing transmission and substation locations, and sometimes fail to match the narratives submitted by different companies as part of the '2022 Window 3 Redacted Proposals.' This map is our best approximation given the information available and will change as PJM releases more information. Please also note, the new transmission lines are depicting general paths, not specific routes.

Transmission lines

Transmission lines are the big, high voltage power lines that bring electricity from where it's made at our generating stations to substations near communities across the U.S.

What's a kV?
kV stands for kilovolt, which is a unit of potential energy.
One kV is equal to 1,000 volts.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

There's **something big** going on.

We don't have all the answers, but we know what's happening is important and we know it matters immensely to the **future of Virginia**.

We need to be creative and work together.

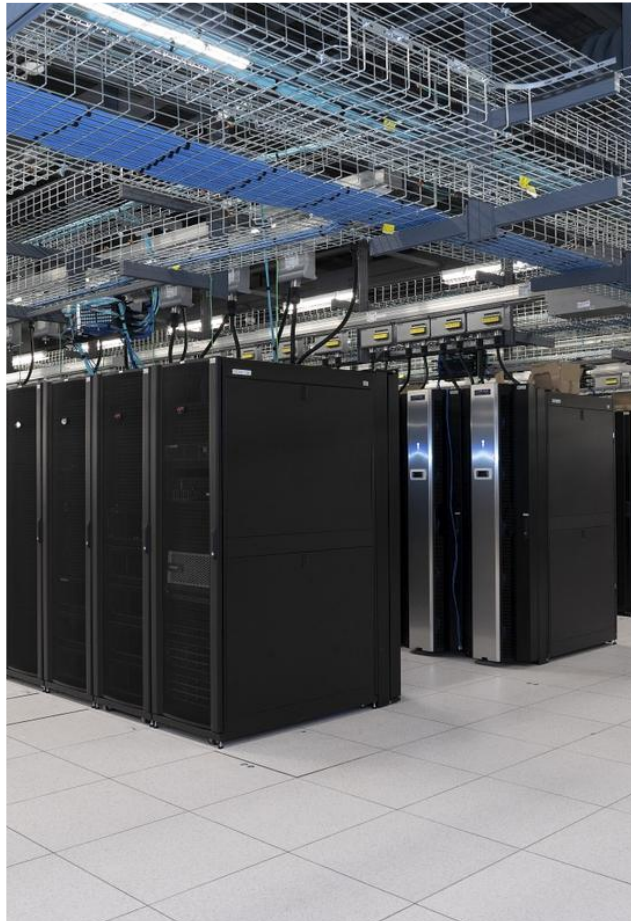
Today's Discussion

- Explosive growth of the data center industry
- Trends and projections
- Who is making the decisions
- What can we individually and collectively do





The digital age relies on **data centers**

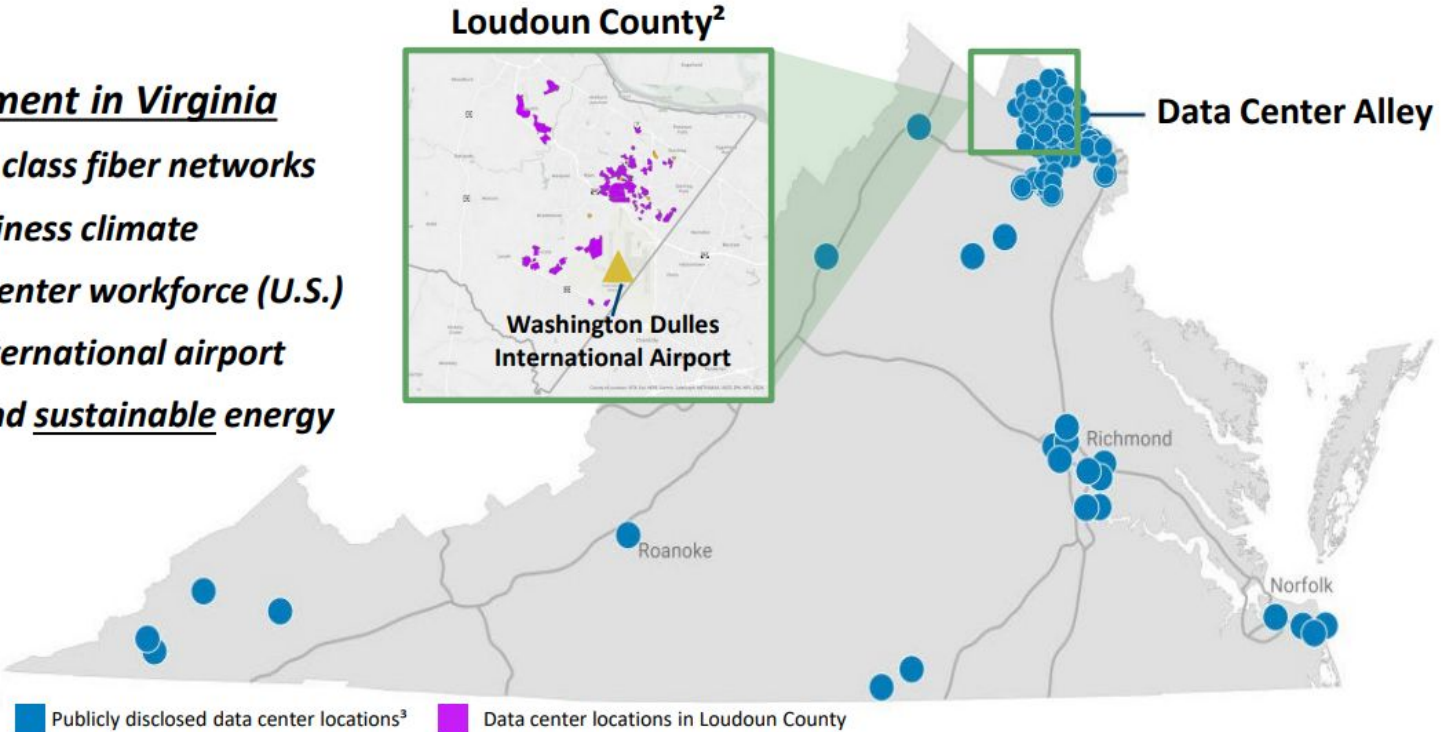


Dominion Energy Virginia

Northern Virginia boasts the largest data center market in the world¹

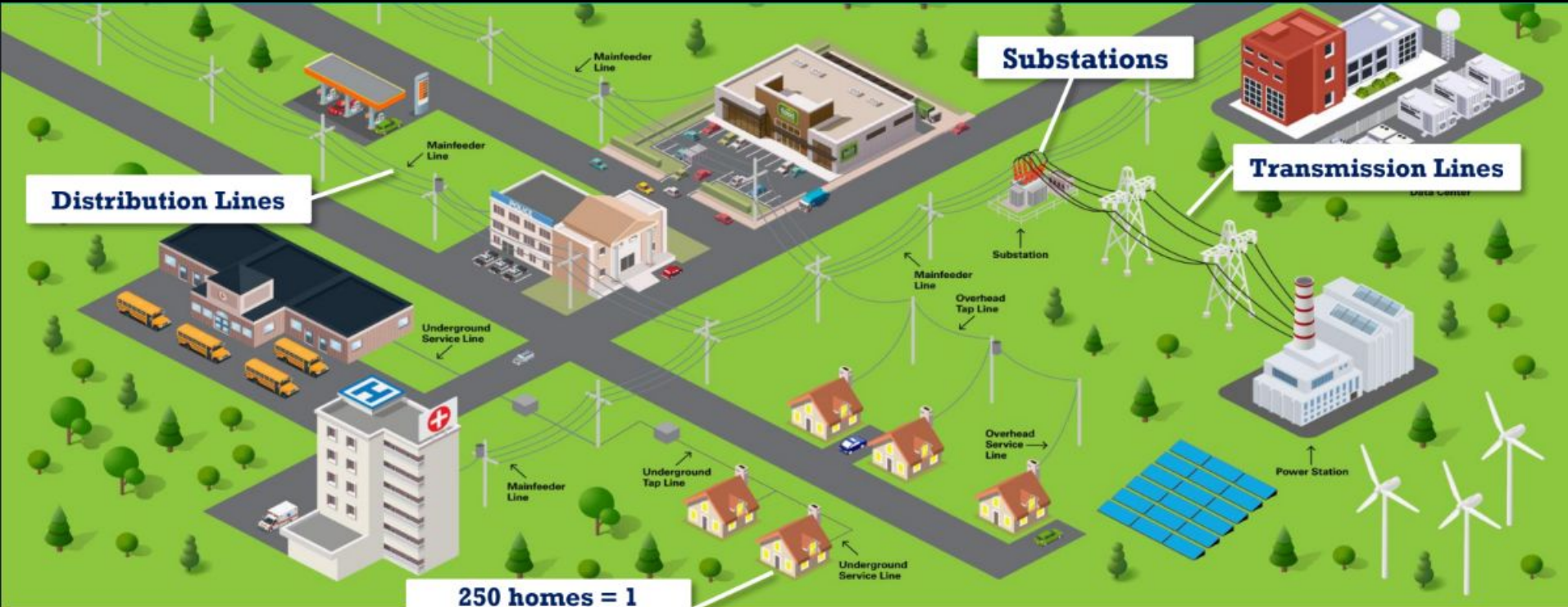
Data center development in Virginia

- ✓ *Connectivity to world class fiber networks*
 - ✓ *Attractive business climate*
- ✓ *Access to largest data center workforce (U.S.)*
- ✓ *Access to nearby international airport*
- ✓ *Access to affordable and sustainable energy*



Committed to deliver safe, reliable, affordable and sustainable energy to our customers

The digital age relies on a **reliable power grid**



250 homes = 1 megawatt (MW)

May 22, 2023

***1000 MW = 1 gigawatt**



Data centers consume a huge amount of electricity



They rely on **diesel generators** for backup power



They use a lot of **water**



NEWS - COLUMNS - BUSINESSES - ABOUT US - ADVERTISE - CALENDAR - JOB CENTER - HOT TOPICS

FAIRFAX WATER ADDRESSES DEVELOPMENT & QUALITY OF DRINKING WATER FROM OCCOQUAN

Fairfax Water Urges Prince William County to Request Study on How Development Would Impact Occoquan Reservoir, Drinking Water

Computer models easily accessible



Occoquan River as seen from Occoquan Trail, Lake Ridge, Virginia.

STACY SHAW

Serving Fredericksburg, Stafford, King George, Caroline, Orange, Culpeper and surrounding counties

The Free Lance-Star

Concerns surface about Caroline water plans, regional data centers

Cathy Dyson Sep 22, 2023 6

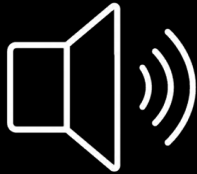
1 of 4



As Caroline County seeks permission to withdraw up to 13.9 million gallons of water daily from the Rappahannock River, water levels near the Indian Punch Bowl along Riverside Drive in Fredericksburg are so low that people can walk across the river on rocks that have emerged.

PETER CIHELKA photos. THE FREE LANCE-STAR

They create a host of **community-level impacts**



Noise



Water



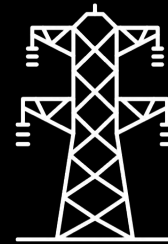
Air Quality



Wildlife Habitat



Design



Transmission

And the proposals are getting much bigger

- Older data centers used 10-15 MW per building, and multi-building campuses were rare.
- Now we are seeing 30-90 MW data centers with multi building campuses.
- A large campus could use 600-1000 MW or more.



Approved But Unbuilt + Applications Filed

County	Status	Development square feet	Estimated Power Range
Loudoun	Approved	12,286,529	1,843MW – 5,529MW
	Applications	10,938,449	1,641MW – 4,922MW
Prince William	Approved	10,719,984	1,608MW – 4,824MW
	Applications	42,510,328	6,377MW – 19,130MW
Fauquier	Approved	2,901,000	435MW – 1,305MW
Culpeper	Approved	4,630,000	695MW – 2,083MW
	Applications	1,990,000	299MW - 896MW
Stafford	Applications	6,010,000	902MW – 2,705MW
Spotsylvania/Caroline	Applications	6,600,000	990MW – 2,970MW
King George	Applications	7,500,000	1,125MW – 3,375MW

Approved But Unbuilt + Applications Filed

Data Centers:

Total Approved But Unbuilt

- 30+ million sq ft
- 4,000 MW – 14,000 MW

Data Centers:

Total Including Applications

- 106+ million sq ft
- 16,000 MW – 48,000 MW

These are **HUGE numbers**.

If 1 MW can power 250 homes...

48,000 MW would power
12 million homes!

SCIENCE & TECHNOLOGY

The hidden costs of AI: Impending energy and resource strain

Deep Jariwala and Benjamin C. Lee on the energy and resource problems AI computing could bring.



In recent years, artificial intelligence (AI) models like ChatGPT have seen notable improvements, with some people concerned about the societal impacts these new technologies may bring including looming concerns related to increasing energy and raw materials demands. (Image: iStock/Alexey Tolmachov)

REPORT OF THE VIRGINIA SECRETARY OF
NATURAL AND HISTORIC RESOURCES AND
VIRGINIA SECRETARY OF COMMERCE AND
TRADE

**Modeling Decarbonization:
Report Summary and Policy
Brief for Virginia Governor's
Office Administration and
Policymakers (Chapter 1194,
2020)**

TO THE GENERAL ASSEMBLY OF VIRGINIA



SENATE DOCUMENT NO. 17

COMMONWEALTH OF VIRGINIA
RICHMOND
2021

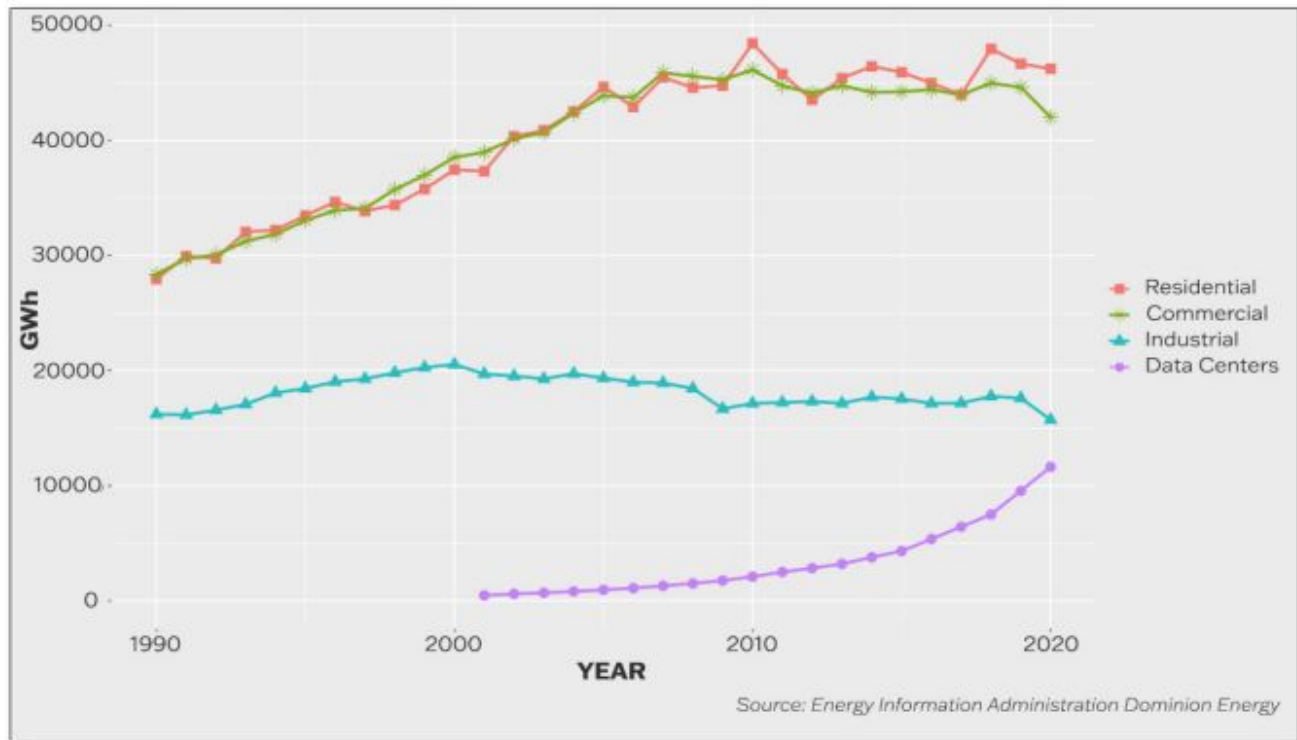


Figure 2: Annual Virginia Electricity Sales by End Use

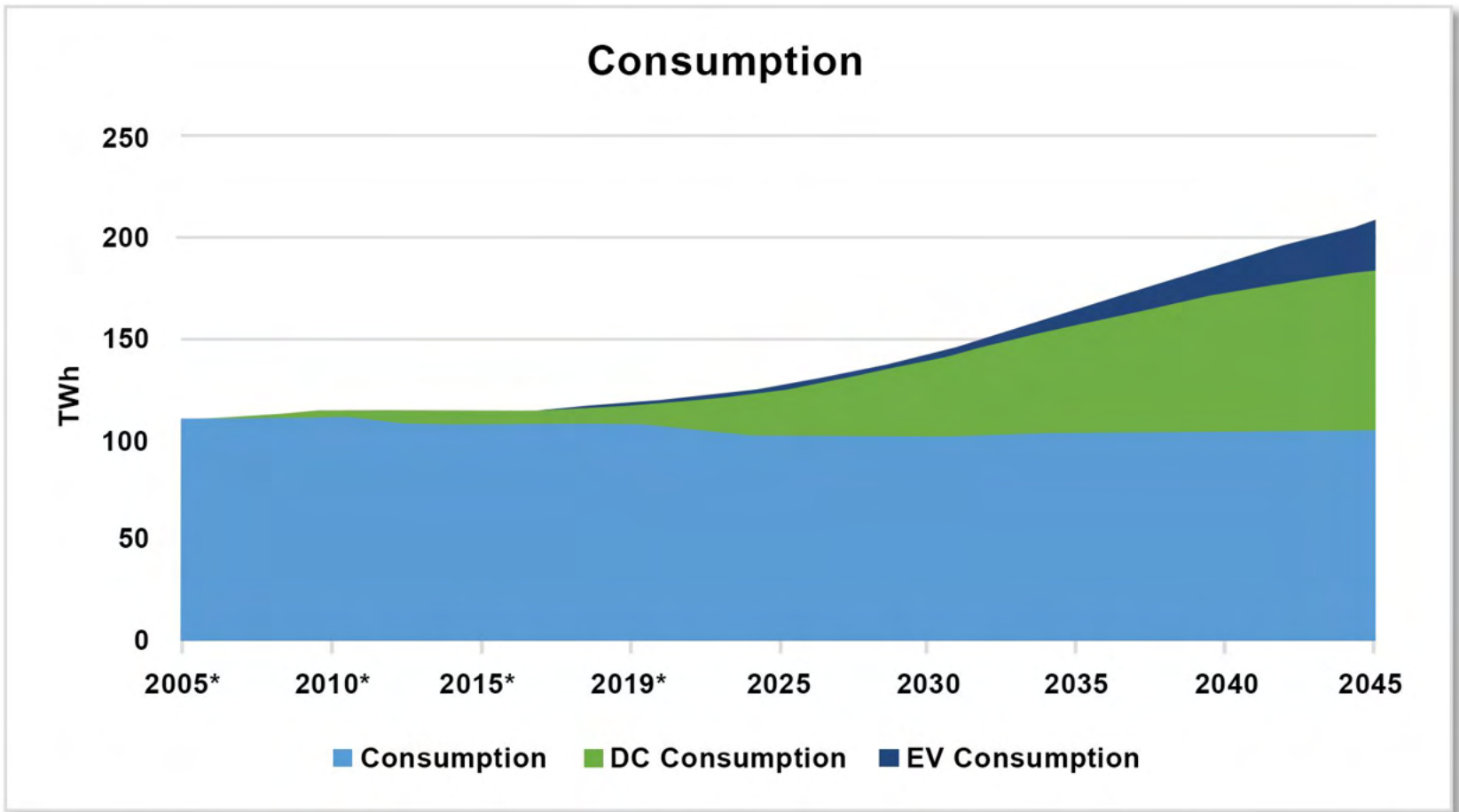
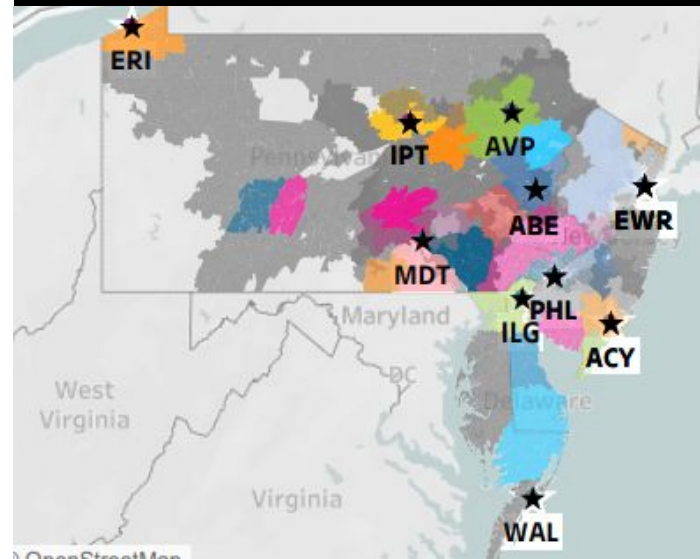
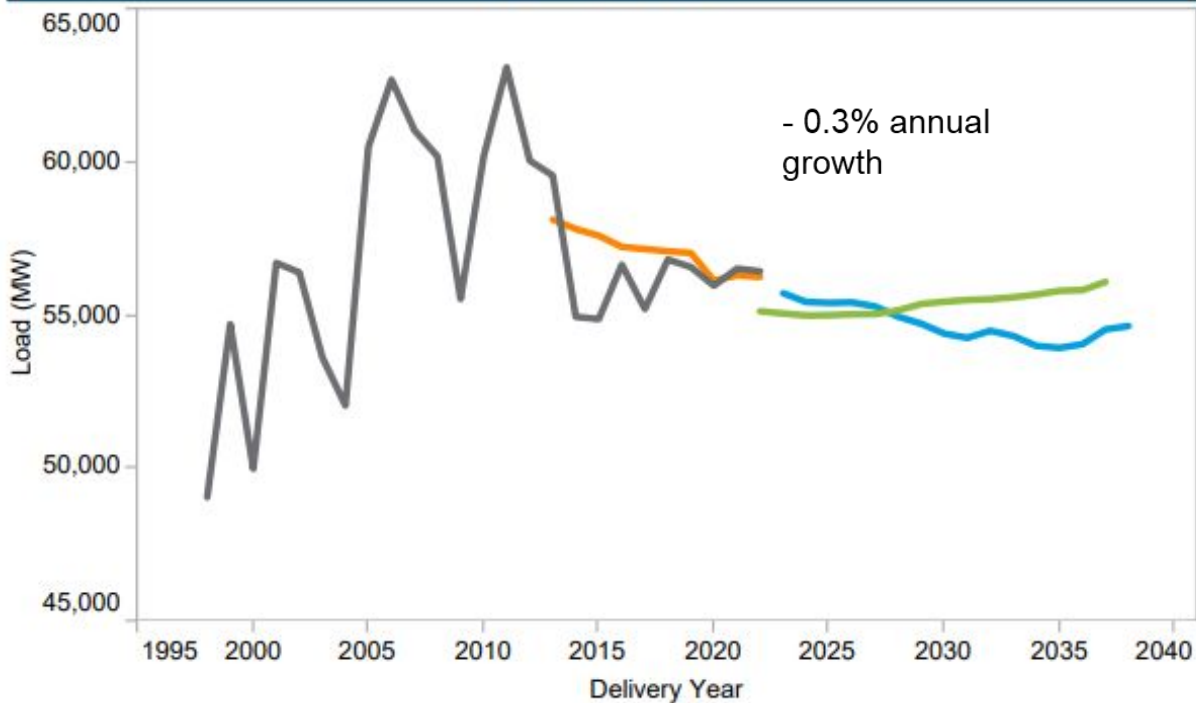


Figure 6: Electricity Sales - Baseline and High Demand Scenarios

What's happening in Virginia
is **unprecedented.**

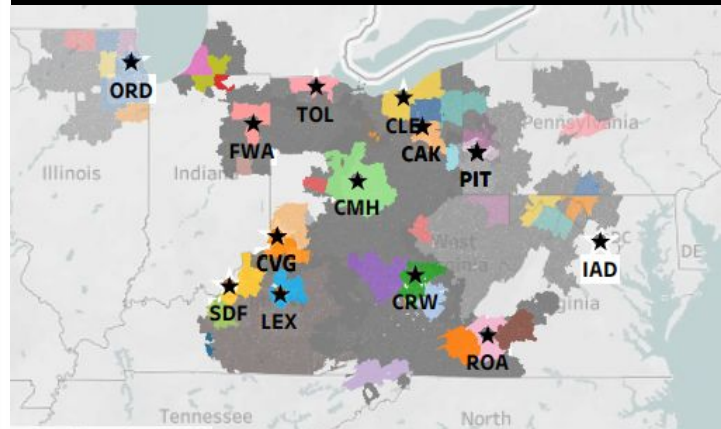
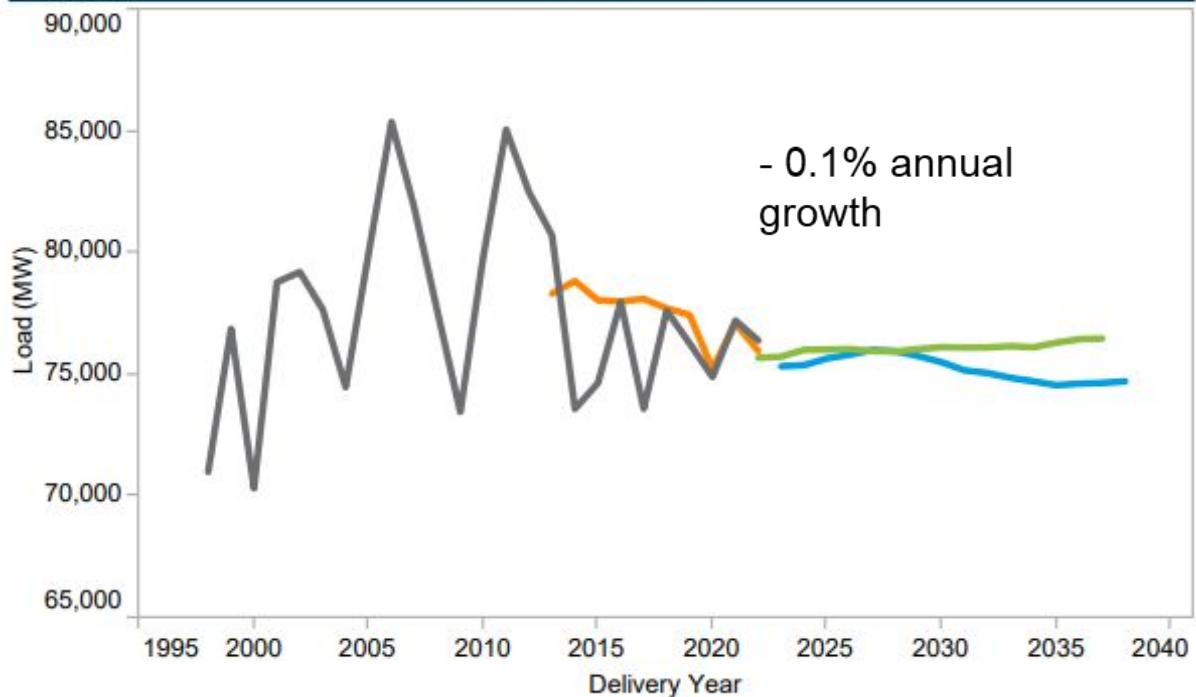
PJM Mid Atlantic Territory

Summer Peak

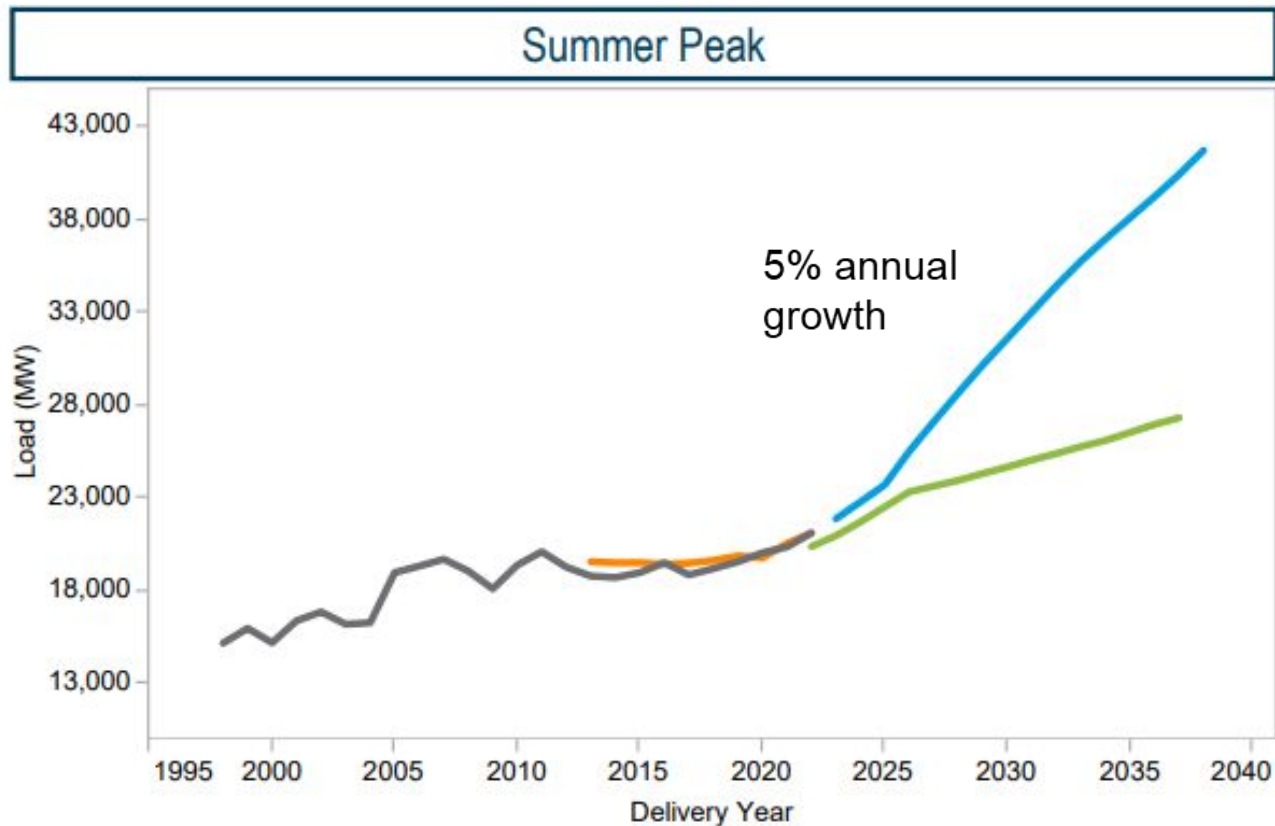


PJM Western Territory

Summer Peak



Dominion Territory Explosive Growth Trends



That's a **doubling of peak load**
within 14 years!

What's Dominion's Plan?



ENERGY + ENVIRONMENT

Dominion projects new gas plants, advanced nuclear will be needed to meet soaring demand

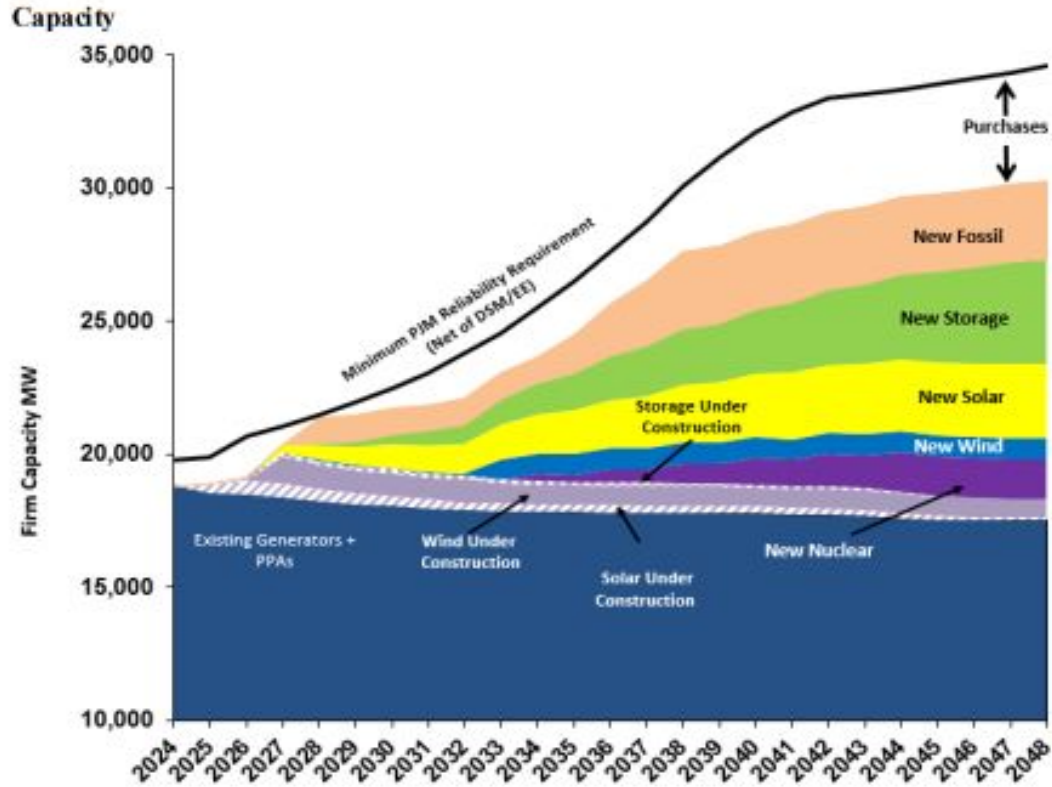
Latest long-range plan shows data centers and electrification are driving rising power needs

BY: CHARLIE PAULLIN - MAY 3, 2023 12:02 AM



Dominion's plans **rely** on...

Appendix 2A: Plan B - Summer Capacity, Energy, and RECs



Executive Summary Table: 2023 Plan Results

	Plan A	Plan B	Plan C	Plan D	Plan E
NPV Total (\$B)	\$109.70	\$127.70	\$127.20	\$140.90	\$138.00
Approximate CO₂ Emissions from Company in 2048 (Metric Tons)	43.8 M	35.9 M	36 M	0 M	0 M
Solar (MW)	10,800 15 yr. 19,800 25 yr.	10,875 15 yr. 19,875 25 yr.	10,800 15 yr. 19,800 25 yr.	10,875 15 yr. 23,955 25 yr.	11,094 15 yr. 24,294 25 yr.
Wind (MW)	3,040 15 yr. 3,220 25 yr.	3,040 15 yr. 3,220 25 yr.	3,040 15 yr. 3,220 25 yr.	3,040 15 yr. 3,220 25 yr.	3,040 15 yr. 3,220 25 yr.
Storage (MW)	1,050 15 yr. 3,960 25 yr.	2,370 15 yr. 5,190 25 yr.	2,220 15 yr. 5,220 25 yr.	2,370 15 yr. 9,780 25 yr.	2,910 15 yr. 10,350 25 yr.
Nuclear (MW)	— 15 yr. — 25 yr.	804 15 yr. 1,608 25 yr.	804 15 yr. 1,608 25 yr.	1,608 15 yr. 4,824 25 yr.	1,072 15 yr. 4,288 25 yr.
Natural Gas-Fired (MW)	5,905 15 yr. 9,300 25 yr.	2,910 15 yr. 2,910 25 yr.	2,910 15 yr. 2,910 25 yr.	970 15 yr. 970 25 yr.	970 15 yr. 970 25 yr.
Retirements (MW)	— 15 yr. — 25 yr.	— 15 yr. — 25 yr.	— 15 yr. — 25 yr.	— 15 yr. 11,399 25 yr.	— 15 yr. 11,399 25 yr.

This cost will be passed on to ratepayers





VIRGINIA MERCURY

COMMENTARY

Are Virginia ratepayers and residents subsidizing the data center industry?



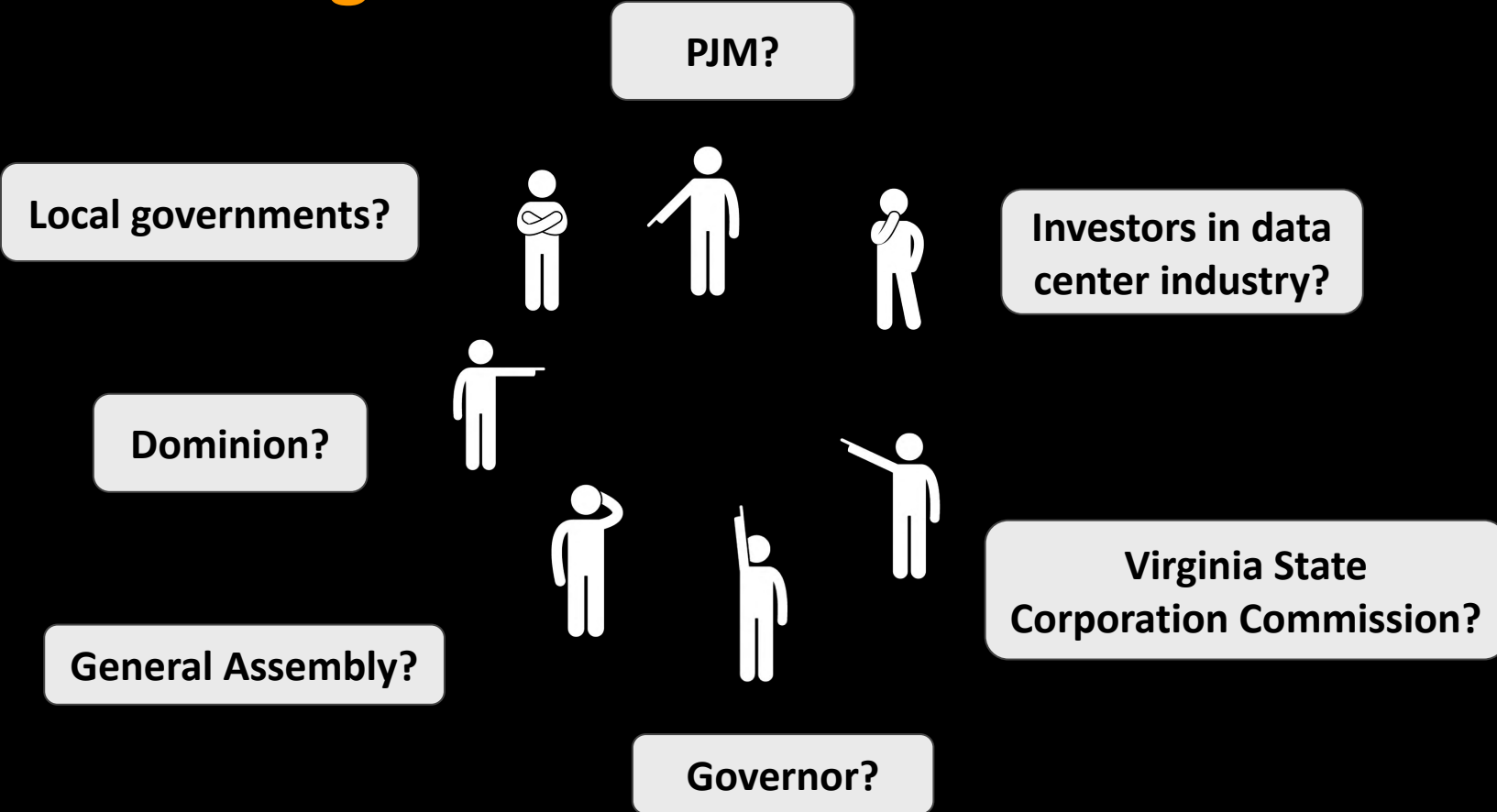
GUEST COLUMN

FEBRUARY 2, 2023 12:05 AM



Continuing down this path will make it
very **difficult to achieve** Virginia's
clean energy goals.

Who is in charge?



What can **we** do about it?

- Push for better land use planning for data centers
- Demand better oversight at the local, state and federal level of electricity planning
- Promote more distributed, sustainable ways to produce power
- Come up with a mitigation plan for communities and conservation



What can **you** do about it?

- Stay informed. Visit: pecva.org/datacenters
- Reach out to elected officials (local, state, federal)
- Share information with friends, family, contacts and neighbors
- Financially support the local efforts and the broader campaign that is needed





Q/A and Panel Discussion