

**ENERGY & DATA
CENTERS**
VIRGINIA'S LANDSCAPE & APPROACH

PRESENTED BY:

Vince Maiden

Director of the Virginia Department of Energy's State Energy Office

November 2025



LEADING THE COMMONWEALTH TO A RELIABLE & RESPONSIBLE ENERGY FUTURE

Strengthening Virginia's Energy Future

Programs supporting an affordable, reliable, & increasingly clean energy grid.

Promoting Economic Growth

Initiatives that attract investment, create jobs, & expand energy infrastructure.

Advancing Innovation

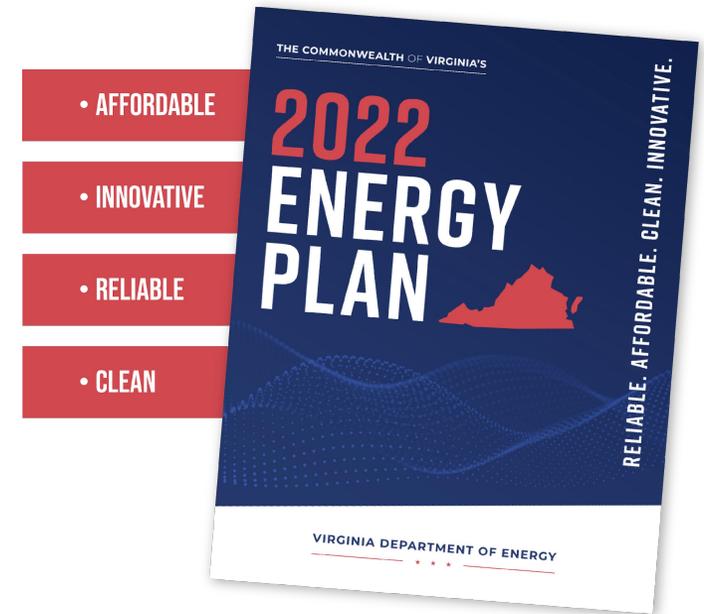
Funding clean technologies like nuclear, carbon capture, and energy storage.

Managing Natural Resources

Oversight of mining, reclamation, & geology to ensure environmental protection.

Providing Public Resources

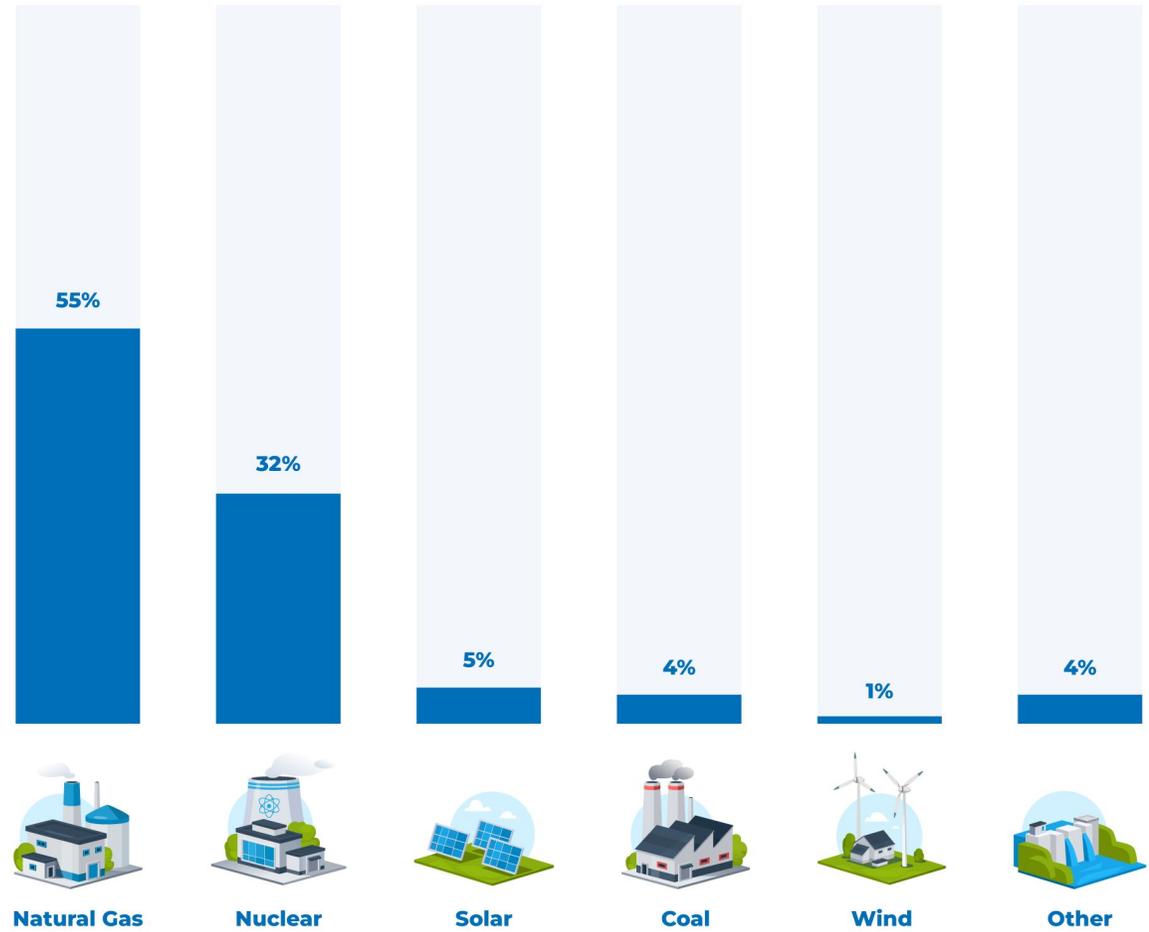
Grants, data, & technical assistance supporting workforce development and community-oriented projects.



VIRGINIA'S ENERGY MIX: RELIABLE, AFFORDABLE, INCREASINGLY CLEAN

Virginia's energy mix is diverse, with natural gas, nuclear, and renewables powering homes and businesses across the Commonwealth.

As energy demand grows, maintaining a reliable, affordable, and sustainable grid requires a balanced approach that leverages all available resources.



OPERATING GENERATORS INVENTORY

ELECTRIC UTILITY SECTOR, AS FOR FEBRUARY 2025

22,312

Nameplate Capacity (MW)

21,174

Net Summer Capacity (MW)

Plant Name

All

Provider

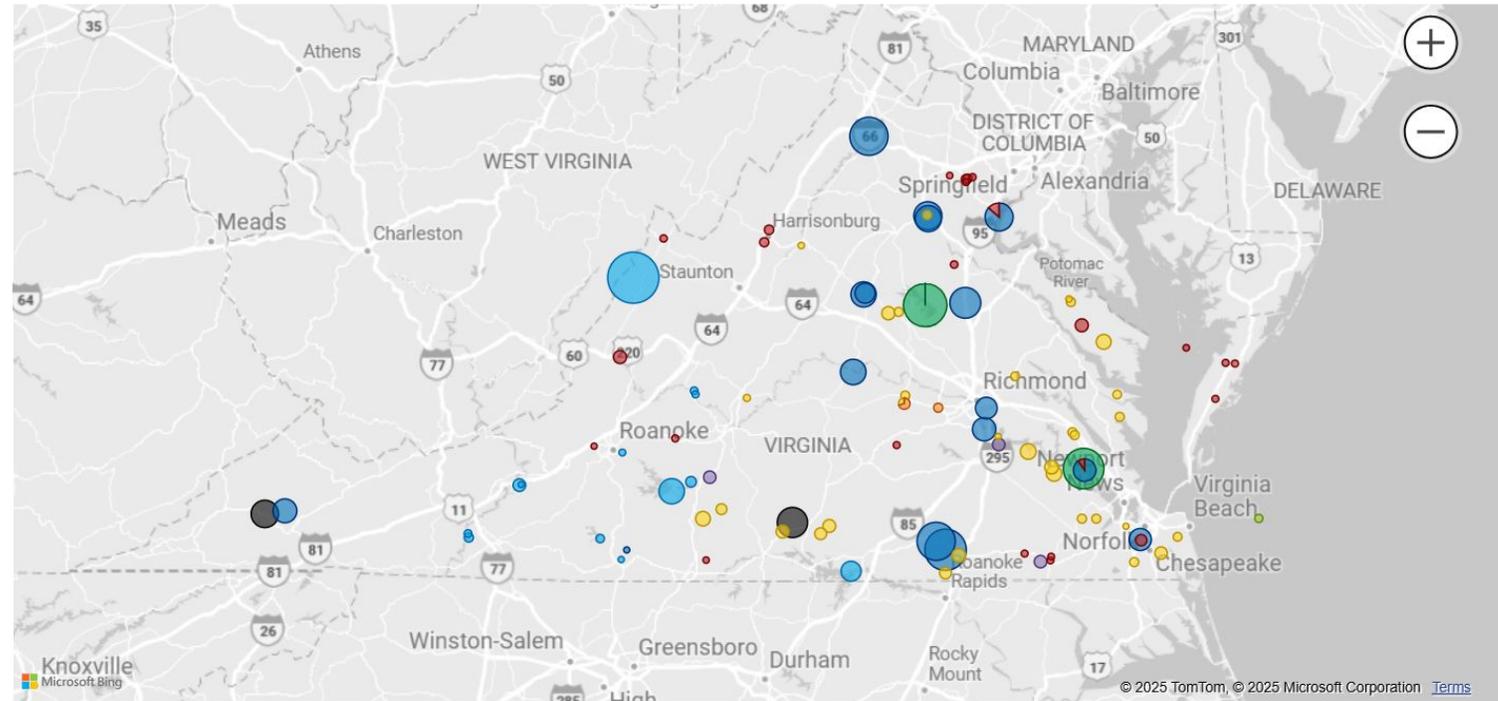
All

Sector

Electric Utility

VA Capacity by Fuel Type

Technology (groups)	Nameplate Capacity (MW)	% of Total
Natural Gas	10,978	49.20%
Hydro	3,885	17.41%
Nuclear	3,654	16.38%
Coal	1,516	6.79%
Solar	1,493	6.69%
Petrol	502	2.25%
Biomass	213	0.96%
Storage	60	0.27%
Wind	12	0.05%
Total	22,312	100.00%



Technology (groups) ● Biomass ● Coal ● Hydro ● Natural Gas ● Nuclear ● Petrol ● Solar ● Storage ● Wind

Data Sources: U.S. Energy Information Administration, [Form EIA-860, 'Annual Electric Generator Report'](#) and [Form EIA-860M, 'Monthly Update to the Annual Electric Generator Report.'](#)



VIRGINIA IS EXPERIENCING THE LARGEST GROWTH IN POWER DEMAND SINCE WWII

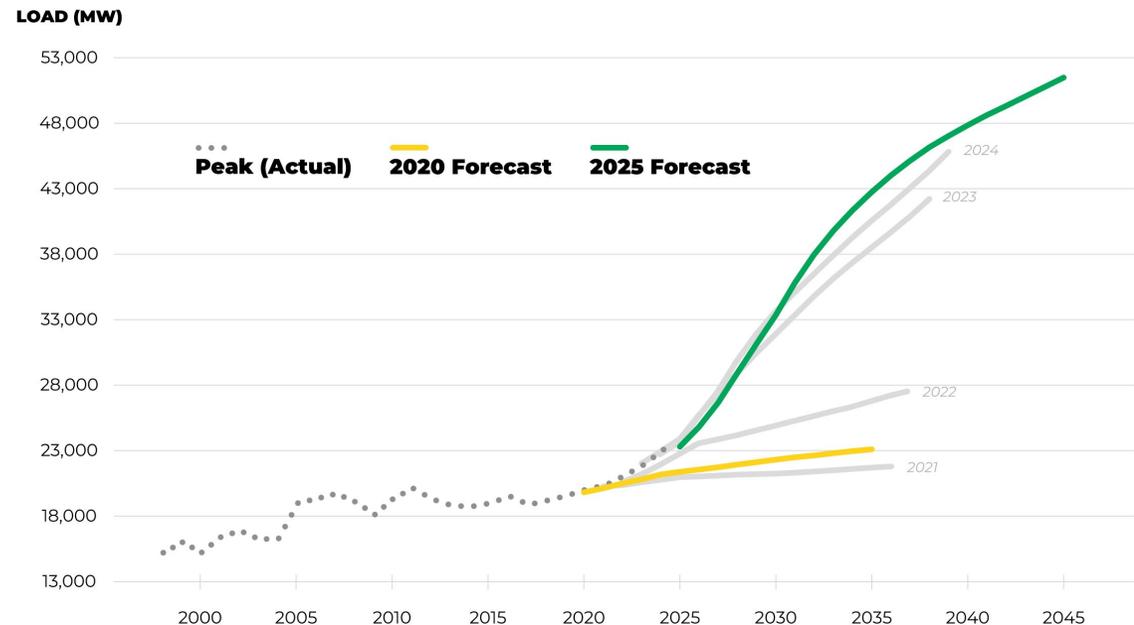
Current projections show up to **6.5% annual increase in demand**—up from 1.4% projected in 2020.

Power **capacity must double** in next 10 years to meet growing demand.

Electricity imports have increased significantly in the last three years, from 18% in 2020 to 36% in 2023.

Continuing growth and depending on imported electricity is not sustainable.

PJM Load Growth Forecasts
2020-2025, Dominion Zone, Summer Peak



Source: PJM Long-Term Load Forecast Reports, 2020-2025.



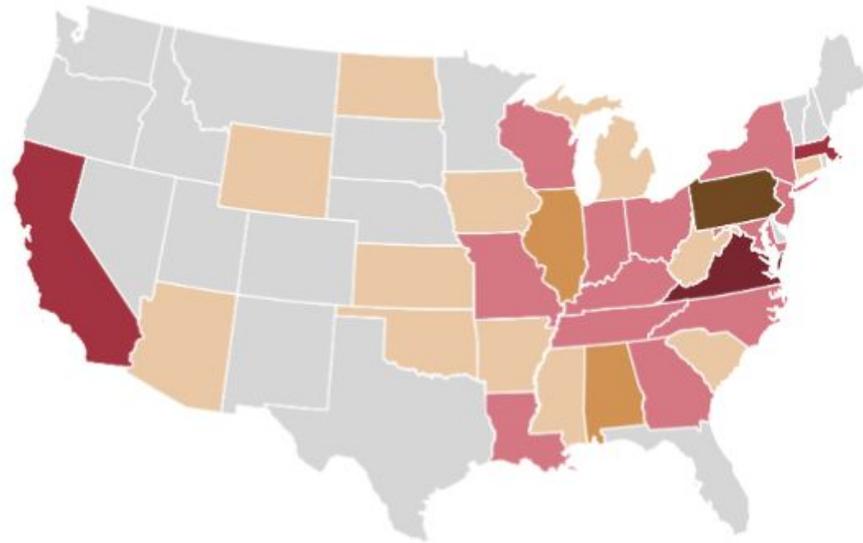
VIRGINIA: THE NATION'S LARGEST ELECTRICITY IMPORTER

State net electricity interstate trade (2023)

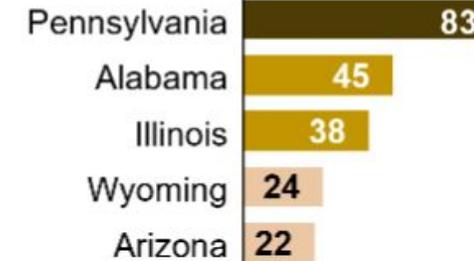
million megawatthours

interstate receipts

interstate deliveries



top deliverers



top recipients



Data source: U.S. Energy Information Administration, [State Electricity Profiles](#)

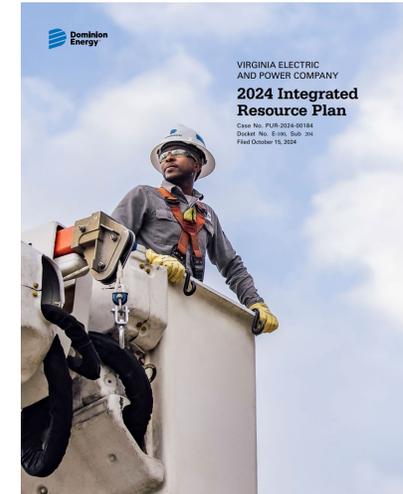
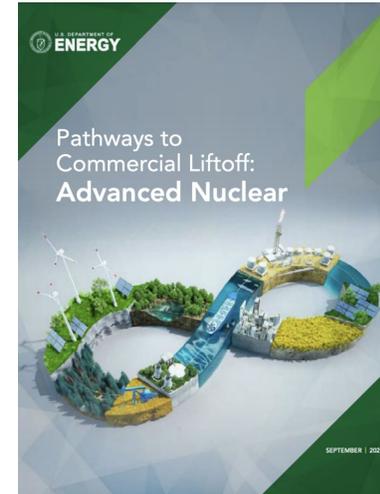


DOMINION, JLARC, PJM, US DOE, & VIRGINIA ENERGY AGREE: WE NEED MORE POWER THAT WE CAN RELIABLY DEPEND UPON

Renewables alone **cannot meet demand.**

Natural gas and nuclear are needed to ensure 24/7 reliable service now and in the future.

Utilities and power providers need **regulatory and economic certainty** to make the necessary investments in technologies such as natural gas and nuclear to advance Virginia's economic development.

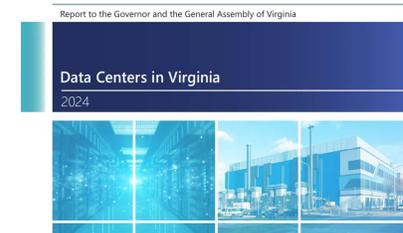


Commonwealth of Virginia
December 9, 2024



2025
PJM Long-Term Load Forecast Report
Posted Date: January 24, 2025
Prepared by: PJM Resource Adequacy Planning Department

For Publication



COMMISSION DRAFT

JLARC
JOINT LEGISLATIVE
AND REVIEW COMMISSION



WE NEED MORE POWER — AND WE NEED IT TO BE RELIABLE, AFFORDABLE, & CLEAN

That means embracing an energy strategy rooted in practicality, innovation, and diversity.

Our strategy is built on:

- A full spectrum of energy sources
- Strategic public-private partnerships
- Regulatory reform to speed up deployment
- Investment in grid infrastructure and future-ready technologies



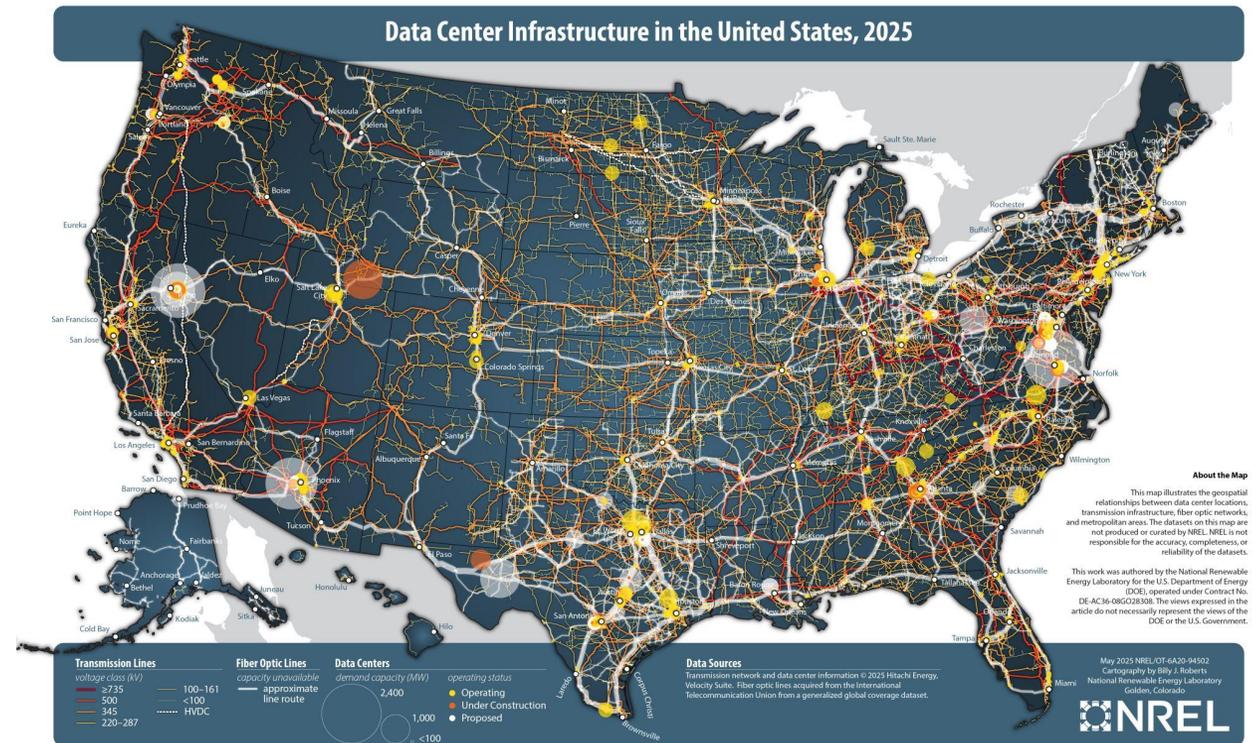
U.S. DATA CENTER INDUSTRY

Statewide (VA JLARC '24 Economic Impact Report)

- \$9.1 billion GDP
- 74,000 Jobs
- \$5.5 billion in total labor income

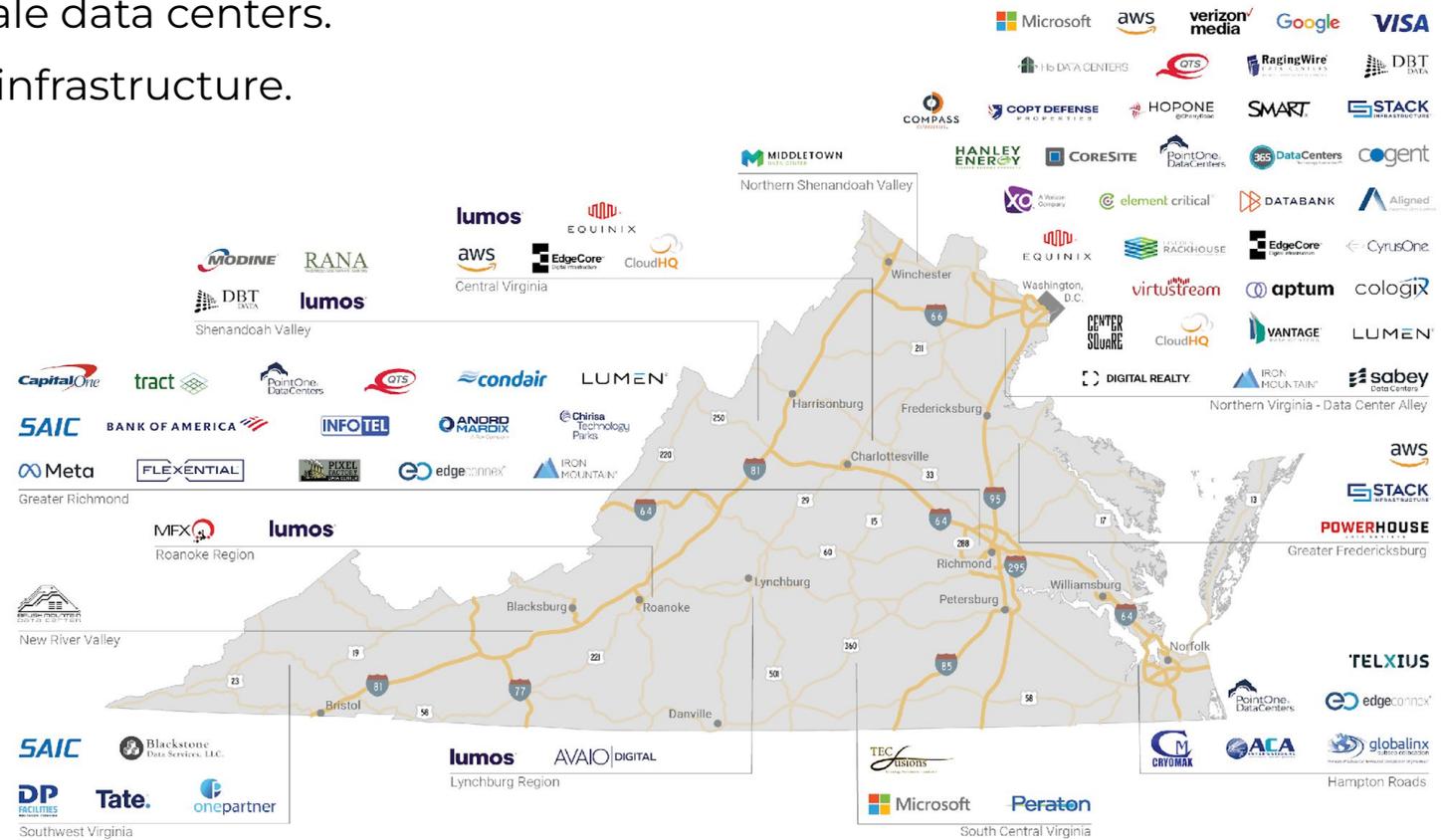
Local – Loudoun County Examples

- County Gov: For every \$1 in Investment, \$26 in Tax Revenue
- \$895 mil. in personal property tax revenue; compare with \$940 mil. operating budget

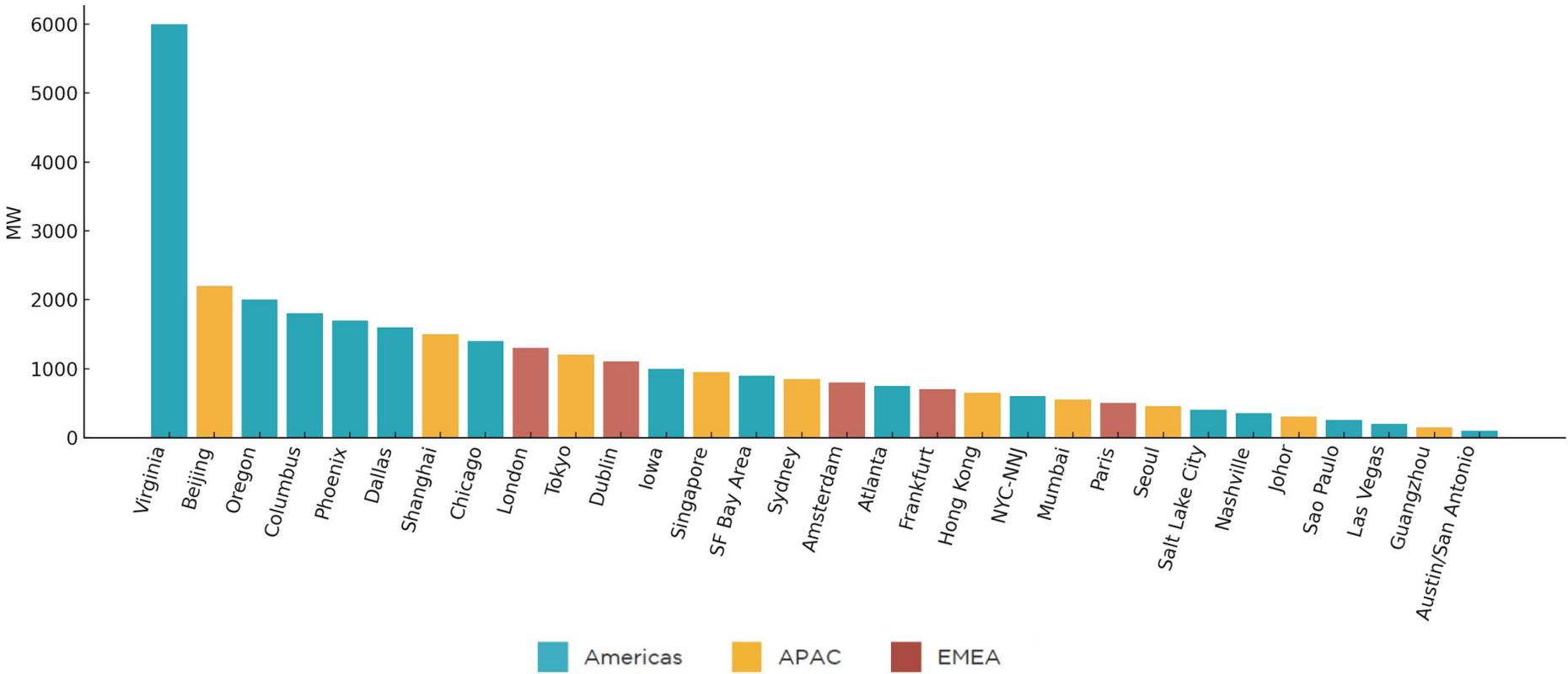


VIRGINIA: THE DATA CENTER CAPITAL OF THE WORLD

- About 35% of the global hyperscale data centers.
- Dense fiber backbones & robust infrastructure.
- Low-cost electricity, expanding behind-the-meter options.
- Competitive tax & construction cost environments.
- Sales & use tax exemptions for qualifying data centers.
- Tax benefits for colocation data center tenants—the first state to do so.
- Several localities offer reduced business property tax rates on data center equipment.



GLOBAL DATA CENTER MARKETS BY POWER CAPACITY

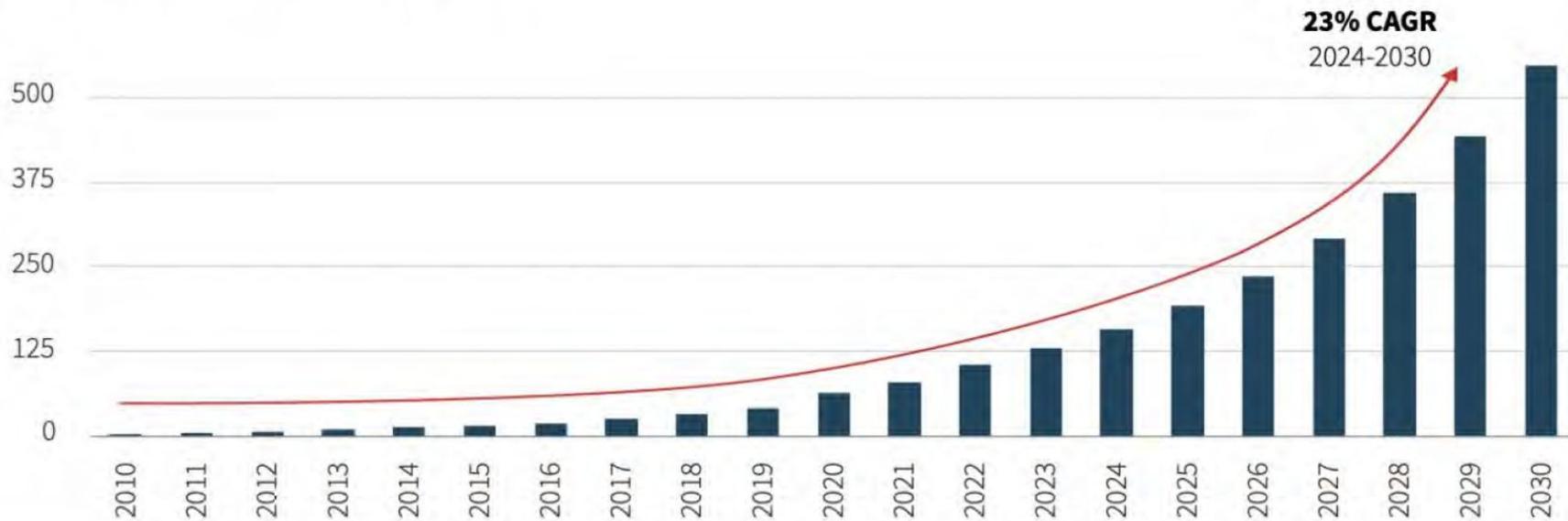


Source: Cushman & Wakefield Research, datacenterHawk, DC Byte



DEMAND FOR DATA CENTERS GROW AS DIGITAL DATA GROWS

Global data created annually in zettabytes



Source: JLL Research, IDC



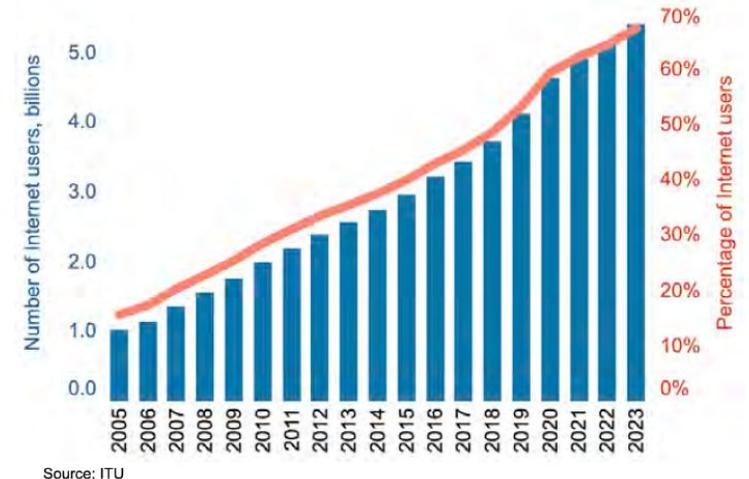
PEOPLE & DEVICES DRIVE DATA CENTER DEMAND

"The data center industry has experienced explosive growth over the past decade, driven by ever-increasing demand for cloud services and the expanding use of web-enabled devices globally. [...] **In the next five years, consumers and businesses will generate twice as much data as all the data created over the past 10 years.**"

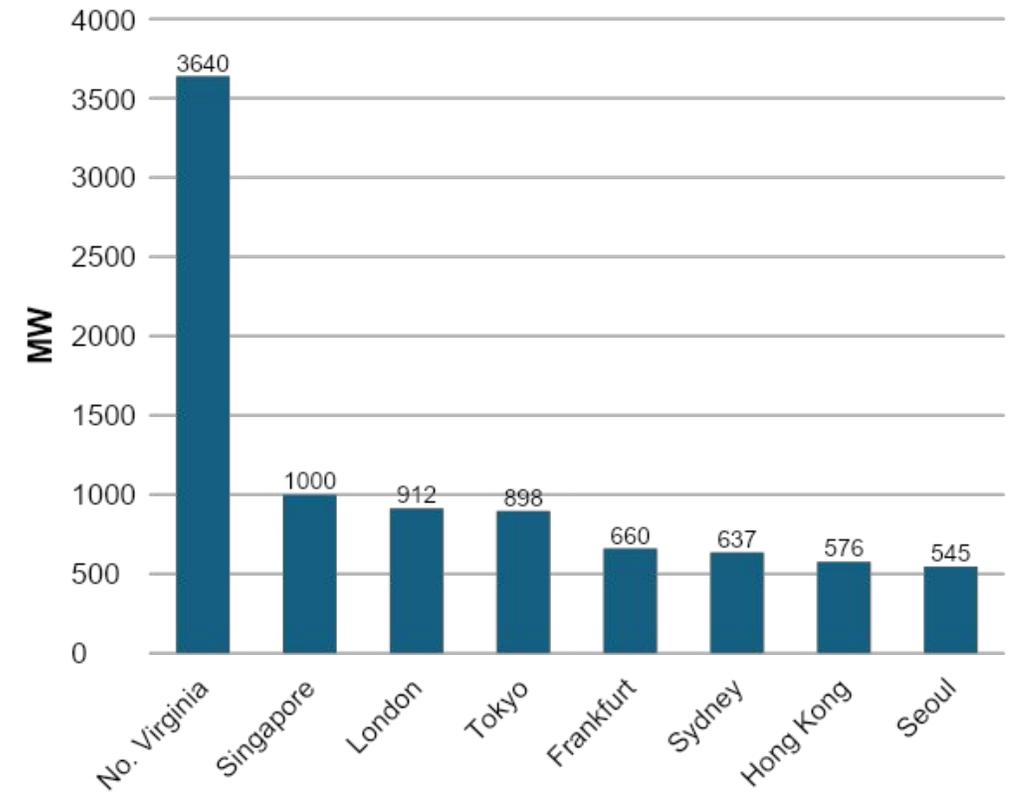
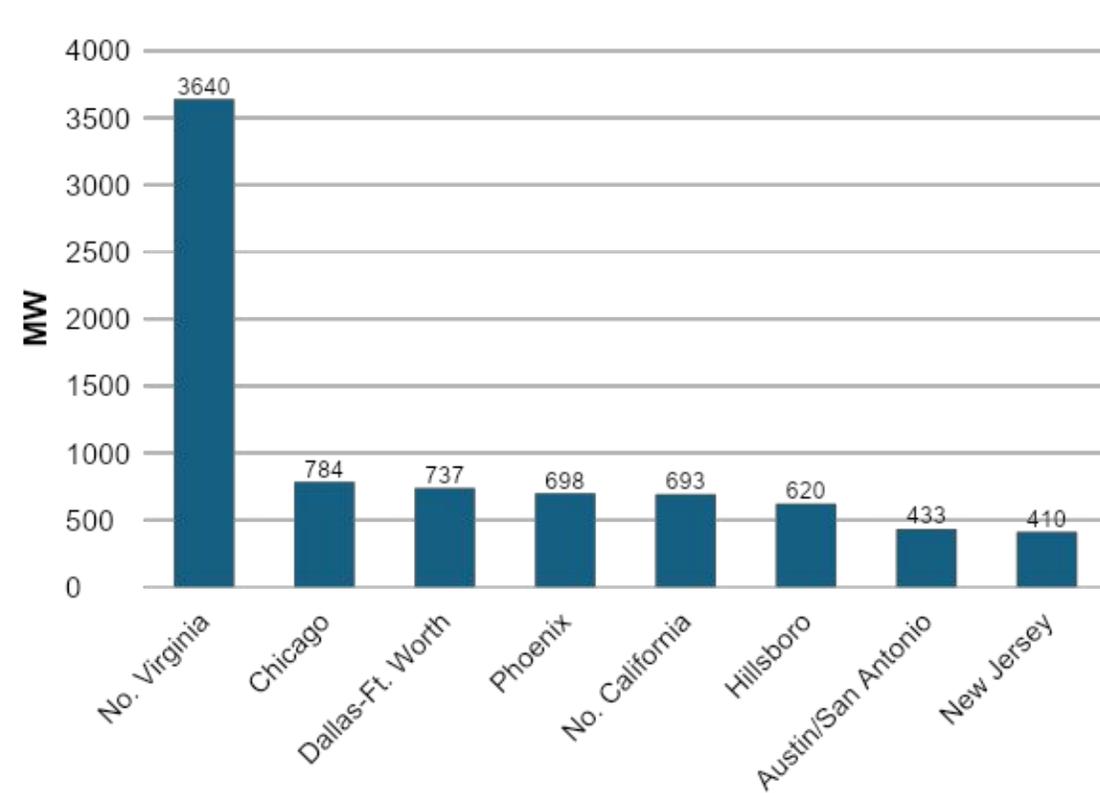
-JLL, *Data Centers 2024 Global Outlook*

More People Are Getting Online

- Approximately 5.4 billion people - or 67% of the global population - are online today. This represents an **increase of 45% since 2018**. 2.6 billion people are not yet connected to the internet.
- On average, U.S. households have a total of **22 connected devices**.



NOVA: LARGEST DATA CENTER MARKET IN THE U.S.

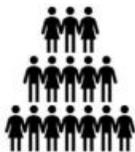


Northern Virginia data center market is larger than next five US markets combined and larger than next four world markets combined

Source: Dominion Q4 Earning Call



DOMINION ENERGY SERVICE TERRITORY OVERVIEW



2.8M

Electric customers
(homes and businesses)



19,000+

Employees & contractors



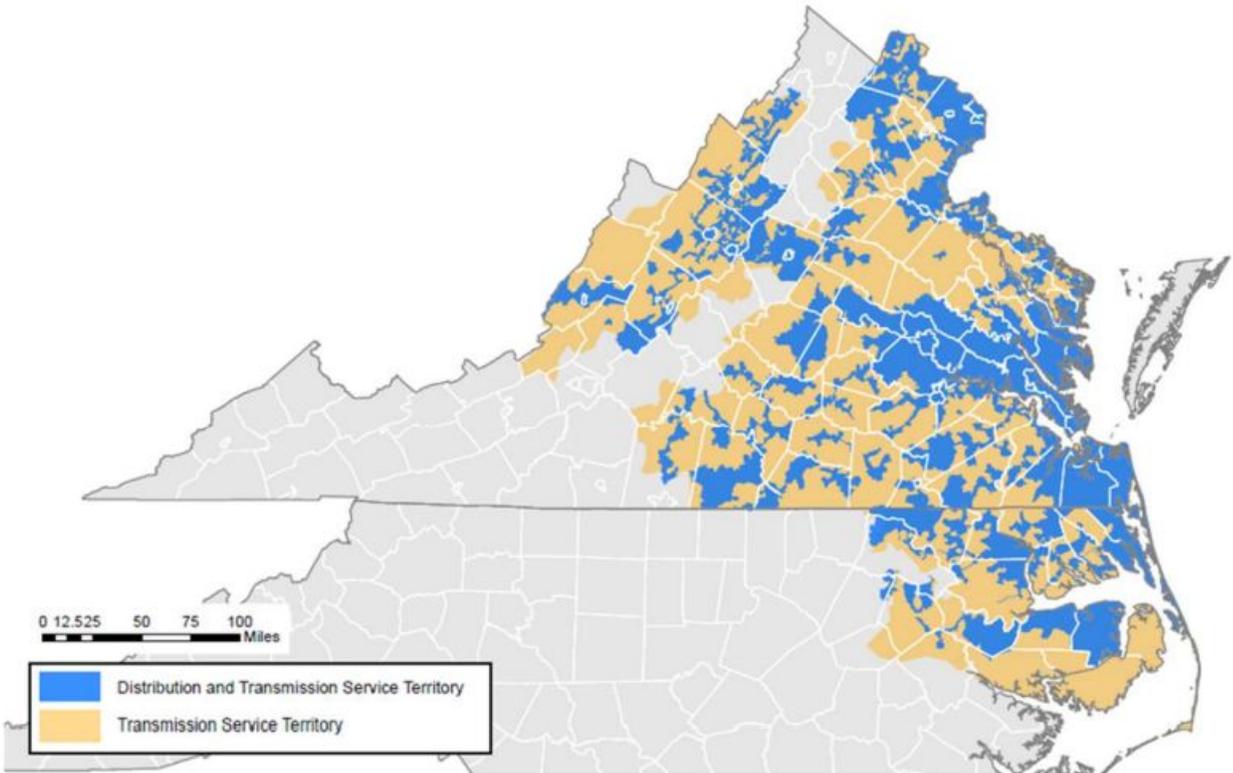
66,000+

Miles of power lines



20,000+

Megawatts of generation



DATA CENTERS: AN OPPORTUNITY TO SECURE VIRGINIA'S ECONOMIC FUTURE

Tens of thousands of high-wage jobs in construction, operations, and advanced manufacturing.

Millions in local tax revenue, funding schools, roads, and public services.

Strategic siting and energy partnerships are ensuring **growth that strengthens—not strains**—Virginia's communities.

With reliable power and a forward-looking policy environment, Virginia is positioned to lead the next generation of digital infrastructure.

AXIOS

Exclusive: Nvidia backs new data center to reduce electricity spikes



Amy Harder



Add Axios on Google



The Aurora data center under construction in Virginia is set to require 96 megawatts of power (similar to a small city) and take up roughly 815,000 square feet (14 football fields). Photo: Courtesy of Digital Realty

A new kind of data center built by a coalition including Nvidia aims to smooth out power use as AI demand surges.



AN ENERGY CHALLENGE WORTH RISING TO

National Security: Reliable U.S. data infrastructure protects defense and critical systems.

Data Sovereignty: Keeping data on American soil safeguards privacy and resilience.

Economic Opportunity: Billions in private investment and high-wage jobs at stake.

If Not Here, Elsewhere: These facilities will be built — Virginia should keep the benefits.

Energy Catalyst: Demand drives investment in modern, reliable, and cleaner power.



TACKLING THE ENERGY AFFORDABILITY CRISIS

Are data centers driving higher energy prices?

How do we keep residential energy prices affordable?

Our strategy is built on:

- A full spectrum of energy sources
- Strategic public-private partnerships
- Regulatory reform to speed up deployment
- Investment in grid infrastructure and future-ready technologies

DATA CENTERS DON'T INCREASE ENERGY DEMAND. **PEOPLE DO.**

Whether it's running a business, coordinating care, transferring money, or just texting goodnight, data centers keep modern life running. **Every year, 5.5 billion people on 20 billion devices connect to the internet and generate:**

- ✉ **135 trillion** emails
- 💬 **8.5 trillion** texts
- 💳 **800 billion** credit-card transactions
- ▶ **365 billion** hours of video watched
- 📺 **110 billion** video calls

These staggering numbers represent only a fraction of our true digital energy footprint, excluding countless other services—from emergency response coordination and air traffic safety to music streaming, social media, online gaming, and beyond.



VIRGINIA RESIDENTIAL ELECTRICITY BILL – DOMINION

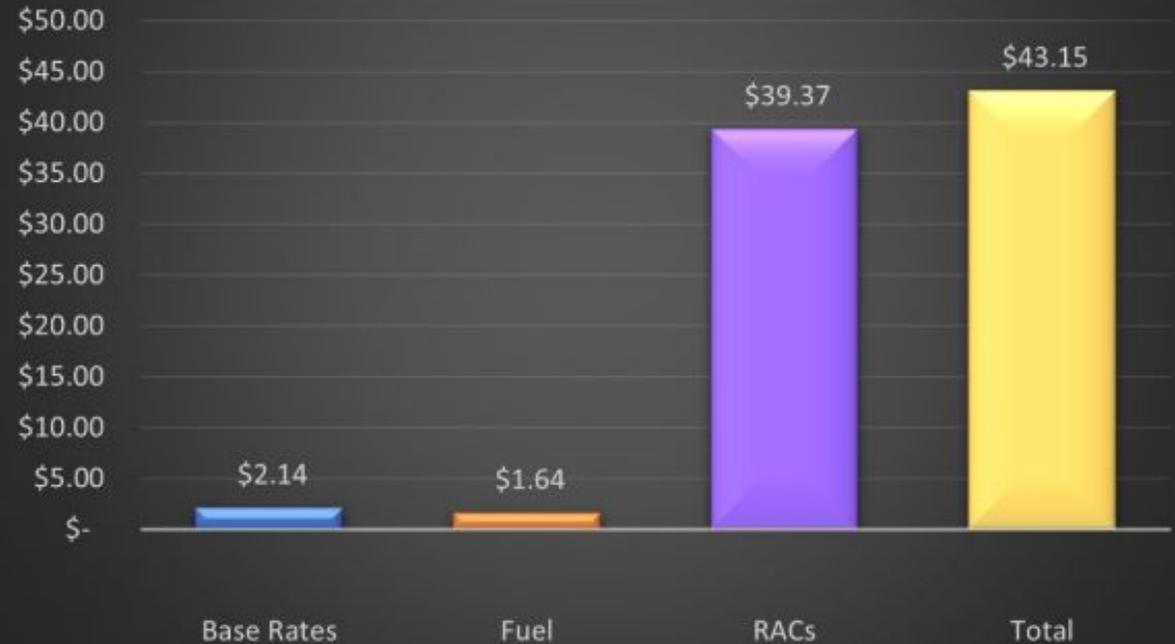
DEV Residential Bill

Using 1,000 kWh



DEV Residential Bill Increase

Using 1,000 kWh
July 2007 - July 2024



VIRGINIA RESIDENTIAL ELECTRICITY BILL – APCO

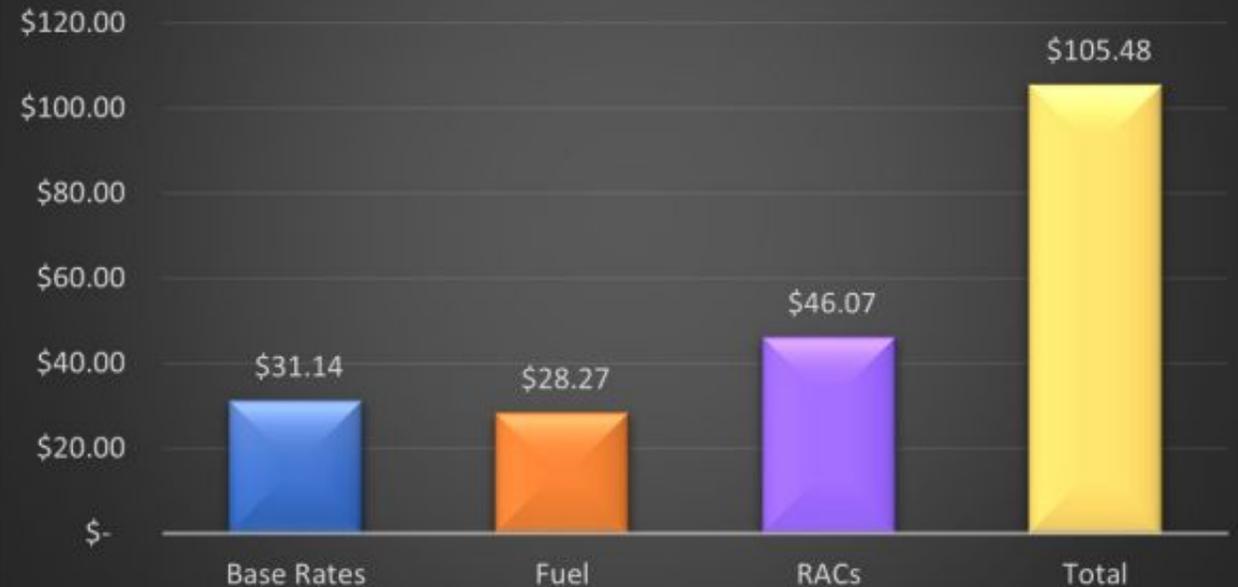
APCo Residential Bill

Using 1,000 kWh



APCo Residential Bill Increase

Using 1,000 kWh
July 2007 - July 2024





November 13, 2025

Virginia Affordability Trend Model and Economic Model

Presented by Vincent Maiden (Virginia Energy)

MEGA-DC PROJECT TEAM –

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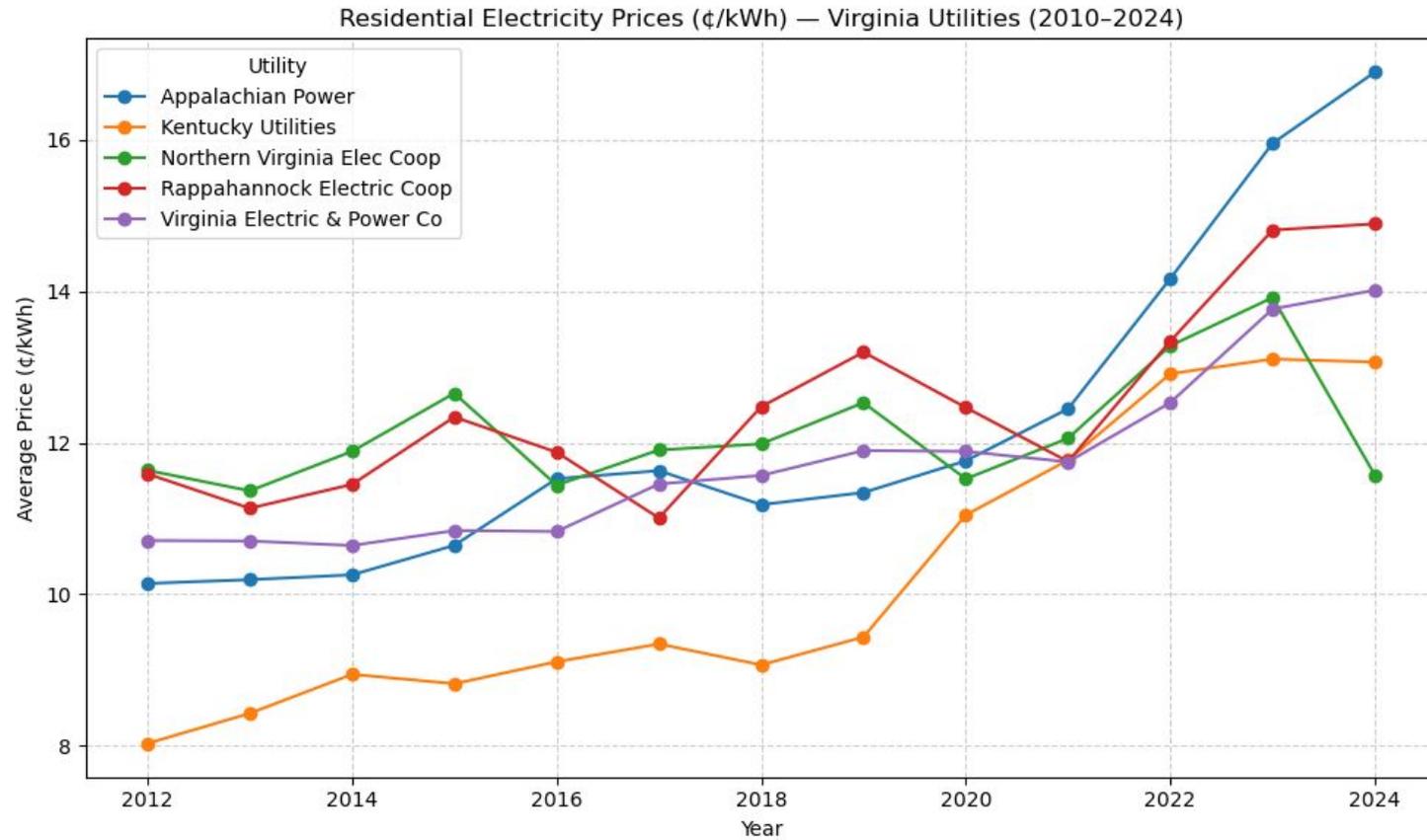


RATE INCREASE VS AFFORDABILITY DILEMMA

- Ordinary customers focus on energy bills (example \$120/month) while utilities focus on rate control (example \$0.16/kWh)
- Indirect economic benefits are often abstract for customers not directly touched by the economic development efforts
- Utilities often think “open” rate setting processes are adequate but social media and retail news dominate mind share
- Affordability modeling captures this dilemma
- Energy Burden vs Energy bill- we think this is an educational opportunity for Virginia



VIRGINIA RESIDENTIAL ELECTRICITY PRICES (2010-2024)



EVOLVING THE AFFORDABILITY MODEL FOR TRADE OFF ANALYSIS

Affordability Snapshots Trending Over Time

Models: Nation-wide County-level Electricity Affordability; State Electricity, Gas, Water and Rent Models

Data: Utility Price, Rent, Median Household Income, and Rate Case Data

Affordability and Data Center and Utility Investment Impacts

Models: Local Economic Models, Population Groups

Data: Data Center, CapEx and OpEx Projects, and Broadband/Fiber Utility Data

Affordability by Design

Models: Affordability and State Incentives

Data: Incentive Programs and Results



ELECTRICITY AFFORDABILITY HISTORICAL TREND MODEL

- **Approach**

- Apply the Affordability Index to the historical Average Electricity Bills and Median Household Income
- Map Electricity Affordability (2010-2025) by County

- **Next Steps**

- Project into 2026 with Rate Cases and other data
- Break out affordability index to different income groups
- Explore urban and rural difference
- Sensitivity Testing on different threshold levels and index bins



COUNTY LEVEL (VA)

AFFORDABILITY ASSESSMENTS TAILORED TO STATE NEEDS

- Share of household income spent on electricity, gas, water, rent, and other household utilities, set by a threshold of income.



Relative to a person's/ household's circumstances

$$\text{Affordability Model} = 1 - \frac{\text{Annual Cost}}{\text{Annual Income} * \text{Threshold}}$$

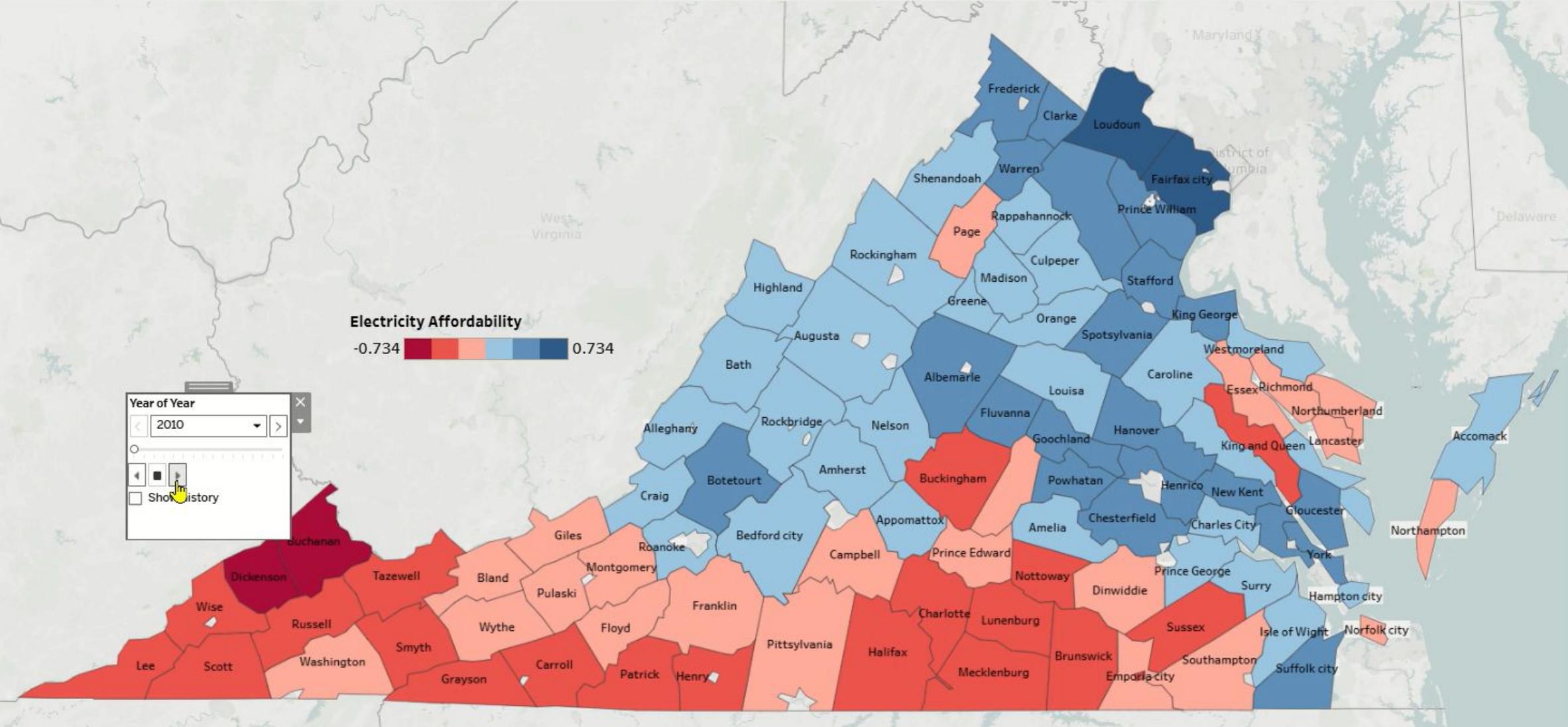
Calculated based on a selected share of income that a person/household is able to pay



Threshold: 3.481% of MHI

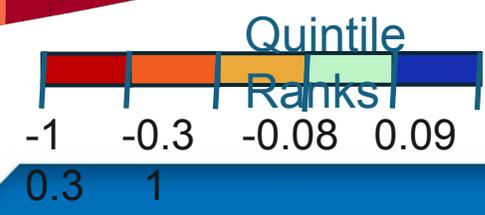
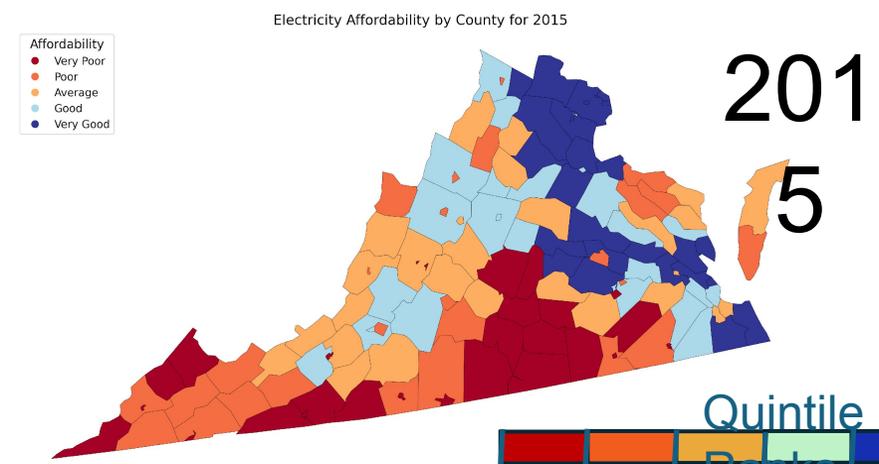
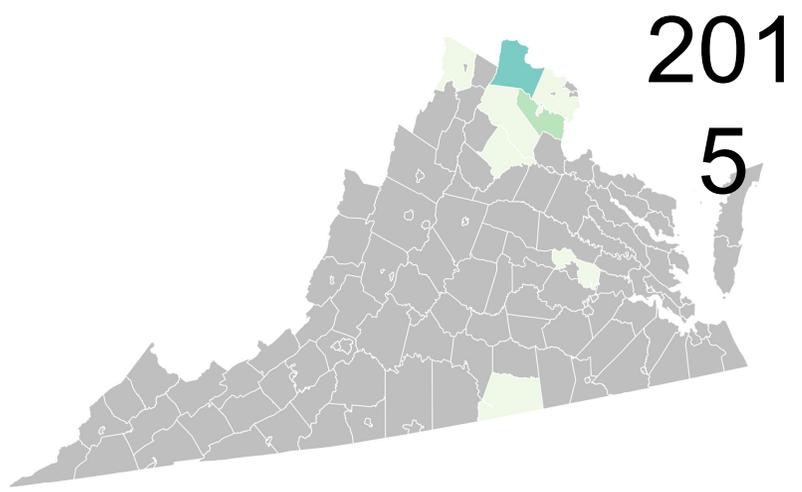
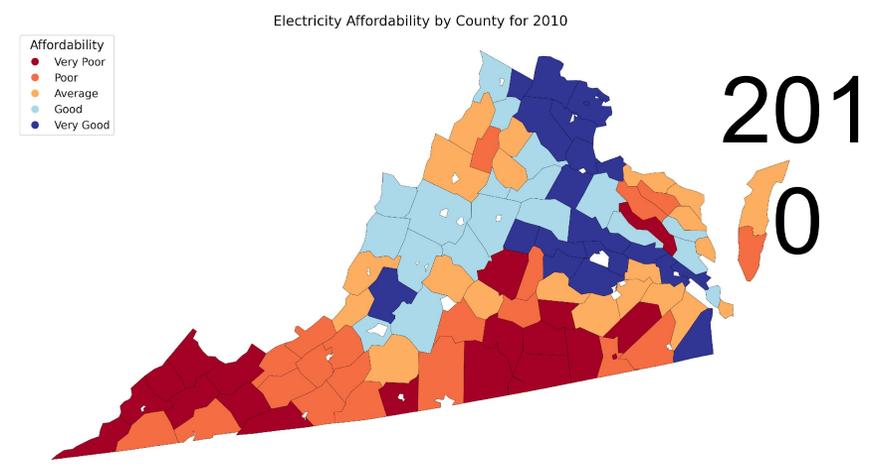
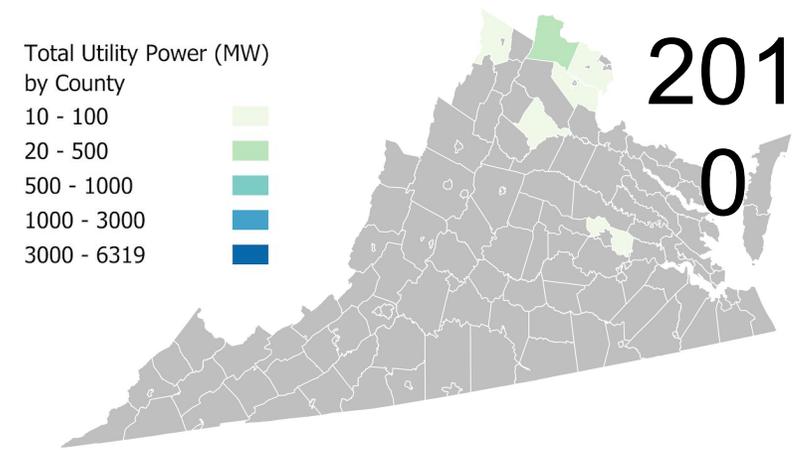
Electricity Affordability, Virginia: 2010-2025

2010



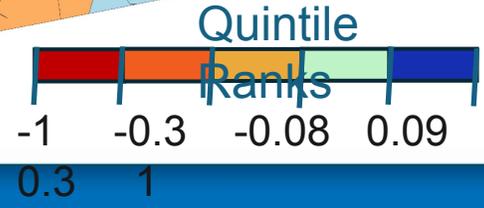
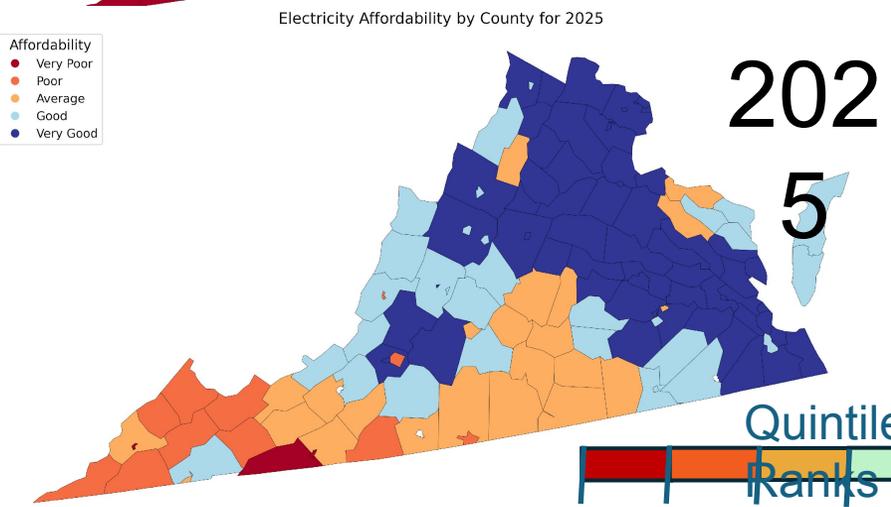
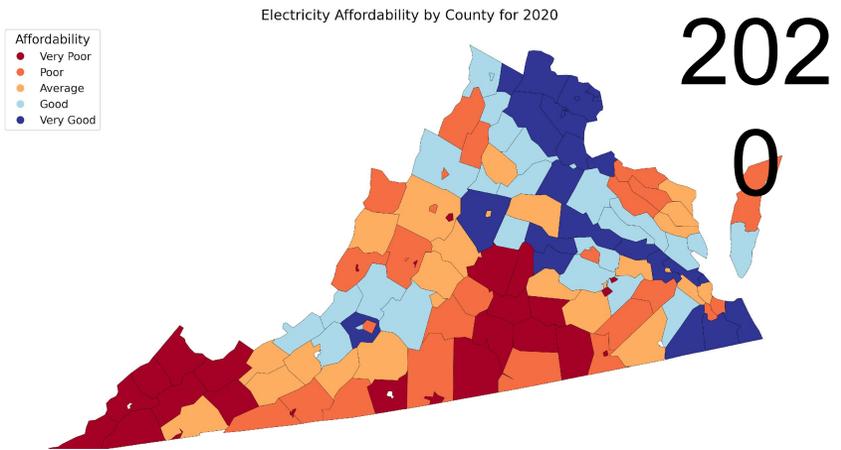
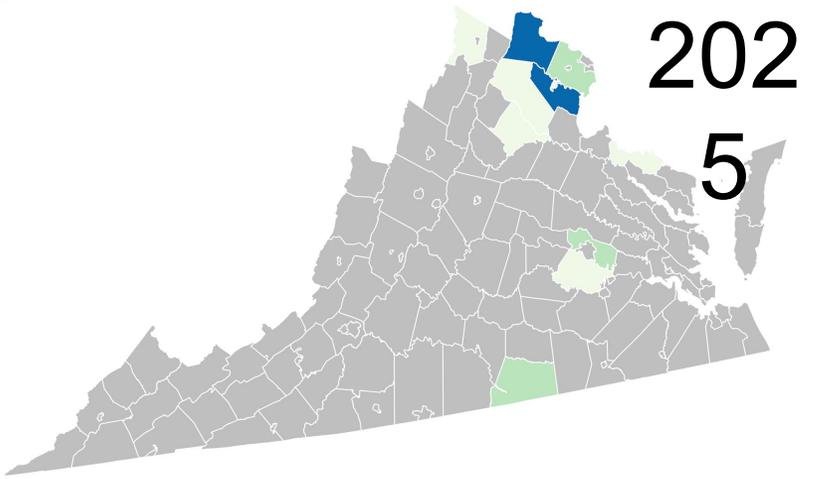
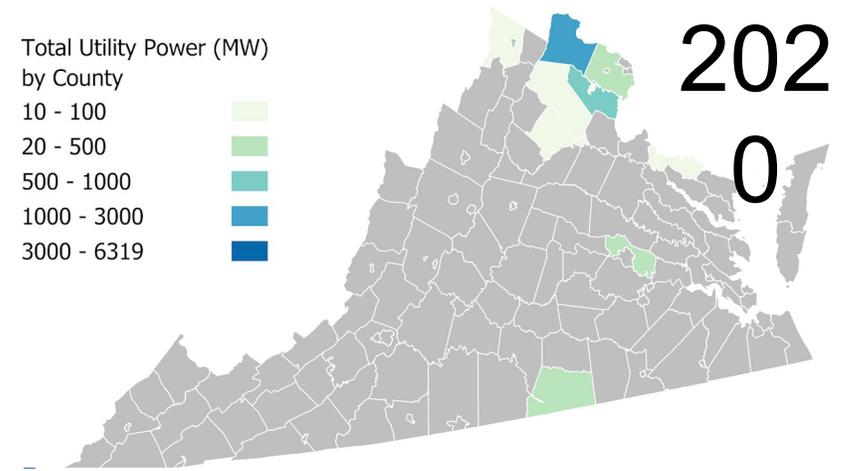
Threshold:
3.481% of MHI

CORRELATION BETWEEN DATA CENTERS & AFFORDABILITY

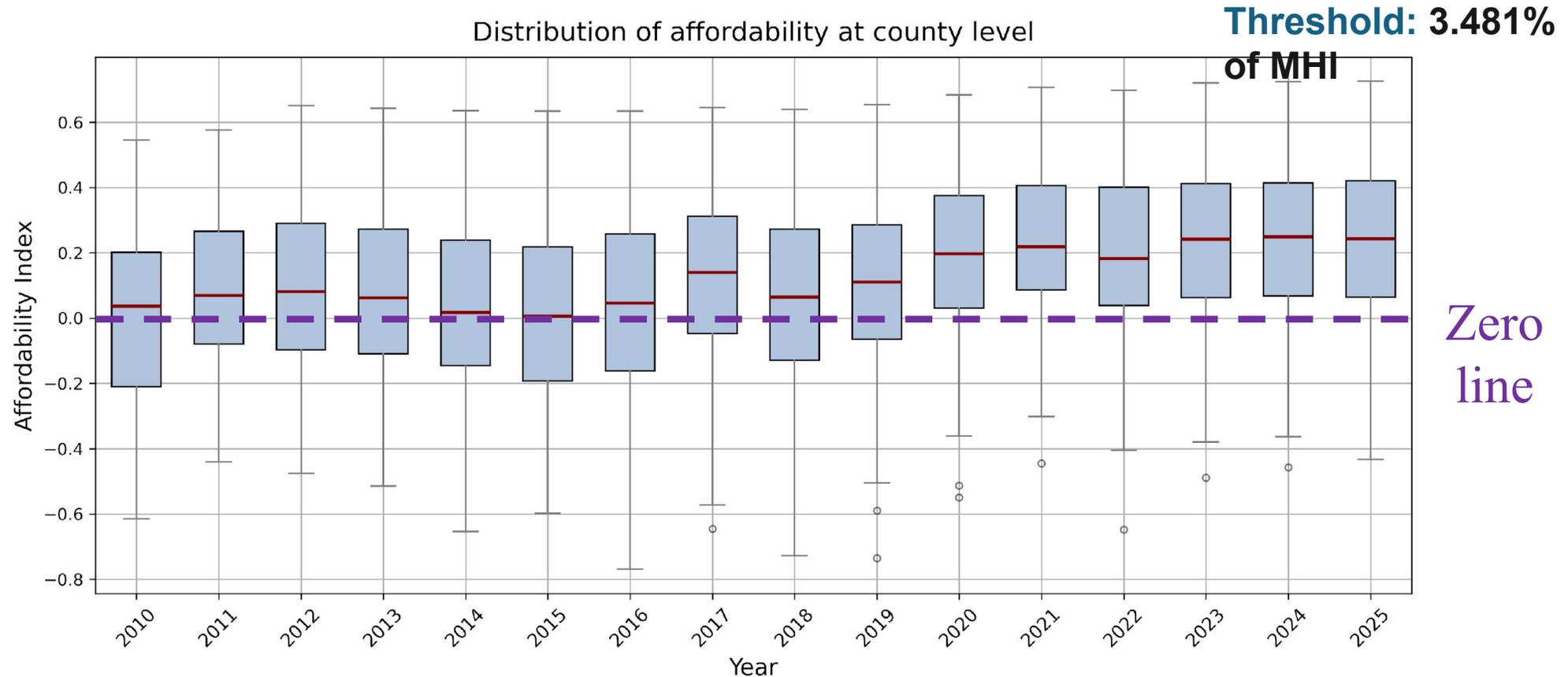


Threshold:
3.481% of MHI

CORRELATION BETWEEN DATA CENTERS & AFFORDABILITY



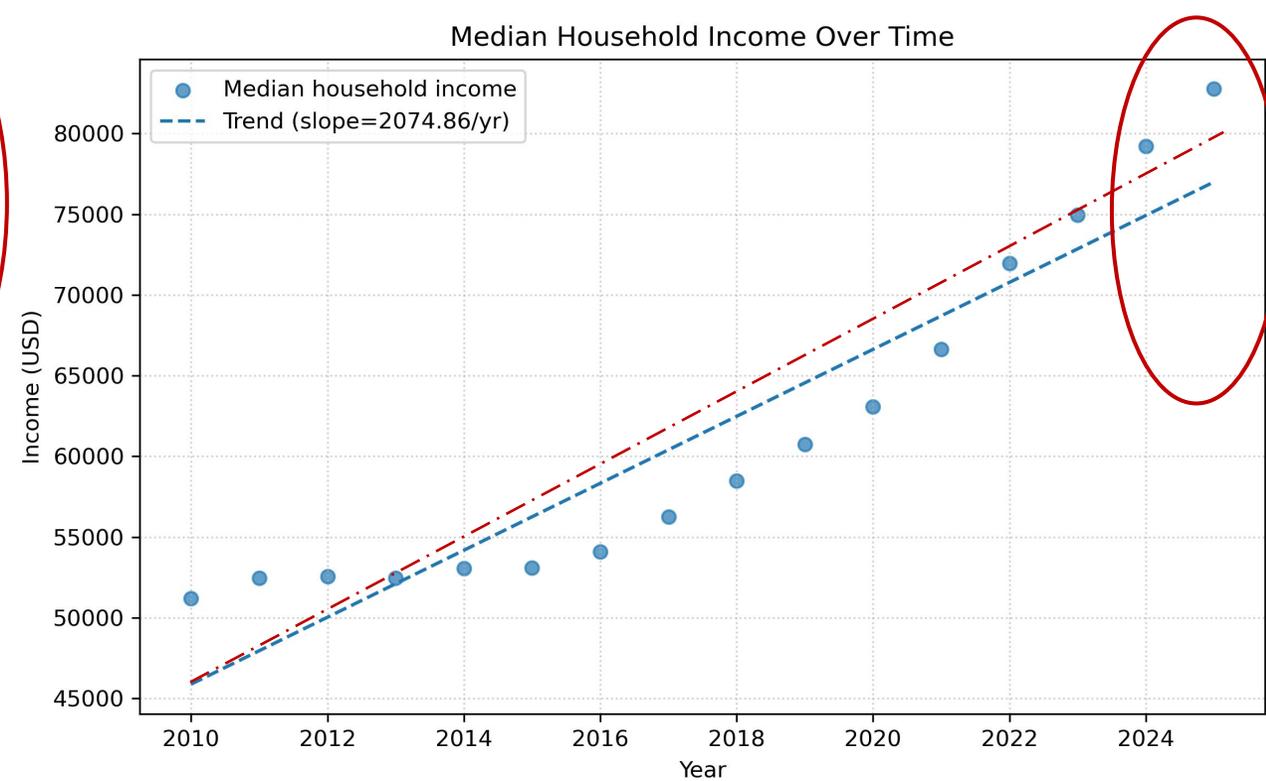
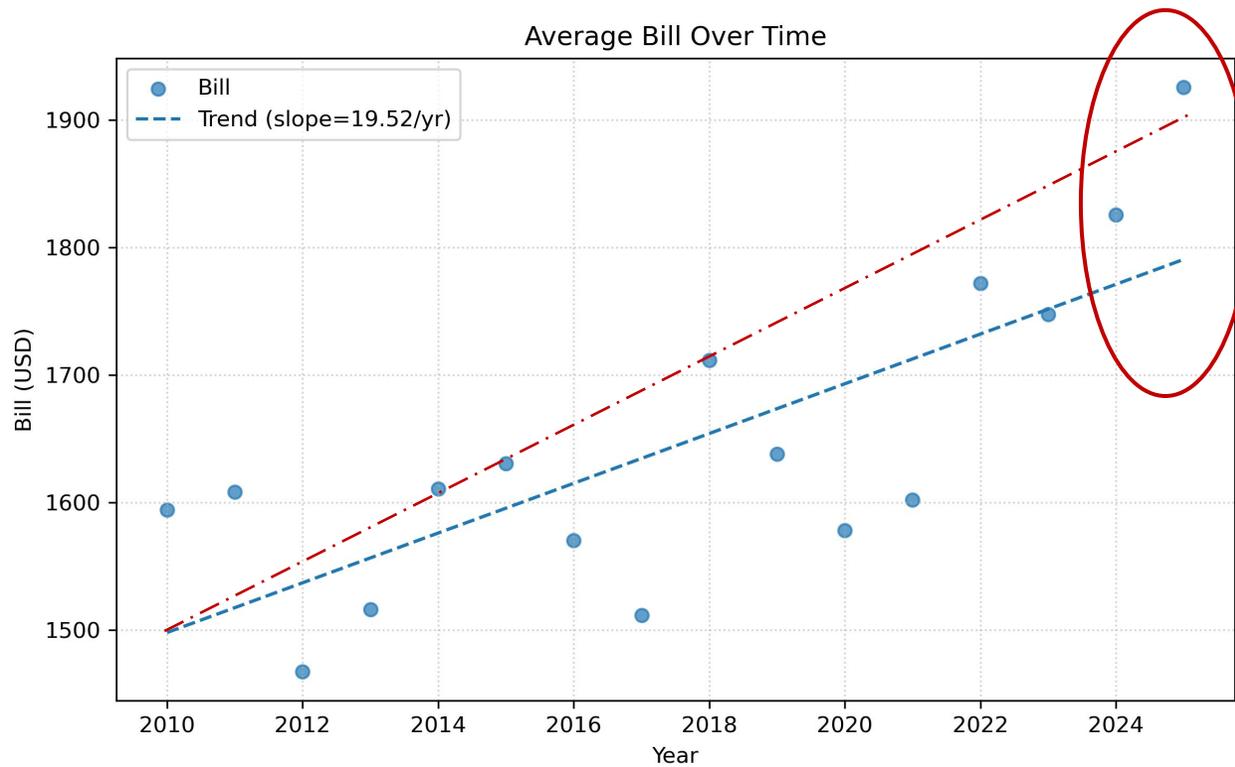
AFFORDABILITY DISTRIBUTION ACROSS VA COUNTIES



Affordability improvements were observed across most of the counties/independent cities (99/101)

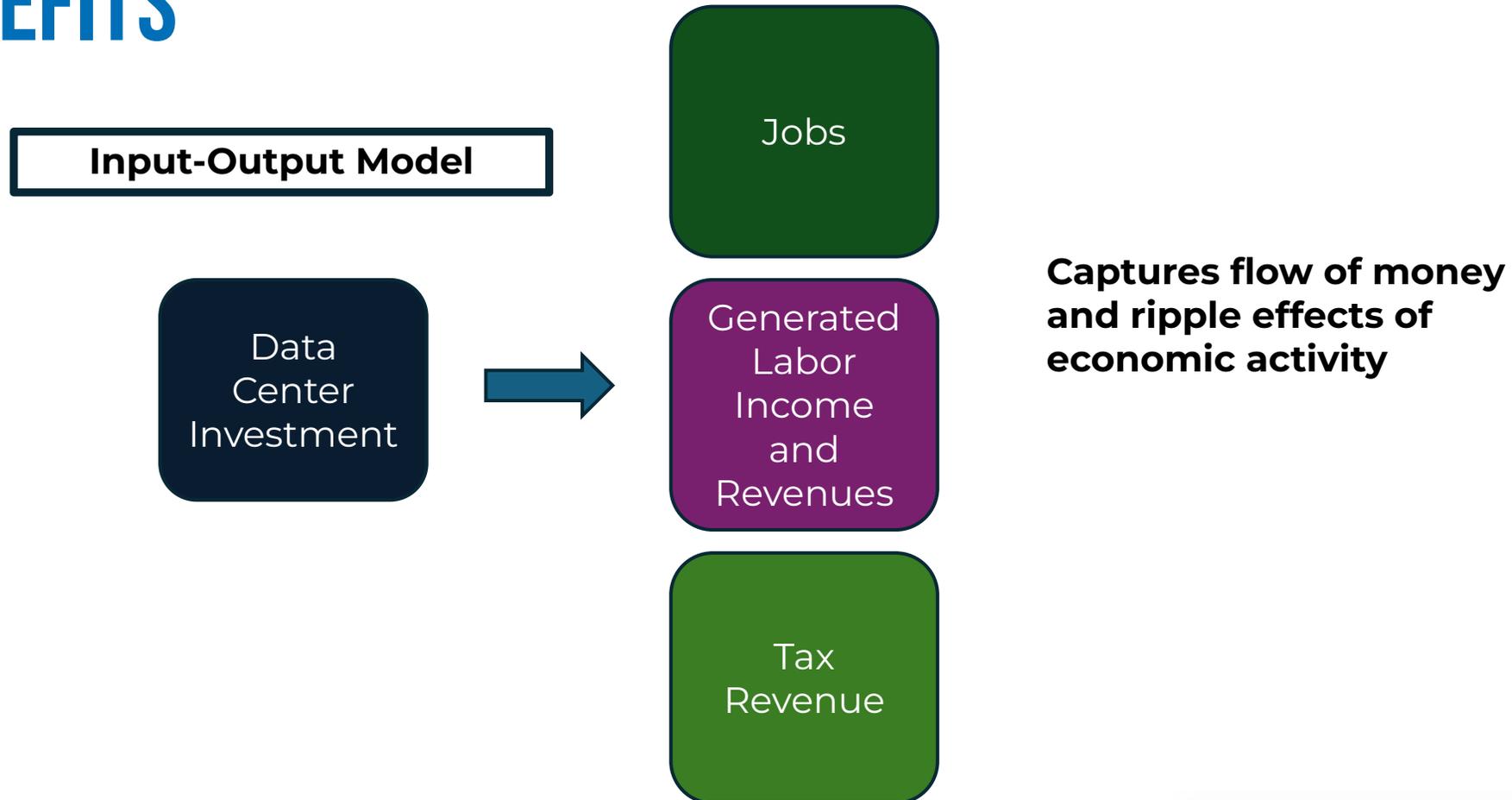


WHAT IS INCREASING AT A HIGHER RATE: ELECTRICITY BILLS OR MHI?



PRELIMINARY MODELING FOR DATA CENTER INVESTMENT

BENEFITS



ECONOMIC INDICATORS BETWEEN COUNTIES:

\$1B DATA CENTER INVESTMENT PER COUNTY

County	Employment (Jobs)	Output (\$M)	Labor Income (\$M)	GDP Contribution (\$M)	Tax Revenue (\$M)
Loudon	3,271	\$1,352	\$495	\$658	\$133
Culpeper	4,224	\$1,326	\$425	\$570	\$140
Fairfax	3,264	\$1,404	\$447	\$638	\$118
Prince William	3,719	\$1,299	\$321	\$468	\$100
Totals	14,478	\$5,381	\$1,688	\$2,334	\$491



ECONOMIC INDICATORS BETWEEN INVESTMENTS

LOUDON COUNTY

Data Center Investment	Employment (Number of Jobs)	Output (\$M)	Labor Income (\$M)	GDP Contribution(\$M)	Tax Revenue (\$M)
\$0.5B	1,635	\$676	\$247	\$329	\$66
\$1B	3,271	\$1,352	\$495	\$658	\$133
\$5B	16,354	\$6,761	\$2,473	\$3,292	\$664
\$10B	32,708	\$13,522	\$4,946	\$6,584	\$1,327



HOW ASSUMPTIONS MIGHT DISTORT A DATA CENTER INVESTMENT CASE

Economic estimates will be overstated

- For very large Data centers

Wages will rise

- Demand for labor rises

Supply-Demand shifts

- Price Inflation may reduce benefits

Firms relocate to serve data centers

- Induced behavioral responses

Technologies evolve

- Total Factor Productivity (TFP) Measure

Missing tax rebates, utility discounts

- Incentives may have uneven economic impacts



THANK YOU.

