VIRGINIA'S CURRENT ENERGY LANDSCAPE & CHALLENGES

STATE ENERGY OFFICE

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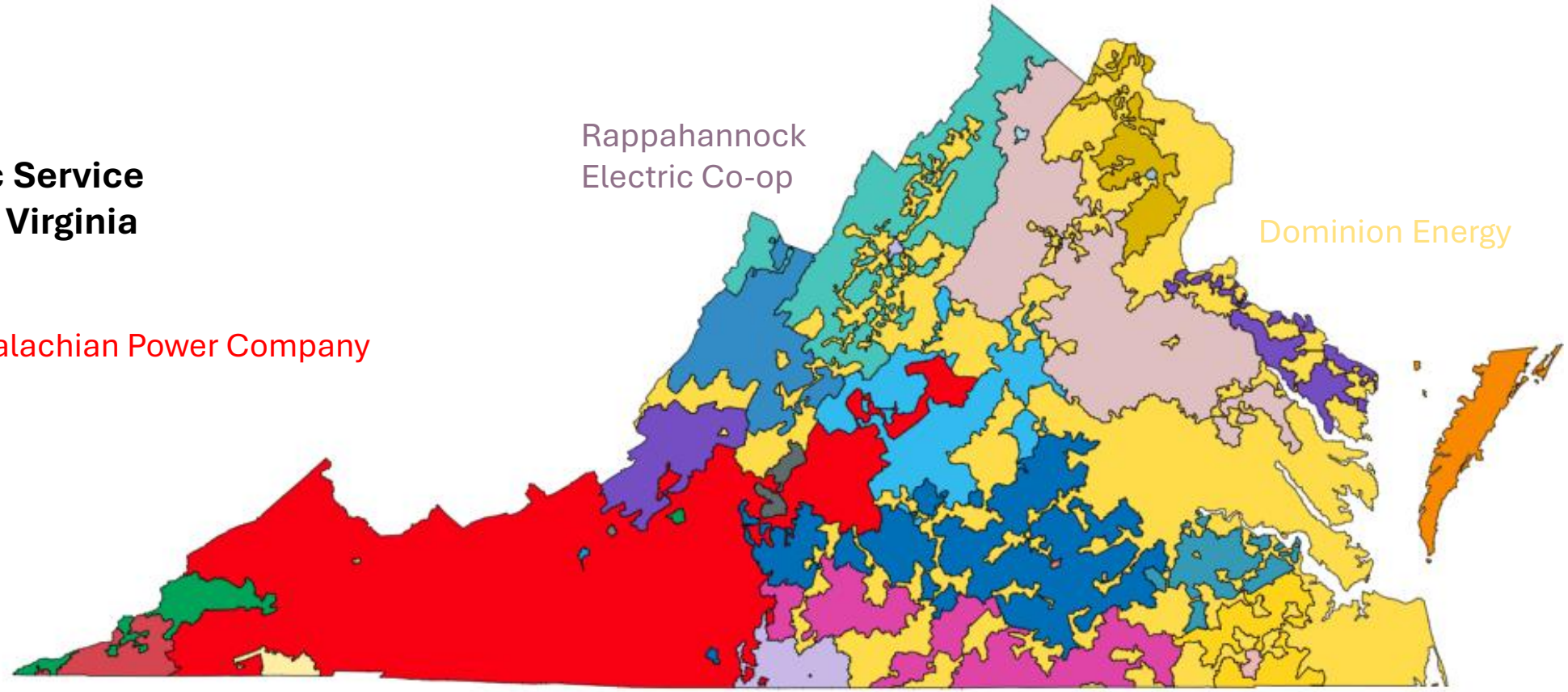
VIRGINIA Energy

VIRGINIA'S CURRENT ENERGY LANDSCAPE

Electric Service Territory: Virginia

In Virginia, Dominion Energy serves approximately 2.6 million customers, about 66% of the state's electric customers. The remaining customers are served by Appalachian Power, electric cooperatives, municipal utilities, and other providers.

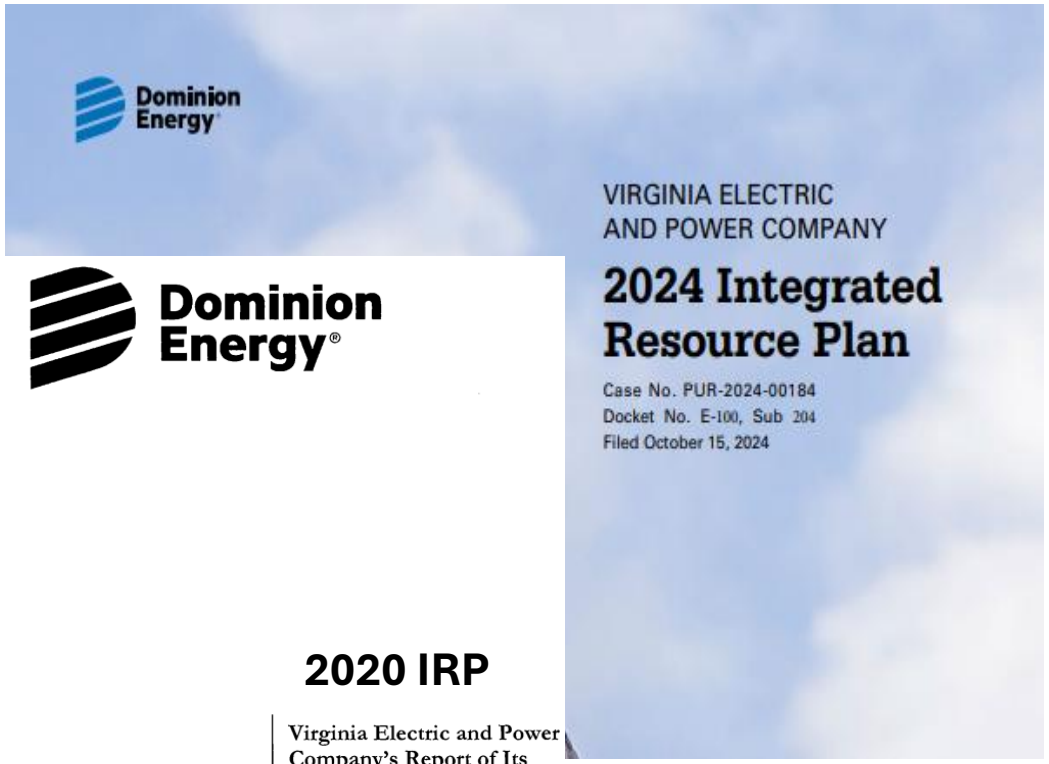
~ 33 Electric Service Providers in Virginia



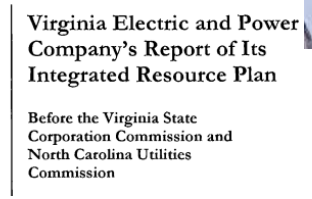
VA Long-Term Energy Planning: References

At Present, State long-term energy planning and policy primarily depend on:

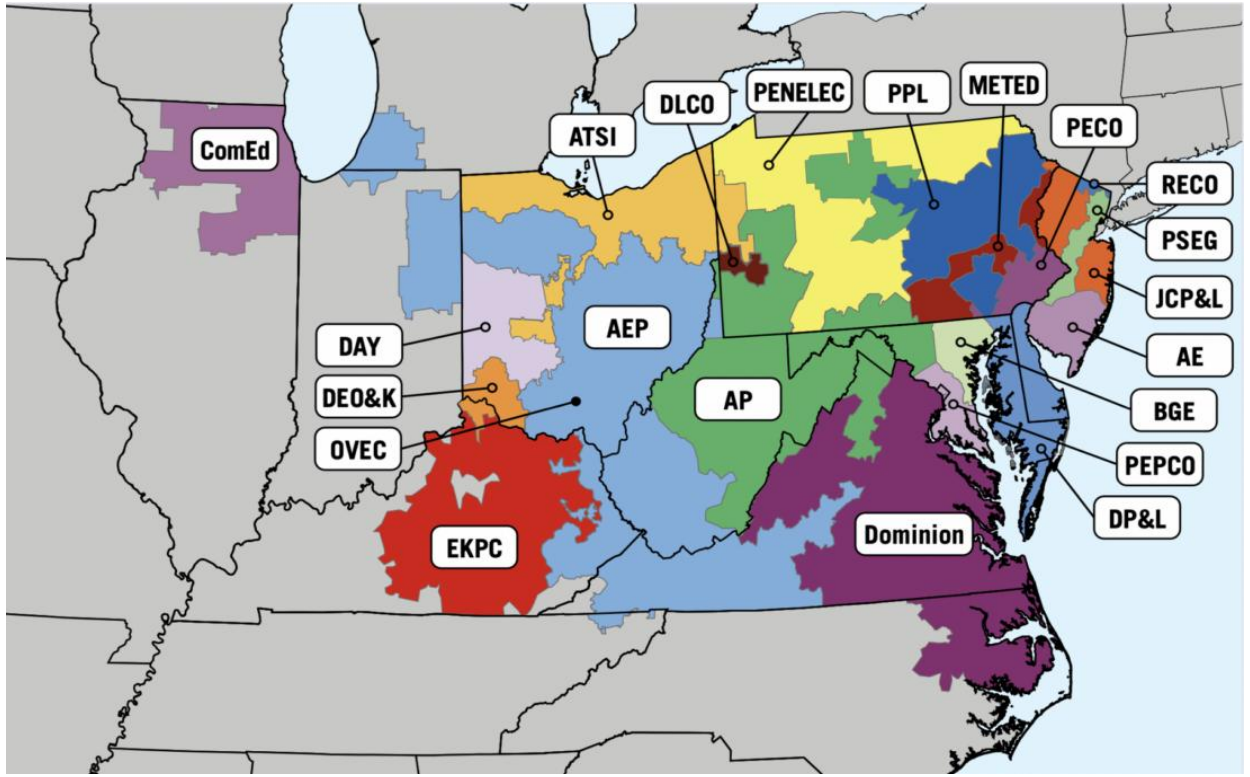
DOM IRPs



2020 IRP

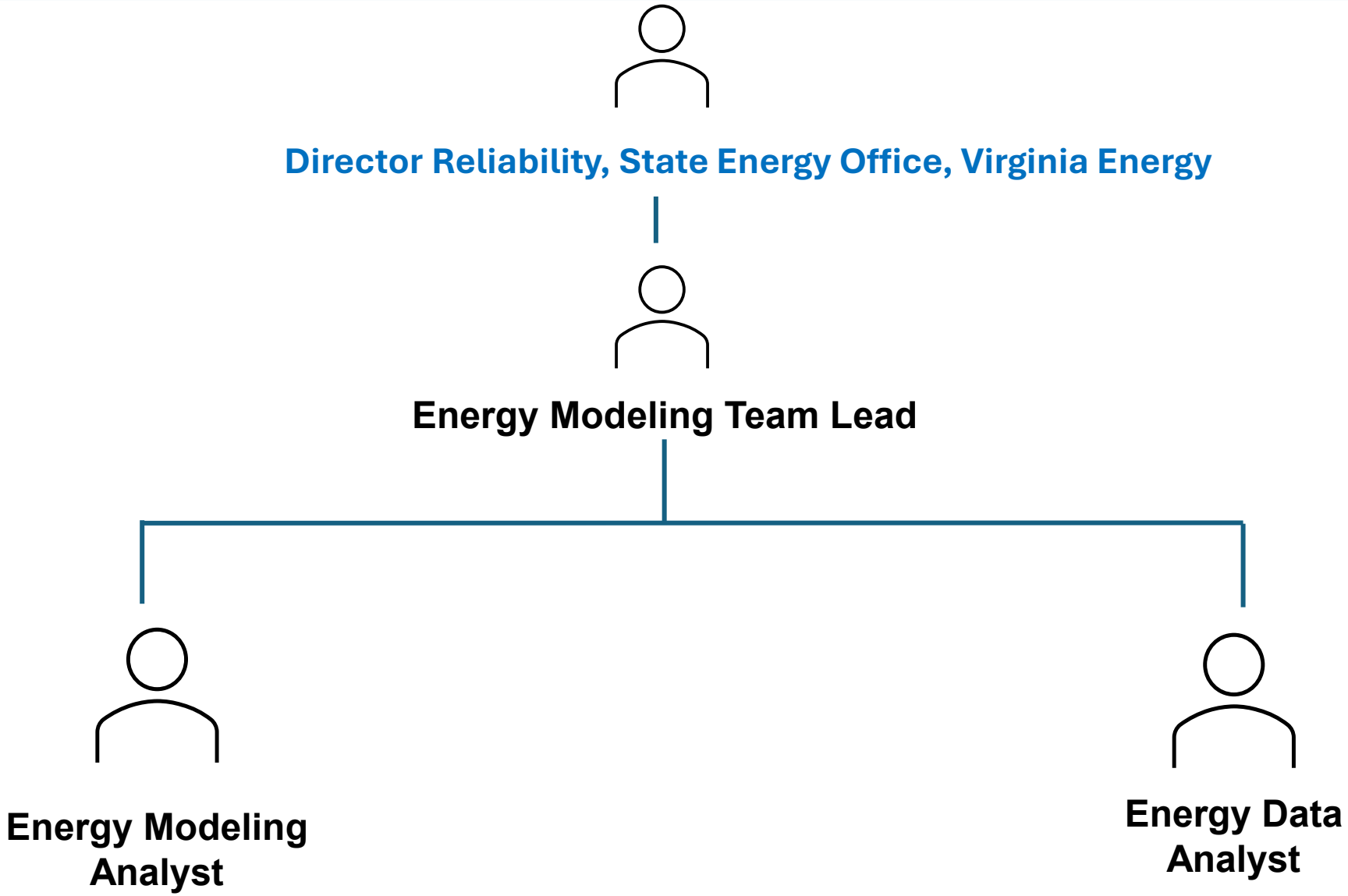


PJM Regional Forecast



While these resources are valuable for energy planning, they do not provide a holistic, statewide view of the Commonwealth's energy system

Team Members



Virginia's State Energy Office is among the few states with a dedicated energy modeling team, envisioned to provide unbiased, high-quality analysis while reducing reliance on external consultants.

Virginia statewide long-term Energy Planning Framework

Forecasting
Part I

Energy Modeling
Part II

Policy Simulator
Part III

Use Cases

Forecasting (Long-term)

- Load
- Energy
- Electricity Prices
- Technology cost
- Extreme Events

Itron

Capacity Expansion Modeling

- Generation mix
- Transmission needs
- Technology review
- Cost

PLEXOS

Techno-Economic Analysis

- Capital and O&M cost
- LCOE
- ROI

System Advisor Model

System Optimization

- Optimal Sizing
- Resiliency Planning
- Decarbonization planning

REopt

Energy Policy Simulator

- Job and GDP impact
- Carbon Pricing
- Investment

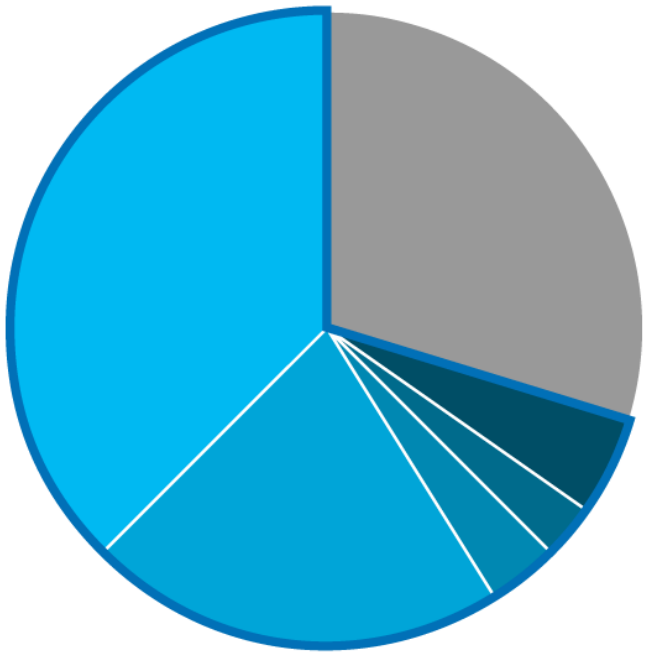
ENERGY INNOVATION POLICY & TECHNOLOGY LLC

- Draft Comprehensive Virginia Energy Plan
- Engage in the modeling components of utility IRP review process
- Simulate policy scenarios during General Assembly Session
- Innovative Technology Review
- Support Federal Grant application

= Support Modules (open sources models)

WHERE DOES VIRGINIA GET ITS ELECTRICITY FROM?

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



70% Generated In-State

Natural Gas	54%
Nuclear	31%
Solar	5%
Coal	4%
Other	7%

30% Imported from Other States

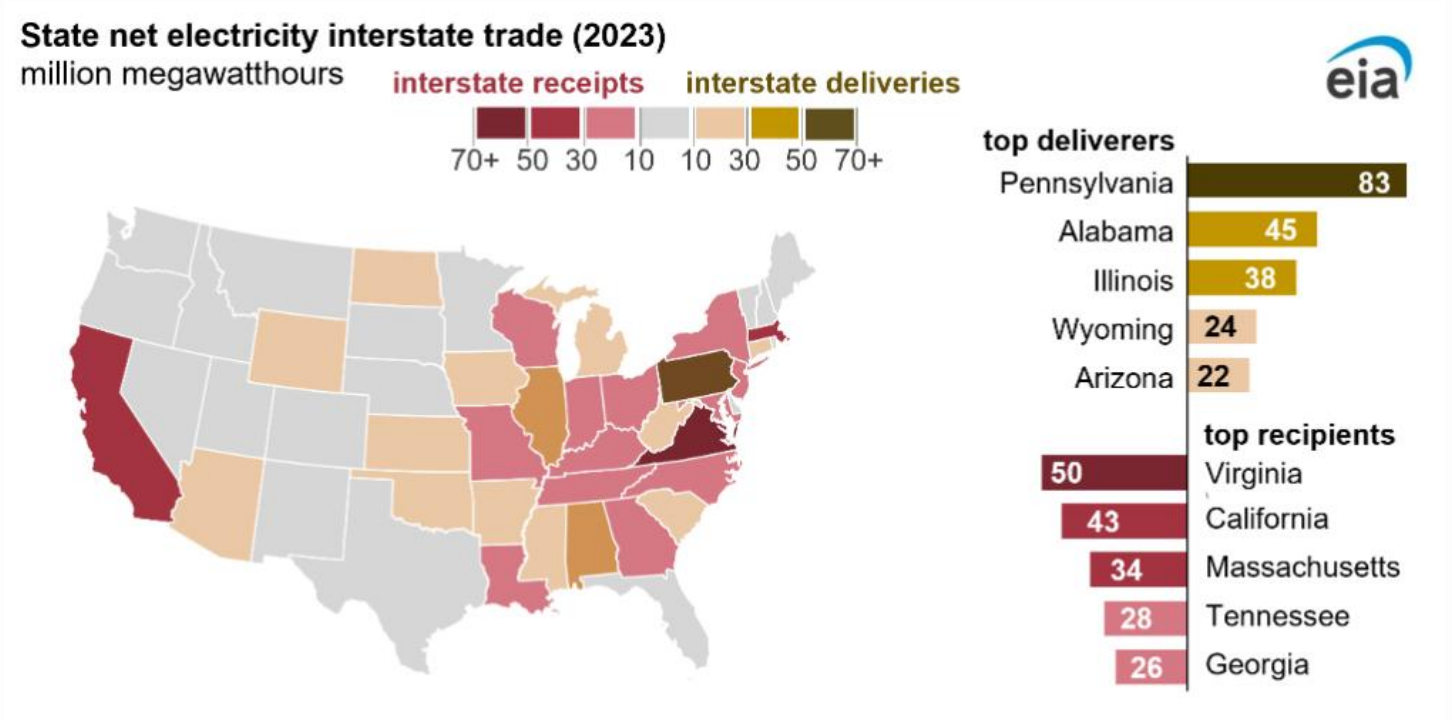
Comes from a variety of sources, but the specific breakdown is unknown.

VIRGINIA: ONE OF THE NATION'S LARGEST ELECTRICITY IMPORTERS

Electricity imports have increased significantly from 18% in 2020 to 31% in 2024.

In 2023, Virginia was the **#1 state for imported electricity.**

In 2024, Virginia was the **#2** state for imported electricity, after **California**



VIRGINIA IS EXPERIENCING THE LARGEST GROWTH IN POWER DEMAND SINCE WWII

Current projections show **5.4% annual increase in demand**—up from 1.4% projected in 2020.

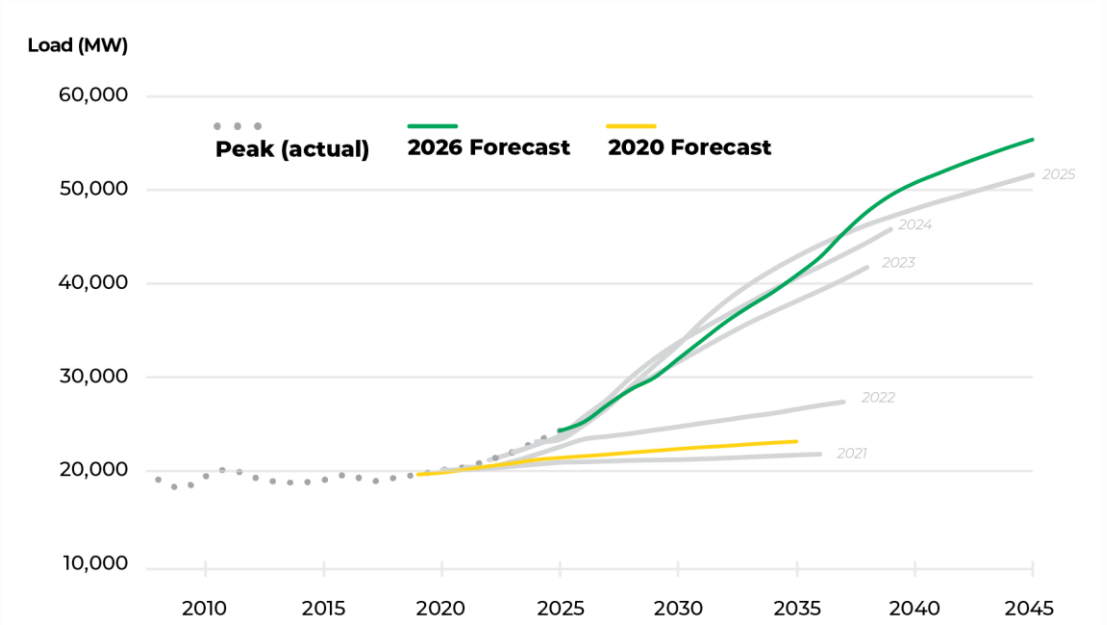
Power **capacity must nearly double** in the next 10 years to meet growing demand.

Data Centers are the primary driver of this demand growth, though electrification, manufacturing, and EVs also play a role.

By 2033 Data Centers will be more than half of Dominion Zones total load

PJM Load Growth Forecasts

2020-2025, Dominion Zone, Summer Peak



Source: PJM Long-Term Load Forecast Reports, 2020-2026

DATA CENTERS
& VIRGINIA ECONOMY

VIRGINIA IS AN ECONOMIC POWERHOUSE

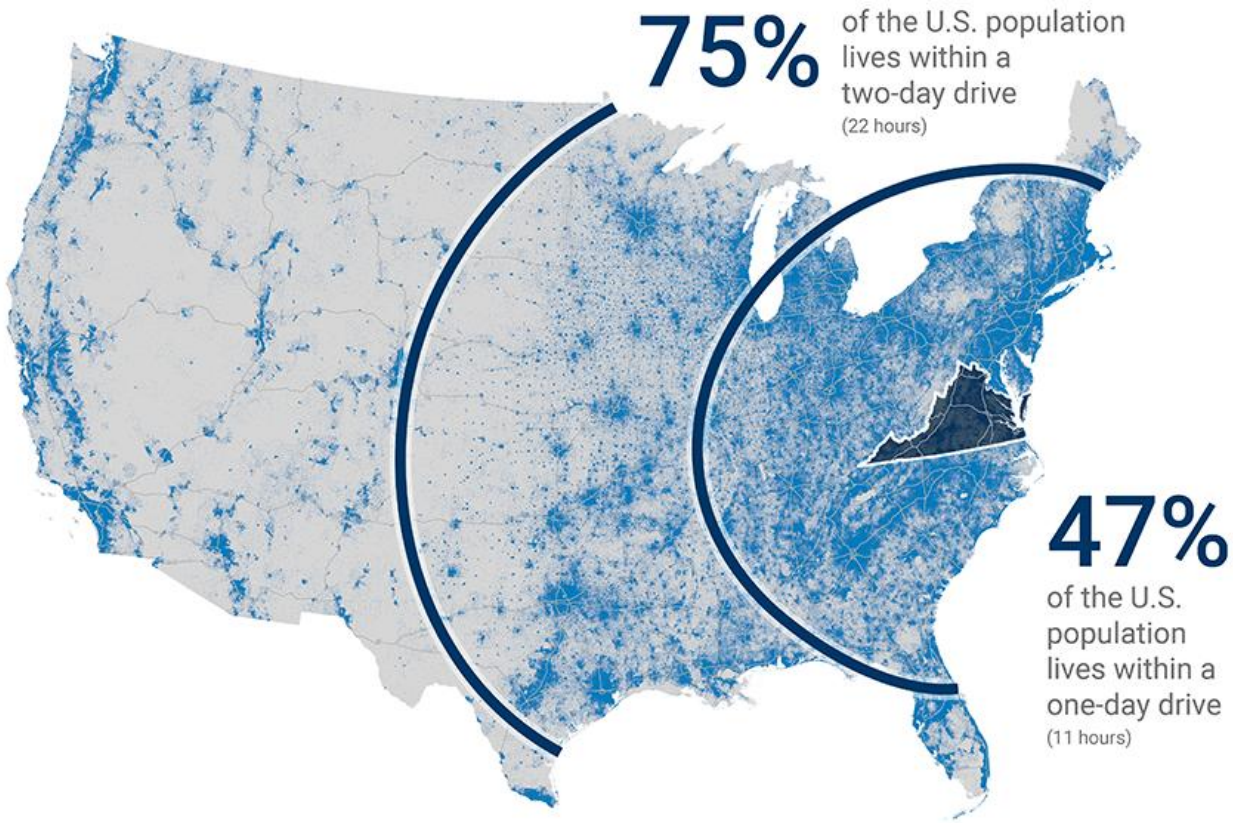
#1 DATA CENTER MARKET
IN THE WORLD

#1 STATE FOR BUSINESS
CNBC - 2021, 2022, & 2024

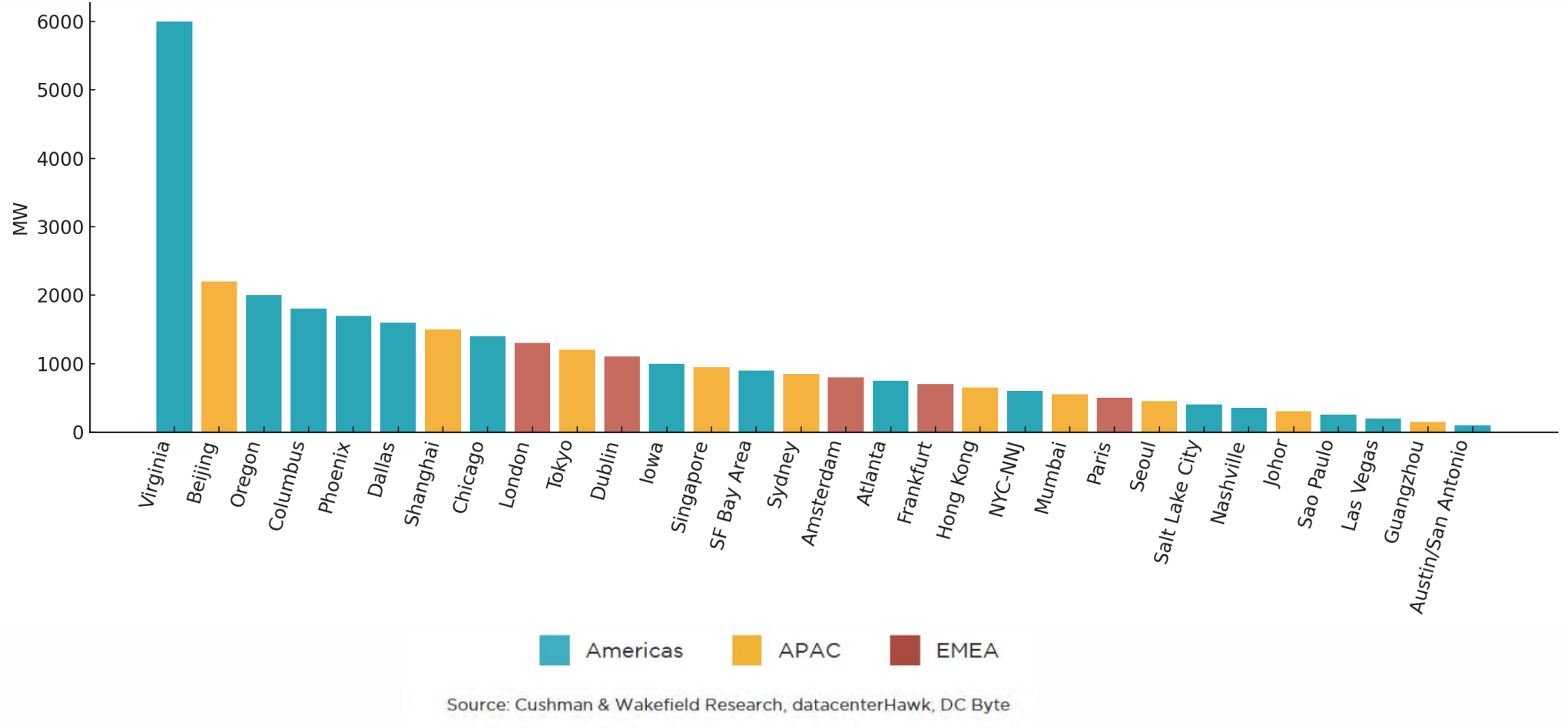
25 FORTUNE 500 COMPANIES
WITH HQs IN VA

$700B GDP
GROWING AT 4.2% YOY

9M POPULATION
6% GROWTH IN LAST DECADE



GLOBAL DATA CENTER MARKETS BY POWER CAPACITY



Source: Cushman & Wakefield Research, datacenterHawk, DC Byte

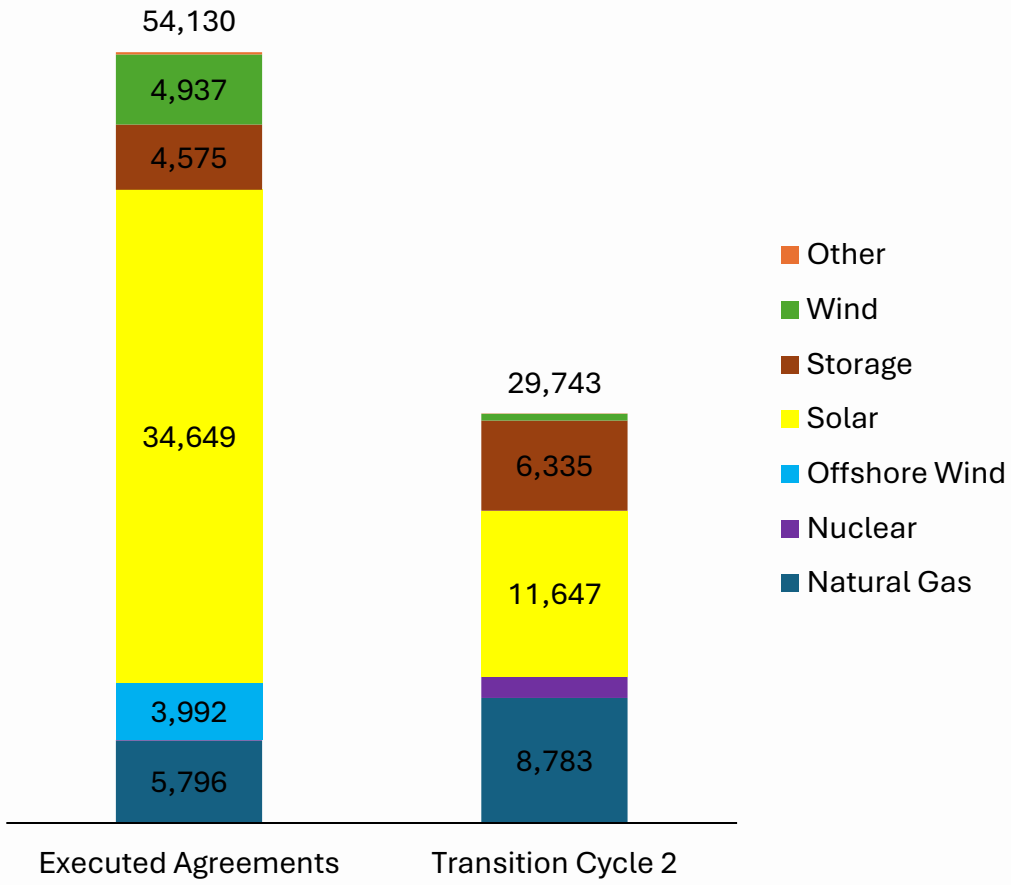
VIRGINIA: THE DATA CENTER CAPITAL OF THE WORLD

- 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.

ENERGY MARKETS & REGULATORY COMPLEXITY

CHALLENGES IN THE PJM

- The PJM capacity auction for the 27/28 Delivery Year **failed to procure adequate capacity by 6,600 MW**.
- Over **54,000 MW** in Virginia's queue
- Average wait time of **5 to 7 years**
- A historic completion rate of just **5%**
- Possible **capacity shortfalls by 2026/27** delivery year (PJM)
- More than half of North America, including PJM, **faces heightened risk of unserved energy** over the next decade (NERC)



ENERGY REGULATION: WHO'S INVOLVED?

Multiple agencies with overlapping mandates create delays and complexity.

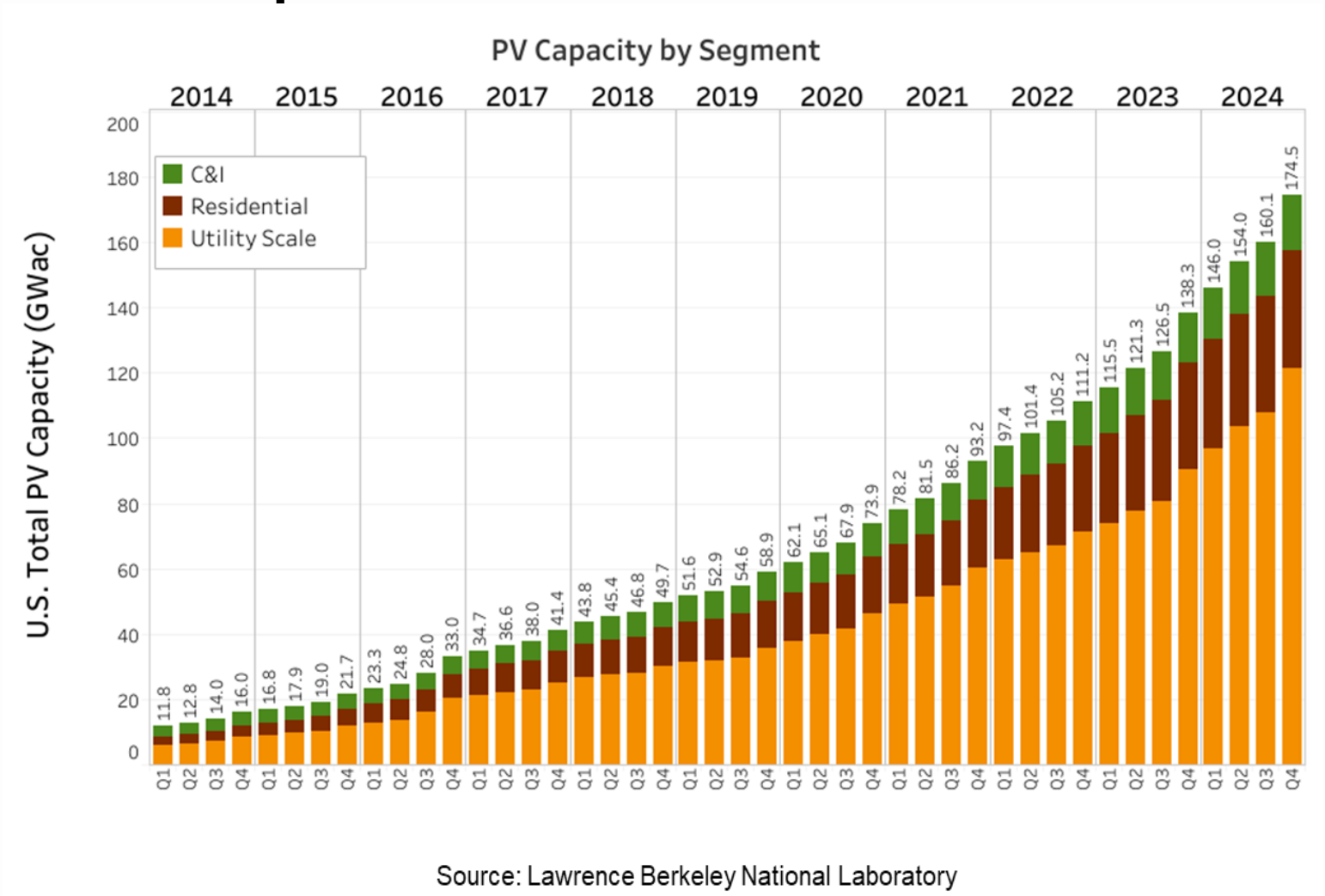
Success often depends less on policy goals than on **aligning reviews and permits.**

Progress hinges on **managing the intersection** of federal, state, local, & regional authorities

Federal	Federal Energy Regulatory Commission (FERC)	Regulates interstate electricity, gas, oil; reviews LNG terminals, pipelines, hydropower licenses.
	Environmental Protection Agency (EPA)	Air & water laws; compliance and enforcement; oversees state implementation
	North American Electric Reliability Corporation (NERC)	Develops and enforces reliability standards
	Department of Energy (DOE)	Policy and local ordinance database; energy R&D grants; energy security
	Department of Interior (DOI)	Leasing/permitting (BLM, BOEM); environmental regulation (OSMRE, BSEE)
	Nuclear Regulatory Commission (NRC)	Licenses and regulates civilian nuclear energy for safety and environment
	Bureau of Ocean Energy Management (BOEM)	Offshore leasing/permitting; environmental review; safety compliance
	U.S. Coast Guard (USCG)	Maritime safety and security; NEPA environmental oversight
	U.S. Maritime Administration (MARAD)	Deepwater port licensing; environmental review; oversees offshore wind vessels
	U.S. Fish & Wildlife Service (USFWS)	Protects threatened/endangered species; regulates hydropower impacts
	National Oceanic and Atmospheric Administration (NOAA)	Environmental assessments; marine mammal and habitat protection
	U.S. Army Corps of Engineers (USACE)	Permits for dredging/fill (hydropower, pipelines, renewables); hydropower development
	Pipeline & Hazardous Materials Safety Administration (PHMSA)	Regulates transport/storage of hazardous materials; inspects pipelines/LNG facilities
	Office of Surface Mining Reclamation & Enforcement (OSMRE)	Regulates active coal mines to limit environmental impacts
	Department of Homeland Security (DHS)	Critical infrastructure protection; emergency preparedness/response
	Bureau of Land Management (BLM)	Leasing/permitting on federal land for oil, gas, coal, geothermal, wind
State	State Corporation Commission (SCC)	Regulates utilities/co-ops; sets rates; permits large projects (>150MW)
	Virginia Department of Energy	Manages state energy programs and policy
	Department of Environmental Quality (DEQ)	Permit by Rule for small renewables; environmental impact reviews; enforces environmental laws
	Department of Health (VDH)	Reviews air, water, radiation, noise, hazardous materials; radiation control
	Dept. of Wildlife Resources (DWR)	Environmental reviews; mitigation plans
	Dept. of Conservation & Recreation (DCR)	Environmental reviews; Permit by Rule for small renewables
	Dept. of Historic Resources (DHR)	Reviews impacts on historic/cultural resources
	Dept. of Transportation (VDOT)	Right-of-way management; utility coordination; siting review
	Dept. of Emergency Management (VDEM)	Infrastructure protection; emergency planning/response; interagency coordination
	Marine Resources Commission (VMRC)	Manages marine and coastal resources
	Dept. of Aviation	Reviews aviation impacts
	Dept. of Forestry	Reviews forestry impacts
	Dept. of Agriculture & Consumer Services	Reviews agricultural impacts
	Virginia Outdoors Foundation	Land conservation and easements
Regional	PJM Interconnection	Coordinates electricity flow; manages wholesale market
Local	Planning District Commissions	Regional energy and land-use coordination
	Local Planning Departments	Local siting, zoning, land use

VIRGINIA SOLAR

National Development Trends



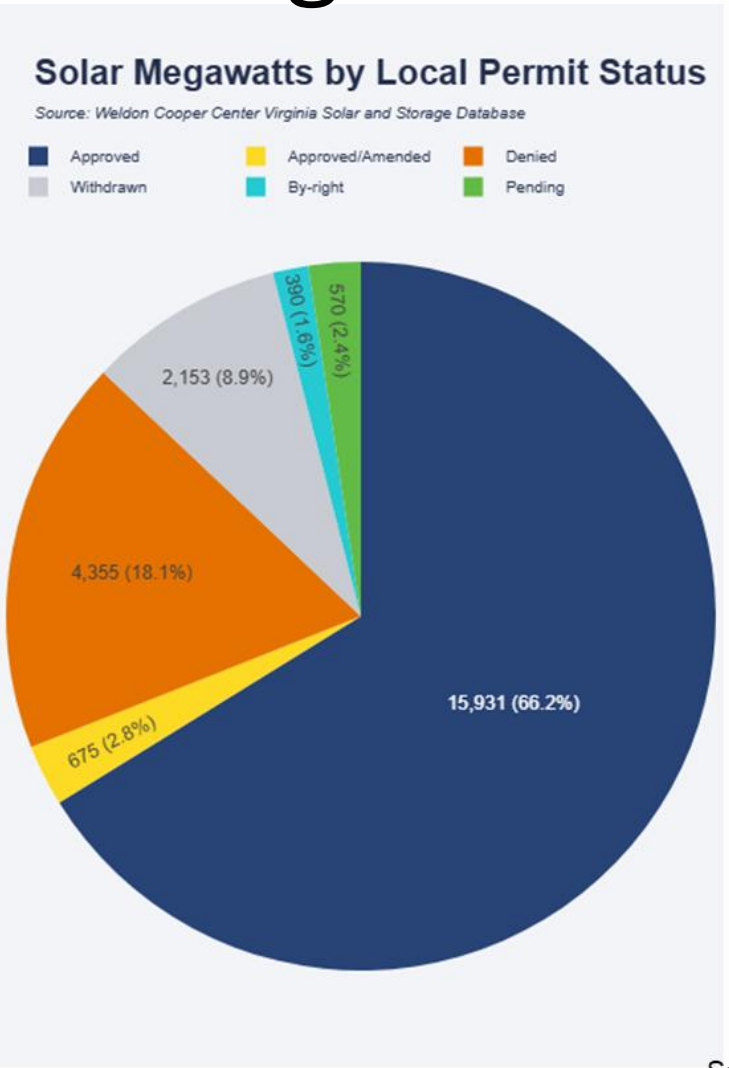
Source: Lawrence Berkeley National Laboratory

Land Use Trends

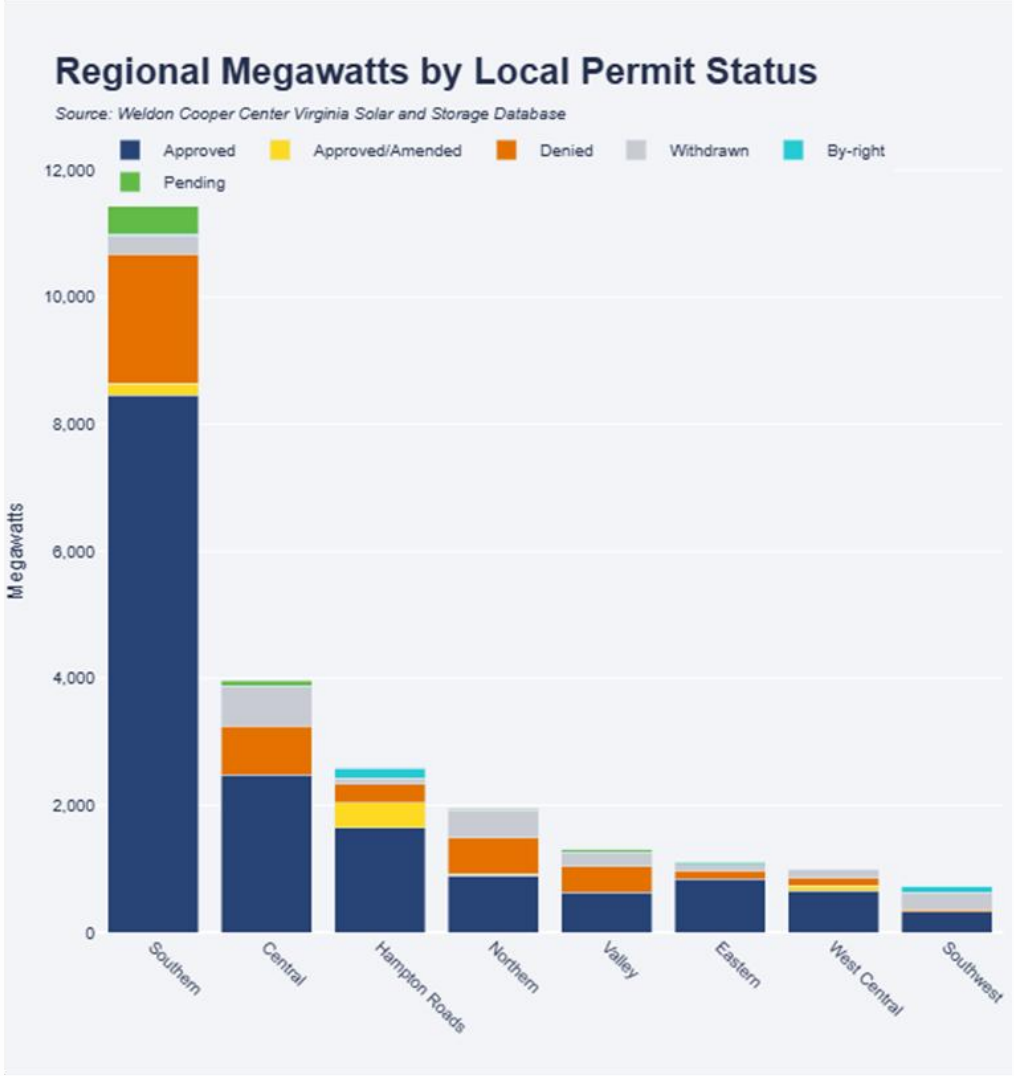
As of June 30, 2025:

Land Cover Classification	Land Cover of Solar Sites		Land Cover of Virginia	
	Total Acres	Percent	Total Acres	Percent
Barren	3	0%	69,929	0%
Cropland	8,433	28%	1,335,967	5%
Forest	15,393	50%	14,770,460	54%
Harvested/Disturbed	2,258	7%	601,685	2%
Impervious	79	0%	987,354	4%
NWI/Other	139	0%	1,170,635	4%
Open Water	2	0%	2,107,259	8%
Pasture	3,246	11%	3,107,189	11%
Shrub/Scrub	335	1%	173,310	1%
Tree	518	2%	1,612,976	6%
Turf Grass	226	1%	1,439,213	5%
Totals	**30,632**	**100%**	**27,375,975**	**100%**

Permitting Trends



89 localities in VA have approved a solar project



Source: UVA Solar Database

Solar Program

WHAT DO WE DO?

- Gather, maintain, and disseminate general and technical information on solar energy and its utilization.
- Coordinate programs for solar energy data-gathering in the Commonwealth.
- Assist localities with siting, procurement, land use concerns, and other solar energy-related issues.

HOW DO WE HELP?

- SolSmart Designation Program
- Virginia Solar Survey
- SolTax Model
- Local Policy Technical Assistance

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OAK RIDGE ENERGY AFFORDABILITY PROJECT

OAK RIDGE National Laboratory

Nov 12, 2025

Virginia Affordability Trend Model and Economic Model

MEGA-DC PROJECT TEAM – VIRGINIA

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U.S. DEPARTMENT OF ENERGY

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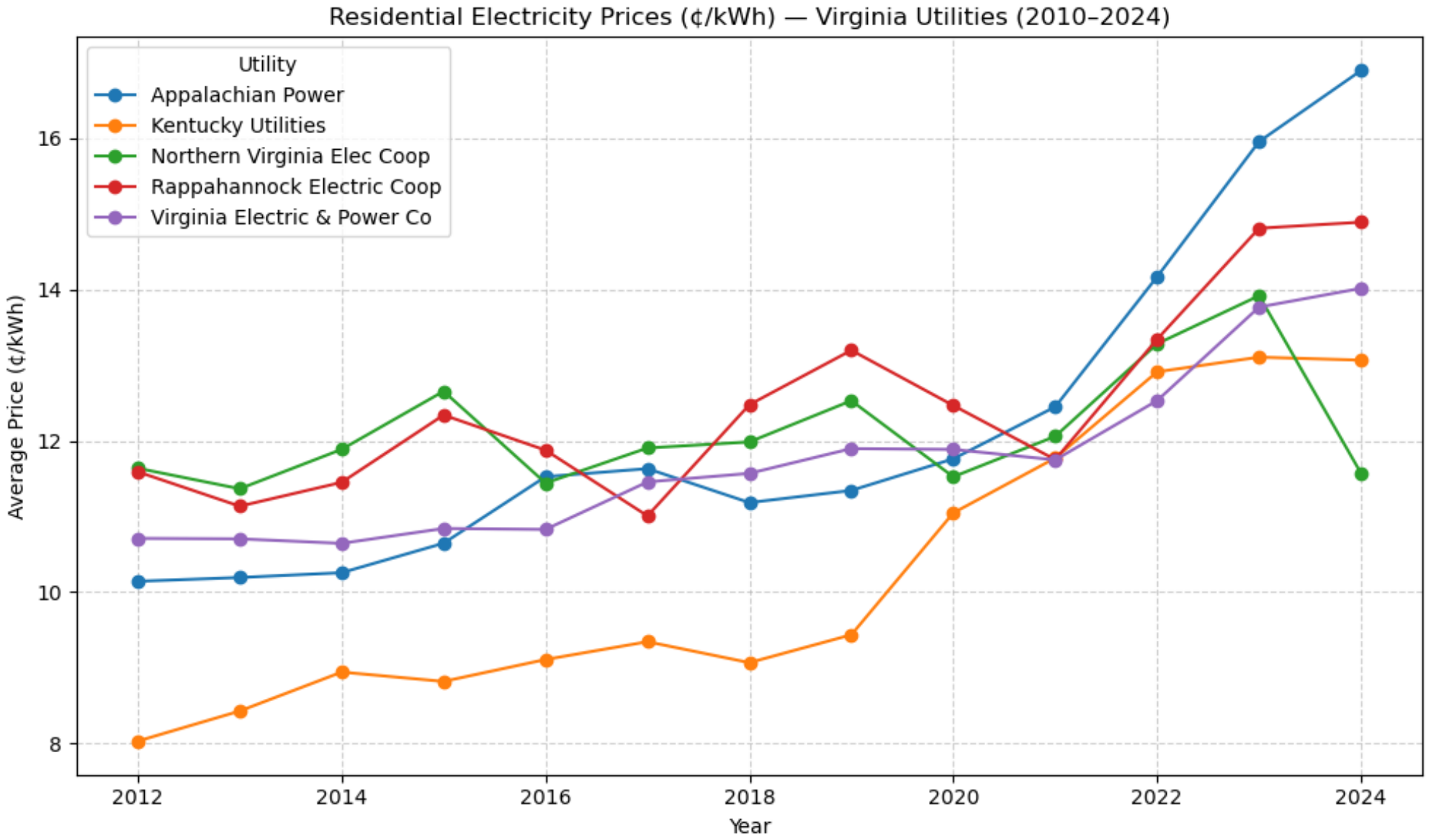
VA Residential Electricity Prices (2010-2024)



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

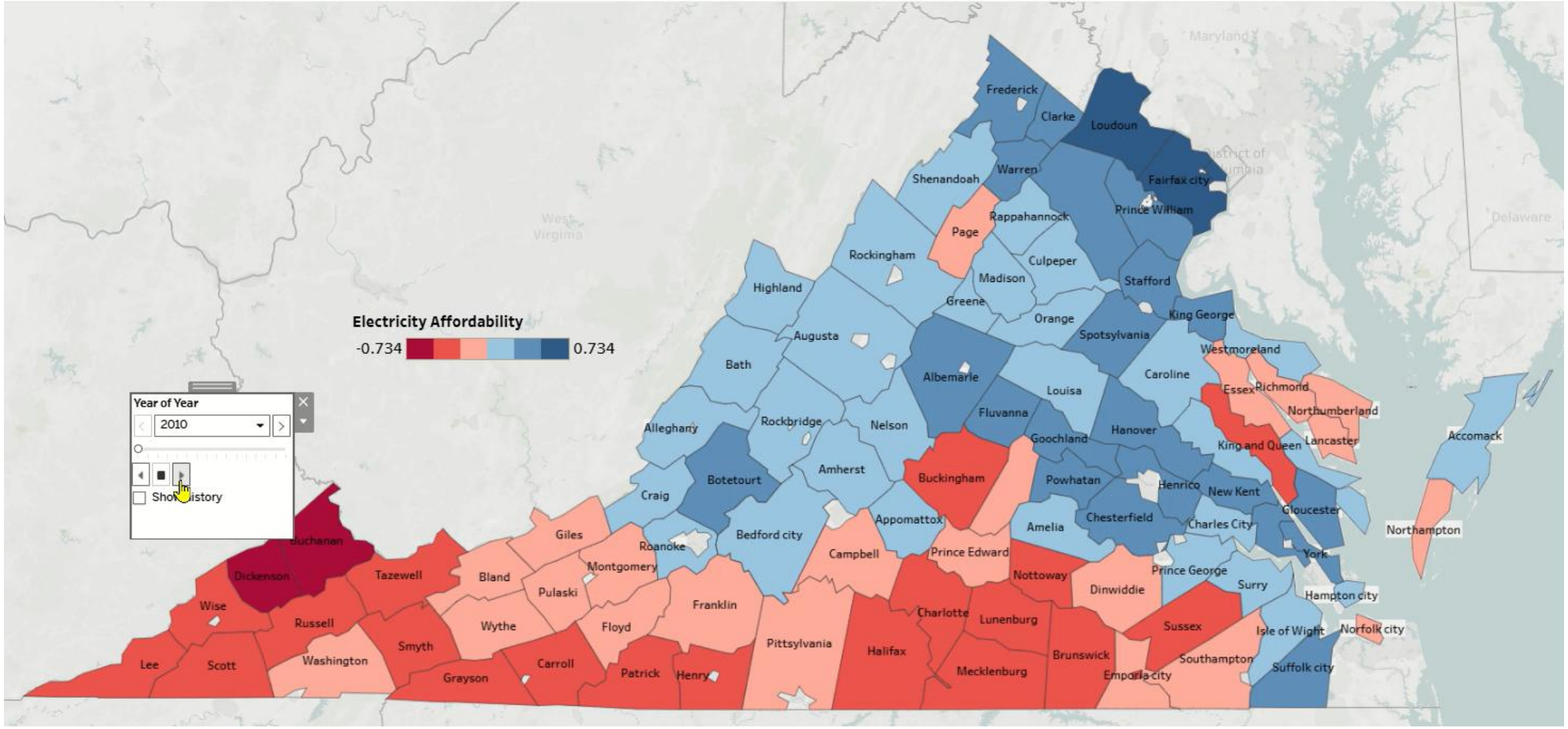
$$\textit{Affordability Model} = 1 - \frac{\textit{Annual Cost}}{\textit{Annual Income} * \textit{Threshold}}$$

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

Threshold: 3.481% of MHI

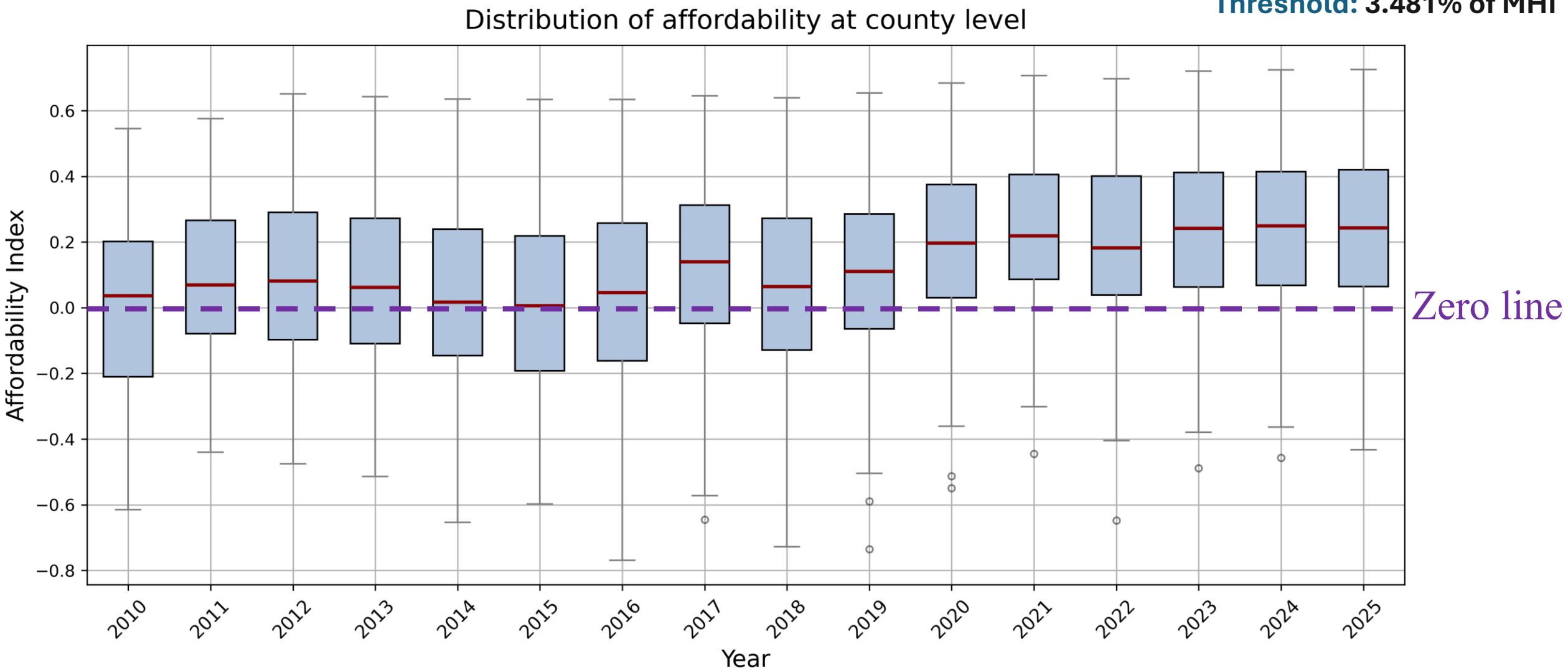
Electricity Affordability, Virginia: 2010-2025

2010



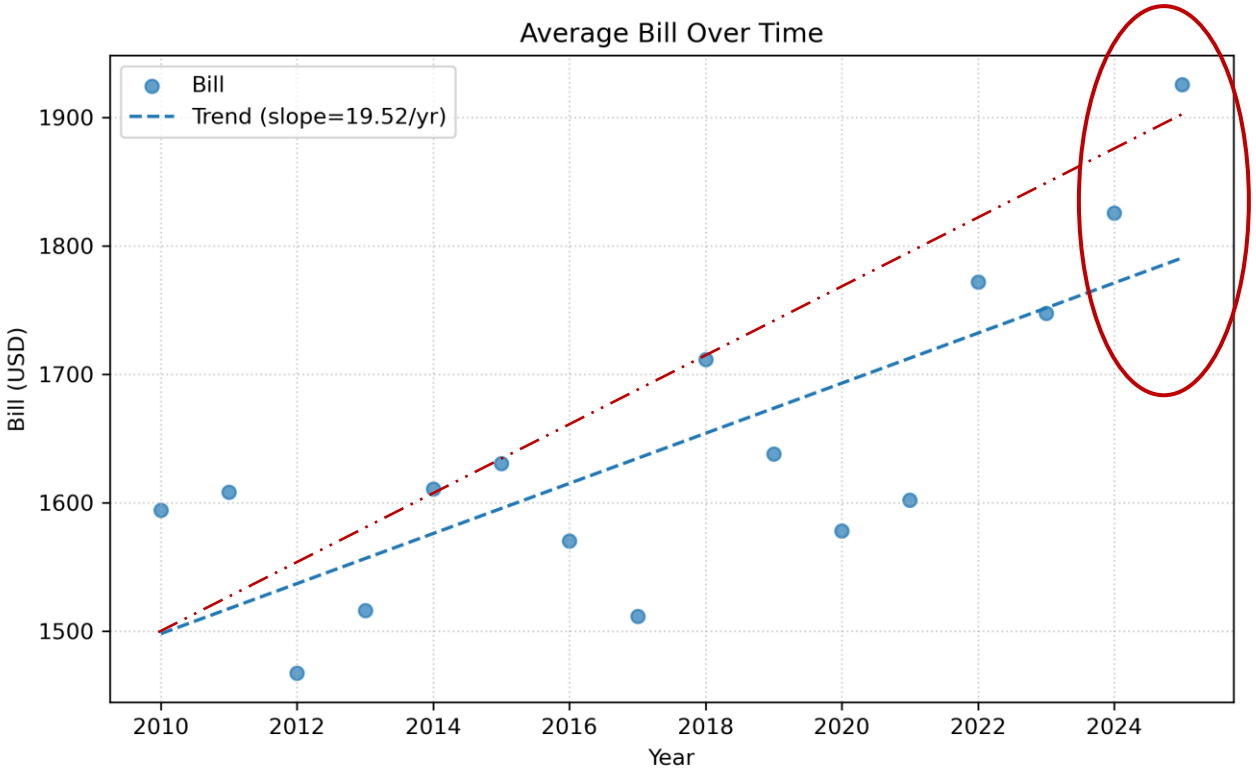
Affordability distribution across VA counties

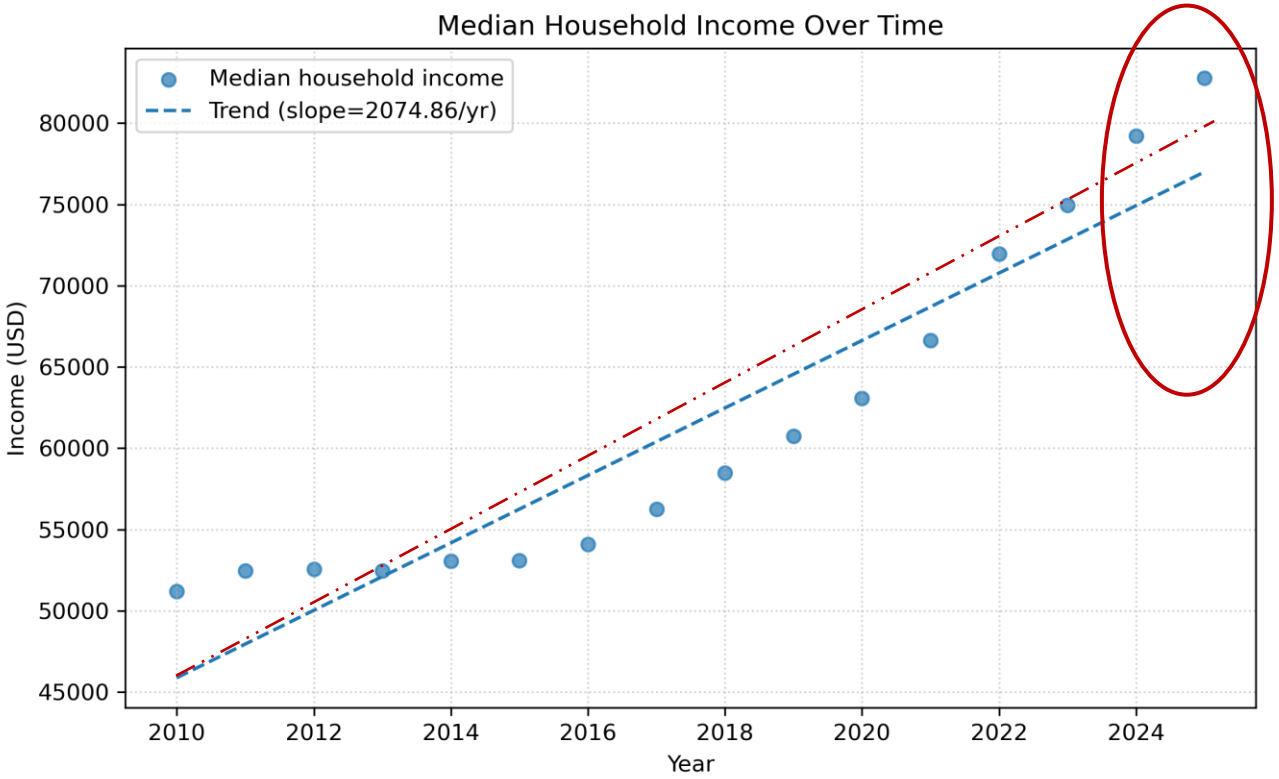
Threshold: 3.481% of MHI



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

What is increasing at a higher rate, VA Electricity bills or MHI ?

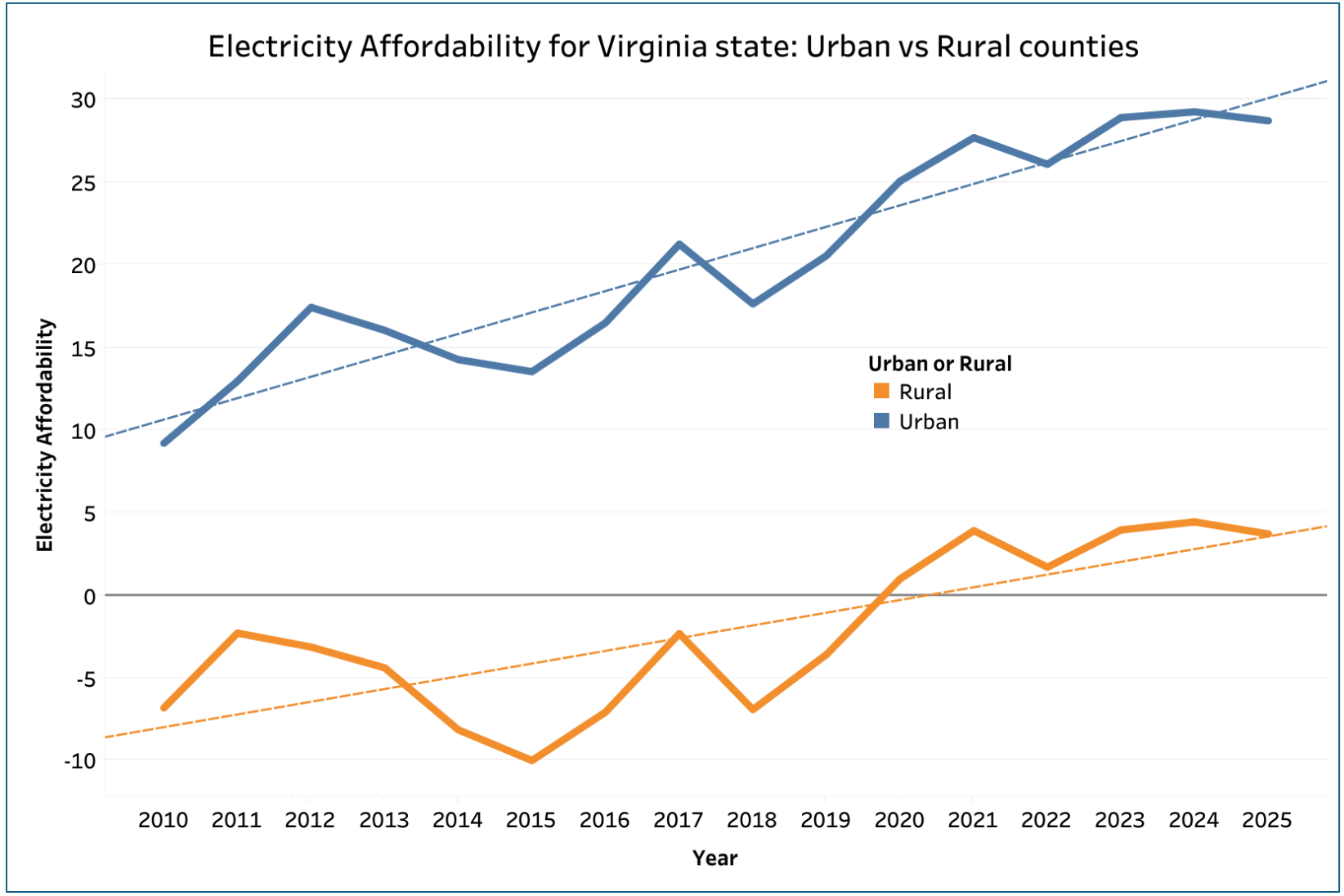




The electricity affordability in the graph is the average of all the urban or rural counties for that particular year

Rural counties collectively moved to positive electricity affordability around the year 2020.

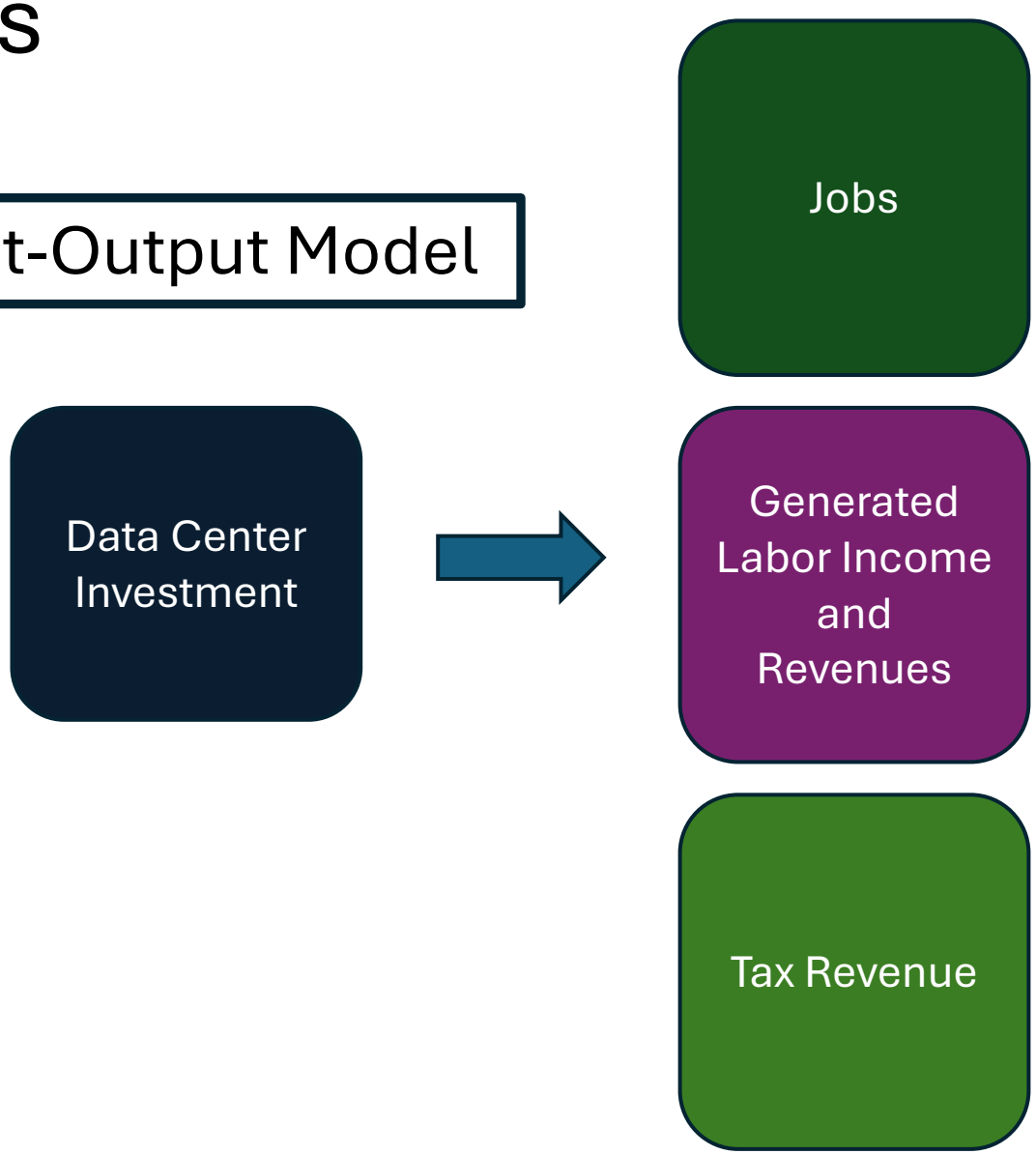
Rural counties have to catch-up and cover the wide difference in electricity affordability as compared to the Urban counties



Economic Impact Analysis – Data Centers

Preliminary Modeling of Data Center Investment Benefits

Input-Output Model



Captures flow of money and ripple effects of economic activity

Economic Indicators Between Counties $1B Data Center Investment Per County

County	Employment (Number of 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.

VIRGINIA Energy