



VIRGINIA ADVANTAGES

Energy



**VIRGINIA ECONOMIC
DEVELOPMENT PARTNERSHIP**

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Virginia's Energy Industry

- Employs 28,800 people
- Consists of 400 companies with 650 locations
- Has a direct economic output of \$18.3 billion
- Covers traditional sectors such as power generation and mining, as well as emerging areas like smart grid technology and renewable fuels
- Benefits from a skilled workforce educated in university, community college, and military settings
- Supported by R&D at academic, government, and corporate facilities
- Generates electricity by fossil fuels, nuclear power, biomass, methane, water, and municipal waste at 131 power plants
- Is home to 3 of the nation's 72 waste-to-energy plants
- Plays a key role in energy domestically and internationally
- Offers a central location on the Atlantic Coast provides interstate and rail access to the Northeast, Southeast, and Midwest
- Provides access to international markets through the Port of Hampton Roads and Washington-Dulles International Airport

Key Sectors

Alternative Energy

- Utility-scale solar farms are planned or in operation in the Hampton Roads, Central Virginia, and Northern Virginia regions by Dominion Virginia Power
- Virginia's offshore wind potential of 2,000 MW is being explored by Dominion, which won the lease rights auction from the federal government
- Apex Clean Energy plans to install up to 25 turbines on a mountain in Botetourt County in Virginia's Valley region
- Dominion converted three coal-fired power stations to biomass with a combined output of 153 MW
- Energy technology companies like Opower, GridPoint, and PowerHub Systems help consumers and businesses manage energy wisely

Nuclear Energy

- Dominion Virginia Power generates electricity using nuclear power at North Anna Power Station and Surry Power Station
- AREVA and BWXT develop, produce, and support nuclear power equipment and fuel from multiple operations in the Lynchburg area
- Naval Station Norfolk is the world's largest navy base and is home to nuclear powered aircraft carriers and submarines
- Huntington Ingalls Newport News Shipbuilding builds nuclear powered aircraft carriers and submarines

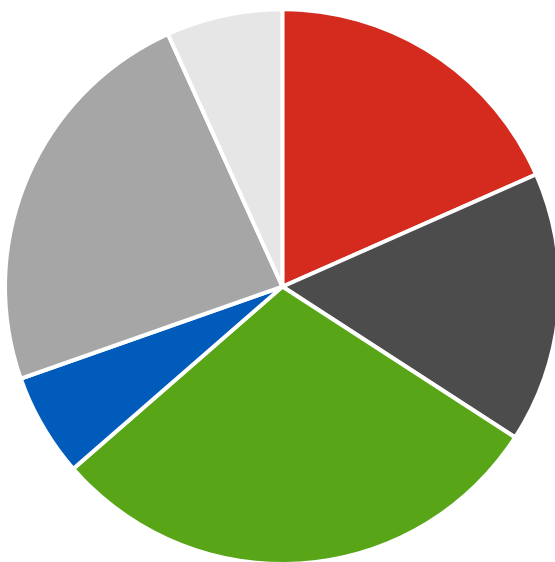
Coal

- Coal is one of Virginia's top export products due to its low sulfur content and high heat output
- 30 companies employ over 1,700 people making mining equipment in Virginia
- 74 companies employ over 2,600 people mining coal in Virginia
- Dominion's Virginia City Hybrid Energy Center, a 600-megawatt station, is one of the cleanest coal-fired power stations in the country and can use up to 20% biomass

Energy Industry Employment in Virginia

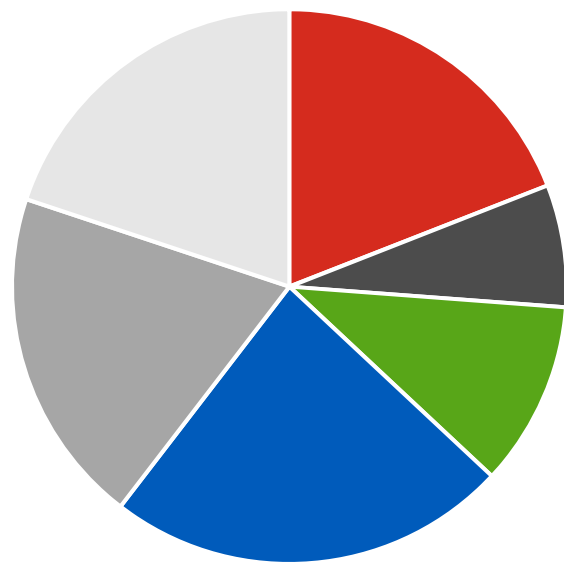
Virginia’s energy industry employs 28,800 people. The top three energy sectors by employment are Conventional Utilities (8,500), Nuclear Equipment and Power (6,800), and Conventional Fuel Mining and Processing (5,300). These three sectors comprise 71% of employment in Virginia’s energy industry. The direct economic output of Virginia’s energy industry is \$18.3 billion. The energy industry also supports an additional \$11.3 billion in economic activity across Virginia. Energy companies are found in all regions of Virginia, with the highest levels of employment in Southern Virginia, Southwestern Virginia, and the Valley.

Employment by Sector



- Conventional Fuel Mining & Processing
- Conventional Power Equipment
- Conventional Utilities
- Mining Equipment
- Nuclear Equipment & Power
- Renewable Energy Equipment & Power

Employment by Region



- Central Virginia
- Hampton Roads
- Northern Virginia
- Southern Virginia
- Southwestern Virginia
- Valley Region

Energy Industry Firms in Virginia

Virginia is home to 400 Energy companies with 650 locations. The top sectors for companies in the Energy Industry are Conventional Fuel Mining and Processing (170), and Conventional Utilities (67), Conventional Power Equipment (65). These three sectors account for 80% of Virginia's Energy companies. Virginia's Nuclear Power and Equipment sector includes leading companies in plant design, components, fuel, and maintenance. Huntington Ingalls Newport News Shipbuilding, which builds nuclear powered aircraft carriers and submarines, is not included in the data.

Major Energy Companies in Virginia

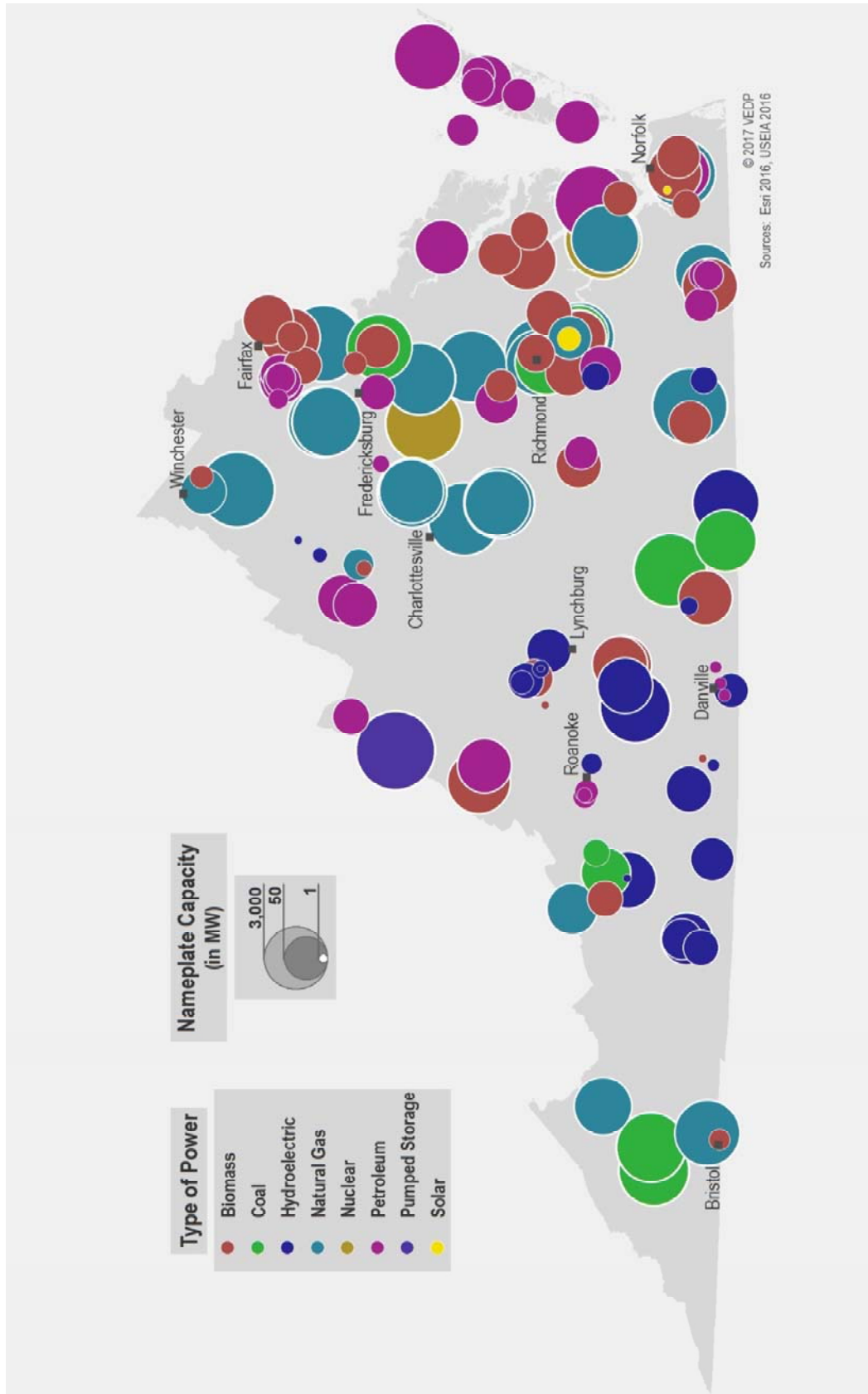
- ABB
- AEP
- Aetna Insulated Wire
- AES
- Alpha Natural Resources
- Apex Clean Energy
- AREVA
- Babcock & Wilcox
- Columbia Gas
- Delta Star
- Dominion
- Fluor
- GE
- GridPoint
- Jennmar
- Joy Mining Machinery
- Liebherr Mining Equipment
- Line Power
- Moog
- Northern Virginia Electric Cooperative
- Opower
- PEMCO
- Rappahannock Electric Cooperative
- Smiths Power
- Thomas & Betts
- Virginia Transformer

New and Expanding Energy Companies in Virginia

Virginia's Energy Industry covers traditional sectors such as power generation and mining, as well as emerging areas like smart grid technology and renewable fuels. In the past ten years, 104 Energy Industry projects have announced 4,906 new jobs and capital investment of \$4.8 billion. Recent notable announcements include

- Amazon
- Enviva
- Grandwatt Electric
- Schaffner MTC Transformers
- W&B Fabricators

Electric Power Production in Virginia



Virginia's Skilled Workforce

Selected Occupations	Employment	Average Salary
Computer Systems Analysts	25,020	\$95,370
Information Security Analysts	11,010	\$102,710
Computer Programmers	8,300	\$91,460
Software Developers, Applications	35,060	\$103,490
Software Developers, Systems Software	26,550	\$110,950
Computer Network Architects	9,330	\$108,860
Computer Hardware Engineers	1,350	\$117,500
Electrical Engineers	6,560	\$92,310
Electronics Engineers, Except Computer	4,900	\$108,360
Industrial Engineers	3,590	\$83,460
Mechanical Engineers	7,470	\$91,260
Nuclear Engineers	2,470	\$87,790
Petroleum Engineers	340	\$122,840
Electrical and Electronics Engineering Technicians	5,420	\$64,020
Industrial Engineering Technicians	890	\$55,020
Mechanical Engineering Technicians	1,510	\$55,310
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	840	\$72,950
Industrial Machinery Mechanics	8,310	\$47,860
Electrical Power-Line Installers and Repairers	2,470	\$60,920
Electrical and Electronic Equipment Assemblers	3,100	\$33,720
Team Assemblers	15,200	\$26,100
Machinists	6,850	\$43,600

Selected Occupations	Employment	Average Salary
Welders, Cutters, Solderers, and Brazers	7,060	\$43,810
Power Distributors and Dispatchers	600	\$75,350
Power Plant Operators	470	\$47,700

Source: U.S. Bureau of Labor Statistics, 2015

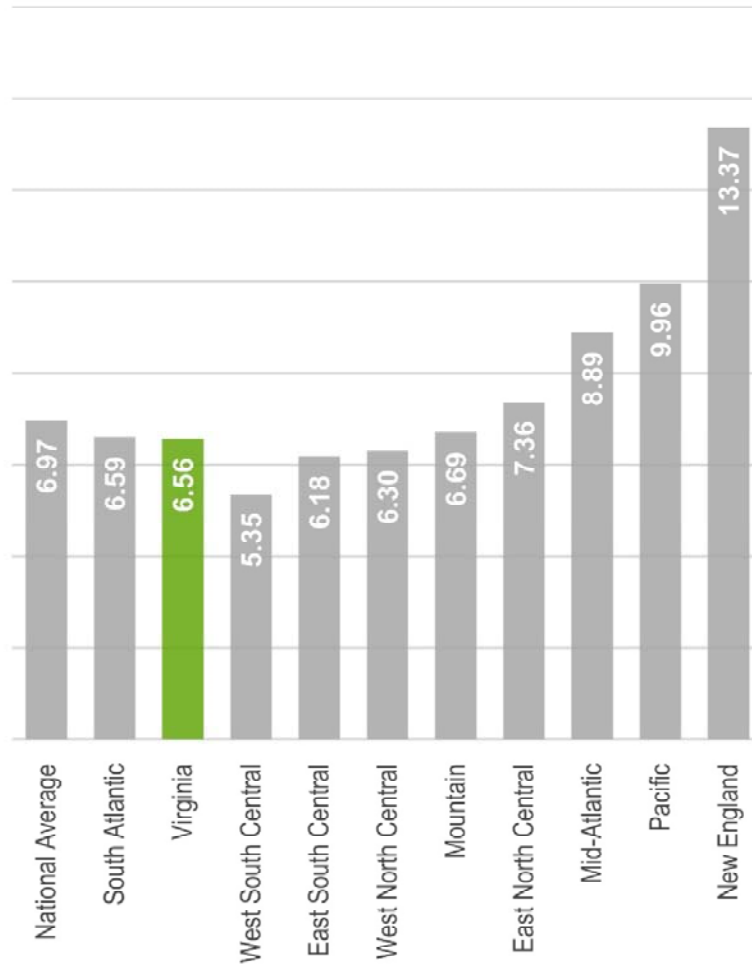
Energy Stakeholders in Virginia

Virginia is home to a variety of organizations which promote different aspects of the Energy Industry. These stakeholders include

- Virginia Bioenergy Network
- Virginia Clean Cities
- Virginia Energy Efficiency Council
- Virginia Coastal Energy Research Consortium
- Virginia Nuclear Energy Consortium
- Virginia Offshore Wind Coalition
- Virginia Offshore Wind Development Authority

Virginia's Competitive Electrical Rates

**AVERAGE INDUSTRIAL ELECTRIC RATES BY REGION
WINTER 2016**



Rates in cents per kilowatt hour

Source: Edison Electric Institute, *Typical Bills and Average Rates Report, Winter 2016*

Research, Education, and Training in Virginia

Virginia's universities offer a wide range of engineering and technology programs which support the Energy industry.

- George Mason University
 - Center for Smart Power Grids
- James Madison University
 - Center for Energy and Environmental Sustainability
 - Institute for Energy and Environmental Research
- Old Dominion University
 - Biomass Research Laboratory
 - Smart grid technology
- Virginia Commonwealth University
 - Solar cells
- Virginia Tech
 - Virginia Center for Coal and Energy Research
 - Advanced Research Institute – solar, wind, waves, and tides
 - Center for Power Electronics Systems – grid-interface connections
 - Center for Energy Harvesting Materials and Systems
- University of Virginia
 - Center for Safe and Secure Nuclear Energy

The Virginia Community College System (VCCS) provides education and training programs for Virginians and Virginia businesses. Dabney S. Lancaster Community College in Covington offers a Wind Turbine Service Technician program. A more broad-based Energy Technology program is available at John Tyler, Northern Virginia, Southwest Virginia, Virginia Highlands, and Virginia Western Community Colleges.

The University of Virginia and VCCS offer the Engineers PRODUCED in Virginia program to allow aspiring engineers to begin their studies at their local community college and then earn their Bachelor of Science in Engineering Science from UVA.

VCCS degree programs include

- CAD/CAM
- Engineering Technology
- Industrial Electronics
- Industrial Production
- Industrial Technology
- Mechanical Engineering Technologies
- Mining Technology
- Welding

Thousands of people exit the U.S. military from bases in Virginia each year.