



VIRGINIA ADVANTAGES

Plastics & Advanced Materials



**VIRGINIA ECONOMIC
DEVELOPMENT PARTNERSHIP**

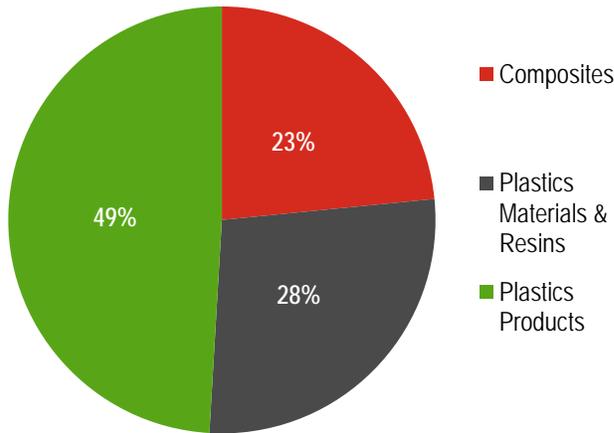
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Plastics & Advanced Materials in Virginia

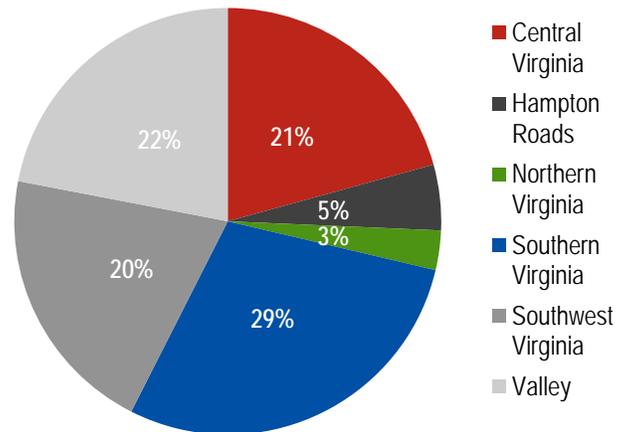
Virginia's strategic mid-Atlantic location, superior transportation network and competitive operating costs combine to make an ideal location for Plastics & Advanced Materials companies. Virginia is home to over 200 plastics companies that employ more than 20,300 Virginians. Plastics & Advanced Materials has a direct economic output of \$11.5 billion in Virginia and supports an additional \$5.5 billion in economic activity.

Since 2005, Plastics & Advanced Materials companies have invested \$1.01 billion and created more than 4,600 new jobs in Virginia. Recent major announcements include: O'Sullivan Films, Creative Urethanes, M&H Plastics, Hanwha Azdel, Trinity Packaging, MGC Advanced Polymers, Eastman Chemical Company, and IntraPac.

Employment by Sector



Employment by Region



Virginia's Plastics & Advanced Materials Technologies

- Plastics material and fiber manufacturers
- Film/sheet manufacturers
- Blow molders
- Injection molders
- Pipe/profile manufacturers
- Thermoformers
- Composites
- Equipment manufacturers

Major Plastics & Advanced Materials Employers in Virginia

BGF
Celanese Corporation
CP Films
DuPont
General Dynamics
Graham Packaging

Honeywell
IAC Strasburg
Invista
Klockner Pentaplast
O'Sullivan
Presto

Phoenix
Royal Moulding
Rubbermaid Inc.
Trex
Universal Fibers
Variform

Advanced Composites in Virginia

Virginia plays a key role in the Advanced Composites sector. Over 4,700 people are employed at 35 Advanced Composites companies across Virginia. The top universities in Virginia conduct Advanced Composites R&D and are supported by federal entities like the NASA Langley Research Center and the Defense Advanced Research Projects Agency. The National Institute of Aerospace in Hampton manages NASA's Advanced Composites Consortium, which is working to improve composite materials research and certification.

Major Advanced Composites Employers in Virginia

American GFM	General Dynamics
BGF Industries	Honeywell
Euro-Composites	Mitsubishi

Advanced Composites R&D in Virginia

Virginia Tech - **The Advanced Materials and Technologies Laboratory (AMTL)** focuses on issues pertaining to the design and manufacturing science of advanced materials with an emphasis on understanding the complex physical phenomena of fabrication, through theoretical and experimental investigations. **The Center for Intelligent Material Systems and Structures (CIMSS)** focuses on the use and development of smart materials and structures, starting from material science and working through the chain of research and development, including device design and modeling. CIMSS has many active projects in structural dynamics, structural health monitoring, energy harvesting and applications of materials science for smart materials and structures.

University of Virginia – **The Intelligent Processing of Materials Laboratory (IPML)**, one of the nation's premier centers for research on the processing of advanced materials, focuses on developing innovative process technologies, creating models for predicting materials evolution during processing, designing advanced in-situ sensors for tracking material changes during processing, and creating model-based path optimization and feedback control.

Norfolk State University – **The Center for Materials Research (CMR)** conducts pioneering research in materials science in four categories: Optics, Plasmonics and Meta-materials; Nano-materials and Nano-technology; Advanced Functional Materials and Devices; and Semiconductor Materials and Devices.

James Madison University – **The Center for Materials Science's (CMS)** aim is to develop a cross disciplinary curriculum in materials science, to integrate undergraduate education with basic and applied research in materials science and to increase funding for applied and basic research in materials science.

The Applied Research Center (ARC) is the flagship research facility for the Applied Research Center Consortium, a collaboration of four Virginia colleges (Christopher Newport University, Old Dominion University, Norfolk State University, and the College of William and Mary) and the Jefferson Lab. Its mission is to advance the use of processes that control energy to create and modify materials, structures and devices critical for high value-added manufacturing in aerospace, automotive, marine, and semiconductor industries.

Virginia is a Leading Gateway to the World

- Two of the nation's largest railroads, CSX Corporation and Norfolk Southern Corporation, have extensive infrastructure throughout the State
- Eleven railroads operate on nearly 3,400 miles (excluding trackage rights) of railway in Virginia, of which more than 2,800 miles are Class I—one of the strongest rail networks in the nation
- Six major interstate highways, I-95, I-85, I-81, I-64, I-77 and I-66, provide quick access to Northeast, Southeast and Midwest markets
- Fourteen commercial airports serve the Commonwealth, including two of the nation's largest - Washington Dulles International and Ronald Reagan Washington National
- The Port of Virginia, served by every major shipping line, offers direct connection to over 100 foreign ports and reach to any country in the world

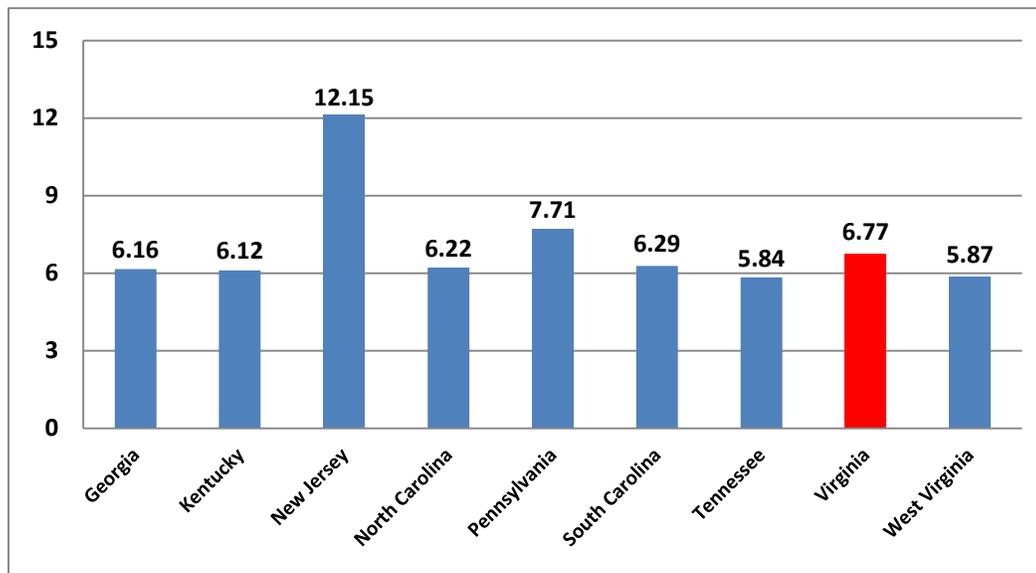
Virginia's Central East Coast Location—Access to Markets



Virginia's Competitive Operation Costs

- Average cost per unit of electricity for the industrial sector is 6.77 cents, compared to 7.13 cents for the nation
- Unemployment tax burden that is lower than the national average
- At \$0.81 per \$100 of payroll, Virginia's workers' compensation employer insurance cost ranks 4th lowest nationally
- Six percent corporate income tax rate has not been increased since 1972
- Right-to-work law allows individuals the right to work regardless of membership in a labor union or organization

Average Industrial Electric Rates: 2015



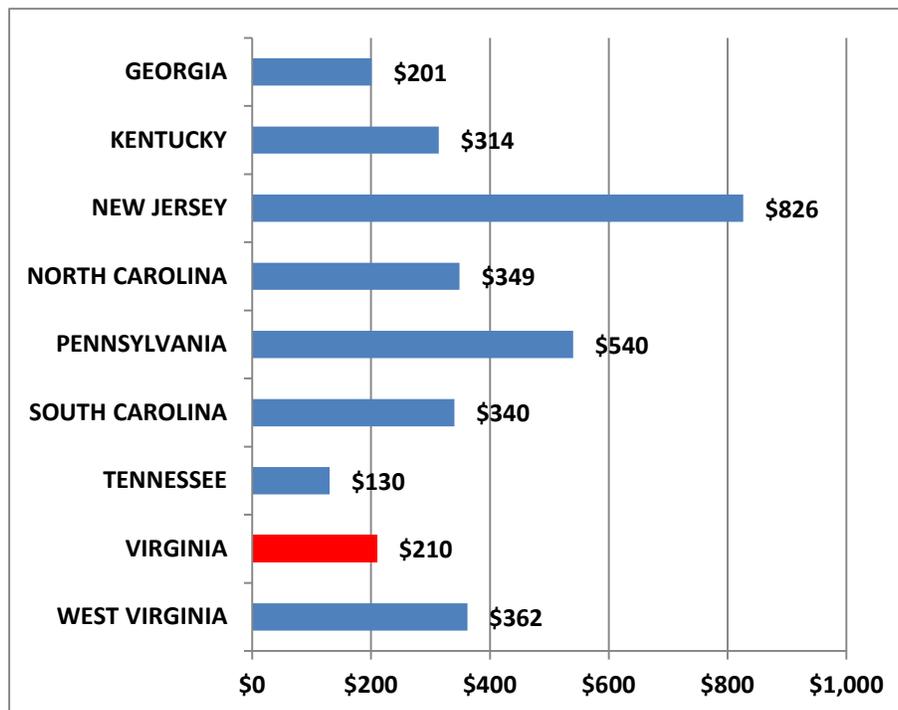
Rates (in cents/kilowatt-hour)

Source: Edison Electric Institute, Typical Bills and Average Rates Report, Summer 2015

Virginia is among the states with a low unemployment insurance tax burden in the U.S. According to United States Department of Labor estimates, employers in Virginia paid an average tax rate of 0.48% of total wages in 2015, compared with the national average of 0.72%.

Tax rates are based on the employer's past unemployment experience (known as the employer's experience rating) and on the state's unemployment compensation experience as reflected by the condition of the State Unemployment Compensation Trust Fund. Basic computed tax rates range from a minimum of 0.44% on the first \$8,000 of each employee's annual wages to a maximum of 6.54%. New employers pay a rate of 2.84% on the \$8,000 wage base for as little as two years.

Unemployment Insurance Tax Per Employee



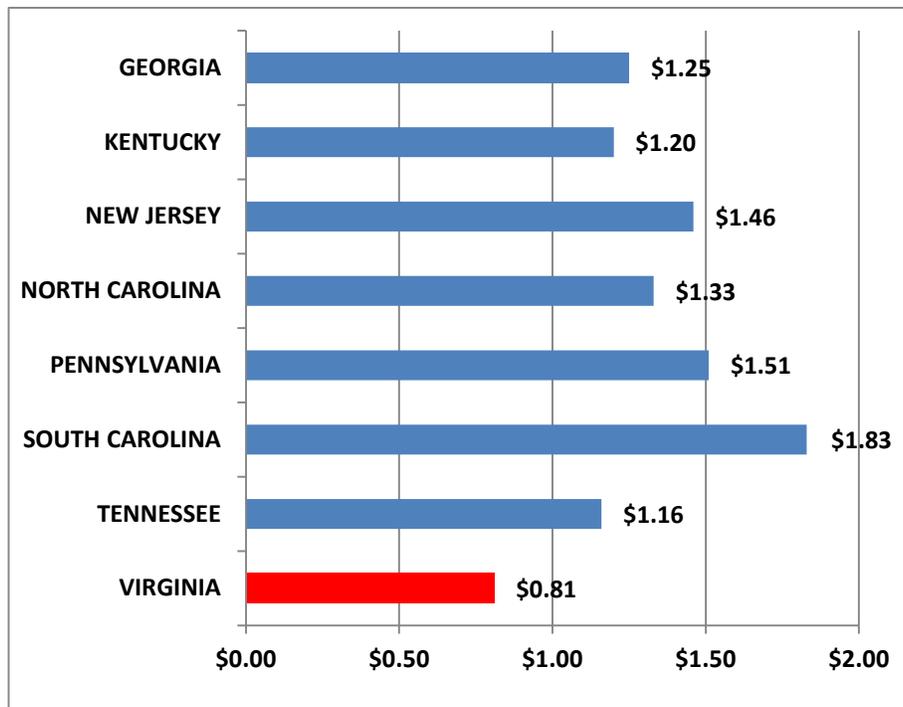
Estimates of unemployment insurance tax per employee are a product of the average unemployment insurance tax as a percentage of taxable wages and the taxable wage base. Source: Average Employer Contribution Rates, By State, 2015 Estimates, Employment and Training Administration, United States Department of Labor

Virginia employers benefit from a workers' compensation system that is efficiently managed and has a low frequency of claims. Several key state features contribute to these results, including a restrictive definition of compensable injury and a low rate of attorney involvement. The Virginia Workers' Compensation Commission also provides considerable assistance to employers and employees in the dispute resolution process.

In Virginia, an employer must carry workers' compensation insurance with a private insurance carrier or have a certificate of self-insurance issued by the Virginia Workers' Compensation Commission. Employers cannot deduct any part of the cost of workers' compensation insurance from the wages of any employee.

Virginia offers one of the lowest workers' compensation employer insurance rates in the nation. In 2013, Virginia ranked 4th lowest with an employer cost of \$0.81 per \$100 of payroll versus \$1.34 per \$100 for all states, aggregated across all types of insurance arrangements. Companies also benefit from a system that has a low frequency of claims, a restrictive definition of compensable injury, a high quality workforce and a low rate of attorney involvement.

Workers' Compensation Employer Insurance Cost



Estimates of workers' compensation employer insurance costs are aggregated across all types of insurance arrangements (private, state-funded, self-insured, etc.). Source: National Academy of Social Insurance, Workers' Compensation: Benefits, Coverage, and Costs, 2013, August 2015

Higher Education and Training

Strong occupational and technical training programs designed to meet the needs of the Plastics & Advanced Materials industry are provided by Virginia's colleges and universities, Community College System, and communities.

- Virginia Tech is home to the interdisciplinary Macromolecules and Interfaces Institute (MII), integrating macromolecular and interfacial sciences and engineering. It is consistently ranked as a leading institution in polymer research and education.
- The Center for High Performance Manufacturing (CHPM) at Virginia Tech works to help manufacturing firms stay competitive via research and development of tools. The research, development, and education are managed through specific areas of specialization.
- The Virginia Community College System, with 23 colleges on 40 campuses across Virginia, offers Career Studies Certificates as well as diplomas and associate degrees through a variety of programs and curricula.
- Danville Community College in Southern Virginia offers Manufacturing Technician and Polymer Processing Technician Certificates through its Workforce Services Programs. Its Regional Center for Advanced Technology and Training (RCATT) includes polymers laboratory space, a rapid prototyper, an injection molder, an extruder, and auxiliary equipment for hands-on training.
- Dabney S. Lancaster Community College in Western Virginia offers an Advanced Manufacturing and Packaging Technology curriculum at its Virginia Packaging Applications Center (VAPAC). This state-of-art training lab gives students an extensive, hands-on experience.
- The Institute for Advanced Learning and Research (IALR) in Danville researches biomass crops and technologies for biopolymers. More than 4,000 square feet of dedicated lab space is available to characterize, analyze, develop and manufacture materials.
- The National Center for Coatings, Application, Research, and Education (C-Care) in Southern Virginia is a Center for Excellence providing one of the most advanced manufacturing laboratories in North America. C-CARE partners with a spectrum of manufacturers, supply chain companies, and application equipment providers to develop applied coating solutions for manufacturers.
- The Center for Advanced Film Manufacturing located in Martinsville offers a 28-credit Advanced Film Certification Program. The Center and the Program collaborate with these partners - the Martinsville-Henry County Economic Development Corporation, Patrick Henry Community College, New College Institute, and Eastman Chemical Company facilities in Martinsville-Henry County.