

THE FISCAL YEAR 2022 VIRGINIA ECONOMIC IMPACTS OF THE PORT OF VIRGINIA

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EXECUTIVE SUMMARY

THE ECONOMIC IMPACTS OF THE PORT OF VIRGINIA ON THE COMMONWEALTH'S ECONOMY IN FY 2022

What a difference a year makes. With the retreating distortions of COVID and sharply declining government supports, companies are seeking reliability and consistency. The fiscal year (FY) of 2022 has revealed an increasingly expansive role in the Port of Virginia's impact on Virginia through superior fluidity, increasing sustainability, and world-class support services.

The Port of Virginia is the global maritime gateway for the Commonwealth's flow of moving freight, exporting Virginia-made goods, and importing goods to be finished, assembled and delivered to users inside Virginia and beyond. Specifically, the Virginia economic impacts of the Port of Virginia in FY 2022 include:

- **\$124.1 BILLION IN OUTPUT SALES;**
- **\$63.0 BILLION IN VIRGINIA GROSS STATE PRODUCT;**
- **\$41.4 BILLION IN VIRGINIA LABOR INCOME;**
- **565,000 FULL- AND PART-TIME JOBS; AND**
- **\$5.8 BILLION IN STATE AND LOCAL TAXES AND FEES.**

Eighty-five percent of the FY 2022 Virginia output, 86 percent of Gross State Product (value-added), 85 percent of labor income, and 83 percent of employment impacts flowed from businesses in Virginia using imports as intermediate inputs in providing consumers here and elsewhere with finished goods.

By these measures, compared to the entire state economy, the Port of Virginia supported:

- 11 % of total employment in the state
- 10 % of gross state product
- 7 % of labor income
- 12 % of total output, and
- 8 % of all state and local taxes.

In fact, every dollar of POV-related impact on Virginia GSP creates on average 9.2 cents of state and local government revenue – again, producing \$5.8 billion.

Comparing POV FY 2022 levels to FY 2021 estimates:

- **FY 2022 CARGO TONNAGE WAS UP 11.0 PERCENT**
- **FY 2022 OUTPUT SALES WERE UP 24 PERCENT**
- **FY 2022 VIRGINIA GROSS STATE PRODUCT WAS UP 33 PERCENT**
- **FY 2022 VIRGINIA LABOR INCOME WAS UP 53 PERCENT**
- **FY 2022 FULL- & PART-TIME JOBS WERE UP 29 PERCENT**
- **FY 2022 STATE & LOCAL REVENUES AND FEES UP 110 PERCENT**

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INTRODUCTION

The Port of Virginia (POV) has been a positive, stabilizing influence in Virginia (The Virginian-Pilot & Daily Press Editorial Board 12-21-2021). The Governor of Virginia website trumpets the success of Virginia’s record level exports in 2022¹. The numbers in this report, again, strongly demonstrate the POV’s economic leadership. This has produced the following results: Virginia-made exports are up two percent while the value of Virginia-used imports increased 21 percent over the last year. While some may be concerned over this imbalance, for Virginia these imports offer value-added opportunities for our businesses as well as improved variety and cost savings for the customer. Virginia has benefited greatly through jobs and pay growth led by the POV economic impacts. Further, the taxes and fee revenues collected through these activities were \$5.8 billion which offsets the need for higher taxes on Virginia citizens. Astonishingly, direct export-related jobs were up 36 percent and direct import-related jobs were up 32 percent over FY 2021. Every dollar of POV-related impact on Virginia GSP creates on average 9.2 cents of state and local revenue.

The Virginia Port Authority (VPA) is a political subdivision of the Commonwealth of Virginia that operates under The Port of Virginia brand name. The VPA owns and through its private operating subsidiary, Virginia International Terminals, LLC (VIT), operates four general cargo facilities Norfolk International Terminals, Portsmouth Marine Terminal, Newport News Marine Terminal and the Virginia Inland Port in Warren County. The VPA leases Virginia International Gateway and Richmond Marine Terminal.

Virginia has an astonishing access to consumers with 75% of the U.S. population within a two-day drive...along with access to the world through deep ports and 2.5 hours to open sea. The Virginia gateway incorporates both a comprehensively connected highway network, rail system, inland waterways, and global deep-sea transport. Eager consumers require the talents of operations personnel, distributors, logistics providers, manufacturers, assembly operations, retailers, and service providers to facilitate access to their needs. This produces the activity that helps drive Virginia’s economic success. While the POV does not transport bulk cargo such as coal, POV operations are a major driver of the Virginia economy through three major channels: 1) moving exports and imports within Virginia, 2) exporting goods made in Virginia, and 3) Virginia businesses using imported goods as inputs.



¹ <https://www.governor.virginia.gov/newsroom/news-releases/2023/april/name-999246-en.html>

The Virginia impacts of this POV-based value chain are reported in Table 1. The FY 2022 amounts and percent distributions of the total impacts for the three impact types show the Virginia users of POV imports create 83 percent of the POV Virginia economic impacts. In the following sections, we describe these three components of the value chain.

Table 1 POV-based Virginia Impacts (\$ in millions)	Output Purchases	Value -added (GSP)	Labor Income	Employ- ment
POV Cargo- moving Impacts	\$7,200.8	\$3,996.8	\$3,088.9	43,246
Percent of Total	5.8%	6.3%	7.5%	7.7%
Virginia-made Exports Impacts	\$11,341.3	\$5,047.4	\$3,159.3	52,777
Percent of Total	9.1%	8.0%	7.6%	9.3%
Virginia-used Imports Impacts	\$105,552.9	\$53,926.0	\$35,162.8	469,040
Percent of Total	85.1%	85.7%	84.9%	83.0%
	\$124,095.0	\$62,970.2	\$41,411.0	565,063

The POV moves exports and imports by loading and unloading of deep-sea vessels at its Norfolk Harbor terminals, loads exports delivered to the terminals from all 50 states, D.C. and Canada, and unloads imports from around the world destined for all 50 states and D.C. This is facilitated by semi-automated stacking cranes, two Class I railroads operating on dock (over 32% of cargo arrives and departs the port by rail – largest on the east coast and provide double-stack service to the Midwest), an impressive interstate network supported with an inland port; barge service to Richmond.

Exports made in Virginia have a separate, additional Virginia economic impact. Overseas demand for these goods drives this production. However, the availability of an exceptional deep-water port (progressing to a unique 55-foot channel depth), able to handle a variety of container exports through nearly 30 international shipping line services with connections to more than 200 countries, provides global market access for Virginia businesses through easy access to the open sea. While the production of Virginia-made exports is a major economic contribution facilitated by Port of Virginia operations, imports of materials, components, parts, and end-products are the dominant value-added source.

Over 40 percent of the imports that move through the Port of Virginia are used as inputs by Virginia businesses to produce goods for sale in Virginia and across the nation. These imports are inputs into a supply chain of services and goods with a large impact on Virginia income and jobs. The dollar cost of the imports is an expense, not Virginia income. But the value-added in production by Virginia businesses, the margins earned in the supply chain here, are income, creating Virginia payroll, taxes, and jobs. This economic impact generated by the port operations should be recognized as a major source of Virginia output of goods and services.

Impacts are reported here by four measures: **output**, **value-added**, **labor income**, and **employment**. These measures are displayed in tables throughout this report and interpretation is discussed.

Output is the dollar demand for current output of the goods or services. This is a broad measure of business activity and taxable flows. However, the dollar sales include not only the seller's internal costs and profit but also the seller's purchase of intermediate inputs from other businesses, e.g., electricity, fuel, and insurance.

Value-added internally by the selling enterprise omits the value of intermediate inputs purchased from other companies, is the seller's direct contribution to Virginia's Gross State Product, and is the direct source for local income and jobs. Summing Value-added to obtain unique national measures of current output of goods and services is the method used worldwide to calculate Gross Domestic Product.

Labor income consists of wages and salaries, benefits, and sole proprietors' income. Labor income is the largest component of Virginia's Gross State Product.

Employment uses the Bureau of Labor Statistics definition of full-time and part-time employees and self-employed persons, so is consistent with the labor income series.

PORT OPERATIONS

The Port of Virginia (POV) operations here include the Virginia Port Authority, and its private operating unit, Virginia International Terminals. The POV terminals include, when referring to the port operations, the deep-water Norfolk International Terminals, Newport News Marine Terminal, the Virginia International Gateway Terminal, and Portsmouth Marine Terminal, plus the two satellite terminals: the Richmond Marine Terminal (RMT) and the Virginia Inland Port (VIP), an intermodal facility in Front Royal.

The Port of Virginia's first priority is physically transferring freight between the 40 container, breakbulk, and RO/RO deep-sea vessels that call weekly and the terminal docks on average. We report here on the tons moved and the containers handled, measured in TEUs (Twenty-foot Equivalent Units). TEUs are the standard unit for describing containers handled by the port, although the predominant container size is 40 feet in length (two TEUs). The port generally gets paid by container, regardless of size, and not the value enclosed within the container.

The port moves containers in response to shippers' needs, whether the containers are loaded or empty. However, the weight of empty TEUs is not included in the container tons moved. The POV terminals also handle breakbulk and roll-on/roll-off cargo which is included in the total tonnage, but the FY 2022 breakbulk and roll-on/roll-off tons were only 0.66 percent of the total tons moved. Breakbulk and roll-on/roll-off cargo can be assumed to be in the total impact results without expressly identifying it in the text or tables.

The tonnage and TEU movement are given in Table 2. Moving 26 million tons is 52,000,000,000 pounds or, stated differently, moving 2,849,315 fifty-pound bags per day, or 118,721 bags per hour... around the clock...only feasible with stevedores using the port's cargo handling equipment, automation, and computer technology. Note that the POV loaded export and import container tonnage breaks down to 55% / 45% in favor of imports. Therefore, export and import cargo transportation impacts within Virginia's borders followed that breakdown. The major difference in overall export and import economic impacts arises from how much of the export production in the loaded containers is made-in-Virginia versus how much of the imported goods value is used as intermediate inputs by Virginia companies.

<i>Table 2</i>			
<i>Port of Virginia Freight Moved, Tons and TEUs</i>		<i>Tons</i>	<i>TEUs</i>
Containers			
Loaded			
Exports		11,585,590	1,045,765
Imports		<u>14,267,215</u>	<u>1,768,850</u>
Total Loaded		<u>25,852,806</u>	<u>2,814,615</u>
Empty			
Exports			838,589
Imports			<u>41,952</u>
Total Empties			<u>880,541</u>
Total		<u>25,852,806</u>	<u>3,695,156</u>
Breakbulk			
Exports		16,158	
Imports		<u>156,577</u>	
Total Breakbulk		<u>172,734</u>	
FY 2022 Tonnage Moved		26,025,540	

<i>Table 3</i>				
<i>Port of Virginia Containers Moved to Satellite Ports</i>	<i>Richmond Marine Terminal</i>		<i>Virginia Inland Port</i>	
	<u>Tons</u>	<u>TEUs</u>	<u>Tons</u>	<u>TEUs</u>
Loaded				
Exports	254,158	19,390	132,711	10,675
Imports	<u>305,754</u>	<u>36,132</u>	<u>176,079</u>	<u>26,400</u>
Total Loaded	559,912	55,522	308,790	37,075
Empty				
Exports		16,080		16,245
Imports		<u>1,536</u>		<u>108</u>
Total Empties		17,616		16,353
Total Moved	559,912	73,138	308,790	53,428

It is important to note that FY 2022 was a banner year for imports at POV. According to US Census trade data, during FY22, while the imported containerized tonnage at the Port of Los Angeles increased by 3%, at the Port of Savannah by 9%, and at the Port of New York by 15%; imported containerized tonnage at the Port of Virginia increased by 23%.

All of the POV tonnage and TEUs passed through the POV deep-water terminals. However, a portion of the container import cargo was shipped onto the Richmond Marine Terminal by rail, truck, and barge, and an even larger portion was sent by rail and truck to the Virginia Inland Port (see Table 3). Please note: import volumes in FY22 going to the two inland facilities, VIP and RMT, were negatively impacted as ocean carriers restricted inland bill of ladings in an effort to keep empty containers close to ports to quickly send them back overseas — cargo was trucked directly to the customer facilities from the marine facilities rather than through the inland terminals with the priority put on speed.

The Richmond Marine Terminal’s 559,912 tonnage was only 2.2 percent of the total POV tonnage but served a valuable function in moving exports from and imports to the Richmond area international trade customers. The volume moved to and from the Virginia Inland Port has not only been a service for the growing number of Virginia international trade customers in Northwest Virginia but also supported Virginia distribution centers (DCs) who send goods to other states, especially in the Midwest and Mid-Atlantic...by some estimates up to 90% of trucks leaving these DCs are bound for out-of-state destinations.

The POV port operations involve more than personnel running terminals and stevedores loading and unloading the cargo. There are also harbor pilots and tugboat services bringing the ships into port and docking them, companies providing ship services, maintenance, and repair, along with warehousing and storage companies consolidating and storing cargo before moving it to ships or inland. These **port and harbor operations** created a direct \$1,309 million demand for output of goods and services, as shown in Table 4.

Table 4 POV-related Port Direct Impacts (\$ in millions)	Output Purchases	Value- added (GSP)	Labor Income	Employ- ment
Ship & harbor operations, vessel (un)loading	\$1,309.0	\$903.2	\$841.2	9,480
Freight arrangement & other transportation support	\$556.2	\$418.6	\$374.3	4,778
Land & barge transportation	\$2,146.3	\$771.3	\$746.8	11,220
Total Direct Impacts	\$4,011.5	\$2,093.1	\$1,962.3	25,478

Freight arrangement and other transportation support includes a broad and diverse range of services, such as freight forwarders who arrange the transportation and warehousing, customs house brokers who assure freight is properly categorized, along with

a variety of enterprises providing other support services (e.g., insurance, inspection, and security) and delivering \$556.2 million in output of goods and services.

The private-enterprise port-related services for **land and barge transportation** of the exports and imports within the borders of Virginia were an estimated \$2,146.3 million. Gross State Product is output and income produced within a state’s borders, so transportation services moving POV exports and imports in other states would be counted as output and income in these other states, even if provided by Virginia companies. The land and barge transportation of Port of Virginia cargo in FY 2022 was 64 percent by truck, 32 percent by rail, and four percent by barge, at an estimated direct cost of \$2,146.3 million, as reported in Table 4.

The direct impacts, i.e., output, value-added, and employment impacts of cargo-moving operations in Table 4 give rise to two other streams: the indirect and induced impacts. The total impacts are the sum of the direct, indirect, and induced impacts as reported in Table 5. Indirect impacts are the business-to-business (B2B) flows created by direct output demand, value-added, compensation, and jobs.

<i>Table 5</i> <i>POV Cargo-moving</i> <i>Virginia Impacts</i> <i>(\$ millions)</i>	<i>Output</i> <i>Purchases</i>	<i>Value-</i> <i>added</i> <i>(GSP)</i>	<i>Labor</i> <i>Income</i>	<i>Employ-</i> <i>ment</i>
Direct Impact	\$4,011.5	\$2,093.1	\$1,962.3	25,478
Indirect Impact	\$1,371.2	\$812.3	\$558.4	7,747
Induced Impact	\$1,818.1	\$1,091.3	\$568.2	10,021
Total Impacts	\$7,200.8	\$3,996.7	\$3,088.9	43,246

The output shown as a Virginia indirect impact in Table 5 is the B2B spending for inputs and supplies from other Virginia businesses – from providers of goods and suppliers of services ranging from power and other utilities to cleaning, accounting, legal, and medical services. The output, labor income, and employment created by this B2B spending are an **indirect impact** - caused by and dependent upon the initial Port of Virginia operations-related demand for goods and services (i.e., the direct impact).

There also is a third impact stream that is labelled an **induced impact**. This is created as the income earned by households and businesses is spent in the process of meeting the direct and indirect demands, primarily for household consumption along with taxes paid to state and local governments being spent to provide public services and infrastructure. The induced impact is very real and predictable. Households spend most of their income, similar to the way state and local governments spend the taxes they receive.

EXPORTS MADE IN VIRGINIA

The Virginia economic impacts of transporting exports to the ports and activities to stow them aboard ship are included as part of the port operations impacts discussed above. In this section we estimate the separate, additional impacts stemming from the portion of these exports that are *made-in-Virginia*. Total port shipments are reported in detail, but information on the origin and destination of the contents and the value of the goods inside containers is sparse, incomplete, and subject to revision. Based on Port of Virginia shipment data and U.S. Census Bureau international trade data, we estimate that Virginia businesses produced \$7,005.5 million in containerized exports in FY 2022, as reported in Table 6.

In our previous impact study, *THE FISCAL YEAR 2021 VIRGINIA* released in *ECONOMIC IMPACTS OF THE PORT OF VIRGINIA*, January 2022, we concluded that FY 2021 POV exports included \$6,864.6 million in Virginia-made goods. Our FY 2022 estimate is that POV exports included \$7,005.5 million in Virginia-made goods – a two percent increase over FY 2021. The FY 2022 and FY 2021 totals are directly comparable because we use the same estimation methodology in both studies. For the exports (and imports), we only use the foreign trade value and tons data reported by months on USA Trade Online (at <https://usatrade.census.gov/index.php>), a dynamic database subject to updates and revisions over time, in addition to POV data and user interviews.

Table 6		
Virginia-Made Exports, Value by Major Sectors	FY 2022 Dollar Value (\$ mill.)	FY 2021 Dollar Value (\$ mill.)
11 Agric., forestry, & fishing products	\$765.3	\$825.4
21 Nonmetallic mining products	\$21.8	\$624.4
31 Food, bev., textiles, & apparel mfg.	\$1,122.3	\$1,379.1
32 Wood, paper, chem., plastics mfg.	\$2,609.3	\$2,113.3
33 Metal, machin., electronics, transpt. & furniture mfg.	\$1,908.3	\$1,655.8
90s Waste, scrap, used/spec classif. goods	\$578.5	\$266.6
Total Exports	\$7,005.5	\$6,864.6

The fiscal year comparisons in Table 6 serve to illustrate the shifts over time in the mix of export products grown, processed, or manufactured by businesses here in the Commonwealth. The types of Virginia export goods are reported by NAICS two-digit codes. NAICS Group 11 is the production of crops and animals including soybeans and tobacco, along with the harvest of timber and seafood, including aquaculture. Group 21 includes mineral and ore products such as kyanite and clay – down significantly. Processed foods, canned, dried, packaged and frozen such as pork, poultry and other meat exports as well as beer exports, are in the NAICS Group 31 manufacturing group. Processed wood and paper products, including logs and lumber, wood chips and wood pulp as well as chemicals and resins including synthetic fibers are in NAICS manufacturing Group 32. Group 33, with machinery, transportation equipment and electronics, has a high percentage of finished durable goods products.

The \$7 billion in international export products sold in FY 2022 by Virginia businesses was a direct economic output impact. These exporting businesses buy inputs and supplies from other Virginia businesses, thus creating a very large FY 2022 indirect output impact of \$2.3 billion. The employees of exporting businesses and their suppliers live in Virginia, spending most of their earnings here, yielding an additional \$2 billion induced impact. The direct export sales of \$7 billion generated a cumulative total of \$11.3 billion in business purchases spent in Virginia, as shown in Table 7. The sum of the direct, indirect, and induced Virginia value-added, or GSP, is \$5 billion. This Virginia value-added includes \$3.2 billion in Virginia labor income for 52,777 employees.

<i>Table 7</i> <i>Virginia-made Exports Impacts</i> <i>(\$ in millions)</i>	Output Purchases	Value-added (GSP)	Labor Income	Employment
Direct Impact	\$7,005.5	\$2,602.8	\$1,807.6	27,857
Indirect Impact	\$2,345.5	\$1,250.0	\$729.5	13,943
Induced Impact	\$1,990.3	\$1,194.6	\$622.2	10,977
Total Impacts	\$11,341.3	\$5,047.4	\$3,159.3	52,777

IMPORTS USED AS INPUTS IN VIRGINIA

The Port of Virginia handled 14.3 million tons of containerized imports worth an estimated \$66 billion. Nearly 60 percent of these imports, by tonnage and value, went to destinations outside of Virginia. As with exports, the Virginia economic impacts of getting these goods unloaded and across Virginia are included as part of the \$7 billion port operations impacts already discussed.

Our focus here is the FY 2022 separate, additional impacts of Virginians' use and purchase of about 40 percent of these imports, \$26.3 billion worth in Table 8. That amount is not Virginia production; it is an input into production that allows Virginia businesses to reduce costs and improve quality. In particular, as they move through the supply chain to Virginia businesses and households, value is added by the manufacturers, wholesalers, warehousing companies, and retailers who use these imports as inputs in producing their products and services. The final sales price to customers in Virginia (and in other states) average about 2.5 times the import input costs. The POV operations do not create these final demands; they instead serve as the means to satisfy them at a profit for Virginia businesses.

The types of Virginia-used import goods are reported in Table 8 by NAICS two-digit codes, with our FY 2022 estimates and the FY 2021 values for comparison. The largest sector by value in both years is NAICS Code Group 33: Machinery, Electronics, and Furniture, with FY 2022 imports valued at \$14.6 billion and nearly \$10.9 billion in FY 2021. Over the one-year period there was an overall growth in value of 21 percent.

Table 8	FY 2022	FY 2021
Virginia-used	Dollar Value	Dollar Value
Imports, Value by	(\$ mill.)	(\$ mill.)
Major Sectors		
11 Agric., forestry & fishing products	\$1,141.4	\$1,143.7
21 Nonmetallic mining products	\$9.3	\$17.1
31 Food, bev., textiles, & apparel mfg.	\$5,084.0	\$4,101.5
32 Wood, paper, chem., plastics mfg.	\$5,353.1	\$5,418.2
33 Metal, machinery, electronics, transport & furniture mfg.	\$14,628.2	\$10,902.8
90s Waste, scrap, used/spec classification goods	\$84.7	\$147.5
Total Imports	\$26,300.7	\$21,730.8

With Virginia exports, the dollar value is the final price of Virginia output. The use of Virginia imports is quite different from export production. The Virginia imports are inputs for different types of durable goods manufacturers (e.g., Stihl, Lego, Lockheed Martin,

Volvo), nondurable goods producers (e.g., International Paper, MeadWestvaco), wholesalers (e.g., BJ's, Costco, Sam's Club), and retailers (e.g., Amazon, Dollar Tree, Home Depot, LIDL, Lowes, Target, Walmart). With imports, the \$26.3 billion in businesses' cost of FY 2022 imports used in the Commonwealth is Virginia inputs, further processing by Virginia's manufacturers, wholesalers, and retailers. The impact in Virginia is the value-added by Virginia businesses, equal to the final price minus the import input purchases.

Therefore, to identify the Virginia economic impacts, we had to estimate the final sales value of the imports in the products sold to the ultimate consumers. The Bureau of Economic Analysis in the U.S. Department of Commerce publishes annual Gross-Domestic-Product (GDP)-by-Industry data for 97 industries, with final output in current dollars, consisting of the value-added within each industry and the dollar amount of intermediate inputs they purchased from other businesses. From the industry information, intermediate inputs as a percent of industry GDP are calculated. Then, dividing that percentage into the dollar value of inputs yields the value of the industry's output.

Viewing Virginia imports as part of the intermediate inputs used by Virginia businesses, a reasonable estimate is they average about 40 percent of the final Virginia output value. What this means is the total import-based output price is about 2.5 times the value of the imported inputs, with additional spending inside Virginia at least equal to 60 percent of total sales. With a 2.5X multiplier, the \$26.3 billion of imported inputs in FY 2022 yields an estimated final import-based sales value of \$64.5 billion. We report this \$64.5 billion in Table 9 as the FY 2022 direct Virginia spending flow from Virginia use of the imports.

Virginia manufacturers, producers, wholesalers, and retailers creating these sales generate Virginia value-added of \$29.7 billion (70 percent of which went for labor income) and make purchases from other Virginia businesses, an indirect output demand of \$20.8 billion. The full FY 2022 economic impacts are reported on the bottom line in Table 9. The \$105.6 billion in output purchases, creating \$53.9 billion in Virginia Gross State Product, with \$35.2 billion in labor income earned by 469,040 Virginia workers is a very large and often underappreciated economic impact related to the POV operations.

<i>Table 9</i> <i>Virginia-Used</i> <i>Imports</i> <i>(\$ in millions)</i>	<i>Output</i> <i>Purchases</i>	<i>Value</i> <i>Added</i> <i>(GSP)</i>	<i>Labor</i> <i>Income</i>	<i>Employ-</i> <i>ment</i>
Direct Impact	\$64,493.8	\$29,738.0	\$20,918.5	263,015
Indirect Impact	\$20,813.8	\$12,036.3	\$7,917.0	94,438
Induced Impact	\$20,245.3	\$12,151.7	\$6,327.3	111,587
Total Impacts	\$105,552.9	\$53,926.0	\$35,162.8	469,040

There is no online data for estimating how much of the \$64.5 billion in direct import-generated Virginia sales in FY 2022 were to Virginia consumers. However, comparing data for national imports of goods (excluding services) with the use of goods reported by type in the Gross Domestic Product accounts gives us a rough estimate that between 45 and 60 percent of the \$64.5 billion in output was bought by Virginia consumers, or \$29 billion to \$38.7 billion. If so, then Virginia output not consumed here is \$25.8 billion to \$35.5 billion sold by Virginia manufacturers, distribution centers, and retailers to customers in other states. This Virginia output is Commonwealth domestic exports, creating POV import-related income and jobs in Virginia.

EXPORTS/IMPORTS DEEP DIVE and TRENDS

COVID-caused demand changes, supply chain disruptions, West Coast port difficulties, labor shortages, inflation, pent-up demand, begin to describe the context within which Virginia ports find themselves. There are interesting changes even across the last year that reveal notable stories. First, direct export-related jobs were up 36 percent, and Pay & Benefits per direct export job, which had declined from 2018 to 2021, increased by 26 percent between 2021 and 2022. In 2018, the average pay and benefits was \$56,610 but dropped to \$51,678 in 2021. But then in 2022, it recovered to \$64,889. Many factors can affect the average pay per worker, specifically changes in the product mix from year-to-year since it is averaged across so many product categories. Alternatively, Direct Output per Direct Job (a measure of productivity) related to exporting went from \$400,480 in 2018 to \$315,241 in 2021 and then to \$251,481 in 2022. This again is an outcome of product mix fluctuations across the industries.

Similarly, direct import-related jobs were up 32 percent – but with a much larger base. The direct Pay & Benefits per direct job continues to rise significantly – up from \$59,215 in 2018 to \$67,260 in 2021, and rising again to \$79,533 in 2022. However, Direct Output per Direct Job related to importing which had increased slightly from \$265,548 in 2018 to \$269,594 in 2021 has declined to \$245,210.

Both Richmond (RMT) and Front Royal (VIP) numbers reversed their TEU decline in the period from 2018 to the 2021 study. RMT tonnage was flat YoY, while VIP tonnage increased 28%. Although a small volume compared to the total port activity, it is an important service to their increasing number of customers. Both Richmond and Front Royal provided an increasingly balanced service to both importers and exporters in 2022.

PORT OF VIRGINIA IMPACT RECAP

The total FY 2022 Virginia impacts attributable to the Port of Virginia were reported by type and category in Table 1, summing to \$124.1 billion in output, creating \$63.0 billion in Gross State Product within Virginia's borders, of which \$41.4 billion was labor income earned by 565,063 employees and proprietors (see Table 10).

To further unpack these total impacts, we report the tons moved to and from Norfolk Harbor to the two POV satellite ports, the Richmond Marine Terminal (RMT) and the Virginia Inland Port (VIP). The economic value of these two ports goes far beyond just

moving containers. At each port, Virginia businesses export goods are loaded into outgoing containers and also receive and use imported goods as inputs in processing, making, and distributing value-added products to their final users. The total (i.e., direct, indirect, and induced) economic impacts of exports made and imports used by RMT users and VIP users are included in the POV all-ports impacts in Table 10. However, we can estimate separately each port’s contribution to the all-ports totals.

POV Total Impacts and Satellite Ports Contributions (\$ in millions)	Output	Value- added Purchases (GSP)	Labor Income	Employ- ment
POV All-ports Impacts	\$124,095.0	\$62,970.2	\$41,411.0	565,063
Percent of Total	100.0%	100.0%	100.0%	100.0%
Richmond Marine Terminal Impacts Contribution	\$2,668.1	\$1,355.6	\$882.2	12,157
Percent of Total	2.2%	2.2%	2.1%	2.2%
Virginia Inland Port Impacts Contribution	\$1,476.7	\$749.3	\$492.8	6,724
Percent of Total	1.2%	1.2%	1.2%	1.2%

For the Richmond Marine Terminal, our analysis indicates a contribution of \$2.7 billion in output purchases, of which \$1.4 billion was Virginia value-added, funding \$882 million in labor income for over 12,000 workers. This contribution accounts for over two percent of the total POV Virginia impacts, as shown in Table 10. The RMT impact contribution is predominantly created by RMT customers using imported goods as inputs in processing, making, and distributing their products: import use accounted for over 90 percent of the RMT value-added, labor income, and employment impact contributions.

As an example of the draw of RMT, in 2020, the direct marketing company Moore invested \$31 million to establish Richmond Print Group and created well over 200 jobs. The new, state-of-the-art manufacturing facility serves marketing clients in the U.S. and abroad. Moore understands the advantages of doing business in a place with such great logistics support.²

Our estimate of the Virginia Inland Port FY 2022 economic impact contribution is \$1.5 billion in output, \$749 million in Virginia value-added (GSP), with \$493 million in labor income earned by more than 6,700 workers, accounting for about 1.2 percent of the total POV impacts. The share of traffic handled by VIP shows a broad mix between imports and exports; however, because of the significant local impact of imports, handling imports generated about 95 percent of VIP’s value-added, labor income, and employment contribution. VIP exports are largely produced outside of Virginia, so the made-in-Virginia export contribution is small compared to its import-use impacts. For example, Nature’s Touch Frozen Foods announced in November 2021 that it plans to invest over \$40 million across the street from VIP, create 67 new jobs, and move up to 45 million pounds of fruit through the terminal.

² [Moore Locates Richmond Print Group in Henrico County, Virginia - Area Development](#)

STATE AND LOCAL GOVERNMENT REVENUE IMPACTS

The IMPLAN model used to estimate the Virginia economic impacts also captures the money flows from corporations, other enterprises, and households to Virginia state and local government. These flows are estimated based on state and local revenue data by dozens of revenue categories as reported in surveys such as the Census Bureau’s Annual Survey of State and Local Government Finances. The Virginia revenue categories include general and selective sales taxes; business and personal property taxes; business and personal motor vehicle licenses; severance taxes; other state and local license taxes; non-taxes such as rents and royalties, special assessments, fines, and settlements; corporate profits taxes; personal income taxes; and institutional charges such for utilities and waste management.

Table 11				
POV-based Virginia Government Revenue Impacts	Port Operations	Exports Made in Virginia	Imports Used as Inputs in Virginia	Total Virginia State & Local Government Revenue
(Revenue in Millions)	\$380.9	\$445.7	\$4,935.4	\$5,762.0
Value-added (GSP) Created in Millions	\$3,996.8	\$5,047.4	\$53,926.0	\$62,970.2
Revenue Percent of Value-added	9.5%	8.8%	9.2%	9.2%

We have estimated revenue for the specific industries directly impacted by POV-related activities. Our final Virginia state and local government estimated revenues produced by the total (direct, indirect, and induced) POV-related FY 2022 economic impacts are \$5.8 billion as shown in Table 11. The \$5.8 billion is the sum of multiple types of tax and fee revenues, but the top three, local property taxes, personal and corporate income taxes, and sales taxes, accounted for \$4.9 billion, or 84 percent of the total \$5.8 billion. The largest state and local government revenue amounts by source, \$4.9 billion, flow from Virginia businesses using the imports as inputs in producing their final goods and services.

We included POV-generated value-added, the addition to Virginia Gross Domestic Product, to illustrate the relationship between port economic impacts and Virginia government revenue. Every dollar of POV-related impact on Virginia GSP creates on average 9.2 cents of state and local government revenue.

This is a much higher government revenue amount than estimated in 2021 (\$2.7 billion). This is because the sources used to calculate government revenues from economic activity rely on data that report *net* government revenue. In 2021, government tax collections were offset by pandemic related stimulus payments and subsidies. The large increase represents a return-to-normal as COVID-19 stimulus payments and subsidies in 2021 subsided and stopped affecting net government revenues in 2022.

LOOKING FORWARD

POV's robust capabilities, proactive technology implementation, and resilience planning have allowed them to manage an enviable flow through the port. One of the major reasons this is possible is that it has unprecedented control facilitated by being its own port authority, marine terminal operator, asset/equipment owner, and technology integrator. This level of control supports companies' major desire at this time to rebuild reliability, consistency and fluidity in their supply chains. This is possible when all the elements are integrated in a seamless way with consistent investment needed to build the modern port that supports companies' present needs and their aspirations. The World Bank Report and S&P Global (CPPI Report 2021) offers outside analytical support for this position by rating the Port of Virginia as the highest operational performance in North America based on total port time facilitated by the introduction of new technologies, increased digitalization, and the willingness of industry interests to work collectively toward system-wide improvements.

How a port performs is a crucial element in the cost of international trade. The overall economic impacts of an efficient port are demonstrated through job and pay growth with imports being the major driver. Alternatively, "Poorly performing ports are characterized by limitations in spatial and operating efficiency, limitations in maritime and landside access, inadequate oversight, and poor coordination between the public agencies involved, resulting in a lack of predictability and reliability" (CPPI Report 2021) – the opposite of what companies are demanding post-COVID. The exceptional fluidity of POV during the post-pandemic surge combined with Virginia's ranking as best state for business climate has brought an unprecedented demand for port-related and port-driven economic development and site development in Virginia. Since July 2020, there have been 79 announcements of companies who have committed to investing more than \$3.9 billion and creating than 16 million square feet of manufacturing and distribution space while generating nearly 11,000 new jobs in Virginia (e.g., Lego Group, Plenty Inc., AutoZone, Celadon, Global Concentrate, Veronesi Holdings, Nestle Purina, Civica Inc., Crown Holdings Inc., and Hershey Company...all investing more than 100 million each).

To offer some detail on these investments, in March 2020, Amazon announced an investment of \$200 million dollars for a 1,000-job, 3.8 million square-foot, robotics fulfillment center in Suffolk, Virginia near the port terminals. At this robotics fulfillment center, Amazon has computerized stickers on the floor guiding robotic vehicles to work alongside Amazon employees and assist with picking, packing, and shipping orders. In addition to the fulfillment center, Amazon announced a 650,000 square-foot, 500-job processing center in Chesapeake. The Virginia Economic Development Partnership worked with the City of Chesapeake, the City of Suffolk, the Hampton Roads Alliance, and the Port of Virginia for these developments. The Secretary of Commerce and Trade at the time, Brian Ball, said in a statement, "The new operations in Suffolk and Chesapeake will utilize the Port of Virginia, which is a critical economic development driver for the region and the commonwealth."³

Maritime transportation is the backbone of global trade since the manufacturing supply chain depends on its key factors of being the most economical, energy efficient, and reliable mode of transportation over long distances. Subsequently, more than four-fifths of global

³ [Amazon Plans Operation Hubs in Suffolk and Chesapeake, Virginia - Area Development](#)

merchandise trade is carried by sea and through ports. Further, the development of efficient port infrastructure is a prerequisite for economic growth. As other ports struggled, the POV delivered on its promise. Virginia's investment in the port, strengthened production and distribution systems, facilitated the expansion of manufacturing and logistics, created worthy employment opportunities, and produced governmental funds in a virtual cycle.

In summary, the Port of Virginia is continually modernizing to meet the needs of the Commonwealth and conditions of the world. Virginia businesses and their customers require superior fluidity, increasing sustainability, and world-class support services to enable them to offer the selection, quality, convenience, and price demanded by their customers. This requires visionary leadership, proactive investment in technology and infrastructure, as well as exceptional skills and partnerships. This also requires an emboldening government that sees investment in the POV as paying dividends to all its citizens. As we emerge from the pandemic, Virginia's ports are vital for the economy in the Commonwealth and the nation and are its greatest competitive advantage. As can be seen in this analysis, the POV has led the way to economic recovery through enabling increased job opportunities, raised incomes, and advantaged businesses.

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BIOGRAPHICAL SKETCH

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K. Scott Swan, Ph.D. is the David L. Peebles Professor of Business Chair at the Raymond A. Mason School of Business and serves as president-elect of Faculty Assembly at The College of William & Mary. He is on the Advisory Board for the Alan B. Miller Entrepreneurship Center. He was awarded a Senior Fulbright Chair: the 2015-2016 Hall Chair for Entrepreneurship in Central Europe at WU (Vienna, Austria) and The University of Bratislava, Slovakia - one of two in business worldwide. He has led the development of an Innovation & Entrepreneurship minor to serve undergraduate students as well as an Online Masters' of Science in Marketing Innovation. Prof. Swan published *Global Marketing* (5th) Routledge: New York and London (with Kate Gillespie). He serves on the board of two journals related to product development, management, and design: *The Design Journal* and the *Journal of Product Innovation Management* along with authoring of three books on these subjects. One book, *Innovation and Product Management: A Holistic and Practical Approach to Uncertainty Reduction* (with Kurt Gaubinger, Michael Rabi, and Thomas Werani - Springer Science & Business Media 2015), has experienced over 70,000 chapter downloads.

Professor Swan has worked in project management for Flour-Daniel, marketing management for Foremost Corporation of America, as well as founding several small businesses. He has accomplished five economic impact studies for the Virginia Port Authority and four for Norfolk Redevelopment and Housing Authority, along with others including Union Mission, Virginia Maritime Association, Governor's Report for Virginia's Housing Policy Advisory Board, and Jefferson Labs. Dr. Swan has presented at conferences across most of Europe, Asia, and S. America. He has lectured internationally at University of Applied Science Upper Austria (Wels), Corvinus University in Budapest, MCI in Innsbruck, Tsinghua University in Beijing, Aoyama Gakuin University in Tokyo, WHU in Koblenz, Germany, The University of Bratislava in Slovakia, and the Vienna Business School (WU) in Austria.

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