Coal: A Very Important Economic Engine in Hampton Roads

COAL: A VERY IMPORTANT ECONOMIC ENGINE IN HAMPTON ROADS

Coal. The word conjures many quick visual associations – coal mining throughout the United States, but especially in southwestern Virginia; the most important worldwide source of energy for the production of electricity; smoke stacks and the possibility of environmental degradation; and, the huge coal terminals in our own backyard.

The coal terminals located in the Port of Virginia, here in Hampton Roads, are our focus in this chapter. How busy are they? How much income and how many jobs in our region are connected to their operation? What is their future?

Two Old Dominion University economists, Vinod Agarwal and Gary Wagner, recently analyzed the economic impact on Hampton Roads and Virginia of coal exports via the Port of Virginia. This chapter relies heavily upon their work, which was performed at the request of CSX Transportation, Dominion Terminal Associates and Kinder Morgan.

Some Background

Hampton Roads is the largest coal port in the United States and one of the largest in the world. There are three coal terminals in our region: the Lambert's Point coal terminal in Norfolk (owned and operated by Norfolk Southern Corp.), the Pier IX coal terminal in Newport News (owned and operated by Kinder Morgan) and the Dominion Terminal Associates coal terminal in Newport News. Coal is delivered by rail to these three terminals. CSX Transportation provides service to the terminals in Newport News, while Norfolk Southern provides the transportation to its own Lambert's Point facility in Norfolk.

Nearly 800 coal vessels made calls at our three terminals in 2011 and they transported more than 47 million metric tons of coal to other locations. Each of these vessels required an extensive range of auxiliary services that were provided by coal forwarders and agents, testing labs, samplers, surveyors, tug services and harbor pilots. However, the impact of coal doesn't stop there. Many other businesses are linked to these coal shipments directly and indirectly, and the economic ripple effect of the coal shipments (as we shall see) is substantial.

Despite the growth in other sources of energy over the past few decades, coal remains one of the primary energy sources in the United States and worldwide. In the U.S., in 2011, far more electricity was generated from coal than the next

TABLE 1

TOP EXPORTERS OF COAL WORLDWIDE, 2011 (MILLIONS OF METRIC TONS)

Country	Total Exports	Steam Coal	Metallurgical Coal
Indonesia	309	309	0
Australia	284	144	140
Russia	124	110	14
United States	97	34	63
Colombia	75	75	0
South Africa	72	72	0
Kazakhstan	34	33	1

Source: "Coal Facts 2012," World Coal Association, www.worldcoal.org

highest (though very rapidly growing) source, natural gas (see Graph 1). Coal fueled more than 40 percent of the world's electricity production and more than 30 percent of total energy production in 2011 ("Coal Facts 2012," World Coal Association).

The United States and Hampton Roads in particular play a vital role in supplying coal for the production of both energy and steel here and abroad. As Table 1 reveals, the U.S. was the fourth-largest overall exporter of coal in the world in 2011 and the second-largest exporter of metallurgical coal (often labeled "met" or "coking" coal).

Hampton Roads has been, and continues to be, the single most important coal exporting port in the nation. Coal exporting market shares for the largest six participating regions over the past decade are presented in Table 2. One can see that Hampton Roads has accounted for nearly 40 percent of the total volume of U.S. coal exports since 2000. Our region's three coal export facilities – Lambert's Point (or Pier 6) in Norfolk and Pier IX and Dominion Terminal Associates in Newport News – collectively have never accounted for less than one-third of our nation's coal exports since 2000. In 2009, the three facilities exported slightly more than 51 percent of the total volume of U.S. coal exports. Until the Detroit area witnessed a considerable jump in its exports between 2005 and 2008, the volume of coal exports from Hampton Roads regularly exceeded the combined volumes of the next five largest coal-exporting regions in the United States.

The total volume of coal exports in both the United States and Hampton Roads has increased at a reasonably steady pace over the past decade. At the end of 2011, exports were just shy of 98 million metric tons nationwide and 43 million metric tons in Hampton Roads, up respectively from 36 million metric tons and 13 million metric tons in 2002. Graph 2 shows coal exports for the U.S. and Hampton Roads since 2002 (but does not include coastwise coal shipments that go to other locations in the U.S., usually via barge).

If we include coastwise coal (which stays inside the U.S.) and examine the three Hampton Roads facilities individually, then we see a very similar trend to that of the nation over the past decade. These relationships are illustrated in Graph 3. Total coal shipments (coastwise plus exports) have risen substantially at Lambert's Point, Pier IX and Dominion Terminal Associates (DTA) since 2002. Total coal shipments increased from just over 20 million metric tons in 2002 to more than 47 million metric tons by 2011. In terms of growth over that period, total coal movements grew more than 106 percent at DTA, more than 114 percent at Lambert's Point and by 193 percent at Pier IX – all very impressive for a 10-year period. Coastwise coal, whose 7 million metric tons accounted for roughly 30 percent of the aggregate coal shipments through these facilities a decade ago, now accounts for only about 10 percent of shipments today. Hence, it is the export share of coal shipments that has been the growth component for coal movements in our region, especially since 2007.

TABLE 2

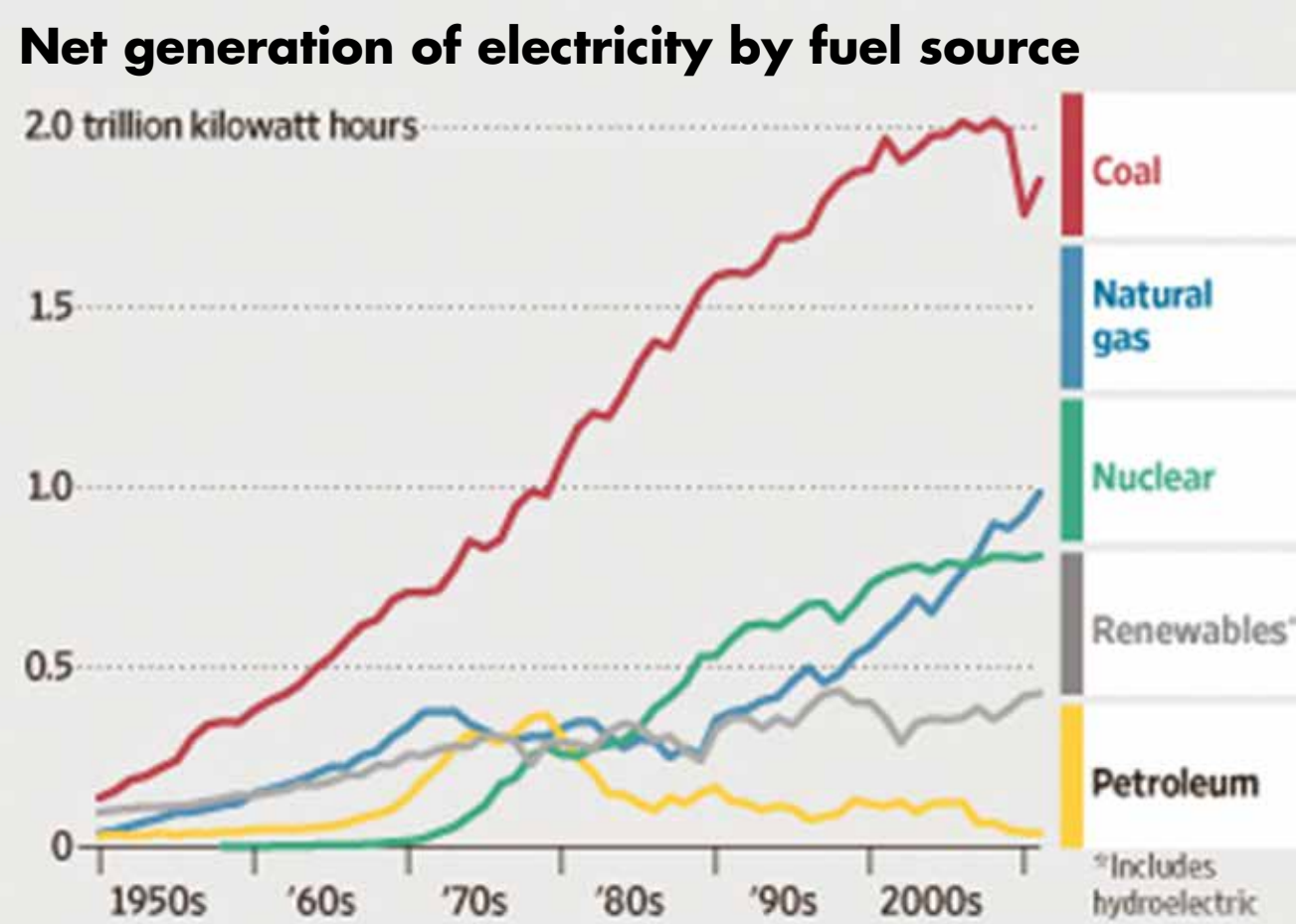
MARKET SHARES OF THE LARGEST U.S. COAL EXPORT REGIONS, 2000-2010

	Hampton Roads	Baltimore	Mobile	New Orleans	Detroit	Seattle
2000	41.5%	11.5%	11.4%	2.4%	2.3%	0.0%
2001	39.4%	10.7%	10.1%	2.9%	1.7%	0.0%
2002	33.8%	10.1%	11.2%	2.1%	1.2%	0.0%
2003	33.2%	7.9%	10.8%	3.0%	8.6%	0.0%
2004	33.2%	10.9%	14.9%	7.0%	14.5%	0.0%
2005	33.3%	11.1%	16.1%	4.1%	19.1%	0.0%
2006	33.3%	13.1%	13.8%	4.9%	30.4%	0.1%
2007	40.2%	14.7%	13.8%	7.3%	24.6%	0.0%
2008	40.1%	14.9%	11.2%	11.9%	22.5%	0.0%
2009	51.6%	12.5%	14.6%	9.0%	11.9%	0.7%
2010	43.2%	18.7%	13.1%	12.6%	8.6%	4.7%
Average 2000-2010	38.4%	12.4%	12.8%	6.1%	13.2%	0.5%

Source: U.S. Energy Information Administration. Data do not include coastwise coal shipments that go to other locations in the U.S., usually via barge.

GRAPH 1

SOURCES OF ENERGY THAT HAVE SUPPORTED THE PRODUCTION OF ELECTRICITY IN THE UNITED STATES, 1950-2012



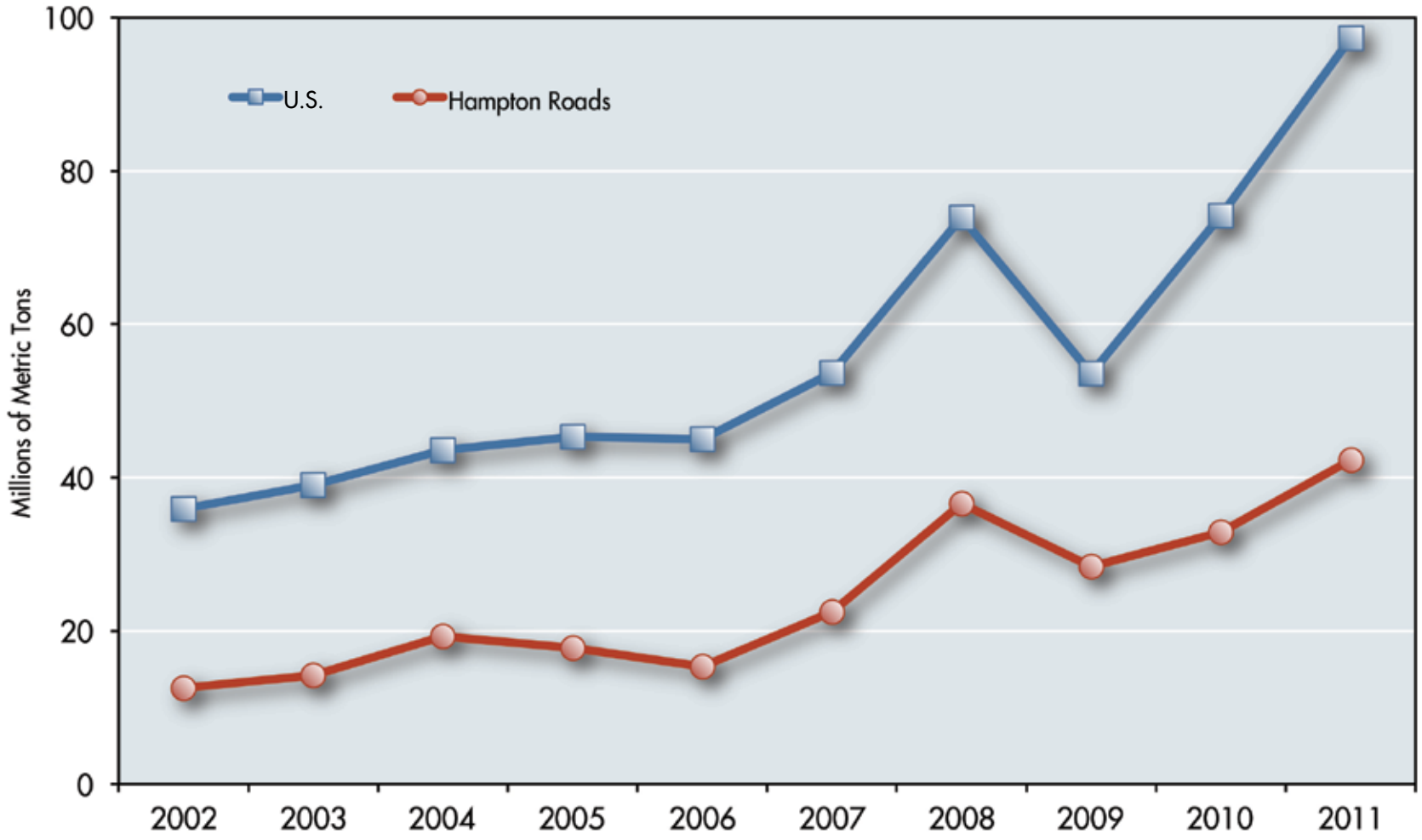
Source: Energy Information Administration

Note: Percentages don't total 100 due to rounding.

Source: Wall Street Journal, 259 (March 28, 2012), A1

GRAPH 2

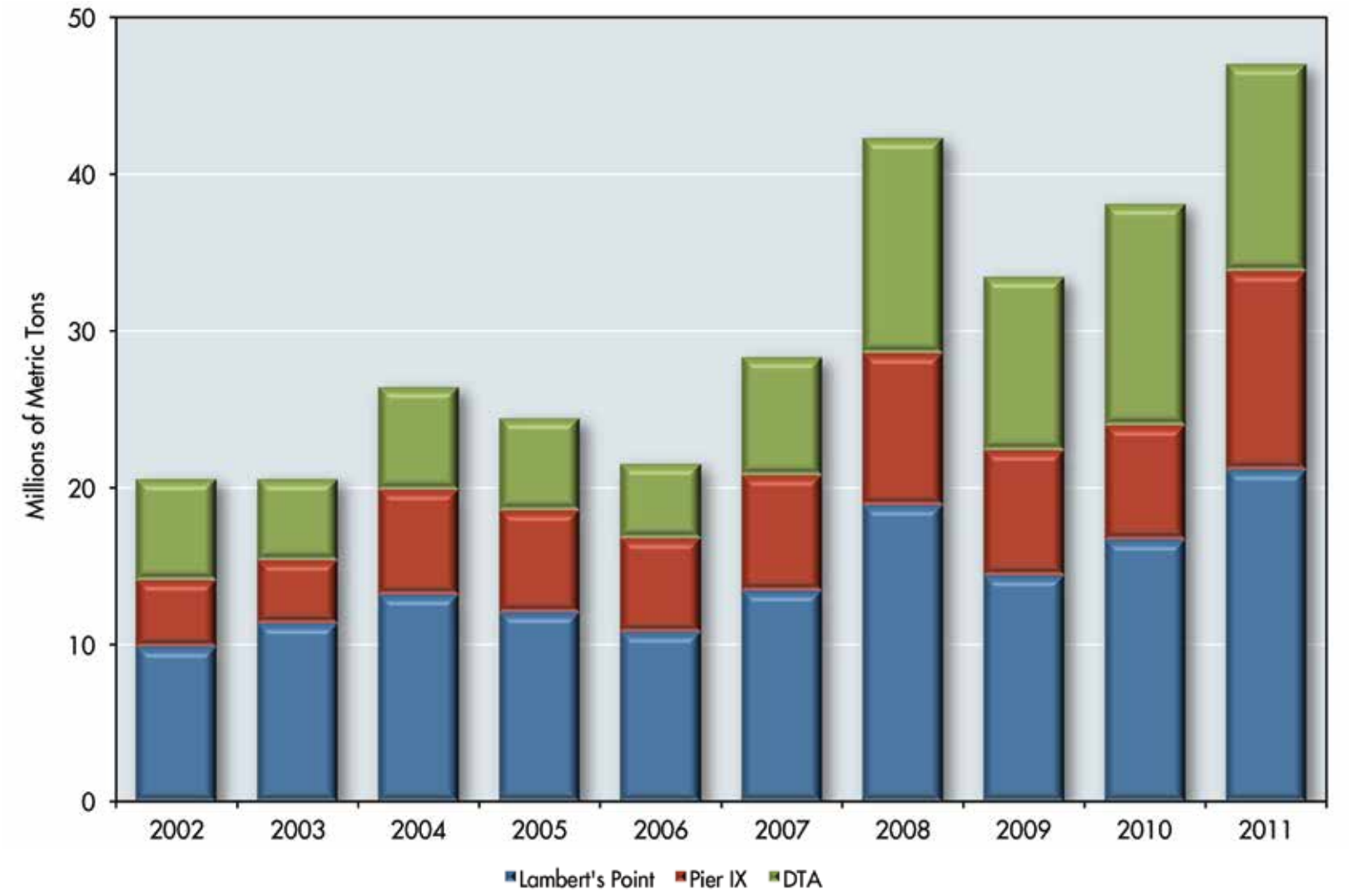
TOTAL COAL EXPORTS FROM HAMPTON ROADS AND THE U.S., 2002-2011



Sources: U.S. Energy Information Administration and T. Parker Host. Data do not include coastwise coal that goes to other locations in the U.S., usually via barge.

GRAPH 3

TOTAL COAL SHIPMENTS FROM HAMPTON ROADS BY TERMINAL, 2002-2011



Source: T. Parker Host

It should be clear from Graph 3 that even though Lambert's Point is the largest coal terminal, each of the three facilities currently is shipping in excess of 12 million metric tons annually. Table 3 presents each terminal's share of coal shipments in Hampton Roads and the U.S. from 2002 to 2011.

During this period, Lambert's Point was responsible for nearly 48 percent of all coal shipments out of Hampton Roads. This constituted nearly 20 percent of all coal shipments in the U.S. over the same period. Further, coal shipments from Pier IX and DTA in Newport News grew from 7.3 percent and 10.9 percent, respectively, of all coal shipments nationwide in 2002 to more than 10 percent and 12 percent by the end of 2011.

In recent years, roughly three-quarters of the aggregate coal shipments through Lambert's Point, Dominion Terminal Associates and Pier IX have consisted of metallurgical coal, which is primarily used in the production of steel. Where were these customers located? As Graph 4 discloses, a third of the coal exports from Hampton Roads in 2011 was destined for just three countries – Italy, Brazil and the Netherlands. The 10 largest export destinations accounted for more than 70 percent of the total coal exports from our region. It is important to keep in mind that destinations with large port facilities, such as Rotterdam and Antwerp in the Netherlands, may simply act as way stations on the journey to the ultimate consuming nation.

The massive volume of coal moving through the facilities in Hampton Roads necessarily means that a steady stream of coal-laden vessels utilizes our regional waterways. Almost 800 vessels made calls either to Pier IX, Dominion Terminal Associates or Lambert's Point in 2011. Each of these vessels departed with an average tonnage of more than 45,500 metric tons of coal, and the largest vessel was loaded with more than 130,000 metric tons of coal! Table 4 reveals that the flow of coal from Hampton Roads was fairly steady throughout the year. Roughly two coal ships a day on average, 365 days a year, are loaded with coal in Hampton Roads and then sent around the world.

TABLE 3

SHARE OF SHIPMENTS OF THE THREE COAL TERMINALS IN HAMPTON ROADS, 2002-2011

	Share of All Coal Shipments in Hampton Roads			Share of All Coal Shipments in the United States		
	Lambert's Point	Pier IX	DTA	Lambert's Point	Pier IX	DTA
2002	47.9%	21.0%	31.1%	16.8%	7.3%	10.9%
2003	55.2%	19.7%	25.1%	20.1%	7.2%	9.2%
2004	50.0%	25.3%	24.8%	22.1%	11.2%	11.0%
2005	49.4%	26.6%	24.0%	19.3%	10.4%	9.4%
2006	50.3%	27.8%	21.9%	17.1%	9.5%	7.5%
2007	47.4%	26.1%	26.5%	19.9%	10.9%	11.1%
2008	44.7%	22.9%	32.4%	22.1%	11.3%	16.0%
2009	43.2%	23.8%	33.0%	22.8%	12.6%	17.5%
2010	43.8%	19.2%	37.0%	19.4%	8.5%	16.4%
2011	45.0%	27.0%	28.0%	19.5%	11.7%	12.2%
Average 2002-2011	47.7%	23.9%	28.4%	19.9%	10.1%	12.1%

Sources: U.S. Energy Information Administration and T. Parker Host. Figures do not include coastwise coal, which goes to other locations in the U.S., usually via barge.

TABLE 4

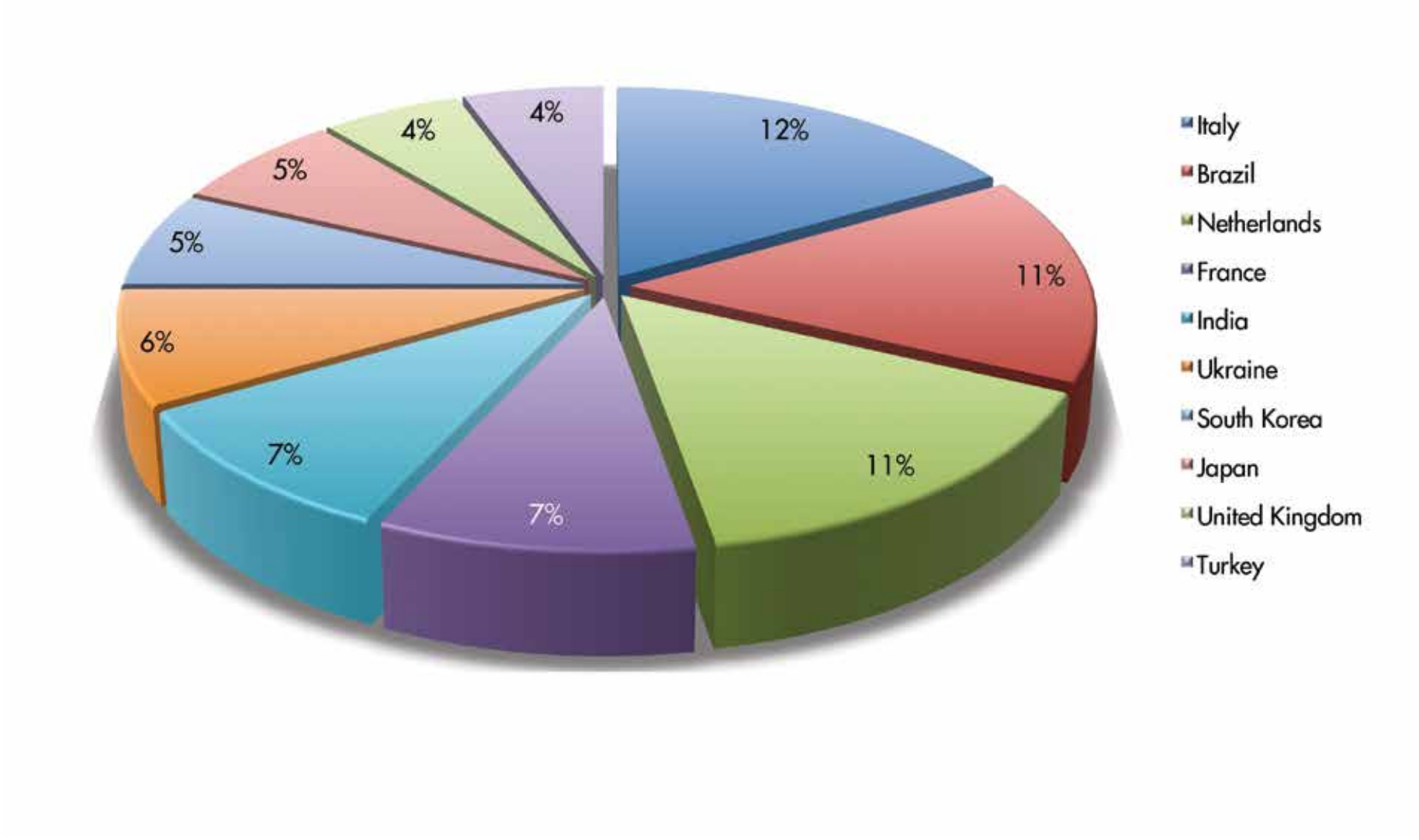
COAL VESSELS AND AVERAGE TONNAGE IN HAMPTON ROADS, 2011

Month	Number of Vessels	Average Metric Tons Per Vessel
January	76	42,751.7
February	65	49,227.2
March	85	47,893.3
April	79	51,968.7
May	67	48,495.1
June	49	42,236.4
July	52	50,936.0
August	57	49,662.5
September	65	45,192.9
October	59	51,021.4
November	64	48,060.6
December	57	55,249.4

Source: T. Parker Host

GRAPH 4

TOP 10 DESTINATIONS FOR COAL EXPORTS FROM HAMPTON ROADS, 2011



Source: T. Parker Host

Computing Coal's Economic Impact In Hampton Roads

The total economic impact of coal shipments on the Hampton Roads economy is the sum of the primary and secondary impacts. The primary economic impact is the direct impact on the economy resulting from an initial round of economic activity – output, earnings and employment that specifically result from all of the firms directly linked to coal shipments. How many employees do coal-related firms have and how much are they paid? How much do these firms spend on machinery, supplies, insurance, food, etc.? Most of this and similar information reported here was obtained via survey questionnaires and personal interviews conducted by ODU economists Agarwal and Wagner.

These direct economic expenditures create secondary economic effects that can be broken down further into indirect and induced impacts. Each of the coal terminals stimulates activity by businesses that supply it with a wide variety of items, ranging from fuel and machinery to food and legal services. Traditionally, this activity is labeled an indirect impact in economic impact studies.

The direct expenditures made by the coal terminals and the indirect expenditures made by suppliers ripple throughout the region and put more money into the pockets of people in many different occupations and locations. When they spend the increased money that appears in their paychecks, this creates induced economic impact.

Thus, the direct economic impact stimulates both the indirect and induced economic impacts. If $1,000 of direct economic expenditures by the coal terminals generates $300 in indirect economic impact and $200 in induced economic impact, then the economic impact multiplier effect is ($1,000 + $300 + $200)/$1,000 = 1.5. The size of the multiplier sometimes can be a subject of controversy. If, for example, most of the ripple effect occurs outside of the region being examined (a "leakage"), then the actual multiplier effect will necessarily be smaller. Or, if consumers refuse to spend the extra money when it appears in their paychecks, then the multiplier also will be smaller.

Readers who have followed the national debate over whether the U.S. government's stimulus package actually worked will recognize the previous discussion. Those who seek to demonstrate that what they are doing is quite significant prefer large multipliers; those who wish to minimize that effect prefer smaller multipliers. In the case at hand, Agarwal and Wagner appropriately let the data provide them with the answer.

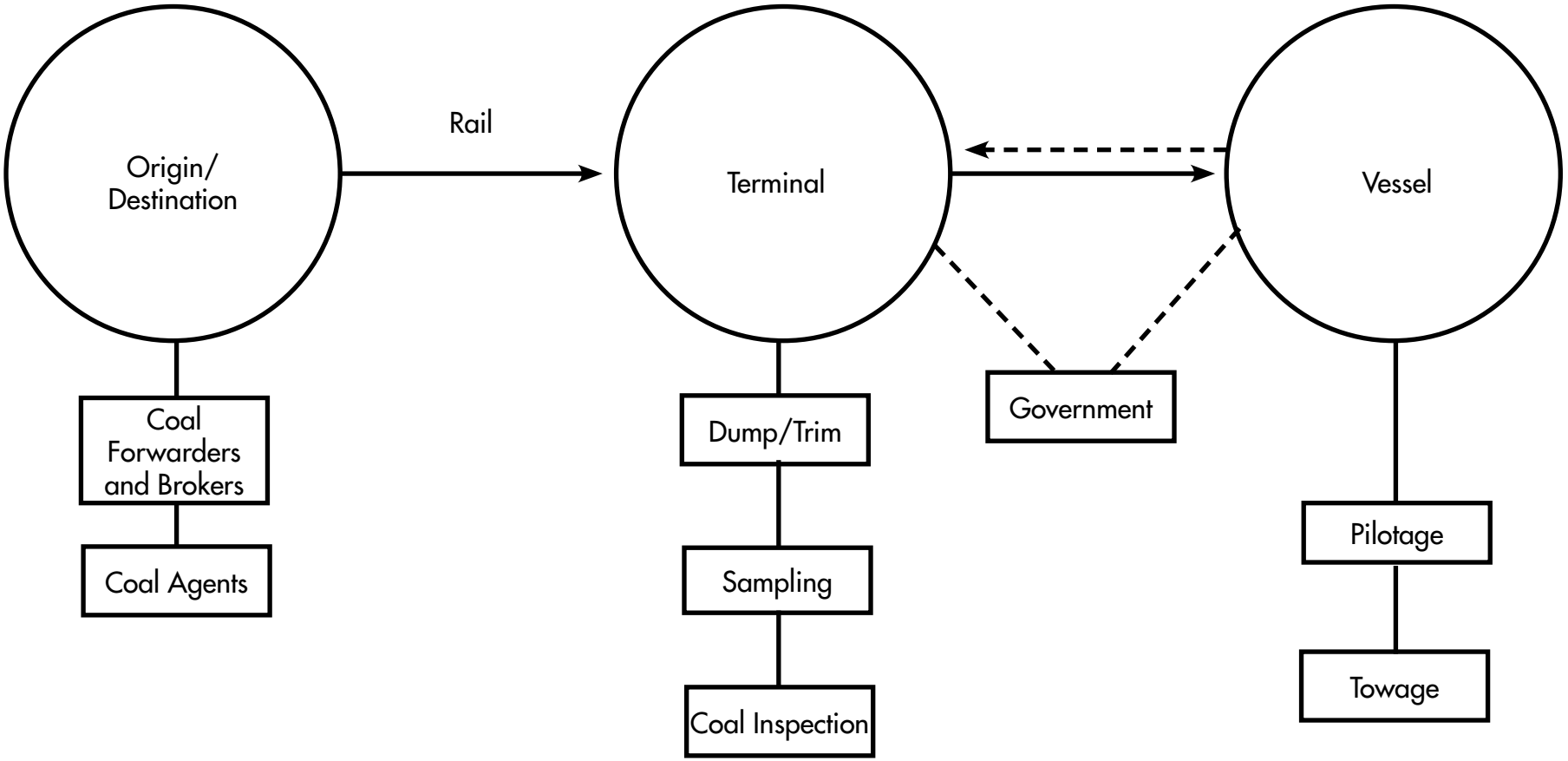
JOBS AND THE PAYROLL-GENERATING PROCESS

The movement of coal is dependent upon three general levels of services: transportation, terminal and vessel. As demonstrated in Graph 5, transportation services are provided by coal forwarders and brokers, by agents who arrange for the movement of coal and by railroads that actually transport coal to the terminals. Coal agents engage in activities such as coordinating and monitoring of shipments from mines to the terminal, as well as monitoring coal loadings at the terminals.

A vessel entering the Port of Virginia to pick up coal requires services that generate jobs and earnings. These services, among others, include pilotage, towing, fuel, supplies and repairs. Further, as coal reaches our port, terminal services begin to generate jobs and earnings. In this case, services are required for dumping, inspection, sampling and dockage. The U.S. government also provides services that include inspection of ships, Customs and Coast Guard services.

GRAPH 5

THE GENERATION OF JOBS AND PAYROLL WITH COAL SHIPMENTS



THE NATURE OF THE DATA

The primary data for this study were gathered in two stages. Coal terminals and the railroads involved in shipping coal provided detailed information on employment, payroll, benefits, capital expenditures, taxes and other expenditures. Firms that directly provide services to the railroads and the terminals were surveyed to gather information about their employment, payroll, taxes and their dependence on the coal terminals in Hampton Roads. Of the 17 firms identified, only one refused to respond; two firms stated that they are not affected by coal shipments. The remaining 14 firms returned the surveys with complete information on jobs and their degree of dependence on coal shipments. A few firms refused to provide information about their payroll and benefits, while many did not provide information on taxes. Missing information on payroll, benefits and taxes was estimated on the basis of completed surveys and other data sources.

It should be noted that this study assumed that the few companies that did not complete our survey or provide any information were treated as having zero jobs and dependence on coal shipments. In addition, since government agencies did not provide any information about their dependence on coal shipments, this study assumed there were no jobs that are directly dependent on coal movements. In other words, the information on the number of jobs and earnings used in this study represents conservative estimates.

The data revealed that coal terminals and railroads connected to coal shipments employed 947 people with a total payroll of $45.4 million in 2011. When fringe benefits were included, that payroll increased to $69.3 million. Other firms engaged in coal shipments had estimated employment of 142 people, with a direct payroll of $9.8 million, and a payroll including fringe benefits of $12.4 million. On average, a worker employed in an industry directly related to coal shipments received $50,772 in wages and $24,284 in benefits in 2011.

In addition, the coal terminals and railroads during the period 2007 to 2011, on average, spent $31.8 million on capital improvements. These companies, on average, paid $5.4 million in state and local taxes during that same period.

Direct, Indirect and Induced Impact Estimation and Results

Estimates of indirect and induced economic impacts in this report were generated by using the U.S. Department of Commerce's Regional Input-Output Model System II (RIMS II). The model is based on a national input-output table for 2010, which has been regionalized utilizing 2010 data. An input-output model shows mathematically how every industry is connected to every other industry. Such a model shows, for example, major relationships such as how much the steel industry depends on the coal industry, but also less obvious relationships such as how the coal industry affects the hotel and motel industry in Hampton Roads.

A useful way to think about the total economic impact of coal shipments is to visualize it as a wave approaching the shore. The wave may hit a breakwater that absorbs some of its momentum, but it will continue on to wash over the beach until all of its energy is exhausted. Likewise, coal shipments arriving in Hampton Roads flow through the region's economy, creating taxes, output, earnings and jobs. Though the initial energy of the economic activity is absorbed by leakages and taxes, the effect of the economic activity flow continues through the region's economy. Thus, industries that are directly involved with the local coal shipment industry pay employees, pay additional taxes and purchase goods and services from intermediate suppliers. Since some of the goods and services are "imported" from suppliers located outside of Hampton Roads, some of the economic energy leaks away and is incrementally dissipated.

However, many of the suppliers to the industries that are directly related to the coal business are located in Hampton Roads. Output, earnings and jobs are created in Hampton Roads within these *indirect* industries, which meet the demands of the directly related industries. A final burst of economic energy created by the flow of coal is expended by subsequent purchases from Hampton Roads industries, whose source is spending *induced* by the household earnings created in the direct and indirect industries.

The estimated direct, indirect, induced and total economic impact of coal shipments on Hampton Roads in 2011 is presented in Table 5. All estimates are reported without sector or industry breakdowns to preserve the confidentiality of survey participants.

The direct economic impact of coal shipments in Hampton Roads (in 2011) was responsible for more than $518 million of the region's economic output, more than $55 million in earnings and nearly 1,100 jobs. Once we include the full ripple effects within our region, the economic footprint expands considerably. **Including the *indirect* and *induced* effects, in 2011 coal shipments in Hampton Roads generated more than $900 million of goods and services for our region, created more than $200 million in earnings across all private-sector industries and led to almost 4,200 jobs.**

In addition to the estimated impacts, the RIMS II model allows us to provide detailed estimates of the sectors that are most heavily influenced by the indirect and induced effects of coal shipments. For instance, Table 6 shows how the *indirect* effects of coal shipments influence specific economic sectors in terms of output and jobs. We have highlighted the top seven industries, which are the sectors that provide the most economic goods and services to the firms that are directly involved in coal shipments. For example, firms in the finance and insurance sector owe $21.5 million of their economic output and 100 jobs to services provided to the firms that are directly linked to coal shipments within Hampton Roads.

TABLE 5

ESTIMATED ECONOMIC IMPACT OF COAL SHIPMENTS ON HAMPTON ROADS IN 2011

	Direct Impact	Indirect Impact	Induced Impact	Total Economic Impact
Output (in millions)	$518.8	$207.0	$117.8	$903.6
Earnings (in millions)	$55.3	$95.8	$52.1	$203.1
Employment	1,089 jobs	1,456 jobs	1,645 jobs	4,190 jobs

The *direct* and *indirect* economic effects generate income for resources owners throughout the local economy, which these owners then spend on additional goods and services. Table 7 illustrates how these induced effects reverberated through specific economic sectors in 2011. For instance, we see that health care and social assistance had an output estimate of $28.1 million and a jobs estimate of 313.

TABLE 6

ESTIMATED *INDIRECT* EFFECTS ON INDIVIDUAL SECTORS IN HAMPTON ROADS IN 2011

Industry	Output (in millions of $)	Jobs
Manufacturing	$55.0	166
Transportation and Warehousing	$28.9	307
Real Estate Rental and Leasing	$22.1	120
Finance and Insurance	$21.5	100
Professional, Scientific and Technical Services	$20.6	156
Administrative and Waste Management Services	$14.5	231
Construction	$12.5	129
All Other Industries	$32.0	247
Total (sum of all indirect economic effects)	**$207.0**	**1,456**

TABLE 7

ESTIMATED *INDUCED* EFFECTS ON INDIVIDUAL SECTORS IN HAMPTON ROADS IN 2011

Industry	Output (in millions of $)	Jobs
Real Estate, Rental and Leasing	$34.3	243
Health Care and Social Assistance	$28.1	313
Retail Trade	$20.1	282
Finance and Insurance	$17.0	76
Manufacturing	$11.2	39
Other Services Including Households	$9.8	120
Food Services and Drinking Establishments	$8.2	154
All Other Industries	$49.1	418
Total (sum of all induced economic effects)	**$177.8**	**1,645**

Summing Up The Importance Of Coal In Hampton Roads

Coal shipments have a considerable impact on the economy of Hampton Roads, accounting for more than $200 million in earnings and nearly 4,200 jobs in 2011 alone. The growth in coal movements over the past decade, when tonnage more than doubled from 20 million metric tons in 2002 to more than 47 million in 2011, also meant that this activity became increasingly important to our region's economy.

Even in the intermediate run, however, the outlook for coal-related activities in Hampton Roads appears mixed. The U.S. Energy and Information Administration (www.eia.gov) projects coal consumption in this country to grow by an average of 1.5 percent a year for at least the next 25 years. However, in the past few years, there has been a sharp decline in the proportion of electricity generated from coal and a significant increase in the proportion of electricity being generated from natural gas and other sources. According to the Energy Information Administration, coal production in the U.S. fell by 15.3 percent between 2008 and 2012; the decline was concentrated in the West, in states such as Wyoming, and in the East in the Appalachian corridor, the primary source of coal coming into the Port of Virginia.

Earlier this year, The Wall Street Journal carried the story "Coal Exports Plunge" (June 14, 2013), reflecting slacking demand in China, the world's largest consumer of coal. While exports do not claim a large percentage of U.S. coal production, the WSJ story noted that most exports of coal consist of metallurgical coal, which is more profitable to coal producers than thermal coal, most of which stays in the United States.

In any case, as Graph 6 divulges, coal's share in the generation of electricity in the U.S. also has fallen about 15 percent since 1998. Environmental concerns and the cost-effectiveness of natural gas are primarily responsible for this evolution.

It is reasonable to predict that coal will continue to decline in importance as a source of electrical power in this country. A senior executive at an electrical utility recently opined that he doubted that his utility would ever construct another generating facility using coal as a fuel. The Port of Virginia's prosperity, however, does not depend upon coal demand inside the United States. Instead, the primary destinations of coal shipments from the port are Europe and Brazil, and rapidly growing countries such as India, South Korea and Japan. Hence, the declining importance of coal in the U.S. may not impact the Port of Virginia's coal activities very much. Worldwide recession, however, would have a negative impact upon coal traffic exiting the United States from the Port of Virginia.

There are numerous other factors that will dictate how significant coal shipments will be to the future of Hampton Roads. How cost-competitive will our region's terminals remain relative to other facilities? Will the Port of Virginia realize benefits from dredging the Port of Virginia's channel to 55 feet (from the current depth of 50 feet)? This dredging would position our coal terminals favorably to handle larger vessels that will travel through both the Panama and Suez canals in the future.

GRAPH 6

SHARE OF U.S. ELECTRICITY GENERATED BY COAL, 1998-2012

Source: Mark Perry's Carpe Diem Blog, May 25, 2012, www.aei-ideas.org/channel/carpe-diem