SECTION 3 - COAL

Coal Markets – Electric Generation

- In 2008, Virginia's electric generators produced 47 percent of the electricity generated in Virginia from coal.
  - Twenty-five percent of the coal used to generate this electricity came from Virginia coal mines.
  - Substantial tonnage also came from Kentucky (38 percent) and West Virginia (16 percent).
  - The sources of coal fluctuate as the cost and availability of coal from Virginia and competing states change.

Table 3-1: Coal Used in Virginia Power Plants (Thousand Short Tons), 1995-2008[1]

Year	Coal Use at VA Power Plants	Virginia Coal Delivered to VA Power Plants	Percent from Virginia Mines
1995	14,454	4,423	30.6
1996	14,479	6,024	41.6
1997	15,346	6,197	40.4
1998	16,818	6,868	40.8
1999	12,932	7,078	54.7
2000	12,584	7,299	58.0
2001	19,647	5,402	27.5
2002	21,632	6,150	28.4
2003	21,118	5,942	28.1
2004	15,750	5,153	32.7
2005	18,314	6,501	35.5
2006	15,442	8,963	58.0
2007	20,212	9,201	45.5
2008[2]	15,511	3,883	25.0

[1] EIA, http://www.eia.doe.gov/cneaf/electricity/cq/cq_sum_backissues.html, June 29, 2010
[2] EIA, http://www.eia.doe.gov/cneaf/electricity/cq/cqaxlfile15_a.xls, June 29, 2010

Table 3-2: Source of Coal to Virginia Power Plants, 2007-2008

Destination Origin	Quantity (thousand tons)	Average Quality				Average Delivered Cost	
		Heat Value (Btu per pound)	Sulfur (percent by weight)	Sulfur (pounds per MMBtu)	Ash (percent by weight	(Cents per million Btu)	(Dollars per ton)
2007							
Virginia	**14,746**	**12,531**	**0.94**	**0.75**	**9.93**	**249**	**62.34**
Colorado	12	12,379	0.5	0.4	9	289	71.43
Kentucky	2,609	12,721	0.96	0.75	9.47	251	63.33
Ohio	316	11,680	0.54	0.46	7.97	257	59.95
Virginia	9,201	12,636	1.02	0.81	10.51	234	59
West Virginia	1,327	12,665	0.81	0.64	10.33	244	59.76
Imported	1,281	11,458	0.51	0.44	6.82	264	60.57
2008							
Virginia	**15,511**	**12,492**	**0.92**	**0.74**	**10.01**	**277**	**69.18**
Alabama	11	12,675	0.64	0.5	8.6	--	--
Colorado	226	12,193	0.56	0.46	9.6	264	64.26
Kentucky	5,913	12,697	1.06	0.84	9.42	269	68.25
Virginia	3,883	12,591	0.98	0.78	11.92	248	62.32
West Virginia	2,406	12,638	0.83	0.65	10.41	282	70.21
Imported	1,643	11,368	0.47	0.42	7.06	272	61.77
Unclassified	1,431	12,469	0.93	0.74	10.1	--	--

- Virginia coal operators also sell coal to electric utilities in states from Florida to New Hampshire and west to Indiana. Most steam sales are made to utility customers in Virginia, Georgia, North Carolina, and West Virginia

Table 3-3: Destination States for Virginia Coal (Thousand Short Tons)

Census Division and Destination State	2007	2006	2005	2004	2003	2002	2001	2000	1995	1990
Total	20212	19387	18314	15750	21118	21632	19647	19582	14454	17366
Virginia	9201	8963	6501	5153	5942	6150	5402	7299	4423	3488
Georgia	5674	5240	5288	5122	6453	5563	7075	5798	1987	3339
Tennessee	2202	2240	3016	2882	4236	4896	2700	1880	658	1223
North Carolina	1227	1494	1978	1867	1713	363	1505	702	3282	4345
West Virginia	816	-	198	50	12	29	18	17	-	-
Delaware	396	385	352	21	40	22	-	41	23	227
Mississippi	282	326	374	-	-	31	139	-	-	-
Florida	135	186	75	19	95	20	38	476	703	969
New Hampshire	102	361	144	157	70	328	-	-	19	-
Connecticut	47	-	-	-	68	-	-	-	-	-
New Jersey	43	-	-	-	1137	539	-	319	689	963
Maryland	39	17	58	33	60	206	-	7	394	21
Pennsylvania	39	9	10	21	19	-	-	-	-	-
Michigan	5	9	-	-	27	-	96	-	76	113
South Carolina	4	110	41	31	253	896	982	1078	1096	993
New York	-	46	142	-	-	-	-	-	-	-
Ohio	-	-	109	143	429	896	454	514	89	-
Indiana	-	-	18	251	529	1172	1065	707	1014	56
Kentucky	-	-	8	-	-	-	-	-	-	60
Massachusetts	-	-	-	-	25	-	-	-	-	1510
Wisconsin	-	-	-	-	-	-	25	62	-	59
District of Columbia	-	-	-	-	-	-	-	10	-	-
Alabama	-	-	-	-	9	218	148	671	-	-
Data are for electric generating plants with a total steam electric and combined name plate capacity of 50 megawatts or more.										
In some cases coal shipments include coal mined in other States but processed and loaded in Virginia, as well as coal mined in and shipped from Virginia.										

Coal Markets – Other Uses

- In a typical year, 25-30 percent of Virginia coal is sold domestically for manufacturing steel or making industrial steam.
- A small amount is sold domestically for institutional, commercial, and residential heating.

Table 3-4: Markets for Coal Shipped From Virginia[3]

Domestic Shipments of Virginia Coal (thousand short tons)			
	2000	1995	1990
Electric Utilities	16,372	14,632	15,892
Coke Plants	3,385	6,511	8,263
Industrial Plants (Other than Coke)	4,738	2,912	3,948
Residential and Commercial	113	187	137
Unknown Consumer Class	101	40	623
Total	24,785	24,283	28,862
Note: Data set was discontinued after 2000.			

- Virginia coal operators also sell coal in the European and Asian markets for steel manufacturing or electric generation.
    - Overseas tonnage varies greatly from year to year, depending on the competitiveness of Virginia coal as compared to Australian, South African, Polish, and South American coal.

Coal Prices

- Coal is priced separately in the steam and metallurgical coal markets.[4] Steam coal is generally lower in cost.
- Coal prices fluctuate over a considerable range as the international and domestic coal markets fluctuate due to changes in economic activity and demand for electricity and steel.
    - Steam coal prices have ranged from just under $23.92 dollars per short ton in 1999 to $51.45 in 2008.[5]
    - Metallurgic coal costs have ranged from $45.25 in March 2001 to a high of $151.18 in September 2009.[6]

[3] Compiled from the EIA, Annual Coal Report, http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html
[4] Metallurgical coal is used for making steel and generally has a higher energy value, lower ash, and higher volatility than steam coal.
[5] EIA, Annual Energy Review, Coal, Coal Prices, 1949-208, http://www.eia.doe.gov/emeu/aer/txt/stb0708.xls, May 11, 2010
[6] EIA, Average Cost of Metallurgical Coal, Priced at Coke Plants, and at Export Docks, January 2001- Latest Available, http://www.eia.doe.gov/cneaf/coal/page/coalnews/metcoalpricepost.xls, May 11, 2010

Table 3-5: Steam Coal Prices – Average Delivered Price ($/ton)[7]

Year	Electric Utilities	Other Industrial Plants
2000	$24.28	$31.46
2001	$24.68	$32.26
2002	$24.24	$35.49
2003	$25.82	$34.70
2004	$27.36	$39.30
2005	$31.22	$47.63
2006	$34.26	$51.67
2007	$36.06	$54.42
2008	$41.32	$63.44

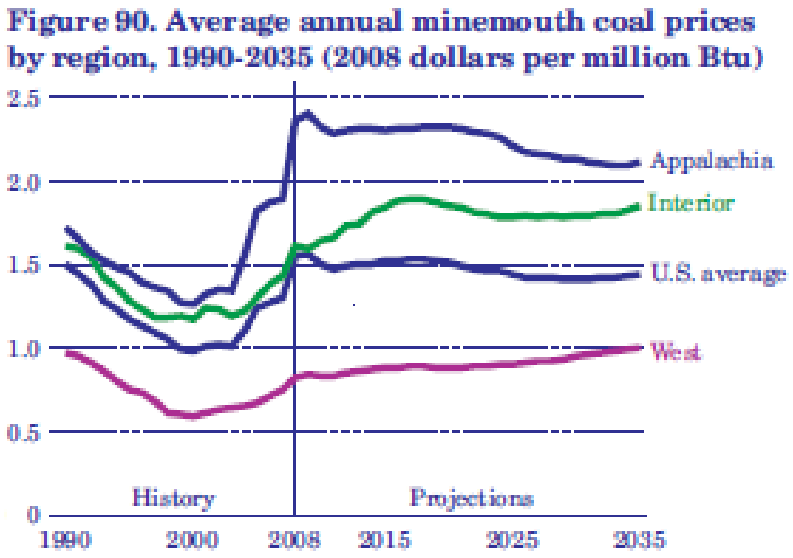
Table 3-6: Metallurgical Coal Prices – Average Delivered Price ($/ton)[8]

Year	Coke Plants and Export Docks
2001	$41.84
2002	$45.51
2003	$44.49
2004	$63.40
2005	$81.82
2006	$90.76
2007	$89.21
2008	$133.28
2009	$118.36

- The federal Energy Information Administration (EIA) estimates that average minemouth prices[9] for Appalachian steam coal, after peaking in 2009, will decline by 0.5 percent per year through 2035. The decline will be a result of falling demand for the region's coal and a shift to lower cost production in the northern part of the Appalachian basin.
- Metallurgical coal prices are projected to remain volatile based on international demand for steel.

[7] EIA, Annual Coal Reports, 2001-2008, http://www.eia.doe.gov/cneaf/coal/page/acr/acr_sum.html, June 23, 2010
[8] EIA, Average Cost of Metallurgical Coal, Priced at Coke Plants and at Export Docks, January 2001- Latest Available, http://www.eia.doe.gov/cneaf/coal/page/coalnews/metcoalpricepost.xls, June 23, 2010
[9] Mine mouth price is the price paid by a purchaser at the mine, without added transportation costs.

Figure 3-1: EIA Coal Price Forecast.[10]

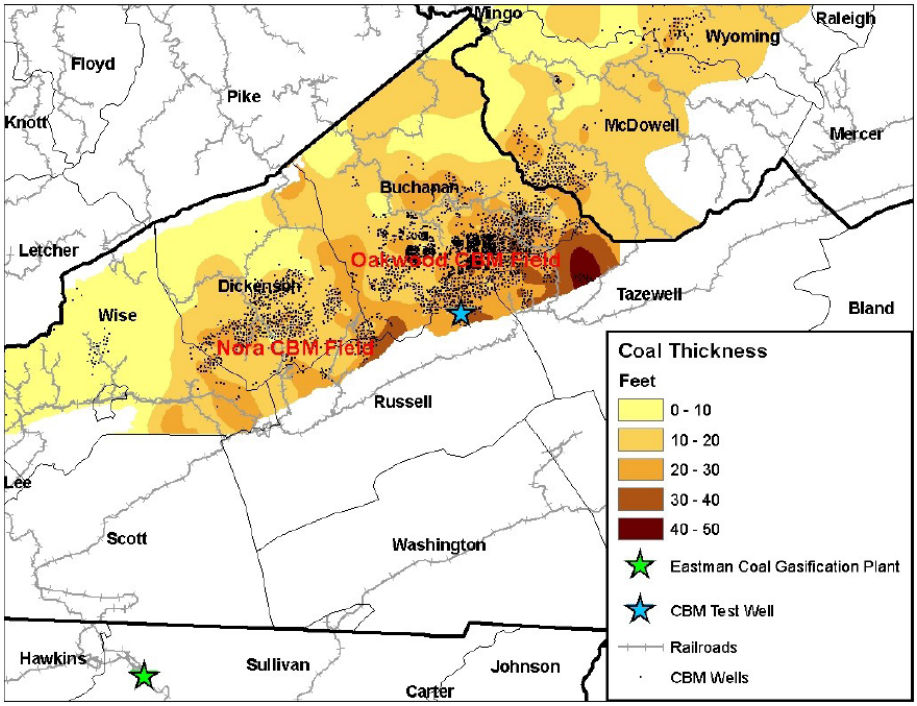


Future Use of Coal

- No source of electricity will be available within the next 10 years that can provide base-load power in the volume provided today by coal. Therefore, coal must continue to provide a large share of fuel for electric power generation over the term of this Plan.
- Use of Virginia coal should increase as the 585 megawatt Virginia City Power Station in Wise County comes on line. This increase may be offset as Dominion converts its 250 megawatt Bremo Power Station from coal to natural gas.
- Long-term use of coal in Virginia and elsewhere will be affected by the cost competitiveness of other fuel sources and whether federal legislation assigns new costs to coal use by capping or taxing carbon emissions.
- Increasing regulatory costs imposed by new federal administrative action will also increase the cost of coal, and therefore the cost of coal-fired electricity.
- Research and development of clean coal technologies is needed in anticipation of federal regulation of greenhouse gases.
    - Virginia has been testing carbon capture and storage as part of the Southeastern Carbon Sequestration Partnership (SECARB), including characterization of unminable coal seams for carbon sequestration and testing sequestration technology in Russell County.

[10] Annual Energy Outlook, Coal Forecasts, http://www.eia.doe.gov/oiaf/aeo/pdf/trend_5.pdf, May 11, 2010. The delivered price of coal ($/ton) = (Heating value of coal (Btu/lb) x Cost (¢/mmBtu)) / 50,000. Appalachian coal is equivalent to $26.00 per ton for every $1.00 per million Btus.

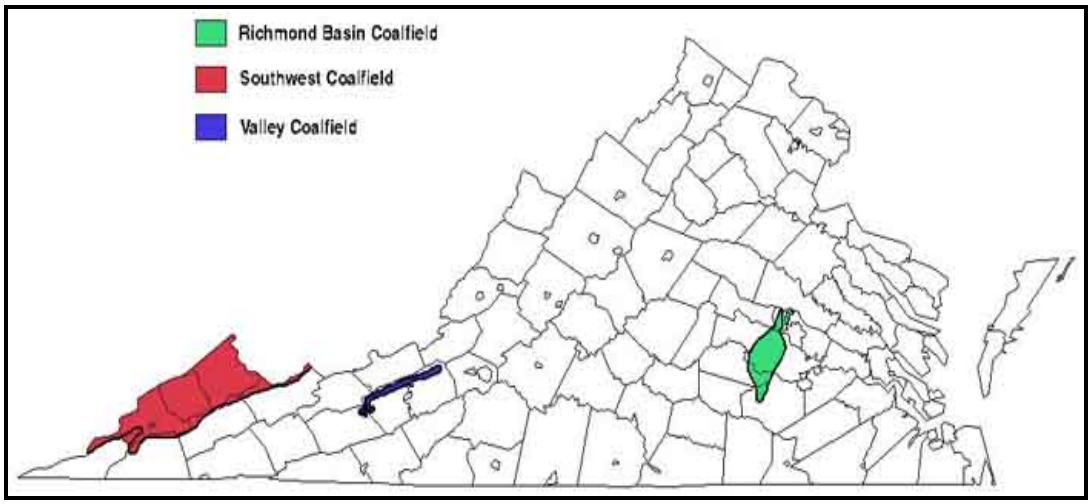
Figure 3-2: Location of Carbon Sequestration Test Well in Russell County, Virginia[11]



Coal Mining in Virginia

- Coal is mined in Virginia in the Southwest Virginia Coalfield.
- The last mining in the Valley Coalfield took place in the 1950s, and in the Richmond Coalfield in the 1920s.

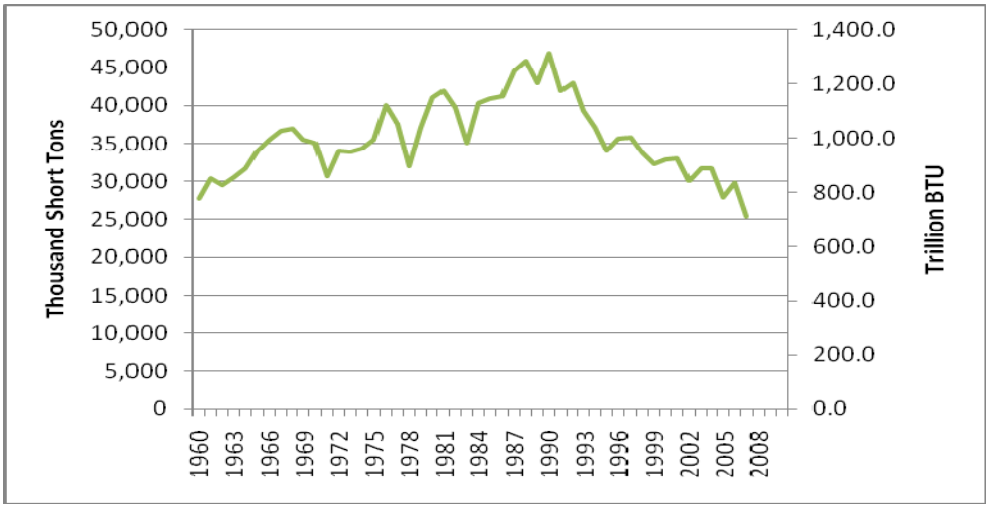
Figure 3-3: Virginia's Coalfields[12]



[11] Southeast Carbon Sequestration Partnership, Central Appalachian Coal Seam Project Fact Sheet, http://www.energy.vt.edu/secarb/index.asp, June 23, 2010
[12] VEPT, Existing Coal Fields, www.energy.vt.edu/vept/coal/basins.asp

- Virginia mining companies produced 24.7 million tons of coal in 2008.
- Production decreased an average of 2.5 percent per year over the last 10 years.

Figure 3-4: Virginia Coal Production, 1960–2008[13]



- Virginia's coal industry directly employed 4,394 people in 2008, down from over 6,000 in 1996.

Table 3-7: Virginia Coal Mining Employment[14]

Year	Number of Mines	Number of Coal Miners
1996	325	6,089
1997	355	6,534
1998	352	5,802
1999	361	5,456
2000	341	4,926
2001	327	5,261
2002	323	4,956
2003	295	4,353
2004	292	4,501
2005	265	4,764
2006	269	4,782
2007	252	4,358
2008	261	4,394

[13] VEPT, Summary of Coal Production and Employment, http://www.energy.vt.edu/vept/coal/coal_prod_eia.asp
[14] VEPT, Production and Employment Data by Mine Size (Coal), www.energy.vt.edu/vept/coal/minesize.asp

- Some of these reductions are the result of mine technology increasing mine productivity, while other reductions are the result of drops in tonnage mined.
- Virginia produces the majority of its coal from underground mines.[15].
  - In 2008, 64 percent of coal mined in Virginia came from underground mines.
  - The percentage of surface mined coal has increased in recent years, from 16 percent in 1990, to 25 percent in 1998, and to 36 percent in 2008.
  - The percentage of coal mined from surface sites is expected to decrease over the next 10 years as the larger areas of surface reserves are mined out.
- There has been a trend towards consolidation of coal ownership.
  - Nationally, there are fewer small operators, with a higher percentage of mine production attributable to a few large operators.
  - The top five companies produce more than 50 percent of the coal mined in the United States 2008.

Table 3-8: Top 20 Coal Producers in the United States, 2008[16]

Rank	Controlling Company Name	Production (thousand short tons)	Percent of Total Production
1	Peabody Energy Corp	200,752	17.1
2	Rio Tinto Energy America	140,818	12.0
3	Arch Coal Inc	134,017	11.4
4	Foundation Coal Corp	69,366	5.9
5	CONSOL Energy Inc	63,806	5.4
6	Massey Energy Co	40,151	3.4
7	Patriot Coal Corp	33,317	2.8
8	NACCO Industries Inc	29,554	2.5
9	Westmoreland Coal Co	29,275	2.5
10	Peter Kiewit Sons Inc	28,198	2.4
11	Alliance Resource Operating Partners LP	26,395	2.3
12	Murray Energy Corp	26,059	2.2
13	Energy Future Holdings Corp	23,307	2.0
14	Alpha Natural Resources LLC	20,879	1.8
15	Intl Coal Group Inc (ICG)	18,340	1.6
16	BHP Billiton Ltd	15,952	1.4
17	Chevron Corp	10,976	0.9
18	PacifiCorp	10,884	0.9
19	James River Coal Co	10,583	0.9
20	Level 3 Communications	10,559	0.9

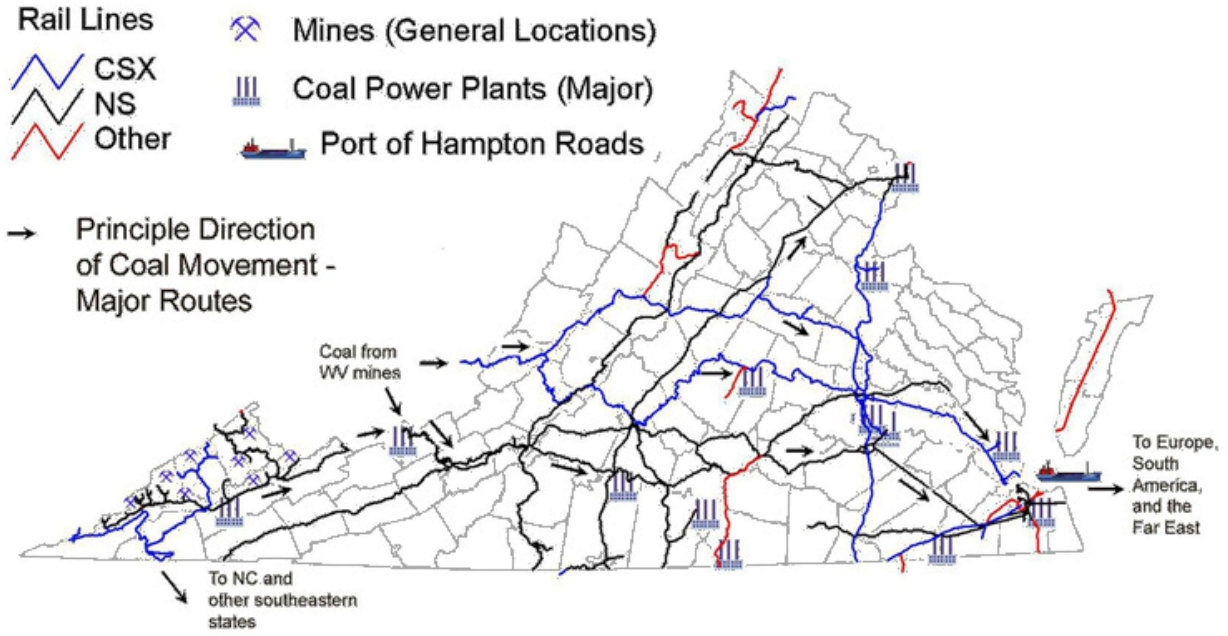
[15] EIA, Coal Production Reports, http://www.eia.doe.gov/fuelcoal.htm , May 10, 2010
[16] EIA, Major Coal Producers, http://www.eia.doe.gov/cneaf/coal/page/acr/table10.htm , May 10, 2010

- In Virginia, production is predominately (70 percent of mining operations) from small operations (36 employees on average) mining remnant or finite reserves using the room and pillar mining method.
- Coal mining companies pay severance taxes of 2 percent of the value of the coal extracted to the county where the mine is located, as well as personal property and other local taxes.
    - Minerals taxes account for over 40 percent of Buchanan County's local government revenue[17], with similar amounts supporting Dickenson and Wise Counties.

Infrastructure

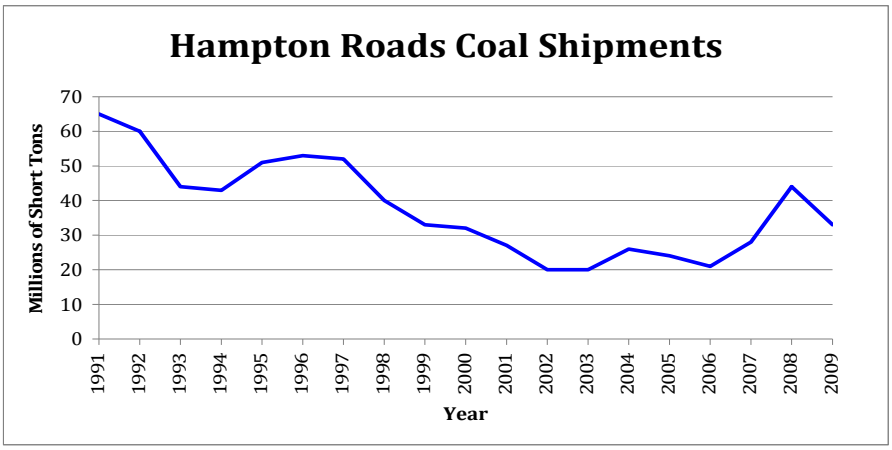
- Most Virginia coal is shipped from mines to preparation plants and rail load outs by truck, then to market and ports by rail.
- Coal transportation is a revenue center for Virginia's railroads, and thereby supports maintenance of Virginia's rail transportation infrastructure.
- Virginia coal is exported from terminals in the Port of Hampton Roads.
    - The port serves as an export point for Virginia, West Virginia, and Kentucky coal.
    - The markets for this coal include electric generators located close to East Coast shipping lanes and overseas electric utilities and steel manufacturers.

Figure 3-5: Map of Coal Transportation Network[18]



[17] Testimony from Buchanan County representatives before the Senate Committee on Agriculture, Conservation and Natural Resources, February 2010, at the public hearing on Senate Bill 564.
[18] VEPT, http://www.energy.vt.edu/vept/coal/virginiacoal.asp, June 28, 2010

Figure 3-6: Coal Shipments from Port of Hampton Roads, 1990–2009[19]



Coal Facility Siting Requirements

- It has become increasing difficult to develop sites for coal mines as EPA and other federal agencies tighten regulations over surface mining.
- Water quality is a critical issue related to permitting and operating coal mining. Additional controls will be needed to address water quality discharges from surface mines and as TMDLs are implemented in streams near coal mines.
- As discussed in the electricity section, it will become more difficult to permit new coal-fired generation plants if plant operators must address carbon controls in permitting proceedings.
- Coal ash management rules are becoming stricter.
    - The EPA issued proposed rules in May 2010 to require use of liners and groundwater monitoring in coal ash fills and transition to dry ash disposal.
    - Any future federal designation of coal ash as a hazardous waste would significantly increase the cost of ash disposal and could eliminate alternate uses such as concrete block and sheetrock.

[19] Virginia Energy Patterns and Trends: Coal Shipments from the Port of Hampton Roads, www.energy.vt.edu/vept/coal/basins.asp and the Port of Hampton Roads.