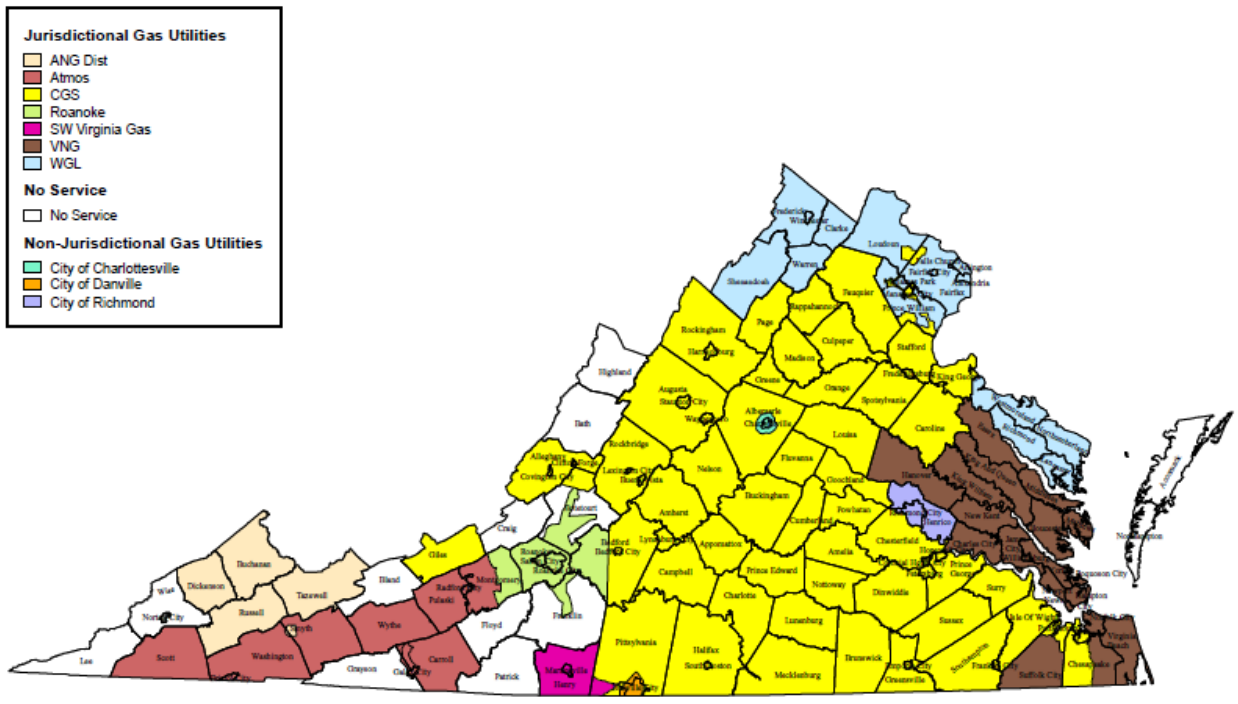
SECTION 5 - NATURAL GAS

Virginia's Natural Gas Providers

- Natural gas is used as an industrial fuel to heat and cool homes and businesses, to generate electricity, and for transportation.
- Natural gas is transmitted from production areas to population centers through transmission pipelines and distributed to end users by local distribution utilities (also called LDCs or Local Distribution Companies).
- Ten natural gas LDCs in Virginia serve customers in assigned territories.
    - Investor-owned LDCs include Columbia Gas of Virginia, Washington Gas, Virginia Natural Gas, Roanoke Gas, Atmos Energy, Appalachian Natural Gas Distribution Company, and Southwestern Virginia Gas Company.
    - Municipal LDCs include the Cities of Richmond, Charlottesville, and Danville.
- LDCs primarily sell gas to the residential and commercial markets. Large natural gas users have been able to contract directly for natural gas purchases under Federal Energy Regulatory Commission rules.
- The LDCs serve approximately 37 percent of households and 90,000 commercial natural gas customers.
- The LDCs operate approximately 20,000 miles of distribution pipelines.

Figure 5-1: Service Areas of Virginia Natural Gas Distribution Companies[1]



[1] State Crporation Commission, http://www.scc.virginia.gov/pue/gas/map.aspx. June 23, 2010.

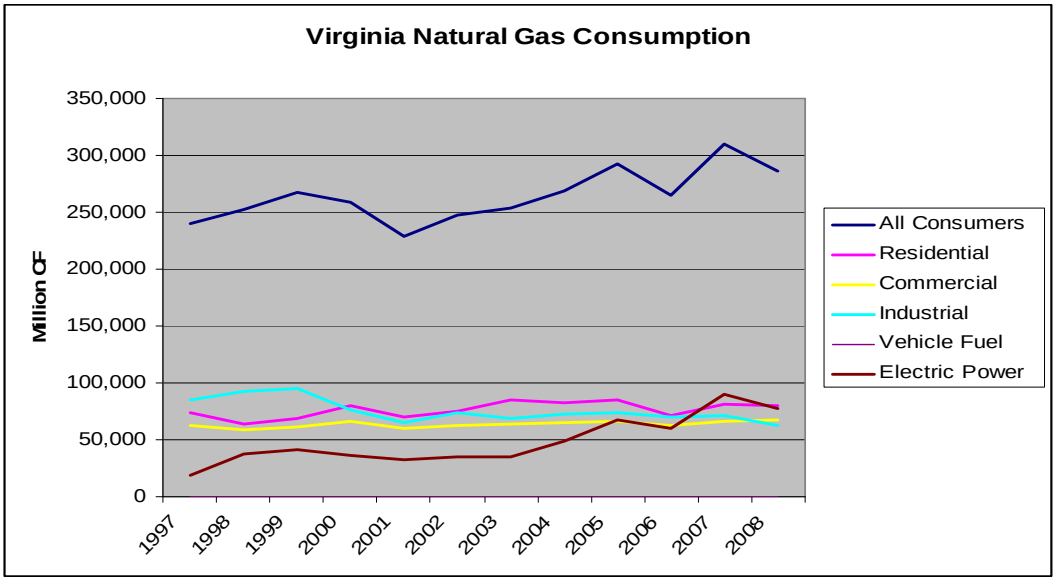
Natural Gas Consumption

- In 2008, Virginia consumers used 286.4 billion cubic feet (BCF) of natural gas. An additional 13 billion cubic feet was consumed for lease and pipeline operations.
- Natural gas use increased on average by 0.8 percent per year over the last decade. Growth was primarily attributable to new customer growth and use of natural gas for electric generation.
- The growth pattern changed and demand dropped by nearly 6 ½ percent from 2007 and 2008 primarily attributable to the economic downturn and warmer than normal winter weather.

Table 5-1: Natural Gas Consumption, 1997-2008 (million cubic feet)[2]

Year	All Consumers	Residential	Commercial	Industrial	Vehicle Fuel	Electric Power
1997	240,244	73,905	61,895	85,264	142	19,038
1998	252,233	63,186	58,283	92,801	154	37,808
1999	267,269	69,189	61,516	95,141	193	41,230
2000	258,975	79,701	66,098	76,263	212	36,700
2001	228,407	70,249	59,809	65,231	263	33,118
2002	247,351	75,476	62,699	73,973	268	34,936
2003	254,009	85,330	64,004	69,090	328	35,256
2004	268,307	82,755	64,518	72,250	368	48,784
2005	291,885	85,355	65,838	73,741	158	66,951
2006	264,786	71,693	62,352	70,420	168	60,321
2007	309,711	80,957	66,444	71,736	154	90,573
2008	286,355	79,725	67,006	62,642	177	76,983

Figure 5-1: Natural Gas Consumption



[2] EIA. Natural Gas Navigator. http://www.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_SVA_a.htm. June 23, 2010

- Natural gas consumption in Virginia should grow over the next ten years.
    - Dominion has included construction of six new natural gas fired generation plants through 2020 in its Integrated Resource Plan.
    - Non-utility producers may also construct new natural-gas fired plants to serve Dominion and other electricity markets.
    - Additional retail consumers will hook up to natural gas distribution systems as Virginia's population grows.
    - Transportation uses may increase demand for natural gas. Natural gas is an efficient fuel for fleet uses such as school bus, public transit, and local fleet services. This use may create new markets for Virginia natural gas.

Virginia's Natural Gas Utility Regulatory Structure

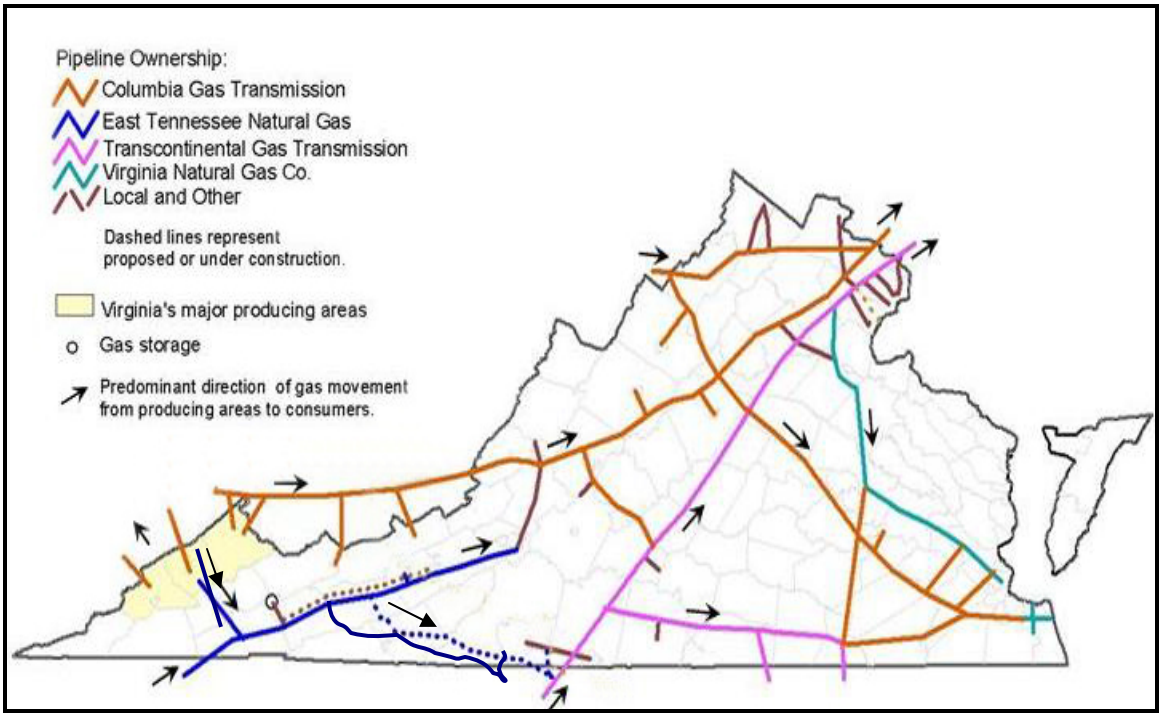
- Under traditional rate regulation, LDCs, in response to being given a monopoly service area, are required to offer service at just and reasonable rates and are limited to earn a maximum rate of return set through rate cases before the State Corporation Commission (SCC).
- Starting in 2000, LDCs were authorized to offer all customers direct access to natural gas suppliers, called retail supply choice.
    - Washington Gas and Columbia Gas offer this choice to all customers.
    - In 2008, 7.9% of eligible residential customers and 22.5 percent of eligible commercial customers participated in the choice programs.[3]
- LDCs have the opportunity to enter into performance-based ratemaking (PBR) agreements that allow higher rates of return on meeting performance standards. Columbia Gas, Virginia Natural Gas and Washington Gas have used SCC approved PBR plans.
- Natural gas LDCs are authorized to undertake Conservation and Ratemaking Efficiency (CARE) programs to decouple earnings from the volume of gas sold. Rate decoupling is conditioned upon adoption of an SCC approved plan for promoting and investing in conservation and efficiency by the company's customers.
    - As of summer 2010, Virginia Natural Gas and Columbia Gas have implemented CARE plans.
- Virginia enacted the Steps to Advance Virginia's Energy Plan (SAVE) program in 2010 to provide timely cost recovery for large-scale replacement of aging local distribution pipeline infrastructure.

[3] EIA. Retail Unbundling Virginia. http://www.eia.doe.gov/oil_gas/natural_gas/restructure/state/va.html. May 16, 2010.

Natural Gas Transmission

- Natural gas consumed in Virginia come from three main sources:
  - The Gulf of Mexico and other southern supply sources through the Transco natural gas transmission pipeline;
  - Virginia and other Appalachian natural gas production through the Spectra pipeline system in Southwest Virginia and the Columbia Gas Transmission pipeline system through West Virginia to Northern Virginia; and
  - The Cove Point Liquefied Natural Gas (LNG) import facility in Maryland through the Dominion/Virginia Natural Gas pipeline serving Eastern Virginia.
- There are approximately 2,950 miles of natural gas transmission pipelines in Virginia.

Figure 5-3: Major Natural Gas Pipelines in Virginia[4]

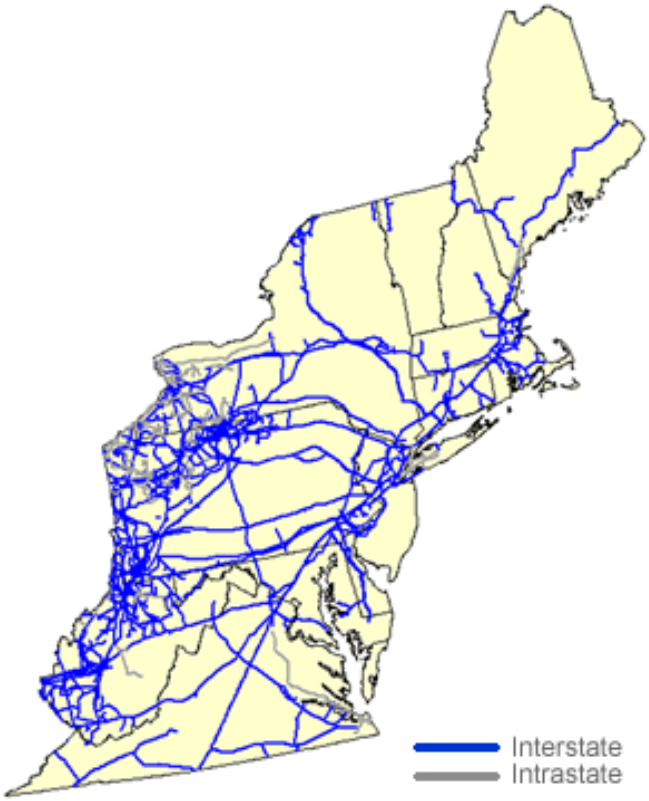


[4] Modified from VEPT. Major Natural Gas Pipelines. http://www.energy.vt.edu/vept/naturalgas/NG_pipelines.asp. June 23, 2010

Table 5-2: Principal Natural Gas Pipeline Companies Serving the Virginia[5]

Pipeline Name	Principal Supply Source(s)
Interstate & Importing Pipelines	
Columbia Gas Transmission Co	Southwest, Appalachia
Dominion Cove Point LNG LP	LNG Imports, Interstate System
Dominion Transmission Corp	Southwest, Appalachia
East Tennessee Natural Gas Co	Interstate System
NORA Gas Transmission Co	Interstate System
Transcontinental Gas Pipeline Co	Southwest
*Intrastate Pipelines***	
Virginia Natural Gas Co	Interstate System

Figure 5-4: Northeast Region Natural Gas Pipeline Network



- Natural gas companies have added new pipeline capacity across the state in recent years, including:
    - Virginia Natural Gas' HRX pipeline that provided a third pipeline water crossing in Hampton Roads;

[5] The pipeline table and following two pipeline figures are taken from EIA. About US Natural Gas Pipelines. http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/northeast.html. June 23, 2010

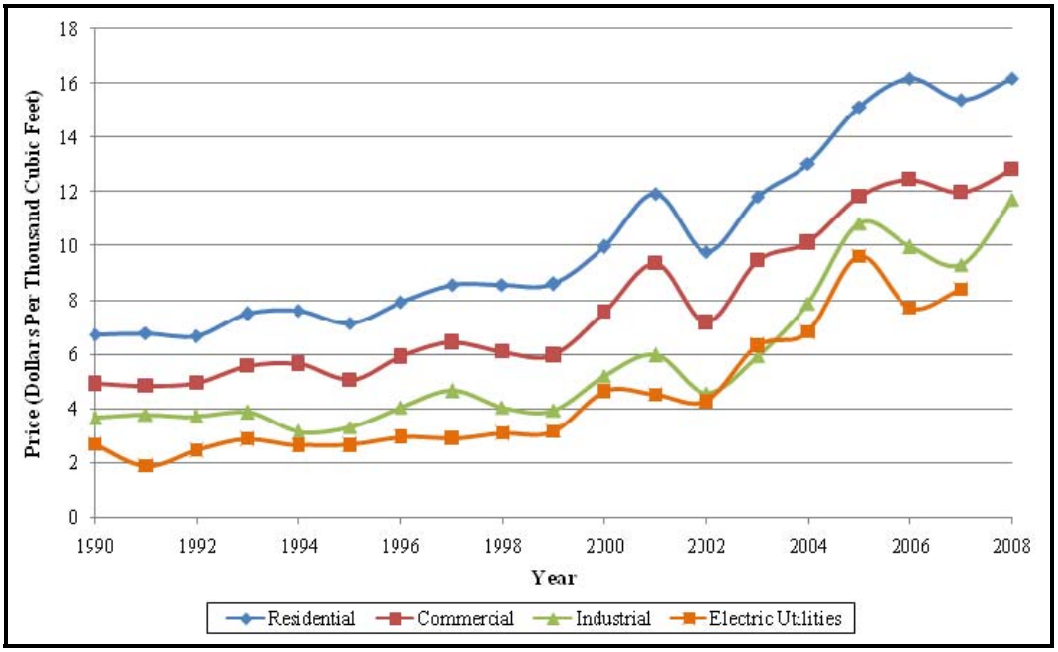
- Spectra's Patriot Line from the East Tennessee Line to Southside Virginia and North Carolina; and
- Spectra's Jewell Ridge Pipeline to deliver natural gas from Virginia's gas production areas to the East Tennessee line and Saltville natural gas storage facility.

- Spectra is adding additional pipeline capacity to the East Tennessee Pipeline to serve a new gas-fired power plant TVA is constructing near the Virginia border.

Natural Gas Prices

- Virginia's residential consumers paid on average $16.20/thousand cubic feet (MCF) in 2008. Commercial customers paid on average $12.98/MCF, industrial consumers paid on average $11.49/MCF, and utilities paid on average $10.87/MCF.

Figure 5-6: Average Natural Gas Price by Sector[6]



- Natural gas prices in Virginia have traditionally been higher than in producing sections of the country, such as the Southeast and Rocky Mountain areas.
- The higher price is largely attributable to the need to transport the natural gas long distances to Virginia.
- This cost structure may change as new production comes on line from the Marcellus shale deposits in the East that have lower transportation costs.

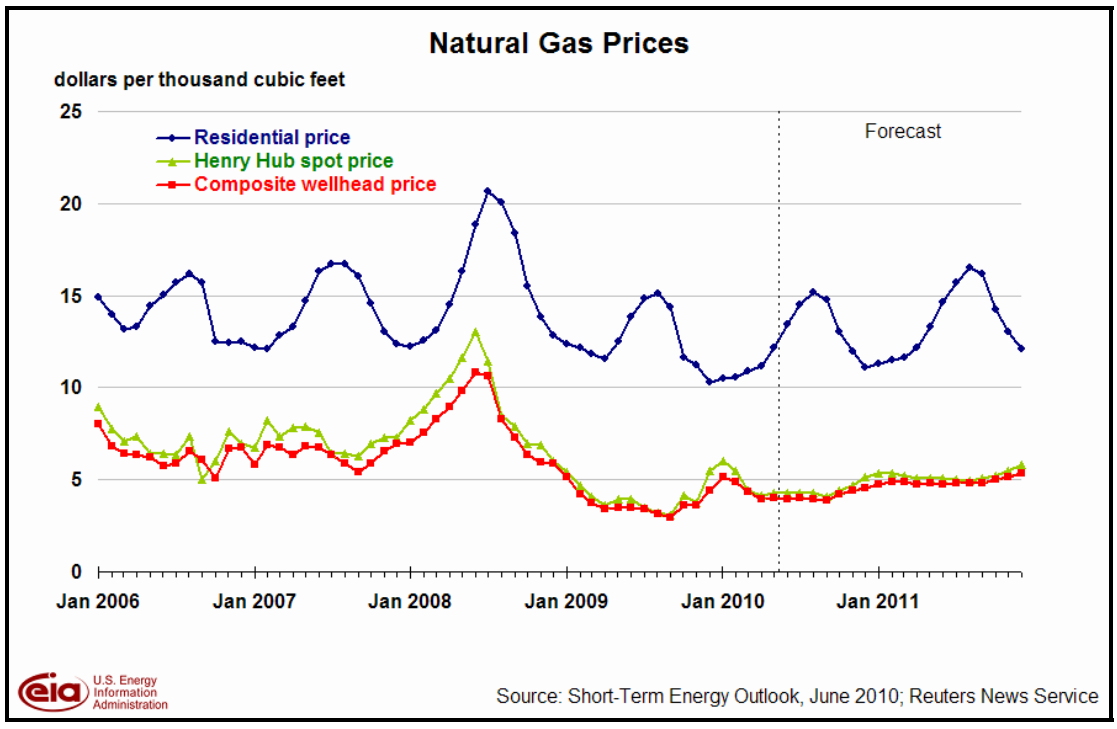
[6] VEPT. Natural Gas and Coal Bed Methane Average Price by Sector. http://www.energy.vt.edu/vept/naturalgas/price_chart.asp. June 23, 2010

Table 5-3: US Regional Natural Gas Prices

Sector/Region	2007	2008	2009	2010
Residential				
New England	16.5	17.29	16.77	15.58
Middle Atlantic	15.01	16.2	14.92	13.8
East North Central	11.62	12.71	10.73	10.28
West North Central	12.04	12.11	10.33	9.95
South Atlantic	16.45	16.91	15.09	14.69
East South Central	14.12	14.9	13.17	12.07
West South Central	12.35	13.7	11.69	11.35
Mountain	10.93	11.24	10.35	9.59
Pacific	11.98	12.77	10.37	10.26
U.S. Average	13.08	13.89	11.97	11.42

- The DOE EIA predicts natural gas prices will remain stable over the next 10 years, estimating that the average delivered price for natural gas in the United States will be $10.61/thousand cubic feet for all end users.[7]

Figure 5-7. EIA Natural Gas Price Projection



[7] EIA, Annual Energy Outlook 2010. Natural Gas Supply, Disposition, and Prices. http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_13.xls. May 16, 2010.

Efficiency and Conservation

- Natural gas is more efficient as a direct fuel for uses such as heating and transportation than when it is burned as a fuel to generate electricity for those uses. Providing for direct use of natural gas can improve overall energy efficiency of energy use in the Commonwealth.
- Local distribution natural gas utilities must include plans to promote and invest in natural gas conservation and efficiency as part of Conservation and Ratemaking Efficiency (CARE) alternate ratemaking plans. As of summer 2010, Virginia Natural Gas and Columbia Gas have implemented CARE conservation and efficiency programs for their customers.
- Other local distribution natural gas utilities have implemented conservation and efficiency programs for their customers outside of the CARE program, such as the City of Richmond's online home energy audit and Washington Gas' energy efficiency and safety program.
- Virginia has included natural gas appliances and equipment in its energy efficiency rebate programs funded through ARRA grants. Customers are receiving rebates to replace old, less efficient appliances and equipment with more efficient, Energy Star appliances and equipment to reduce future natural gas bills.

Natural Gas Production

- Virginia's natural gas exploration and production companies produced 128.5 billion cubic feet of natural gas from 6,428 wells in 2008.
    - This amount is equal to 43 percent of the natural gas consumed in Virginia in 2008.
    - Approximately 80 percent of Virginia natural gas production is from coalbed methane wells. The remaining 20 percent is produced from shale formations located below the coal seams in Southwest Virginia.

Figure 5-8: Appalachian Basin Coalbed Methane Formations

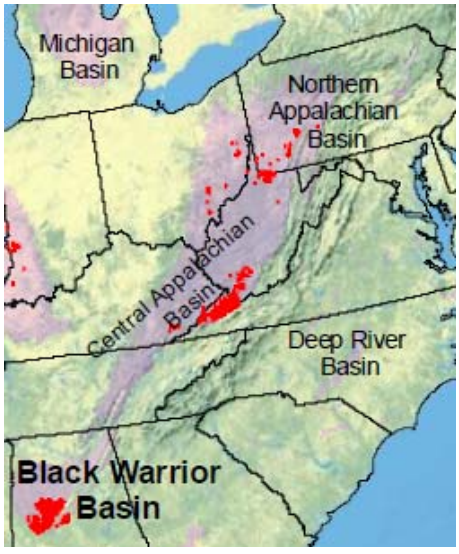
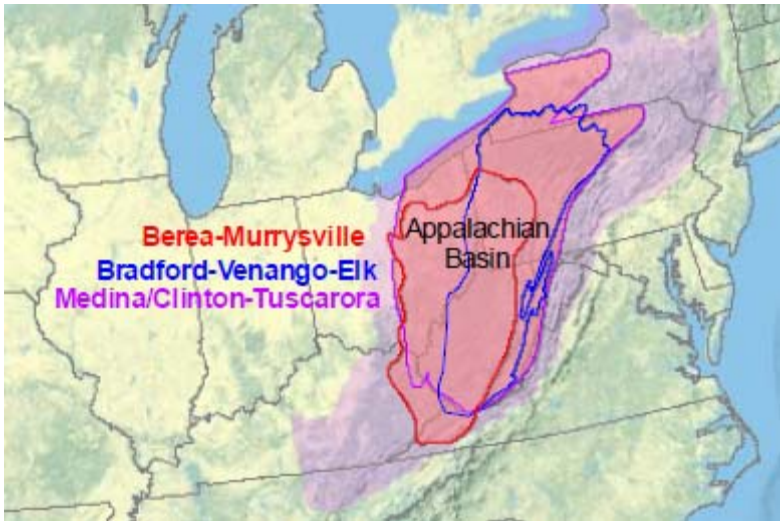
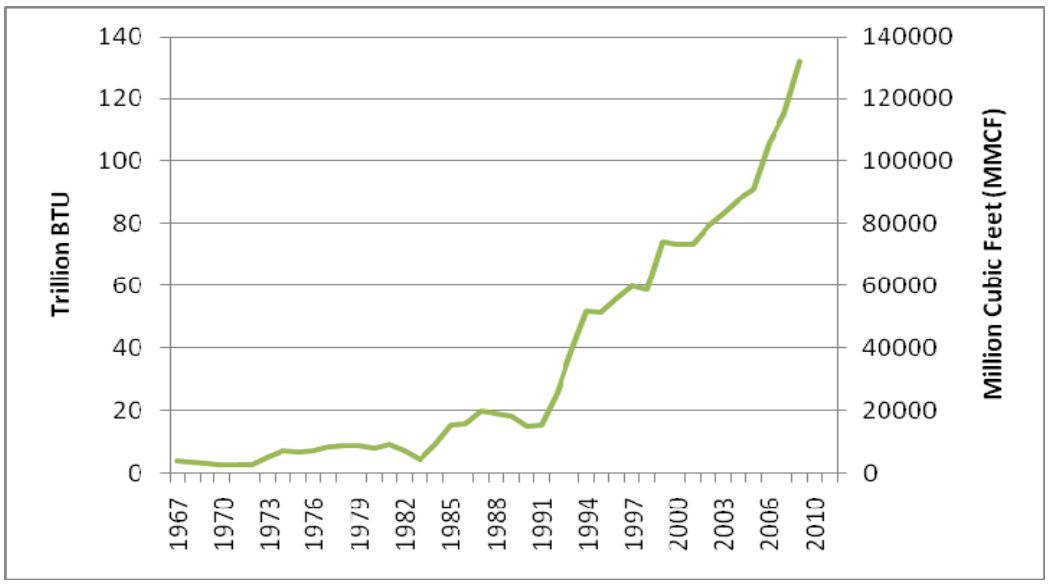


Figure 5-9: Appalachian Basin Natural Gas Shale Formations



- Virginia natural gas production has increased by an average of 12.4 percent per year over the last 10 years. Most of the increase has been from expanded coalbed methane production in Buchanan, Wise, and Dickenson Counties.[8]
- Virginia ranked 16th highest of the 32 states with natural gas production in 2008.

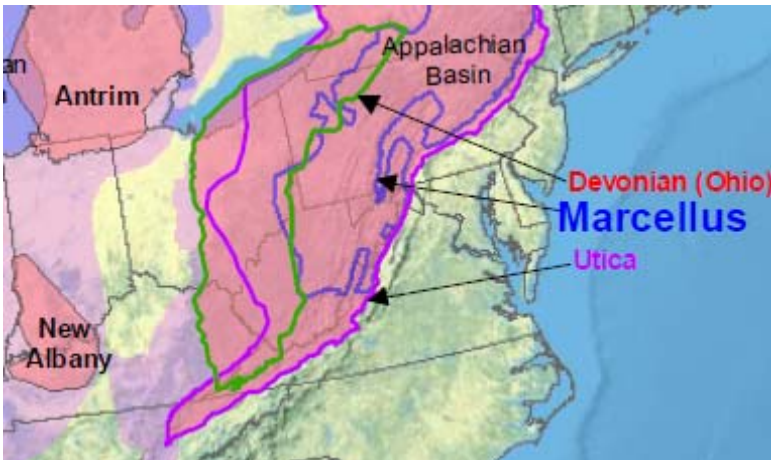
Figure 5-10: Natural Gas Production in Virginia, 1967–2008[9]



[8] VEPT. Gas Production By County. http://www.energy.vt.edu/vept/naturalgas/gas_county.asp
[9] VEPT. Virginia Total Historic Gas Production. http://www.energy.vt.edu/vept/naturalgas/historic_production.asp

- Production may increase if the Marcellus Gas formation in Virginia is able to produce marketable quantities of natural gas.

Figure 5-11: Marcellus Shale Formations



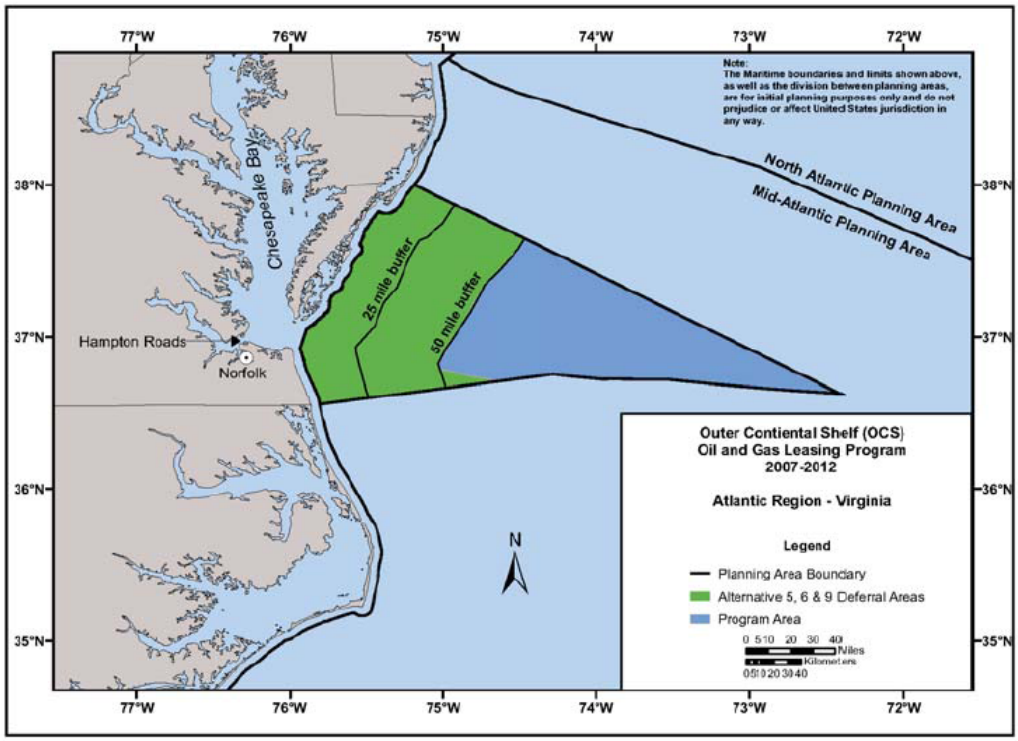
- Natural gas produced in Virginia is collected in gathering pipeline systems. These systems include low pressure pipelines from wells to compression facilities where the gas is cleaned and compressed. After being compressed, the gas is fed into the interstate pipeline network where it is delivered to customers.
- Natural gas produced in Virginia is sold in Tennessee, Southwestern Virginia, and Northeastern states because there is limited pipeline capacity to deliver the gas from Southwestern Virginia to the Central and Eastern Virginia markets.
- The capacity to deliver Virginia natural gas to the Northern, Central, and Hampton Roads regions of Virginia increased with the connection of the Spectra Patriot Pipeline to the Transco interstate pipeline.
- Natural gas producers can serve up to 35 customers and public schools in areas not located in a local natural gas distribution company service territory, allowing customers in Southwest Virginia not covered by a public utility to receive natural gas service.
- Prices for Appalachian region natural gas have stayed in the high $3 to low $4/thousand cubic feet range in 2010. The Dominion South hub price was $4.42 for the week of May 15, 2010.[10]. Future prices will depend on factors such as demand, price of oil, and regional natural gas production levels.
- As shown in Figure 5-7 above, the EIA projects natural gas wellhead prices will increase annually over the next decade, increasing from $4.06/thousand cubic feet in 2010 to $7.18 in 2020.[11]

[10] NTI Weekly Natural Gas Price Index, Firm Physical Natural Gas Price Bulletin History, For Natural Gas Delivered at Dominion-South. http://intelligencepress.com/features/intcx/gas/intcx_gas_point.emb?pointcode=ICENEACNG. May 16, 2010
[11] EIA, Annual Energy Outlook 2010. Natural Gas Supply, Disposition, and Prices. http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_13.xls. May 16, 2010.

Offshore Natural Gas

- There is an estimated 1.66 trillion cubic feet of natural gas reserves in federal waters in the Virginia administrative boundary areas offshore Virginia.
- The value of natural gas in the Virginia offshore administrative boundary areas could total more than $10 billion (1.66 trillion cubic feet at $6/thousand cubic feet).
    - The value will depend on the actual amount of recoverable resources and the cost of gas.
    - Offshore natural gas production would support infrastructure expansion in Hampton Roads, attracting new business and creating jobs in the supply chain and exploration and production.
- Developing offshore natural gas resources is dependent on an extensive federal lease sale and permitting process.
- Offshore extraction will need to be compatible with Department of Defense operations in Virginia offshore waters. Federal-state cooperation can lead to developing a compatible exploration and production plan.
- The Bureau of Ocean Energy Management, Regulation and Enforcement (formally Minerals Management Service) has suspended offshore leases until the causes of the 2010 Deepwater Horizon accident and oil spill are better understood and suitable protections are put in place.

Figure 5-9: 2007-2012 Mid-Atlantic OCS Proposed Lease Area[12]



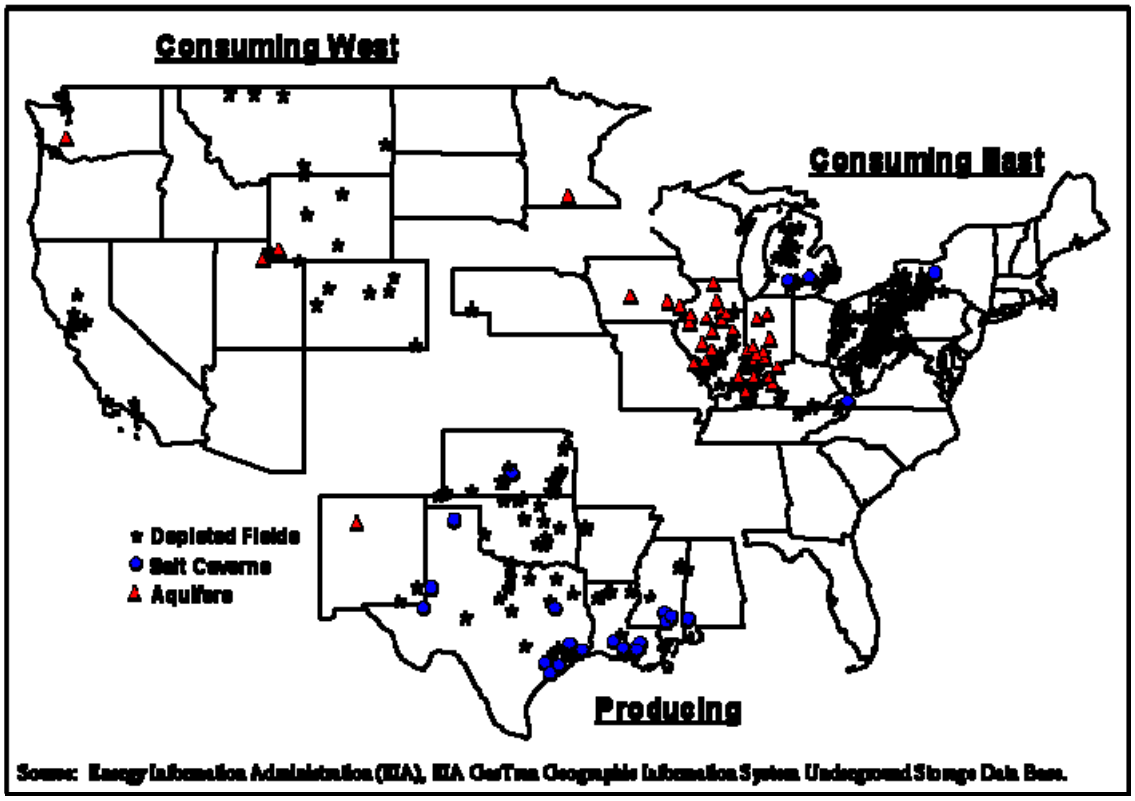
[12]Source: U.S. Department of the Interior, MMS, *Proposed Final Program of the Outer Continent Oil and Gas Leasing Program, 2007–2012*, April 2007, map 9, p. 68.

- Virginia's coastal regions may hold producible methane hydrate resources if the technology is developed to produce the methane hydrates from geologic formations found offshore Virginia. The technology to produce these resources is not expected to be developed in the 10-year term of this Plan.

Natural Gas Storage

- Virginia is home to two underground natural gas storage facilities, the Spectra salt cavern storage facility in Saltville and Early Grove underground storage field in Scott and Washington Counties.
- Other underground natural gas storage services available to Virginia utilities and consumes are located in West Virginia, Pennsylvania, and Ohio. Dominion is one of the largest operators of these underground natural gas storage facilities.

Figure 5-12: Underground Natural Gas Storage Facilities



- Virginia LDCs operate peaking natural gas storage facilities near their local distribution networks.
    - These facilities include compressed natural gas tanks, liquefied natural gas tanks, and one underground propane storage cavern.
    - Companies store gas in these facilities when demand is low and inject gas into the pipeline system during times of peak demand.

Adequacy of Supply

- Natural gas production in the coalfield region should rise incrementally as producers continue to drill new coalbed methane and conventional shale wells in Southwest Virginia.
- Virginia's natural gas reserves were estimated in 2008 to be 2,378 billion cubic feet.[13] Given current removal rates, this reserve would support production for about 20 years.[14]
- Additional reserves and production are available in the Marcellus Shale areas west of the Shenandoah Valley and offshore.
- A growing amount of out of state supply is available from shale production areas in Pennsylvania, West Virginia, and elsewhere.
- The federal Energy Information Administration predicts there should be adequate supplies from new domestic production for expanded uses of natural gas.[15]
- Disruptions in Gulf of Mexico supply or interstate transmission pipelines will affect multiple states including Virginia. States will need to work with the federal Department of Energy to coordinate responses to supply disruptions.

[13] EIA. Advance Summary: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 2007 Annual Report. http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/advanced_summary/current/adsum.pdf

[14] This annual natural gas removal rate is based on a three-year average rate of production for the years 2006–2008 based on VEPT numbers.

[15] EIA. Annual Energy Outlook, 2010. http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2010).pdf. May 16, 2010.