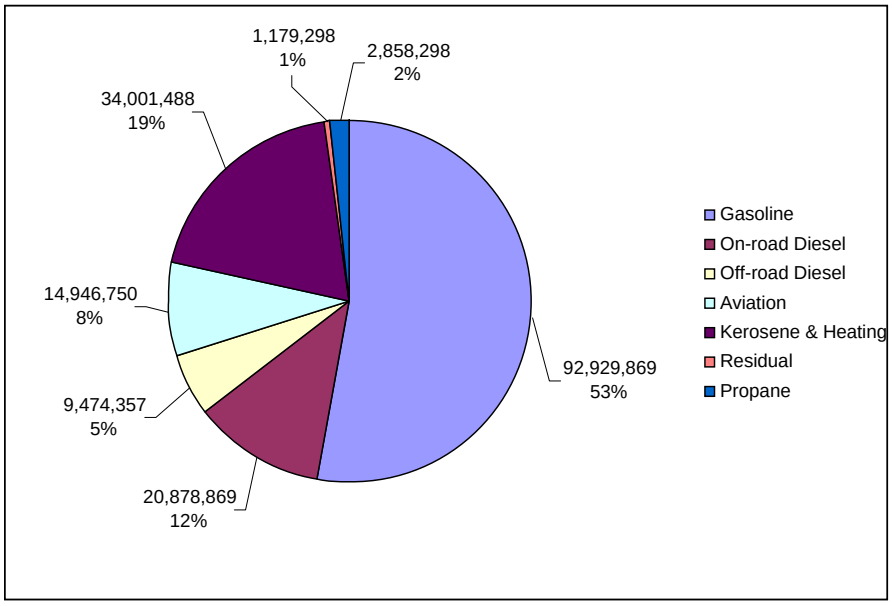
SECTION 7 - PETROLEUM

Petroleum Consumption

- Petroleum is used primarily to fuel transportation (65 percent) and as heating oil (20 percent). Smaller amounts are used for aviation (8 percent) and off-road use (5 percent). Use of propane accounts for the remaining two percent.

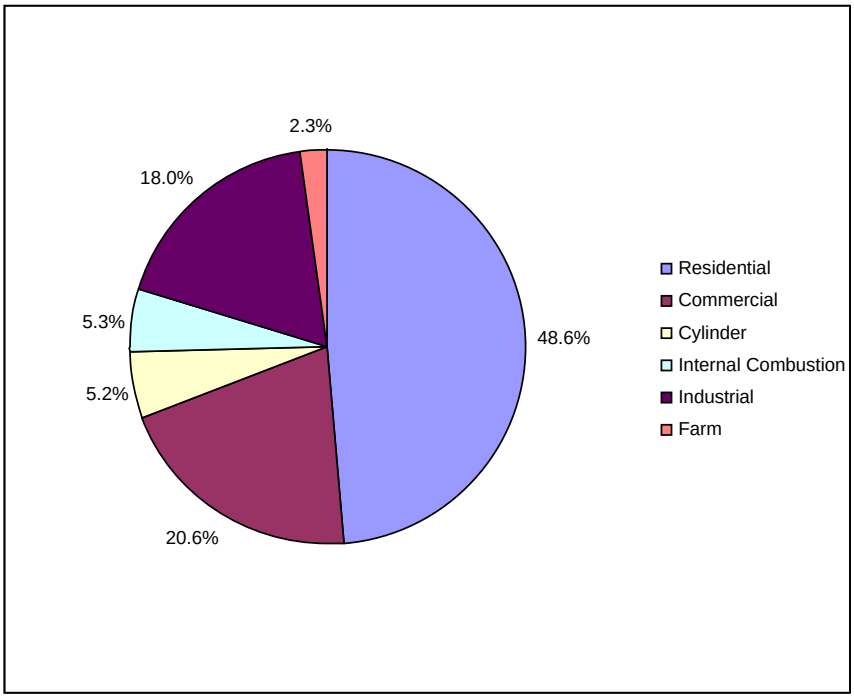
Figure 7-1: Petroleum Consumption, 2008[1]



- Petroleum use grew on average one percent per year from 1989 through 1998. Use has been stabile since 1999 as vehicle miles traveled stabilized and the oldest, low-mileage vehicles aged out of the fleet.
- Virginians used approximately 219.8 million gallons of propane in 2008. [2]
    - This was 2.21 percent of the propane used nationwide.
    - The 2000 U.S. Census reports that 5.1 percent of households in Virginia use propane or bottled gas for space heating.

[1] U.S. Energy Information Administration, http://tonto.eia.doe.gov/dnav/pet/PET_CONS_PRIM_DCU_SVA_A.htm
[2] Source: American Petroleum Institute

Figure 7-2: Propane Consumption, 2008[3]



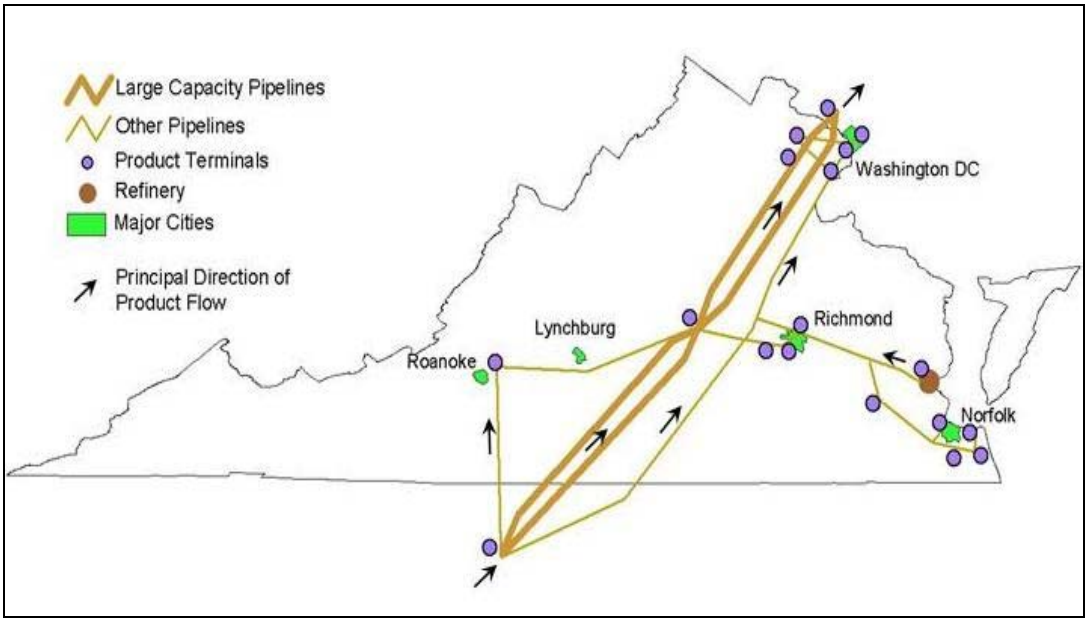
- Petroleum consumption is affected by the distance people drive and use of alternate forms of transportation.
  - Virginia has 160,097 lane miles of Interstate, state primary, state secondary, and local roads, [4] providing an extensive, state-maintained road system reaching all communities across the state.
  - Virginia's mass transit network primarily serves the eastern part of the state. Virginia's mass transit resources include:
    - Amtrak routes on the I-95 corridor and I-64 to Newport News, from Washington DC through Charlottesville, Lynchburg, and Danville to the Gulf Coast; and through Charlottesville, Staunton, and Clifton Forge to the Midwest;[5]
    - Virginia Rail Express, from Fredericksburg and Manassas to Washington DC;
    - Metro (subway) in the Washington DC area;
    - Intracity buses in urban areas and van service in many rural areas; and
    - Intercity bus service serving much of the state.
  - New light rail lines are under construction in Norfolk and under development in Northern Virginia.

[3] National Propane Gas Association, http://www.npga.org/files/public/Economic_Study_Propane_Value_Final.pdf
[4] http://www.fhwa.dot.gov/policyinformation/statistics/2008/hm60.cfm
[5] For Virginia Amtrak routes, see http://amtrakvirginia.com/

Petroleum Product Pipelines and Distribution

- Petroleum is supplied to Virginia through a network of refineries, pipelines, port facilities, terminals, and retail outlets.
  - Crude oil, which is mostly imported, is delivered by tanker to the Yorktown petroleum refinery where it is transformed into gasoline, fuel oil, jet fuel, and diesel.
  - Finished petroleum products are shipped to petroleum terminals across Virginia in various ways:
    - The Colonial and Plantation underground pipelines deliver product from refineries in the Gulf of Mexico region to distribution terminals in Fairfax, Richmond, Montvale/Roanoke, and Chesapeake.
    - Tankers and barges deliver product to coastal petroleum distribution terminals in Chesapeake and Richmond.
  - Virginia is also regularly supplied from out-of-state petroleum terminals in Baltimore, MD; Greensboro, NC; and Knoxville, TN.

Figure 7-3: Major Petroleum Pipelines and Terminals in Virginia[6]

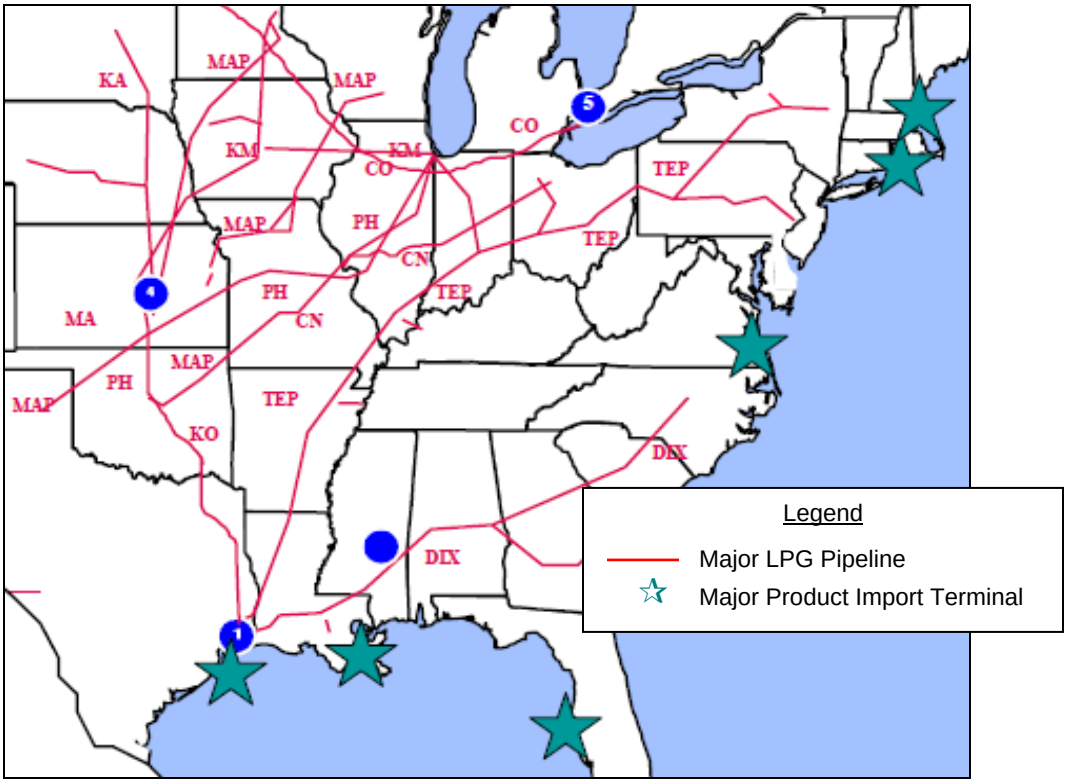


- Petroleum distributors, also called jobbers, purchase gasoline, diesel, heating oil, and other products from central terminals and truck them directly to large users, gas stations, and other retailers. Most jobbers also store gasoline, diesel, fuel oil, kerosene, lubricants, and other petroleum products in smaller storage facilities located in nearly every locality across Virginia.

[6]Virginia Energy Patterns and Trends: Major Petroleum Product Pipelines, www.energy.vt.edu/vept/petroleum/oil_pipeline.asp

- The petroleum product supply chain has a limited ability to respond to delivery disruptions such as from storms, pipeline problems, or panic buying runs. On average, there is a larger volume of empty capacity in vehicle gas tanks than there is in the entire fuel delivery system.
- The majority of Virginia's propane gas is supplied by the interstate propane pipeline terminating in Apex, North Carolina, and the water-based terminal in Chesapeake.
- Propane is trucked from the North Carolina and Chesapeake terminals to bulk plants, and then distributed to end users.

Figure 7-4: Propane Pipelines and Major Terminals[7]



[7] Harry Hunter Hanger, Jr., Atlantic Energy Import Terminal, Presentation to the Pennsylvania Public Utility Commission Winter Meeting, November 9, 2006

Petroleum Prices

- Petroleum price and availability are affected more by national and international policies and events than from in-state factors. These include:
  - Political instability in oil producing countries;
  - Drops in productivity in some oil producing regions;
  - Effects of weather such as Gulf of Mexico hurricanes; and
  - Growth in demand in international markets such as China, India, Central America, and the Middle East.
- Gasoline prices have been volatile over time, increasing to $4.04 in June 2008 and dropping to $2.51/gallon 15 months later in September 2009.[8]
- Gasoline prices trended higher from year to year until 2009 when they declined.

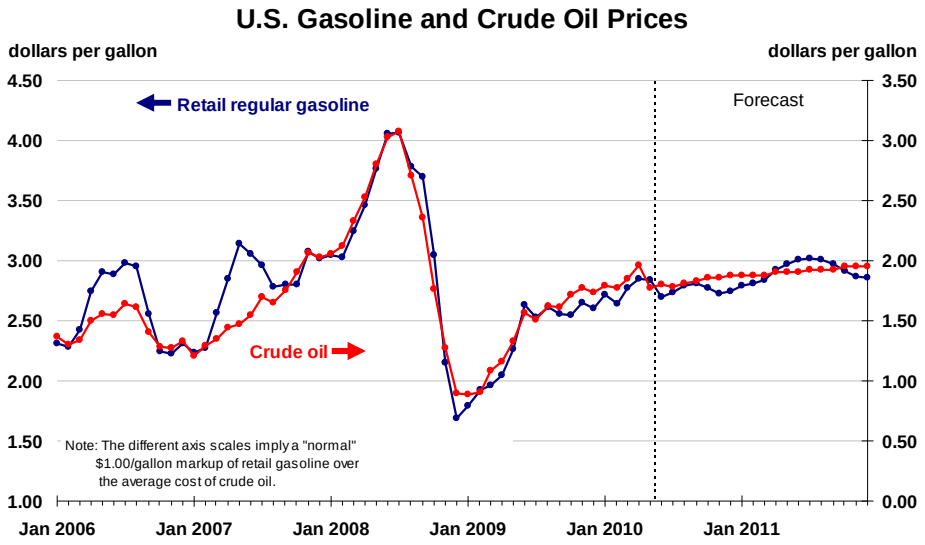
Table 7-1: Gasoline Prices, 1993-2009[9]

Year	Average Retail Gasoline – Price per Gallon (Including Federal and State Gasoline Taxes)
1993	1.033
1994	1.035
1995	1.136
1996	1.231
1997	1.211
1998	1.028
1999	1.115
2000	1.467
2001	1.373
2002	1.330
2003	1.534
2004	1.853
2005	2.306
2006	2.588
2007	2.794
2008	3.297
2009	2.366

- The Energy Information Administration (EIA) predicts that petroleum prices will rise over the next ten years,[10] with annual refined petroleum prices (nominal dollars) to increase from $2.69/gallon (including taxes) in 2010 to $4.12/gallon by 2020.

[8] EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mg_tt_1c&f=m, June 29, 2010
[9] EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MG_TT_1C&f=A, June 29, 2010
[10] EIA, Gasoline Prices by Formulation, Virginia, Sales to End Users, Average Through Retail Outlets, http://www.eia.doe.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=d100613512&f=m, June 1, 2010

Figure 7-5: U.S. Gasoline and Crude Oil Prices 2006 to 2012 ($/gal) [11]

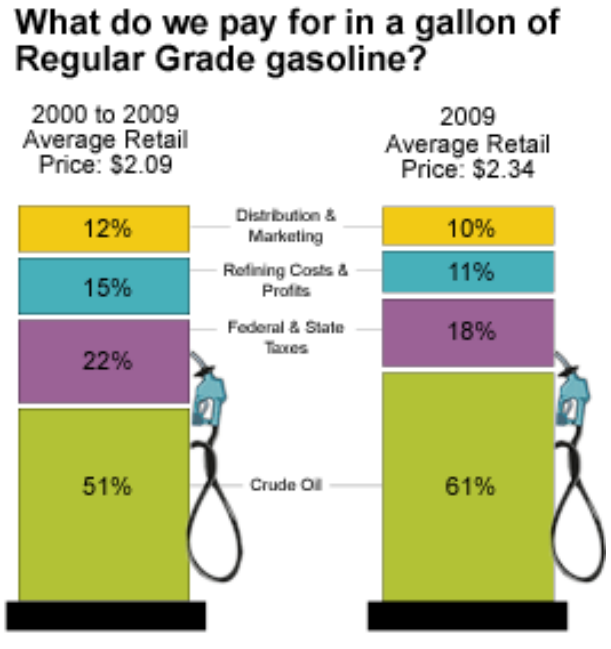


Note: Crude oil price is refiner average acquisition cost. Retail gasoline price includes State and Federal taxes.

U.S. Energy Information Administration

Source: Short-Term Energy Outlook, June 2010

- Petroleum product prices are also affected by changes in delivered input costs.
  - Crude oil prices were about $68/barrel in 2007, accounting for 58 percent of the $2.80/gallon regular grade gasoline price; $100/barrel in 2008, accounting for 69 percent of the $3.25/gallon price; and $62/barrel in 2009, accounting for 61 percent of the $2.34/gallon price.[12]



Source: U.S. Energy Information Administration.

[11] EIA, 2010 Annual Energy Review, Petroleum Product Prices, http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_12.xls, June 1, 2010
[12] EIA, A Primer on Gasoline Prices, http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/index.html, June 1, 2010

- Propane prices (residential) have been less volatile than petroleum prices, ranging from $3.09/gallon in October 2008 to $2.27 in October 2009. Annual prices are projected to increase from $2.12/gallon in 2010 and up to $3.17 in 2020.

Table 7-2: East Coast Propane Residential Price[13]

Year	Residential Price
2000	$1.43
2001	$1.51
2002	$1.33
2003	$1.60
2004	$1.82
2005	$2.09
2006	$2.28
2007	$2.54
2008	$2.93
2009	$2.68

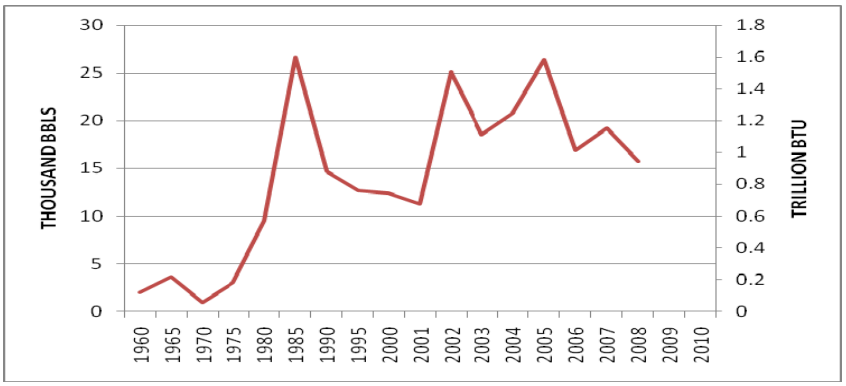
Conservation

- Use of petroleum can be reduced through:
  - Driving more efficiently;
  - Driving less – lowering Vehicle Miles Traveled (VMT) through increased use of mass transit and transit-oriented development; and
  - Weatherizing facilities to more efficiently use fuel oil for heating.

Petroleum Production

- Virginia's oil and gas operators produced 15,712 barrels of oil in 2008 from 75 stripper oil wells located in Lee, Wise, and Russell Counties, equivalent to less than one percent of the state's annual consumption. This production is typically shipped to refineries in Kentucky for processing.

Figure 7-6: Petroleum Production in Virginia, 1960–2008[14]

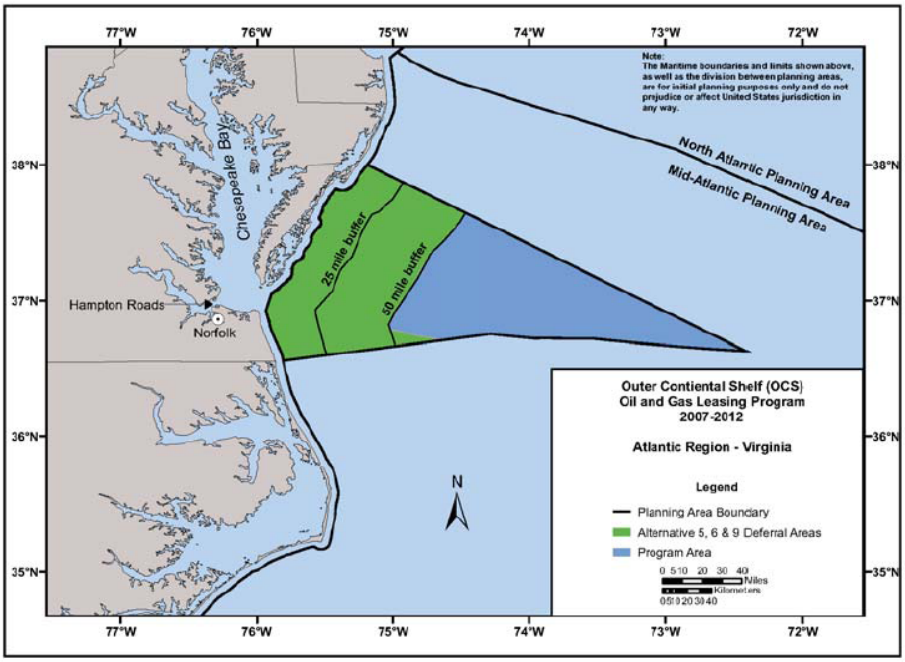


[13] EIA, East Coast (PADD1) Propane Residential Price, http://tonto.eia.doe.gov/dnav/pet/hist_xls/MPRREP14m.xls, June 23, 2010
[14] VEPT, Historical Petroleum Production, http://www.energy.vt.edu/vept/petroleum/Historical_Production.asp

Offshore Oil

- There is an estimated 165 million barrels of petroleum reserves in federal waters in the Virginia administrative boundary area offshore Virginia.
- The value of crude oil in the Virginia offshore administrative areas could total to more than $13 billion (165 million barrels at $80/barrel).
    - The ultimate value will depend on the actual amount of recoverable resources and the cost of oil.
- Offshore oil production would support infrastructure expansion in Hampton Roads, attracting new business and creating jobs in the supply chain and for exploration and production.
- Developing offshore oil 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 (formerly 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 7-7: 2007-2012 Mid-Atlantic OCS Proposed Lease Area[15]



[15]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

Petroleum Refining

- The state is home to one oil refinery in Yorktown.
  - Production capacity is 70,000 barrels of petroleum products per day, or 25 million barrels per year, less than 15 percent of the state's use.[16]
  - It is ranked 90th in size out of the 143 U.S. refineries.
  - Crude feedstock comes from Canada, the North Sea, South America, and the Far East, delivered by barge and tanker to the dock on the York River.
  - Products include gasoline, diesel, propane, butane, heavy fuel oils, and petroleum coke.
- The market for gasoline and diesel has been challenging for refiners in 2009 and 2010.
  - Demand has dropped with the drop in economic activity.
  - Capacity additions are underway, primarily at Port Arthur, Texas, and Daryville, Louisiana, totaling 500,000 barrels per day.

Adequacy of Supply

- There is sufficient capacity to supply petroleum products to users in Virginia under normal situations through the pipeline, tank farm, and distribution system.
- Disruptions in Gulf of Mexico supply or petroleum product pipelines will disrupt supply in multiple states, including Virginia.
- Virginia is updating its Energy Assurance Plan to enhance the Commonwealth's ability to respond to a supply disruption. This includes cooperation with petroleum distribution and pipeline companies, other states, and the federal government

[16] About Western Refining/Refining, http://www.wnr.com/Refining.aspx, June 24, 2010