Energy Efficiency Policy Recommendations for the Commonwealth of Virginia

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About Us

ENE is a non-profit organization that researches energy policies and solutions that promote sustainable economies.

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Introduction

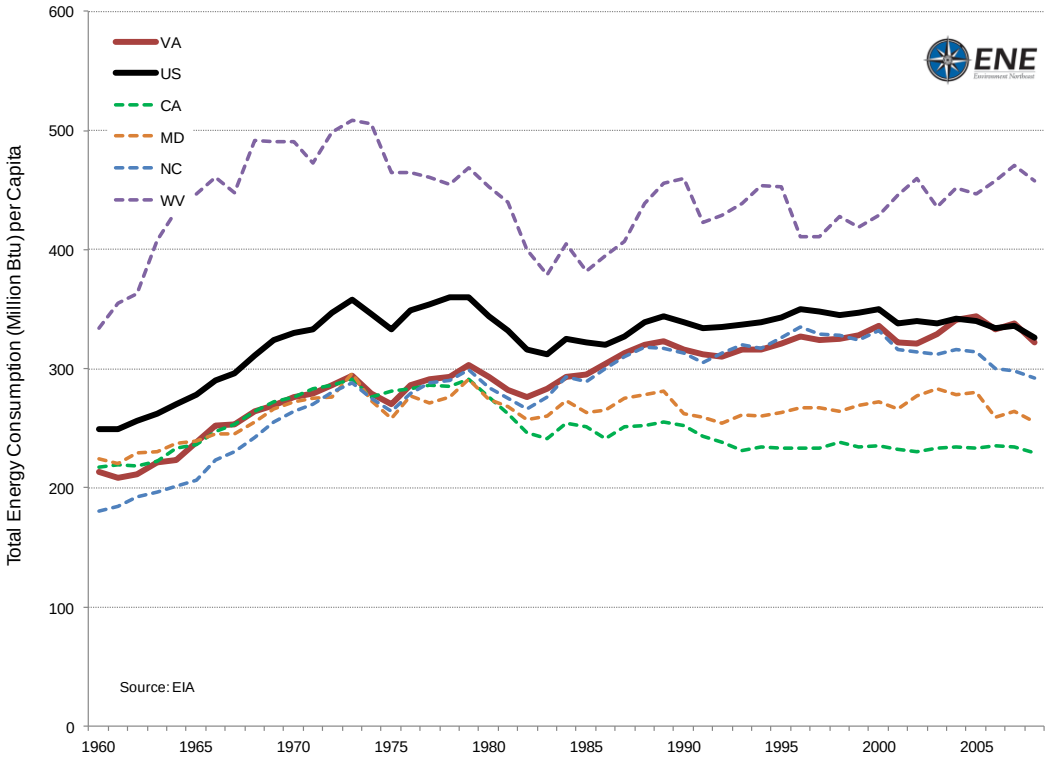
This paper contains state-specific policy recommendations for the Commonwealth of Virginia that build on a prior paper by ENE entitled: *Best Practices for Advancing State Energy Efficiency Programs: Policy Options & Suggestions*, which is available at: http://www.env-ne.org/resources/detail/best-practices-for-advancing-state-energy-efficiency-programs-policy-option

This paper is designed to review the current state of energy efficiency policy in Virginia and provide ideas and recommendations for state policymakers and stakeholders to consider going forward. Policy concepts have been developed for both the short-term and in relation to a longer term set of changes that would likely require legislation.

Virginia Energy Context

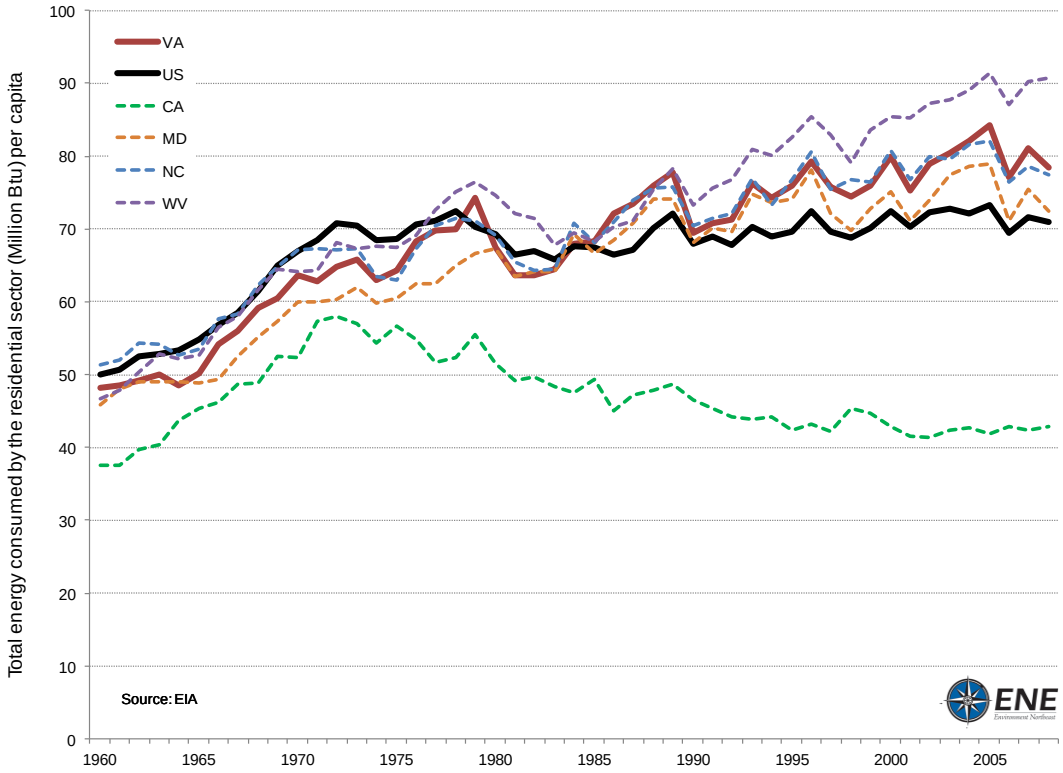
Over the past few decades, Virginia's consumption of energy has been rising and the Commonwealth's dollar expenditures on energy have also been increasing both in absolute terms and on a per capita basis. Figure 1 illustrates the Commonwealth's total energy consumption from 1960 to 2008 on an MMBtu per capita basis. It shows that while the state's total energy use per capita was lower than the national average in 1960, since then it has risen both in absolute terms and in relationship to other states. Today, Virginia's total energy consumption (electricity, thermal, industrial, and transportation) has increased to roughly the national average.

Figure 1: Virginia's Total Energy Consumption (MMBtu) Per Capita (1960-2008)



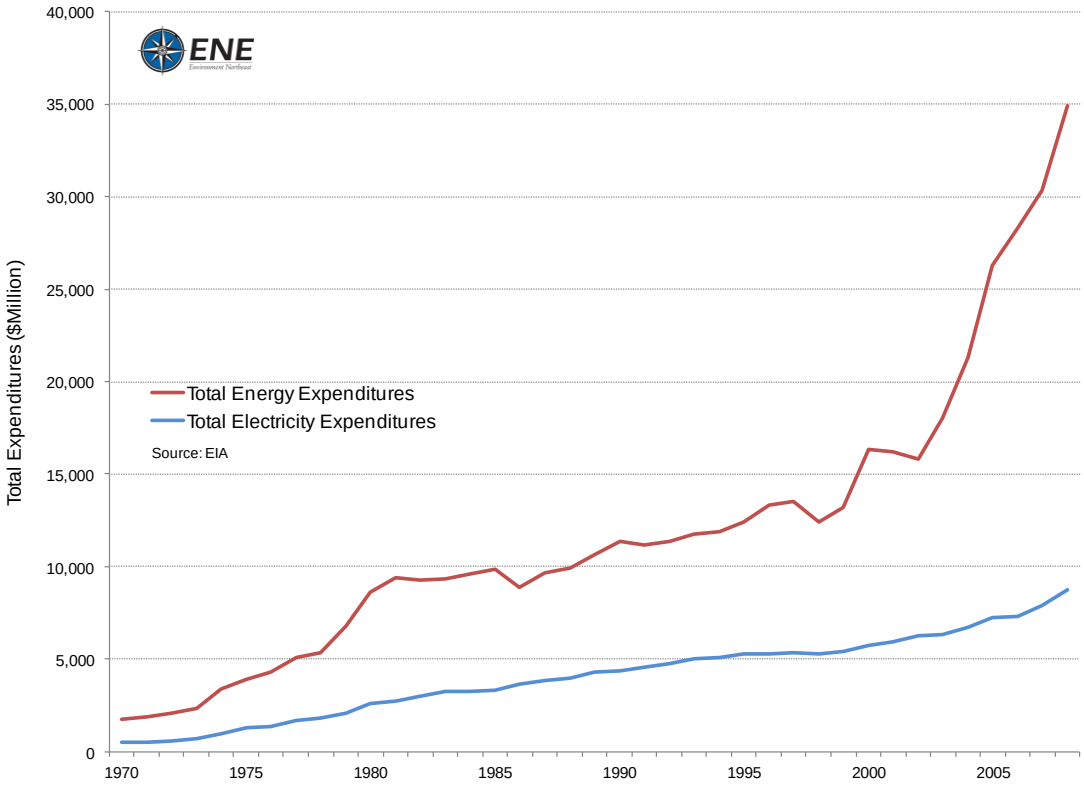
For Virginia's residential sector alone the picture of increasing energy use is even more striking – residential energy consumption has increased annually from less than 50 MMBtu per capita in 1960 to 80 MMBtu per capita in 2008 and is now above the national average (Figure 2). Further, Figure 3 shows that designating 1990 as a base year and looking from that date forward illustrates that the rise in residential energy consumption on per capita basis has been: (1) substantially larger than the national average and (2) dramatically larger than states such as California that have invested aggressively in cost saving efficiency programs.

Figure 2: Virginia's Residential Energy Consumption (MMBtu) Per Capita (1960-2008)



A large part of the focus of the Multi-state Residential Retrofit Program is developing and implementing cost-effective electric and thermal efficiency programs. As a practical matter, and given experience in other states, it is generally easier to establish efficiency policies and programs that address home energy use than it is to establish policies and programs that target transportation energy use. In light of these two facts, it is helpful to look at Virginia's total electricity expenditures – particularly residential electricity expenditures – segmented out from its total energy expenditures to see how it has changed over time. Figure 4 shows that both the Commonwealth's total energy expenditures and total electric expenditures have risen steadily since 1970.

Figure 4: Virginia's Total Energy Expenditures ($M) vs. Total Electric Expenditures ($M) (1990-2008)



Drilling down further on the state's electrical use, Figure 5 illustrates that Virginia's residential electricity use per capita has increased much faster than other states since 1960 and is now substantially above the national average. Strikingly, Virginia's residential electricity use per capita is more than double that of California's, which has invested aggressively in cost-saving electric efficiency programs over the past few decades. Additionally, Figure 6 shows that even using more recent data and 1990 as a baseline, Virginia's residential electricity use per capita has increased more than that national average.

Figure 5: Virginia's Residential Electricity Consumption (MWh) Per Capita (1960-2008)

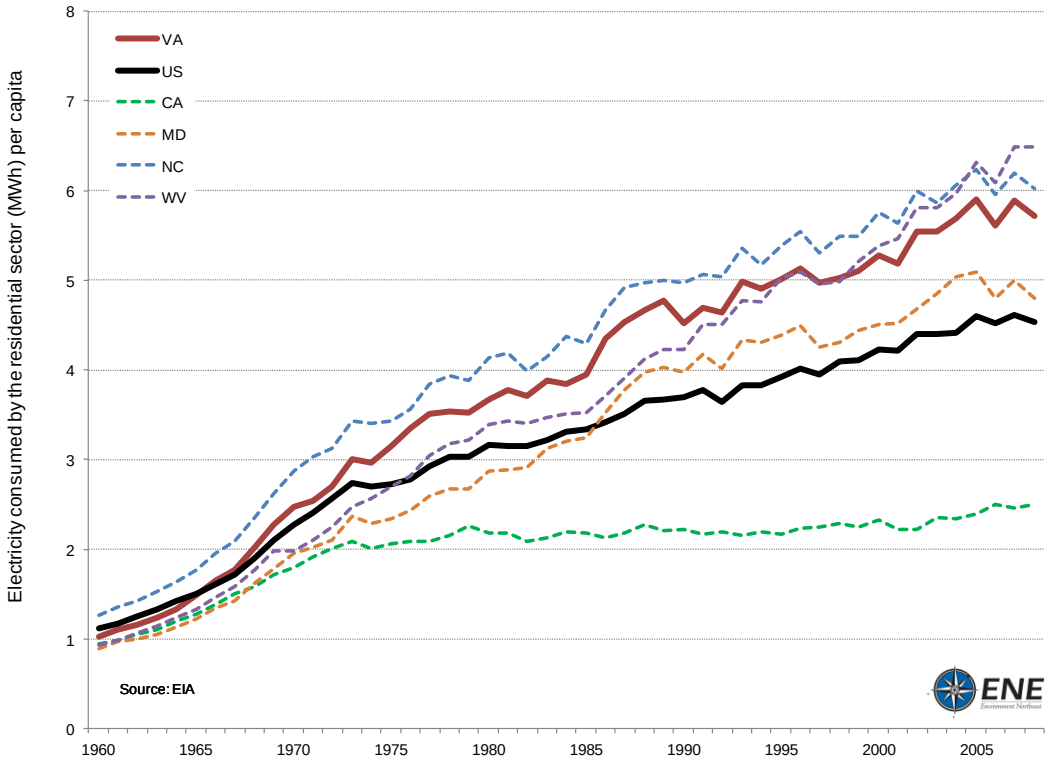


Figure 7 depicts the cost of electricity in Virginia, which has risen approximately 3 cents per kWh between 2001 and today for residential customers (slightly less for commercial and industrial). Even though Virginia's cost of electric supply is lower than the national average, it has been rising.

Energy efficiency should be compared primarily to the cost of electric supply (not including distribution) since the local network will always have to be maintained and efficiency investments primarily avoid the need for purchases of energy and new generation and transmission infrastructure. Figure 8 presents the annual average total energy price in the PJM power pool. Actual energy costs for the utilities in Virginia vary and vary by rate class, but PJM average data is being used to give an estimate of energy costs that can be compared to efficiency cost. In this case, PJM energy costs approximately $60/MWh or 6 cents per kWh.

Figure 7: Residential, Commercial and Industrial Electric Rate Trend

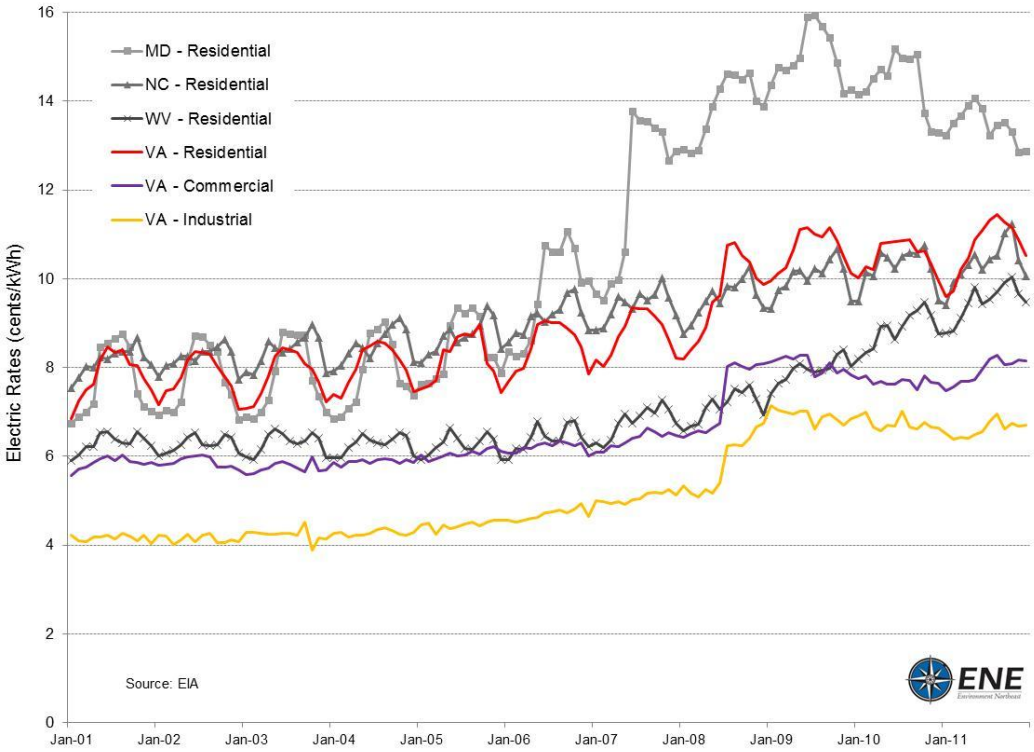
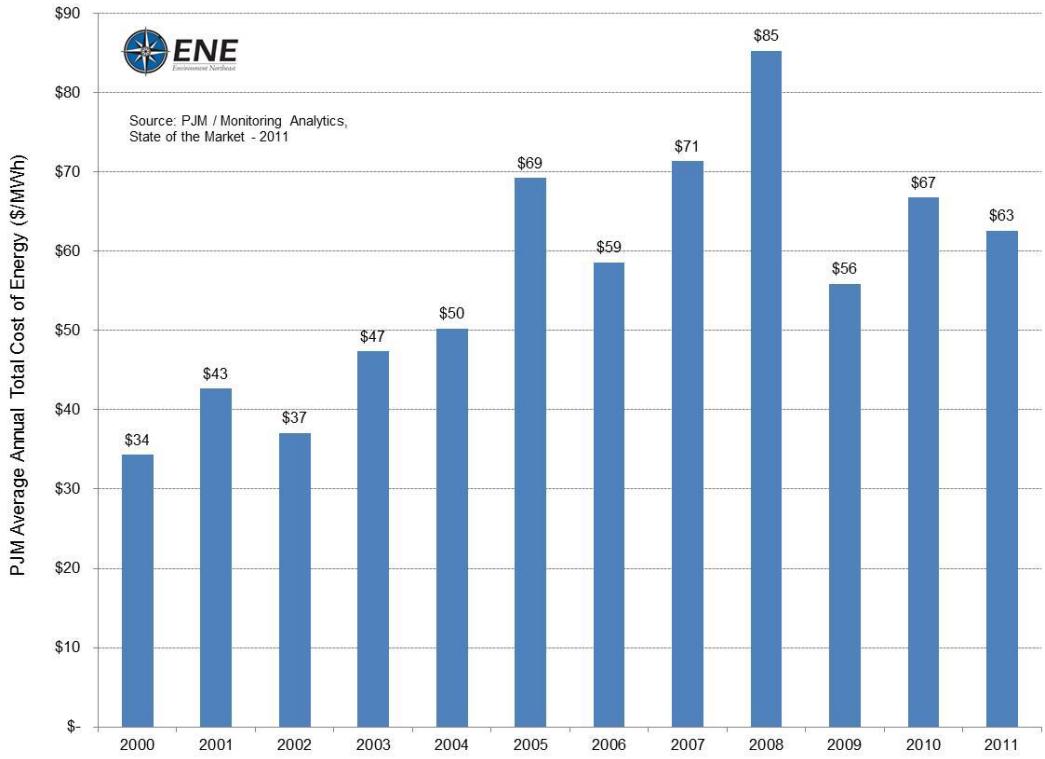


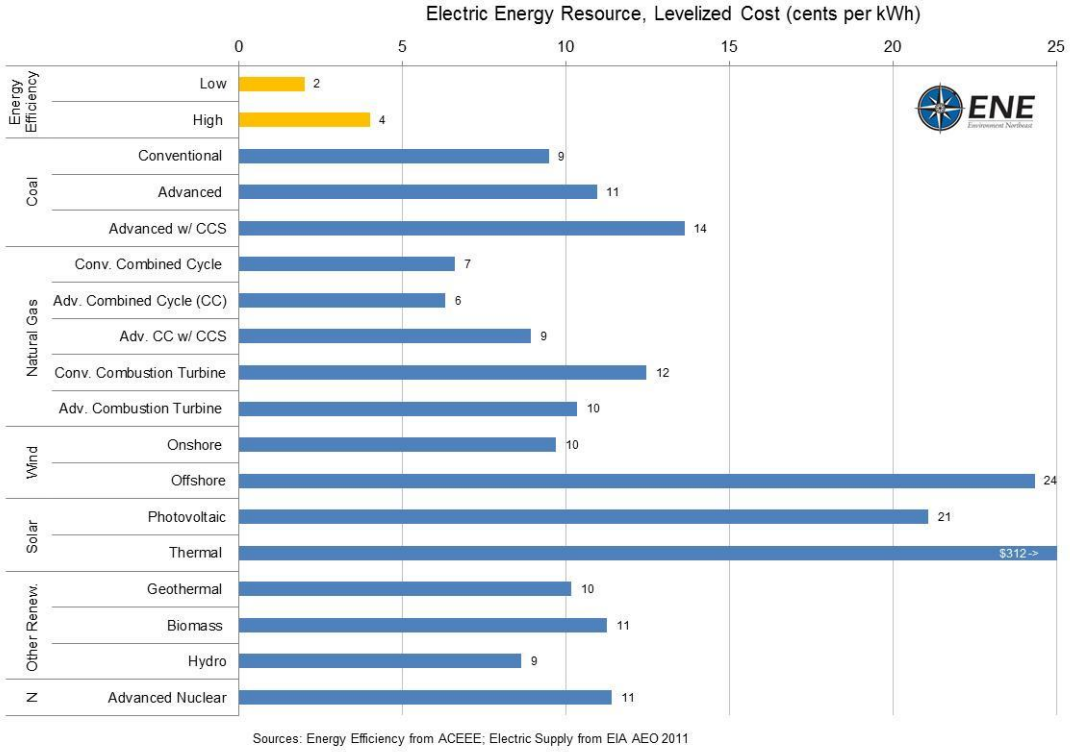
Figure 8: PJM Average Annual Energy Price



States have a fundamental resource acquisition choice between spending on electric supply or investing in lower cost electric energy efficiency programs. Virginia's electric supply costs are on the order of 6 cents per kWh – this is for the energy component and does not include transmission and distribution. The decades of efficiency program experience around the country tell us that efficiency programs save electricity for about 2 to 4 cents per lifetime kWh.

Figure 9 compares electric efficiency programs to the levelized cost of new electric supply resources, and efficiency is again a winner. This is true even before factoring in other benefits of efficiency programs such as avoided transmission and distribution costs, demand induced price effects, and environmental and health benefits.

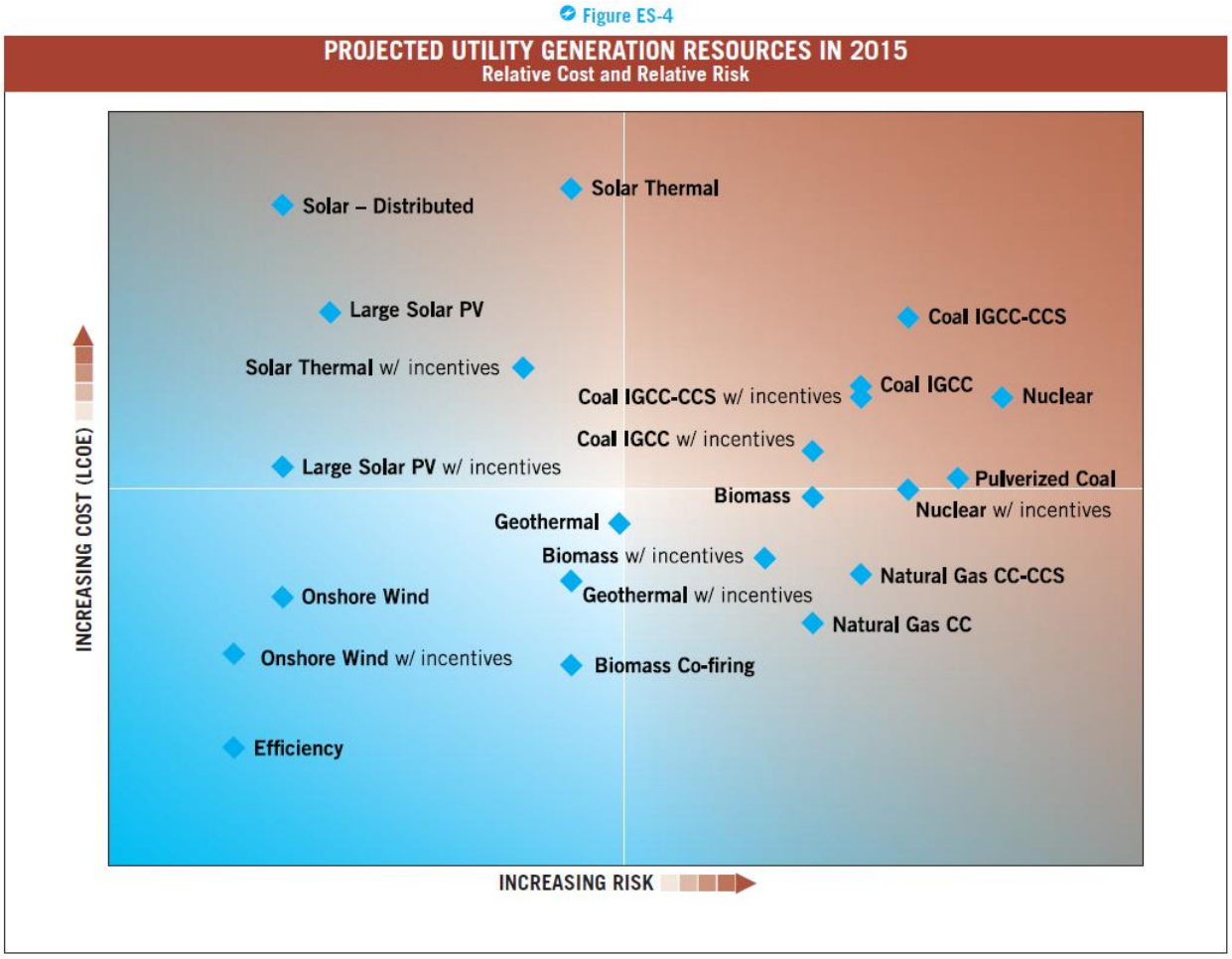
Figure 9: Electric Efficiency Cost per kWh saved vs. Supply Cost for New Generation



Efficiency delivers significant benefits on an energy basis, saving consumers energy and money throughout the year. However, efficiency programs can also be a tool in reducing peak demand. As Virginia experiences growth in peak demand and considers options, including new resources, to meet this growth, efficiency should be considered as a resource that would reduce demand and thus mitigate the need to construct expensive new power plants.

Another metric to factor into electric resource planning is risk. A recent report entitled, *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know*,[1] examines electric resource options from both a cost and risk perspective and finds that efficiency is both the lowest cost and lowest risk option, making it an obvious priority resource for both utilities and regulators. The following figure is from that report.

Figure 10: Electric Efficiency Capacity Cost per kW vs. Supply Cost for New Generation



Each year the Commonwealth is spending dramatically more on higher cost electric supply than it invests in lower-cost efficiency programs. This represents an unnecessary economic and environmental burden for the state. Macroeconomic analysis for other states and regions has found tremendous economic benefits and job growth potential from efficiency as the savings on customers' energy bills are put to work stimulating other parts of the economy.[2] Virginia consumers are currently

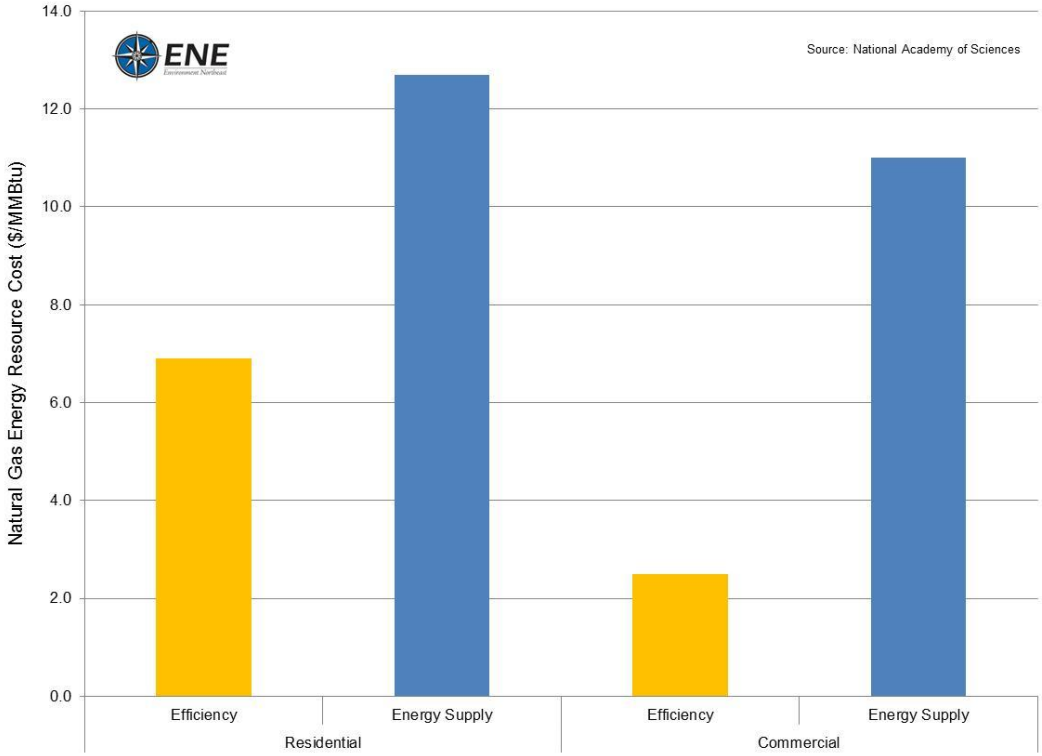
[1] Binz et al, 2012, *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know*, Ceres, available at: http://www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation/view

[2] See Howland, Murrow et al. Energy Efficiency: Engine of Economic Growth (ENE, October 2009), available at http://www.env-ne.org/resources/open/p/id/964.

spending on the order of $6.8 billion on electric supply at about 6¢ per kWh (rough estimate based on 6 cent/kWh energy component of rates and 114 million MWh per year) and yet only invested $1.3 million in efficiency programs saving energy for 2-4¢ per lifetime kWh. Spending five-thousand times more on supply that is about double the price of local efficiency resources is a drain on the Commonwealth's economy.

There are significant opportunities for natural gas efficiency programs as well as electric. Figure 11 below depicts efficiency program costs vs. supply costs from a National Academy study.

Figure 11: Natural Gas Energy Resource Costs – Efficiency Programs vs. Supply



Natural gas prices have declined since this study was published, and the gas commodity costs have declined to about $7 dollars per thousand cubic feet in Virginia (EIA, 2011 average, city gate price). With the decline in natural gas prices, residential energy efficiency programs are not quite as cost-effective as they used to be. But there is still a significant opportunity in the commercial and industrial sectors and programs that are coordinated and provide joint-fuel services for both electric and natural gas use can be even more cost-effective.

Existing State Policy and Programs

In 2007 the General Assembly passed a goal of reducing electricity consumption from 2006 levels by 10% by 2022.[3] The next year, in 2008, Virginia passed a bill that requires utilities' integrated resource plans to include a description of the demand-side resources they plan to invest in.[4] The Commonwealth has seen several unsuccessful attempts to enact an energy efficiency resource standard bill, which would require the utilities to deliver a specified amount of savings each year. One such proposal in 2008 would have required 19% cumulative electric efficiency savings by 2025.

Legislation that has passed includes Senate Bill 348, which established goals for peak demand reduction for electric utilities by 2015 and 2020 that are slightly less than peak demand in 2010. In March 2009, House Bill 2531 passed. The Bill directs the State Corporation Commission (SCC) to conduct a proceeding to determine achievable, cost-effective energy conservation and demand response targets through demand-side management portfolios of generating electric utilities including a cost-benefit analysis of those resources.

Through 2011, the SCC had discretion to review efficiency programs based on: (1) the Total Resource Cost Test; (2) the Societal Test; (3) the Program Administrator Test (aka Utility Cost Test); (4) the Participant Test; and (5) the Ratepayer Impact Measure Test. The SCC approved five Dominion energy efficiency programs in March 2010. Additionally, the SCC had decided to not approve several proposed efficiency programs based on findings that the programs did not pass the rate impact measure (RIM) test. On March 20, 2012 the Governor signed into a law a bill – SB 493 – that (1) reduced the number of tests to four by eliminating the Societal Cost Test and (2) states the SCC shall include an analysis of all four tests and shall not reject a program or portfolio of programs based solely on the results of a single test.

The universe of Virginia electric utilities, which could work together or separately to deliver efficiency programs include Dominion, Appalachian Power, TVA, Old Dominion, and electric co-operatives. Currently, Dominion is the primary electric utility in the Commonwealth that offers and administers efficiency programs. The universe of gas utilities includes Appalachian Power, Virginia Natural Gas, Washington Gas, Columbia Gas, and Roanoke Gas.

The natural gas efficiency efforts have been aided dramatically by a 2007 law which established revenue decoupling for natural gas utilities, which breaks the link between sales volume and their revenues. This eliminated the disincentive gas utilities had previously to promote consumer energy efficiency programs that saved consumers money but hurt their own bottom line. Virginia Natural Gas, Washington Gas, Columbia Gas all currently offer and administer small but successful efficiency programs. On the electric side, the state has not adopted revenue decoupling, which eliminates that link between sales volume and revenue, but rather has adopted loss based revenue (LBR). The difference is that LBR compensates utilities for losses in revenue related to efficiency program savings but does not

[3] ACEEE (American Council for an Energy-Efficient Economy), State Energy Efficiency Policy Database, "Virginia Utility Policies", available at http://www.aceee.org/sector/state-policy/virginia.
[4] Id.

break the link between sales volume and revenue. Under LBR utilities have a financial incentive to maximize sales volume and also claim credit for as large an amount of efficiency savings as possible.

As a whole, the state has taken important steps on utility efficiency policy and program implementation – both savings and investments. However, there is substantial room for improvement on both policy and implementation as evidenced by the fact that in the "Utility and Public Benefits Programs and Policies" section of ACEEE's[5] 2011 State Energy Efficiency Scorecard Virginia ranked #41 (Table 1).[6]

Table 1 : ACEEE 2011 Ranking on Utility and Public Benefits Efficiency Programs and Policies

2011 ACEEE Scorecard Rank	
1. Vermont	21. Idaho
2. Massachusetts	21. Illinois
2. Rhode Island	23. New Jersey
4. Minnesota	23. Ohio
5. California	25. Indiana
6. New York	26. District of Columbia
7. Iowa	27. Arkansas
8. Oregon	28. New Mexico
8. Washington	29. Montana
10. Hawaii	29. South Dakota
10. Utah	29. North Carolina
10. Connecticut	32. Pennsylvania
13. Wisconsin	33. Kentucky
13. Nevada	33. Florida
13. Arizona	35. Texas
16. Colorado	36. Missouri
17. Maine	36. Oklahoma
17. New Hampshire	36. Alabama
19. Michigan	36. Louisiana
20. Maryland	36. Delaware
	41. Virginia
	41. Tennessee
	41. Wyoming

It is important to note that over the last couple of years and separate from the utilities' efficiency program efforts the Virginia Department of Mines, Minerals and Energy (DMME) has operated energy efficiency rebate programs with federal stimulus funds provided by the American Recovery and Reinvestment Act of 2009. Below is a DMME summary of those efforts:

[5] ACEEE stands for the American Council for an Energy-Efficient Economy a nonprofit, 501(c)(3) organization that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors.
[6] See Sciortino et al., State Energy Efficiency Scorecard (ACEEE, October 2011), pg. 6, available at http://www.aceee.org/research-report/e115.

"The Virginia Energy Efficiency Rebate Program was originally launched in late October 2009 for Virginia homeowners and commercial businesses to reserve rebates for energy efficiency products and systems. Energy efficiency improvements included upgrading heating and air conditioning equipment, adding insulation, replacing leaky windows, and other improvements to existing homes and businesses to reduce energy consumption and utility costs. Homeowners were eligible for rebates for 20 percent of the costs of qualifying energy conserving products and services, up to $2,000. Commercial consumers were eligible for 20 percent of their costs, up to $4,000. Home and business owners also could qualify for an additional $250 for an energy audit.

The first round of funding for efficiency rebates totaling about $10 million was reserved in less than three weeks when the program opened. In late March 2010, Governor Bob McDonnell announced that approximately $6.5 million was available for a second round of the rebate program to make existing homes and businesses more energy efficient. Funds for the second and final round of the Energy Efficiency Rebate Program were exhausted on March 26, 2010. Over 3,000 applicants were wait-listed, and eventually approved for rebates. The Energy Efficiency Rebate Program was closed out on April 29, 2011 after paying out almost 7,700 rebates and dispersing $10.4 million to Virginia homeowners and businesses."[7]

The results achieved by DMME's federal ARRA-funded rebate program are laudable; however, it is important to note that the level of federal stimulus money provided for the program is very unlikely to be repeated in the foreseeable future. This makes it all the more imperative that the Commonwealth establishes efficiency policies to support ongoing utility efficiency programs overseen by the SCC and with stable funding from year to year.

ENE Policy Recommendations

Virginia has tremendous potential to improve upon its existing efficiency policies and increase its investments in cost-effective efficiency resources that are lower cost than spending on electric supply. This investment would generate large consumer savings, create local jobs, and boost the Gross State Product (GSP).

To substantially increase Virginia's level of investment in SCC-regulated, cost-effective electric and natural gas efficiency programs, it is recommended that the Commonwealth adopt the following policies. Policy ideas are broken down into near-term policies that could be proposed by the utilities and/or the administration and adopted by SCC. Implementation of these policies should allow the state to become a leader in energy efficiency policy and program delivery and save state ratepayers significant money that they could invest in other parts of the economy.

1) Near-term Policy Recommendations:

a) **Cost-effectiveness Screening:** The state should move away from using the RIM test in assessing energy efficiency program costs and benefits (the RIM test is only used in a couple of

[7] Summary from the Virginia Department of Mines, Minerals and Energy website, available at http://www.dmme.virginia.gov/de/arra-public/seprebate.shtml .

states across the country) and instead use a utility cost or total resource cost test to determine whether programs are cost-effective.

b) ***Potential Study:*** The Commonwealth should commission a new energy efficiency potential study, developed by an experienced consulting firm, to assess the scale, availability, and cost of the efficiency resource in the state. The study should address the potential for electric, natural gas, and joint-fuel programs.

c) ***Modest Program Design and Ramp-up:*** The Commonwealth should work with all electric and natural gas utilities to develop coordinated, joint-fuel programs that are modest in scale and scope to build experience and understanding of program costs and benefits. Program design should build on experience in other states and take advantage of DOE and EPA resources and the expert consultants that are available in this area. Coordinated programs and plans across the state will provide customers with consistent messages and programs and avoid confusion that can be caused by one utility offering a service that another does not. The scale of programs should ramp-up in 3-4 years to capture on the order of 1% annual electric savings and 0.5% annual natural gas savings. These would be significant goals for Virginia, but, by comparison, less than half the levels set at the leading edge jurisdictions. This kind of expanded program offering should especially be considered in the context of any integrated resource planning or consideration of new power plant needs.

d) ***Stakeholder Engagement:*** The Commonwealth should identify a critical set of stakeholders to invite to briefings and other sessions to discuss energy efficiency as a resource, program design, etc. These stakeholders could become part of an official board or council if it was formed later (see below).

e) ***Utility Incentives:*** The SCC should be asked to submit a report to the legislature on current utility incentives related to energy efficiency and how they could be adjusted or changed in order to fully align utilities' interests with their customers' and help reduce energy bills (both removing disincentives and creating incentives that make efficiency program delivery a viable business model for the companies); avoid concerns about gaming of results due to incentive structures; and address constraints on regulators' ability to access risk and determine reasonable returns. The study should include a comparison to other jurisdictions.

2) Longer-term Legislative Package - Cost-effective Energy Efficiency Procurement

a) ***All Cost-effective Energy Efficiency Requirements:*** All electric and natural gas utilities shall be required to procure all cost-effective energy efficiency resources and programs on behalf of all their distribution customers.

b) ***State-wide Coordinated Efficiency Plan:*** The utilities shall develop a joint, three year plan, in collaboration with the efficiency board, that describes consistent programs that will be run across the state in a coordinated manner to treat both electric and natural gas energy use in buildings, provide parity across sectors, and ramp-up over time to procure all cost-effective energy efficiency.

c) ***Stakeholder Energy Efficiency Council Oversight:*** A broad group of stakeholders (residential, commercial, industry, low-income, environmental, etc.) shall be appointed to a volunteer advisory board that will examine the utility program and plan and provide recommendations for changes or improvements to both the companies and the SCC; the board should have a reasonable budget to hire outside consultants to assist them in this process; the board shall also have the resources and responsibility for conducting regular program evaluation, monitoring, and verification assessments, which the companies and SCC shall use to refine programs going forward.

d) ***SCC Plan and Funding Approval:*** The SCC shall review the plan for cost-effectiveness and approve any funding requests for cost-effective programs; deference shall be given to the efficiency council on issues of program design, assuming council support for the plan.

e) ***Utility Incentives:***

i) The state should require full decoupling of utility distribution rates from sales, removing loss-based revenue as the model for electric utilities; the current prohibition on adjustments to ROE related to decoupling should also be removed (decoupling reduces both upside and downside risk for both the company and customers and should not have a significant impact on ROE, but regulators should not be constrained in weighing all risks and market conditions as they determine an appropriate ROE); and

ii) Utilities should be eligible for performance based incentives for delivering programs that meet or exceed the plan goals (focus on energy savings), with the incentive designed to provide enough return for the companies to make energy efficiency delivery an important part of their business model.

The benefits of expanding comprehensive energy efficiency programs should be large. Reduced energy consumption can offset the need for new power plants and T&D infrastructure, reduce emissions, and put money back in consumers' wallets. They can invest their savings in other parts of the state economy, stimulating economic and job growth. The following table presents estimates of the benefits associated with one year's investment in electric and natural gas energy efficiency at a level to achieve 1% and 0.5% annual savings respectively. Assuming programs were expanded over time and continued for the long term these one-year benefits would repeat year after year and grow significantly. For electric efficiency, we have used economic multipliers from an ENE and EDR Group study[8] that examined the macroeconomic effects of efficiency in six northeastern states. The economic benefits noted below for Virginia are meant to provide a sense of potential benefits, but an assessment like this

[8] Howland, Murrow et al. Energy Efficiency: Engine of Economic Growth (ENE, October 2009), available at http://www.env-ne.org/resources/open/p/id/964

could be done in the future, specific to Virginia, that would provide more accurate estimates of economic benefits for both the electric and natural gas efficiency investments.[9]

[9] Although the ENE study looked at natural gas as well as electric efficiency programs, we have chosen not to use those multipliers here due to the change in natural gas prices since the completion of the Howland et al report in 2009

Table 2: Estimates of One-Year Electric and Natural Gas Efficiency Costs and Benefits at 1.0% and 0.5% Annual Savings

Electric		Virginia		Units
	Current Energy Consumption (Total, 2010)	113,806,135		MWh
	Annual Near-term Savings Goal	1%		
	Est. Energy Cost of Efficiency Programs - Lifetime	$31		per MWh
	Est. Capacity Cost of Efficiency Programs	$2,900		per kW
	Estimate of Annual Efficiency Program Costs to Achieve Goal	$455		Million
	Annual Reduction in Energy Consumption	1,138,061		MWh
	Lifetime Reduction in Energy Consumption	14,684,663		MWh
	Reduction in Peak Demand	157		MW
	Est. Avoided Cost of Energy	$60		per MWh
	Est. Energy Savings (does not include T&D or DRIPE benefits)	$881		Million
	Gross State Product Multiplier	5.9		per $Million in EE
	Jobs Multiplier	46		per $Million in EE
	Estimate of Economic Benefits - Gross State Product	$2,686		Million
	Estimate of Economic Benefits - Additional Jobs	20,940		job-years
	Average CO_2 Emissions Rate	1,200		lbs per MWh
	Estimate of Avoided CO_2 Emissions	8.8		Million Tons
Natural Gas		**Virginia**		**Units**
	Current Energy Consumption (RC&I, 2010)	224,793,775		MMBtu
	Annual Near-term Savings Goal	0.5%		
	Est. Energy Cost of Efficiency Programs - Lifetime	$3		per MMBtu
	Estimate of Annual Efficiency Program Costs to Achieve Goal	$62		Million
	Annual Reduction in Energy Consumption	1,123,969		MMBtu
	Lifetime Reduction in Energy Consumption	20,606,096		MMBtu
	Est. Avoided Cost of Energy	$7.1		per MMBtu
	Est. Energy Savings	$146		Million
	Average CO_2 Emissions Rate	53		Kg per MMBtu
	Estimate of Avoided CO_2 Emissions	1.2		Million Tons
Sources: ENE Analysis and EIA Data				