

THE POTENTIAL IMPACT OF ENERGY CODES IN VIRGINIA

As one component of the *building codes* adopted by state and local governments, *energy codes* specify minimum requirements for the efficient design and construction of new and renovated residential and commercial buildings. Since 2011, Virginia's energy code is based on the 2009 International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2007.

If the Commonwealth were to adopt and achieve full compliance with the 2012 edition of the IECC and the 2010 edition of ASHRAE Standard 90.1 by the year 2014, then by 2035 Virginia would...

STRENGTHEN THE COMMONWEALTH AND FEDERAL ECONOMY & REDUCE IMPORTS

- **Allow businesses and households to keep about \$800 million annually via reduced energy bills** (about \$9.2 billion cumulatively through 2035).¹
- **Reduce the demand for about 82 trillion Btu of energy per year**² (about 10% below the projected baseline energy use of the Commonwealth's building sector in 2035).³
- **Reduce the need for state and federal funding for low-income households that struggle with high energy bills.**

Millions of Virginia dollars flow out of the Commonwealth to import energy for buildings. Through lower energy bills, households can improve the standard of living for families and strengthen the economy. Virginia businesses with reduced energy costs are more competitive and less likely to move overseas to cut costs.

Upfront efficiency improvements through energy code implementation are much more cost-effective than back-end retrofit and subsidy programs. Almost \$80 million was spent to assist low-income Virginia households with high energy bills in 2012.⁴

PROTECT CONSUMERS AND PROMOTE HEALTH AND SAFETY

- **The vast majority (84%) of Southern consumers believe that homeowners should have a right to a home that meets national energy standards.** Most (73%) also believe that energy codes should be enforced like other safety and quality standards of construction.⁵
- **Lower monthly energy bills typically exceed the slight increase in the monthly mortgage payment when amortized over a standard mortgage.**⁶

Energy codes protect homeowners and tenants from excessive energy costs. Buildings that meet or exceed national standards are more durable and comfortable, with fewer drafts.

Policymakers and government leaders can ensure that energy codes are enforced as effectively as other life, health, and safety codes. Residents have the right to energy-efficient homes built with modern technology and building practices.

REDUCE POLLUTION

- **Eliminate about 55.6 million metric tons (MMT) of CO₂ emissions cumulatively,⁷ equivalent to one year of emissions from:**⁸
 - 11.6 million passenger vehicles;
 - The energy use of 2.9 million homes;
 - 16 coal-fired power plants.

Buildings that meet national standards reduce pollution because fewer fossil fuels are combusted to meet demand. This reduces air, water, and land pollution and improves public health and the environment.

Table 1: BCAP Code Calculator Estimates of Savings from 2012 IECC / ASHRAE 90.1-2010 Adoption and Compliance in Virginia (2014 – 2035)

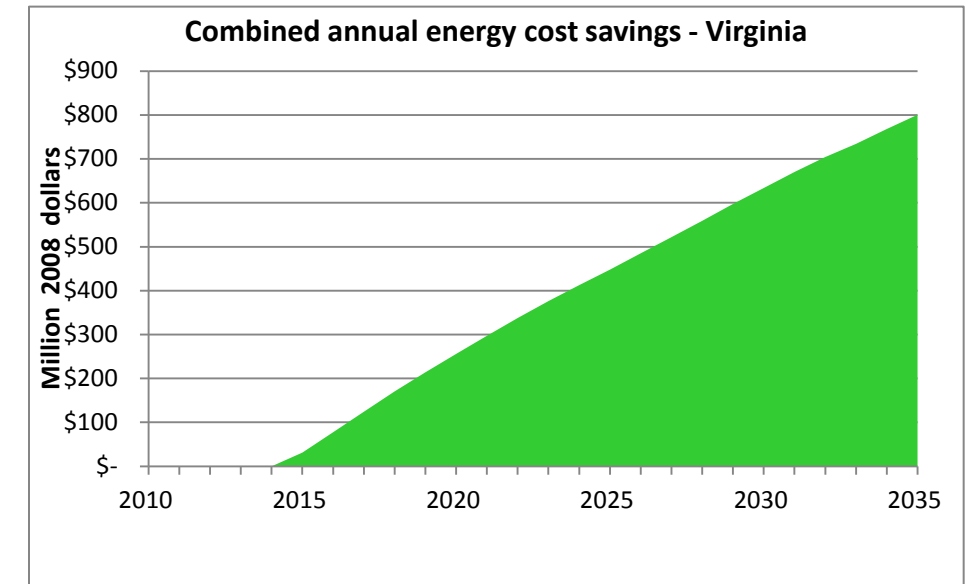
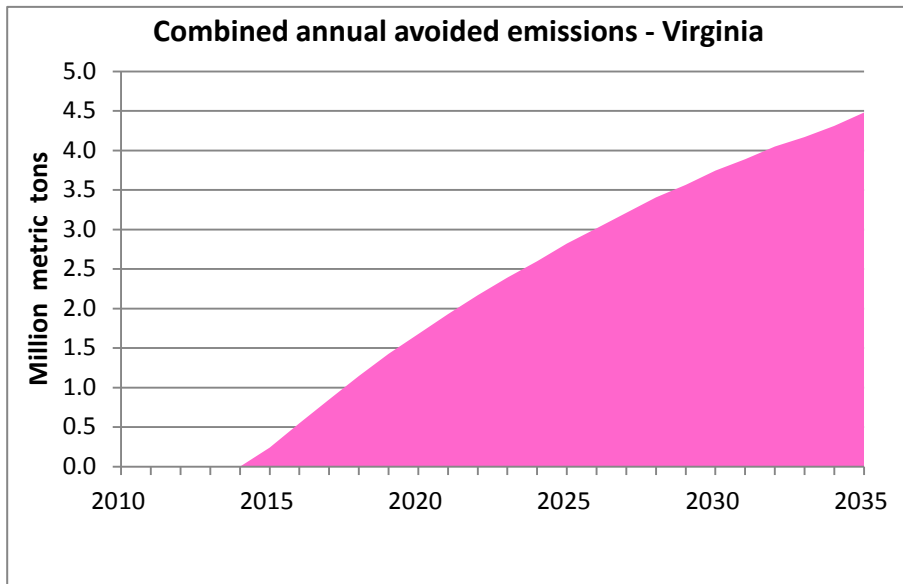
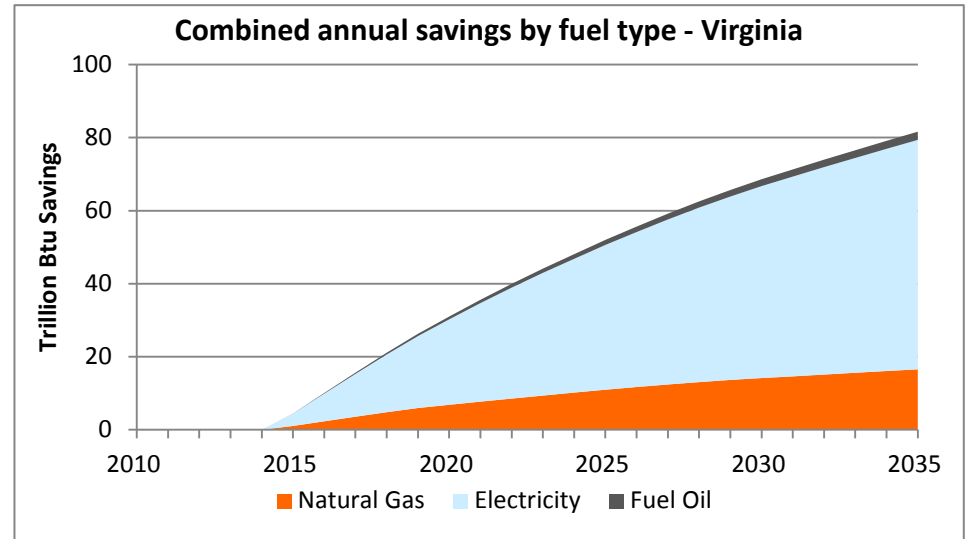
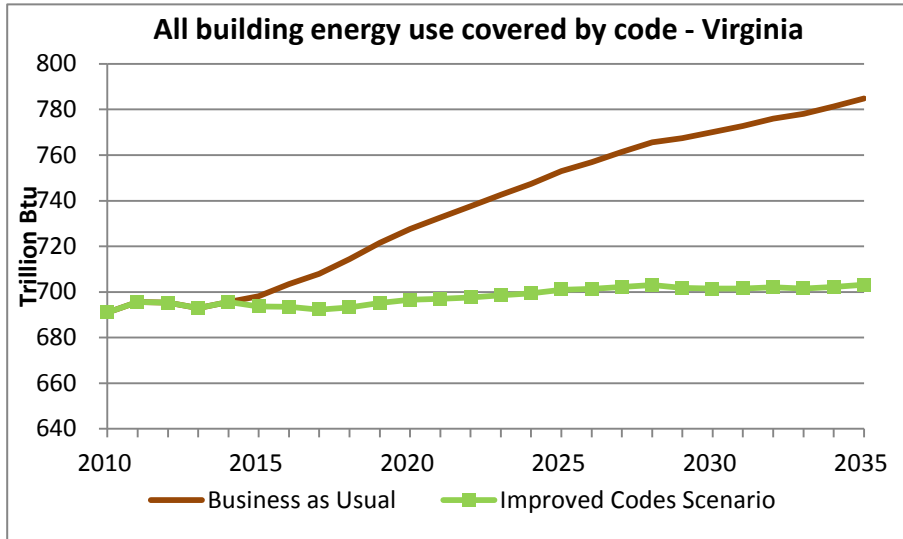
Selected savings estimates - Virginia	Annual savings by year...					Cumulative savings through year...				
	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035
Residential										
Overall source energy savings (trillion Btu)	0	8	14	20	24	0	24	83	171	282
Percent of business-as-usual energy use	0.1%	2.2%	4.0%	5.4%	6.6%	0.0%	0.6%	1.5%	2.3%	3.1%
Energy cost savings (millions of 2008 dollars)	\$ 2	\$ 91	\$ 173	\$ 251	\$ 322	\$ 2	\$ 279	\$ 986	\$ 2,084	\$ 3,553
CO ₂ emissions reduction (million metric tons)	0.0	0.4	0.8	1.1	1.3	0.0	1.3	4.6	9.5	15.7
Commercial										
Overall source energy savings (trillion Btu)	4	23	38	49	58	4	85	245	469	740
Percent of business-as-usual energy use	1.2%	6.2%	9.5%	12.0%	13.7%	0.2%	2.1%	4.1%	5.9%	7.4%
Energy cost savings (millions of 2008 dollars)	\$ 29	\$ 165	\$ 275	\$ 383	\$ 479	\$ 29	\$ 594	\$ 1,759	\$ 3,457	\$ 5,666
CO ₂ emissions reduction (million metric tons)	0.2	1.2	2.0	2.7	3.1	0.2	4.6	13.2	25.3	40.0
Residential and commercial combined										
Overall source energy savings (trillion Btu)	4	31	52	69	82	4	108	328	640	1,022
Percent of business-as-usual energy use	0.6%	4.3%	6.9%	8.9%	10.4%	0.1%	1.4%	2.9%	4.2%	5.3%
Energy cost savings (millions of 2008 dollars)	\$ 31	\$ 256	\$ 448	\$ 634	\$ 800	\$ 31	\$ 873	\$ 2,745	\$ 5,542	\$ 9,219
CO ₂ emissions reduction (million metric tons)	0.2	1.7	2.8	3.7	4.5	0.2	5.9	17.8	34.7	55.6

Source: BCAP Code Calculator estimates

Table 2: Equivalent Emissions Savings from 2012 IECC / ASHRAE 90.1-2010 Adoption and Compliance in Virginia (2014 – 2035)

CO2 emissions equivalencies - Virginia	Annual savings by year...					Cumulative savings through year...				
	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035
Residential										
<i>CO₂ emissions reduction (million metric tons)</i>	0.0	0.4	0.8	1.1	1.3	0.0	1.3	4.6	9.5	15.7
Annual emissions of X passenger vehicles	1,986	89,086	165,070	227,986	279,233	1,986	276,087	955,944	1,973,045	3,264,076
Annual electricity use of X homes	1,427	64,014	118,613	163,823	200,647	1,427	198,386	686,906	1,417,757	2,345,444
Annual energy use of X homes	491	22,008	40,779	56,322	68,982	491	68,205	236,157	487,422	806,359
Annual emissions of X coal-fired power plants	0.0	0.1	0.2	0.3	0.4	0.0	0.4	1.3	2.7	4.4
Commercial										
<i>CO₂ emissions reduction (million metric tons)</i>	0.2	1.2	2.0	2.7	3.1	0.2	4.6	13.2	25.3	40.0
Annual emissions of X passenger vehicles	48,208	260,391	422,832	552,194	653,963	48,208	951,077	2,752,384	5,264,535	8,327,078
Annual electricity use of X homes	34,641	187,107	303,832	396,786	469,913	34,641	683,409	1,977,761	3,782,900	5,983,529
Annual energy use of X homes	11,909	64,327	104,457	136,414	161,555	11,909	234,955	679,951	1,300,554	2,057,127
Annual emissions of X coal-fired power plants	0.1	0.4	0.6	0.8	0.9	0.1	1.3	3.7	7.2	11.3
Residential and commercial combined										
<i>CO₂ emissions reduction (million metric tons)</i>	0.2	1.7	2.8	3.7	4.5	0.2	5.9	17.8	34.7	55.6
Annual emissions of X passenger vehicles	50,195	349,477	587,902	780,181	933,196	50,195	1,227,164	3,708,328	7,237,580	11,591,154
Annual electricity use of X homes	36,068	251,121	422,445	560,609	670,560	36,068	881,795	2,664,667	5,200,656	8,328,973
Annual energy use of X homes	12,400	86,335	145,236	192,736	230,537	12,400	303,159	916,108	1,787,977	2,863,486
Annual emissions of X coal-fired power plants	0.1	0.5	0.8	1.1	1.3	0.1	1.7	5.0	9.8	15.7

Source: BCAP Code Calculator estimates and EPA Greenhouse Gas Equivalencies Calculator



Source: BCAP Code Calculator estimates

The Building Codes Assistance Project (BCAP) is a nonprofit advocacy organization that promotes the adoption, implementation and advancement of building energy codes on the state, local, and international levels. BCAP is a proud team of the Alliance to Save Energy.

REFERENCES

¹ Building Code Assistance Project (BCAP) and Nils Petermann. (2012). "BCAP Code Calculator."

BCAP's **Code Calculator** is a tool that estimates energy, utility cost (in real 2008 dollars), and carbon emissions (CO₂ equivalent) savings at a state level through the adoption and implementation of residential and commercial energy codes. The Code Calculator compares the desired "target code" scenario to the "business-as-usual" baseline scenario based in part on the Annual Energy Outlook (AEO) reference case published by the U.S. Energy Information Administration (see <http://www.epa.gov/cleanenergy/energy-resources/refs.html#houseenergy> for more details).

Details on the methodology behind BCAP's code calculator are available in the BCAP Code Calculator Primer at: <http://energycodesocean.org/resource/bcap-codes-savings-estimator-primer>.

² BCAP and Nils Petermann. (2012). "BCAP Code Calculator."

³ U.S. Department of Energy (DOE). "Table 1.1.3. Buildings Share of U.S. Primary Energy Consumption (percent)." *Building Energy Data Book*. <http://buildingsdatabook.eren.doe.gov/tableview.aspx?table=1.1.3>.

The U.S. commercial and residential building sector comprised about 41.2% of the 96.9 quadrillion Btu ("quads") of total U.S. energy consumption in 2012, or about 40 quads.

NOTE: All figures for energy savings refer to *source energy* – the total amount of raw fuel required to operate the building, including all transmission, delivery, and production losses in getting the energy from the power plant to the building. For example: Electricity, as a fuel, requires roughly three times the energy input (*source energy*) to produce one unit of energy consumed by or at the building itself (*site energy*). For more information, visit

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_benchmark_comm_bldgs.

⁴ U.S. Department of Health and Human Services. *LIHEAP Clearinghouse*. "Funding."

<http://www.liheap.ncat.org/Funding/funding.htm>.

The federal Low-Income Home Energy Assistance Program (LIHEAP) is a program that pays a portion of utility bills for low-income households. The federal Weatherization Assistance Program (WAP) enables low-income families to permanently reduce their energy bills by making their homes more energy efficient. The allocations for fiscal year 2012 for Virginia were \$80,436,332 from LIHEAP and \$0 from WAP.

⁵ Consumers Union and BCAP (August 2011). *Energy Codes Messaging Test*.

http://energycodesocean.org/sites/default/files/Energy%20Code%20Survey%20by%20Region_1.pdf.

A survey of 2,992 consumers, with 977 from the South region (see page 2).

⁶ NOTE: "Standard mortgage" refers to a 15-year or 30-year mortgage, where it is assumed that a buyer's typical 20% mortgage down payment is increased incrementally due to the increased home price resulting from building to the energy code.

⁷ BCAP and Nils Petermann. (2012). "BCAP Code Calculator."

⁸ U.S. Environmental Protection Agency (EPA). "Greenhouse Gas Equivalencies Calculator."

<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.