THE POTENTIAL IMPACT OF ENERGY CODES IN PENNSYLVANIA

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 2010, Pennsylvania's code is based on the 2009 International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2007.

If Pennsylvania were to adopt and achieve full compliance with the 2012 edition of the IECC and 2010 edition of ASHRAE Standard 90.1 by the year 2014, then by 2040 Pennsylvania would...

STRENGTHEN THE STATE AND FEDERAL ECONOMY & REDUCE IMPORTS

- **Allow businesses and households to keep about $1.4 billion annually via reduced energy bills** (about $19 billion cumulatively through 2040).[1]
- **Reduce the demand for about 1.2 quadrillion Btu of energy per year**[2] (about 5.5% less than the projected baseline energy demand of Pennsylvania's building sector in 2040).[3]
- **Reduce the need for state and federal funding for low-income households that struggle with high energy bills.**

Millions of Pennsylvania 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. Pennsylvania 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 $213 million was spent to assist low-income Pennsylvania households with high energy bills in 2012.[4]

PROTECT CONSUMERS AND PROMOTE HEALTH AND SAFETY

- **The vast majority (80%) of Northeast consumers believe that homeowners should have a right to a home that meets national energy standards.** Most (75%) 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 64 million metric tons (MMT) of CO_2 emissions cumulatively,**[7] **equivalent to one year of emissions from:** [8]
  - o 13.2 million passenger vehicles;
  - o The energy use almost 6 million PA homes;
  - o More than 18 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 Pennsylvania (2014 – 2040)

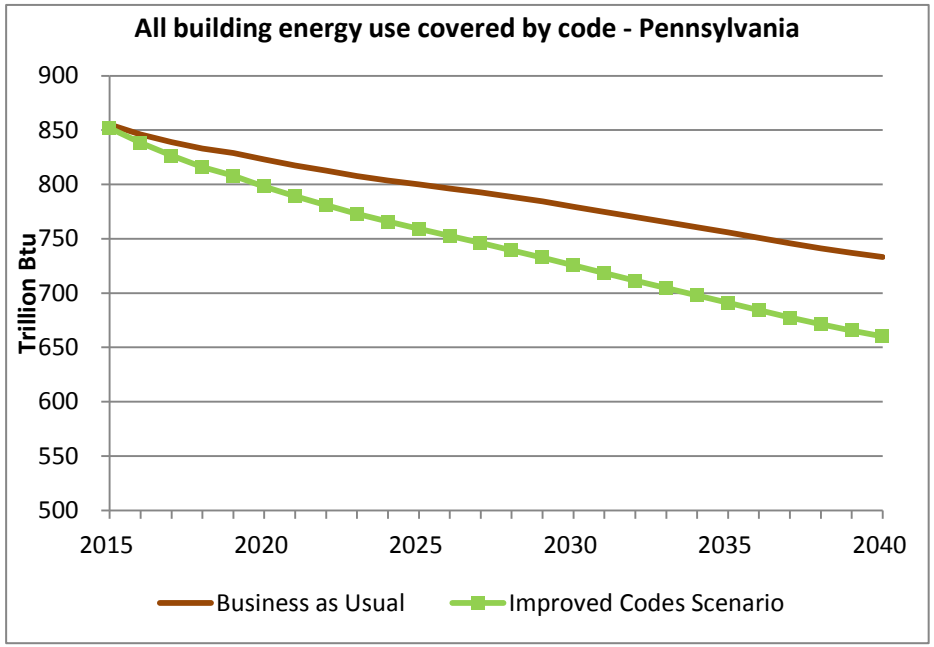
Selected savings estimates - Pennsylvania	Annual savings by year…					Cumulative savings through year…				
	2015	2020	2025	2030	2040	2015	2020	2025	2030	2040
Residential										
Overall source energy savings (trillion Btu)	1	13	22	31	47	1	42	136	275	675
Percent of business-as-usual energy use	0.2%	2.4%	4.4%	6.3%	10.0%	0.1%	0.9%	1.8%	2.7%	4.6%
Energy cost savings (millions of 2011 dollars)	$ 19	$ 218	$ 406	$ 595	$ 1,031	$ 19	$ 707	$ 2,362	$ 4,957	$ 13,249
CO_2 emissions reduction (million metric tons)	0.1	0.7	1.3	1.8	2.6	0.1	2.4	7.7	15.6	38.2
Commercial										
Overall source energy savings (trillion Btu)	2	12	18	23	27	2	44	124	229	482
Percent of business-as-usual energy use	0.7%	4.1%	6.3%	8.0%	9.9%	0.2%	1.6%	3.0%	4.1%	5.8%
Energy cost savings (millions of 2011 dollars)	$ 22	$ 129	$ 205	$ 264	$ 362	$ 22	$ 465	$ 1,350	$ 2,558	$ 5,751
CO_2 emissions reduction (million metric tons)	0.1	0.6	1.0	1.2	1.4	0.1	2.3	6.6	12.2	25.7
Residential and commercial combined										
Overall source energy savings (trillion Btu)	3	25	41	54	73	3	86	259	504	1,157
Percent of business-as-usual energy use	1.5%	3.9%	5.9%	7.6%	9.2%	0.1%	0.9%	2.0%	2.9%	5.5%
Energy cost savings (millions of 2011 dollars)	$ 40	$ 347	$ 611	$ 859	$ 1,394	$ 40	$ 1,172	$ 3,712	$ 7,515	$ 19,001
CO_2 emissions reduction (million metric tons)	0.2	1.4	2.2	3.0	4.0	0.2	4.7	14.3	27.8	63.8

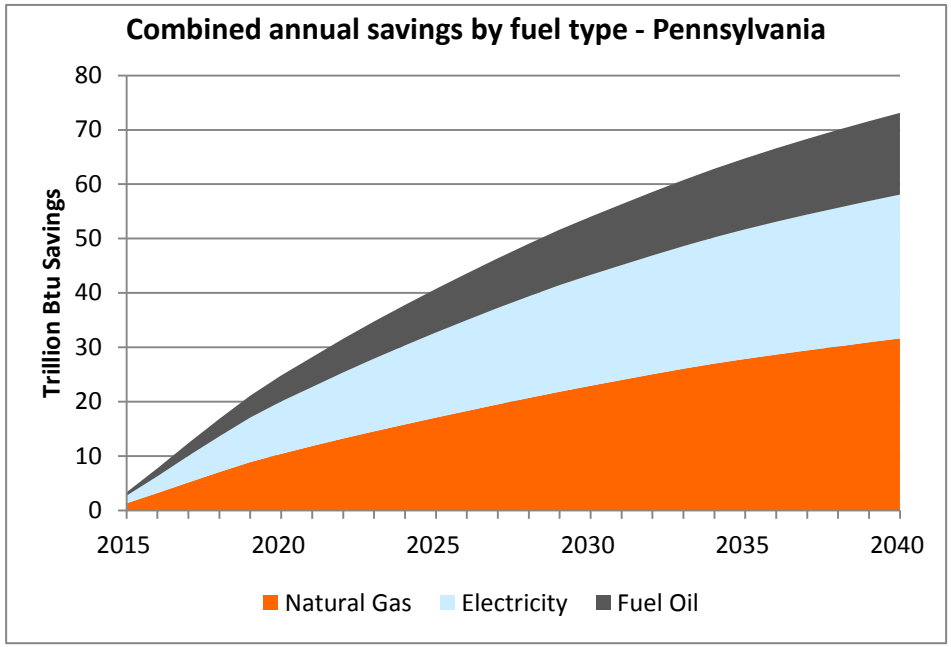
Source: BCAP Code Calculator estimates

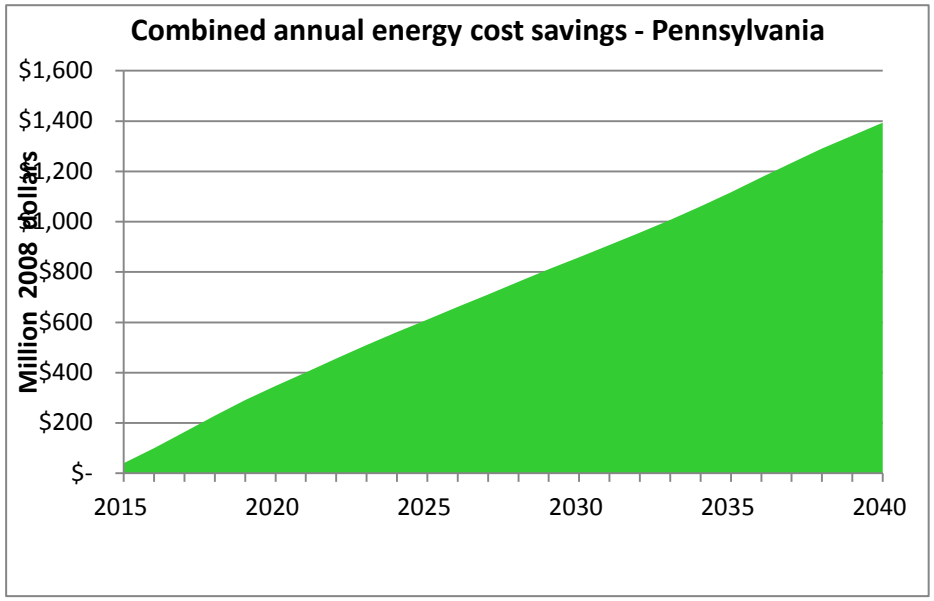
Table 2: Equivalent Emissions Savings from 2012 IECC / ASHRAE 90.1-2010 Adoption and Compliance in Pennsylvania (2014 – 2040)

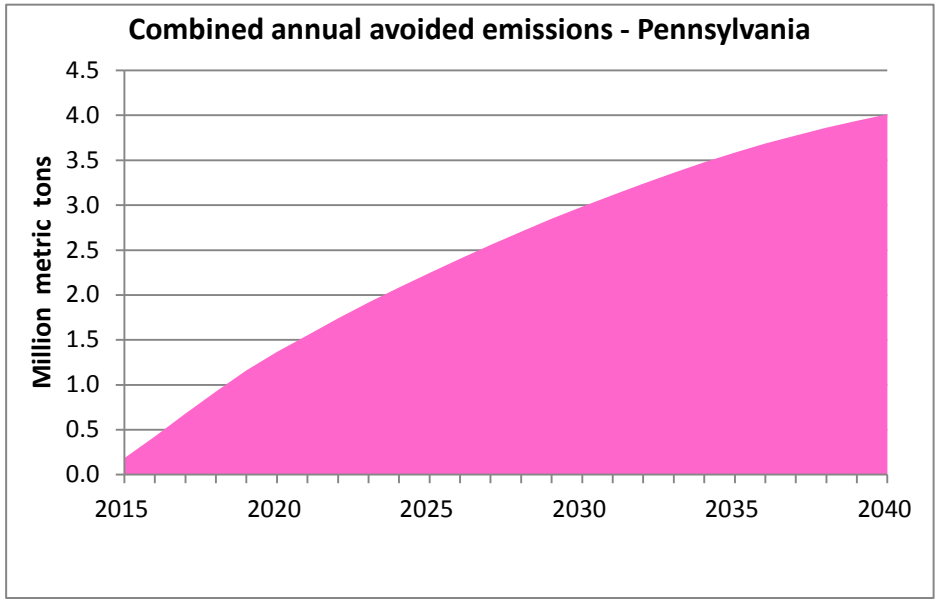
CO2 emissions equivalencies - Pennsylvania	Annual savings by year…					Cumulative savings through year…				
	2015	2020	2025	2030	2040	2015	2020	2025	2030	2040
Residential										
CO_2 emissions reduction (million metric tons)	*0.1*	*0.7*	*1.3*	*1.8*	*2.6*	*0.1*	*2.4*	*7.7*	*15.6*	*38.2*
Annual emissions of **X** passenger vehicles	13,656	151,853	265,170	369,302	544,606	13,656	502,006	1,606,278	3,247,325	7,954,370
Annual electricity use of **X** homes	9,835	109,359	190,966	265,958	392,206	9,835	361,527	1,156,784	2,338,609	5,728,456
Annual energy use of **X** homes	6,006	66,781	116,614	162,408	239,501	6,006	220,767	706,393	1,428,077	3,498,095
Annual emissions of **X** coal-fired power plants	0.0	0.2	0.4	0.5	0.7	0.0	0.7	2.2	4.4	10.8
Commercial										
CO_2 emissions reduction (million metric tons)	*0.1*	*0.6*	*1.0*	*1.2*	*1.4*	*0.1*	*2.3*	*6.6*	*12.2*	*25.7*
Annual emissions of **X** passenger vehicles	24,716	132,976	202,694	252,208	291,209	24,716	486,291	1,369,386	2,540,649	5,344,627
Annual electricity use of **X** homes	17,799	95,764	145,973	181,631	209,719	17,799	350,210	986,184	1,829,686	3,849,011
Annual energy use of **X** homes	10,869	58,479	89,139	110,914	128,065	10,869	213,856	602,215	1,117,302	2,350,408
Annual emissions of **X** coal-fired power plants	0.0	0.2	0.3	0.3	0.4	0.0	0.7	1.9	3.5	7.3
Residential and commercial combined										
CO_2 emissions reduction (million metric tons)	*0.2*	*1.4*	*2.2*	*3.0*	*4.0*	*0.2*	*4.7*	*14.3*	*27.8*	*63.8*
Annual emissions of **X** passenger vehicles	38,372	284,829	467,864	621,510	835,815	38,372	988,297	2,975,664	5,787,975	13,298,997
Annual electricity use of **X** homes	27,634	205,124	336,939	447,590	601,924	27,634	711,737	2,142,968	4,168,294	9,577,467
Annual energy use of **X** homes	16,875	125,259	205,753	273,322	367,567	16,875	434,624	1,308,609	2,545,379	5,848,503
Annual emissions of **X** coal-fired power plants	0.1	0.4	0.6	0.8	1.1	0.1	1.3	4.0	7.9	18.1

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 2011 dollars), and carbon emissions (CO_2 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 Pennsylvania were $209,548,185 from LIHEAP and $3,866,228 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 551 from the Northeast 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.