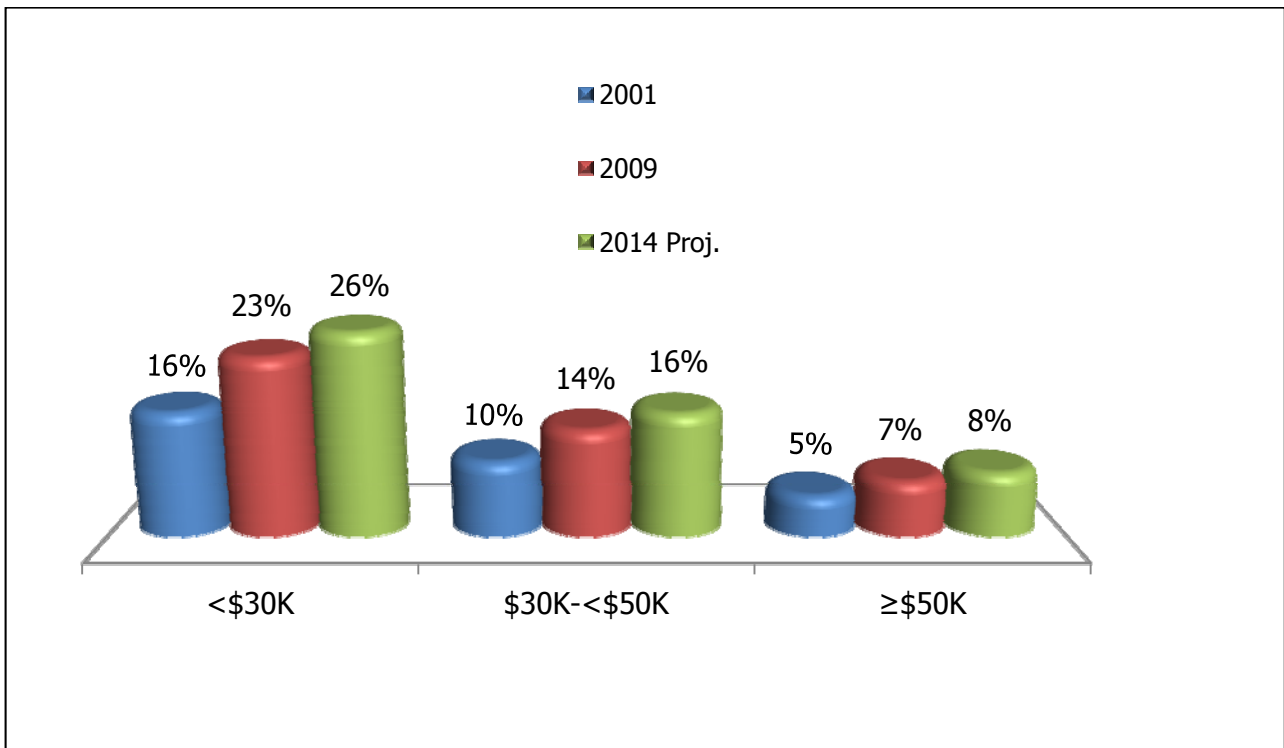


Energy Cost Impacts on American Families, 2001-2014



Energy Costs as Percentage of Nominal After-Tax Household Income

February 2014

www.americaspower.org

Executive Summary

This report analyzes consumer energy cost increases and the reduction of real household incomes since 2001 for all U.S. households. It projects household energy expenditures for 2014 among four income levels and for senior and minority families. It relies on historical energy consumption survey data and current energy price forecasts from the U.S. Department of Energy's Energy Information Administration (EIA).¹ Energy costs are summarized in nominal (then-current) and constant 2001 dollars by household income category for U.S. households in 2001, 2005, 2009, and 2014, using data from EIA, U.S. DOT, and the U.S. Bureau of the Census.² Energy price projections for 2014 are based on the DOE/EIA Short-Term Energy Outlook released in January 2014.

Key findings of this report are:

- Declining real household incomes, coupled with increased energy prices, are burdening family budgets for millions of low- and middle-income Americans. Real household incomes have declined across all five income quintiles measured by the Bureau of Labor Statistics since 2001. The largest percentage losses of real average household incomes have occurred in the first and second income quintiles, among households least able to afford higher energy costs for heating, cooling and other necessities. Average real household incomes in these lower-income household groups decreased by 13% and 10%, respectively, from 2001 to 2012.
- For households with gross annual incomes below \$50,000 – representing one-half or more of U.S. households since 2001 – total energy costs will increase by 27% in constant dollars between 2001 and 2014, while estimated average real after-tax household incomes will decline by 22%. Average U.S. household energy costs for residential utilities and gasoline will increase by 33% in real terms. Average real after-tax household income is projected to decline by 10% from 2001 to 2014. The percentage of after-tax income spent on energy is not affected by the adjustment of survey-based income and expenditures from then-current to constant 2001 dollars.
- For low- and middle-income families, energy costs are consuming a portion of after-tax household income comparable to that traditionally spent on major categories such as housing, food, and health care. The average American family's energy expenditures will increase by 33% in real terms since 2001, while average real pre-tax income will decline by 6%.
- Higher gasoline prices account for most of the increased cost of energy for consumers since 2001. Average U.S. household expenditures for gasoline will grow by 55% measured in 2001 constant dollars from 2001 to 2014, based on EIA gasoline price projections for 2014 and changes in household gasoline consumption. In comparison, residential energy costs for heating, cooling, and other household energy services will increase on average by 10% in constant 2001 dollars over this period.

- Residential electricity has maintained relatively stable average annual price increases at a national level, with steeper increases in many eastern states. National residential electricity prices have increased by 7% in constant dollars since 2001, while the price of gasoline has increased by 72% in real terms. The price of residential natural gas has declined in real terms by 10% since 2001, reflecting the expansion of gas supplies due to new drilling technologies.
- Additional upward pressures on electricity prices can be expected due to additional capital, operating and maintenance costs associated with meeting new clean air and other environmental standards, as well as higher natural gas prices.
- Lower-income families are more vulnerable to energy costs than higher-income families because energy represents a larger portion of their household budgets, reducing the amount of income that can be spent on food, housing, health care, and other necessities. Some 30% of U.S. households had gross annual incomes less than \$30,000 in 2012. Energy costs in 2014 are projected to account for an average of 26% of their family budgets, before taking into account any energy assistance programs.
- The Census Bureau finds that real median household incomes for both white and minority households have not returned to their pre-2001 recession peaks. Household income in 2012 was 6.3 percent lower for non-Hispanic Whites (from \$60,849 in 1999), 15.8 percent lower for Blacks (from \$39,556 in 2000), 7.7 percent lower for Asians (from \$74,343 in 2000), and 11.8 percent lower for Hispanics (from \$44,224 in 2000).
- The average incomes of Hispanic and Black households were 25% and 33% lower, respectively, than the average income of U.S. households in 2012. These income inequality data indicate that disproportionate numbers of Black and Hispanic families are vulnerable to energy price increases.
- Fixed-income seniors are a growing proportion of the U.S. population, and are among the most vulnerable to energy cost increases due to their relatively low average incomes. In 2012, the median gross income of 27.9 million households with a principal householder aged 65 or older was \$33,848, one-third below the national median household income.

Energy Cost Impacts on American Families, 2001–2014

Energy costs for residential utilities and gasoline continue to strain low- and middle-income family budgets. As Table 1 illustrates, the average American family with an after-tax income of \$54,286 will spend an estimated \$5,752 on energy in 2014, or 11% of the family budget. The 60 million households earning less than \$50,000, representing 49% of U.S. households, will devote an estimated 20% of their after-tax incomes to energy, compared with an average of 8% for households with annual incomes above \$50,000. For the 37 million lower-income families with pre-tax incomes less than \$30,000, energy costs in 2014 will represent 26% of average after-tax incomes, compared with 16% in 2001. These energy expense estimates for lower-income households do not take into account any energy assistance programs that may be available.

The summary income and energy expenditure data in Table 1 are based on U.S. Bureau of the Census pre-tax household income data for 2012 (the most recent available, with households as of March 2013) and energy prices for 2014 projected by U.S. DOE/EIA. The Congressional Budget Office has calculated effective total federal tax rates, including individual income taxes and payments for Social Security and other social welfare programs.³ Federal tax rates for 2014 are based on CBO's estimates for 2009 adjusted for payroll and other tax increases in the American Taxpayer Relief Act of 2012.⁴ State income taxes are estimated from current state income tax rates

Table 1. Projected Household Energy Expenditures as a Percentage of Income, 2014

Pre-tax income	<\$30K	\$30K<\$50K	<\$50K	≥\$50K	Average
Est. average after-tax income	\$15,120	\$33,469	\$22,624	\$85,827	\$54,286
Percentage of households	30%	19%	49%	51%	100%
Residential energy	\$1,715	\$1,985	\$1,832	\$2,642	\$2,246
Transportation fuel	\$2,171	\$3,260	\$2,606	\$4,369	\$3,506
Total energy	\$3,886	\$5,245	\$4,438	\$7,011	\$5,752
Energy pct. of after-tax income	26%	16%	20%	8%	11%

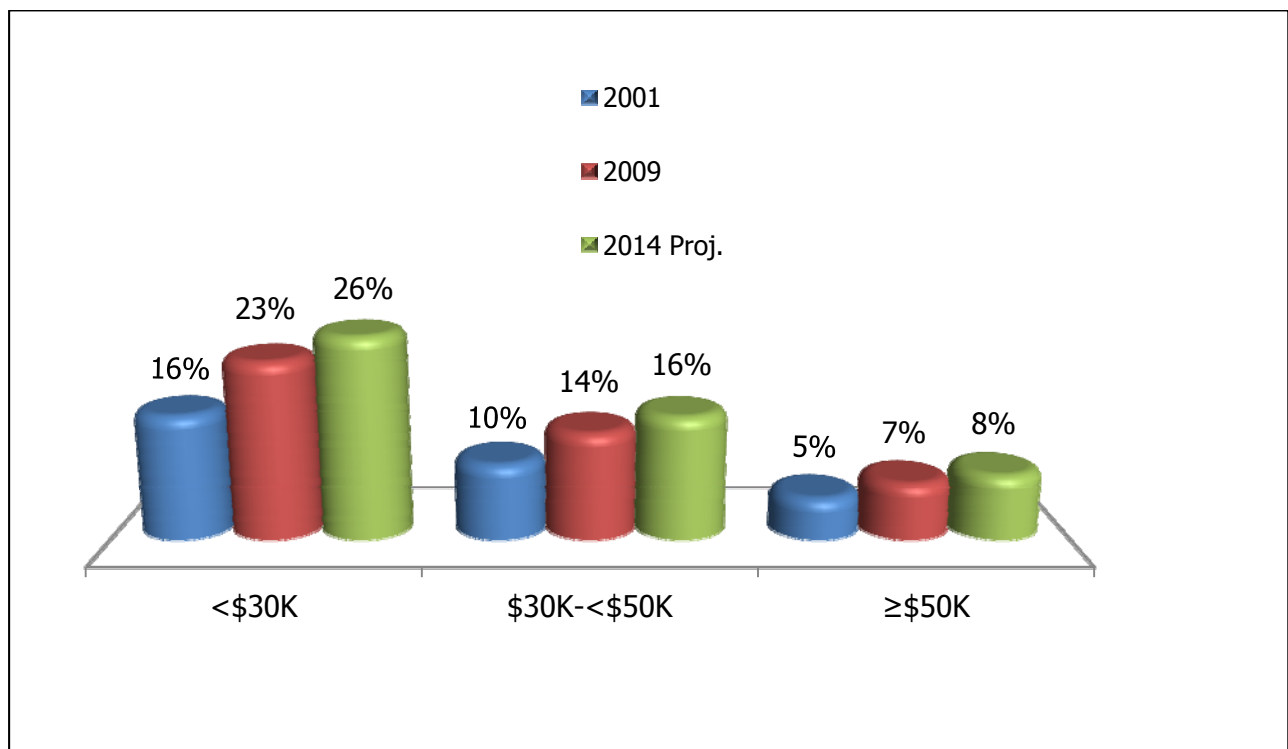
Source: Appendix Table 1.

The Bureau of Labor Statistics reports that 21% of total pre-tax household income is concentrated among the top-4% of households, those earning \$200,000 or more. The 49% of U.S. households earning less than \$50,000 in 2012 received 17% of total household income. The 30% of households earning less than \$30,000 received 7% of total household income.⁵

Many lower-income families qualify for federal or state energy assistance. However, these programs are unable to keep up with household energy costs. In FY2011, federal funding for the Low Income Home Energy Assistance Program (LIHEAP) was cut from \$5.1 billion to \$4.7 billion.⁶ In FY2012, Congress again reduced annual funding for LIHEAP to \$3.5 billion.⁷ LIHEAP funding for FY2014 is \$2.9 billion under the Continuing Resolution.⁸ Based on DOE/EIA's 2009 Residential Energy Consumption Survey (2012), a \$2.9 billion funding level for LIHEAP would offset less than 4% of projected 2014 residential energy bills for lower-income households with incomes below \$30,000.

The portion of household incomes devoted to energy has increased substantially since 2001 (see Chart 1). In 2001, 62 million families with nominal gross annual incomes less than \$50,000 spent an average of 12% of their after-tax income on residential and transportation energy. In 2014, energy will account for an average of 20% of the after-tax income of the 60 million American families in this income category. Energy cost burdens are greatest on low-income families, those earning less than \$30,000. Their average energy bills will increase from 16% of estimated after-tax income in 2001 to 26% in 2014. Because these estimates do not account for any energy assistance that these families may receive, they may not reflect actual personal energy consumption expenditures.

Chart 1
Energy costs as percentage of nominal after-tax household income, 2001, 2009, and projected 2014



Source: Appendix Table 1.

Adjustment to Constant Dollars

The quadrennial government energy expenditure survey data used in this report are updated for current population and energy prices. The DOE/EIA residential energy survey results are expressed in current dollars, and the percentage of income allocated to energy does not change when income and expenditure data are converted to constant 2001 dollars (see Appendix Tables 1 and 2). These calculations use as-reported income categories (e.g., <\$30,000) in current dollars to preserve the integrity of the survey findings.

The impacts of higher energy prices on lower-income families are compounded by the sluggish growth of household incomes since 2001 expressed in then-current dollars, and by the reduction of real incomes in constant 2001 dollars. For the 36 to 38 million low-income households with pre-tax incomes below \$30,000 represented in the DOE/EIA residential energy surveys since 2001, and the 58 to 62 million households with gross incomes below \$50,000, average pre-tax incomes have declined substantially in real terms:

Table 2
Household incomes for low- and middle-income households in current and constant dollars, 2001, 2005, 2009 and projected 2014

Income/pop.	2001	2005	2009	2014 (Proj.)
<\$30K	<\$30K	<\$30K	<\$30K	<\$30K
H/holds (mil.)	38.7	37.5	35.5	36.9
Avg. pre-tax income (current \$)	\$16,168	\$16,112	\$16,217	\$16,096
Avg. pre-tax income (2001\$)	\$16,168	\$14,647	\$13,402	\$11,284
<\$50K	<\$50K	<\$50K	<\$50K	<\$50K
H/holds (mil.)	62.3	60.9	58.2	59.9
Avg. pre-tax income (current \$)	\$24,893	\$25,055	\$25,143	\$24,953
Avg. pre-tax income (2001\$)	\$24,893	\$22,778	\$20,779	\$18,622

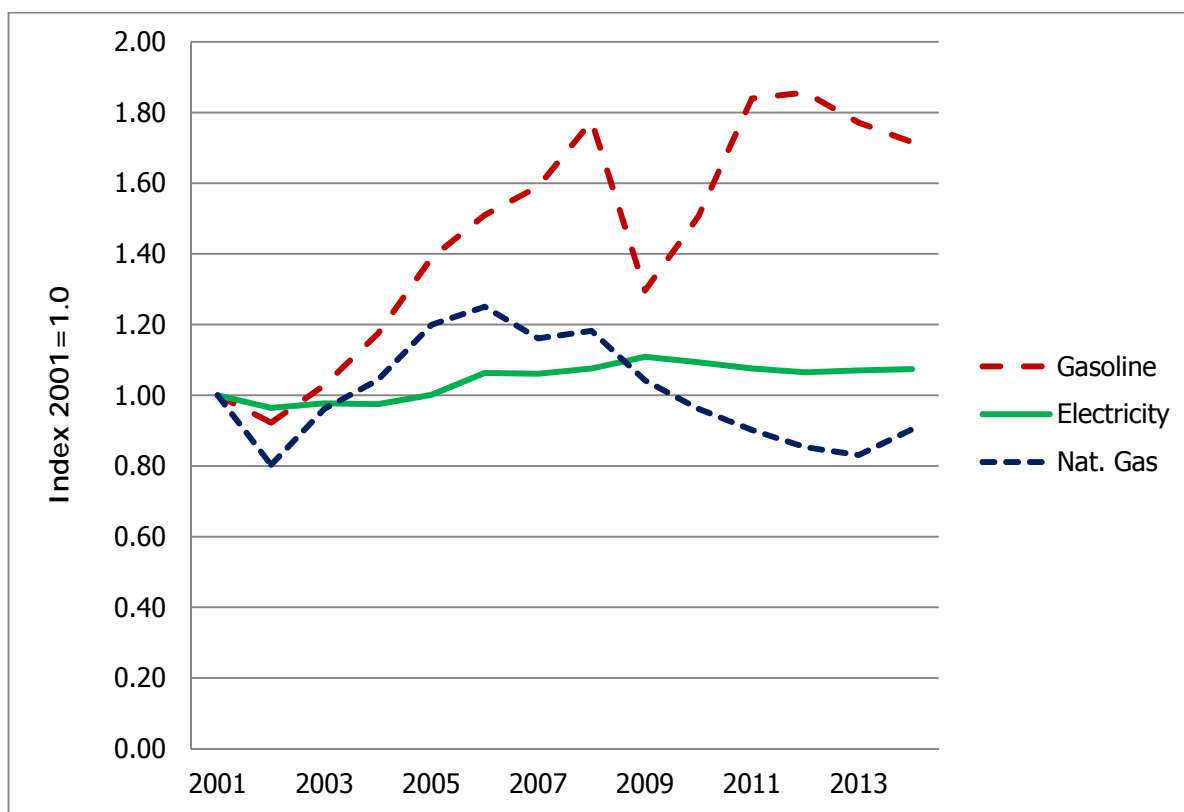
Source: Appendix tables 1 and 2.

Relative energy price increases

Chart 2 (below) presents an index of price trends for the three principal consumer energy commodities - gasoline, residential electricity and natural gas - in constant 2001 prices from 2001 to 2014. Price projections for 2014 are based on current EIA projections.

The price of gasoline will increase by 72% in real terms over this period, while residential electricity is projected to increase by 7%. Residential natural gas prices will decline by 10% following a period of sharp price volatility and the development of additional gas reserves. Average U.S. household expenditures for gasoline will grow by 55% measured in 2001 constant dollars from 2001 to 2014, based on EIA gasoline price projections for 2014 and changes in household gasoline consumption. In comparison, residential energy costs for heating, cooling, and other household energy services will increase on average by 10% in constant 2001 dollars over this period.

Chart 2
 Index of real prices of gasoline, residential electricity, and residential natural gas,
 2001-2014 (2001=1.0)
 (Gasoline in \$/gal., electricity in cents/kWh and natural gas in \$/tcf)

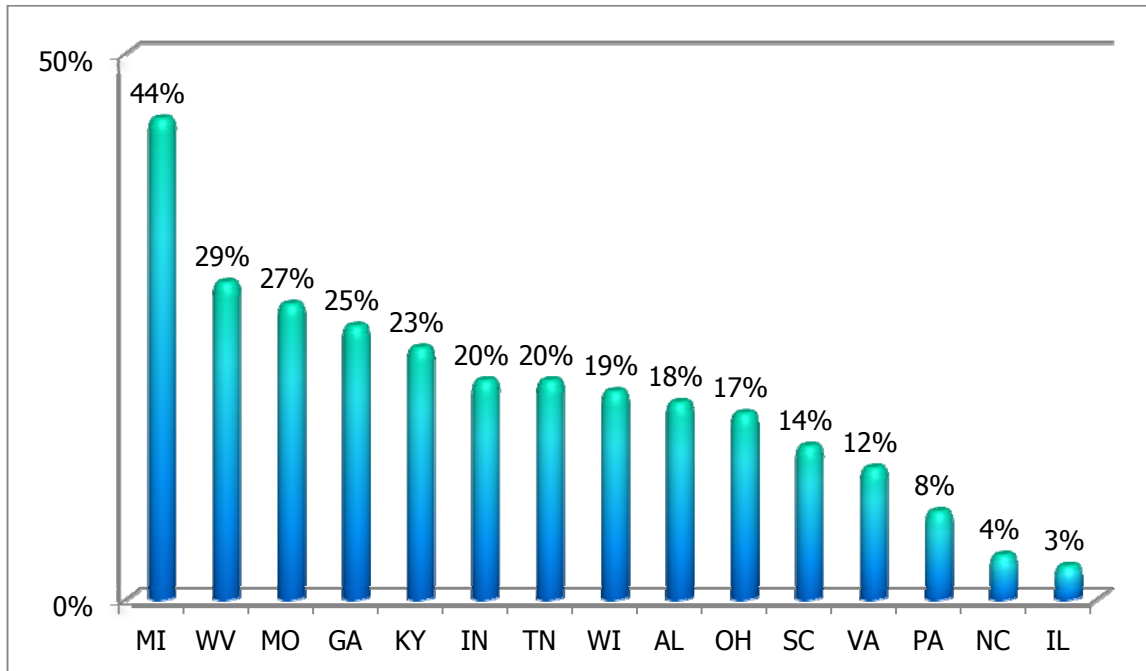


Source: U.S. DOE/EIA, Annual Energy Review (2012) and Short-Term Energy Outlook (January 2014). Prices are adjusted from current dollars to constant 2001 dollars using the CPI and indexed to 2001.

These national energy price trends mask larger consumer electric price increases in eastern coal-dependent states subject to major U.S. EPA rules for reducing sulfur dioxide and nitrogen oxides, including the 1998 Ozone Transport Rule and the 2005 Clean Air Interstate Rule.⁹ The chart below summarizes real residential electric price increases from 2005 to 2013 in 15 eastern states subject to both of these rules. The total estimated capital

investment for pollution control retrofits in this group of states for compliance with federal and state air quality regulations is \$71 billion (nominal \$) through the year 2012.¹⁰

Chart 3
Residential real electric price increases in coal-dependent states covered by U.S. EPA's Ozone Transport Rule and Clean Air Interstate Rule, 2005-2013
(Electric price in cents/kwh deflated by CPI)



Source: DOE/EIA, Electric Power Monthly (2013 data through September.) Includes states covered by both rules and that generated more than 40% of their electricity from coal in 2011. Excludes Maryland, which was subject to the 2006 Maryland Healthy Air Act and the expiration of rate caps.

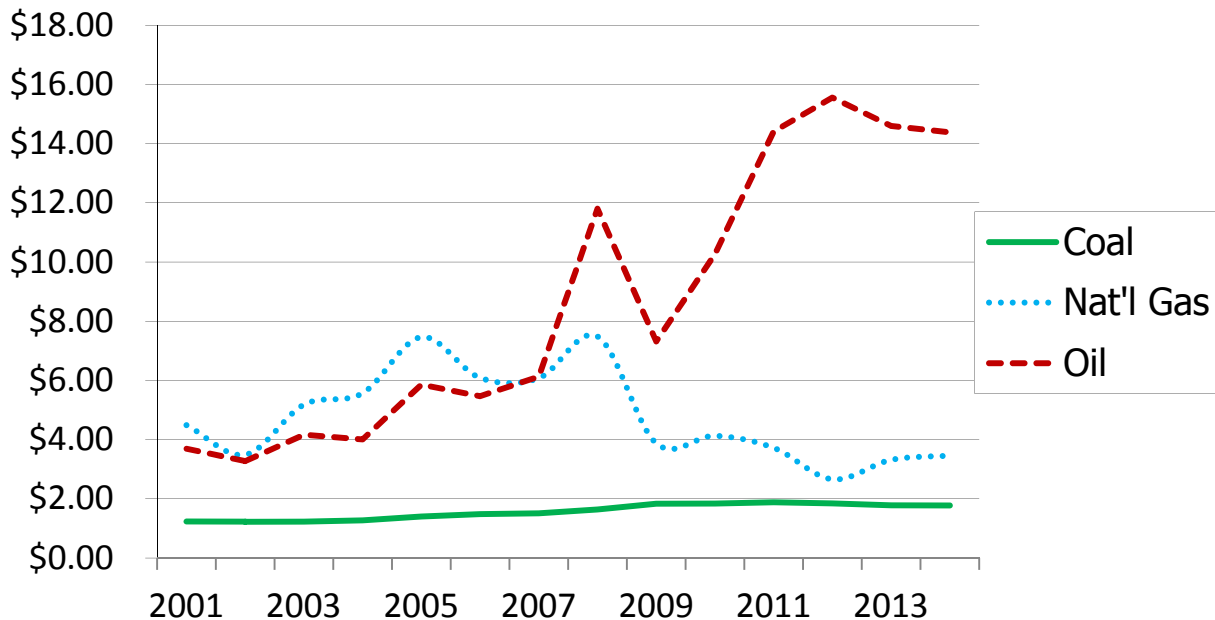
These electric price increases are due to a variety of factors, including costs of compliance with state and federal environmental regulations, fuel prices, and rate case determinations.

Current and prospective EPA rules are expected to result in additional electricity price increases in many areas of the country.¹¹ For example, EPA estimates the annual costs of compliance with one recent Clean Air Act regulation – the utility Mercury and Air Toxics Standards rule – at \$9.6 billion (\$2007) in 2016.¹² The projected annual cost of this rule is 45% greater than EPA's \$6.6 billion (\$2006) estimate of the annual costs of compliance with all utility Clean Air Act requirements in 2010.¹³

Electric utility fuel cost trends

As Chart 4 illustrates, real (2001\$) coal prices at electric utilities have remained stable relative to competing fuels such as natural gas and petroleum.¹⁴ Natural gas prices have declined sharply in the past five years due to increased supply, and have helped to restrain the rate of residential electricity price increases.

Chart 4
Electric utility fuel costs, 2001-2014
(Constant 2001\$ per Million BTU)



Source: DOE/EIA, Electric Power Annual (2012) and Short-Term Energy Outlook (January 2014).

EIA forecasts that domestic coal will cost \$2.38 per million British Thermal Units (MMBTU) delivered to power plants in 2014, an increase of 1% over 2013.¹⁵ The cost of natural gas at utility plants in 2014 is projected at \$4.64/MMBTU, a 6% increase over 2013 delivered gas prices.¹⁶

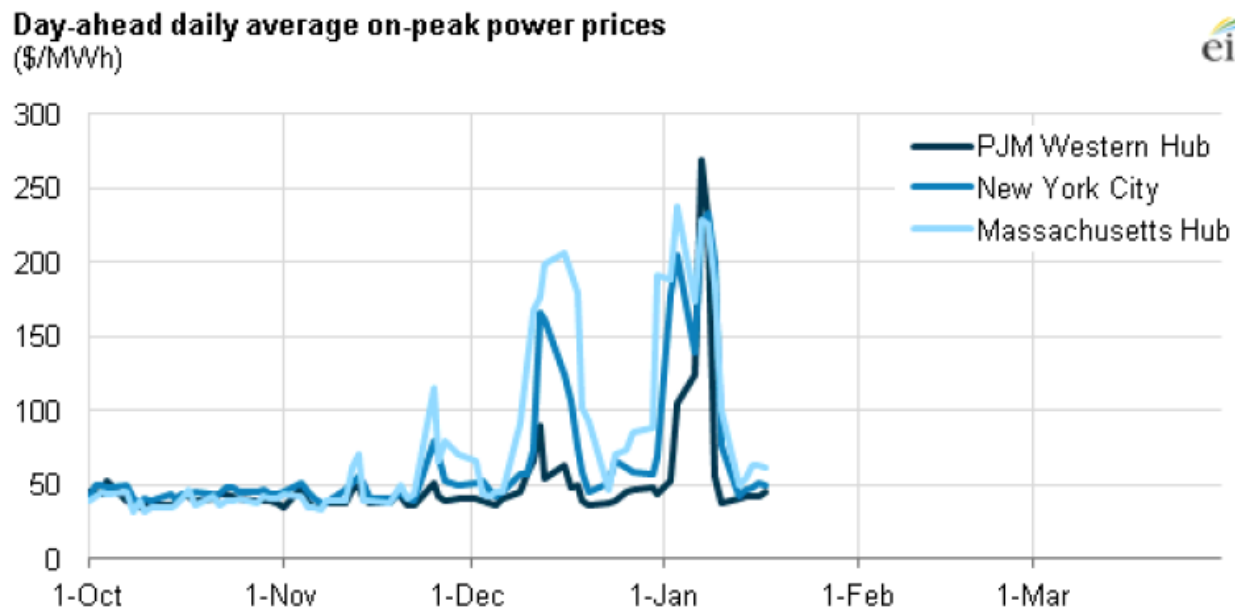
EIA projects that natural gas wellhead prices will increase due to projected LNG exports and increased domestic demand. EIA's 2014 Annual Energy Outlook (AEO) reports that:

The Henry Hub spot price for natural gas in the *AEO2014* Reference case is higher than projected in *AEO2013* through 2037, with price increases in the near term driven by faster growth of consumption in the industrial and electric power sectors and, later, growing demand for export at LNG facilities. A sustained increase in production follows, leading to slower price growth over the rest of the projection period.

The Henry Hub spot natural gas price in *AEO2014* reaches \$4.80 per million Btu (MMBtu) (2012 dollars) in 2018, which is 77 cents/ MMBtu higher than in *AEO2013*. The stronger near-term price growth is followed by a lagged increase in supply from producers, eventually causing prices to settle at \$4.38/MMBtu in 2020, which is still notably higher than in *AEO2013*.¹⁷

Recent natural gas price spikes due to cold winter weather in the eastern U.S. have led to extreme price volatility in regional electric markets, both in the gas-dependent Northeast and in the Mid-Atlantic and PJM regions. Chart 5 below shows the trend of electric prices in these regions in from October 2013 to early January 2014:

Chart 5
Northeast and Mid-Atlantic electricity prices, Oct 2013-Jan 2014



Source: DOE/EIA, Today in Energy, January 21, 2014.

The extreme price volatility reflected in these recent power prices is due to major increases in power demand to meet increased heating requirements, shortages in natural gas supply and transmission capability to some areas of the Northeast, and the unexpected outages of power plants and natural gas equipment. The scheduled retirements of more than 60 Gigawatts of existing coal-based capacity in the eastern U.S.¹⁸ in response to EPA's 2011 Mercury and Air Toxics Standards Rule and other factors will add further upward pressure to power prices, especially during peak demand periods.

Consumer Energy Cost Estimates

The distribution of U.S. households by income categories provides the basis for estimating the effects of energy prices on consumer budgets in 2014. EIA's quadrennial Surveys of Residential Energy Consumption¹⁹ are the principal sources for estimating energy expenditures for residential heating, cooling, electricity, and other household energy services. For this report, the most recent EIA 2009 survey (2012) is updated with Census Bureau 2012 population data and EIA's January 2014 forecast of 2014 residential energy prices.

EIA's 2001 Survey of Household Vehicles Energy Use²⁰ provides benchmark data on transportation energy costs by household income category based on gallons of gasoline used per household. These gasoline consumption data are updated using Census Bureau 2012

population data and EIA's January 2014 national average retail gasoline price forecast for 2014 of \$3.52 per gallon.

It is assumed that household gasoline usage in 2014 will be 17% below the levels of the EIA 2001 survey, reflecting a population-adjusted decline of motor gasoline sales over this period. The more recent 2009 National Highway Transportation Survey (2011) confirms the aggregate gasoline expenditure estimates for 2014 in this report.²¹

Residential and transportation energy expenses

The principal residential energy expenses are for electricity and natural gas for heating, cooling, lighting, and appliances. Some homes also use propane fuel (LPG) and other heating sources, such as home heating oil, kerosene, and wood.

Gasoline accounts for the largest single increase in consumer energy costs over the past decade. In 2014, the average U.S. family will spend an estimated \$2,617 (2001\$) on gasoline, compared with \$1,688 in 2001. This 55% increase in real expenditures for gasoline takes into account a 17% reduction in average household gasoline consumption since 2001.

The increase in gasoline prices follows a long-term trend of increased market shares of pickup trucks and sport utility vehicles (SUVs), and an increase in the average number of vehicles owned per household.²² While average vehicle efficiency has been improving in recent model years,²³ and will continue to improve due to new CAFE standards, many families continue to own low-efficiency vehicles with low trade-in values. The average age of vehicles on the road has increased to 11 years, a trend that is expected to continue.²⁴

The impacts of residential and transportation energy costs on low- and middle-income families and for all households are summarized in Table 3 and in Appendix Tables 1 (current dollars) and 2 (constant 2001 dollars). For households with gross annual incomes below \$50,000 – representing one-half or more of U.S. households since 2001 – total energy costs will increase by 27% in constant dollars between 2001 and 2014, while estimated average real after-tax household incomes will decline by 22%. Total U.S. household energy costs will increase by 33% in real terms. Meanwhile, average real after-tax household income is projected to decline by 10%.

Table 3
 Estimated after-tax income and energy costs by income category,
 2001, 2005, and Projected 2014
 (In constant 2001 dollars)

Pre-tax annual income (EIA Survey basis):	<\$30K	<\$50K	U.S. Total
Est. avg. after-tax income			
2001	\$14,624	\$21,635	\$45,127
2005	\$13,286	\$19,890	\$43,428
2014	\$11,284	\$16,883	\$40,512
Pct. Chg. 2001-14	-23%	-22%	-10%
Residential energy expenditures			
2001	\$1,204	\$1,299	\$1,530
2005	\$1,328	\$1,423	\$1,681
2014	\$1,280	\$1,367	\$1,676
Pct. Chg. 2001-14	6%	5%	10%
Transport energy expenditures			
2001	\$1,103	\$1,306	\$1,688
2005	\$1,624	\$1,926	\$2,537
2014	\$1,620	\$1,944	\$2,617
Pct. Chg. 2001-14	47%	49%	55%
Total energy expenditures			
2001	\$2,307	\$2,605	\$3,218
2005	\$2,952	\$3,349	\$4,218
2014	\$2,900	\$3,312	\$4,292
Pct. Chg. 2001-14	26%	27%	33%

Source: Appendix Table 2.

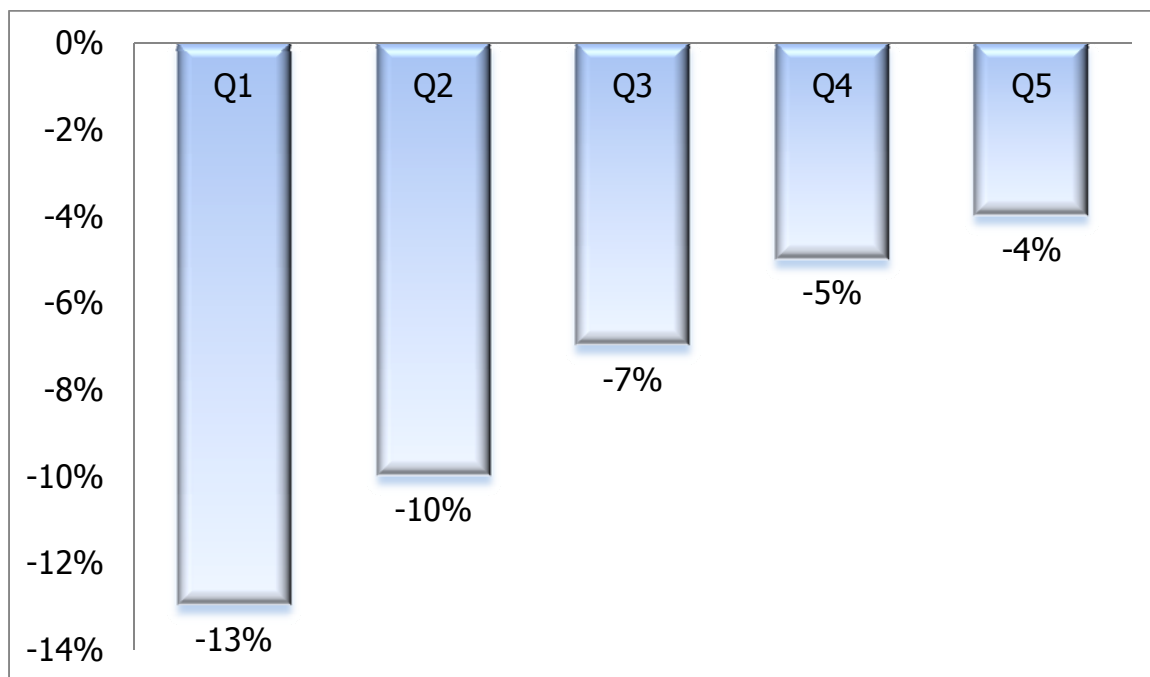
Rising Energy Costs and Declining Real Incomes

Increasing energy costs are straining low- and middle-income family budgets. Heating, cooling, and transportation are necessities of life, and increased energy costs are impacting low- and middle-income family budget choices among energy and other necessities such as health care, housing, and nutrition.

As energy costs have risen over the past decade, the real, inflation-adjusted incomes of American families have declined. The U.S. Census Bureau reports in its latest assessment of income and poverty that real median household income declined slightly between 2011 and 2012, a third consecutive year of declining family incomes. Real median household income has declined by 8.3% since 2007.²⁵

The Bureau of Labor Statistics measures average household incomes by income quintile. BLS data for 2001-2012, expressed in constant 2012 dollars, show a steady decline in real average pre-tax household incomes across all five income quintiles, including the top-5% of households. As indicated by Chart 6, the largest declines in real household incomes have occurred in the two lowest income quintiles, among households least able to afford energy cost increases. The 20% of households in the lowest quintile had gross incomes of \$13,146 in 2001. After a 13% decline, these households had real average incomes of \$11,490 in 2012. Households in the second quintile experienced a 10% decline of real income, from \$33,030 in 2001 to \$29,696 in 2012.

Chart 6
 Percent change in real household income by income quintile, 2001 to 2012
 (Percent change in average income in 2012\$)

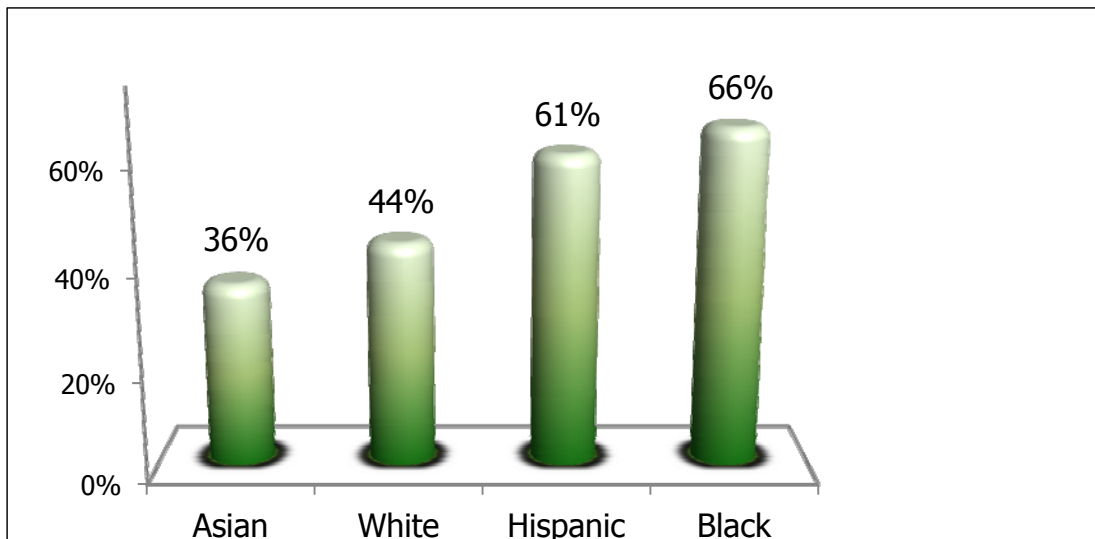


Source: U.S. Bureau of Labor Statistics.

Energy Cost Impacts on Minorities

EIA's residential energy consumption surveys do not provide energy consumption expenditures by income group combined with minority status. However, as shown in Chart 7, the unequal distribution of household incomes is a principal factor leading to disproportionate energy cost impacts on many minority families. More than 60% of Hispanic households and two-thirds of Black households had pre-tax household incomes below \$50,000 in 2012, compared with 36% for Asian families and 44% for white households.

Chart 7
Percentage of Households with Pre-Tax Incomes below \$50,000, 2012



Source: U.S. Bureau of the Census, Current Population Survey (August 2013).

The Census Bureau finds that real median household incomes for both white and minority households have not returned to their pre-2001 recession peaks.²⁶ Household income in 2012 was 6.3 percent lower for non-Hispanic Whites (from \$60,849 in 1999), 15.8 percent lower for Blacks (from \$39,556 in 2000), 7.7 percent lower for Asians (from \$74,343 in 2000), and 11.8 percent lower for Hispanics (from \$44,224 in 2000).

Table 4 summarizes 2012 household incomes for Asian, Black, Hispanic, and white families by gross annual income bracket. The average incomes of Hispanic and Black households were 25% and 33% lower, respectively, than the average income of U.S. households. Asian households, on the other hand, had average annual incomes 28% higher than the U.S. average income of \$69,677. Based on these income inequality data, disproportionate numbers of Black and Hispanic families appear to be more vulnerable to energy price increases than Asian or white families.

Table 4. Distribution of U.S. households by pre-tax annual income, 2012

Pre-tax annual income: Percentage of households	<\$10K	\$10-<\$30K	\$30-<\$50K	<\$50K	≥\$50K	Totals
Asian	7%	15%	15%	36%	64%	100%
Black	15%	30%	20%	66%	34%	100%
Hispanic	10%	28%	22%	61%	39%	100%
White	5%	21%	18%	44%	56%	100%
U.S. average	7%	23%	19%	49%	51%	100%

**Source:* U.S. Bureau of the Census, Current Population Survey (August 2013).

Impacts on Senior Citizens

In 2012, 29% of U.S. households received Social Security benefits. The average basic Social Security income of these 34 million households was \$16,977.²⁷ Some 18% of U.S. households also received retirement income averaging \$23,335.²⁸

Fixed-income seniors are a growing proportion of the U.S. population, and are among the most vulnerable to energy cost increases due to their relatively low average incomes. In 2012, the median gross income of 27.9 million households with a principal householder aged 65 or older was \$33,848, one-third below the national median household income.²⁹ The \$33,848 median income of senior U.S. households in 2012 means that half of these households depend on incomes below this level.

Lower-income senior households that depend mainly on fixed incomes are among those most vulnerable to energy price increases. Food, health care, and other necessities compete with energy costs for a share of the household budget.

Conclusion

Shrinking real household incomes among American families are magnifying the impacts of rising energy costs on family budgets. Government support for energy assistance programs has declined markedly due to fiscal pressures, increasing the vulnerability of millions of American families to energy cost increases.

Acknowledgment – This report was prepared for ACCCE by Eugene M. Trisko, who has conducted these analyses annually since 2000. Mr. Trisko is an attorney and energy economist who represents labor and industry clients. He previously served as an energy economist with Robert Nathan Associates, an attorney in the Bureau of Consumer Protection of the U.S. Federal Trade Commission, and as an expert witness on utility cost of capital.

Notes

¹ Data on residential energy consumption patterns by income are derived from U.S. Department of Energy, Energy Information Administration, "Survey of Residential Energy Consumption," (2001, 2005 and 2009 surveys), available at <http://www.eia.doe.gov/emeu/recs/contents.html>. Data for 2009 energy consumption by household income are updated to projected 2014 values based on changes in household income and population, and changes in consumer residential energy prices between 2009 and 2014 from EIA's "Short-Term Energy Outlook" (January 2014).

² Household incomes by gross income category are calculated from the 2012 distribution of household income in U.S. Bureau of the Census, Current Population Survey, "Annual Social and Economic Supplement" (2013).

³ Congressional Budget Office (CBO), "Effective Federal Tax Rates Under Current Law, 2001 to 2014" (August 2004); "Effective Federal Tax Rates 1979-2006" (April 2009). Effective federal tax rates for the income categories in this paper were interpolated from CBO's tax rates by income quintile based on the distribution of 2001, 2005, 2009, and 2012 household incomes. State income tax rates were

estimated from tax rates summarized in Federation of Tax Administrators, http://www.taxadmin.org/fta/rate/ind_inc.html.

⁴ Effective federal tax rates for 2014 are estimated from CBO's estimates for 2009 adjusted for payroll and other tax increases in the American Taxpayer Relief Act of 2012 (January 1, 2013), as analyzed by the Urban-Brookings Tax Policy Center (January 1, 2013, ATRA versus patched 2012 base.) See, <http://www.taxpolicycenter.org/numbers/displayatab.cfm?Docid=3755&DocTypeID=1>.

⁵ U.S. Bureau of the Census, Current Population Reports, Table HHINC-06 (2013).

⁶ See, <http://www.neada.org/appropriations/index.html>.

<http://www.acf.hhs.gov/programs/ocs/resource/low-income-home-energy-assistance-program-provides-help-for-struggling>

⁷ See, <http://www.acf.hhs.gov/programs/ocs/resource/low-income-home-energy-assistance-program-provides-help-for-struggling>

⁸ See, <http://www.acf.hhs.gov/programs/ocs/news/liheap-fact-sheet-for-fy-2014>

⁹ Since 2000, the electric utility sector has complied with the federal acid rain program enacted in the 1990 Clean Air Act Amendments, EPA's 1998 Ozone Transport Rule reducing nitrogen oxide emissions in 19 eastern states, Phase I of EPA's 2005 Clean Air Interstate Rule requiring further reductions of sulfur dioxide and nitrogen oxide emissions in the eastern U.S., and a variety of other federal and state air and water quality standards.

¹⁰ Energy Ventures Analysis, Inc., Coal-fired Power Investment in Air Pollution Controls (October 1, 2013), Appendix Fig. A-1.

¹¹ See, U.S. EPA, "The Benefits and Costs of the Clean Air Act from 1990 to 2020" (2011) at Table 3-2 (electric utility direct annual compliance costs increased from an estimated \$1.4 billion (\$2006) in 2000 to \$6.6 billion (\$2006) in 2010.) Since 2000, the utility sector has complied with the federal acid rain program enacted in the 1990 Clean Air Act Amendments, EPA's 1998 Ozone Transport Rule reducing nitrogen oxide emissions in 19 eastern states, Phase I of EPA's 2005 Clean Air Interstate Rule requiring further reductions of sulfur dioxide and nitrogen oxide emissions in the eastern U.S., and a variety of other federal and state air and water quality standards.

¹² U.S. EPA, "Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards," (December 2011) at ES-14.

¹³ U.S. EPA, "The Benefits and Costs of the Clean Air Act," *supra*.

¹⁴ U.S. DOE/EIA, "Electric Power Annual 2010," (historical tables, 2011) and "Short-Term Energy Outlook," (January 2014).

¹⁵ U.S. DOE/EIA, "Short-Term Energy Outlook" (January 2014), Table 2.

¹⁶ *Id.*

¹⁷ U.S. DOE/EIA, "Annual Energy Outlook 2014 Early Release," (December 2013).

¹⁸ Edison Electric Institute, "Coal Fleet Announcements," December 16, 2013 (68 Gigawatts of announced capacity retirements, representing 20% of the total coal fleet, between 2010 and 2022).

¹⁹ U.S. DOE/EIA, "Residential Energy Consumption Survey, 2009," (2012). Data in this report for households with incomes below \$60,000 were provided to the author by EIA.

²⁰ U.S. DOE/EIA, "Household Vehicles Energy Use: Latest Data & Trends" (November 2005), available at http://www.eia.doe.gov/emeu/rtecs/nhts_survey/2001/.

²¹ U.S. Department of Transportation, National Household Travel Survey, Summary of Travel Trends (June 2011) at Table 34 (average household gasoline expenditures increased from \$1,275 in 2001 (2001\$) to \$3,308 (2009\$) in 2009.) The average price of gasoline in the NHTS 2009 survey was \$2.96/gallon, compared with the \$3.52/gallon price that EIA projects for 2014. The 2009 NHTS report does not provide gasoline expenditure or consumption data by household income category.

²² *Id.*, at Fig. 1, Tables 1, 20.

²³ See, U.S. EPA, Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 - 2013 (2013), available at <http://epa.gov/otaq/fetrends>.

²⁴ R.L. Polk & Co. reports that the average age of automobiles on the road reached a record of 11.4 years in 2013, reflecting a rising trend for the past 10 years. Polk expects the number of vehicles 12 years and older to keep expanding, growing by more than 20% by 2018. *See*, <http://money.cnn.com/2013/08/06/autos/age-of-cars/>.

²⁵ U.S. Census Bureau, "Income, Poverty, and Health Insurance Coverage in the United States: 2012" (2013), at 5.

²⁶ U.S. Census Bureau, "Income, Poverty, and Health Insurance Coverage in the United States: 2012" (2013), at 8.

²⁷ U.S. Census Bureau, "American Community Survey – 2012 American Community Survey 1-Year Estimates," (2013).

²⁸ *Id.*

²⁹ U.S. Census Bureau, "Income, Poverty, and Health Insurance Coverage in the United States: 2012" (2013), Table 1.

APPENDIX TABLE 1 - 2001, 2005, 2009, AND 2014 HOUSEHOLD INCOME AND ENERGY EXPENSES (CURRENT DOLLARS)

2001 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (CURRENT DOLLARS)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	9.8	28.9	23.6	47.0	109.3	38.7	62.3	47.0
Pct of total households	9.0%	26.4%	21.6%	43.0%	100.0%	35.4%	57.0%	43.0%
Avg pre-tax income	\$5,733	\$19,707	\$39,201	\$107,649	\$60,488	\$16,168	\$24,893	\$107,649
Effec. fed tax rate %	2.0%	9.0%	14.9%	22.3%	21.0%	7.2%	10.1%	22.3%
Est. state tax rate%	1.5%	2.6%	4.0%	6.3%	4.4%	2.3%	3.0%	6.3%
Est. after-tax income	\$5,532	\$17,421	\$31,792	\$76,861	\$45,127	\$14,624	\$21,635	\$76,861
Residential energy \$	\$1,039	\$1,260	\$1,456	\$1,836	\$1,530	\$1,204	\$1,299	\$1,836
Residential electric \$	\$628	\$772	\$922	\$1,172	\$963	\$736	\$806	\$1,172
Other resid. energy \$	\$411	\$488	\$534	\$664	\$567	\$469	\$493	\$664
Transport energy \$	\$934	\$1,160	\$1,638	\$2,195	\$1,688	\$1,103	\$1,306	\$2,195
Total energy \$	\$1,973	\$2,420	\$3,094	\$4,031	\$3,218	\$2,307	\$2,605	\$4,031
Energy % of after-tax inc.	35.7%	13.9%	9.7%	5.2%	7.1%	15.8%	12.0%	5.2%
Resid. % of after-tax inc.	18.8%	7.2%	4.6%	2.4%	3.4%	8.2%	6.0%	2.4%
Trans. % of after-tax inc.	16.9%	6.7%	5.2%	2.9%	3.7%	7.5%	6.0%	2.9%

2005 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (CURRENT DOLLARS)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	9.4	28.1	23.4	53.5	114.4	37.5	60.9	53.5
Pct of total households	8.2%	24.6%	20.5%	46.8%	100.0%	32.8%	53.2%	46.8%
Avg pre-tax income	\$5,400	\$19,695	\$39,388	\$106,947	\$63,344	\$16,112	\$25,055	\$106,947
Effec. fed tax rate %	2.0%	8.8%	14.1%	20.6%	20.1%	7.1%	9.8%	20.6%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.5%	2.2%	2.9%	6.3%
Est. after-tax income	\$5,238	\$17,450	\$32,259	\$78,178	\$47,771	\$14,614	\$21,879	\$78,178
Residential energy \$	\$1,351	\$1,498	\$1,733	\$2,173	\$1,850	\$1,461	\$1,565	\$2,173
Residential electric \$	\$785	\$914	\$1,098	\$1,361	\$1,150	\$882	\$965	\$1,361
Other resid. energy \$	\$566	\$583	\$635	\$812	\$699	\$579	\$600	\$812
Transport energy \$	\$1,513	\$1,878	\$2,652	\$3,554	\$2,790	\$1,786	\$2,119	\$3,554
Total energy \$	\$2,863	\$3,375	\$4,385	\$5,728	\$4,640	\$3,247	\$3,684	\$5,728
Energy % of after-tax inc.	54.7%	19.3%	13.6%	7.3%	9.7%	22.2%	16.8%	7.3%
Resid. % of after-tax inc.	25.8%	8.6%	5.4%	2.8%	3.9%	10.0%	7.2%	2.8%
Trans. % of after-tax inc.	28.9%	10.8%	8.2%	4.5%	5.8%	12.2%	9.7%	4.5%

2009 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (CURRENT DOLLARS)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	8.4	27.1	22.7	59.0	117.2	35.5	58.2	59.0
Pct of total households	7.1%	23.1%	19.4%	50.3%	100.0%	30.3%	49.7%	50.3%
Avg pre-tax income	\$5,049	\$19,672	\$39,061	\$111,116	\$68,424	\$16,217	\$25,143	\$111,116
Effec. fed tax rate %	1.9%	5.2%	10.4%	17.8%	16.6%	4.4%	6.8%	17.8%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.6%	2.2%	2.9%	6.3%
Est. after-tax income	\$4,903	\$18,138	\$33,436	\$84,337	\$53,904	\$15,140	\$22,711	\$84,337
Residential energy \$	\$1,546	\$1,645	\$1,856	\$2,447	\$2,083	\$1,620	\$1,711	\$2,447
Residential electric \$	\$1,042	\$1,083	\$1,256	\$1,610	\$1,379	\$1,073	\$1,143	\$1,610
Other resid. energy \$	\$504	\$562	\$600	\$837	\$704	\$547	\$568	\$837
Transport energy \$	\$1,524	\$1,897	\$2,678	\$3,582	\$2,870	\$1,804	\$2,140	\$3,582
Total energy \$	\$3,070	\$3,542	\$4,534	\$6,029	\$4,953	\$3,424	\$3,850	\$6,029
Energy % of after-tax inc.	62.6%	19.5%	13.6%	7.1%	9.2%	22.6%	17.0%	7.1%
Resid. % of after-tax inc.	31.5%	9.1%	5.6%	2.9%	3.9%	10.7%	7.5%	2.9%
Trans. % of after-tax inc.	31.1%	10.5%	8.0%	4.2%	5.3%	11.9%	9.4%	4.2%

PROJECTED 2014 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (CURRENT DOLLARS)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	8.9	28.0	23.0	62.5	122.4	36.9	59.9	62.5
Pct of total households	7.3%	22.9%	18.8%	51.1%	100.0%	30.2%	48.9%	51.1%
Avg pre-tax income	\$4,762	\$19,709	\$39,191	\$115,670	\$71,274	\$16,096	\$24,953	\$115,670
Effec. fed tax rate %	1.8%	4.5%	10.6%	19.5%	19.2%	3.8%	6.4%	19.5%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.6%	2.2%	2.9%	6.3%
Est. after-tax income	\$4,629	\$18,310	\$33,469	\$85,827	\$54,286	\$15,120	\$22,624	\$85,827
Residential energy \$	\$1,655	\$1,763	\$1,985	\$2,642	\$2,246	\$1,715	\$1,832	\$2,642
Residential electric \$	\$1,116	\$1,158	\$1,343	\$1,730	\$1,482	\$1,133	\$1,223	\$1,730
Other resid. energy \$	\$539	\$605	\$642	\$912	\$764	\$582	\$609	\$912
Transport energy \$	\$1,854	\$2,309	\$3,260	\$4,369	\$3,506	\$2,171	\$2,606	\$4,369
Total energy \$	\$3,509	\$4,072	\$5,245	\$7,011	\$5,752	\$3,886	\$4,438	\$7,011
Energy % of after-tax inc.	75.8%	22.2%	15.7%	8.2%	10.6%	25.7%	19.6%	8.2%
Resid. % of after-tax inc.	35.8%	9.6%	5.9%	3.1%	4.1%	11.3%	8.1%	3.1%
Trans. % of after-tax inc.	40.0%	12.6%	9.7%	5.1%	6.5%	14.4%	11.5%	5.1%

Sources: Population and income data from U.S. Bureau of the Census, Current Population Survey Supp. (2001, 2005, 2009, 2013 eds.) Residential energy costs are based on U.S. DOE Residential Energy Consumption Survey (2001, 2005, 2009 eds.) 2014 projections based on changes in 2009-2014 residential energy prices from U.S. DOE/EIA Short-Term Energy Outlook (January 2014). Transportation energy expenditures are estimated from U.S. DOE/EIA, Household Vehicle Energy Use: Latest and Trends (November 2005) and DOE/EIA Short-Term Energy Outlook (January 2014). Gasoline use per household in 2014 is reduced by 17% from 2001 levels based on DOE/EIA data on total gasoline consumption adjusted by households. Average effective federal tax rates are estimated from Congressional Budget Office, Effective Federal Tax Rates Under Current Law, 2001-2014 (August 2004), and Effective Federal Tax Rates, 1979-2006 (April 2009). Tax rates for 2013 are based on CBO 2009 effective rates compiled by the Tax Policy Foundation for 1979-2009 (October 24, 2012), adjusted for changes in the American Taxpayer Relief Act of 2012. State tax rates are estimated from www.taxadmin.org/fta/rate/ind_inc.html (various years).

APPENDIX TABLE 2 - 2001, 2005, 2009, AND 2014 HOUSEHOLD INCOME AND ENERGY EXPENSES (In 2001 \$)

2001 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	9.8	28.9	23.6	47.0	109.3	38.7	62.3	47.0
Pct of total households	9.0%	26.4%	21.6%	43.0%	100.0%	35.4%	57.0%	43.0%
Avg pre-tax income	\$5,733	\$19,707	\$39,201	\$107,649	\$60,488	\$16,168	\$24,893	\$107,649
Effec. fed tax rate %	2.0%	9.0%	14.9%	22.3%	21.0%	7.2%	10.1%	22.3%
Est. state tax rate%	1.5%	2.6%	4.0%	6.3%	4.4%	2.3%	3.0%	6.3%
Est. after-tax income	\$5,532	\$17,421	\$31,792	\$76,861	\$45,127	\$14,624	\$21,635	\$76,861
Residential energy \$	\$1,039	\$1,260	\$1,456	\$1,836	\$1,530	\$1,204	\$1,299	\$1,836
Residential electric \$	\$628	\$772	\$922	\$1,172	\$963	\$736	\$806	\$1,172
Other resid. energy \$	\$411	\$488	\$534	\$664	\$567	\$469	\$493	\$664
Transport energy \$	\$934	\$1,160	\$1,638	\$2,195	\$1,688	\$1,103	\$1,306	\$2,195
Total energy \$	\$1,973	\$2,420	\$3,094	\$4,031	\$3,218	\$2,307	\$2,605	\$4,031
Energy % of after-tax inc.	35.7%	13.9%	9.7%	5.2%	7.1%	15.8%	12.0%	5.2%
Resid. % of after-tax inc.	18.8%	7.2%	4.6%	2.4%	3.4%	8.2%	6.0%	2.4%
Trans. % of after-tax inc.	16.9%	6.7%	5.2%	2.9%	3.7%	7.5%	6.0%	2.9%

2005 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (IN 2001 \$)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	9.4	28.1	23.4	53.5	114.4	37.5	60.9	53.5
Pct of total households	8.2%	24.6%	20.5%	46.8%	100.0%	32.8%	53.2%	46.8%
Avg pre-tax income	\$4,909	\$17,905	\$35,807	\$97,225	\$57,585	\$14,647	\$22,778	\$97,225
Effec. fed tax rate %	2.0%	8.8%	14.1%	20.6%	20.1%	7.1%	9.8%	20.6%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.5%	2.2%	2.9%	6.3%
Est. after-tax income	\$4,762	\$15,863	\$29,326	\$71,071	\$43,428	\$13,286	\$19,890	\$71,071
Residential energy \$	\$1,228	\$1,361	\$1,575	\$1,976	\$1,681	\$1,328	\$1,423	\$1,976
Residential electric \$	\$713	\$831	\$999	\$1,237	\$1,046	\$802	\$877	\$1,237
Other resid. energy \$	\$514	\$530	\$577	\$738	\$636	\$526	\$546	\$738
Transport energy \$	\$1,375	\$1,707	\$2,411	\$3,231	\$2,537	\$1,624	\$1,926	\$3,231
Total energy \$	\$2,603	\$3,068	\$3,987	\$5,207	\$4,218	\$2,952	\$3,349	\$5,207
Energy % of after-tax inc.	54.7%	19.3%	13.6%	7.3%	9.7%	22.2%	16.8%	7.3%
Resid. % of after-tax inc.	25.8%	8.6%	5.4%	2.8%	3.9%	10.0%	7.2%	2.8%
Trans. % of after-tax inc.	28.9%	10.8%	8.2%	4.5%	5.8%	12.2%	9.7%	4.5%

2009 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (IN 2001 \$)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	8.4	27.1	22.7	59.0	117.2	35.5	58.2	59.0
Pct of total households	7.1%	23.1%	19.4%	50.3%	100.0%	30.3%	49.7%	50.3%
Avg pre-tax income	\$4,173	\$16,258	\$32,282	\$91,831	\$56,549	\$13,402	\$20,779	\$91,831
Effec. fed tax rate %	1.9%	5.2%	10.4%	17.8%	16.6%	4.4%	6.8%	17.8%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.6%	2.2%	2.9%	6.3%
Est. after-tax income	\$4,052	\$14,990	\$27,633	\$69,700	\$44,549	\$12,512	\$18,769	\$69,700
Residential energy \$	\$1,278	\$1,360	\$1,534	\$2,022	\$1,721	\$1,339	\$1,414	\$2,022
Residential electric \$	\$861	\$895	\$1,038	\$1,331	\$1,140	\$887	\$945	\$1,331
Other resid. energy \$	\$417	\$464	\$496	\$692	\$582	\$452	\$469	\$692
Transport energy \$	\$1,260	\$1,568	\$2,213	\$2,960	\$2,372	\$1,490	\$1,768	\$2,960
Total energy \$	\$2,537	\$2,927	\$3,747	\$4,983	\$4,093	\$2,829	\$3,182	\$4,983
Energy % of after-tax inc.	62.6%	19.5%	13.6%	7.1%	9.2%	22.6%	17.0%	7.1%
Resid. % of after-tax inc.	31.5%	9.1%	5.6%	2.9%	3.9%	10.7%	7.5%	2.9%
Trans. % of after-tax inc.	31.1%	10.5%	8.0%	4.2%	5.3%	11.9%	9.4%	4.2%

PROJECTED 2014 HOUSEHOLD ENERGY EXPENSES BY INCOME CATEGORY - ALL U.S. HOUSEHOLDS (IN 2001 \$)

EIA SURVEY CATEGORIES:					TOTALS	SUBTOTALS		
	<\$10K	\$10K-<\$30K	\$30K-<=\$50K	>=\$50K		<\$30K	<\$50K	>=\$50K
Households (Mil.)	8.9	28.0	23.0	62.5	122.4	36.9	59.9	62.5
Pct of total households	7.3%	22.9%	18.8%	51.1%	100.0%	30.2%	48.9%	51.1%
Avg pre-tax income	\$3,554	\$14,708	\$29,247	\$86,321	\$53,190	\$12,012	\$18,622	\$86,321
Effec. fed tax rate %	1.8%	4.5%	10.6%	19.5%	19.2%	3.8%	6.4%	19.5%
Est. state tax rate%	1.0%	2.6%	4.0%	6.3%	4.6%	2.2%	2.9%	6.3%
Est. after-tax income	\$3,454	\$13,664	\$24,977	\$64,050	\$40,512	\$11,284	\$16,883	\$64,050
Residential energy \$	\$1,235	\$1,316	\$1,481	\$1,972	\$1,676	\$1,280	\$1,367	\$1,972
Residential electric \$	\$833	\$864	\$1,002	\$1,291	\$1,106	\$846	\$912	\$1,291
Other resid. energy \$	\$402	\$451	\$479	\$681	\$570	\$434	\$455	\$681
Transport energy \$	\$1,383	\$1,723	\$2,433	\$3,261	\$2,617	\$1,620	\$1,944	\$3,261
Total energy \$	\$2,618	\$3,039	\$3,914	\$5,232	\$4,292	\$2,900	\$3,312	\$5,232
Energy % of after-tax inc.	75.8%	22.2%	15.7%	8.2%	10.6%	25.7%	19.6%	8.2%
Resid. % of after-tax inc.	35.8%	9.6%	5.9%	3.1%	4.1%	11.3%	8.1%	3.1%
Trans. % of after-tax inc.	40.0%	12.6%	9.7%	5.1%	6.5%	14.4%	11.5%	5.1%

Sources: See Appendix Table 1. CPI adjustments to constant 2001 dollars from CPI Inflation Calculator (2014). CPI adjustment for 2014 estimated at 1.34.