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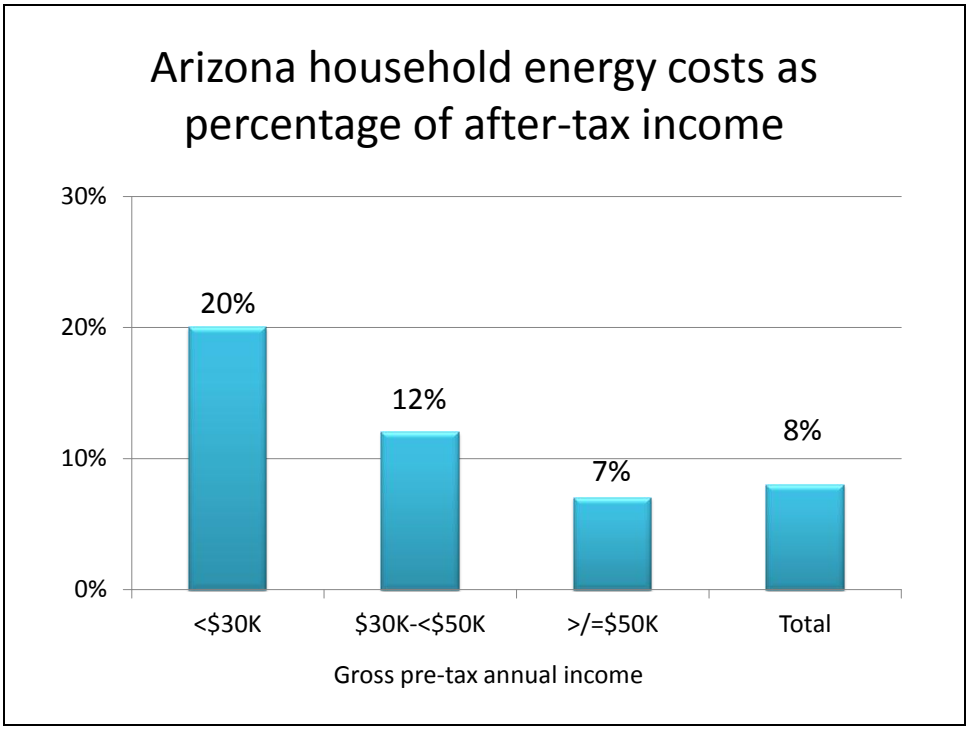
Energy Cost Impacts on Arizona Families

Rising electricity prices and below-average family incomes are straining the budgets of Arizona's lower- and middle-income families. Arizona households with pre-tax annual incomes below $50,000, representing 51% of Arizona's population, spend an estimated average of 15% of their after-tax income on residential and transportation energy. Energy costs for the 31% of households earning less than $30,000 before tax represent 20% of their after-tax family incomes, before accounting for any energy assistance programs. Minorities and senior citizens are among the most vulnerable to energy price increases due to their relatively low median household incomes.



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This paper assesses the impact of energy costs on Arizona households using energy consumption survey data and energy price data and projections from the U.S. Department of Energy's Energy Information Administration (DOE/EIA).[1] Energy costs are summarized by household income group using Arizona data from the U.S. Bureau of the Census, tax data from the Congressional Budget Office, and Arizona income tax rates.[2]

Key findings include:

- Some 51% of Arizona's families have gross annual incomes of $50,000 or less, with an average after-tax income of $23,540, less than $2,000 per month. In other words, more than half of Arizona's families have average take-home incomes of less than $2,000 per month.

- The median household income of Arizona families in 2013 was $48,510, 7% below the national median household income. Median income is the midpoint of the distribution of family incomes: one-half of families have incomes below the median, while the other one-half of families have incomes above it.

- Measured in constant 2005 prices, residential electricity prices in Arizona are 12% above 2005 levels. These increased electricity prices reflect changes in fuel costs, the costs of compliance with U.S. EPA and other regulations, and other factors.

- New U.S. EPA regulations will cause Arizona electricity prices to rise substantially. National Economic Research Associates projects that electricity prices for Arizona consumers will be 13% higher, on average, each year under EPA's proposed Clean Power Plan (CPP) than they would be without the rule. NERA projects peak year Arizona electricity price increases of as much as 15%.

- Energy costs are consuming the after-tax household incomes of Arizona's low- and middle-income families at levels comparable to other necessities such as housing, food, and health care. The 51% of Arizona households earning less than $50,000 before taxes devote an estimated average of 15% of their after-tax incomes to energy.

- The median pre-tax income of Hispanic households, representing 22% of Arizona households, is $37,179, 29% below the U.S. median income. Arizona households aged 65 or more, 25% of all households, have a median pre-tax income of $39,097, 25% below the U.S. median. These relatively low pre-tax median incomes indicate that Arizona's minority and senior households are among those most vulnerable to energy price increases such as rising household utility bills.

Arizona Household Incomes

U.S. Census Bureau data on Arizona household incomes in 2013 (the most recent available) provide the basis for estimating the effects of energy prices on consumer budgets. The table below shows estimated 2013 after-tax incomes for Arizona families in different income brackets. 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. State income taxes are estimated from current Arizona income tax rates.

Arizona households by pre-tax and after-tax income, 2013

Pre-tax annual income:	<$30K	$30-<$50K	<$50K	≥$50K	Total/avg.
Households (Mil.)	0.737	0.492	1.229	1.172	2.401
Pct. of total households	30.7%	20.5%	51.2%	48.8%	100.0%
Avg. pre-tax income	$16,312	$39,772	$25,704	$109,081	$66,389
Effec. fed tax rate %	3.5%	10.6%	6.3%	19.5%	12.8%
Est. state tax %	1.5%	3.0%	2.1%	4.5%	3.3%
Est. after-tax income	$15,503	$34,363	$23,540	$82,902	$55,750

Some 51% of Arizona families had estimated pre-tax incomes below $50,000 in 2013, compared with 48% nationally. After federal and state taxes, these families had average annual incomes of $23,540, equivalent to an average monthly take-home income of less than $2,000. In 2013, the median pre-tax household income of Arizona families was $48,510, 7% below the national median household income of $52,250.[3]

The U.S. Census Bureau reports that the average incomes of American households have declined across all five income quintiles since 2001, measured in constant 2013 dollars. As shown in the table below, the largest percentage losses of income are in the two lowest income quintiles. Households in the lowest quintile lost 13% of their real income between 2001 and 2013. Declining real incomes increase the vulnerability of low- and middle-income households to energy price increases such as rising utility bills.

Average real U.S. household incomes by income quintile, 2001-2013
(In constant 2013 $)

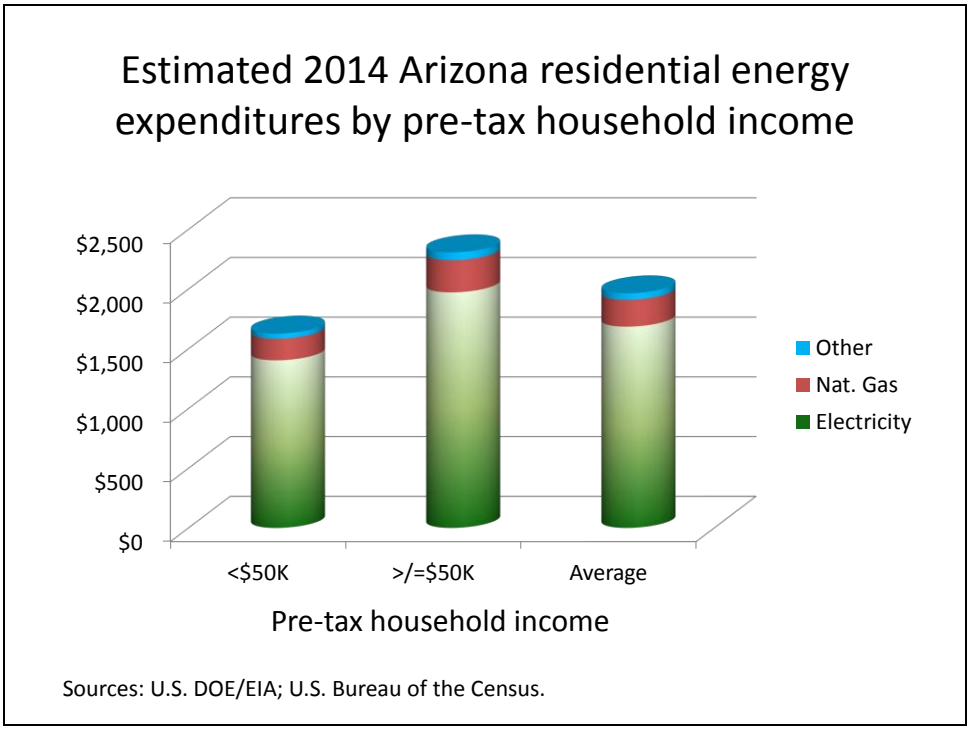
	1Q	2Q	3Q	4Q	5Q
2001	$13,336	$33,510	$56,090	$87,944	$192,063
2013	$11,651	$30,509	$52,322	$83,519	$185,206
Pct Chg	-13%	-9%	-7%	-5%	-4%
$ Chg	($1,685)	($3,001)	($3,768)	($4,425)	($6,857)

Source: https://www.census.gov/hhes/www/income/data/historical/household/

Residential and Transportation Energy Expenses

Arizona households spent an estimated average of $1,965 for residential energy in 2014. As shown in Chart 1 below, electricity is the dominant residential energy source, accounting for 86% of total Arizona residential energy expenditures for home heating, cooling and appliances. In addition to natural gas, some Arizona homes also use propane and other heating sources such as wood.

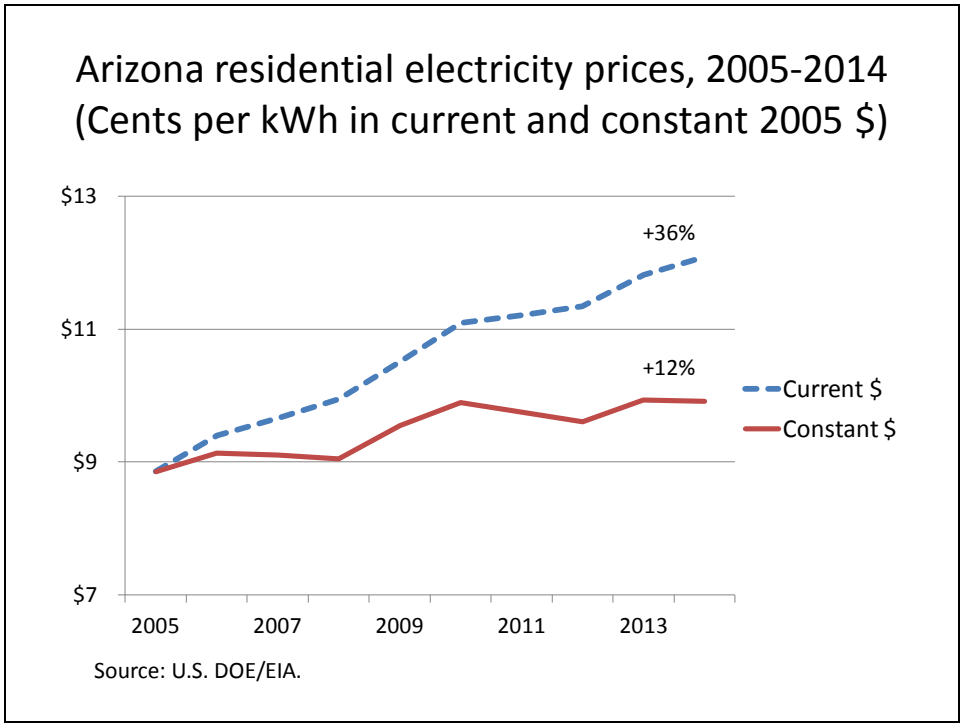
Chart 1



The price of residential electricity in Arizona has increased by 36% since 2005, and is 18% above 2005 levels measured in real, inflation-adjusted terms (see Chart 2).

Large electricity price increases are expected under EPA's proposed Clean Power Plan (CPP) for reducing CO2 emissions from existing power plants. A recent analysis by NERA[4] estimates that electricity prices for Arizona consumers will be at least 13% higher, on average, each year under the CPP than they would be without the CPP. NERA projects peak year Arizona electricity price increases during the period 2017-31 of as much as 15%. Consumer prices for natural gas also are projected to rise due to EPA's carbon rule, requiring utilities to switch from low-cost coal to higher-cost natural gas. In addition, NERA estimates that consumers nationwide could be required to spend more than $500 billion to reduce electricity use to meet EPA's targets.

Chart 2



Energy Expense Estimates

Estimated household energy expenses for Arizona are based upon DOE/EIA residential electric and natural gas sales data for Arizona through September 2014.[5] Total household energy costs are distributed by income category using DOE/EIA residential energy survey data.

Gasoline prices have declined substantially in recent months, but the decline of pump prices has not matched the ~50% reduction in world oil prices between June and December 2014.[6] EIA's December 2014 Short-Term Energy Outlook estimates national average gasoline prices of $3.47/gallon in 2014, declining to $2.60/gallon in 2015. This 2015 projection appears reasonable based on potential actions by OPEC nations to reduce oil production in response to falling oil prices, and the ongoing reduction of domestic drilling investment caused by lower oil prices.

DOE/EIA's 2001 Survey of Household Vehicles Energy Use (2005) provides data on regional gasoline use by household income category. These regional gasoline consumption data are updated using EIA's 2015 national average retail gasoline price projection of $2.60 per gallon. Household gasoline consumption is reduced by 17% from 2001 levels, reflecting trends in household-adjusted retail gasoline sales.[7]

The table below summarizes estimated Arizona household energy expenses by income group, with the percentage of after-tax income represented by energy costs:

Estimated Arizona household energy costs by income category

Pre-Tax Annual Income:	<$30K	$30-<$50K	<$50K	≥$50K	Average
Residential energy $	$1,531	$1,774	$1,628	$2,307	$1,965
Electric $	$1,315	$1,538	$1,404	$1,973	$1,686
Natural Gas $	$174	$190	$181	$270	$225
Other* $	$42	$46	$43	$65	$54
Gasoline $	$1,552	$2,248	$1,831	$3,136	$2,468
Total energy $	$3,083	$4,022	$3,459	$5,443	$4,433
Energy % of after-tax income	20%	12%	15%	7%	8%

*Other includes LPG and wood.

The share of household income spent for energy falls disproportionately on lower- and middle-income families earning less than $50,000 per year. The 51% of Arizona households earning less than $50,000 before taxes spend an estimated 15% of their after-tax income on energy. While many lower-income consumers qualify for energy assistance, budgetary support for these government programs has been pared back in recent years.[8]

Arizona families spend an estimated average of $4,433 on residential and transportation energy, or 8% of the family budget. The 737,000 Arizona households earning less than $30,000 before taxes, representing 31% of households, allocate 20% of their after-tax incomes to energy. The large share of after-tax income devoted to energy poses difficult budget choices among food, health care and other basic necessities.

Disproportionate Impacts on Minorities and Senior Citizens

The impacts of high energy costs are falling disproportionately on Arizona's minorities and elderly residents. Social Security recipients represent nearly one-third of the state's households. Unlike young working families with the potential to increase incomes by taking on part-time work or increasing overtime, many fixed income seniors are limited to cost-of-living increases that may not keep pace with energy prices.

The table below summarizes Arizona's 2013 median incomes for elderly and minority households, and compares these with the U.S. median household income of $52,250.

U.S. and Arizona Median Pre-tax Household Incomes, 2013

	Median Household Income	AZ Pct. Diff. Vs. U.S. Median	Pct. of Households
U.S.	$52,250		
Arizona	$48,510	-7%	
AZ: Black	$36,528	-30%	4%
AZ: Hispanic	$37,179	-29%	22%
AZ: Age 65+	$39,097	-25%	25%

Source: U.S. Bureau of the Census, American Community Survey 2013 (2014)

The disparity between Arizona's statewide median household income and the U.S. median is even greater among minority and elderly Arizona households. The median income of Hispanic households, 22% of Arizona households, is 29% below the U.S. median income. Arizona households aged 65 or more, one-quarter of all households, have a pre-tax median income of $39,097, 25% below the U.S. median.

These relatively low median incomes indicate that Arizona's minority and senior households are among those most vulnerable to energy price increases such as rising household utility bills.

Conclusion

High consumer energy prices - together with relatively low median household incomes and negative real income growth among lower- and middle-income households - underscore the need to find ways to maintain affordable energy prices, especially for low- and middle-income families. Maintaining the relative affordability of electricity and other energy prices is essential to the wellbeing of Arizona's lower-income citizens.

Acknowledgment: This paper was prepared for ACCCE by Eugene M. Trisko, an energy economist and attorney in private practice. Mr. Trisko has served as an attorney in the Bureau of Consumer Protection at the Federal Trade Commission and as an expert economic witness before state public utility commissions. He represents labor and industry clients in environmental and energy matters. Mr. Trisko can be contacted at emtrisko@earthlink.net.

End Notes

[1] Data on residential energy consumption patterns by income category are from U.S. Department of Energy, Energy Information Administration, 2009 Survey of Residential Energy Consumption (RECS). Arizona residential energy costs are based on 2014 state data from U.S. DOE/EIA Electric Power Monthly (October 2014), Natural Gas Monthly (October 2014) and State Energy Data System data for biomass, LPG and miscellaneous fuels available at www.eia.gov/state/seds. 2015 gasoline price projections are from DOE/EIA Short Term Energy Outlook (December 2014).

[2] Household incomes in Arizona by income category are derived from the distribution of household income in U.S. Census Bureau, American Fact Finder, Arizona Selected Economic Characteristics: 2013 (2014). Federal income tax rates are from Congressional Budget Office, "Effective Federal Tax Rates Under Current Law, 2001 to 2014," (August 2014). Effective federal tax rates for the income categories employed in this paper were interpolated from CBO's tax rates by income quintile and adjusted for changes in the American Taxpayer Relief Act of 2013. State tax data are estimated from state tax rates compiled by the Tax Foundation (2012).

[3] U.S. Census Bureau, American Fact Finder, Arizona Selected Economic Characteristics 2013 (2014).

[4] National Economic Research Associates, Potential Energy Impacts of the EPA Proposed Clean Power Plan (prepared for ACCCE, *et al.*, October 2014). The average 2017-31 and peak year electricity price increases cited here are for NERA's State Unconstrained BB1-4 case, using all four of EPA's proposed building blocks

[5] U.S. DOE/EIA, Electric Power Monthly and Natural Gas Monthly (October 2014).

[6] NYMEX West Texas Intermediate and Intercontinental Exchange data (Brent Crude) for June 1-December 14, 2014.

[7] DOE/EIA data indicate that retail gasoline consumption in barrels per day declined by 17% from 2001 to 2013 on a household-adjusted basis, with little change from 2013 to 2014.

[8] Federal funding for the Low Income Home Energy Assistance Program (LIHEAP) has declined from $4.5 billion in FY2011 to $3.0 billion in FY2015. See, http://www.liheapch.acf.hhs.gov/Funding/funding.htm.