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Statement on Behalf of
American Coalition for Clean Coal Electricity
House Majority Policy Committee Hearing
St. Vincent College
Latrobe, PA
September 6, 2012

Thank you, Chairman Reed and distinguished members, for the opportunity to testify today on the impacts of recent U.S. EPA regulations on energy and jobs in Pennsylvania.

I am Eugene Trisko, an energy economist and attorney, and am here as a consultant to the American Coalition for Clean Coal Electricity (ACCCE). ACCCE is an association of major U.S. railroads, coal producers, electric utilities, and a variety of industrial firms. ACCCE's principal mission is to help ensure a continued role for domestic coal as a mainstay of low-cost, affordable electric power. ACCCE is pleased to be a member of the Pennsylvania Coal Alliance.

In my brief remarks today, I wish to bring the Committee's attention to two studies that ACCCE sponsored this year bearing upon the issues before you. These studies are attached to my statement.

The first is a March 2012 analysis by National Economic Research Associates (NERA) assessing the economic impacts of EPA's Mercury and Air Toxics Standards Rule (MATS), relative to alternative baselines including the 2005 Clean Air Interstate Rule (CAIR) and the 2011 Cross State Air Pollution Rule (CSAPR). CSAPR was recently vacated by the U.S. Court of Appeals for the D.C. Circuit, and remanded to EPA, leaving CAIR in effect.

The second study, "Energy Cost Impacts on Pennsylvania Families," is part of a series of national and state studies illustrating the impacts of rising energy costs on family budgets that I have prepared for ACCCE over the past decade.

NERA Analysis of MATS Costs and Job Impacts

NERA's March 2012 analysis assesses the economic costs associated with EPA's MATS rule, compared to EPA's findings, as summarized in the table below:

Figure 1: Comparison of Annualized Incremental Compliance Costs for MATS, Relative to CSAPR

Annualized and Present Value Incremental Compliance Costs (Billions of 2010$)				
	2015	2020	2030	PV (2014-2034)
EPA (IPM)	$9.7	$9.0	$7.7	$89.9
NERA (N_{ew}ERA)	$10.4	$10.8	$11.9	$94.8

NERA's model produced slightly higher cost estimates for MATS than EPA's analysis, but the findings of both studies are remarkable for one fact: MATS is the most expensive regulatory program ever proposed by EPA. NERA estimates the cumulative net present value of costs for the rule at $95 billion, compared with EPA's estimate of $90 billion.

NERA projected that some 38 Gigawatts of coal capacity would be retired by 2015 in a scenario including baseline retirements and

MATS and CSAPR. Most of this capacity would be retired in a MATS-only case.

NERA's econometric model projects that some 180,000 net full-time jobs would be lost in 2015 as a consequence of income reductions associated with MATS, assuming CSAPR remained in effect. Relative to a CAIR baseline, the net job losses would be 215,000 jobs:

> Because the [NERA] model integrates electric sector costs with the rest of the economy, our analysis also directly estimates the impacts on wages and net employment as a result of the MATS Rule. Our estimate of the net impact (inclusive of job gains associated with installing retrofits and building new power plants) of the MATS Rule in 2015 is a loss in income equivalent to 180,000 full-time jobs (215,000 full-time jobs if compared relative to CAIR).

NERA did not allocate these job impacts by state, but it may be reasonable to apportion these job loss estimates for based on Pennsylvania's share of national coal-based electric generation. In 2011, Pennsylvania generated 100.5 million Megawatt-hours of coal-based electricity, or 5.7 percent of the national total (DOE/EIA, Electric Power Monthly, February 2012.) For example, a *pro rata* allocation of NERA's 180,000 net job loss estimate implies a net Pennsylvania job loss of 10,260 jobs. This may be larger than some other estimates of potential job losses because it takes into account the impacts of higher electricity prices on the Pennsylvania economy.

<u>Pennsylvania Household Energy Cost Impacts</u>

The Pennsylvania family energy cost study attached to my statement documents the rising cost of energy over the past several years, due mainly to rising gasoline prices. This study relies on

U.S. Census income and Department of Energy consumer expenditure survey data. Key findings include:

- Nearly 51% of Pennsylvania's families have gross annual incomes of $50,000 or less – the same as the national average - with an average after-tax income of $22,037. This translates to a take-home pay of about $1,800 a month for one-half of the households of the Commonwealth.

- Measured in constant 1990 prices, residential electricity prices in Pennsylvania have declined by 16%, while the price of residential natural gas has declined by 1%. The relatively low cost of electric power is due in part to Pennsylvania's historic reliance on domestic coal for much of its electric generation.

- Energy costs are consuming the after-tax household incomes of Pennsylvania's low- and middle-income families at levels comparable to other necessities such as food and health care. Pennsylvania families spend an estimated average of 11% of their after-tax incomes on energy. The 2.5 million Pennsylvania households earning less than $50,000 devote an estimated 21% of their after-tax incomes to energy.

Our research shows that since 2001, the portion of after-tax household income devoted to energy by households earning less than $50,000 has roughly doubled, from 11% to 21%. When the cost of a necessity such as energy doubles as a percent of after-tax income, something else has to give – housing, food, health care, child care or other essentials. Increased energy costs should be of particular concern to policymakers in an era of declining real incomes and persistent high unemployment. Pursuing policies that will help to ensure the continued vital role of coal in low-cost baseload generation should be a top priority.

Thank you, Chairman Reed, for the opportunity to speak with you and the Committee this morning. I will be pleased to answer any questions.

March 1, 2012

An Economic Impact Analysis of EPA's Mercury and Air Toxics Standards Rule

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INTRODUCTION

On December 16, 2011, EPA released its final Mercury and Air Toxics Standards (MATS) Rule, accompanied by a Regulatory Impact Analysis (RIA) that reported the incremental cost to the U.S. electricity sector would be $9.6 billion per year in 2015. This is a large cost to the U.S. economy and, therefore, the Rule merits close examination. NERA has the capability to analyze the electric sector impacts and associated macroeconomic impacts of emissions policies. In this paper, we analyze the economic impacts of the MATS Rule. Our analysis is designed to generally match the EPA assumptions in its own analysis, and to offer a broader range of insights about the impacts of that Rule than EPA provided in its RIA. This paper briefly summarizes the approach in our MATS analysis, compares our results to those that EPA has reported, and provides some further results that are available from our own analysis. A particular addition that this paper offers is insight into the overall economy-wide impacts of the Rule that can be expected to result from the costs that the U.S. electric sector is projected to bear under the MATS Rule – EPA did not provide such an economy-wide assessment in its RIA.

NERA's N_{ew}ERA MODEL

NERA's analysis was performed using NERA's N_{ew}ERA model.[1] The N_{ew}ERA model is an economy-wide economic model that includes a detailed representation of the electric sector. It has been designed to assess, on an integrated basis, system costs to the power sector to meet any specified policy scenario as well as the overall macroeconomic impacts of that policy scenario. For the power sector, N_{ew}ERA uses a unit-level representation of the power generation system that considers the actions each generator takes to new policies such as MATS by providing compliance options such as retrofitting, retiring, fuel switching and re-dispatching. The outputs of the model include a variety of electric sector-specific results such as number of retrofits (and types), number of retirements, number and types of new capacity additions, fuel usage, and total sector costs. In addition, because the N_{ew}ERA model includes all sectors of the economy we can also evaluate changes in fuel markets (most importantly, natural gas markets) and macroeconomic indicators such as GDP, consumption and employment measures. Additional information about the N_{ew}ERA model is included in Appendix A.

MATCHING EPA's ANNUAL COST OF $10 BILLION IN 2015

The initial focus of the analysis was to see how closely our own projected electric sector impacts might match the analysis that EPA performed. Note that EPA only considered the impacts of the policy on the electric sector; they did not consider the broader economic effects of the Rule on the economy that arise because of the impacts of the Rule on prices and resources throughout the economy. EPA forecast the impacts of the MATS Rule using the IPM model. EPA analyzed two policy scenarios: 1) a Baseline, which included the Cross-State Air Pollution Rule (CSAPR) that has since been stayed by the court,[2] and 2) MATS, which layers the requirements of the

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1 For additional technical details on the N_{ew}ERA model see http://www.nera.com/67_7607.htm.

2 On December 30, 2011, the United States Court of Appeals for the D.C. Circuit issued a ruling to stay CSAPR pending judicial review.

MATS Rule on top of the Baseline; the impacts of the Rule (MATS) are calculated by comparing these two scenarios. The IPM model projected the incremental compliance costs to the electric sector in 2015 would be $9.4 billion (in 2007$).[3] EPA added another $0.2 billion to that cost to reflect monitoring and administrative costs, which accounts for EPA's total cost being reported as $9.6 billion. Our analysis did not include the extra $0.2 billion, so our cost results, when stated as the annual cost in 2015, should be compared to IPM's estimate of $9.4 billion (2007$). Since the N_{ew}ERA model produces results in 2010$, it is useful to convert the IPM cost estimate of $9.4 billion in 2007$ to its value in 2010$: $9.7 billion.

NERA initially analyzed the same two policy scenarios in the N_{ew}ERA model – a Baseline with CSAPR and a scenario with the addition of MATS on top of CSAPR. We also used EPA's assumptions about retrofit options and their costs.[4] Doing so, we projected the incremental compliance costs to the electric sector in 2015 to be $10.4 billion (in 2010$), which is the result that is comparable to EPA's $9.7 billion (in 2010$). Figure 1 compares our cost results to those from IPM with more years, and also stated as present values.[5]

Figure 1: Comparison of Annualized Incremental Compliance Costs for MATS, Relative to CSAPR

Annualized and Present Value Incremental Compliance Costs (Billions of 2010$)				
	2015	2020	2030	PV (2014-2034)
EPA (IPM)	$9.7	$9.0	$7.7	$89.9
NERA (N_{ew}ERA)	$10.4	$10.8	$11.9	$94.8

CAPITAL COST REQUIREMENTS ARE ATTRIBUTABLE TO BOTH RETROFITS AND REPLACEMENT CAPACITY

The U.S. electric sector must not only comply with the MATS Rule, but will likely also need to comply with CSAPR, which has been stayed by the U.S. Court of Appeals. Given the investments that will need to be made to comply with CSAPR (if the stay is removed) as utilities also work towards complying with MATS, it is useful to also compare the costs to comply with the MATS Rule and with CSAPR, relative to a Baseline that includes the Clean Air Interstate Rule (CAIR), which specifies the current SO_2 and NO_X limits that generators must meet.

We addressed this issue by evaluating a scenario that did not include CSAPR in the Baseline and instead had only CAIR, which is presently the actual existing regulation. CAIR is assumed to continue into its second phase starting in 2015. Thus, we are able to make comparisons of a scenario that includes both the MATS Rule and CSAPR with one that includes CAIR, but does not include either the MATS Rule or CSAPR. The remaining results presented in this paper are based on this comparison, unless otherwise stated.

3 Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, December 2011, p. 3-13.

4 The only difference in assumptions about retrofit options in the N_{ew}ERA runs was to limit Dry Sorbent Injection (DSI) to units burning subbituminous coals and that have capacity less than 300 MW.

5 In calculating the net present value, we used a real discount rate of 5%.

There are some important details about costs that EPA did not report, but that we can report from our own analysis based on the N_{ew}ERA model. One of these is the level of total capital that electric companies will need to raise within the implementation period. EPA only reports the annual capital payments that companies incur over time to "pay back" the upfront spending. Annualized costs have relevance because they may affect electricity rates. However, the level of spending that must occur upfront is of relevance for other reasons. For example, it indicates how leveraged companies may have to become, which can affect their borrowing costs and their stock valuate.

The capital costs are associated with both pollution control retrofits and new capacity to replace capacity retired as a result of the Rule. Reporting only the annualized costs masks the significant increase in capital that would be required in order to comply with the MATS Rule. We thus turn to the key drivers of capital spending prior to 2015.

Retrofits

EPA's analysis shows that in 2015 the MATS Rule (incremental to CSAPR being fully implemented first) will entail 60 GW of scrubber retrofits (wet scrubbers, dry scrubbers and dry sorbent injection combined), 63 GW of scrubber upgrades, 99 GW of activated carbon injection (ACI) and at least 102 GW of fabric filters.[6] In contrast, our analysis shows an incremental 64 GW of scrubbers, 70 GW of ACI and 124 GW of fabric filters (the scrubber retrofit numbers are 70 GW if compared relative to CAIR). The details on the retrofits are in Figure 2.

Figure 2: Summary of 2015 Retrofit Additions

Scenario	WFGD	DFGD	DSI	Total Scrub	SCR	ACI	FF
EPA Results (IPM)							
Base (CSAPR)	55	6	9	70	0	0	0
CSAPR/MATS	52	26	52	130	0	99	102
Delta	***-3***	***19***	***44***	***60***	***0***	***99***	***102***
NERA Results (N_{ew}ERA)							
CAIR	18	0	0	18	15	7	4
CSAPR	18	6	0	24	15	7	9
CSAPR/MATS	19	47	22	88	16	78	128
Delta from CSAPR	***1***	***41***	***22***	***64***	***2***	***70***	***124***
Delta from CAIR	***1***	***47***	***22***	***70***	***2***	***70***	***124***

Note: Deltas may not add up due to rounding.

[6] Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, p. 3-15.

Retirements

The other component of the capital spending relates to new capacity to replace coal-fired generators that economically retire due to the compliance requirements of the MATS Rule. EPA projects that the MATS Rule will result in an incremental 5 GW of coal-fired capacity retiring by 2015 relative to CSAPR. Our analysis of the MATS Rule has an incremental 19 GW of coal-fired capacity retiring as a result of the MATS Rule relative to CSAPR. We project 23 GW of retirements relative the Baseline without CSAPR. We note, however, that the Baseline without CSAPR has 15 GW of retirements in it, so that the total capacity retired through 2015, once both CSAPR and MATS are applied, is 38 GW. (It is about the same even if only the MATS Rule is imposed on top of the CAIR-only Baseline.) Almost all of the incremental retirements are in states east of the Mississippi River.

Some of the retired capacity is replaced by new natural gas-fired combined cycle units. This has to occur in some locations in order to maintain reserve margins.[7] However, when reserve margins do not force replacement capacity, a significant part of the generation that comes from those retired units in the Baseline is replaced by greater generation from existing natural gas combined cycle units in the same region. Nationally, by 2015 there is an incremental build of 1 GW of natural gas combined cycle units and an incremental build of 1.5 GW of combustion turbines driven by the MATS and CSAPR Rules combined. (It is about the same even if only the MATS Rule is imposed on top of the CAIR-only Baseline.)

Total Capital Spending by 2015

Thus, there are capital costs incurred due to retrofits and replacement capacity. Between 2012 and 2015, the model projects that this capital requirement would be $84 billion to comply with both MATS and CSAPR. This represents a 30% increase over the capital requirements in a Baseline with either CAIR or CSAPR. Such an increase might create financing challenges for individual operating companies and the sector as a whole, which could lead to credit downgrades and possibly higher costs of borrowing. We have not attempted to include these potential costs in our estimates (nor has EPA included them in theirs).

NON-CAPITAL COSTS

The capital spending is the most significant feature of the costs. In addition, there are increased costs of generation that are due to: the greater use of natural gas to displace the coal-fired plants that retire specifically as a result of the MATS Rule, operating costs of the retrofits, and the reductions in unit efficiencies resulting from the retrofits themselves.[8] To some extent, these added operating costs are offset by reduced costs of maintaining the coal plants that are retired. The net effect of these operating costs, plus the annualized capital payments for the $84 billion in investment, is reflected in the total costs that were reported in Figure 1.

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7 Each region in the model has a reserve margin. If the available capacity relative to the region's peak demand falls below the required reserve level then capacity must be added to the system.

8 The retrofits often require additional power from the facility to operate, resulting in a net reduction in the efficiency of the plant.

OVERALL MACROECONOMIC IMPACTS ASSOCIATED WITH THE COSTS OF THE MATS RULE

The consequences of the MATS Rule are not just limited to the electric sector. The electric sector has to invest significant capital to comply with the MATS Rule. This capital and other added spending for compliance will induce lower industrial output (because the cost of power, natural gas, and other commodities will increase) and hence drive down income for workers. Although the investments also will create jobs installing the retrofits and building new power plants, the net effect of complying with the MATS Rule will be an increase in the costs of electricity and natural gas, and will produce a drag on the economy as a whole. EPA did not evaluate the MATS Rule using a macroeconomic model so they could not produce a net impact on jobs; instead they cited an estimated 46,000 short-term jobs and 8,000 long-term utility jobs created.[9]

Because the N_{ew}ERA model integrates electric sector costs with the rest of the economy, our analysis also directly estimates the impacts on wages and net employment as a result of the MATS Rule. Our estimate of the net impact (inclusive of job gains associated with installing retrofits and building new power plants) of the MATS Rule in 2015 is a loss in income equivalent to 180,000 full-time jobs (215,000 full-time jobs if compared relative to CAIR). Figure 3 shows that while the largest job losses are in 2015, there are continuing job losses over time as the economy shrinks due to higher energy costs.

Figure 3: Change in Full-Time Job Equivalents

Change in Full-Time Job Equivalents (Thousands)	2015	2018	2021	2024
CSAPR/MATS (relative to CSAPR)	-180	5	-60	-50
CSAPR/MATS (relative to CAIR)	-215	-15	-75	-85

The costs of the MATS Rule are also reflected in several other common economic measures. For example, the present value of GDP losses from 2012 through 2035 would be between $84 and $112 billion dollars ($84 billion is relative to CSAPR, $112 billion is relative to CAIR). Figure 4 shows the annual GDP losses and the present value loss through 2035. Not surprisingly, the largest loss is in 2015 when the MATS Rule is assumed to be fully implemented.

9 Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, p. 6-1.

Figure 4: Change in Gross Domestic Product

Change in GDP (Billions of 2010$)	2012	2015	2018	2021	2024	2027	2030	2033	Present Value
CSAPR/MATS (relative to CSAPR)	-$1	-$22	$1	-$4	-$4	-$4	-$5	-$5	-$84
CSAPR/MATS (relative to CAIR)	-$3	-$25	$1	-$4	-$7	-$7	-$7	-$7	-$112

Similar to GDP, the MATS Rule also leads to losses in consumption or disposable income for consumers. The present value of consumption losses from 2012 through 2035 would be between $35 and $71 billion dollars ($35 billion is relative to CSAPR, $71 billion is relative to CAIR). Figure 5 shows the annual consumption losses and the present value loss through 2035. For consumption, the largest losses are in 2012 as investment has to ramp up to meet the 2015 compliance deadline, which requires a diversion of funds from consumption to investment.

Figure 5: Change in Consumption (billions, 2010$

Change in Consumption (Billions of 2010$)	2012	2015	2018	2021	2024	2027	2030	2033	Present Value
CSAPR/MATS (relative to CSAPR)	-10	-3	1	0	0	0	-1	-1	-35
CSAPR/MATS (relative to CAIR)	-13	-5	-1	-2	-2	-2	-3	-4	-71

CONCLUSION

Both NERA's analysis with the N_{ew}ERA model and EPA's analysis with IPM find that complying with the MATS Rule will impose annual costs on the electric sector that are approximately $10 billion in 2015 and almost $100 billion on a present value through 2034. Not included in these numbers are the potential for higher financing costs due to the more than $80 billion in incremental capital that will be required in 2015.

NERA's analysis goes a step further than EPA's analysis in a few different ways. First, we also looked at the cost of complying with the MATS Rule relative to a Baseline with CAIR (instead of CSAPR). This comparison may be more relevant given that the electric sector must be working towards compliance with both the MATS Rule and CSAPR (assuming that the current stay is lifted). Second, because the N_{ew}ERA model is an integrated model of the entire economy, we are able to identify the economic impacts outside of the electric sector, which were largely ignored by EPA. These include significant net declines in labor wages, which would result in losses of full-time job equivalents; declines in the growth of the U.S. economy as measured by GDP; and declines in consumption, or household disposable income.

APPENDIX A – Additional Details on the N_{ew}ERA Model

NERA developed the N_{ew}ERA model to forecast the impact of policy, regulatory, and economic factors on the energy sectors and the economy. When evaluating policies that have significant impacts on the entire economy, one needs to use a model that captures the effects as they ripple through all sectors of the economy and the associated feedback effects. The N_{ew}ERA model combines a macroeconomic model with all sectors of the economy (except for the electric sector) with a detailed electric sector model. This combination allows for a complete understanding of the economic impacts of different policies on all sectors of the economy.

The macroeconomic model incorporates all production sectors and final demand of the economy. Policy consequences are transmitted throughout the economy as sectors respond until the economy reaches equilibrium. The production and consumption functions employed in the model enable gradual substitution of inputs in response to relative price changes, thus avoiding all-or-nothing solutions.

The main benefit of the integrated framework is that the electric sector can be modeled in great detail yet through integration the model captures the interactions and feedbacks between all sectors of the economy. Electric technologies can be well represented according to engineering specifications. The integrated modeling approach also provides consistent price responses since all sectors of the economy are modeled. In addition, under this framework we are able to model electricity demand response.

There are great uncertainties about how the U.S. natural gas market will evolve, and the N_{ew}ERA model is designed explicitly to address the key factors affecting future natural gas supply and prices. One of the major uncertainties is the availability of shale gas in the United States. To account for this uncertainty and the subsequent effect it could have on the domestic and international markets, the N_{ew}ERA model includes resource supply curves for U.S. natural gas. The model also accounts for foreign imports and U.S. exports of natural gas, by using a supply (demand) curve for U.S. imports (exports) that represents how the global LNG market price would react to changes in U.S. imports or exports.

The electric sector model is a detailed model of the electric and coal sectors. Each of the more than 17,000 electric generating units in the United States is represented in the model. The model minimizes costs while meeting all specified constraints, such as demand, peak demand, emissions limits and transmission limits. The model determines investments to undertake and unit dispatch. Because the N_{ew}ERA model is an integrated model of the entire U.S. economy, electricity demand can respond to changes in prices and supplies.

The steam coal sector is represented within the N_{ew}ERA model by a series of coal supply curves and a coal transportation matrix. The N_{ew}ERA model represents the domestic and international crude oil and refined petroleum markets.

The N_{ew}ERA model outputs include demand and supply of all goods and services, prices of all commodities, and terms of trade effects (including changes in imports and exports). The model outputs also include gross regional product, consumption, investment, disposable income, and changes in "job equivalents" based on labor wage income.

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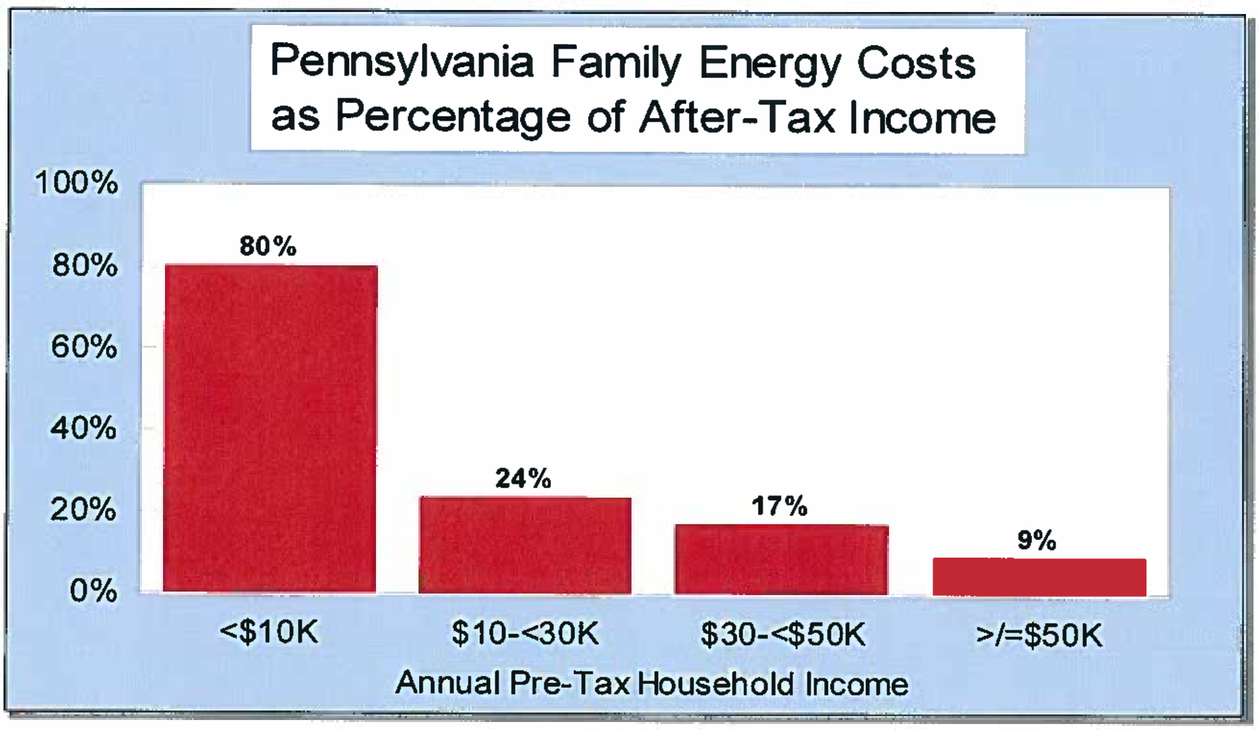
Energy Cost Impacts on Pennsylvania Families

Energy prices, high unemployment, and declining incomes are straining the budgets of Pennsylvania's lower- and middle-class families. Pennsylvania households with annual incomes below $50,000, representing nearly 51% of Pennsylvania's population, spend an estimated average of 21% of their after-tax income on energy. Energy costs for the poorest households earning less than $10,000 represent 80% of their family incomes, before accounting for any state energy assistance. Increased energy costs are competing with other necessities for lower- and middle-income family budgets across the Commonwealth.



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www.americaspower.org

Energy Cost Impacts on Pennsylvania Families

This paper assesses the impact of energy costs on Pennsylvania households using energy consumption survey data and current energy price data from the U.S. Department of Energy's Energy Information Administration (DOE/EIA).[1] Energy costs are summarized by household income group using Pennsylvania data from the U.S. Bureau of the Census.[2] Energy expenditures as a percentage of after-tax income are estimated for the effects of federal, state and local income taxes and federal social insurance payments.

Key findings include:

- Nearly 51% of Pennsylvania's families have gross annual incomes of $50,000 or less, with an average after-tax income of $22,037. Pennsylvania's unemployment rate of 7.6% in December 2011 ranked 26th highest in the nation.

- Measured in constant 1990 prices, residential electricity prices in Pennsylvania have declined by 16%, while the price of residential natural gas has declined by 1%. The relatively low cost of electric power is due in part to Pennsylvania's historic reliance on domestic coal for much of its electric generation.

- Energy costs are consuming the after-tax household incomes of Pennsylvania's low- and middle-income families at levels comparable to other necessities such as food and health care. Pennsylvania families spend an estimated average of 11% of their after-tax incomes on energy. The 2.5 million Pennsylvania households earning less than $50,000 devote an estimated 21% of their after-tax incomes to energy.

- The 1.1 million Pennsylvania families with annual incomes of $10,000 to $30,000, nearly one-quarter of the state's population, spend an estimated 24% of their after-tax family budgets on energy.

- The 374,000 poorest families in Pennsylvania, living well below the federal poverty line and earning less than $10,000 per year, are being squeezed hardest by energy cost increases. Many of these families receive state energy assistance to help reduce energy costs. Yet for most lower-income families and for 1.6 million Pennsylvania households receiving Social Security – representing 32% of all Pennsylvania households – rising energy costs are competing with other basic necessities for the family budget.

Pennsylvania Household Incomes

U.S. Census Bureau data on Pennsylvania household incomes in 2010 (the most recent available) provide the basis for estimating the effects of energy prices on consumer budgets.[3] The table below shows estimated 2010 after-tax incomes for Pennsylvania 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.[4] State and local income taxes are estimated from current Pennsylvania income tax rates.[5]

Pennsylvania households by pre-tax and after-tax income, 2010

Pre-tax annual income:	<$10K	$10-<$30K	$30-<$50K	≥$50K	Total/avg.
Households (Mil.)	0.374	1.151	0.970	2.441	4.936
Pct. of total households	7.6%	23.3%	19.6%	49.4%	100.0%
Avg. pre-tax income	$4,791	$19,840	$39,675	$108,621	$65,878
Effec. fed tax rate %	2.0%	9.1%	14.1%	23.2%	16.5%
Est. state & local tax %	0.0%	4.4%	4.4%	4.4%	4.0%
Est. after-tax income	$4,695	$17,171	$32,355	$78,696	$52,350

Nearly 51% of Pennsylvania families had estimated pre-tax incomes below $50,000 in 2010, compared with 50% nationally. After federal and state taxes, these families had average annual incomes of $21,830, equivalent to an average monthly take-home income of $1,819. In 2010, the median household income of Pennsylvania families was $49,288, a 3% decline from the 2008 median income of $50,713.[6] In December 2011, Pennsylvania's unemployment rate of 7.6% ranked 26th highest in the nation.[7]

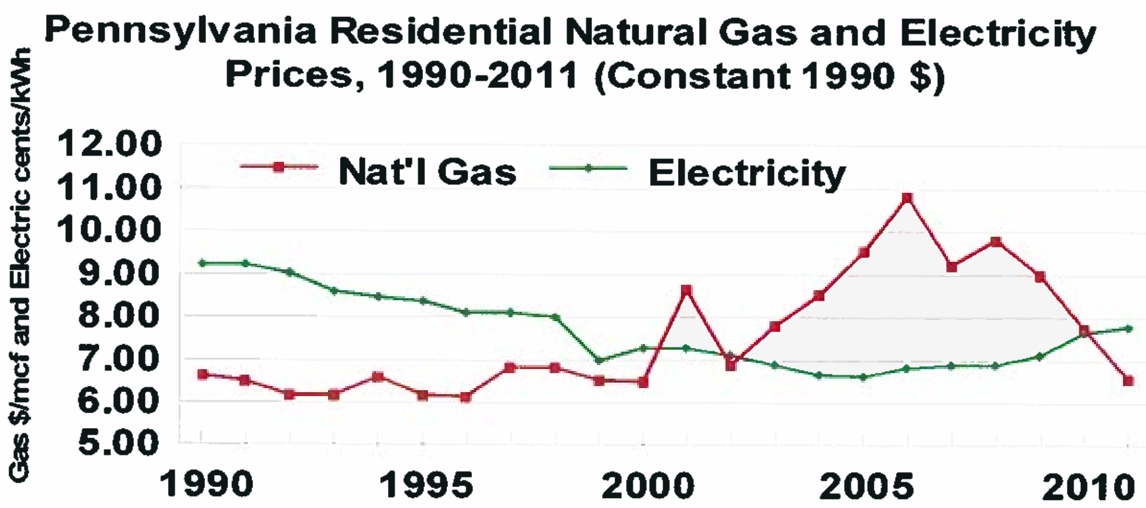
Residential and Transportation Energy Expenses

The principal residential energy expenses are for electricity and natural gas for home heating, cooling, and household appliances. Many Pennsylvania homes also use heating oil, propane fuel, and other heating sources such as wood.

As shown in Chart 1, the price of residential electricity in Pennsylvania has declined by 16% in real, inflation-adjusted terms since 1990, while the price of residential natural gas has decreased by 1%. The inflation-adjusted 16% decrease in residential electricity prices since 1990 reflects, in part, Pennsylvania's historic reliance on low-cost coal for the majority of its electric energy supplies. In 2011, coal-based generation provided 45% of the state's electricity.[8]

DOE/EIA data show that recent electricity rate increases have raised consumer electricity prices in nominal prices by 35% since 2005.[9] Pennsylvania's average residential electricity rate in 2011, 13.3 cents per kilowatt-hour, was 13% higher than the U.S. average rate of 11.8 cents per kWh-hour.[10]

Chart 1



Source: U.S. DOE/EIA (2011 data through Oct. 2011).

Energy Expense Estimates

Estimated household energy expenses for Pennsylvania are based upon DOE/EIA residential electric and natural gas sales data for Pennsylvania in 2011.[11] Total household energy costs are distributed by income category using DOE/EIA residential energy survey data.

Gasoline prices have declined from their 2008 peaks, but are above $3.50 per gallon in many areas. Gasoline accounts for the largest single increase in consumer energy costs since 2001. EIA's January 2012 Short-Term Energy Outlook projects 2012 average retail gasoline costs at $3.54 per gallon. In 2001, the average price of gasoline was $1.47 per gallon.

The increase in gas prices follows a decade-long trend of increased market shares of pickup trucks and SUVs, and an increase in the average number of vehicles owned per household.[12] Many families continue to own low-efficiency vehicles with low trade-in values.

DOE/EIA's 2001 Survey of Household Vehicles Energy Use (2005) provides information on regional gasoline use by household income category. These regional gasoline consumption data are updated using EIA's 2012 national average retail gasoline price estimate of $3.54 per gallon. To be conservative, household gasoline consumption is reduced by 6.3% from 2001 levels, reflecting recent trends in the number of vehicle-miles driven annually per household.[13]

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

Estimated Pennsylvania household energy costs by income category

Pre-Tax Annual Income:	<$10K	$10-<$30K	$30-<$50K	≥$50K	Average
Residential energy $	$1,809	$2,010	$2,317	$2,895	$2,493
Electric $	$1,053	$1,226	$1,473	$1,826	$1,506
Natural Gas $	$394	$408	$439	$556	$473
Other* $	$363	$376	$405	$513	$437
Gasoline $	$1,957	$2,079	$3,317	$4,298	$3,410
Total energy $	$3,766	$4,089	$5,635	$7,193	$5,903
Energy % of after-tax income	80%	24%	17%	9%	11%

*Other includes heating oil, propane gas, 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 23% of Pennsylvania households earning between $10,000 and $30,000 spend an estimated 24% of their after-tax income on energy. While many lower-income consumers qualify for energy assistance, these government programs are hard pressed to keep pace with the escalation of energy prices. In 2011, Congress reduced annual funding for the federal LIHEAP energy assistance program from $5.1 to $4.7 billion.

The average Pennsylvania family with an after-tax income of $52,350 spends an estimated $5,903 on energy, or 11% of the family budget. The 2.5 million Pennsylvania households earning less than $50,000, representing nearly 51% of households, allocate 21% 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 necessities.

Disproportionate Impacts on Senior Citizens

The impacts of increased energy costs are falling disproportionately on Pennsylvania's 1.6 million households of Social Security recipients, representing 32% of the state's households. In 2010, Social Security recipients in Pennsylvania had an average household Social Security income of $16,593.[14] Two-thirds of these households (976,000) had additional retirement income averaging $18,240.

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. Maintaining the relative affordability of electricity and natural gas prices, and increasing low-income energy assistance, are essential to the wellbeing of hundreds of thousands of Pennsylvania's senior and lower-income citizens.

Conclusion

The escalation of Pennsylvania consumer energy prices - together with declining income among middle-income households and high unemployment rates - underscore the need to find ways to reduce energy cost impacts on Pennsylvania families, especially lower- and fixed-income households.

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End Notes

[1] Data on residential energy consumption patterns by income category are from U.S. Department of Energy, Energy Information Administration, 2005 Survey of Residential Energy Consumption (RECS), available at http://www.eia.doe.gov/emeu/recs/contents.html. Pennsylvania electricity, natural gas and other residential energy costs are based on 2011 state data (annualized based on data through October 2011) from U.S. DOE/EIA Electric Power Monthly (December 2011), Natural Gas Monthly (December 2011) and State Energy Data System data available at www.eia.gov/state/seds. 2012 gasoline price projections are from DOE/EIA Short Term Energy Outlook (January 2012).
[2] Household incomes in Pennsylvania by income category are derived from the distribution of household income in U.S. Census Bureau, American Fact Finder, Pennsylvania Selected Economic Characteristics: 2010 (2011).
[3] Ibid.
[4] Congressional Budget Office, "Effective Federal Tax Rates Under Current Law, 2001 to 2014," (August 2004). Effective federal tax rates for the income categories employed in this paper were interpolated from CBO's tax rates by income quintile.
[5] State tax data are estimated from state and local tax rates compiled by the Tax Foundation (2010).
[6] U.S. Census Bureau, American Fact Finder, Pennsylvania Selected Economic Characteristics (2008 and 2010 eds.).
[7] U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics (January 2012).
[8] U.S. DOE/EIA, Electric Power Monthly (December 2011, annualized based on data through October 2011).
[9] Id.

[10] Id.
[11] Id., and U.S. DOE/EIA, Natural Gas Monthly (December 2011).
[12] U.S. DOT, 2001 National Household Travel Survey, "Summary of Travel Trends," (December 2004).
[13] The Department of Transportation's 2009 National Highway Transportation Survey (2011) reports that average vehicle-miles traveled per household declined from 21,187 miles in 2001 to 19,850 miles in 2009.
[14] U.S. Census Bureau, Pennsylvania Selected Economic Characteristics: 2010 (2011).