ANALYSIS OF THE IMPACT ON FLORIDA OF THE PROPOSED EPA UTILITY MACT REGULATIONS

Prepared For

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Tampa, Florida

By

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Purpose of Report

On May 3, 2011, EPA published in the *Federal Register* proposed Maximum Achievable Control Technology (MACT) regulations, and revisions to the New Source Performance Standards, for coal- and oil fired electric utility steam generating units under the Clean Air Act. Comments on these proposed regulations were initially due by July 5, 2011 – on July 1, EPA published notice that the deadline was extended to August 4. Given EPA's delay in announcing the extension, this report was prepared in anticipation of submittal on July 5.

These proposed Utility MACT regulations are highly controversial and could result in significant impacts on coal power plants, electric reliability, electricity rates, and the national and state economies. This report estimates the potential impacts on Florida from the Utility MACT regulations.

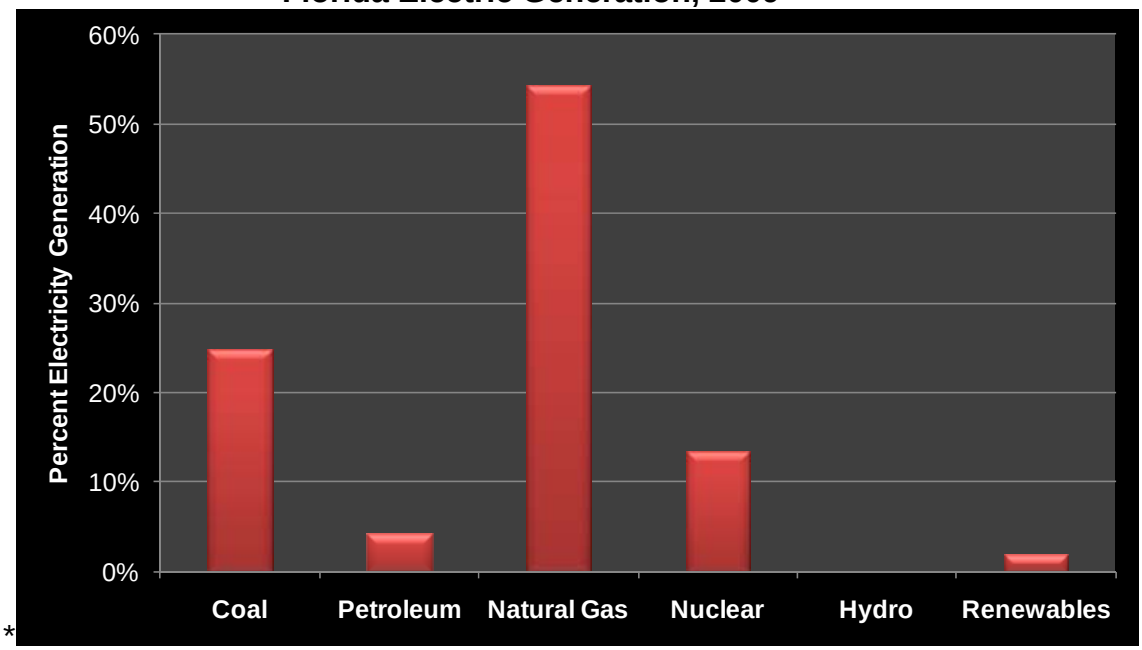
After discussing the Utility MACT and other recent and imminent EPA regulations, we assess and evaluate recent studies of the potential economic and energy impacts of these regulations. We then estimate the impacts of Utility MACT on Florida

Summary of Findings

Figure EX-1 and EX-2 indicate that there are major differences between electricity sources in Florida and the U.S. average; for example:

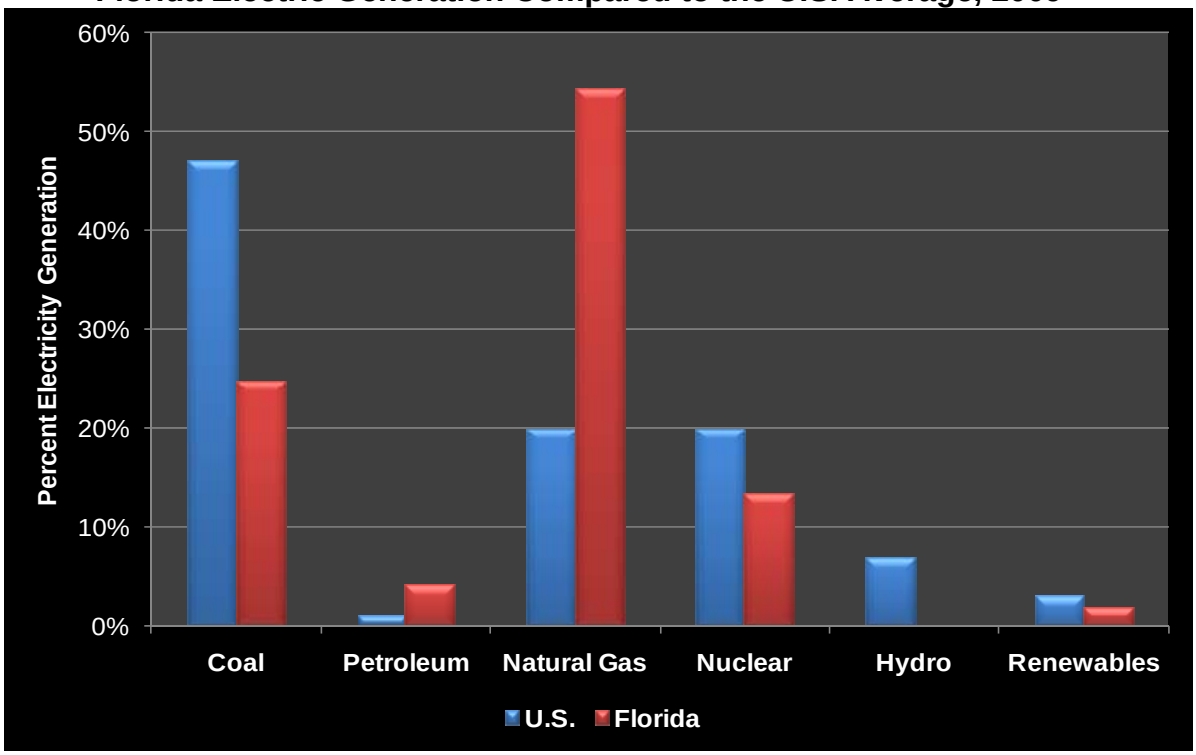
- Florida generates about 25 percent of its electricity from coal, whereas the U.S. average is about 47 percent.
- Florida generates about 54 percent of its electricity from natural gas, whereas the U.S. average is about 20 percent.
- Florida generates about 13 percent of its electricity from nuclear power, whereas the U.S. average is about 22 percent.
- Florida generates virtually none of its electricity from hydro power, whereas the U.S. average is about seven percent.
- Florida generates about four percent of its electricity from petroleum, whereas the U.S. average is about one percent.

Figure EX-1
Florida Electric Generation, 2009



Source: U.S. Energy Information Administration.

Figure EX-2
Florida Electric Generation Compared to the U.S. Average, 2009



Source: U.S. Energy Information Administration.

We estimate that the EPA Utility MACT regulations in Florida would by 2015 result in:

- An average electricity rate increase of nearly 25 percent
- Gross State Product (GSP) loss of nearly $18 billion – about 2.5 percent of state GSP
- Annual (FTE) job losses of 157,000
- An unemployment rate of nearly 13 percent – a 16 percent increase
- Lost annual manufacturing output of $1.3 billion – nearly four percent of Florida's total
- Lost annual state and local government revenues of $2.1 billion – about two percent of the total

These impacts are illustrated in Figures EX-3, EX-4, and EX-5:

- Figure EX-3 shows the percentage changes in major Florida economic indicators, and is notable for the large percentage increases in electricity rates and the unemployment rate.
- Figure EX-4 shows the total annual dollar losses in GSP, state and local government revenues, and manufacturing output.
- Figure EX-5 shows the relative job losses, illustrating that the potential job losses in Florida from Utility MACT are about twice the total number of jobs created in the state over the past six months and are nearly four times the total number of jobs created in the state in all of 2010.

It is important to note that these results do not consider many other costs that will result from this Utility MACT, including: (1) control equipment and monitoring equipment installations, capital and annual operating and maintenance expenses, (2) stranded investments from units that will be shutdown before the end of their useful life, and control equipment installations that may no longer be sufficient, (3) adding or upgrading transmission capabilities, and (4) differing impacts to municipal generating entities.

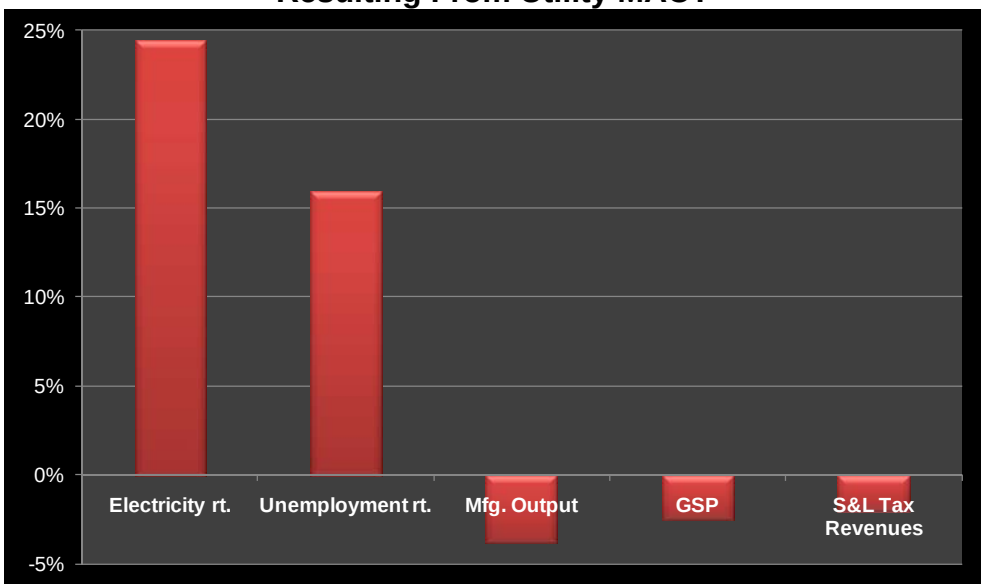
Implications for the State Economy and Jobs

Florida's economy is currently struggling to recover from its worst performance on record, and the economic impacts of the Utility MACT on the state will hinder, and could even reverse, Florida's current nascent recovery. The state's economic situation is still precarious, and the last several years have been extremely difficult for Florida's economy.

While there are some glimmers of hope for the state economy, the bottom line is that Florida is currently experiencing, at best, an anemic recovery from the worst recession in decades. Losses in the state resulting from the Utility MACT of $18 billion in GSP and nearly 160,000 jobs may be sufficient to delay or derail this fragile economic

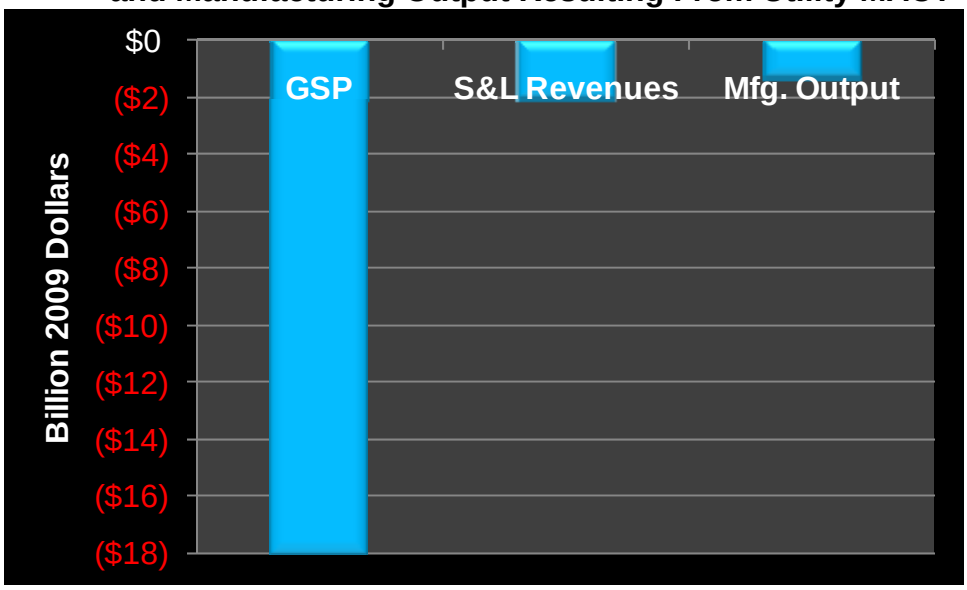
recovery. For example, as noted and shown in Figure EX-5, the job losses estimated to result from the Utility MACT could be more than twice the number of jobs created in the entire state over the past six months, and are four times the total number of jobs created in Florida in all of 2010.

Figure EX-3
Percentage Changes in Major Florida Economic Indicators Resulting From Utility MACT



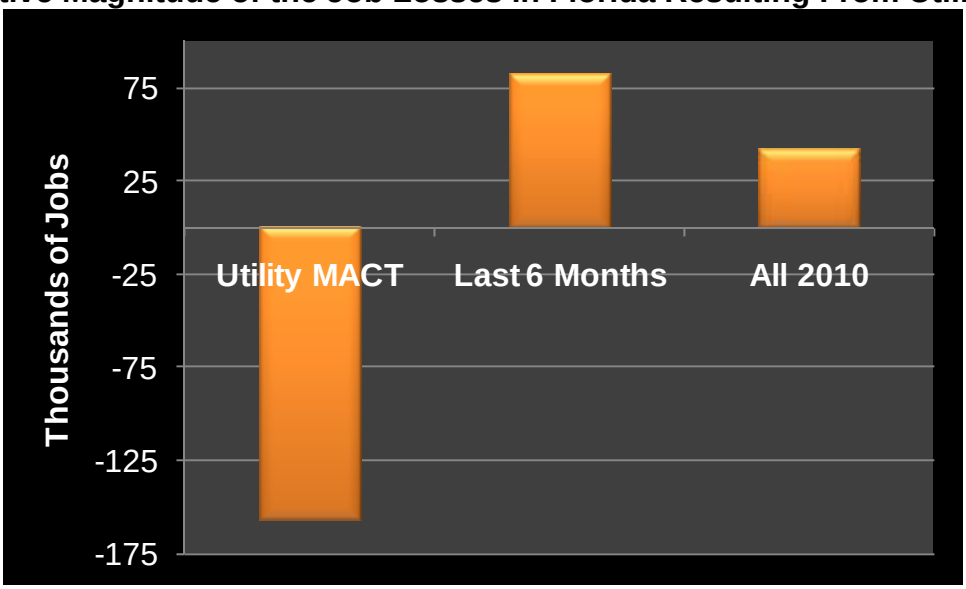
Source: Management Information Services, Inc., 2011.

Figure EX-4
Annual Dollar Losses in Florida GSP, State and Local Government Revenues, and Manufacturing Output Resulting From Utility MACT



Source: Management Information Services, Inc., 2011.

Figure EX-5
Relative Magnitude of the Job Losses in Florida Resulting From Utility MACT



Source: Management Information Services, Inc., 2011.

Implications for Florida Business and Commerce

The electricity cost increases that would result from the Utility MACT will place thousands of business throughout Florida at risk. Business owners in virtually every sector of the Florida economy – including tourist-related businesses -- are currently experiencing difficulties accessing affordable energy sources, and this is especially true for many small businesses that are high consumers of energy, including restaurants, bars, entertainment companies, groceries, convenience stores, laundries and dry cleaners, bakeries, commercial stores, and manufacturing firms. In numerous studies and surveys, small businesses have identified energy costs as one of their most important concerns, and even though energy costs often represent only 5-10 percent of total costs, they are important for small businesses because they can make the difference between profit and loss.

The Utility MACT regulations will increase electricity prices over what they would be otherwise, and these price increases will have several adverse affects on the Florida economy and jobs. First, businesses currently located in Florida will face increased costs. Second, some businesses currently in Florida will leave the state to relocate to other states that have lower electricity costs. Third, some new businesses will think twice about locating in Florida. Fourth, and perhaps most important, electric customers will have less money to spend on other things.

Certain sectors of the economy have become increasingly sensitive to even minor changes in electricity costs. For example, the health care sector – a major industry in Florida -- finds that almost all provisions of services are related to energy costs, with hospitals using twice as much electricity per square foot than comparable

office space. One recent study found that "electricity used exclusively for medical records is rapidly increasing, by 400-800 percent in the past four years."

Implications for Florida State and Local Governments

As demonstrated by the devastating impact of the recession on state and local government budgets throughout the U.S., state and local government tax revenues are sensitive to downturns in economic activity. For example, the state of Florida has recently struggled with a budget shortfall of nearly $4 billion. Revenue shortfalls persist even though, over the past three years since the recession took hold in Florida, the state has cut spending radically and closed shortfalls.

The Utility MACT will decrease Florida state and local government revenues by more than $2 billion annually and thus exacerbate these budget difficulties. Over the five year period 2015 – 2019, the Utility MACT could reduce Florida state and local government revenues by more than $10 billion.

The recession struck Florida early, and in a major way. Without an income tax, state government has long depended on property and sales taxes. However, since the Florida real estate industry has been devastated, the state's annual revenues declined more than $12 billion from a 2006 peak of $74 billion.

Florida's public infrastructure funding problems are already causing controversy and dissension in the state and, since the state's constitution requires a balanced budget, possible remedies are becoming increasingly severe. The bottom line is that Florida's fiscal problems are serious and are worsening, and are causing hardship, controversy, and dissension throughout the state. Nevertheless, there is probably one thing that all of the various parties and interest groups involved can agree on: Florida does not need the loss of an additional $2 billion annually in state and local government revenues that would result from the Utility MACT.

Implications for Florida's Elderly, Poor, and Minorities

Increases in electricity prices will affect all Florida residents, but high electricity prices and price surges are particularly troublesome for those with limited budgets. The electricity price increases from Utility MACT will act as a regressive tax on low income consumers, decrease their discretionary income and economic well-being, and increase their energy burden.

The Elderly

Elderly households often face a disproportionate energy cost burden – a burden that will be exacerbated by the Utility MACT regulations. Lower-income elderly households that depend mainly on fixed incomes are among those most vulnerable to energy price increases. Housing, food, healthcare, and other necessities must compete with energy costs for a share of the family budget. The approximately $30,000 median

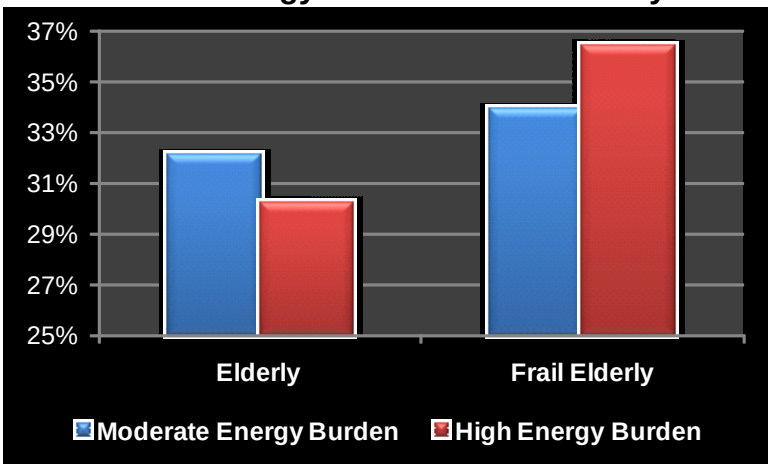
income of elderly U.S. households means that half of elderly households depend on incomes below this level. As a share of income, households headed by a person age 65 or older spend more on energy-related expenditures than their younger counterparts.

Home energy costs make up a large portion of elderly household budgets, and volatile natural gas, electricity, and fuel oil prices in recent years have significantly increased the energy burden facing many elderly consumers. Low-income older households spend an average of 10 percent of their income on residential energy. However, about one of every four low-income older households spends 15 percent or more of its entire income on home energy bills. Too often low-income older people risk their health or comfort by choosing between cutting back on energy expenditures and reducing spending for other necessities.

Thirty-five percent of older households have total household incomes of less than $20,000, and they will experience the greatest energy burden. As shown in Figure EX-6, large percentages of the elderly have high energy burdens, and nearly 34 percent of the elderly and more than 36 percent of the frail elderly have high energy burdens

Low income senior citizens dependent primarily on retirement income, of which there are many millions in Florida, have especially high energy burdens: About 45 percent of such individuals have high energy burdens, as compared to about 36 percent of all low income persons. Thus, the greatest burdens of the increased energy costs resulting from Utility MACT regulations will fall on households of elderly Social Security recipients – 20 percent of all households -- who depend mainly on fixed incomes, with limited opportunity to increase earnings from employment. In 2008, these households had an average Social Security income of about $14,550.

Figure EX-6
Total Energy Burdens of the Elderly



Source: Division of Energy Assistance, U.S. Department of Health and Human Services.

The low-income elderly are particularly susceptible to weather-related illness, and a high energy burden can represent a life-threatening challenge. Given their susceptibility to temperature-related illnesses, elderly households tend to require more energy to keep their homes at a reasonable comfort level. However, despite this requirement, low-income elderly households spend 16 percent less on residential energy than all households. Implementation of the Utility MACT regulations would place many elderly households at serious risk by forcing them to heat and cool their homes at levels that are inadequate for maintenance of health. In the Florida summers, the dangers from loss of cooling are particularly acute for the elderly. Finally, senior homeowners may be forced to sell their homes because they cannot afford their energy bills.

The Poor and Minorities

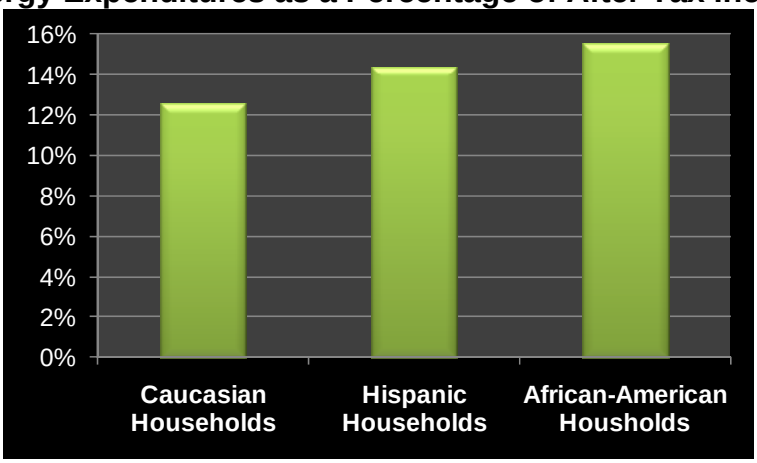
The increased electricity prices will cause adverse repercussions throughout the Florida economy, but nowhere will higher prices bring consequences as swiftly and harshly as in low-income and minority households. For the millions of low-income households in the state, the higher energy prices will intensify the difficulty of meeting the costs of basic human needs. At the same time, the price increases will threaten low-income households' access to vital energy and utility services, thereby endangering health and safety while creating additional barriers to meaningful low-income participation in the economy. While home energy costs average about four percent per year in middle class households, they can reach a prohibitive 70 percent of monthly income for low-income families and seniors.

By virtually every measure of economic well being and security, African-Americans and Hispanics are worse off than Caucasians, and they tend to be especially vulnerable to the economic downturn and job losses likely to result from implementing the Utility MACT regulations. This will impact minorities disproportionately.

The increased energy costs resulting from the Utility MACT regulations will cause great economic harm to minority families. Lower-income families are forced to allocate larger shares of the family budget for energy expenditures, and minority families are significantly more likely to be found among the lower-income brackets. Figure EX-7 shows that Hispanic families must dedicate almost 15 percent more of their after-tax income to energy expenditures than Caucasian families. African-American families must dedicate nearly 25 percent more than Caucasian families.

This disparity between racial groups means that rising energy costs have a disproportionately negative effect on the ability of minority families to acquire other necessities such as food, housing, childcare, or healthcare. In other words, the Utility MACT regulations impose a regressive tax disproportionately impacting the elderly, poor, and minorities.

Figure EX-7
Energy Expenditures as a Percentage of After Tax Income



Source: U.S. Energy Information Administration.

I. INTRODUCTION

On May 3, 2011, EPA published in the *Federal Register* proposed Maximum Achievable Control Technology (MACT) regulations, and revisions to the New Source Performance Standards, for coal- and oil fired electric utility steam generating units under the Clean Air Act (Utility MACT).[1] Comments on these proposed regulations were initially due by July 5, 2011; on July 1, EPA published notice that the deadline was extended to August 4. Given EPA's delay in announcing the extension, this report was prepared in anticipation of submittal on July 5. This short deadline limited the amount of original research that could be conducted here and required extensive use of previous studies and existing data and forecasts.

These proposed Utility MACT regulations are highly controversial and could result in significant impacts on coal power plants, electric reliability, electricity rates, and the national and state economies. Here we estimate the potential impacts on Florida of the Utility MACT regulations. Specifically, we:

- Summarize the Utility MACT regulations and discuss the related EPA suite of "train wreck" regulations
- Discuss whether the Utility MACT is even necessary
- Summarize and assess recent studies of the impacts of the Utility MACT and other current and pending regulations
- Estimate the potential impacts of the Utility MACT on Florida, including the impacts on Florida electricity generation, electric rates, and the state economy.
- Discuss the implications for:
  - -- The state economy and jobs
  - -- Florida business and commerce
  - -- Florida state and local governments
  - -- Florida's elderly, poor, and minorities

[1]Environmental Protection Agency, "National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Proposed Rule," Federal Register, 40 CFR Parts 60 and 63, Vol. 76, No. 85, May 3, 2011, 24976-25147.

II. THE UTILITY MACT AND THE EPA TRAIN WRECK

II.A. The EPA Train Wreck

The EPA "train wreck" refers to an unprecedented number and scope of simultaneous regulations recently finalized and scheduled to be finalized over the next several years focused on coal-fueled power plants – Table II-1 and Figures II-1, II-2, and II-3. The EPA regulations are in four areas:

- Conventional air pollutants (SO_2, NO_x and PM)
- Mercury and other hazardous air pollutants (HAPS) – the Utility MACT
- Coal combustion residuals (coal ash)
- Power plant cooling water intake structures

Specifically, the regulations typically considered the primary causes of the train wreck are:[2]

- Clean Air Transport Rule (Transport Rule) for reduction of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emissions in the eastern United States
- National Emission Standard for Hazardous Air Pollutants (NESHAP) for Utility Boilers for reduction of mercury and other Hazardous Air Pollutants (HAPs) emissions – the Utility MACT. Particulate matter (PM) emissions are used as a surrogate for the metals sub-group of HAPs in this regulation.
- Coal Combustion Residuals Regulations which may eliminate wet ash storage ponds and force conversion of wet ash handling systems to dry ash handling systems. This regulation would also require the disposal of coal residuals in either a municipal solid waste landfill or a hazardous waste landfill, which is statutorily prohibited in Florida.
- Clean Water Act (CWA) Sections 316(a) and 316(b) for reduction of thermal temperature discharges and lessened impact on aquatic life through redesign of intake structures, respectively. Reduction of temperature discharges would likely necessitate installation of cooling towers at plants with once-through cooling systems.

These EPA regulations on air quality, water use, and ash disposal will likely require existing coal units to either retrofit with environmental controls or retire.

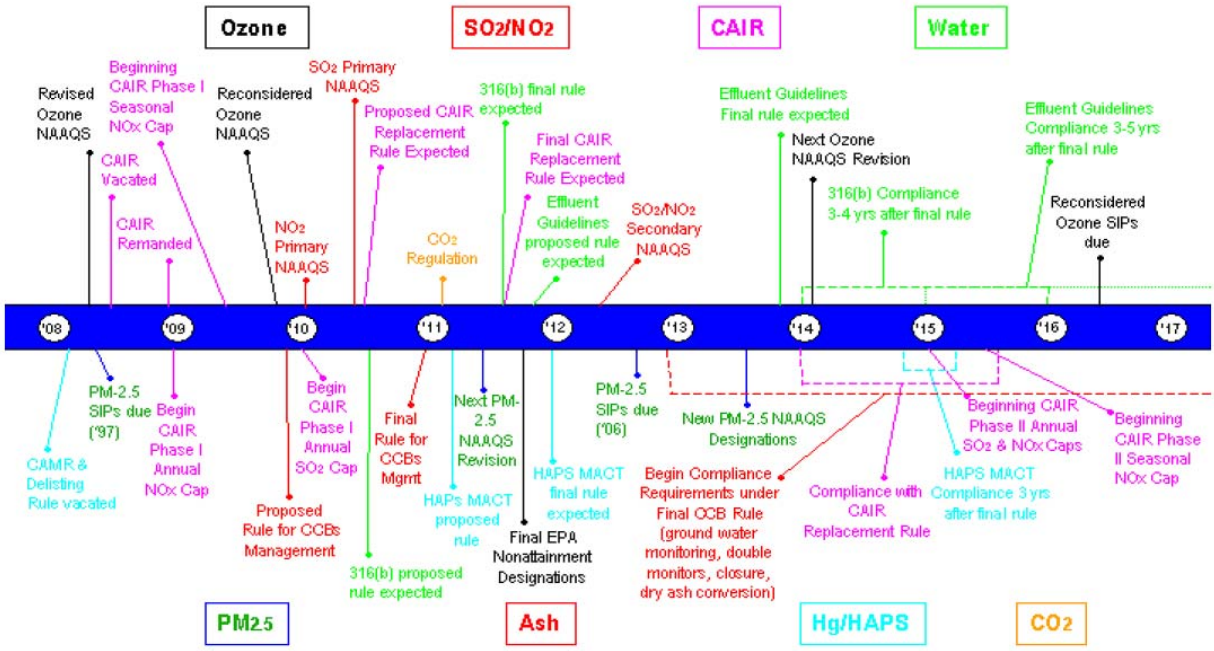
[2]It should be noted that there are other EPA rules that will also substantially impact Florida's coal-fired utilities, such as the NAAQS for SO_2, NO_2, ozone and PM2.5; GHG regulations; the IB MACT; the RICE MACT; Regional Haze program; numeric nutrient criteria; and Hg TMDL.

Table II-1
Summary of Impending EPA Regulations and Schedules

EPA Rule	Rule Identified as …	Estimated Compliance Date
Criteria pollutants	Transport Rule #1 (1997 ozone and annual $PM_{2.5}$ standard; 2006 daily $PM_{2.5}$ standards)	2012 – 2014 (Phase I) 2014 – 2016 (Phase II)
Criteria pollutants	Transport Rule #2 (updated 2011 ozone standard)	2015 – 2017
Criteria pollutants	Transport Rule #3 (updated 2011 $PM_{2.5}$ standard)	2016 – 2018
Hazardous air pollutants	Utility MACT	January 2015
Waste	Coal Combustion Residuals	2017 - ?
Water (intake)	Cooling Water Intake Structures	2016 – 2020
Water (discharge)	Steam Electric Effluent Guidelines	2017 – 2022

Source: Van Ness Feldman, 2011.

Figure II-1
Environmental Timeline For EPA Regulations



Source: AEP, March 22, 2011.

Figure II-2
EPA Dates For Proposed And Final Rules: Scope of the Impending Train Wreck

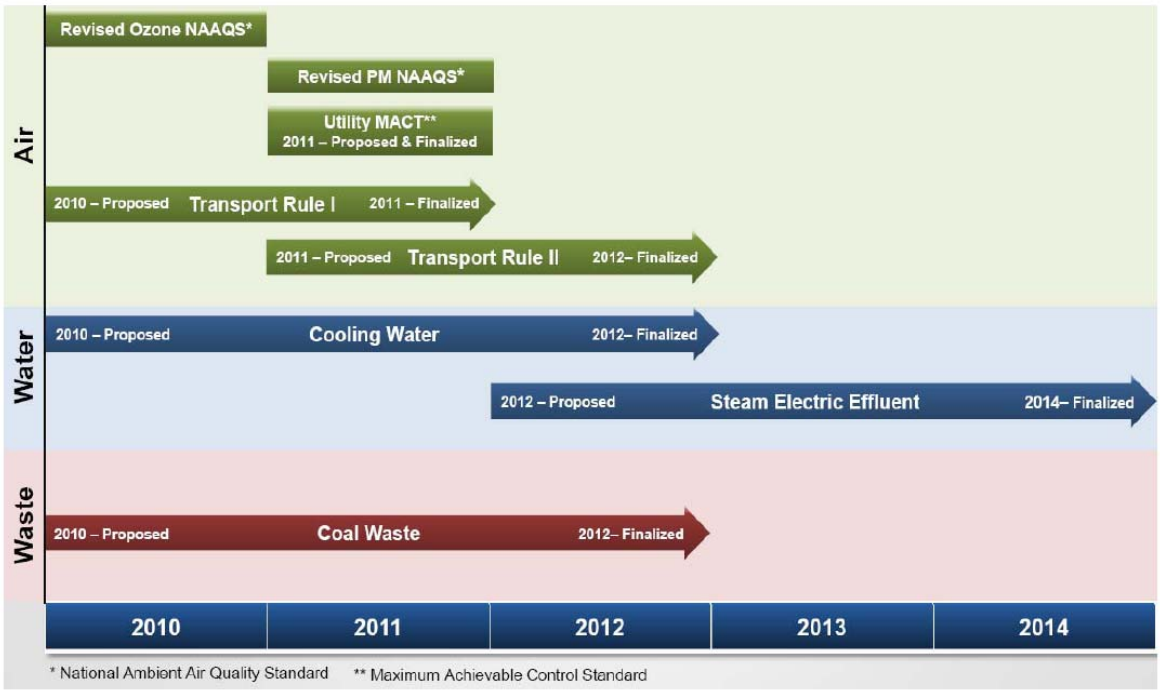
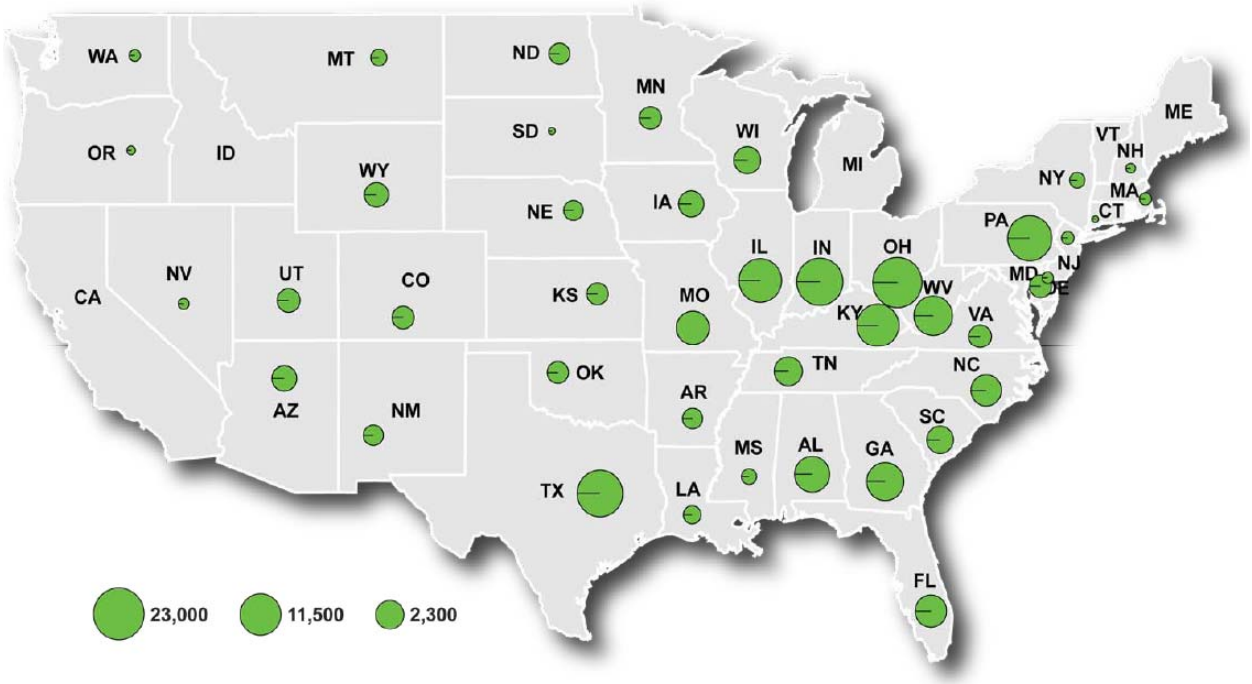


Figure II-3
Different Regions at Risk From EPA Train Wreck Regulations
(2010 Coal-fired Capacity)



Source: Burns & McDonnell, 2010.

Each regulation affects different groups of generating units over different time frames and in different parts of the country; for example:

- The Transport Rule principally affects fossil plants in the Eastern half of the U.S., and focuses on reducing SO_2 and NO_x emissions. EPA released the final rule on July 7, and the requirements begin on January 1, 2012.
- The utility MACT regulations mainly affect coal-fired power plants.
- The regulations affecting the disposal of coal combustion residuals (the so-called "coal ash") rule, also affect certain coal-fired power plants.
- The Clean Water Act regulations (the so-called "316(b)" regulations) will affect the water intakes and discharges of cooling systems of certain thermal power plants that use "once-through" cooling systems; may impact many other power plants besides coal-fired power stations.
- New regulations covering greenhouse gases (GHGs) from new and modified power plants went into effect on January 2, 2011, and EPA has committed to proposing GHG regulations for existing power plants by July 26, 2011.

Accordingly, EPA regulations affecting coal-fired generating units are already scheduled and timetables are set. They will significantly reduce coal-fired electricity generation in the near future and will result in severe economic consequences for the U.S. Taken together, these regulations will impact roughly 400,000 MWs of oil and coal-fired generation, which comprises about 40 percent of the total current available capacity in the U.S., and makes up nearly 50 percent of the U.S. total electricity generation. EPA has promulgated or will promulgate numerous new rules in 2010 - 2012 with compliance deadlines on, before, or near 2015. In 2015, due to the timetables established by EPA, the industry will face perhaps its costliest and most pressing challenge in the Utility MACT.

II.B. The Proposed Utility MACT

On May 3, 2011, EPA proposed regulations that, when finalized, will establish emission limits for mercury and other HAPs for new and existing coal- and oil-fired power plants -- the Utility MACT. EPA has repeated its commitment to sign the final rule by November 16, 2011, based on an agreement with environmental groups, so the agency's consideration of public comments necessarily will be brief, which is a cause of concern to the electric generation sector.

The Utility MACT will require owners of coal- and oil-fired power plants to invest in costly pollution control and monitoring equipment. Available control technologies include electrostatic precipitators, dry sorbent injection, flue gas desulfurization, active carbon injection, selective catalytic reduction, and fabric filters. The required control will necessarily be unit-specific, particularly for coal-fired units, since mercury and other

HAP emissions tend to vary widely based upon the design of the unit and the type of coal fired.

EPA's efforts to regulate HAP emissions from coal- and oil-fired power plants began over a decade ago. In 2000, EPA first determined that mercury emissions from power plants should be subject to regulatory controls under Section 112 of the Clean Air Act (CAA) and listed power plants as a category of stationary sources to be regulated for their emissions of HAPs. In 2005, EPA under then President George W. Bush reversed this determination, "de-listed" power plants as a source category under Section 112, and instead promulgated the Clean Air Mercury Rule (CAMR) under Section 111 of the CAA (regarding standards of performance for new stationary sources). The CAMR established a cap-and-trade program for emissions of mercury from coal-fired power plants, instead of the mandatory MACT standards (i.e., command and control emission limits) required under Section 112. The EPA's reversal of its 2000 "listing" determination and subsequent promulgation of CAMR was challenged in court and ultimately struck down by the U.S. Court of Appeals for the D.C. Circuit. Under the terms of the consent decree in that proceeding, EPA agreed to sign proposed new air toxics standards by March 16, 2011, and is required to issue final standards by November 16, 2011.

The Utility MACT rule requires coal and oil-fired power plants to reduce emissions of mercury, other metallic toxics, acid gases, and organic air toxics. Following the CAA's approach for toxic pollutants, the rule requires "command and control" emission rate limits for mercury, acid gases, and particles. The limits must represent MACT, defined as the top 12 percent performance of existing units, which EPA set after collecting performance data from industry. In addition, the proposal establishes "work practice standards" to reduce organic air toxics, such as dioxin and furans.

EPA's proposed Utility MACT would thus impose numerical limits on emissions of metals, including mercury and acid gas from oil- and coal-fired power plants. Specifically, mercury, PM (as a potential surrogate for non-mercury metallic HAPs) and hydrogen chloride or SO_2 limits (as potential surrogates for inorganic HAPs (i.e., acid gases) will apply to coal-fired units, and total metals, mercury, hydrogen chloride and hydrogen fluoride limits will apply to oil-fired units.[3] Limits will vary based on whether a regulated unit falls into one of five different subcategories: There are two subcategories of coal-fired power plants (based upon the heat content of the fuel burned), two subcategories of oil-fired power plants (i.e., liquid oil and solid oil (e.g., petroleum coke)), and a category for units burning gasified coal (i.e., integrated gasification combined cycle (IGCC).[4]

[3]EPA has requested comment on potential alternative surrogates and whether to establish separate limits for specific toxic metals and acid gases.
[4]EPA is also soliciting comment on whether additional subcategorization would be appropriate.

The HAP emission limits proposed by EPA are based on MACT, or the emissions limits that can be actually achieved by the top performing 12 percent of existing sources in a given source category. In determining MACT, the EPA proceeded on a "HAP-by-HAP" basis, drawing from the top performing sources for a given pollutant. This approach has generated significant controversy in the context of EPA's ongoing "Boiler MACT" rulemaking and other MACT rulemakings for other industrial sectors. Critics charge that the EPA must establish MACT based upon the emission limits achieved by the best performing sources (i.e., on a source basis) rather than "cherry-picking" emission limits from sources with the lowest emission rates for a single HAP.[5] EPA also declined to adopt health-based emissions standards, in lieu of MACT emission limits, for the electric generation sector (which it has the flexibility to do under Section 112).

EPA estimates that about 1,350 coal- and oil-fired units at 525 power plants will be affected by the air toxics standards. It contends that the resulting rule will reduce emissions of mercury and acid gases by 91 percent and, as a co-benefit, emissions of SO_2 by 55 percent. All existing sources will have until 2015 to come into compliance with the new rule; however, EPA will evaluate whether to grant a one year extension to individual sources on a case-by-case basis.

The consequences of the utility MACT are thus severe:

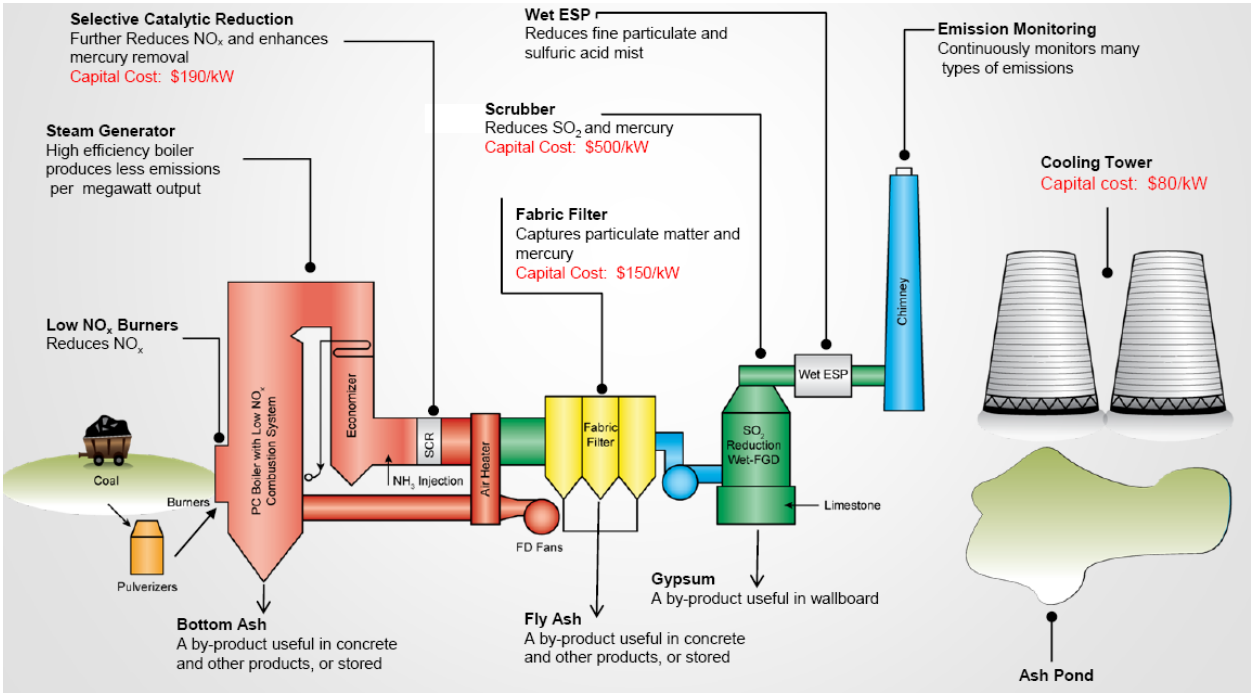
- MACT could force early retirements of existing industrial facilities and power plants.
- Units without scrubbers are at high risk.
- There is considerable uncertainty regarding pollutants covered for Utility MACT and for the costs of compliance.
- Utility MACT is to be determined based on best available technology for new sources and the top 12 percent of units for existing sources.
- Costly control options will be required, including sorbent injection, baghouse, and ESP, as well as control equipment with co-benefits for other CAA regulations (FGD, SCR).

As shown in Figure II-4, the costs for complying with Utility MACT and related regulations are significant, and the total capital cost for adding scrubber, SCR, and cooling tower on 300 MW unit can reach $230 million.[6]

[5]For example, the EPA established the proposed mercury emission limit for existing coal-fired units based upon the top 12 percent performing sources; however, the emission limits it has proposed for PM or hydrogen chloride may not have been achieved by the same sources that achieved the mercury emission limit. Critics contend that the "HAP-by-HAP" approach followed by the EPA violates the Clean Air Act. See the discussion in Dewy and LeBoeuf, op. cit.

[6]Van Ness Feldman, "Upcoming EPA Rules Will Impact All Coal-Fueled Electric Power Plants Across the United States," February 2011.

Figure II-4
Control Options for Coal-Fueled Power



Source: Van Ness Feldman, 2011.

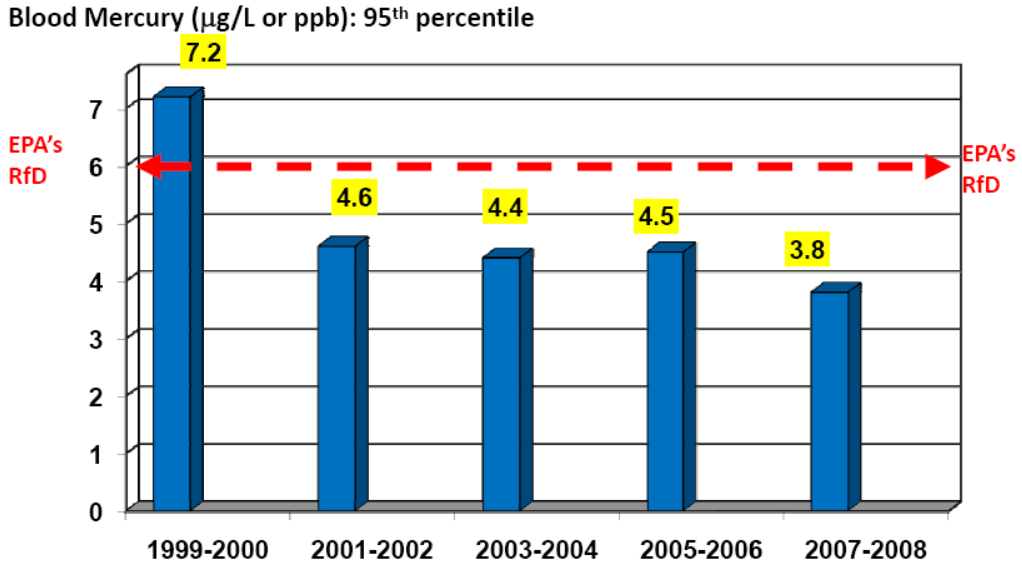
II.C. Is The Utility MACT Even Necessary?

Mercury (Hg) has always existed naturally in Earth's environment. A 2009 study found numerous spikes (and drops) in mercury deposition in Antarctic ice over the past 650,000-years.[7] Mercury is found in air, water, rocks, soil, and trees (which absorb it from the environment).

EPA regulators ignore the results of medical studies that clearly show its new restrictions are not needed and will not improve people's health.[8] For example, according to the Centers for Disease Control's National Health and Nutrition Examination Survey, which actively monitors mercury exposure, blood mercury counts for U.S. women and children decreased steadily 1999-2008, placing today's counts well below the already excessively "safe" level established by EPA.[9] As shown in Figures II-5 and II-6, blood mercury levels in the U.S. population have been decreasing for the past decade.

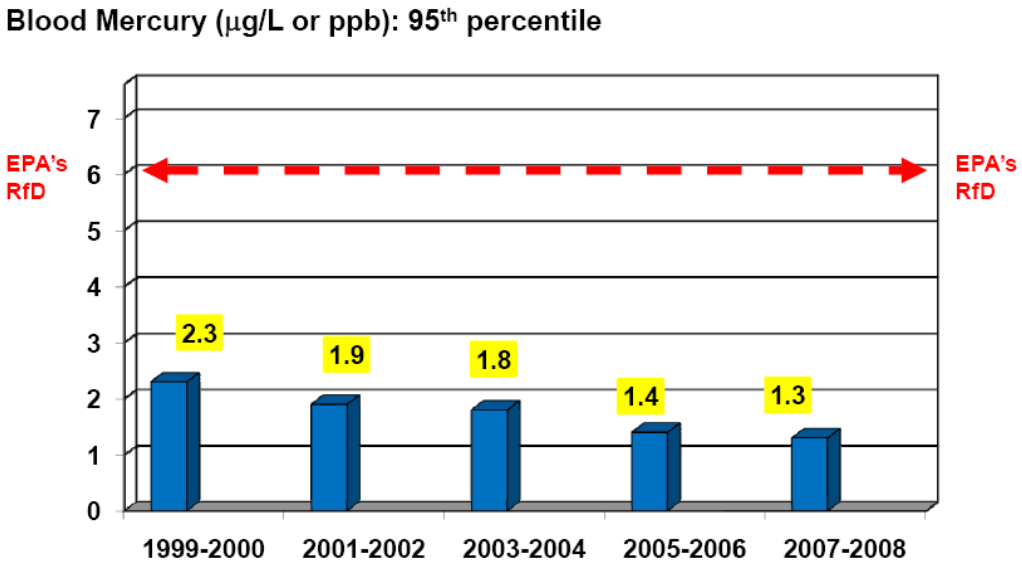
[7]Willie Soon and Paul Driessen, "The Myth of Killer Mercury," *Wall Street Journal*, May 25, 2011.
[8]Scott Segal, "EPA's Utility MACT Proposal: Negative Economics for What?" *MasterResource*, March 17, 2011.
[9]Soon and Driessen, op. cit.

Figure II-5
NHANES Survey of Total Blood Mercury for US Women age 16-49: 1999-2008



Source: CDC NHANES and EPA updates and Caldwell, et. al. (2009), *International Journal of Hygiene and Environmental Health*, vol. 212, pp. 588-598.

Figure II-6
NHANES Survey of Total Blood Mercury for US Children age 1-5: 1999-2008



Source: CDC NHANES and EPA updates and Caldwell, et. al. (2009), *International Journal of Hygiene and Environmental Health*, vol. 212, pp. 588-598.

III. ANALYSES OF THE UTILITY MACT AND RELATED REGULATIONS

III.A. Regulatory Impact Studies

Over the past year, numerous studies have been conducted of the potential impacts of EPA's Utility MACT and other recent proposals on the U.S. electricity system and economy. All of these studies indicate serious potential impacts, and identify the utility MACT regulations as one of the most troublesome. Many of the studies recommend delay or reconsideration of the EPA regulations.

While there are some common themes, reports sometimes reach different conclusions about the potential energy and economic implications of the regulations.[10] Some of the studies assess the impacts of air regulations alone, but not water regulations. Others estimate the impacts of EPA actions relating to new greenhouse gas (GHG) emission regulations, while others do not. Some studies are clear about their assumptions regarding important factors such as replacement costs and natural gas prices, while others are not. These differences can make it difficult even for experts to make sense of why the studies come to different conclusions.[11]

Nevertheless, virtually all of the studies indicate that the potential implications of the EPA regulations are severe. The studies indicate that as much as 100 GW of coal-fired capacity could be affected, compared to a total coal-fired resource base of approximately 340 GW and an estimated 1,045 GW base of generating capacity in the U.S. in the year 2015.[12] The parts of the U.S. with potential exposure to relatively high retirements in response to the air regulations, including the Utility MACT, are the regions with a high percentage of coal plants (especially older plants) and with lower existing reserve levels. The studies estimate that the costs of these regulations could total nearly $30 billion per year and that electricity rate impacts will be well into the double digits.

The studies reviewed in this project include the following:

- North American Electric Reliability Corporation, *2010 Special Reliability Scenario Assessment: Resource Adequacy Impacts of Potential U.S. Environmental Regulations,* October 2010.
- Burns & McDonnell, "Coal Fleet Study," Prepared for Peabody Energy, December 21, 2010.

[10]See the discussion in Susan Tierney, "Electric Reliability under New EPA Power Plant Regulations: A Field Guide," World Resources Institute, January 18, 2011.

[11]The studies often differ in terms of what they assume about the starting baseline of coal-fired power plants – that is, which new additions are included, and which already announced retirements are excluded.

[12]This figure is based on NERC's Special Reliability Assessment which uses as its reference case for 2015 the "Adjusted Potential Capacity Resources" of 1,045 GW – representing existing and planned capacity, along with potential announced capacity adjusted for a confidence factor.

- Hugh Wynne, et al., “U.S. Utilities: Coal-Fired Generation Is Squeezed in the Vice of EPA Regulation: Who Wins and Who Loses?” Bernstein Research, October 10, 2010.
- American Coalition for Clean Coal Electricity, “New Analysis Finds EPA’s Power Plant Regulations Would Increase Electricity Costs; Lose Jobs,” June 8, 2011 – a report by NERA.
- Metin Celebi, Frank Graves, Gunjan Bathla, and Lucas Bressan, “Potential Coal Plant Retirements Under Emerging Environmental Regulations,” Brattle Group, December 2010
- Ira Shavel and Barclay Gibbs, “A Reliability Assessment of EPA’s Proposed Transport Rule and Forthcoming Utility MACT,” Charles River Associates, December 16, 2010.
- Credit Suisse, “A Thought… CATR is First Step in Changing the Coal Fleet,” July 7, 2010
- Deutsche Bank Group Climate Change Advisors, “Natural Gas and Renewables: A Secure Low Carbon Future Energy Plan for the United States,” November 2010.
- ICF, “Preliminary Reference Case and Scenario Results,” report prepared for the Edison Electric Institute, May 2010.
- Steven Fine, “Clean Air, Ash and Water Regulations: Potential Impact of EPA Proposed Rules,” ICF, October 2010.
- ICF, “Coal-Fired Electric Generation Unit Retirement Analysis,” prepared for the Interstate Natural Gas Association of America, May 2010.
- Thomas A. Fanning, Chairman, President, and Chief Executive Officer, The Southern Company, “Recent EPA Rulemakings Relating to Boilers, Cement Manufacturing Plants, and Utilities,” Testimony before the Subcommittee on Energy and Power Committee on Energy and Commerce, United States House of Representatives April 15, 2011.
- Stan Kaplan, “Potential for Displacing Coal With Generation from Existing Natural Gas Plants,” Energy Information Administration, presentation to the National Capitol Area Chapter, U.S. Association for Energy Economics, November 2010.
- M.J. Bradley, Susan Tierney, Paul Hibbard, et. al., “Ensuring a Clean, Modern Electric Generating Fleet while Maintaining Electric System Reliability,´ prepared for the Clean Energy Group, M.J. Bradley Associates and Analysis Group, August 2010.
- Unions for Jobs and the Environment, Comments on Proposed National Ambient Air Quality Standards for Ozone, March 22, 2010, (Docket ID No. EPA-HQ-OAR-2005-0172;FRL-9102-1).
- Management Information Services, Inc., “Impending EPA Coal Regulations: Disaster for the Midwest,” January 2011.
- ICF, “Preliminary Reference Case and Scenario Results,” prepared for the Edison Electric Institute, May 2010.

- Bruce Braine, “Cost and Reliability Impacts of Pending EPA Regulations,” American Electric Power Company, May 2011.
- Edison Electric Institute, *Potential Impacts of Environmental Regulation on the US Generation Fleet: Final Report,* January 2011.
- Van Ness Feldman, “Impending EPA Coal Regulations: National Economic Implications," February 2011.
- Mark C. McCullough, “Understanding the Potential Impact of Proposed USEPA Regulations: Case Study,” American Electric Power, March 22, 2011.

III.B. Assessment of the Studies

The studies published over the past year were conducted by various authors and organizations, including energy researchers, investor analysts, industry trade associations, and reliability organizations. They differ widely in terms of assumptions, estimated costs, constraints, and other parameters.[13] Some of the more important assumptions clearly shape the results of the studies, and these include such critical factors as the role of natural gas supply and prices, the response of the markets in providing new capacity to replace power plant capacity that is derated or retired; the time frames needed for the market to respond in one form or another, inflationary impacts of simultaneous utility plant refurbishment programs, the extent to which investment choices and resource options differ in light of whether a plant is in a regulated utility’s rate base or in a merchant power market, etc.

The studies made differing assumptions about regulatory impacts. Some of the studies assessed not only the impact of EPA regulations affecting traditional air pollutants (SO_2, NO_x, and mercury) but also the impacts of the 316(b), GHG and coal-ash regulations. NERC identified the 316(b) regulations as having the largest impact on retirements of coal plants with concerns raised for reliability, especially if EPA’s 316(b) regulations are “strict”.[14] The Brattle Study did not distinguish between impacts of the air rules only and the impacts of all of EPA’s upcoming regulations. The ICF-Fine study includes the impact of GHG regulations. And the ICF-EEI study analyzed scenarios including 316(b) and GHG regulatory impacts. The B&M and Van Ness Feldman studies estimated the impact of all of the train wreck regulations referenced above.

The studies made varying assumptions about market responses. Many of the reports emphasized that action needs to be taken soon by a variety of parties to minimize the impacts on reliability. NERC makes this clear, as does the CRA study and

[13]Many of the reports describe their assumptions, but not necessarily at the level of detail that would allow for consistent comparisons across studies, either in key elements of models or data and parameter assumptions, such as for equipment costs.

[14]“The Strict Case scenarios reflect the coupled effects of a higher increase in costs with more stringent requirements for the proposed rules.” NERC, page 5. For the 316(b) proposed regulations, NERC assumed a 25 percent increase in compliance costs.

several of the studies conducted by investment analyst firms. However, the studies find it difficult to make assumptions about how the market will respond as retirements are announced or anticipated, since conditions will change over time as electric supply and demand markets evolve.

The studies used a variety of assumptions about fundamental power plant economics. Some of the studies use different technical assumptions about key parameters that affect a power plant owner's decision about whether it is more economic to add new pollution-control equipment on an existing coal plant or to retire the unit instead. Relevant key assumptions include the cost of replacement power, the cost of back-end control equipment, the types of equipment that are suitable for compliance with EPA rules, the amount of time that an existing plant will continue to operate in the future, the amount of time that the new plant will be dispatched to produce power in future electricity markets, the regulatory and tax treatments afforded to different types of plants, and the level of demand for electricity. These assumptions influence the findings, as do the structures of the financial and dispatch models used in the studies.

The studies that assess "system reliability" mainly focus on resource adequacy (i.e., are there enough resources available to provide power when needed, under reasonable outlooks for demand?) rather than operational security (i.e., can the system keep the lights on in all places and at any time of day in ways consistent with reliability standards?). As NERC stated in its study, "The impacts of potential EPA regulations may also have second tier effects on reliability, beyond resource adequacy. Resource deliverability, outage scheduling, construction constraints, local pockets of retirements, and transmission needs may also affect bulk power system reliability.[15]

III.C. Summary of the Studies' Findings

Despite the caveats and concerns discussed above, the weight of the studies indicates serious energy and economic implications from current and imminent EPA regulations – especially from the Utility MACT. For example, to determine the impact of meeting the current and imminent regulations on the existing coal fleet, Burns & McDonnell consolidated publicly available plant information and emissions data from EPA, the National Energy Technology Laboratory, and EIA databases into a single database. [16] The study database provided emissions and operating information for all plants, including currently installed air quality control systems (AQCS), ash handling systems, and cooling water systems.

B&M used plant information from the study database in the EPA Coal Utility Environmental Cost model to estimate costs for installing AQCS required to comply with the regulations. Plant location and currently installed AQCS information determined which additional AQCS would be required for each plant. The total cost of meeting the

[15]NERC, op. cit.
[16]Burns & McDonnell, "Coal Fleet Study," Prepared for Peabody Energy, December 21, 2010.

regulations by retrofitting AQCS was developed for each plant, and general trends and analysis for the entire coal fleet were determined from these values. Finally, B&M reviewed the total cost of compliance and the current electricity prices for each state to estimate electricity prices after retrofit for each state. The study estimated that total annual retrofit costs would exceed $28 billion per year, that the average U.S. electricity price would increase by more than eight percent, and that electricity price increases in some states would be in the range of 20-30 percent.

Similarly, the ACCCE/NERA study found that EPA's proposed Transport Rule and Utility MACT would be among the most expensive regulations ever imposed by the agency on coal-fueled power plants, and would dramatically increase electricity rates and natural gas prices and lead to substantial job losses. The study produced results generally compatible with most of the studies reviewed here, and it:

- Forecast about 50 GW of coal retirements
- Assumed retirements and replacement with natural gas
- Forecast a total cost of the regulations of $184 billion
- Estimated an average electric price increase of 11.5 percent
- Estimated natural gas price increases of about 17 percent
- Estimated a net job loss of 1.44 million jobs.

The VNF study estimated that the Utility MACT and related EPA regulations will penalize coal generation and force the use of more expensive, intermittent, and unreliable electricity fuels – especially natural gas. This research found that:

- Nationwide, 30 GW-90 GW of coal capacity may have to be retired
- Electricity prices will dramatically increase
- There could be a more than 30 percent increase in NG used for electricity production
- There could be a more than 10 percent increase in total U.S. NG consumption
- Nationwide, 2 – 3 million jobs could be lost
- The impact will not be uniform nationwide, and the Midwestern states will be especially harmed
- Capital costs could total $140 billion, and more in annual costs
- 50 million low income Americans could be forced to choose between higher bills for heat and electricity and other life essentials – food, health care, education, etc.

EEI found that:

- Incremental capital expenditure costs could range between $100 billion and $270 billion
- NG prices could increase more than 100 percent

FRB Capital found that:[17]

- EPA is proposing new standards requiring costly emissions controls, forcing coal units to install equipment that in some cases is prohibitively expensive, and in other cases simply do not yet commercially exist.
- The combination of the Transport and Utility MACT rules could force the retirement of 30-70 GW of the lowest cost electricity generating capacity.

The Electric Power Research Institute estimated that the Coal Combustion Residuals Rule could result in the closing of as many of 350 coal-based facilities. Cement, drywall, kitchen counters, even bowling balls, are just some of the products that rely on recycled coal residuals as an essential component in their makeup. Such recycling activities could come under new threat if EPA re-categorizes these materials as "hazardous," costing as much as $75 billion over the next two decades.[18]

ICF International studies yielded the following results:

- When a complete environmental future is analyzed, over 150 GWs of coal, half of the U.S. coal fleet, are at risk of being unavailable in 2015 for the needed energy and required reliability due to insufficient time to install controls or replacement generation.[19] Nearly 80 GWs of coal may be retired by 2015 and the remaining coal is subject to an unachievable retrofit program.
- The required retirements and retrofits create the need to spend about $300 billion in the next five years, over two thirds of which is for replacement generation. These circumstances lead to generation shortages and a rapid run-up in prices creating a reliability and affordability crisis.[20]
- Particularly in certain regions, retail electricity prices are estimated to increase by 20 to 25 percent to cover the costs of complying with the new environmental requirements. Costs include installing emission control equipment, constructing new generating units, shifting more generation away from less-expensive plants to more-expensive ones, and retiring existing coal units.
- The average US household is estimated to lose buying power of $400 to $500 per year. This reflects higher prices for energy-intensive goods, fuel shifting, and reduced household income due

[17]Scott Disavino, "EPA Regs May Shut Down 70,000 MW of U.S. Coal Plants: FBR," *Reuters*, December 13, 2010.
[18]Neil King Jr. and Rebecca Smith, "White House, EPA at Odds Over Coal-Waste Rules, and Workers Agree: New Rules Result in Lost Middle-Class Jobs," *Wall Street Journal*, January 9, 2010.
[19]ICF, “Preliminary Reference Case and Scenario Results,” prepared for the Edison Electric Institute, May 2010.
[20]Edison Electric Institute, *Potential Impacts of Environmental Regulation on the US Generation Fleet: Final Report,* January 2011l.

to both reduced employment income and reduced investment income.

- Nationwide, employment is estimated to decline by an amount equivalent about 2 - 2.5 million full-time workers. This estimate includes an estimated increase in offsetting compliance-related employment equivalent to about 0.2-1 million full-time workers limited to the early years of implementation. Without the offsets, the estimated reduction in jobs would be 2 - 3.5 million.[21]

AEP estimated that:[22]

- The NERC Reliability First Corporation region alone will require between 16 and 29 GW of coal retirements, or about 15 to 25 percent of RFC coal, most occurring by 2015.
- Higher natural gas use and related price increases will affect all consumers, and a $0.50/MMBtu gas price increase will increase other consumer costs about $8-9 billion/year.
- The net job impacts are negative and will total between 1 and 2.5 million jobs lost – mostly due to large electricity price increases.
- There will be massive AEP coal unit retirements, totaling 5 to 7 GW – about 20 - 30 percent of AEP total capacity by 2014-2015.
- AEP Capital costs will total $6 to $11 billion by 2020 -- as much as double AEP environmental capital spending over the past 20 years
- Ongoing additional O&M, fuel, and purchased power expenses will total $300 to $600 million per year, at a NPV cost of about $2 to $4 billion.

The Illinois Power Agency found that:[23]

- Coal-fired plants historically have been one of the cheapest ways to generate electricity, but operating costs are expected to increase significantly because of upgrades needed on older plants to meet new EPA environmental regulations.
- Coal plants that account for roughly a fifth of Illinois' electricity generation could exit the market as a result of the new emissions rules.
- Illinois ratepayers could see their electricity bills increase as much as 60 percent in the next few years.

[21]Offset employment takes into account environmental retrofitting, new power plant construction, and energy efficiency improvements.
[22]Braine, op. cit.
[23]Julie Wernau, "Consumers' Electric Bills Likely to Spike as Coal Plants Close," *Chicago Tribune*, June 11, 2011. In January 2011, MISI estimated that electric bills in the Midwest could increase by 30 percent or more, with disastrous economic consequences. Environmentalists criticized these estimates as being alarmist and unduly pessimistic. It is thus interesting to note that in June 2011, the Illinois Power Agency estimated that Illinois electric rates could increase by as much as 60 percent.

- The increases are expected to begin to appear in 2014, and consumers can expect further increases as more expensive forms of generation take on a greater share of the electricity load, since "those costs will be passed through to consumers."

The Southern Company found that:[24]

- EPA's proposed Utility MACT, on its current schedule and in its current form, puts the reliability and affordability of power in the U.S. at risk.
- Over 150 GW of coal, half of the U.S. coal fleet, are at risk of being unavailable in 2015 for the needed energy and required reliability due to insufficient time to install controls or replacement generation.
- Nearly 80 GWs of coal are retired by 2015 and the remaining coal is subject to an unachievable retrofit program.
- These retirements and retrofits create the need to spend about $300 billion in the next five years, over two thirds of which is for replacement generation. These circumstances lead to generation shortages and a rapid run-up in prices creating a reliability and affordability crisis.
- With respect to the Utility MACT limits, there is a serious concern that some emission limits are so stringent that current technology does not exist to meet them on all units on a continuous basis.
- The total cost of compliance will remain uncertain even throughout the Utility MACT implementation period, due to current schedules for other final rules and their compliance deadlines.
- The final Utility MACT rules will trigger the need to initiate compliance plans leaving only three years for the impracticable task of overhauling the fleet that provides nearly 50 percent of the U.S. generation.

In addition:

- Credit Suisse estimated that these new rules could cost up to $100 billion and eliminate up to 60 GW of coal power – roughly 20 percent of nationwide coal-fired power capacity.
- IHS/Global Insight estimated that that every $1 billion spent on upgrade and compliance costs will put 16,000 jobs at risk and reduce U.S. GDP by as much as $1.2 billion.[25]
- The Brattle Group estimated that the Transport Rule alone could cost $130 billion by 2015.[26]

[24]Fanning, op. cit. These results include the impacts of EPA's air, water, ash and CO_2 rules combined.
[25]HIS/Global Insight, "The Economic Impact of Proposed EPA Boiler/Process Heater MACT Rule on Industrial, Commercial, and Institutional Boiler and Process Heater Operators," report prepared for the Council of Industrial Boiler Owners, August 2010.

- Bernstein Research estimated that the EPA regulations have the potential to severely impact nearly 25 percent of U.S. coal-based generation.
- Unions for Jobs and the Environment estimated that EPA's ozone rule would cost the U.S. 7.3 million jobs.[27]
- NERC warned that the "Overlapping compliance schedules for the air and solid waste regulations, along with required compliance for rule 316(b) following shortly thereafter, may trigger a large influx of environmental construction projects at the same time as new replacement generating capacity is needed." Such a large construction increase could cause potential bottlenecks and delays in engineering, permitting and construction.[28]

As a further frame of reference for what the EPA regulations place at risk, consider the contribution likely to be made by the affected part of the power sector if allowed to continue and to innovate. Adam Rose and Dan Wei of Penn State University estimated the total economic footprint of coal-fueled electric generation by 2015.[29] They found that coal-fueled generation will contribute $1.05 trillion (2005$) in gross economic output, $362 billion in annual household incomes, and 6.8 million jobs.

Some analysts contend that the suite of power-sector regulations will stimulate new investment in technology of various descriptions, creating so-called "green jobs." However, the studies cited above controlled for near-term, temporary job gains, and still found a total net jobs deficit of 2 to *2.*5 million jobs due to the overlapping impact of power-sector rules. In any event, heavy regulatory burdens have never been truly conducive to business confidence, investment and job creation.

Research has shown that salaries paid for jobs classifiable as "green" are far below the national average, and European experience has demonstrated that for every four green jobs created, nine higher paying industrial jobs are lost.[30] At the very least, flimsy or overly optimistic economic benefit cannot be the basis for risking millions of industrial jobs and billions of dollars in GDP.[31]

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[26]Metin Celebi and Frank Graves, "Potential Coal Plant Retirements under Emerging Environmental Regulations", The Brattle Group, December 8, 2010.

[27]Unions for Jobs and the Environment, "Comments on Proposed National Ambient Air Quality Standards for Ozone," March 22, 2010, (Docket ID No. EPA-HQ-OAR-2005-0173;FRL-3102-1).

[28]North American Electric Reliability Corporation, *2010 Special Reliability Scenario Assessment: Resource Adequacy Impacts of Potential U.S.. Environmental Regulations,* October 2010.

[29]Adam Z. Rose and Dan Wei, *The Economics of Coal Utilization and Displacement in the Continental United States, 2015* (July 2006).

[30]See, for example, Gabriel Calzada Álvarez, Raquel Merino Jara, Juan Ramón Rallo Julián, and José Ignacio García Bielsa, *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*, Univisidad de Juan Carlos, March 2009.

[31]Editorial, "How Green Is Your Lost Job?" *Investor's Business Daily,* March 1**,** 2011.

Noted economist David Montgomery recently testified that: "The serious debate in environmental policy is about how the costs of new regulations compare to their benefits, and how to design the regulations to minimize cost, uncertainty and disruption. Claims that regulations that raise the cost of doing business will create new jobs are, at best, a sideshow. Such claims only distract attention from the difficult tradeoffs that must be made between costs and benefits. 'Green jobs' is not a subject that leading economists have usually taken seriously enough to criticize in professional journals. As most economists agree, a policy of "regulating ourselves to prosperity" seems suspect at best."[32]

III.D. Finding: EPA's Cost Estimates are Low

After analyzing the range of reports produced on the proposed EPA regulations and their timelines for compliance, we conclude that EPA's recent and imminent regulations, with the Utility MACT being the most immediate threat, constitute an extraordinary threat to the power sector -- particularly the half of U.S. electricity generation derived from coal-fired generation. The industry is concerned about the ability to retrofit environmental controls or build replacement capacity in the three years to comply with the Utility MACT rule (and then other rules). Construction timeframes are also expected to increase due to the logistics of simultaneous installations, industry-wide competition for materials and craft labor, and increasing permitting requirements.

EPA admits that the Utility MACT will cost over $10 billion, making it one of the most expensive rules in the history of the Agency. However, this estimate does not include indirect costs, nor does EPA attempt to estimate the cumulative costs associated with overlapping rules due to be adopted at or about the same time. Further, as discussed above, independent studies indicate that the costs of the Utility MACT may be an order of magnitude (or more) higher than EPA estimates -- $100 - $200 billion or more. These other analyses make more realistic assumptions about technologies likely to be required to meet the terms of the proposed rule and its costs.[33]

[32]David Montgomery, "Testimony," Senate Committee on Environment and Public Works, Subcommittee on Green Jobs and the New Economy hearing entitled, "Green Jobs and Trade," February 18, 2011.

[33]For example, AEP estimates that the capital costs of the EPA regulations could cost $11 billion by 2020 -- as much as double AEP environmental capital spend during last 20 years, and that the ongoing additional O&M, fuel, and purchased power expenses could total $300 to $600 million per year; see Braine, op. cit. The Southern company testified that total U.S. retirements and retrofits from the EPA regulations would require utilities to spend about $300 billion in the next five years; see Fanning, op. cit.

III.E. Warnings From Recent PJM Auctions

PJM recently conducted a capacity auction for the 2014-15 capacity year. The resulting capacity prices were about 4.5 to 8 times as high as prices paid in the last two auctions, and 2.5 to 3 times as high as market analysts had predicted. According to PJM, most of this increase can be attributed to EPA.[34] Based on PJM information, analysts estimated the portion of the increase attributable to EPA will cost load (customers) in the PJM region $2-3 billion just in capacity costs and just for a one-year period (2014-15).

In May 2011, PJM conducted the capacity auction for the 2014/2015 capacity year.[35] Market analysts predicted the May 2011 auction would clear at moderately increased levels in comparison to the last two years (which cleared at $16 and $27 per MW/day, respectively). Specifically, Macquarie Equities Research estimated that the RTO price would clear at $40, and Barclays Capital reportedly predicted the price would clear at $50. Instead, PJM announced that the market clearing price increased to $125.[36]

In its report on auction results, PJM concluded that compliance with the Utility MACT from existing resources would be required in early 2015, which implicates the 2014/2015 Delivery Year. Compliance with increasingly stringent environmental regulations requires generation resources to install emission mitigation technology which increases the avoided cost offers of these resources. These increased costs were a significant contributor to the increase in clearing prices in the western part of the PJM RTO. The increasingly stringent environmental regulations had a two-fold impact on western PJM clearing prices: (1) generation resources affected by the increasingly stringent rules, the majority of which are located in the western part of the PJM RTO, could include the cost of investment needed to comply with the new regulations in their cost-based offer price, and (2) the amount of offered MWs from generation resources decreased because the resource owners decided the resources were not viable to comply with future regulations and therefore will deactivate as opposed to installing equipment to comply with the new rules. Thus:

[34]Marlo Lewis, "Market Speaks: Impacts of EPA Train Wreck Will Be Much Higher Than Anticipated," June 2, 2011, GlobalWarming.org.

[35]The PJM Interconnection is a FERC-approved regional transmission organization that manages the high-voltage electric grid and the wholesale electricity market that serves 13 states and the District of Columbia. In PJM, the "Reliability Pricing Model" (or "RPM") is a forward auction of electric generating capacity that occurs annually, three years ahead of the year for which capacity is procured. PJM procures enough capacity to cover the anticipated demand for electricity in the region plus a reserve margin. Generating units bid into the RPM auction based on their anticipated costs. Every generating unit that clears the auction receives a capacity payment based on the market-clearing price, which is set by the marginal (most expensive) unit. PJM then assesses the costs for those capacity payments on load (customers) in the PJM region. These capacity payments are in addition to payments that generators receive for the energy they sell from their generation.

[36]These results even surprised the analysts who monitor these markets. See "PJM Capacity Market Stuns Market Analysts," *Platts Megawatt Daily*, May 17, 2011.

- The May 2011 auction cleared over 142,000 MW of capacity for the unconstrained areas of PJM.
- The System Marginal Price (the basis for the market clearing price) was over $125 per MW/day.
- This represents an increase of over $97 dollars per MW/day over the clearing price from the last annual auction and a $75 increase from the price expected by Barclay's.
- PJM concluded that "60 to 80 percent" of the increase in generators bid costs in the May 2011 auction was due to environmental regulations.
- Even if one assumes that the market price would have cleared at higher levels than the last auction (e.g. the $50 price expected by Barclay's), the proposed EPA regulations caused an increase in electric capacity prices of approximately $2-3 Billion for a one year period, in the PJM region alone.
- Analysts have concluded that these prices are not "likely to decline meaningfully anytime soon, and thus, we expect the clearing price levels to remain relatively elevated (versus the 2013/2014 auction) for the foreseeable future."[37]

Thus, EPA's attempt to minimize the impact of its recent and imminent regulations on the electric utility industry has been discredited by results of the capacity auction that PJM recently conducted for the 2014-15 capacity year. In its response to Congress' request for extension of the comment period EPA argued that the PJM auction supports the need for a timely-finalized rule. EPA stated that because companies participated in the capacity auction, and committed resources that considered the cost impact of the Utility MACT, the rule should be finalized quickly so that they can meet their commitments. The results of the recent PJM auction refute this argument.

[37]Lewis, op. cit.

IV. ECONOMIC IMPACTS OF THE UTILITY MACT

IV.A. National Economic Impacts

As discussed, over the past year, a number of studies have been conducted of the potential impacts of the Utility MACT and EPA's recent and imminent proposals on the U.S. electricity system and economy. In addition to the recent NERA study and the work MISI conducted with Van Ness Feldman and Burns & McDonnell, studies have been conducted by IPC, NERC, BPC, ICF, Heritage, EPRI, GI, EEI, the Brattle Group, CRA, Credit Suisse, EIA, WRI, EPA, Bernstein Research, and individual utilities such as AEP, the Southern Company, Exelon, and others. All of these studies indicate serious potential impacts, they identify the Utility MACT regulations as among the most troublesome, and many of them recommend delay or reconsideration of the EPA regulations.

Despite the caveats and concerns regarding the differing results, the weight of the studies indicates serious energy and economic implications from the EPA train wreck regulations. The studies estimate that as much as 100 GW of coal-fired capacity could be affected, compared to a total coal-fired resource base of approximately 340 GW and an estimated 1,045 GW base of generating capacity in the U.S. in 2015. The parts of the country with potential exposure to relatively high retirements in response to the air regulations are the regions with a high percentage of coal plants (especially older plants) and with lower existing reserve levels. The studies estimate that the costs of these regulations could total nearly $30 billion per year and that electricity rate impacts could be well into the double digits. Further, nationwide, between 2 and 3 million jobs (or more) could be at risk.

IV.B. Florida Economic Impacts

IV.B.1. Theoretical Framework

MISI has developed a methodology that permits the estimation of the impacts on the economy, jobs, and other variables of changes in energy-related assumptions and variables – specifically electricity prices.[38] Here, this methodology was utilized to estimate the potential impacts on Florida from the Utility MACT. There are several major underpinnings to the MISI methodology.

[38]This methodology has been used and vetted in numerous research project and PUC hearings; see, for example, Roger H. Bezdek, "Answer Testimony and Exhibits of Roger H. Bezdek," on Behalf of the Colorado Mining Association Before the Public Utilities Commission of the State of Colorado in the Matter of Commission Consideration of Public Service Company of Colorado Plan in Docket No. 10m-245e Compliance With House Bill 10-1365, "Clean Air-Clean Jobs Act," September 17, 2010; and Roger H. Bezdek, "Economic and Energy Impacts of Fuel Switching in Colorado," Presented at the 2010 North American Regional Science Association Meeting, Denver, Colorado, November 2010.

The first and most basic assumption is that energy and energy prices – specifically electricity and electricity prices -- matter to the economy and that, in general, more abundant, efficient, and less expensive electricity is desirable and preferred and that it provides significant economic and jobs benefits.[39] Electricity is a mainstay of the U.S. economy and a critical factor of production, so this assumption would appear to be straightforward and noncontroversial. However, as prior research has shown, this is not necessarily the case.[40]

Second, to quantify the relationship between electricity prices and the economy, the elasticity of GDP with respect to electricity prices is utilized. Extensive review of the literature indicates that a reasonable long run value for this elasticity is about -0.10. This indicates that a ten percent increase in electricity prices will result in a decrease in GDP (or GSP) of one percent. Wide ranges of estimates for this value have been made over the past several decades in the U.S. and elsewhere, but a value of -0.10 is credible and defensible and has been used in rigorous studies of the impact of energy and electricity on the economy.[41] As discussed below, it is a conservative estimate.[42]

Third, the methodology posits that the mix of electric generating capacity – existing and new -- among the various fossil, nuclear, and renewable sources will significantly affect electricity prices. Estimates of the levelized cost of electricity (LCOE) of existing and, especially, new electricity generating technologies vary by orders of magnitude – see Figure IV-1. Nevertheless, it is clear that coal is the least expensive, followed by natural gas.[43] New builds of nuclear and renewables are the most expensive and, among renewables, geothermal and biomass are the least expensive, followed by onshore wind, offshore wind, solar thermal, and PV.[44] Here we utilized estimated changes in the cost of electricity resulting from the EPA utility MACT regulations.

The basic metric used is the levelized cost of electricity (LCOE). This is the constant dollar electricity price that would be required over the life of a plant to cover all operating expenses, payment of debt, accrued interest on initial project expenses, and the payment of an acceptable return to investors. LCOE is comprised of three

[39]See the discussion in Roger Bezdek, Robert Wendling, and Robert Hirsch, *The Impending World Energy Mess*, Toronto, Canada: Apogee Prime Press, 2010.

[40]Management Information Services, Inc., *Literature Review of Employment Impact Studies of Power Generation Technologies,* DOE/NETL-2009/1381, September 14, 2009.

[41]See the numerous citations referenced in Management Information Services, Inc., *GDP Impacts of Energy Costs*, report prepared for the U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL- DOE/NETL- 402/083109, October, 2009; and Management Information Services, Inc., "Energy Costs and the Economy," February 2011.

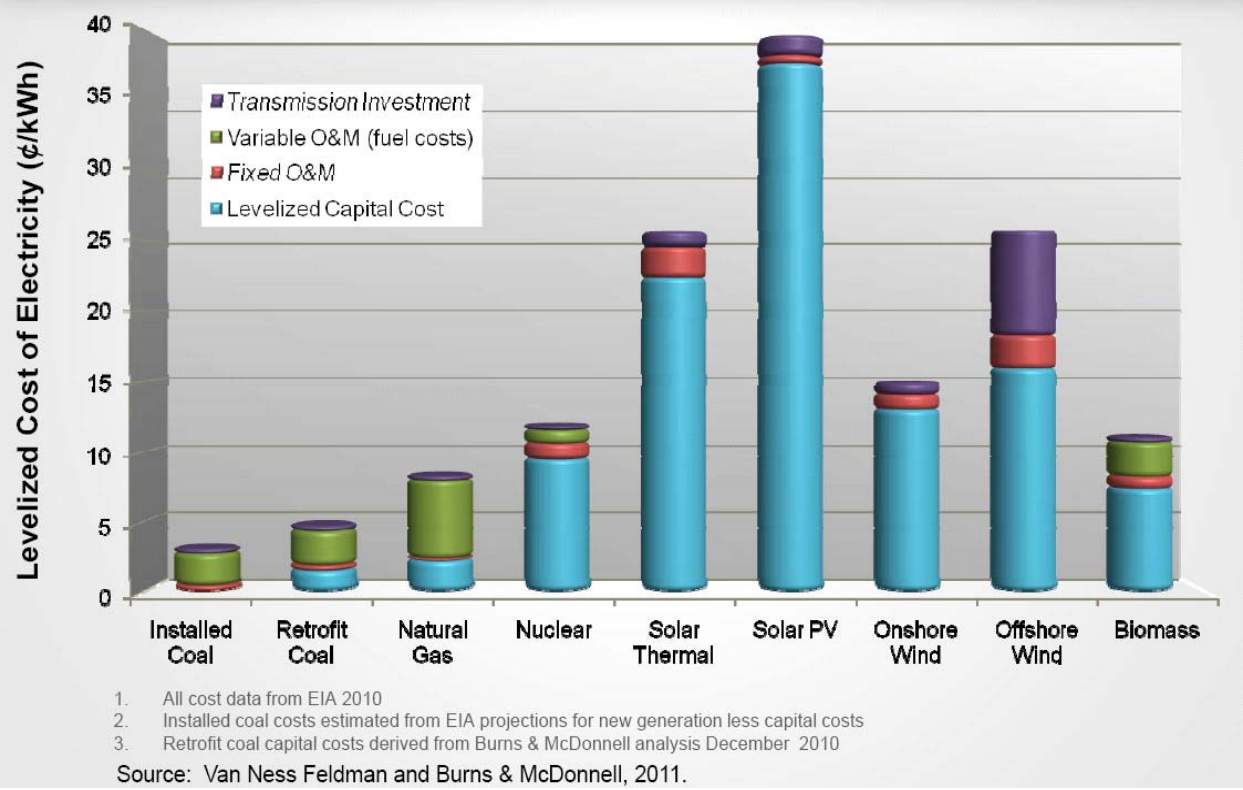
[42]In the analysis, this elasticity estimate can be varied by the user to simulate the different effects on the economy and jobs. Clearly, the higher the value used for the elasticity estimate the larger impact that changes in electricity prices will have, and vice-versa. However, using values significantly higher than -0.10 runs the risk of overestimating the impact of electricity prices on the economy, while using values significantly lower than -0.10 runs the risk of underestimating the impact of electricity prices on the economy.

[43]Large hydro is not included here because there are no new large hydro projects likely in the U.S. for the foreseeable future.

[44]This ranking is corroborated by recent EIA AEO reports and analyses.

components: Capital charge, operation and maintenance costs, and fuel costs. Levelized costs represent the present value of the total cost of building and operating an electricity generating plant over its financial life, converted to equal annual payments and amortized over expected annual generation from an assumed duty cycle. The key factors contributing to levelized costs include the cost of constructing the plant, the time required to construct the plant, the non-fuel costs of operating the plant, the fuel costs, the cost of financing, and the utilization of the plant.

Figure IV-1
Levelized Costs of Electricity Generation



1. All cost data from EIA 2010
2. Installed coal costs estimated from EIA projections for new generation less capital costs
3. Retrofit coal capital costs derived from Burns & McDonnell analysis December 2010

Source: Van Ness Feldman and Burns & McDonnell, 2011.

Levelized costs are used to compare different technology options to satisfy a given duty cycle requirement, and levelized costs for different technologies can be evaluated using appropriate capacity factors. LCOE is a standard, basic metric that analysts use to analyze the economic and rate impacts of alternate electricity generation scenarios.

LCOE is a valuable metric because it allocates the costs of an energy plant across its useful life, to give an effective price per each unit of energy (kWh). The advantage of LCOE is that it yields a single metric that can be used to compare different types of systems, including renewable energy, coal, natural, gas, nuclear, etc. It is the metric adopted by and widely used by the U.S. Department of Energy, the EIA, the National Renewable Energy Laboratory, the Nation Energy Technology Laboratory, and other energy research organizations. The LCOE approach is widely used in the U.S.

and internationally[45] for utility planning and generation decisions by governments and utilities. In the U.S., for example, the LCOE approach is used by virtually every relevant government entity, including DOE,[46] EIA,[47] CRS,[48] CBO,[49] GAO,[50] the DOE labs,[51] including NREL, NETL, and LBL, the National Academies of Science,[52] the CEC,[53] EPRI,[54] financial institutions,[55] and other states agencies, the PUCs of every state,[56] and most major utilities[57]

[45]International Energy Agency, *Projected Costs of Generating Electricity -- 2010 Edition*, Paris, France, 2010; European Commission, *Strategic Energy Review: An EU Energy Security And Solidarity Action Plan -- Energy Sources, Production Costs and Performance of Technologies for Power Generation, Heating and Transport*, SEC 2872, Brussels, Belgium, 2008.

[46]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Solar Energy Technologies Program, Multi-Year Program Plan 2007 - 2011," 2007; S. Price and R. Margolis, "Solar Technologies Market Report, Energy Efficiency & Renewable Energy," US Department of Energy, 2008..

[47]U.S. Energy Information Administration, "2016 Levelized Cost of New Generation Resources From the *Annual Energy Outlook 2010*," 2010; U.S. Energy Information Administration, Levelized Cost of New Generating Technologies," *Annual Energy Outlook 2009* (revised), April 2009,

[48]S. Kaplan, "Power Plants: Characteristics and Costs," CRS Report for Congress, RL34746. Washington, DC: U.S. Congressional Research Service, 2008; U.S. Congressional Budget Office, "Nuclear Power's Role in Generating Electricity," May 2008.

[49]U.S. Congressional Budget Office, *Nuclear Power's Role in Generating Electricity*, Washington, DC, 2008.

[50]U.S. General Accountancy Office, "Federal Energy Regulatory Commission Charges for Hydropower Projects' Use of Federal Lands Need to Be Reassessed," GAO-03-383, May 2003.

[51]National Energy Technology Laboratory, "Baseline for Fossil Energy Plants, Volume 1: Bituminous Coal and Natural Gas to Electricity," (DOE/NETL-2007/1281). Pittsburgh, PA, 2007; "State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States," National Renewable Energy Laboratory Technical Report NREL/TP-6A2-45551, May 2009..

[52]Committee on America's Energy Future, *America's Energy Future: Technology and Transformation*, Washington, DC: The National Academies Press, 2009.

[53]J. Klein, "Comparative Costs of California Central Station Electricity Generation: Final Staff Report," (CEC-200-2009-017-SF), Sacramento, CA: California Energy Commission, 2010; Ivin Rhyne, "2009 Integrated Energy Policy Report Staff Workshop," Levelized Cost of Electricity Generation Technologies Project, California Energy Commission, August 25, 2009.

[54]J. Hutchinson, S. James, Inwood, R., Ramachandran, G., Hamel, J., and C. Libby, C., Program on Technology Innovation: Integrated Generation Technology Options, Palo Alto, CA: Electric Power Research Institute, 2009; Steve Gehl, "Generation Technologies in a Carbon-constrained World," Electric Power Research Institute, April 21, 2006.

[55]Lazard Ltd., "Levelized Cost of Energy Analysis - Version 3.0," New York, NY, 2009; J. Hempstead, A.J. Sabatelle,M. Rose Haggarty, L Schumacher, W. Smyth, and W.L. Hess, "New Nuclear Generating Capacity: Potential Credit Implications for U.S. Investor Owned Utilities," New York," NY: Moody's Investors Service, 2008..

[56]Oregon Public Utility Commission staff, "Establish the Alternative Compliance Payment rate for 2011 pursuant to ORS 469A.180," May 22, 2009.

[57]American Electric Power, "Comparative Cost of Generation 2007," 2008; Appalachian Power, "American Electric Power Service Corporation's "Integrated Gasification Combined Cycle Technology," 2005; The Brattle Group, "Connecticut Integrated Resource Plan (IRP)," prepared under contract to Connecticut Light and Power and United Illuminating, January 2008; South Carolina Electric & Gas, "Application to the South Carolina Public Service Commission For a Certificate of Environmental Compatibility and Public Convenience and Necessity and for a Base Load Review Order," May 2008; Progress Energy Florida, "Petition for Determination of Need with the Florida Public Service Commission," March 2008; Florida Power and Light Company, "Petition for Determination of Need with the Florida Public Service Commission," October 2007; Southern Company, *Southern Company and Renewable Energy*, 2008.

Fourth, the methodology assumes that there is a quantifiable relationship between economic activity and jobs – between the level of GDP and jobs. This is relatively noncontroversial, although the nature of the relationship is contentious. Here, for convenience, we assume that the relationship is linear, but changes over time as productivity increases. Specifically, in the U.S.[58]

- In 2010, $1 billion (2008 dollars) generates about 10,040 jobs
- In 2020, $1 billion (2008 dollars) generates about 8,520 jobs
- In 2030, $1 billion (2008 dollars) generates about 6,970 jobs

In the simulations conducted, these values were fixed. However, the methodology allows changes in the relationship as a user option. Increasing the number of jobs created per billion dollars of GDP implies slower productivity growth, while decreasing the number of jobs created per billion dollar of GDP implies more rapid productivity growth.

Finally, the methodology was developed to assess the impacts of replacing exiting coal-fired electricity generating capacity with retrofitted capacity or with various alternatives – primarily new natural gas and renewables. However, the methodology is flexible enough to consider a wide range of fossil, nuclear, and renewable options. In the analyses discussed here, we did not estimate the impact on electricity prices from perturbations in the electricity generation mix – either at the national or state levels. As discussed, these estimates were obtained from research conducted by other analysts and organizations.

MISI utilized available estimates because a major objective of this project was to estimate the potential economic and jobs impacts on Florida of changes in electricity prices and rates caused by the Utility MACT. Thus, it is important to estimate the potential impacts on the economy of these cost increases.

The basic MISI estimation approach is as follows.

First, changes in the electricity costs within a jurisdiction (national or state) are simulated. In the work conducted here the national electricity rate impacts were obtained from various studies.[59]

Second, the change in GSP is calculated using a price elasticity factor applied to the change in electricity price. Increased electricity prices will reduce GSP and decreased electricity prices will increase GSP. As discussed, here we used an elasticity estimate of -0.10.

[58]These estimates were derived from the EIA AEO reports.

[59]Normally, using this methodology, changes in the electricity generation mix and corresponding LCOEs within a jurisdiction (national or state) are first simulated. These changes will change the average electricity price within the jurisdiction. As noted, in the work conducted here this was not necessary because the national electricity rate impacts were available from a variety of sources.

Third, the effects on other economic parameters (jobs, tax revenues, etc.) are estimated on the basis of the GSP impacts. Impacts on jobs and unemployment rates are estimated using Florida-specific employment data; impacts on tax revenues are estimated using Florida -specific tax and tax rate data; impacts on specific population groups (low-income, elderly, minorities) are estimated using Florida -specific demographic and income data; and so forth.[60]

The salient point is that existing coal plants produce inexpensive electricity and modifying them with retrofits (or replacing them with much higher cost natural gas and renewable facilities) will, inevitably, cause electricity costs and rates to increase significantly.[61] The MISI methodology and data base was used here to estimate the impact of such changes on electricity prices, GDP, jobs, and other economic variables in Florida.

IV.B.2. Parameters

The relationships between the costs of each electricity generation option, average electricity costs, rate impacts, and economic and jobs impacts are based on jurisdiction-specific data and on research conducted by MISI and others.[62] Basically,

[60]For example, national GDP and state GSP data are obtained from the U.S. Bureau of Economic Analysis; demographic data are obtained from the U.S. Census Bureau; jobs, employment, labor force, and unemployment data are obtained from the U.S. Bureau of Labor Statistics; data on state, local, city, and municipal budgets, tax revenues, and tax burdens are obtained from the U.S. Department of the Treasury, the Federal Reserve Board, and the U.S. Census Bureau; data on the energy burdens of specific population groups (low-income, elderly, minorities) are obtained from the U.S. Department of Health and Human Services, the U.S. Energy Information Administration, and the U.S. Census Bureau; energy data are obtained from the U.S. Energy Information Administration.

[61]New builds are costly and will generate LCOEs that could be orders of magnitude higher than LCOEs from existing coal plants. This is also true for other perturbations as well. For example, advocates in the Pacific Northwest are recommending that some existing dams be torn down and that the electricity generation lost be replaced with renewables. Hydro power is less costly by orders of magnitude than renewable electricity, and the MISI methodology could be used to analyze these proposals as well.

[62]The documentation for this work is extensive, and is based on a large volume of research MISI conducted for DOE/NETL, which has been subsequently presented at international, peer-reviewed scientific conferences and symposia; See Roger H. Bezdek, "Environmental and Economic Impacts of Increased Efficiency in Coal Power Plants," Presented at the International Conference on Environmental Science and Technology, Houston, Texas, July 2010; Roger H. Bezdek and Robert M. Wendling, "Economic and Job Impacts of Increased Efficiency in Existing Coal-Fired Power Plants," Presented at the Clean Technology 2010 World Conference, Anaheim, California, June 2010; Roger H. Bezdek, "Economic and Energy Impacts of Fuel Switching in Colorado," Presented at the 2010 North American Regional Science Association Meeting, Denver, Colorado, November 2010; Roger H. Bezdek, "Environmental and Economic Impacts of Increased Efficiency in Coal Power Plants," Presented at the 2011 Energy, Utility, and Environment Conference Phoenix, Arizona, January 2011; Management Information Services, Inc., *Optimizing the Relationship Between Energy Productivity/Costs and Jobs Creation*, report prepared for the U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL-402/110209, November 2009; Management Information Services, Inc., *GDP Impacts of Energy Costs*, report prepared for the U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL- DOE/NETL- 402/083109, October, 2009; Management Information Services, Inc., *Development of Economic and Job Impacts Analysis Tool and Technology Deployment Scenario Analysis*, report prepared for the U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL-402/092509, September 2009; Management Information Services, Inc., *Economic and*

higher cost electricity generation options result in higher electricity rates, and these higher rates will adversely affect economic activity, jobs, and other economic and fiscal variables in the relevant jurisdictions. The major parameters of the MISI model include.[63]

- Dollar base: Constant 2008 dollars, derived using the GDP deflator
- Years: 2008 through 2030
- Electricity generation options: The basic options currently in the model are coal, nuclear, natural gas, hydro, onshore wind, offshore wind, geothermal, solar thermal, PV, petroleum, biomass, and other. However, the analysis can incorporate coal retrofits and other generation options, such as coal/CCS, NG/CCS, Coal SC, IGCC, NGCC, advanced coal and NG technologies, wind with various backup options, unconventional hydro, etc.
- Electricity demand: Fixed for each year on the basis of the latest EIA AEO
- Electricity production among the generation options: Fixed for each year in the reference case on the basis of latest EIA AEO
- Prices of the electricity generation options: Fixed for each year in the reference case on the basis of MISI research, although these can be changed by the user
- Average price of electricity: Fixed in the reference case but dependent in the simulations on the distribution and prices of the electricity generation options

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Employment Impacts of Increased Efficiency in Existing Coal-Fired Power Plants, report prepared for the U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL-41817M4462, June 2009. It is also based on rigorous econometric studies conducted by other researchers, including Adam Rose and Dan Wei, *The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015,* report prepared for the Center for Energy and Economic Development, Inc., Alexandria, Virginia, by the Pennsylvania State University, July 2006; T. Hewson, T. and J. Stamberg, *At What Cost? Manufacturing Employment Impacts from Higher Electricity Prices,* Energy Ventures Analysis, Arlington, *Virginia, 1996; *Coal: America's Energy Future*, Volume II, "Appendix: Economic Benefits of Coal Conversion Investments," National Coal Council, prepared by Professor Tim Considine, Pennsylvania State University, March 2006; J. Musemeci, "Economic Impact Analysis of the Proposed Prairie State Energy Campus," College of Business and Administration, Southern Illinois University, Carbondale, Illinois; 2003; A. Rose, and B. Yang, "The Economic Impact of Coal Utilization in the Continental United States," Center for Energy and Economic Development, 2002; D. J. Shields, S. A. Winter, G. S. Alward, and K. L. Hartung, "Energy and Mineral Industries in National, Regional, and State Economies," U.S. Department of Agriculture, Forest Services, General Technical Report, FPL-GTR-95, 1996; and A.. Rose, and O. Frias, "The Impact of Coal on the U.S. Economy," Report to the National Coal Association, Department of Mineral Economics, Pennsylvania State University, 1994; *Mesaba Energy Project: Report to the Minnesota Public Utilities Commission*. Report by Excelsior Energy, Inc., December 2005; *The Economic Impacts of an Electric Power Generation Facility in Illinois*. Report prepared by John Lewis and Lisa Bergeron, Regional Development Institute, Northern Illinois University, May 2007; *An Economic Impact Analysis of Proposed Tax Incentives to Attract Integrated Gasification Combined Cycle Power Generation Facilities to Wyoming*. Report prepared for the Wyoming Infrastructure Authority by Roger Coupal, Robert Godby, David Bell, David Taylor, Jamison Pike, and Thomas Foulke, University of Wyoming, School of Energy Resources and Office of Research, January 9, 2007.

[63]However, exceptions may have to be made in implementation.

- Elasticity of GDP (or GSP) with respect to the electricity price: Fixed here at -0.10, although this can be changed by the user
- GDP (or GSP): Fixed for each year in the reference case on the basis of the latest EIA AEO
- Total jobs: Fixed for each year in the reference case on the basis of the latest EIA AEO and U.S. Bureau of Labor Statistics (BLS) forecasts
- Relationship between GDP and jobs: Fixed for each year in the reference case on the basis of the latest EIA AEO – although this can be varied by the user to assess the effects of different labor productivity assumptions.

For example, the 2009 basic U.S. reference parameters are shown in Table IV-1.

Table IV-1
2009 Reference Parameters

	Consumption		Est.Price
Electric Power Sector 2009	BkWh	Percent	c/kWh
Coal	1719.0	47%	7.6
Nuclear	799.0	22%	12.9
Natural Gas	722.0	20%	10.8
Onshore Wind	71.0	2%	19.0
Other	344.3	9%	8.4
Hydroelectric	*270.0*	*7%*	6.2
Geothermal	*15.0*	*0%*	10.0
Offshore Wind	*0.0*	*0%*	29.3
Solar Thermal	*0.0*	*0%*	32.9
PV	*0.0*	*0%*	49.3
Petroleum	*32.0*	*1%*	14.0
Biomass	*27.0*	*1%*	12.0
Other	*0.3*	*0%*	10.0
Total	3655.3	100.0%	
Calculated average price of electricity (cents/kWh)			9.70
2009 reference price of electricity (cents/kWh)			9.70

With electricity accounting for total U.S.	
2009 energy consumption at	100%
and GDP (trillion 2008$) at	$11.8
and the elasticity of output to energy price of:	0.1
…….the reduction in U.S. GDP (billion 2008$) is:	$0
With the average U.S. jobs/billion$ GDP ratio at :	10,200
…..the reduction in U.S. jobs (thousand FTE[64]) is:	0

[64]The job concept used is a full time equivalent (FTE) job. An FTE job is defined as 2,080 hours worked in a year's time, and adjusts for part time and seasonal employment and for labor turnover. Thus, for example, two workers each working six months of the year would be counted as one FTE job. An FTE job is the standard job concept used in these types of analyses and allows meaningful comparisons over time and across jurisdictions.

IV.B.3. Discussion and Caveats

The methodology is straightforward, but the analysis can get complex very quickly, and hundreds of simulations are possible. Further, many straightforward additions to the approach and model can be made that increase by orders of magnitude the number of simulations that can be conducted.

Possible parameters, variables, and assumptions in the current version that can be changed include the following:

- Year: Past years and forecast years 2010 through 2030
- The base year dollar can be changed
- Coal price advantage: Can be reasonably varied from 0 to 100 percent+, depending on alternatives and retrofits, CCS, cap & trade, etc.
- Coal price advantage over individual fuels: Can also be varied widely
- Future electricity prices: Can be changed within a broad range depending on assumptions about future economic growth, new electric power plant builds, GHG control legislation, etc.
- The future LCOEs of the two dozen electricity generation options can be varied widely – and may need to be.
- A detailed time series of the two dozen LCOE estimates for each of the generation options can be created for 2008 – 2030 and then used to develop electricity cost estimates on the basis of alternate projections of the distribution of electricity generation growth. This could also be used to "reverse engineer" EIA electricity price forecasts.
- Other electricity generation options can be added to the spreadsheet.
- Future estimates of total electricity requirements can be changed
- The future shares of the different generation options within the overall electricity mix can be varied greatly
- The time periods of these changes can be varied.
- U.S. GDP (and GSP) base forecasts can be varied
- Employment in each year can be varied.
- The GDP/jobs or GSP/jobs ratio can be varied, depending on assumptions about productivity growth
- The elasticity estimates can be varied: On the basis of the literature, estimates in the range of -0.05 to -0.15 appear feasible[65]

[65]See the literature review in Management Information Services, Inc., "Energy Costs and the Economy." March 2011.

These and other changes in the methodology can be simulated. More basically, the methodology itself can be expanded to be more realistic; for example:

- Large variations in the share of the various generation options in the total electricity mix and the resulting changes in electricity prices can be expected to result in changes in GDP, and such changes could be made endogenous rather than exogenous.
- Similarly, as electricity and energy prices change significantly, productivity will likely be affected.
- There is clearly an important relationship between the LCOEs of the different generation options and the likely rates of growth in the generation mix, and this relationship could be made endogenous.
- An input-output component could be added to generate detailed sector, industry, employment, and occupational and skill estimates.
- No CO_2 estimates were considered in the analysis, and these could be included based on the CO_2 profiles of the different generation options.
- Numerous other improvements and extensions are possible.

However, as more and more of these improvements and extensions are made, the methodology begins to be transformed into an econometric model with appropriate feedback loops and interactions. This would be a very ambitious project and was outside the scope of the current work. Even its desirability can be questioned, since straightforward spreadsheet analysis can offer advantages in terms of cost, transparency, ease of use, and rapid turnaround over very large, complex models.

Finally, electricity is becoming a larger share of U.S. energy consumption: In 2000, it was 37 percent and EIA forecasts that in 2030 it will increase to more than 40 percent.[66] Thus, whatever economic and jobs impacts electricity prices currently have on the economy, these impacts will be gradually increasing in the coming decades.

The MISI approach cannot compare to the EIA NEMS or similar large scale econometric models, and it is not designed to. However, it can offer valuable insights, and straightforward spreadsheet analysis can provide advantages in terms of cost, transparency, ease of use, and rapid turnaround over very large, complex models. Further, as Milton Friedman famously argued, any type of economic model should be judged on its predictive accuracy and not on its complexity or the resources that went into its development.[67] Thus, while models such as NEMS may be preferred on the basis of their size and imbedded data bases, the MISI methodology, at least in some instances, may be preferable.

[66] AEO 2002 and AEO 2011.

[67] Milton Friedman, "A Review of Input-Output Analysis -- Comment" in *Input-Output Analysis: An Appraisal*, Studies in Income and Wealth, Vol. 18, National Bureau of Economic Research, 1955, pp. 169-173. There is also the principle of Occam's razor, which states that when there are two competing constructs for making predictions, the simpler one is usually preferred, and that explanation of any phenomenon should make as few assumptions as possible.

IV.C. Impacts on Florida From the Utility MACT

In the most straightforward terms, the MISI methodology can be summarized as follows:

- There is general agreement that increased energy prices (including electricity prices) have a negative impact on GDP and GSP.
- while there is not uniform agreement on what the precise impact is, three decades of research indicate that a 10 percent increase in electricity costs will cause about a one percent decrease in GDP/GSP.[68]
- A decrease in GDP/GSP results in job losses, manufacturing output losses, revenue losses, and other negative economic effects.

Basically, energy price increases act like a tax increase on the economy, increasing the outflows of funds and reducing the incomes of energy consumers and ratepayers. In addition, the supply-side impacts from rate increases will depress business development and economic output. On the other hand, the consumer cost-savings realized from lower rates increase the disposable incomes of ratepayers and, this income, when used to buy other goods and services, creates additional economic benefits.

The MISI methodology was used to estimate the impact of Utility MACT on Florida.[69] The basic economic and electricity parameters for the state are given in Tables IV-2 and IV-3. Table IV-2 shows that Florida's 2009 unemployment rate was 11.5 percent (it is currently 10.8 percent), and Table IV-3 and Figure IV-2 show that about 25 percent of the state's electricity is generated by coal.

Table IV-2
Basic Economic Parameters for Florida, 2009

GSP (millions)	$729,485
Manufacturing (millions)	$36,718
Manufacturing percent of GSP	5.0 percent
FL mfg. percent of U.S. mfg.	2.3 percent
Labor force (thousands)	9,255
Employment (thousands)	8,178
Unemployment (thousands)	1,077
Unemployment rate	11.5 percent

Source: U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics.

[68] See "Energy Costs and the Economy," op. cit. and *GDP Impacts of Energy Costs*, op. cit.

[69] Florida economic and energy data are available from a variety of sources, including U.S. Bureau of Economic Analysis, the U.S. Energy Information Administration, the U.S. Treasury Department, the U.;S. Bureau of Labor Statistics, and a variety of Florida research organizations and state government agencies.

Table IV-3
Florida 2009 Net Electricity Generation by Energy Source

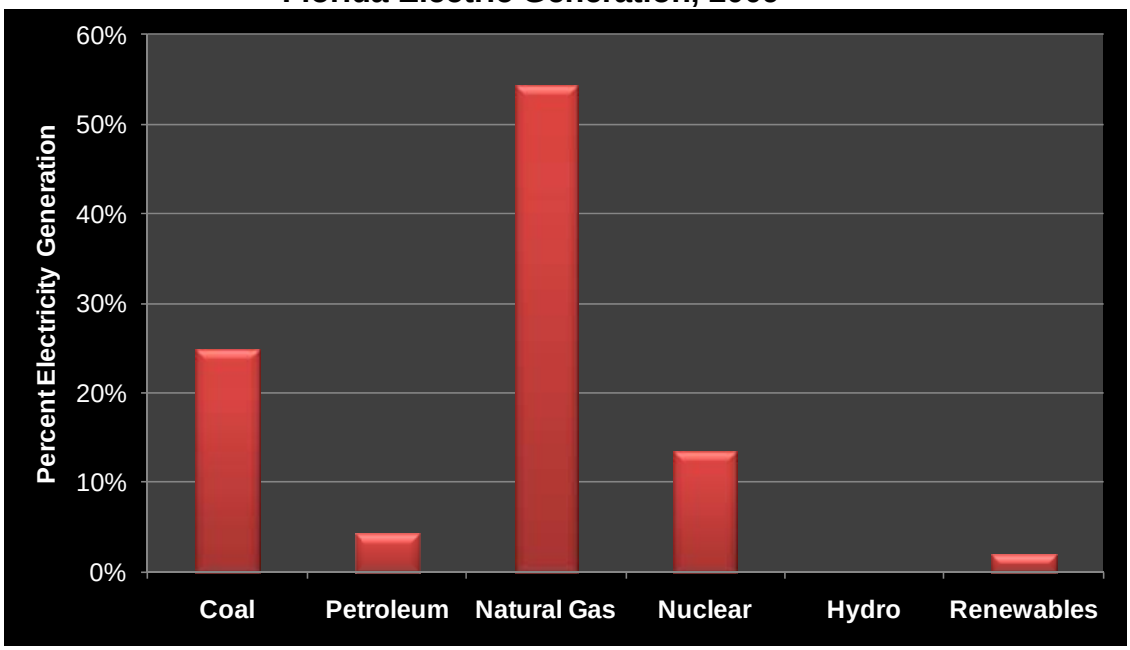
	mWhr	Percent of Total
Coal	54,003,072	24.8 percent
Petroleum	9,221,017	4.2 percent
Natural gas	118,329,108	54.3 percent
Nuclear	29,117,877	13.4 percent
Hydroelectric	208,202	0.1 percent
Wind	-	-
Solar and photovoltaics	9,470	0.0 percent
Biomass	4,330,862	2.0 percent
Other	2,732,701	1.3 percent
TOTAL	217,952,309	100.0 percent

Source: U.S. Energy Information Administration.

Figure IV-3 indicates that there are major differences between electricity sources in Florida and the U.S. average; for example:

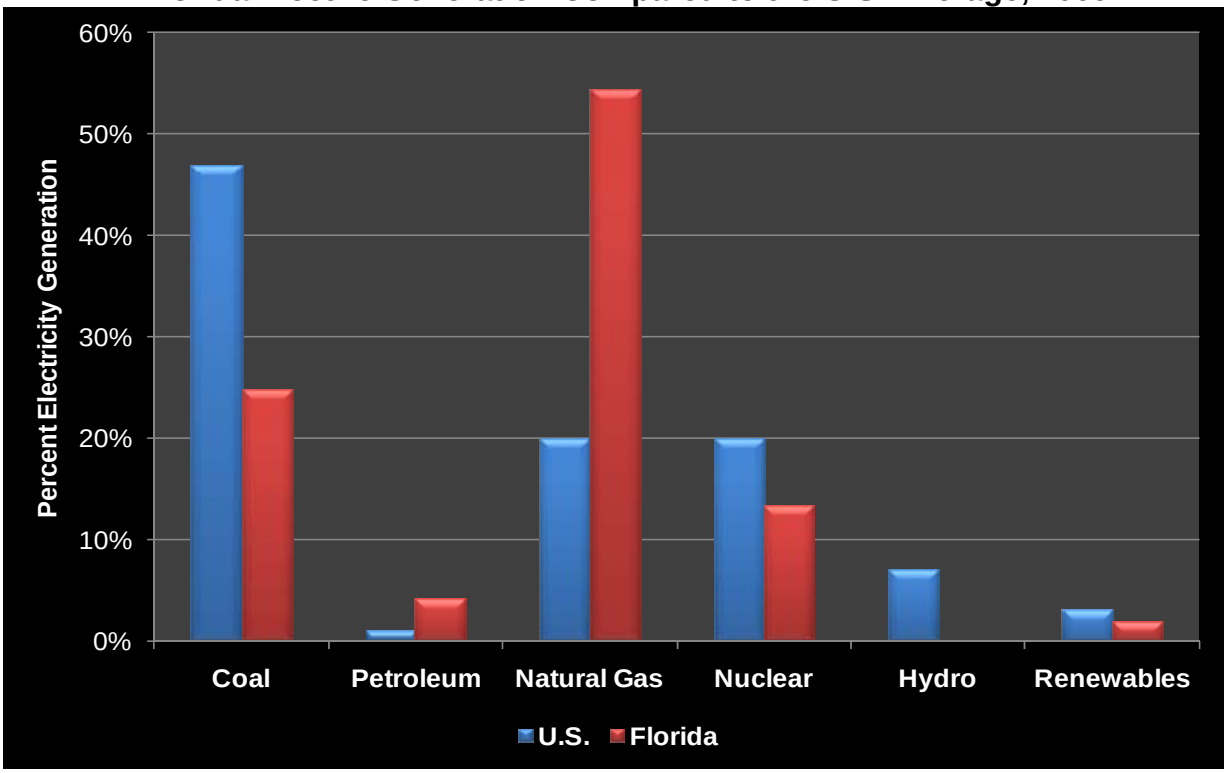
- Florida generates about 25 percent of its electricity from coal, whereas the U.S. average is about 47 percent
- Florida generates about 54 percent of its electricity from natural gas, whereas the U.S. average is about 20 percent
- Florida generates about 13 percent of its electricity from nuclear power, whereas the U.S. average is about 22 percent
- Florida generates virtually none of its electricity from hydro power, whereas the U.S. average is about seven percent
- Florida generates about four percent of its electricity from petroleum, whereas the U.S. average is about one percent

Figure IV-2
Florida Electric Generation, 2009



Source: U.S. Energy Information Administration.

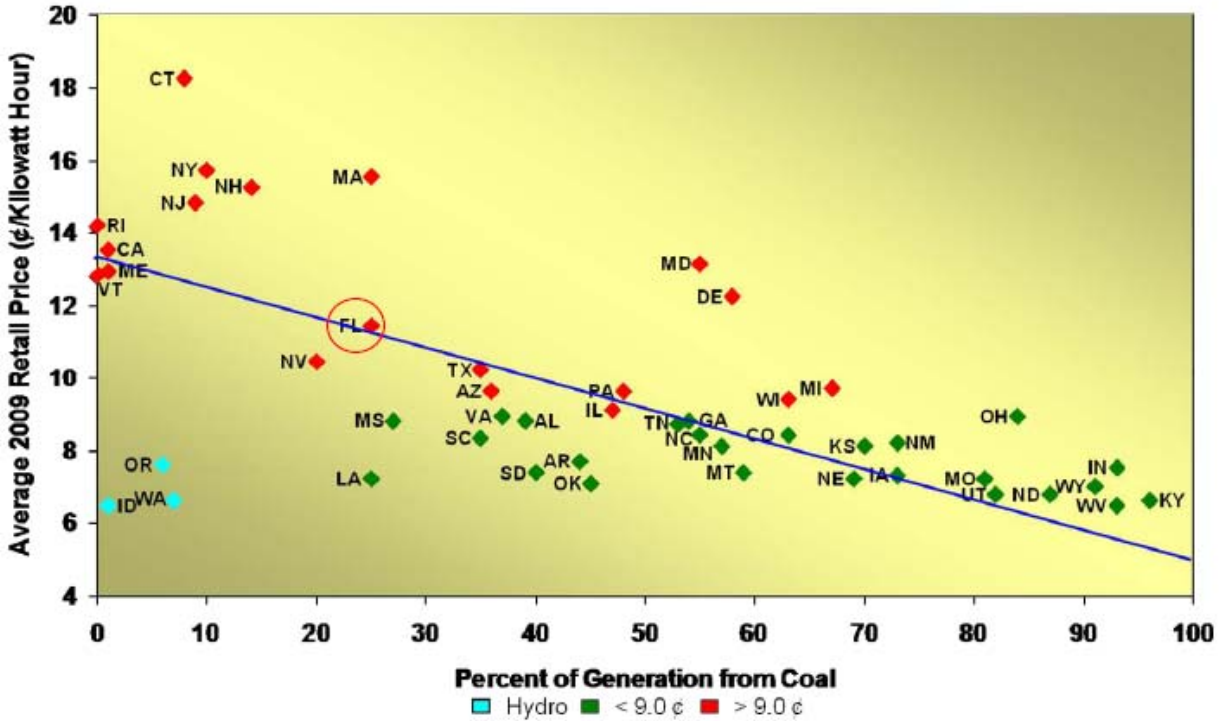
Figure IV-3
Florida Electric Generation Compared to the U.S. Average, 2009



Source: U.S. Energy Information Administration.

As noted, MISI began by conducting extensive research on the LCOEs of existing electricity generation options (e.g., coal, natural gas, hydro, renewables, etc), and the likely LCOEs of new electricity generation options estimated on the basis of various fuel and environmental costs, capital costs, etc. The salient finding is that, at present, coal-fired electricity generation is much less expensive than any alternative, with the exception of large existing hydro. For example, there is a negative correlation between the percent of a state's electricity generation comprised of coal and that state's average price of electricity; that is, in states with high coal use, the average cost to produce electricity is lower, and the larger the percent of a state's electricity generation comprised of coal, the lower the electricity price. This is shown in Figure IV-4, which indicates that Florida has a relatively low portion of its electricity generated by coal and has relatively high electricity rates. This indicates that any shift away from coal in Florida will increase the state's electricity rates.

Figure IV-4
Relationship Between Coal Generation & Electricity Prices by State



Source: U.S. Energy Information Administration.

There is another important, but more subtle reason why the Utility MACT, by forcing a substantial displacement of coal by natural gas in electricity generation in Florida (and elsewhere), will increase electricity rates. Electric power generation is currently the single largest end-use of natural gas in the U.S., and increased use of natural gas in place of coal electricity generation will subject Florida's electricity grid and rate base to future price shocks. Analysts have estimated that, using reasonable assumptions about natural gas supplies, infrastructure, and prices, that the natural gas

supply elasticity is 0.29.[70] That is, for every ten percent increase in natural gas prices, producers expand production almost three percent. As noted, independent studies have estimated that the Utility MACT regulation may increase the demand for natural gas by as much as 15 percent. This increased demand could thus increase natural gas prices to electric utilities by more than 45 percent and, since the price of natural gas represents about 70 percent of the LCOE of natural gas-fired electricity, this could increase the price of electricity from natural gas plants in Florida by about 45 - 50 percent. Thus, the Utility MACT regulations will have a triple negative impact on Florida electric rates:

- First, they will displace coal-fired generation in Florida, which is the most inexpensive.
- Second, they will increase the portion of the state's electricity generated by more expensive natural gas and, to a lesser extent, renewables.
- Third, the nationwide increase in demand for natural gas to produce electricity will increase the price of natural gas and of electricity produced by natural gas in Florida – and elsewhere.

The basic point is that in Florida, as in other states, existing coal-fired plants provide, by far, the lowest-cost electricity and replacing this generation capacity with almost any type of new capacity will be more expensive – potentially much more expensive. This is especially true because the Utility MACT will lead to higher natural gas prices in Florida, and, as noted, natural gas represents about 70 percent of the cost of electricity produced by natural gas electricity generation plants.[71]

These estimates are generally consistent with those derived by other researchers; for example:

- The Bipartisan Policy Center estimated that the Utility MACT regulations could increase total U.S. natural gas consumption by 10 – 12 percent by 2017.[72]
- ACCCE/NERA estimated that the EPA regulations could increase natural gas consumption in for electricity generation by 26 percent.

[70]See, for example, Timothy J. Considine, "Powder River Basin Coal: Powering America," report prepared for the Wyoming Mining Association, December 21, 2009.

[71]For example, the Brattle Group estimates that the 2015 price of natural gas in Florida will be about $7.75/mcf (2010 dollars); see Celebi, Graves, Bathla, and Bressan, op. cit. EEI estimates that the EPA regulations could increase U.S. natural gas prices by as much as 100 percent; see Edison Electric Institute, op. cit. Considine estimates that increased natural gas consumption of 15% – 30% could increase natural gas prices by 50% - 100%; see Considine, op. cit. EIA estimates that current natural gas prices to electric utilities in Florida are about $6.00/mcf; see U.S. Energy Information Administration, *Natural Gas Monthly*, June 2011. In addition, there are concerns the volatility of gas prices, currently and in the future, and about potential hazards of decreased fuel-variability by increasing the percentage of gas, especially in a peninsular state that is subject to frequent hurricane damage/impacts.

[72]Jennifer Macedonia and Lourdes Long, "The Impact of EPA Utility MACT Rule on Natural Gas Demand," Bipartisan Policy Center, 2011.

- The Brattle Group estimated that the regulations could increase natural gas consumption by about 10 percent
- Credit Suisse estimated that U.S. natural gas consumption would increase 8 – 16 percent
- EEI estimated that the EPA regulations could increase U.S. natural gas prices between 20 percent and 100 percent.
- AEP estimated that higher natural gas use and related price increases will affect all consumers, and will increase other consumer costs about $8-9 billion/year
- ICF estimated that the regulations could increase U.S. natural gas prices by as much as 30 percent.

Using the MISI methodology, data base, and Florida-specific information, we estimate that the impact of the Utility MACT regulations in Florida[73] would result, in 2015, in:

- An average electricity rate increase of nearly 25 percent[74]
- Gross State Product (GSP) loss of nearly $18 billion – about 2.5 percent of state GSP
- Annual (FTE) job losses of 157,000[75]
- An unemployment rate of nearly 13 percent – 2 percent greater than current levels[76]
- Lost annual manufacturing output of $1.3 billion – nearly four percent[77]

[73]These are the best estimates, to the degree possible given the time and resource limitations of this study, of the impacts of the Utility MACT only. As noted, many of the studies reviewed here assessed the impacts of multiple rules of subsets of them. We focused on isolating the likely impacts of the Utility MACT, although it is possible that a portion of the total impacts estimated here could be affected by several of the other key rules.

[74]The actual electricity rate increase estimated is 23.8 percent. It results from two major factors: The shift of a portion of Florida electricity generation from low-cost coal plants to higher cost natural gas plants and the increased cost of natural gas to electricity generators resulting from the significantly increased demand for natural gas resulting from the EPA regulations.

[75]As noted, an FTE job is defined as 2,080 hours worked in a year's time, and adjusts for part time and seasonal employment and for labor turnover. Thus, for example, two workers each working six months of the year would be counted as one FTE job.

[76]Based on the actual 2011 unemployment rate in the state.

[77]Manufacturing is especially vulnerable to electricity price increases, and the negative impacts on this sector are higher than average. See, for example, T. Hewson, and J. Stamberg, *At What Cost? Manufacturing Employment Impacts from Higher Electricity Prices,* Energy Ventures Analysis, Arlington, Virginia, 1996; Matthew E. Kahn and Erin T. Mansur, How Do Energy Prices, and Labor and Environmental Regulations Affect Local Manufacturing Employment Dynamics? A Regression Discontinuity Approach," Energy Institute at Haas and Haas School of Business, University of California, Berkeley, November 2010; Peter C. Balash, Natural Gas and Electricity Costs and Impacts on Industry, U.S. Department of Energy, National Energy Technology Laboratory, DOE/NETL-2008/1320, April 28, 2008; Joel R. Hamilton and M. Henry Robison, "Economic Impacts from Rate Increases to Non-DSI Federal Power Customers Resulting from Concessional Rates to the DSIs," Submitted to the Public Power Council, Portland, Oregon, May 31, 2006.

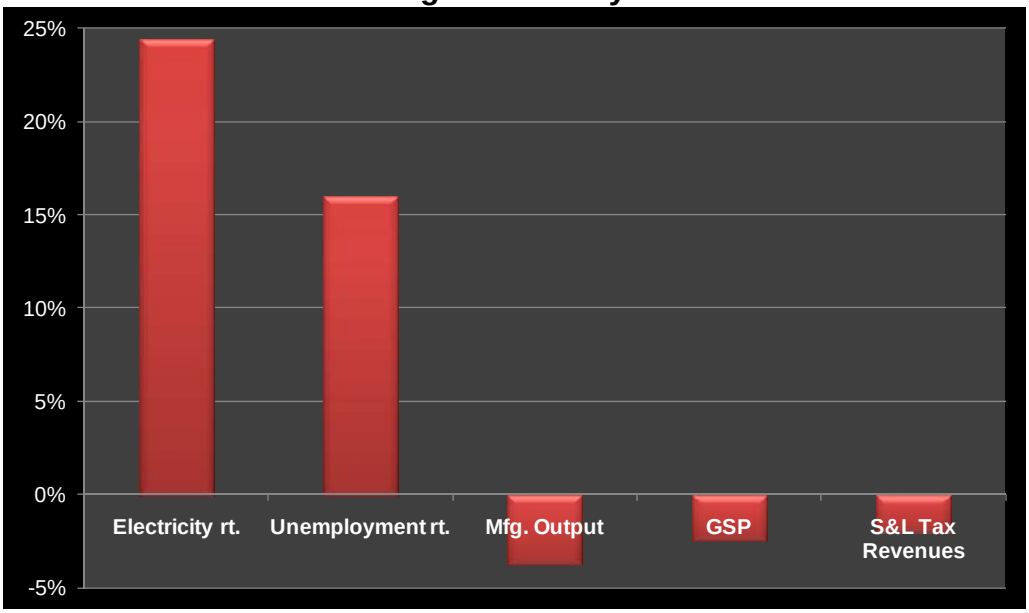
- Lost annual state and local government revenues of $2.1 billion – about two percent.[78]

It is important to note that these results do not consider many other costs that will result from this Utility MACT, including: (1) control equipment and monitoring equipment installations, capital and annual operating and maintenance expenses, (2) stranded investments from units that will be shutdown before the end of their useful life, and control equipment installations that may no longer be sufficient, (3) adding or upgrading transmission capabilities, and (4) differing impacts to municipal generating entities.

The impacts are illustrated in Figures IV-5, IV-6, and IV-7:

- Figure IV-5 shows the percentage changes in major Florida economic indicators, and is notable for the large percentage increases in electricity rates and the unemployment rate.
- Figure IV-6 shows the total annual dollar losses in GSP, state and local government revenues, and manufacturing output.
- Figure IV-7 shows the relative job losses, illustrating the that potential job losses in Florida from the Utility MACT are about twice the total number of jobs created in the state over the past six months and are nearly four times the total number of jobs created in the state in all of 2010.

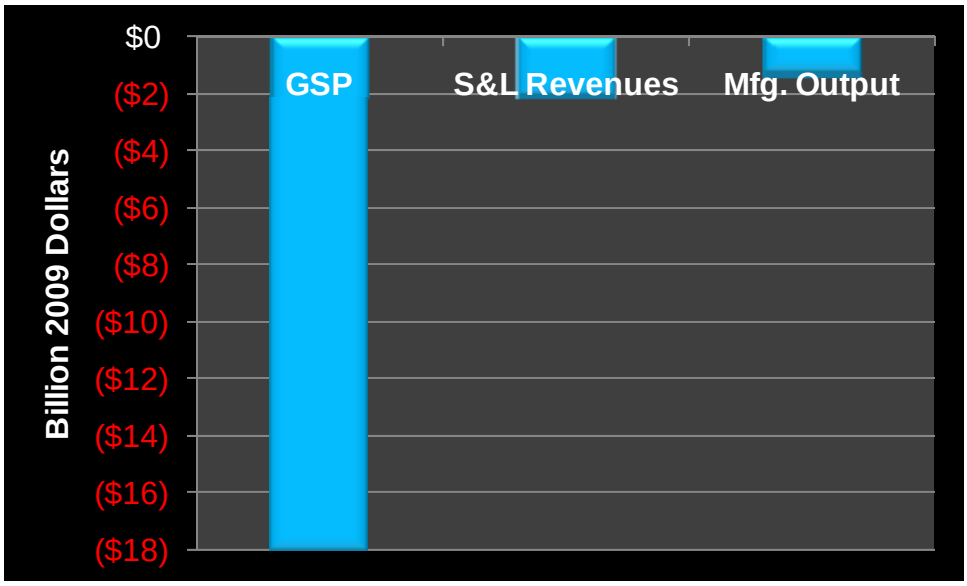
Figure IV-5
Percentage Changes in Major Florida Economic Indicators
Resulting From Utility MACT



Source: Management Information Services, Inc., 2011.

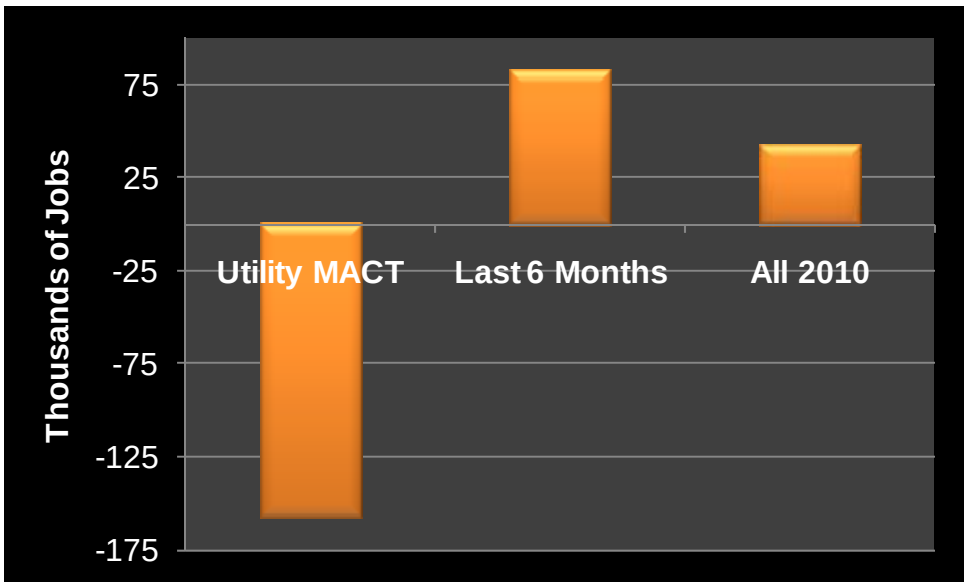
[78]As noted, data on state, local, city, and municipal budgets, tax revenues, and tax burdens are obtained from the U.S. Department of the Treasury, the Federal Reserve Board, and the U.S. Census Bureau. These data are specific to each state.

Figure IV-6
Annual Dollar Losses in Florida GSP, State and Local Government Revenues, and Manufacturing Output Resulting From Utility MACT



Source: Management Information Services, Inc., 2011.

Figure IV-7
Relative Magnitude of the Job Losses Resulting From Utility MACT



Source: Management Information Services, Inc., 2011.

IV.D. Comparison With Independent Estimates

Although there are few independent estimates of the impacts of EPA's regulations on Florida, MISI's findings are generally consistent with those that are available. For example, we estimate that the Utility MACT may force the shutdown of about 1.5 GW of coal capacity in Florida, representing about 13 percent of coal capacity in the state and more than 15 percent of electricity generation in the state. MISI's estimate is generally consistent with other studies. For example:

- CRA estimated that about 1.3 GW of coal is at risk in Florida
- The Brattle Group estimated that about 1 GW of coal is at risk in Florida
- EEI estimated that 1-5 GW of coal could be shut down
- NERC estimated that about 10 – 15 percent of coal generation in Florida could be shut down
- ICF estimated that about 1 GW of coal in Florida may be at risk,

There are even fewer independent estimates of the economic impacts on Florida from the EPA regulations, but those available are generally consistent with MISI's. For example, NERA estimated that the Utility MACT could lead to the loss of about 135,000 jobs in Florida. This is of the same order of magnitude as MISI's estimate of job losses in the state of about 157,000.

The American Council for Capital Formation and the National Association of Manufacturers (ACCF/NAM) published a study of the potential impact of Federal GHG control legislation on Florida.[79] While these regulations are different than, and would be in addition to, the Utility MACT regulations, the impacts appear generally similar. ACCF/NAM estimated that this legislation could cause in Florida:

- Residential electricity rate increases of 10 – 50 percent
- Natural gas price increases of 10 - 60 percent
- GSP losses of $20 - $30 billion
- Loss of about 125,000 jobs

IV.E. Implications for Florida

IV.E.1. Implications for the State Economy and Jobs

Florida's economy is struggling to recover from its worst performance on record, and the economic impacts of the Utility MACT on the state will hinder, and could even reverse, Florida's current anemic recovery. The state's economic situation is still precarious, and Florida has been ranked among the six states mostly likely to suffer an

[79] American Council for Capital Formation and the National Association of Manufacturers, *Analysis of the Waxman-Markey Bill "The American Clean Energy and Security Act of 2009" (H.R. 2454)*, August 2009. This study uses the NEMS/ACCF-NAM 24 model.

economic collapse of "Californian proportions."[80] Its high rates of foreclosure and unemployment, decreasing tax collections, and increasing budget gap put it in the company of Arizona, Rhode Island, Michigan, Oregon, and Nevada as those most at risk of fiscal calamity after California.

The last several years have been extremely difficult for Florida's economy. The recession that started in 2007 was one of the deepest in history, and Florida was both a leader of the recession and one of the hardest hit states due to the vulnerability of its economy to the housing market crash. In the last two years, Florida has suffered from historically high levels of unemployment and underemployment, reductions to hours for those who still have jobs, and declining wages for most workers. As a result, poverty and income inequality have increased in the state. Evidence of the state's current economic problems abounds; for example:[81]

- Population growth is flat.
- Nearly a million Floridians are unemployed, and the state's current unemployment rate of 10.8 percent is one of the highest in the nation.
- Over 2/3 of Florida counties currently have double-digit unemployment.
- Nearly half of the jobs that do currently exist pay at or below 150 percent of the federal poverty level.
- Florida has the second highest filings for foreclosure and the third highest actual foreclosure rate in the nation.
- Workers who have managed to keep their jobs are, on average, working fewer hours.
- Underemployment, which includes people who are not working enough hours and who are discouraged from looking for work, has risen to almost one in five workers.
- Over one-third of the unemployed have been out of work for longer than a year, and nearly half were unemployed for at least six months.
- For every job in Florida that has recently been added, there are still 25 people for whom there was no job.
- In April 2011, the state's consumer confidence level fell for the third straight month.

[80]"Pew study: Florida's economic problems comparable to California's," *Palm Beach Post*, November 11, 2009.

[81]U.S. Bureau of Labor Statistics, "Florida Economy at a Glance," June 2011; Enterprise Florida, Inc., "Florida: Economic Quick View," June 2011; Enterprise Florida, Inc., "Florida: Statewide Indicators," June 2011; "Did Florida's Economy Make Progress in 2010?" Florida International University, Center for Labor Research and Studies, Miami, 2011; Emily Eisenhauer, Bernardo Oseguera, and Carlos A. Sanchez, *The State of Working Florida 2010*, Center for Labor Research and Studies, Florida International University, Miami, September 2010.

Employment in construction has continued to decline since the beginning of the recession and is lower than it has been for the last two decades. Construction employment declined 5.6 percent in 2010, the largest decline of all major industry sectors in the state. Other industries with employment declines were Information, Manufacturing, Financial Activities, Government, and Professional and Business services.

Florida ranks second only to California in total securitized non-agency mortgage loans, 10 percent of the national total.[82] Of those, half are 60 days or more delinquent, or 16 percent of all such mortgage delinquencies in the country, the highest ratio anywhere. A disproportionate amount of housing loans in the state are at-risk loans, and 85 percent of the statewide pool is rated Alt-A or Subprime. Overall, 80 percent of all Florida loans are under water, with the average mark-to-market loan-to-value ratio at 138 percent. Almost 40 percent of borrowers have debt of more than 150 percent of the value of their homes. Nationally, fewer than 30 percent of houses sold for a loss in the past year, compared to nearly 50 percent in Miami and 65 in Orlando.

Nevertheless, there are some glimmers of hope for the state economy. Job gains are beginning to broaden, led by tourism and health care, and nearly all the state's largest metropolitan areas are seeing at least some employment growth.[83] The rebound in the tourism industry is being led by international visitors. The unemployment rate appears to have peaked and is headed downward, while housing remains weak, housing prices may have bottomed in Florida. International trade is another bright spot, with Florida manufacturers benefiting from stronger growth in Asia and Latin America. However, Florida's manufacturing base is small, so an increase in manufacturing sales does not translate into many jobs.

The bottom line is that Florida is currently experiencing, at best, a slow recovery from the worst recession in decades. Losses in the state resulting from Utility MACT of $18 billion in GSP and nearly 160,000 jobs may be sufficient to delay or derail this fragile economic recovery. For example, the job losses estimated to result from Utility MACT could be more than twice the number of jobs created in the entire state economy over the past six months, and are four times the total number of jobs created in Florida in all of 2010.

IV.E.2. Implications for Florida Business and Commerce

The electricity cost increases that would result from the Utility MACT will place thousands of business throughout Florida at risk. Business owners in virtually every sector of the Florida economy – including tourist-related businesses -- are currently experiencing difficulties accessing affordable energy sources, and this is especially true

[82]Doug Horning, "Florida Economic Problems Much Worse Than the BP Gulf Oil Spill," Casey Research, August 14, 2010.
[83]Margie Manning, "Wells Fargo: Florida's Economy Slowly Improving," *South Florida Business Journal*, April 29, 2011.

for many small businesses that are high consumers of energy, including restaurants, bars, entertainment companies, groceries, convenience stores, laundries and dry cleaners, bakeries, commercial stores, and manufacturing firms. In numerous studies and surveys, small businesses have identified energy costs as one of their most important concerns.[84]

Even though energy costs often represent only 5-10 percent of total costs, they are important for small businesses because they can make the difference between profit and loss. Small businesses are especially vulnerable to increased energy costs. First, energy costs comprise a significant portion of small business discretionary expenses, and they can make the difference between profit and loss. Increased energy prices reduce already-low profit margins, and many small entrepreneurs find it difficult to raise prices to offset increased energy prices. Second, large businesses can often postpone or moderate a price increase based on their large inventories purchased at a lower price, but small firms do not have that option. Third, the uncertainty caused by rising energy costs and energy price volatility makes it difficult for many small firms to accurately and profitably bid on future projects. Fourth, in the face of increasing energy prices, small businesses must struggle to find "innovative" ways to reduce other costs. However, substantial cost cutting opportunities for small firms are becoming increasingly difficult to implement. Finally, increased energy costs make it more difficult for small businesses to obtain loans to start a new business or expand an existing one.

The Utility MACT regulations will increase electricity prices over what they would be otherwise, and these price increases will have several adverse affects on the Florida economy and jobs.[85] First, businesses currently located in Florida will face increased costs. Second, some businesses currently in Florida will leave the state to relocate to other states that have lower electricity costs. Third, some new businesses will think twice about locating in Florida. Fourth, electric customers will have less money to spend on other things.

The Utility MACT regulations will increase electricity prices over what they would be otherwise, and these price increases will have several adverse affects on the Florida economy and jobs. First, businesses currently located in Florida will face increased competitive disadvantages. Second, some businesses currently in Florida will leave the state. Third, new businesses will think twice about locating in Florida. Fourth, electric customers will have less money to spend on other things.

[84]See Andy Bollman, "Characterization and Analysis of Small Business Energy Costs," report by E.H. Pechan & Associates, Inc. prepared for the U.S. Small Business Administration, April 2008; Laura Palotie, "Health Care Still Top Concern -- NFIB Small Business Survey," June 20, 2008; "Impact of Rising Energy Costs on Small Business, Report by the U.S. House of Representatives Small Business Committee, August 10, 2006; Women Impacting Public Policy, "What Businesswomen Want: Affordable Health Care, Lower Energy Costs; National WIPP Poll Released Today," April 6, 2005.

[85]Florida electricity prices will increase more than in some states, less than in others, and about the same as in other states. The precise supply side impacts will depend on the specific industry and firm and the degree of international competition. The reduction in consumer discretionary income in the state will adversely affect all businesses.

Certain sectors of the economy have become increasingly sensitive to minor changes in the cost of electricity. For example, the health care sector – a major industry in Florida -- finds that almost all provisions of services are related to energy costs, with hospitals using twice as much electricity per square foot than comparable office space. One recent study found that "electricity used exclusively for medical records is rapidly increasing, by 400-800 percent in the past four years.[86]

Some industries in Florida will be able to pass their energy costs on to consumers because they sell to a local market. However, most manufacturing companies in the state do not have that luxury, and have to sell their products in national and international markets. Increasing electricity costs in Florida will put many thousands of employees and their jobs in these energy intensive industries at special risk.

Manufacturing is essential for facilitating economic development and good jobs in the state. Further, there is a strong desire in Florida (and other states that are in competition with Florida) to retain and attract new, high tech manufacturing. Even biotechnology, advanced IT, the manufacture of wind turbines, and other new technologies require energy and electricity, and the state cannot afford to be placed at a competitive disadvantage by increased electricity costs. (Note that Google, the poster child for California's Silicon Valley, has its energy- intensive server farms located in Oregon and North Carolina, where electricity costs are much lower. Similarly, Facebook announced in February 2010 that it planned to build what is expected to be the world's largest centralized data storage centers in Portland, Oregon, and the sheer scale of the Facebook operation will use more electricity than many developing countries. The company will source its electricity from Pacific Power, which uses coal to generate 2/3 of its electricity.)

U.S. manufacturers, including those in Florida, are very concerned about the increased use of natural gas for electricity production. For example, the Industrial Energy Consumers of America recently stated:

> As manufacturers that rely heavily on the use of natural gas as both an energy source and an essential raw material or 'feedstock' we are concerned that legislative fuel switching incentives could result in short and long-term price volatility and higher prices, causing further industrial 'demand destruction' that forces good U.S. manufacturing jobs to overseas competitors. Higher natural gas prices will also impact electricity prices. The farm sector depends on significant use of natural gas for food processing, irrigation, crop drying, heating farm buildings and homes, and nitrogen fertilizer production, which is used on virtually every crop produced in this country. Legislating increased natural gas demand by creating incentives is misguided energy and public policy.[87]

[86]Dan Bednarz, "Rising Energy Costs and the Future of Hospital Work," *Energy Bulletin*, April 29, 2008.
[87]Industrial Energy Consumers of America, letter to the U.S. Senate, July 2010.

Finally, many analysts agree that, to solve its current economic and financial problems, the U.S. and Florida will have to start producing more and exporting more and will have to reverse the decades-long atrophy of the manufacturing sector. For example, the Society of Manufacturing Engineers concluded that "[w]e are not going to get out of this economic crisis without a strong, innovative manufacturing sector."[88] President Obama has articulated a goal for the U.S. to double its exports over the next five years. Thus, the U.S. will no longer be able to shift its energy-intensive production activities abroad and will therefore require substantially more reasonably priced electricity in the coming years. Absent this, the U.S. and Florida manufacturing sectors will continue to decline, well-paying manufacturing jobs will continue to disappear and to be off-shored, and U.S. and Florida living standards will erode. Much of this reliable and reasonably priced electricity will have to be provided by coal, the least cost source of electricity. Finally, even if Florida already has relatively low energy prices compared to many parts of the U.S., an increase in energy prices can still be harmful to existing Florida manufacturing firms and to firms considering locating in the state.

IV.E.3. Implications for Florida State and Local Governments

As demonstrated by the devastating impact of the recession on state and local government budgets throughout the U.S., state and local government tax revenues are sensitive to downturns in economic activity. For example, the state of Florida has recently struggled with a budget shortfall of nearly $4 billion. Revenue shortfalls persist even though, over the past three years since the recession took hold in Florida, the state has cut spending radically and closed shortfalls.

MISI projects that the Utility MACT will decrease Florida state and local government revenues by more than $2 billion annually and thus exacerbate these budget difficulties. Accordingly, over the five year period 2015 – 2019, the Utility MACT could reduce Florida state and local government revenues by more than $10 billion.

The recession struck Florida early, and in a major way. Without an income tax, state government has long depended on property and sales taxes. However, since the Florida real estate industry has been devastated, the state's annual revenues declined more than $12 billion from a 2006 peak of $74 billion. Nevertheless, Florida's politicians have remained steadfast in refusing new taxes.

Florida's public finance problems are already causing controversy and dissention in the state and, since the state's constitution requires a balanced budget, are requiring increasingly severe remedies.[89] For example, Governor Scott has recommended

[88] *Manufacturing Business Technology*, April 23, 2009. www.mbtmag.com. See also, Nina Ying Sun, "U.S. Manufacturing Vital to Crisis Recovery," February 22, 2009, http://plasticsnews.com; James W. Owen, "The Financial Crisis and the U.S. Economy – a CEO's Perspective," Council on Foreign Relations, Washington, D.C., April 2009; and Susan Helper, "The High Road for U.S. Manufacturing," *Issues in Science and Technology*, Winter 2009.

[89] Arian Campo-Flores and Jennifer Levitz, "Florida Governor Seeks Cuts in Budget," *Wall Street Journal*, February 8, 2011.

overhauling Florida's Medicaid program, reforming its pension system, and reducing government services. For example:

- The state's 2012 spending plan reflects cuts of $4.6 billion over the fiscal 2011 budget, and Governor Scott has proposed more cuts for FY 2013.
- The governor recommended cutting $5 billion from the budget, while reducing property and corporate income taxes by about $2 billion.
- Governor Scott proposed transferring Medicaid recipients to managed-care plans, with expected savings resulting mainly from reduced administrative costs and cuts to reimbursement rates for providers.
- The governor proposed pension-system changes that would require public employees to contribute 5 percent of their salaries to the retirement system and would direct new hires into 401(k)-style plans.
- He proposed renegotiating state contracts and leases.
- The budget cuts the state's workforce by 4,500 positions.
- The governor proposed privatizing prisons in the state's 18 southernmost counties
- The budget reduces the state's transportation trust fund by $150 million and reallocates the funds to other parts of the budget.

There are also serious problems with Florida's $113.8 billion public pension fund. It must generate earnings of 7.75 percent per year to meet its commitments to the nearly one million public employees and retirees who depend on it. However, since at present no investment safely yields 7.75 percent, the fund's administrators are asking for permission to try some "riskier" investments. There is a high probability that they will not succeed, further exacerbating Florida's public finance problems.[90]

In another proposal generating considerable controversy, more than 7 percent of the state's overall workforce - 655,000 teachers, firefighters, police and other government employees - also will absorb pay cuts as lawmakers require 3 percent pension contributions from them.

While even some Republican lawmakers have expressed concerns about the size of the proposed tax cuts amid the state's budget problems, business groups have generally endorsed the budget proposals. is also debatable whether reductions in the corporate income tax will do much to enhance the state's competitiveness, because "Florida is already one of the top states in having a business-friendly environment."[91] Many fear that the state government's retrenchment will lead to at least a short-term reduction in dollars circulating in Florida and could add to the state's 10.8 percent unemployment rate.

[90]Hornig, op. cit.
[91]Hornig, op. cit.

Lawmakers approved a budget that cuts $2.6 billion from spending on public schools and health and human services, and the fiscal proposals are causing deep concern for school districts, hospitals, and other big public employers. [92] Schools will receive their lowest level of funding in six years: $6,267 per student, an almost 8 percent reduction. Almost all school districts in Florida are eliminating jobs; for example, Palm Beach County is poised to close a $35.4 million budget hole by cutting more than 700 positions, including custodians, school monitors and school police officers.

Florida higher education is also at risk. Policy-makers have kept the university system's tuition low while, at the same time, reducing state funding. The result for the state's 11 public universities has been cutbacks in available funds, which have led to "gutted programs, faculty departures, low salaries for professors, and the nation's highest student-to-faculty ratio." University leaders say this is by far the worst chapter in a long history of chronic under-financing.[93]

The bottom line is that Florida's fiscal problems are severe and are worsening, and are causing hardship, controversy, and dissension throughout the state. Nevertheless, there is probably one thing that all of the various parties and interest groups involved can agree on: One thing Florida does not need is the loss of an additional $2 billion annually in state and local government revenues that would result from the Utility MACT.

IV.E.4. Implications for Florida's Elderly, Poor, and Minorities

Increases in electricity prices will affect all Florida residents, but high electricity prices and price surges are particularly troublesome for those with limited budgets. The electricity price increases from the Utility MACT will act as a regressive tax on low income consumers, decrease their discretionary income and economic well-being, and increase their energy burden.

The increased electricity prices will cause adverse repercussions throughout the Florida economy, but nowhere will higher prices bring consequences as swiftly and harshly as in low-income and minority households. For the millions of low-income households in the state, the higher energy prices will intensify the difficulty of meeting the costs of basic human needs, while increasing energy burdens that are already excessive. At the same time, the price increases will threaten low-income households' access to vital energy and utility services, thereby endangering health and safety while creating additional barriers to meaningful low-income participation in the economy.

[92] John Kennedy, "Florida's Budget Cuts Cost Tens of Thousands Of Jobs; Take Billions Out of the Economy," *Orlando Sentinel*, May 23, 2011.
[93] Paul Fain, "Budget Cuts Cast Shadow Over Florida's Universities," Chronicle of Higher Education, May 29, 2009.

While home energy costs average about four percent per year in middle class households, they can reach a prohibitive 70 percent of monthly income for low-income families and seniors.

The Energy Burden

The "energy burden" is defined as the percentage of gross annual household income that is used to pay annual residential energy bills. The energy burden concept is used to compare energy expenditures among households and groups of households, and it is often used in the Low Income Home Energy Assistance Program (LIHEAP) to estimate required payments. For example, consider the case where one household has an energy bill of $1,000 and an income of $10,000 and a second household has an energy bill of $1,200 and an income of $24,000. While the first household has a lower energy bill ($1,000 for the first household compared to $1,200 for the second), the first household has a much higher energy burden (10 percent of income for the first household compared to five percent of income for the second).

The energy burdens of low-income households are much higher than those of higher-income families, and energy burden is a function of income and energy expenditures. Since residential energy expenditures increase more slowly than income, lower income households have higher energy burdens. High burden households are those with the lowest incomes and highest energy expenditures.

As shown in Figure IV-8:

- Families earning more than $50,000 per year spent only four percent of their income to cover energy-related expenses.
- Families earning between $10,000 and $25,000 per year (29 percent of the U.S. population) spent 13 percent of income on energy.
- Those earning less than $10,000 per year (13 percent of population) spent 29 percent of income on energy costs.

Thus, for 42 percent of households – mostly senior citizens, single parents, and minorities – increased energy costs force hard decisions about what bills to pay: Housing, food, education, health care, and other necessities.

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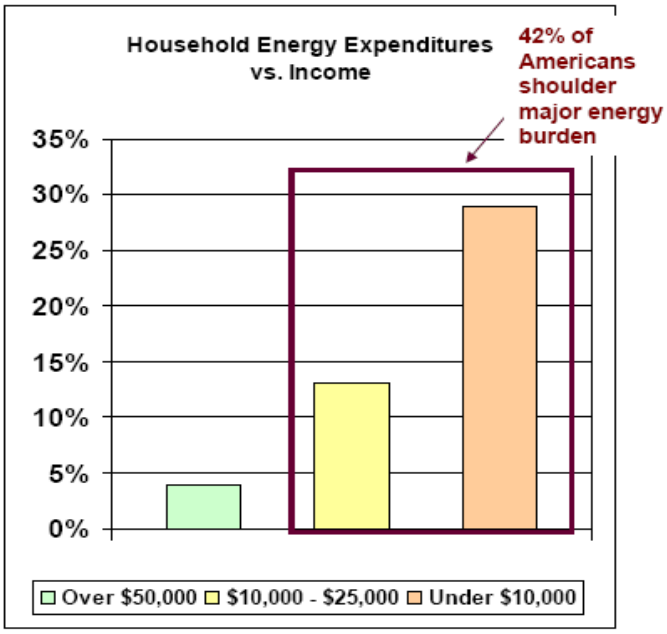
Cost increases for any basic necessity are regressive in nature, since expenditures for essentials such as energy consume larger shares of the budgets of low-income families than they do for those of higher-income families. Whereas higher-income families may be able to trade off luxury goods in order to afford the higher cost of consuming a necessity such as energy, low-income families will always be forced to trade off other necessities to afford the higher-cost good.

Figure IV-8



Source: American Association of Blacks in Energy.

When families with income constraints are faced with rising costs of essential energy, they are increasingly forced to choose between paying for that energy use and other necessities (also often energy-sensitive) such as food, housing, or health care. Because all of these expenditures are necessities, families who must make such choices face sharply diminished standards of living. For example, of the 8.7 million American households earning less $10,000 per year in 2008, 60 percent of the average after-tax income was used to meet those households' energy needs. Among the highest earners, the 56 million households making more than $50,000 per year, only 10 percent of the average after-tax income was spent on those households' energy needs. The national average for energy costs as a percentage of household income is about 12 percent.

Energy Costs and the Elderly

Energy has been consuming a larger share of typical family budgets over the past decade, and is imposing disproportionate energy cost burdens on elderly households – burdens that will be exacerbated by the Utility MACT regulations. The average after-tax income of low- and middle-income U.S. families has remained virtually unchanged since 2001; however, inflation has eroded about 25 percent of the value of American families' incomes.

Lower-income elderly households that depend mainly on fixed incomes are among those most vulnerable to energy price increases. Housing, food, healthcare, and other necessities must compete with energy costs for a share of the family budget. The approximately $30,000 median income of elderly U.S. households means that half

of elderly households depend on incomes below this level. Elderly households aged 65 or older spend about the same amount on residential energy as households in the 25-34 age bracket, and have the highest per capita residential energy expenditures among all age groups.[94] EIA estimates that households with one or two adults over the age of 60 consume an average of about 750 gallons of gasoline annually, and with estimated 2010 prices, these households spent nearly $2,200 on gasoline in 2010.[95]

Older Americans are disproportionately affected by higher energy costs – costs that the Utility MACT regulations will greatly increase. As a share of income, households headed by a person age 65 or older spend more on energy-related expenditures than their younger counterparts. Older households account for approximately 20 percent of U.S. total consumption on energy-related products, but they are disproportionately affected by higher energy costs. Although in actual dollar terms older households spend slightly less on energy related consumption than households headed by a person under age 65, they spend a higher share of their income on energy-related expenditures. As shown in Table IV-4, in 2006, older households spent 9.5 percent of their income on energy-related services compared to 7.4 percent for younger households in 2006.[96]

Among older households, lower-income elderly spend significantly more as a share of income for energy-related services compared to those with higher incomes. Older households with less than $15,000 in household income spent approximately 20 percent of their income for energy-related expenditures, as compared to 7.3 percent for elderly households with incomes over $15,000 in 2006. For utilities and fuel, these same households spent 13 percent of their income to heat and operate their homes, compared to only 4.7 percent for older households with $15,000 or more in income. The $15,000 threshold for household income is a close approximation to older households that have incomes below or near 150 percent of poverty.[97] The 150 percent of poverty threshold is used by current public programs that provide low-income energy assistance to households. As noted, nearly 25 percent of older Americans have family incomes below 150 percent of the poverty thresholds.[98]

Over time, growth in energy expenditures has increased more rapidly than the incomes of older households, and older Americans with household incomes below $25,000 are significantly more likely to reduce their savings and other spending to offset higher energy prices.[99] Other alternatives that households explore in response to rising energy costs include replacing heating and cooling systems with more energy-efficient units, installing energy-efficient windows, and purchasing more fuel-efficient cars.

[94]U.S. Energy information Administration, "Residential Energy Consumption Survey, 2005."
[95]U.S. Energy information Administration, "Household Vehicles Energy Use: Latest Data & Trends" (November 2005).
[96]Janemarie Mulvey, “Impact of Rising Energy Costs on Older Americans,” U.S. Congressional Research Service, March 2008.
[97]Ibid.
[98]See Patrick Purcell, *Income and Poverty Among Older Americans in 2006,* CRS Report RL32697, 2008.
[99]Mulvey, op. cit.

Although these alternatives may save costs in the longer-run, many lower-income elderly households do not have sufficient funds to purchase them.

Table IV-4
Average Annual Household Energy Expenditures By Age, 2006

	Age of Head of Household	
	Under 65	**65+**
Utilities and Fuel Expenditures	$1,931	$1,837
Natural Gas	$500	$507
Electricity	$1,293	$1,154
Fuel Oil and Other Fuels	$129	$176
As a share of Income	2.9 percent	4.8 percent
Transportation Expenditures		
Gasoline and Motor Oil	$2,436	$1,359
As a Share of Income	4.5 percent	4.7 percent
Local Energy Expenditures	$4,367	$3,196
As a Share of Income	7.4 percent	9.5 percent

Source: U.S. Congressional Research Service.

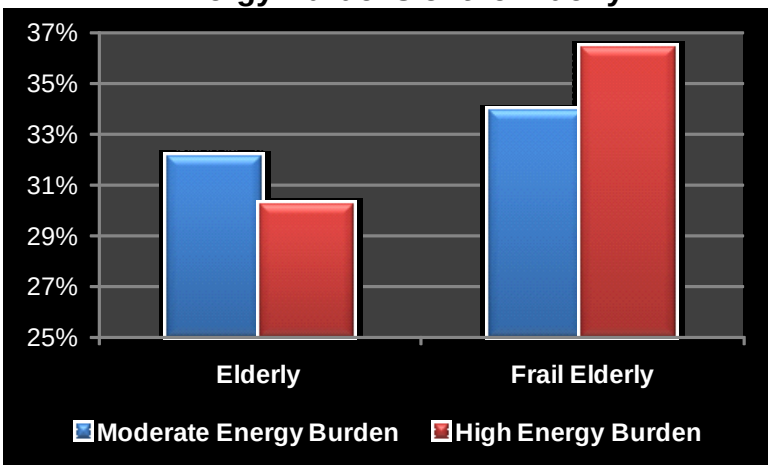
Home energy costs make up a large portion of elderly household budgets, and volatile natural gas, electricity, and fuel oil prices in recent years have significantly increased the energy burden facing many elderly consumers. Older consumers are particularly vulnerable to rapid increases in energy prices and would thus be seriously affected by the price increases resulting from the Utility MACT regulations. Low-income older households spend an average of 10 percent of their income on residential energy. However, about one of every four low-income older households spends 15 percent or more of its entire income on home energy bills. Too often low-income older people risk their health or comfort by choosing between cutting back on energy expenditures and reducing spending for other necessities.

The Energy Vulnerability and Energy Burden of the Elderly

Senior citizens are particularly vulnerable to energy price increases due to their relatively low incomes. In 2008, the median gross income of 25 million senior households over 65 years was about $30,000, and seniors have the highest per capita residential energy consumption among all age categories. The average basic Social Security income of 30 million senior households was about $15,000 in 2008. For many senior households, as with other households earning less than $50,000 annually, energy price increases can force difficult choices among energy, food, and other basic necessities of life, choices that would be made more difficult by the Utility MACT regulations.

Older consumers with the lowest incomes will experience the greatest cost burdens from Utility MACT. Thirty-five percent of older households have total household incomes of less than $20,000, and they will experience the greatest energy burden. Although consumption data show that low-income older consumers tend to use less heating fuel than higher-income groups, higher winter heating costs are likely to be a greater burden on this group than on higher-income older consumers who have greater financial resources available to meet the increased costs. As shown in Figure IV-9, large percentages of the elderly have high energy burdens, and nearly 34 percent of the elderly and more than 36 percent of the frail elderly have high energy burdens

Figure IV-9
Energy Burdens of the Elderly



Source: Division of Energy Assistance, U.S. Department of Health and Human Services.

Low income senior citizens dependent primarily on retirement income have especially high energy burdens: About 45 percent of such individuals have high energy burdens, as compared to about 36 percent of all low income persons.[100] Thus, the greatest burdens of the increased energy costs resulting from Utility MACT regulations will fall on households of elderly Social Security recipients – 20 percent of all households -- who depend mainly on fixed incomes, with limited opportunity to increase earnings from employment. In 2008, these households had an average Social Security income of about $14,550.

Elderly individuals with low average annual incomes are more vulnerable to increasing energy costs even if their energy consumption levels are below those for households with similar annual incomes. Unlike young working families with the potential to increase incomes by taking on part-time work or increasing overtime, fixed income seniors are largely limited to cost-of-living increases that often do not keep pace with rising energy prices. Maintaining affordable energy costs is critical to the wellbeing of millions of the nation's elderly citizens.

[100]APPRISE, "LIHEAP Energy Burden Evaluation Study Final Report," Prepared for Division of Energy Assistance, Office of Community Services, Administration for Children and Families, U.S. Department of Health and Human Services, PSC Order No. 03Y00471301D, July 2005.

For many senior households energy price increases represent a serious financial burden -- for example, the elderly relying on Supplemental Security Income spend nearly 20 percent of their incomes on utility bills. The diversion of increased shares of family incomes to energy costs implied by the Utility MACT regulations will reduce available funds for other necessities, such as housing and healthcare, and diminish quality of life and the ability to save and invest for future needs.

Energy-Related Health Risks to the Elderly

The low-income elderly are particularly susceptible to weather-related illness, and a high energy burden can represent a life-threatening challenge. Given their susceptibility to temperature-related illnesses, elderly households tend to require more energy to keep their homes at a reasonable comfort level. However, despite this requirement, low-income elderly households spend 16 percent less on residential energy than all households. Implementation of the Utility MACT regulations would place many elderly households at serious risk by forcing them to heat and cool their homes at levels that are inadequate for maintenance of health. In the Florida summers, the dangers from loss of cooling are particularly acute for the elderly. Finally, senior homeowners may be forced to sell their homes because they cannot afford their energy bills.

Elderly Americans' limited budgets are stretched even further by higher health care expenditures. Medical spending for those between the ages of 55 and 64 is almost twice the amount spent by those between the ages of 35 and 44, and the health care expenditures of those 65 and older are even larger. Health care costs have contributed to the rise in bankruptcy filings among the elderly. More serious, being unable to afford home energy can be harmful to the health of household members, and many persons are forced to purchase less medicine and health care when their utility bills are too high. A 2009 survey of low-income seniors[101] found that due to energy costs:

- 41 percent were forced to defer or forgo medical or dental care
- 33 percent were unable to afford their prescriptions
- 22 percent were unable to pay their energy bills due to medical expenses
- Nearly 30 percent became ill because their home was too cold or too hot
- 33 percent went without food for at least one day.

For the elderly, the impact of higher energy costs on food expenditures is an especially serious problem. Nearly 18 percent of low-income elderly (with incomes below 130 percent of the poverty line) who live with others are food insecure, as are more than 12 percent of low-income seniors who live alone. And although 65 percent of

[101] Jackie Berger, 2009 National Energy Assistance Survey, prepared for NEADA By APPRISE, June 15, 2010.

individuals who are eligible for food stamps receive benefits, the participation rate among the elderly is much lower at only 30 to 40 percent.[102]

Other health hazards can occur if inside temperatures are too low or too high as a result of shut-offs or household member efforts to lower bills by reducing their use of heating and cooling sources. Thirty-one percent of households with incomes at or below 150 percent of poverty kept their homes at a temperature that they thought was unsafe or unhealthy at some point during the past year. Similarly, so did 24 percent of those between 151 percent to 250 percent of poverty.[103]

These temperature extremes can be dangerous to the elderly, who are particularly susceptible to hypothermia (cold stress or low body temperatures) and hyperthermia (heat stress or high body temperatures), conditions that can cause illness or death.[104] Of the approximately 600 people who die from hypothermia each year, half are typically 65 or older,[105] and this group accounts for 44 percent of those who die from weather-related heat exposure.[106] Senior citizens are at increased risk for these conditions because they do not adjust well to sudden changes in temperature and are more likely to have medical conditions or take medications (including over-the-counter cold medications) that impair the body's response to hot and cold temperatures.[107] Thus, the Utility MACT regulations have serious implications for the health of many of Florida's senior citizens.

Income, Earnings, and Wealth of African-Americans and Hispanics[108]

The average (real) income of American families has fluctuated over the past four decades, but Caucasian income has remained significantly higher than Hispanic income or African-American income:[109]

- African-American incomes are only about 65 percent that of the U.S. average, and these disparities will be exacerbated by the Florida GSP and income losses resulting from the Utility MACT.
- Hispanic incomes are only about 74 percent that of the U.S. average, and these disparities will be exacerbated by the Florida GSP and income losses resulting from the Utility MACT.

[102]Hawthorne, op. cit.
[103]Energy Programs Consortium and National Energy Assistance Directors' Association, "2008 Energy Costs Survey," June 2008.
[104]U.S. Department of Health and Human Services, "Tips for Health and Safety," available at www.acf.hhs.gov/programs/ocs/liheap/consumer_info/health.html.
[105]National Institutes of Health, "Staying Warm in the Winter Can Be a Matter of Life and Death for Older People," *NIH News* (January 2005).
[106]Centers for Disease Control, "Heat-Related Illnesses, Deaths, and Risk Factors—Cincinnati and Dayton, Ohio, 1999, and United States, 1979-1997," *MMWR Weekly* (June 2, 2000).
[107]National Institutes of Health, "Staying Warm"; Centers for Disease Control, "Extreme Heat Fact Sheet" (August 2004).
[108]Note that the official U.S. Census Bureau racial classifications are White, Black, Hispanic, and Asian – Hispanics can be of any race.
[109]Data based on 2009 and 2010 Census Bureau sources.

- The income of Caucasian families is nearly twice that of African-American and Hispanic families.
- The average weekly earnings of African-Americans and Hispanics are significantly below those of Caucasians.
- The wage gap between African-American workers and Caucasian workers has remained relatively constant over the past several decades.
- The average wage gap between Hispanics and African-Americans and Caucasians has widened over the past two decades -- due, in part, to the widening gap in educational attainment between Hispanics and the rest of the population.

Incomes and earnings provide a measure of the economic differences between demographic groups. Another measure is the poverty rate and, while there are several different measures of this rate, here we use the Federal government's official definition.[110] Some of the disparities in poverty rates between the demographic groups can be explained by differences in factors such as age distribution, family structure, and educational attainment. However, substantial differences between groups exist among individuals with similar characteristics. For example, in 2008: The overall U.S. poverty rate was 13.2 percent; for non-Hispanic Caucasians, the poverty rate was 8.6 percent; for Hispanics it was 23.2 percent; for African-Americans it was 24.7 percent.[111] Thus, the poverty rate for African-Americans is slightly higher than that for Hispanics, and the poverty rates for African-Americans and Hispanics are nearly twice the national average and nearly three times as high as the rate for non-Hispanic Caucasians.

Further, the poverty rate for African-Americans and Hispanics has historically been about three times that of Caucasians, and poverty rates among the elderly are considerably higher for African-Americans and Hispanics than for Caucasians. While poverty rates are relatively high for all children in single-parent families maintained by women, they are significantly higher for Hispanic and African-American children than for Caucasian children in such families. Among persons aged 25 and over without a high school degree, poverty rates for African-Americans and Hispanics are well above those of Caucasians.

Incomes, earnings, and poverty rates thus indicate that African-Americans and Hispanics are significantly less well off than Caucasians. In addition, the net worth of Caucasian households is nearly five times that of African-American and Hispanic households, and even among households with similar monthly incomes net asset holdings are far higher among Caucasians than African-Americans or Hispanics.[112]

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[110]See the discussion in Constance F. Citro and Robert T Michael, eds. *Measuring Poverty: A New Approach*, Washington, D.C.: National Academy Press, 1995.

[111]"Who is Poor?" Institute for Research on Poverty, University of Wisconsin -- Madison, September 2009. IRP developed the poverty estimates using the official Census definition of poverty.

[112]Net worth is defined as the sum of the market value of the assets owned by household members minus liabilities (secured and unsecured). Assets not included are the cash value of life insurance policies, equities in pension plans, and value of home furnishings and jewelry.

The Economic Vulnerability of African-Americans and Hispanics

The year 2009 ended with the dubious honor of being the worst year on record for employment in Florida. The unemployment rate in Florida reached an all time high in March 2010 of 12.3 percent, three times what it had been before the recession started. While the situation was bad for all workers, African Americans and Hispanics were particularly affected.[113] In 2009, over a quarter of the African American workforce was underemployed, more than double the 2007 rate of 11.3 percent. This increase of 14.2 percentage points compares with a 9 percentage point increase for Caucasian non-Hispanic workers, who had a 15.6 percent underemployment rate in 2009, up from 4.9 percent in 2007. Hispanic workers also experienced a significant increase in underemployment, from 7.3 percent in 2007 to 22.3 percent in 2009, more than triple. For African-Americans, the rise in underemployment was driven by unemployment, which increased 9.2 percentage points from 2007 to 2009, compared with a 6.8 percentage point increase for Hispanics and a 5.6 percent increase for non-Hispanic Caucasians. For Hispanics, the increase in underemployment was driven by the increase in involuntary part-time employment, which increased by 17.3 percentage points, compared with 15.7 percent for African Americans and 11.6 percentage points for non-Hispanic Caucasians.

By virtually every measure of economic well being and security, African-Americans and Hispanics are worse off than Caucasians, and they tend to be especially vulnerable to the economic downturn and job losses likely to result from implementing the Utility MACT regulations.[114]

Minority families have assets that are, on average, only about 20 percent as large as those of Caucasian families, and they thus have little to cushion themselves from the economic downturn and job losses that will likely result from implementing the Utility MACT regulations:

- Caucasians have, on average, a net worth that is nearly five times that of African-Americans and Hispanics, and Caucasians are thus much better prepared to cope with economic downturns and periods of unemployment.
- Caucasians own a much broader range of financial assets than African-Americans and Hispanics, and these assets are more than three times as large of those owned by African-Americans and Hispanics. This also gives Caucasians a much better capacity to cope with downturns in the economy.

[113]Emily Eisenhauer, Bernardo Oseguera, and Carlos A. Sanchez, op. cit.

[114]Data in this section were obtained from the U.S. Department of Labor, the U.S. Census Bureau, and the Federal Reserve Board, 2010. Also see the discussions in U.S. Census Bureau, *Income, Earnings, and Poverty From the 2004 American Community Survey*, October 2006; American Psychological Association, Fact Sheet: Ethnic and Racial Minorities and Socioeconomic Status, 2010; Dennis Chong and Dukhong Kim, "The Experiences and Effects of Economic Status Among Racial and Ethnic Minorities" American Political Science Review, Vol. 100, No. 3 (August 2006) pp. 335-351.

- African-Americans and Hispanics are much less likely than Caucasians to have discretionary income, and the amount of discretionary income they have is less.[115]
- African-Americans and Hispanics still suffer from the "last hired, first fired" syndrome, and those who are employed are generally less secure than their Caucasian counterparts. Thus, the job losses resulting from implementing the Utility MACT regulations will be disproportionately felt by African-Americans and Hispanics
- African-Americans and Hispanics are disproportionately concentrated in jobs that pay the minimum wage or below.
- African-Americans and Hispanics have a much lower rate of home ownership than do Caucasians.
- More than 20 percent of African-Americans lack health insurance and about one-third of Hispanics lack health insurance.

Across racial categories, minority families are statistically more likely to be found among the lowest-income households. Table IV-5 shows that Hispanic, and especially African-American, families are disproportionately found in the lower income categories.

Table IV-5
Disaggregation of Income Categories by Race (2008)

Income Category	Less than $10K	$10K-$30K	$30K-$50K	More than $50K	Totals
Caucasian Households	5.8 percent	21.7 percent	19.6 percent	52.9 percent	100 percent
Hispanic Households	9.2 percent	29.1 percent	25.0 percent	36.7 percent	100 percent
African-American Households	15.8 percent	30.3 percent	21.7 percent	32.3 percent	100 percent

Source: U.S. Energy Information Administration.

The energy burden is even more discriminatory for low-income African-Americans and Hispanics. For example:

- The energy burden for African-American households with annual incomes less than $10,000 is four times that of the overall energy burden for non-Hispanic Caucasians
- The energy burden for Hispanic households with annual incomes less than $10,000 is more than three times that of the overall energy burden for non-Hispanic Caucasians

[115]Discretionary income is estimated by first subtracting Federal, state, and local income, payroll, and property taxes from household income to yield disposable income. Next, basic, necessary household expenses are subtracted from disposable income. The resulting figure is multiplied by 0.75 to yield a conservative estimate of discretionary income.

- The energy burden for African-American households with annual incomes less than $10,000 is nearly ten times that of the energy burden for non-Hispanic Caucasian households with annual earnings of more than $50,000 per year
- The energy burden for Hispanic households with annual incomes less than $10,000 is eight times that of the energy burden for non-Hispanic Caucasian households with annual earnings of more than $50,000 per year.
- Across all household income categories, the energy burden for African-American and Hispanic households is greater than that for non-Hispanic Caucasian households.

Impacts on Cost of Living and Poverty Rates

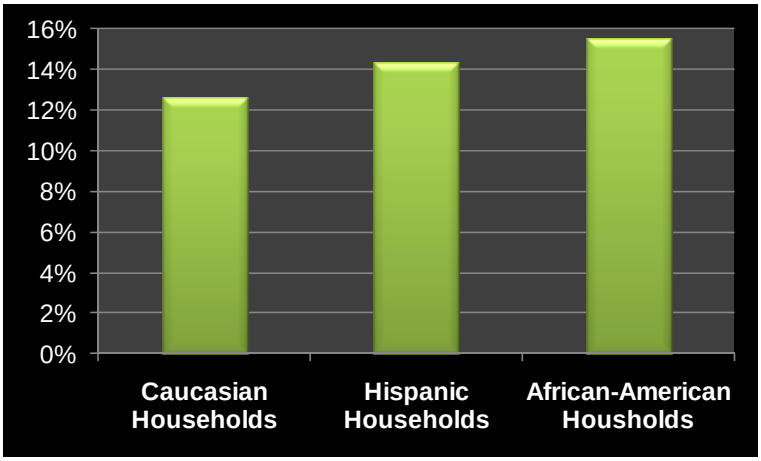
As discussed, one of the major effects of implementing the Utility MACT regulations will be to substantially increase the costs of energy and, especially, electricity. This will impact minorities disproportionately, both because they have lower incomes to begin with, but also because they have to spend proportionately more of their incomes on utilities and electricity. For example: Caucasians spend, on average, about six percent of their income on utilities, whereas African-Americans spend ten percent and Hispanics spend seven percent. Caucasians spend, on average, about two percent of their income on electricity, whereas African-Americans spend nearly four percent and Hispanics three percent.

There is an average income disparity of $15,900 between non-Hispanic Caucasian families and Hispanic families and an average income disparity of $18,200 between non-Hispanic Caucasian families and African-American families. Thus, the increased energy costs resulting from the Utility MACT regulations will inflict greater economic harm on minority families. Lower-income families are forced to allocate larger shares of the family budget for energy expenditures, and minority families are significantly more likely to be found among the lower-income brackets. Figure IV-10 shows that Hispanic families must dedicate almost 15 percent more of their after-tax income to energy expenditures than Caucasian families. African-American families must dedicate nearly 25 percent more than Caucasian families.[116]

This disparity between racial groups means that rising energy costs have a disproportionately negative effect on the ability of minority families to acquire other necessities such as food, housing, childcare, or healthcare. Essentially, the Utility MACT regulations will have the effect of a regressive tax disproportionately affecting the poor, elderly, and minorities.

[116]Steven H. Wade, *Price Responsiveness in the AEO2003 NEMS Residential and Commercial Buildings Sector Models,* Energy Information Administration, U.S. Department of Energy, 2008..

Figure V-10
Total Energy Expenditures as a Percentage of After Tax Income



Source: U.S. Energy Information Administration.

The poverty rate for African-Americans is slightly higher than that for Hispanics, while the poverty rates for African-Americans and Hispanics are nearly twice the national average and nearly three times as high as the rate for non-Hispanic Caucasians. We estimate that one of the impacts of implementing the EPA regulations will be to, by 2025, increase the poverty rate for African-Americans and Hispanics.

This must be considered one of the more troubling potential impacts of the EPA regulations. While it is possible to debate specific estimates, timelines, and percentages, an unintended result of the Utility MACT regulations will likely be to force millions of African-Americans and Hispanics below the poverty line -- many of whom have only recently managed to work their way out of poverty. Further, it should also be recognized that the welfare reforms of the 1990s and the 2007 – 2009 recession have made the social safety net at both the Federal and state levels less comprehensive and much stricter.[117] This will have unfortunate implications for those African-Americans and Hispanics whose incomes are reduced below the poverty level over the next decade because of the Utility MACT.

In addition, the EPA regulations, by increasing the costs of energy and energy-intensive building materials, will also increase the costs of housing. This will seriously affect African-Americans and Hispanics because they have higher housing costs and a lower rate of home ownership than Caucasians: Only about ten percent of Caucasians pay 50 percent or more of their income in housing costs; the comparable percentage for

[117]For example, in March 2011 Michigan enacted into law a reduction of the number of weeks it will pay unemployment insurance to 20 weeks from 26 weeks, beginning in 2012. The reduction will make Michigan the state that provides jobless benefits for the shortest number of weeks. Governor Rick Snyder stated that the reduction was necessary because the state's unemployment insurance fund had a deficit of $4 billion as a result of the state's economic difficulties. As another example, in its FY 2010 federal budget proposal the Obama Administration proposed decreasing funding for the Low Income Home Energy Assistance Program (LIHEAP) by $2.5 billion.

African-Americans and Hispanics is about 20 percent. Whereas 25 percent of Caucasians pay 30 percent or more of their income in housing costs, the comparable percent for African-Americans is 40 percent, and for Hispanics it is 45 percent.[118]

[118]See Wade, op. cit.; *Current Population Survey, Annual Social and Economic Supplement*, U.S. Bureau of the Census, 2008; Eileen Diaz McConnell, "No Place Like Home: The State of Hispanic Housing in Chicago, Los Angeles, and New York City, 2003," Department of Sociology and Latina/Latino Studies, University of Illinois, June 2005; Rakesh Kochhar, Ana Gonzalez-Barrera, and Daniel Dockterman, *Through Boom and Bust: Minorities, Immigrants and Homeownership*, Pew Hispanic Center, 2010; Timothy Ready, *Hispanic Housing in the United States, 2006*, Esperanza USA, 2006.

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