MISSOURI STATE AUDITOR'S OFFICE
FISCAL NOTE (11-110)

Subject

Initiative petition from Paul C. Wilson regarding a proposed amendment to Chapters 386 and 393 of the Revised Statutes of Missouri. (Received December 29, 2011)

Date

January 13, 2012

Description

This proposal would amend Chapters 386 and 393 of the Revised Statutes of Missouri.

The amendment is to be voted on in November, 2012.

Public comments and other input

The State Auditor's office requested input from the **Attorney General's office,** the **Department of Agriculture,** the **Department of Economic Development,** the **Department of Elementary and Secondary Education,** the **Department of Higher Education,** the **Department of Health and Senior Services,** the **Department of Insurance, Financial Institutions and Professional Registration,** the **Department of Mental Health,** the **Department of Natural Resources,** the **Department of Corrections,** the **Department of Labor and Industrial Relations,** the **Department of Revenue,** the **Department of Public Safety,** the **Department of Social Services,** the **Governor's office,** the **Missouri House of Representatives,** the **Department of Conservation,** the **Department of Transportation,** the **Office of Administration,** the **Office of State Courts Administrator,** the **Missouri Senate,** the **Secretary of State's office,** the **Office of the State Public Defender,** the **State Treasurer's office, Adair County, Cole County Public Works, Jackson County Legislators, St. Charles County, St. Louis County,** the **City of Columbia,** the **City of Jefferson,** the **City of Kansas City,** the **City of Kirksville,** the **City of Kirkwood,** the **City of St. Louis,** the **City of Springfield,** the **City of West Plains, Cape Girardeau 63 School District, Hannibal 60 School District, Rockwood R-VI School District, Linn State Technical College, Metropolitan Community College, University of Missouri, St. Louis Community College,** and the **Public Service Commission.**

Missouri Energy Development Association provided information as an opponent of the proposal to the State Auditor's office.

Peabody Energy provided information as an opponent of the proposal to the State Auditor's office.

Assumptions

Officials from the **Department of Agriculture** indicated there will be no fiscal impact on their department.

Officials from the **Department of Economic Development** indicated they anticipate no fiscal impact for their department or Public Service Commission (PSC).

Officials from the **Department of Higher Education** indicated the proposal contained in this initiative petition would have no direct, foreseeable fiscal impact on their department.

Officials from the **Department of Health and Senior Services** indicated this initiative petition is a no impact note for their department.

Officials from the **Department of Insurance, Financial Institutions and Professional Registration** indicated this petition, if passed, will have no cost or savings to their department.

Officials from the **Department of Mental Health** indicated this proposal places no direct requirements on their department that would result in a fiscal impact.

Officials from the **Department of Natural Resources (MDNR)** estimated this proposal would increase costs to their department of $99,175 in fiscal year 2014, $89,176 in 2015, and $90,113 in 2016.

To the extent the provisions result in development/expansion of Missouri renewable energy businesses, there could be a positive economic impact on small businesses in Missouri, such as solar due to the solar rebates to be provided to customers for installation of small systems.

Because of this proposal's exclusion of biomass as an eligible renewable resource, there could be a negative economic impact on developing renewable energy businesses in Missouri that have invested in biomass feedstocks and/or technologies as a result of their current status under the RES statute as eligible renewable energy resources.

This proposal would require new rulemaking(s) after public notice and hearing each time DNR certifies technologies that are not explicitly named as renewable resources in the proposal.

Section 393.102(8) defines "renewable energy" as "electric energy produced from renewable sources that operate in compliance with all state and federal environmental standards and limited to the following technologies: wind turbines; solar thermal sources; photovoltaic cells and panels; hydropower (other than that excluded below); fuel cells using hydrogen produced by another renewable energy source; facilities that capture or use landfill gas; a project facility as defined in section 620.2300 RSMo; and other technologies used to produce electric energy, to the extent that such other technologies

are certified as a renewable energy source in a rule adopted by the department or any successor agency after notice and hearing and consideration of the fuel, type, technology and environmental impacts…"

Under the current Renewable Energy Standard (RES) law, MDNR is responsible for identifying additional sources of renewable energy as eligible that may become available after November 2008 (the date the current RES was adopted). The current RES statute specifically identifies a larger number of eligible renewable resources than this proposal, which would result in more frequent actions by the MDNR to analyze, evaluate and potentially promulgate rules under this proposal. MDNR's current process as established by rule is an internal review, and if MDNR finds the resource eligible, this information is communicated to the applicant and posted. This RES proposal does not specifically identify many eligible renewable resources, which leaves a large number of resources that are or could be eligible under the current RES, but under this proposal, a public notice, hearing and rulemaking process would be required (subject to compliance with other eligibility provisions of the law). Additional citizen participation prior to public hearing would also be needed to make the appropriate determinations. This would require a significant amount of research, analysis and justification each time MDNR wished to consider certifying other technologies as renewable energy resources. Most notably missing from the new RES proposal is biomass, specifically the following currently eligible renewable energy resources are removed "dedicated crops grown for energy production, cellulosic agricultural residues, plant residues, thermal depolymerization or pyrolysis for converting waste material to energy, clean untreated wood such as pallets."

The current RES law and this proposal requires MDNR to certify that renewable generation facilities cause no undue adverse environmental impacts to air, land or water.

MDNR's interpretation of the determination of whether there is "undue adverse air, water, or land use impacts" is as follows: The department issues permits for facilities with potential to cause adverse impacts to air, land and water. Therefore, facilities qualifying for and receiving a permit, or facilities under the threshold requiring a permit, will, by definition, be deemed not to have an impact on air, water or land use. MDNR's fiscal note is based on this interpretation and therefore, the department's Division of Environmental Quality is requesting no additional FTE.

<u>In addition to the MDNR rulemakings that would be required to certify other technologies that are not explicitly named in the proposal as renewable sources, the department's Division of Energy would be a participant in Public Service Commission (PSC) rulemaking(s) established by the following provisions</u>:

- 393.1030 – Authorizes the PSC to enact rules necessary to enforce the provisions of the RES;
- 393.1040 – Requires electric utilities to develop and administer all cost-effective energy efficiency and demand response programs that reduce annual growth in energy consumption and the need to build additional generation capacity. This would require amendment to the PSC's current rules implementing the Missouri Energy Efficiency

Investment Act (MEEIA). MDNR has been heavily involved in PSC rulemaking for the MEEIA. This provision would address a provision that was not included in the MEEIA law regarding PSC authority over energy efficiency. This would be a separate rulemaking amendment process from rule(s) promulgated to implement the RES provisions.

- 393.1045 - Requires the PSC to adopt rules establishing procedures for the tracking and recovery of the net costs of compliance; and
- 393.1050 - General rulemaking authority for the PSC to implement all provisions of the RES.

In coordination with Missouri's investor-owned (regulated) electric utilities, the Missouri Public Service Commission should be in a position to estimate long-range costs for utilities' compliance with the provisions of this initiative petition. Projected costs would be lower in the early years of implementation but potentially increase as the RES compliance targets increase to 20 percent in 2023 and 25 percent beginning in 2026. Increased RES compliance costs could be mitigated as environmental compliance costs for traditional energy sources increases and utilities consider the comparatively lower cost of renewable energy sources when uncertainty and environmental costs are factored in.

To the extent this new RES results in development of Missouri's renewable energy resources and businesses, there would be economic and energy security benefits to the state of Missouri. However, such benefits would not be as significant due to the exclusion of biomass technologies as renewable sources as Missouri's greatest potential renewable energy sources are from biomass feedstocks.

MDNR's interpretation of the determination of whether there is "undue adverse air, water, or land use impacts" is as follows: the department issues permits for facilities with potential to cause adverse impacts to air, land and water. Therefore, facilities qualifying for and receiving a permit, or facilities under the threshold requiring a permit, will, by definition, be deemed not to have an impact on air, water or land use. MDNR's fiscal note is based on this interpretation and therefore, the department's Division of Environmental Quality is requesting no additional FTE.

However, the department assumes our Division of Energy-Policy and Resources Program would request a Planner III to implement the provisions of this proposal identified below. In addition, portions of existing FTE would be involved as technical consultants, providing policy direction/guidance, legal assistance/review and public information duties related to public notice/hearing(s). For purposes of this fiscal note, it is assumed the salary of a Planner III would be starting in FY 2014.

Section 393.1025(8) require the Department of Natural Resources, after notice and hearing, to identify other sources of renewable energy in a rule, and provide guidance for what constitutes 'renewable.'

Planner III duties associated with each rulemaking that may be promulgated to certify other technologies that are not explicitly named in the proposal as renewable sources: consultation with technical staff to coordinate research, analysis and justification for identifying other renewable sources; develop plan and implement plan for citizen participation process that identifies potential affected entities such as, renewable energy industry and interest groups and gathers information and discusses analysis and recommendations; draft rule language in consultation with affected entities; develop all documents and coordinate and follow administrative rulemaking process; work with public information staff to issue public notice and organize and conduct public hearing.

Under Sections 393.1030, 393.1040, 393.1045 and 393.1050 the department will be a participant in Public Service Commission rulemaking(s) required or authorized in these sections.

Planner III duties associated with participation in PSC rulemaking workshops: research, analyze and develop proposals and consult with management and legal counsel to develop positions/suggestions/language for rulemaking provisions and responses to other parties' positions/suggestions/language; monitor PSC workshop dockets and PSC Agenda meetings for policy direction on rule development from the Commission; attend and participate in all workshops; review all draft rulemakings and comment, in coordination with management and legal counsel; report developments.

Officials from the **Department of Corrections** indicated this initiative petition will have no impact for their department.

Officials from the **Department of Labor and Industrial Relations** indicated this initiative petition has no fiscal impact to their department.

Officials from the **Department of Revenue** indicated there is no fiscal impact to the department from IP 11110. To mirror existing practices, the department recommends the following change to Section 386.715.4

4.On behalf of the public counsel, the commission shall render a statement of such assessment to each such public utility on or before July first and the amount so assessed to each such public utility shall be paid by it to the [director of revenue] commission in full on or before July fifteenth next following the rendition of such statement, except that any such public utility may at its election pay such assessment in four equal installments not later than the following dates next following the rendition of such statement, to wit: July fifteenth, October fifteenth, January fifteenth, and April fifteenth. The [director of revenue] commission shall remit such payment to the director of revenue for deposit to the state treasurer.

Officials from the **Department of Social Services** indicated under current law, a certain percentage of energy provided by the state's electrical utilities must be generated from renewable energy resources. This initiative petition seeks to replace the current

renewable energy requirements with newer, higher standards. The old and new standards are shown below:

Existing Standards

Time Period	Renewable Energy Standard
2011 - 2013	2%
2014 – 2017	5%
2018 – 2020	10%
2021 and Beyond	15%

Proposed Standards

Time Period	Renewable Energy Standard
2014 – 2016	5%
2017 – 2019	10%
2020 – 2022	15%
2023 – 2025	20%
2026 and Beyond	25%

To cover the cost of compliance, Section 393.1040.2 allows an electric utility to impose a fee of up to $3 per month on each residential customer.

As an electrical energy consumer, the Department of Social Services would be impacted by the proposal in the same way as any other energy consumer. If electrical rates were to rise as a result of this proposal, there could be increased costs to the Department of Social Services.

Officials from the **Governor's office** indicated there should be no added costs to their office if this amendment is approved by the voters.

Officials from the **Missouri House of Representatives** indicated there is no fiscal impact to their agency.

Officials from the **Department of Conservation** indicated that no adverse fiscal impact on their department would be expected as a result of this proposal.

Officials from the **Office of Administration (OA)** indicated there should be no direct costs or savings to their office. However, there could be an impact on utility costs paid by the state should utility providers adjust consumer rates in order to comply with this proposal.

Officials from the **Office of State Courts Administrator** indicated there is no fiscal impact on their office.

Officials from the **Missouri Senate** indicated this initiative petition appears to have no fiscal impact as it relates to their agency.

Officials from the **Secretary of State's office** indicated their office is required to pay for publishing in local newspapers the full text of each statewide ballot measure as directed by Article XII, Section 2(b) of the Missouri Constitution and Section 116.230-116.290, RSMo. The Secretary of State's office is provided with core funding to handle a certain amount of normal activity resulting from each year's legislative session. Funding for this item is adjusted each year depending upon the election cycle with $1.3 million historically appropriated in odd numbered fiscal years and $100,000 appropriated in even numbered fiscal years to meet these requirements. The appropriation has historically been an estimated appropriation because the final cost is dependent upon the number of ballot measures approved by the General Assembly and the initiative petitions certified for the ballot. In fiscal year 2011, at the August and November elections, there were 6 statewide Constitutional Amendments or ballot propositions that cost $1.02 million to publish (an average of $170,000 per issue). Therefore, the Secretary of State's office assumes, for the purposes of this fiscal note, that it should have the full appropriation authority it needs to meet the publishing requirements.

Officials from the **Office of the State Public Defender** indicated this initiative petition will not have any significant impact on their office.

Officials from the **State Treasurer's office** indicated there is no fiscal impact to their office.

Officials from the **City of Columbia** indicated as currently drafted, this version appears to apply to electric utilities regulated by the Public Service Commission. Although the City of Columbia runs a municipal electric utility and generates some of its own power, it also buys power wholesale from Ameren Missouri, from renewable source providers and from other suppliers. To the extent that the requirements in the initiative increase operating costs for any of our wholesalers or power partners, or increase competition for renewable power sources, this could increase costs for the city's utility. It is not possible to predict the extent of cost increases, if any.

Officials from the **City of Jefferson** do not expect any fiscal impact should this petition become law.

Officials from the **City of Kansas City** indicated the enactment of this legislation by the people of Missouri would impose no new costs upon the City of Kansas City, as a political subdivision. But as a utility consumer, any increase in costs experienced by KCPL, KCPL GMO, or Platte-Clay Electric Coop, will be placed into rates. Therefore, there is the potential for an increase in costs, but it is not capable of estimation since it is based solely on utility costs.

Official from the **City of Kirkwood** indicated that Ameren Missouri and Kirkwood Electric both operate within Kirkwood’s city limits. Residents served by Ameren

Missouri would be subject to an economic burden due to the above-market cost for renewables. This initiative repeals the hard cost cap provisions of the 2008 initiative and opens cost recovery of renewable energy to the discretion of the Public Service Commission. Recent renewable proposals to the City of Kirkwood have been four times the cost of market power. Elimination of the cost cap provisions would increase rates for Ameren Missouri customers by more than 1.5%. Although this initiative does not apply directly to Kirkwood Electric, it would hinder the city's efforts to implement renewables into its portfolio. This initiative precludes the city from selling renewable energy credits and would increase the cost of any renewable project the city would like to do for its utility. The elimination of the cost cap would also increase market power costs for the city's utility.

Officials from **Linn State Technical College** indicated that based on the information presented, there appears to be no fiscal impact to their college.

Officials from the **Metropolitan Community College** indicated this petition would have no direct fiscal impact on their college.

Missouri Energy Development Association (MEDA) provided the following information as an opponent of this initiative petition.

MEDA's electric investor-owned utility members are Ameren Missouri, Kansas City Power & Light, and The Empire District Electric Company. MEDA's electric members' collective annual governmental entity rate increase associated with this proposed initiative petition mandate is approximately $4,089,000 per year.

MEDA's Fiscal Note and Fiscal Note Summary comments only quantify the "direct costs" in association with electric rate increases as a result of the proposed initiative petition mandate. Additional "direct costs" that may be incurred by government entities through higher electric rates but have not been quantified yet include additional transmission infrastructure and generation resources development, system reliability as a result of an increase in the use of intermittent energy resources, and regional reliability issues that may result in an increase in spinning reserve requirements. "Indirect costs" associated with increased electric rates for non-governmental entities and individuals would include, for example, increased costs for businesses, job losses, and the negative fiscal impact that typically results from a downturn in economic activity. While MEDA has not attempted to quantify these indirect costs, they could be quite substantial.

Peabody Energy provided the following information as an opponent of this initiative petition.

THE ECONOMIC AND FISCAL IMPACTS ON MISSOURI OF THE PROPOSED RENEWABLE ENERGY STANDARD

Management Information Services, Inc.
Washington, D.C.
www.misi-net.com
202-889-1324

January 9, 2012

Pursuant to Section 116.175.1, RSMo, and 15 CSR 40-5.010, the following report is submitted on behalf of Peabody Energy, Inc. This report focuses on the fiscal impact of the proposed legislation to state government, Missouri local governmental entities, and small and large businesses for the next two fiscal years and through the full implementation of the renewable energy standard called for by the proposal. In compliance with Section 23.140, RSMo, this report also notes that the proposal will modify the existing renewable energy standard but not duplicate an existing program or agency; the proposal is not the result of a federal mandate; and it is unknown whether any new physical facilities will be required as a result of the proposal.

EXECUTIVE SUMMARY

A proposed Missouri initiative entitled "Renewable Energy Standard" (RES) would mandate that 25 percent of the state's electricity sold to retail customers be generated by renewable energy resources by 2026. We find that the fiscal impacts on the Missouri state and local governments would be devastating:

- The direct fiscal impact on the Missouri state government would be to increase its annual electric bill by $29 million (70 percent) – the state would have to pay $70 million/yr. for its electricity instead of $41 million/yr.
- The direct fiscal impacts on Missouri local governments would be even more severe, since they have to pay for electricity for their schools, offices, police and fire facilities, etc. For example, the City of St. Louis would have to pay an additional $6 million every year for its electric bill -- $15 million/yr. instead of $9 million/yr.
- More generally, Missouri local governments would have to pay an additional $153 million every year for their electric bills -- $323 million/yr. instead of $170 million/yr.[1]
- Thus, **the direct fiscal impact on the Missouri state and local governments of the RES would total an additional $182 million per year.**

The indirect costs to Missouri state and local governments of the RES mandate would be much larger:

- Missouri state government tax revenues would decrease by about $940 million per year
- Missouri local government tax revenues would decrease by about $860 million per year

Finally, the RES would increase the Missouri unemployment rate, and, on the basis of statistical and epidemiological research, we estimate that this would increase the Missouri mortality rate by seven percent – causing an additional 3,900 deaths per year. These deaths exceed the annual deaths in Missouri from causes such as Stroke, Diabetes, Kidney Disease, Breast Cancer, or traffic accidents and, over a decade, will equal or exceed the populations of cities such as Jefferson City, Cape Girardeau, Hannibal, and Rolla.

[1]In order to precisely estimate the full fiscal impact of the RES upon local governments, the Auditor can solicit utility rates paid data from local governmental entities which purchase electricity from the affected providers, including city and county governments, police departments, fire departments and protection districts, school districts, etc.

As shown below, the State of California provides the most salient example of how energy policies that displace coal generated electricity have devastating direct and indirect economic costs.

Economic Impacts in Missouri

Coal plants produce inexpensive electricity and replacing them with much higher cost renewable facilities will cause electricity costs and rates to increase significantly. By the time the full RES mandate goes into effect in 15 years, it is likely that average electric rates in Missouri will be nearly twice as high as they would be in the absence of the mandate. Missouri would change from having electric rates that are 30% less than the U.S. average to rates that are 40% higher than the U.S. average – Figure EX-1. Electricity price increases act like a tax increase, reducing incomes of energy consumers and ratepayers and depressing business development and economic output. We derived estimates of the likely impact in Missouri of enacting the RES.

As illustrated in Figures EX-2, and EX-3, the impact on the Missouri economy would be devastating: i) Missouri gross state product (GSP) would be reduced by $21 billion annually; ii) nearly 200,000 annual jobs would be lost; iii) the jobs losses would be more than 12 times as large as total 2010 Missouri job losses; iv) the Missouri unemployment rate could increase by more than 75%; v) annual Missouri manufacturing output could be reduced by over $1 billion; vi) annual Missouri state and local government tax revenues could be reduced by nearly $2 billion.

Fiscal Impacts on Missouri State and Local Governments

Direct Impacts

There are direct costs to Missouri state and local governments resulting from significant increases in electric utility bills for all levels of government due to the large electricity rate increases resulting from the RES. If the RES is implemented, the Missouri state government's annual electric bill will increase by $29 million (70 percent) – the state would have to pay $70 million/yr. for its electricity instead of $41 million/yr. Local governments would be affected even more severely.

Indirect Impacts

The indirect costs to Missouri state and local governments of the RES would be much larger than the direct costs. Tax revenue losses to state and local governments from full implementation of the RES would total at least $1.8 billion annually: i) Missouri state government tax revenues would decrease by $940 million per year; ii) Missouri local government tax revenues would decrease by $860 million per year

The $940 million annual revenue losses to the state government resulting from the RES would total (Figure EX-4): i) Nearly seven times the annual revenues collected from alcohol and tobacco taxes combined; ii) about 2.5 times the annual revenues

collected from state corporate income taxes; iii) more than three time the annual revenues collected from state motor vehicle license fees.

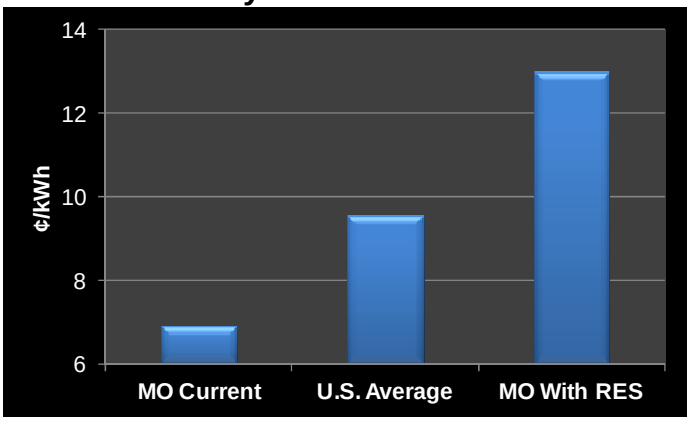
The $940 million annual revenue losses to the state government resulting from the RES would total (Figure EX-4): i) More than four times as much as the state police budget; ii) more than three times as much as the state judicial and legal system budget; iii) three times more than the state currently spends on all natural resource programs.

The $860 million annual revenue losses to Missouri local governments resulting from the RES would total (Figure EX-6): i) About twice as much as local governments receive every year in public utilities taxes; ii) about 2.5 times more than local governments receive every year in personal income taxes; iii) more than 2.5 times as much as local governments receive every year in airport fees.

The annual revenue losses of $860 million to Missouri local governments resulting from the RES would total (Figure EX-7): i) More three times as much as local governments spend every year on libraries; ii) more than twice as much as local governments spend every year on health programs; iii) about twice as much as local governments spend every year on housing and community development programs.

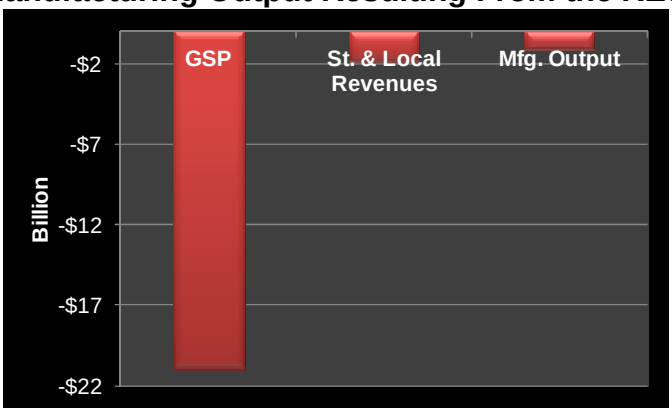
Finally, a major impact of the RES would be to increase deaths in Missouri (compared to not implementing the RES) by about 3,900 per year -- exceeding the annual deaths in Missouri from causes such as Stroke, Diabetes, Kidney Disease, Breast Cancer, or traffic accidents (Figure EX-8).

Figure EX-1: Increase in the Average Missouri Electricity Rate Due to the RES



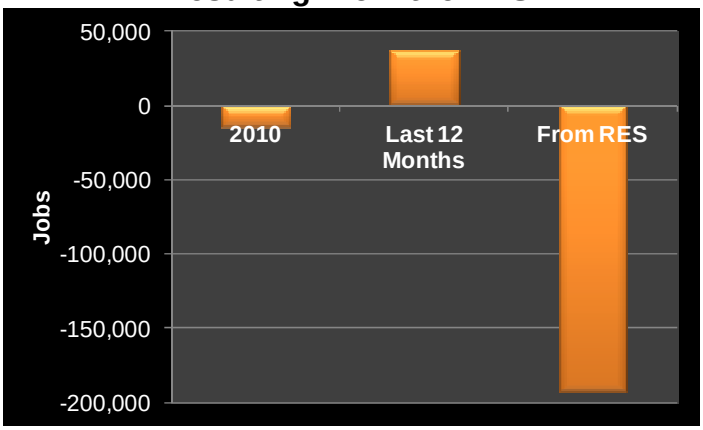
Source: U.S. Energy Information Administration and Management Information Services, Inc.

Figure EX-2: Annual Dollar Losses in Missouri GSP, State, and Local Government Revenues, and Manufacturing Output Resulting From the RES



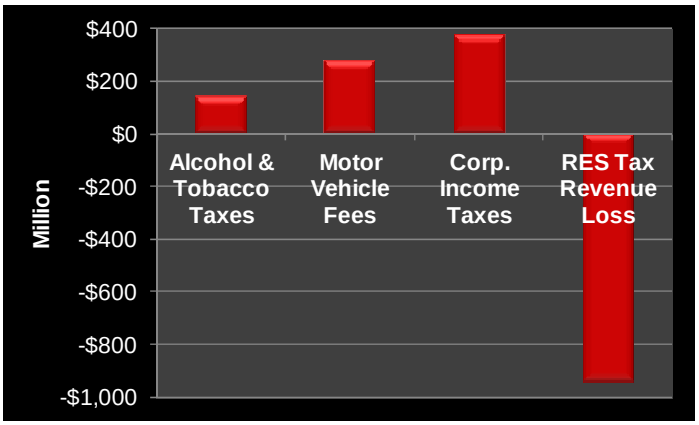
Source: U.S. Bureau of Economic Analysis and Management Information Services, Inc.

Figure EX-3: Magnitude of Missouri Job Losses Resulting From the RES



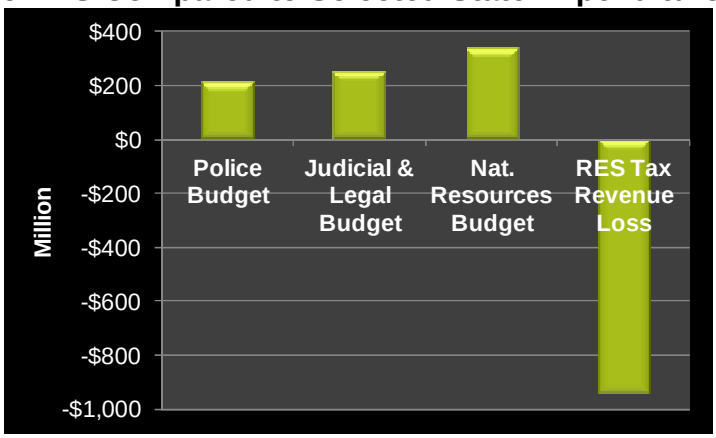
Source: U.S. Bureau of Economic Analysis and Management Information Services, Inc.

Figure EX-4: State Government Annual Revenue Losses From the RES Compared to Selected Revenue Sources



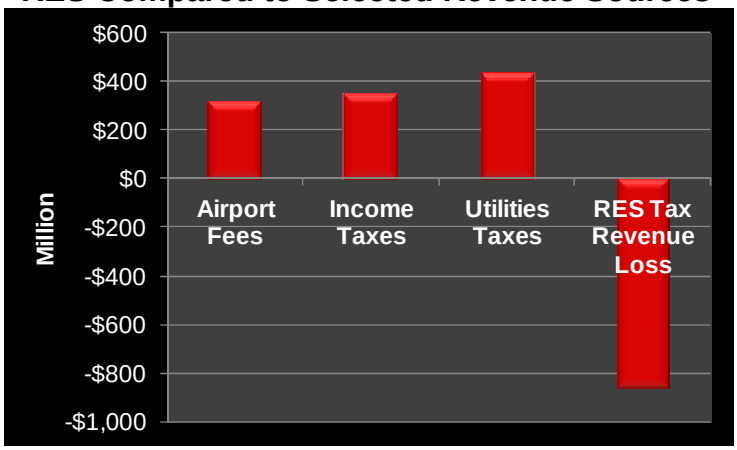
Source: U.S. Census Bureau and Management Information Services, Inc.

Figure EX-5: State Govt. Annual Revenue Losses From the RES Compared to Selected State Expenditures



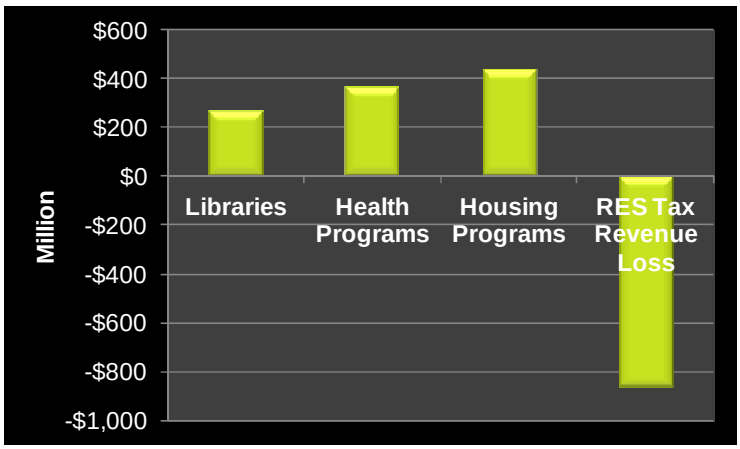
Source: U.S. Census Bureau and Management Information Services, Inc.

Figure EX-6: Local Governments Annual Revenue Losses From RES Compared to Selected Revenue Sources



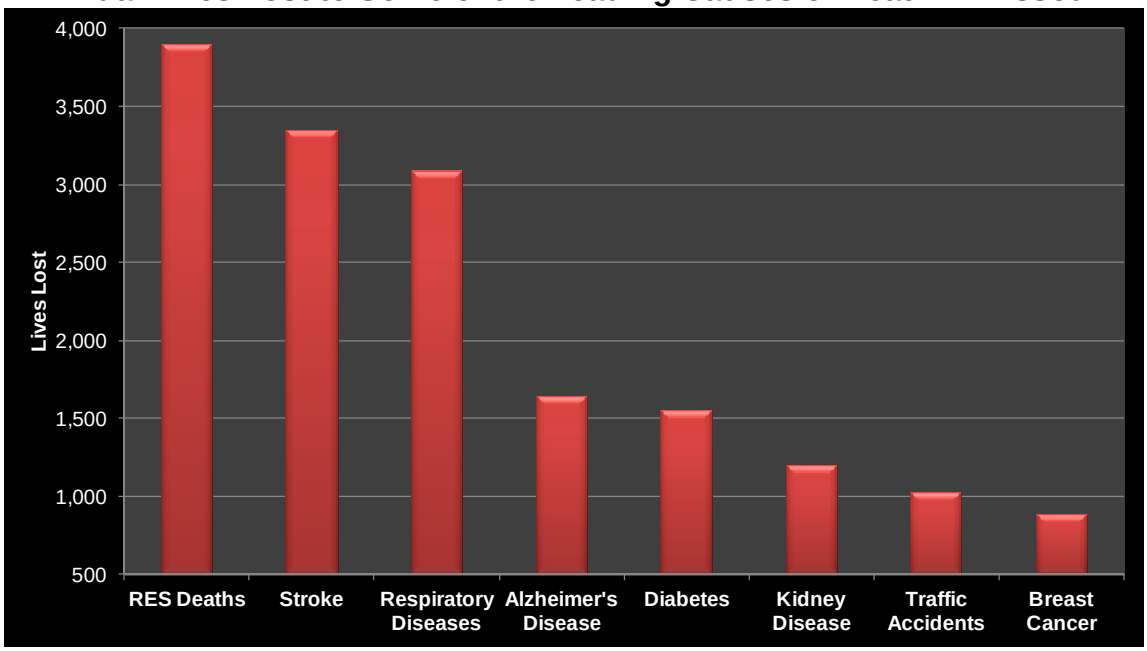
Source: U.S. Census Bureau and Management Information Services, Inc.

Figure EX-7: Local Governments Annual Revenue Losses From RES Compared to Selected Local Expenditures



Source: U.S. Census Bureau and Management Information Services, Inc.

Figure EX-8: Comparison of the Annual Lives Lost Due to the RES With the Annual Lives Lost to Some of the Leading Causes of Death in Missouri



Source: National Center for Health Statistics and Management Information Services, Inc.

I. FISCAL IMPACTS ON MISSOURI STATE AND LOCAL GOVERNMENTS

I.A. Direct Impacts

The Missouri statutory audit language states that "…the auditor shall assess the fiscal impact of the proposed measure," and that "The fiscal note and fiscal note summary shall state the measure's estimated cost or savings, if any, to state or local governmental entities."[2]

There are no savings to the Missouri state or local governmental entities that would result from the proposed RES.

There will be costs to the state of managing and enforcing the mandate. These include the increased government administrative costs, costs of hiring more government workers, etc. These will likely be small in comparison to the other costs that will be incurred by Missouri state and local governments.

There are two major categories of fiscal impact costs on Missouri state and local governments. First, there are the direct costs to these governments resulting from significant increases in electric utility bills for all levels of government due to the large electricity rate increases resulting from the RES.

The Missouri state government spends about $41 million annually on electricity.[3] We estimate that, if the full RES mandate is implemented, average Missouri electric rates could increases by 90%. However, the state government purchases about 78 percent of its electricity from the IUOs to whom the RES mandate would apply,[4] and the state's electric bill would thus increase by about 70 percent. Thus:

- Under the RES, the state government would have to pay an additional $29 million every year for its electric bill -- $70 million/yr. instead of $41 million/yr.

Missouri local governments would be affected even more severely, since they have to pay for the electricity for their schools, administrative offices, police facilities, fire stations, etc. For example, officials from the City of St. Louis contended that the original 2008 Proposition C initiative would result in a significant fiscal impact on the city.[5] The impact of the proposed RES initiative would be even worse. The City of St. Louis (City Offices, Street Department, and Lambert International Airport, excluding Water

[2]Missouri Revised Statutes, Chapter 116, Initiative and Referendum, Section 116.175, August 28, 2010.
[3]State of Missouri, Office of Administration, Division of Accounting, Missouri Accountability Portal, "Payments by Category Detail," 2011.
[4]State of Missouri, Office of Administration, Division of Accounting, Division of Purchasing and Materials Management, December 2011.
[5]See Missouri State Auditor's Office, op. cit

Department and Metropolitan Police Department) currently pays about $9 million annually for electricity.[6] Under the proposed RES:

- The City of St. Louis would have to pay an additional $6 million every year for its electric bill -- $15 million/yr. instead of $9 million/yr.

City officials stated that the cost increases from the original 2008 Proposition C "could prove to be devastating to the entire economy of St. Louis City."[7] The impact of the proposed RES would be even more devastating to the City's economy.

More generally, local governments in Missouri spend about $170 million annually on electricity from the three major investor owned utilities in the state: Ameren, Empire, and KCP&L.[8] If the full RES mandate is implemented, these annual electricity expenditures would increase by about 90%. Thus:

- Under the RES, Missouri local governments would have to pay an additional $153 million every year for their electric bills -- $323 million/yr. instead of $170 million/yr.

I.B. Indirect Impacts

The increased electricity costs would have serious fiscal impacts on Missouri state and local governments. However, the indirect costs to Missouri state and local governments of the RES mandate would be much larger and much more important.[9] These include impacts such as the following:

- Increased state and local government spending and burdens caused by the job losses resulting from the RES
- Increased state and local government spending required due to the adverse effects of the RES on poverty, homelessness, health, etc.

But even these impacts would be trivial compared to the major indirect impacts: Tax revenue losses to state and local governments that would result from the economic damage to the state from the RES.[10] We estimate that the tax revenue losses to state

[6]Ibid.
[7]Ibid.
[8]This expenditure was estimated on the basis of the amount that the utilities annually bill all government entities in the state, the percent of electricity sales in Missouri accounted for by Ameren, Empire, and KP&L, and the amount paid for electricity by the Missouri state government. Data were derived from the *2010 Operating Statistics* listed in the utility companies' latest 10-K reports.
[9]See the discussion in Section VI.
[10]See the discussion in Section VI.

and local governments from full implementation of the RES would total at least $1.8 billion annually:

- Missouri state government tax revenues would decrease by about $940 million per year
- Missouri local government tax revenues would decrease by about $860 million per year

How serious would these revenue losses be for Missouri state and local government? Perspective is provided by examining current Missouri state and local government revenues and expenditures.[11]

I.B.1. Missouri State Government Revenue Losses

The Missouri state government would suffer a decrease in revenues of about $940 million per year as a result of the RES. With respect to revenues, the state currently receives, annually, about:

- $31 million in alcohol beverage taxes
- $110 million in tobacco product taxes
- $380 million in corporate income taxes
- $280 million in motor vehicle license fees

Thus, the $940 million annual revenue losses to the state government resulting from the RES would total (Figure I-1):

- Nearly seven times the annual revenues collected from alcohol and tobacco taxes combined
- About 2.5 times the annual revenues collected from state corporate income taxes
- More than three time the annual revenues collected from state motor vehicle license fees

With respect to expenditures, the state currently spends, annually, about:

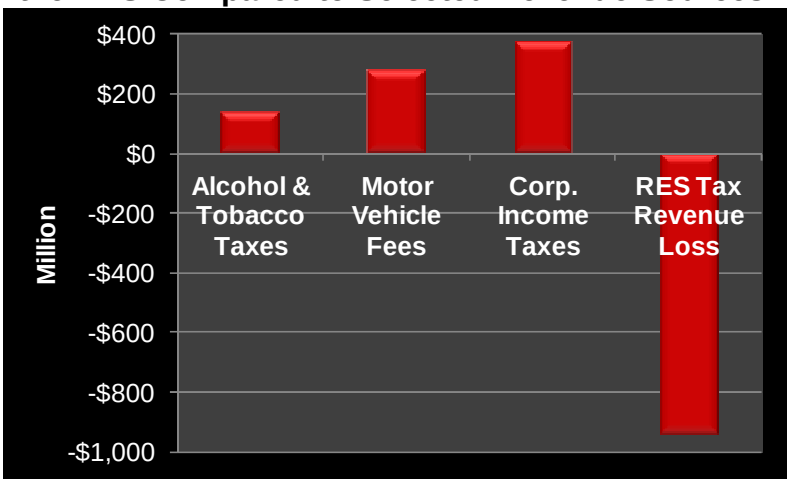
- $215 million for police protection
- $250 million for the judicial and legal system
- $340 million for natural resource programs

Thus, the $940 million annual revenue losses to the state government resulting from the RES would total (Figure I-2):

[11]Derived from the data series "State and Local Government Finances by Level of Government and by State," U.S. Census Bureau, 2011.

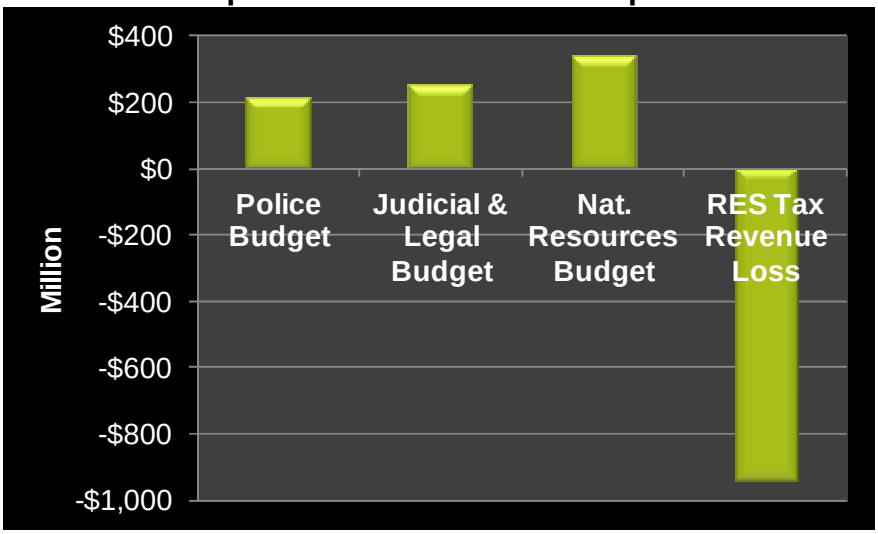
- More than four times as much as the state police budget
- More than three times as much as the state judicial and legal system budget
- Nearly three time more than the state currently spends on all natural resource programs

Figure I-1
State Government Annual Revenue Losses From the RES Compared to Selected Revenue Sources



Source: U.S. Census Bureau and Management Information Services, Inc.

Figure I-2
State Govt. Annual Revenue Losses From the RES Compared to Selected State Expenditures



Source: U.S. Census Bureau and Management Information Services, Inc.

I.B.2. Missouri Local Governments Revenue Losses

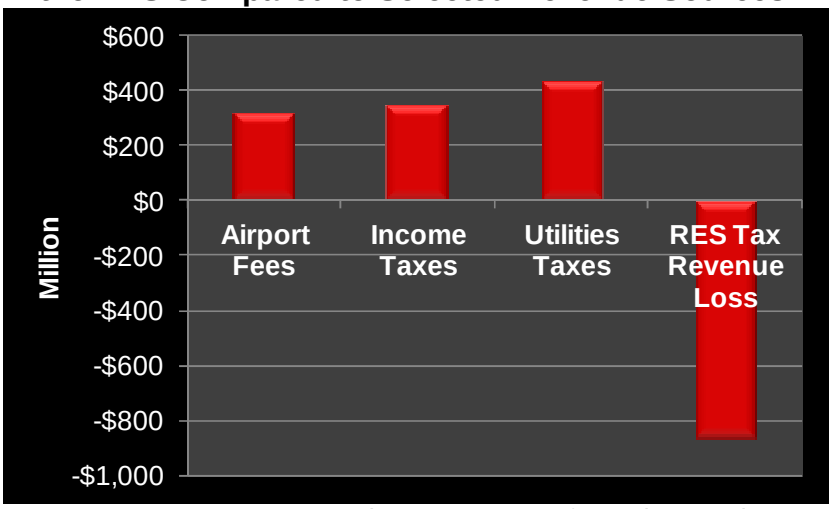
Missouri local governments would see a decrease in revenues of about $860 million per year as a result of the RES. With respect to revenues, local governments currently receive, annually, about:

- $440 million in public utilities taxes
- $350 million in individual income taxes
- $320 million in airport fees

Thus, the $860 million annual revenue losses to Missouri local governments resulting from the RES would total (Figure I-3):

- About twice as much as local governments receive every year in public utilities taxes
- About 2.5 times more than local governments receive every year in personal income taxes
- More than 2.5 times as much as local governments receive every year in airport fees

Figure I-3
Local Governments Annual Revenue Losses From the RES Compared to Selected Revenue Sources



Source: U.S. Census Bureau and Management Information Services, Inc.

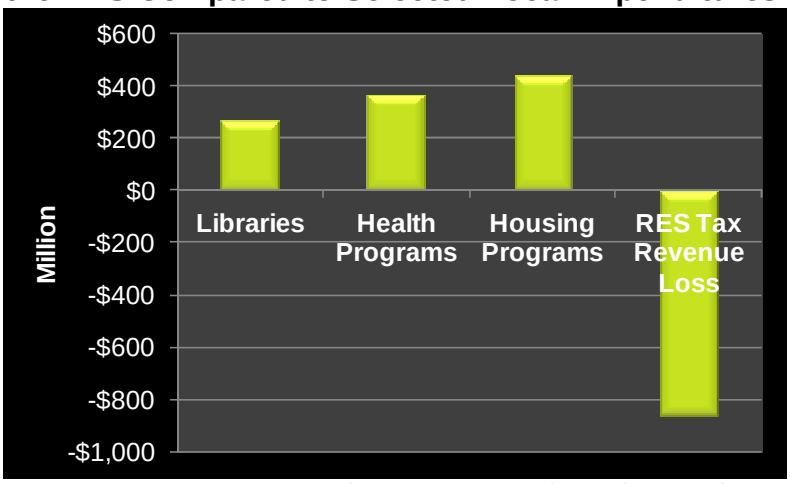
With respect to expenditures, Missouri local governments currently spend, annually, about:

- $270 million on libraries
- $370 million on health programs
- $440 million on housing and community development programs

Thus, the annual revenue losses of $860 million to Missouri local governments resulting from the RES would total (Figure I-4):

- More three times as much as local governments spend every year on libraries
- More than twice as much as local governments spend every year on health programs
- About twice as much as local governments spend every year on housing and community development programs

Figure I-4
Local Governments Annual Revenue Losses From the RES Compared to Selected Local Expenditures



Source: U.S. Census Bureau and Management Information Services, Inc.

I.C. Missouri Fiscal Impacts in Perspective

The bottom line is that the revenue losses resulting from the RES would have serious negative impacts on Missouri state and local governments. This is especially significant because Missouri state and local government budgets are under intense strain due to the recession (as is the case in most other states), and successive rounds of expenditure reductions and tax and fee increases have been required. For example, earlier this year Governor Nixon was forced to make an additional $172 million reduction in the state budget, with most of the reduction made in state aid to public

universities.[12] The state government revenue losses resulting from the RES total more than five times this reduction in the state budget.

It is also noteworthy that the Governor stated the budget reduction was necessary, in part, to free up $50 million required for disaster assistance in Joplin and flood-damaged southeastern Missouri.[13] The revenue losses from the RES are more than 17 times as large as these funds required for disaster assistance.

More generally, the Missouri state government faces serious, continuing fiscal problems. For example:

- The state's revenue decline between FY 2009 and FY 2010 was the largest sustained decline since the Great Depression of the 1930s. Further, FY 2011 revenues of $7.2 billion were $828 million less than FY 2008 revenues, and were even less than the $7.3 billion collected in FY 2006.[14]
- The state originally passed a budget of $23.8 billion in spending for FY 2012 (July 2011 through June 2012) and $23.2 billion in projected revenues, thus projecting a $600 million shortfall – although independent analysts estimated that the budget shortfall was nearly $1 billion.[15]
- Missouri's revenues are currently falling short of what is required to meet budget requirements, increasing 1.2 percent through October 2011 compared with the same point in the previous fiscal year, whereas state budget director Linda Luebbering estimates that revenues need to increase two percent to balance the budget.[16]
- A comprehensive survey of state budgets found that Missouri confronts an $850 million budget shortfall for FY 2013 – 10.7 percent of the state's FY 12 budget.[17]
- Governor Nixon is asking five state universities to consider lending the state more than $100 million next year to help balance the state's budget, a proposal that is drawing criticism from key legislators displeased with both its secrecy and its impact.[18]

[12]Jason Hancock, "Jay Nixon Cuts Millions From State Budget," *St. Louis Post-Dispatch*, June 11, 2011.
[13]Ibid.
[14]Tom Kruckemeyer, *Missouri General Revenue Report, First Quarter FY 2012,* The Missouri Budget Project, October 24, 2011.
[15]Brian R. Hook, "Missouri Could Face Budget Shortfall of $1 Billion in 2012," http://missouri.watchdog.org, August 6, 2010.
[16]"Missouri Revenue Falling Short of Budget," *Businessweek*, November 3, 2011.
[17]Elizabeth McNichol, Phil Oliff, and Nicholas Johnson, "States Continue to Feel Recession's Impact," Center on Budget and Policy Priorities, June 17, 2011.
[18]"Nixon Considers Asking 5 Missouri Universities to Lend Money to State," *St. Louis Post-Dispatch*, December 17, 2011.

In sum, the fiscal impacts on the Missouri state and local governments would be twofold:

- First, all levels of government would experience very large increases in their electricity bills – their bills cold nearly double
- Second, and much more devastating, total state and local government tax revenues would decrease by nearly $2 billion

However, the fiscal impact on Missouri state and local governments will be even worse for, at the same time their electricity expenditures are increasing and their tax revenues decreasing, the economic impacts of the RES will place further burdens on state and local government services. The precise costs of these cannot be determined, but they will be significant. For example:

- The RES will cause as many as 200,000 Missourians to lose their jobs, and this will increase demand for government resources for unemployment compensation, joblessness assistance, retraining, etc.
- The RES will increase "fuel poverty" in Missouri and will thus place demands on government energy assistance, and health and welfare services
- Inability to pay utility bills is the second leading cause of homelessness (after domestic abuse), and increased homelessness will place additional strains on government resources.[19]

The bottom line is that the fiscal impact of the proposed RES would be very serious for Missouri state and local governments.

Note: The Missouri State Auditor's Office estimated that the direct cost to state governmental entities of the 2008 Proposition C would be about $400,000.[20] In reality, the total cost to state governmental entities of the proposed RES initiative would be more than 2,000 times larger than this, and the total cost to all state and local government entities would be more than 4,000 times larger.

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[19]The Colorado Statewide Homeless Count, "Colorado Statewide Homeless Count, Summer 2006: Final Report," February 2007.
[20]Missouri State Auditor's Office, op. cit.

II. THE PROPOSED MISSOURI RES INITIATIVE

The proposed Missouri initiative states that:[21]

"In meeting, its obligations to provide energy services to retail customers in this state, each electrical corporation shall acquire and use energy generated from renewable energy resources in amounts equal to the following percentages of its total retail electric sales:

(a) No less than five percent for calendar years 2014 through 2016;

(b) No less than ten percent for calendar years 2017 through 2019;

(c) No less than fifteen percent for calendar years 2020 through 2022;

(d) No less than twenty percent for calendar years 2023 through 2025; and

(e) No less than twenty-five percent for each calendar year beginning in 2026 and thereafter.

[21]"This report assumes that electric utilities will recover costs incurred to fully implement the mandates called for in the proposed § 393.1030.1 according to all applicable legal standards.

III. MISSOURI ELECTRICITY

At present, electricity generation in Missouri is provided overwhelmingly by coal. As shown in Figure III-1, coal provides over 80 percent of the state's electricity while renewables proves less than one percent.[22] The major impact of this initiative would be thus to shift about 25 percent of Missouri's electricity generation from coal to renewables within 15 years.[23]

This will result in very large increases in Missouri electricity costs and rates, since renewables are, by far, the most expensive source of electricity generation. Figure III-2 shows the levelized cost of electricity (LCOE)[24] from different generation sources and illustrates that:

- Biomass is more than three times as expensive as coal
- Wind is four to five times as expensive as coal
- Solar thermal is six to seven times as expensive as coal
- Solar photovoltaics is more than 10 as expensive as coal

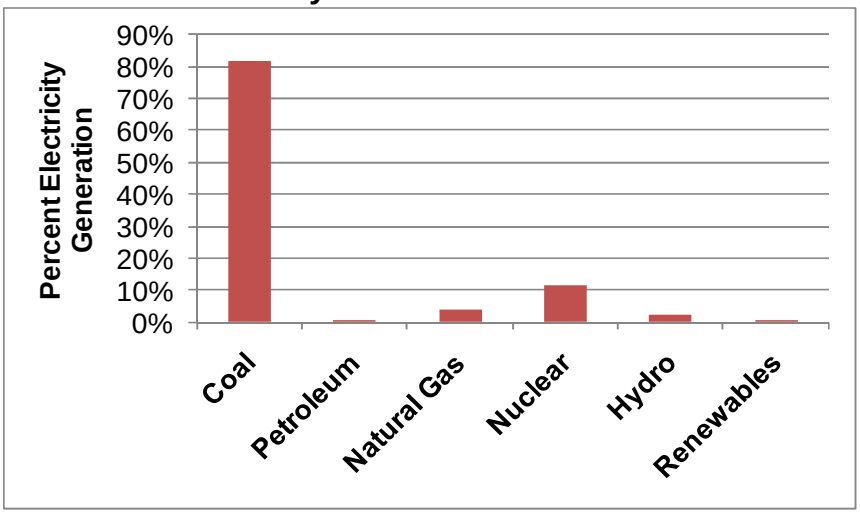
Thus, replacing 25 percent of the least expensive electricity generation source (coal) with the most expensive (renewables) will inevitably cause Missouri electric rates to increase dramatically.

[22]U.S. Energy Information Administration, 2011.

[23]The RES would apply exclusively to investor owned utilities (IOUs) in Missouri, which account for about 75 percent of total electricity generation in the state. However, nuclear power accounts for 12 percent of Missouri electricity and hydroelectric for two percent, and it is unlikely that the RES will displace significant quantities of either of these electricity generation sources. Therefore, coal-fired electricity will represent virtually all of the electricity that would be replaced by renewables under the RES.

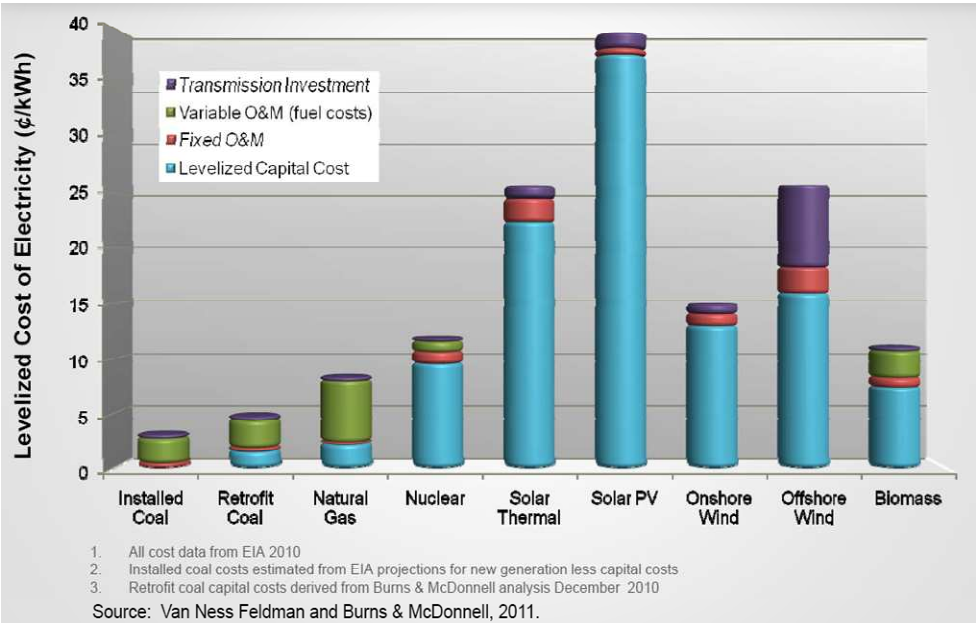
[24]The LCOE is the constant dollar electricity price that would be required over the life of a plant to cover all operating expenses, payment of debt, accrued interest on initial project expenses, and the payment of an acceptable return to investors. LCOE is comprised of three components: Capital charge, 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. 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 and utilities.

Figure III- 1
Electricity Generation in Missouri



Source: U.S. Energy Information Administration.

Figure III-2
Levelized Costs of Electricity by Generation Sources



Missouri will likely experience a series of significant step increases in rates as the increasingly stringent RES mandates take effect in 2014, 2017, 2020, 2023, and 2026. The end result is that, if the RES is enacted, within 15 years electricity rates in Missouri would be much higher than they would be in the absence of the RES.

IV. MISSOURI RATE IMPACTS OF THE RES

As noted in section II, the proposed RES would require that in Missouri renewable energy resources provide the following portions of the state's electricity:

- At least five percent for the years 2014 through 2016
- At least 10 percent for the years 2017 through 2019
- At least 15 percent for years 2020 through 2022
- At least 20 percent for the years 2023 through 2025
- At least 25 percent for the year 2026 and thereafter

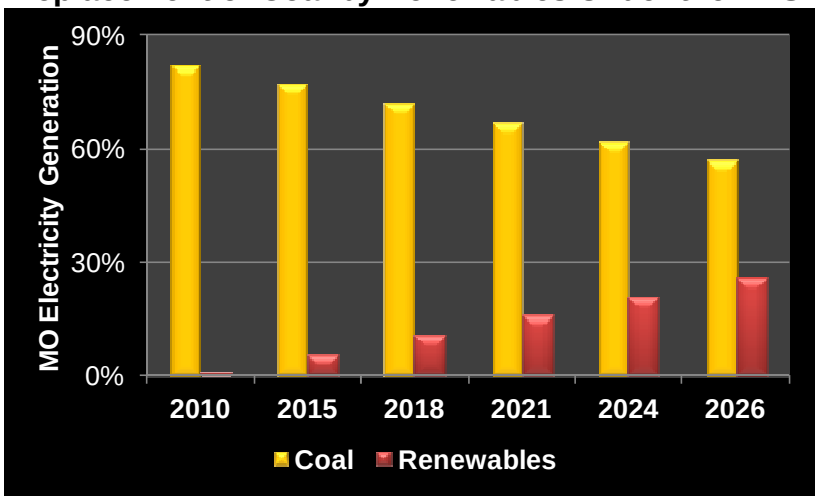
At present, as discussed in Section III, 82 percent of Missouri's electricity is derived from coal and less than one percent is derived from all renewables combined. Thus, as illustrated in Figure IV-1, the major impact of the RES would be to force over a 14 year period a major shift in Missouri electricity generation from coal to renewables;[25] for example:

- In 2010, 82 percent of Missouri electricity generation was from coal and less than one percent was from renewables
- In 2015, under the RES, 77 percent of Missouri electricity generation would be from coal and five percent would be from renewables
- In 2021, under the RES, 67 percent of Missouri electricity generation would be from coal and 15 percent would be from renewables
- In 2026, under the RES, 57 percent of Missouri electricity generation would be from coal and 25 percent would be from renewables

Thus, the major impact of the RES would be to reduce the percentage of electricity in Missouri generated by coal from its current 82 percent to 57 percent by 2026 and to increase the percentage of electricity in Missouri generated by renewable coal from the current less than one percent to 25 percent by 2026. Since the costs of electricity generation from renewables are from three to 10 times more expensive than the cost of electricity generation from coal, the inevitable result will be a rapid, dramatic increase in Missouri electricity rates.

[25]See the discussion in footnote 21.

Figure IV-1
Replacement of Coal by Renewables Under the RES



Source: Management Information Services, Inc.

The precise magnitude of the rate increases will be determined by the detailed mix of renewable sources and their corresponding LCOEs. This can be illustrated conceptually by the simple formula, assuming generation sources other than coal and renewables are held constant:

$A = f\ (BC + D_1E_1, + D_2E_2, + \ldots D_nE_n)$

Where:

A is the average LCOE
B is the coal LCOE
C is the percent electricity generation provided by coal
D_1 is the LCOE of renewable source 1
E_1 is the percent electricity generation provided by renewable source 1
D_2 is the LCOE of renewable source 2
E_2 is the percent electricity generation provided by renewable source 2
D_n is the LCOE of renewable source n
E_n is the percent electricity generation provided by renewable source n
Renewable sources 1 through n are those specified in the RES: Wind, solar, biomass, etc.

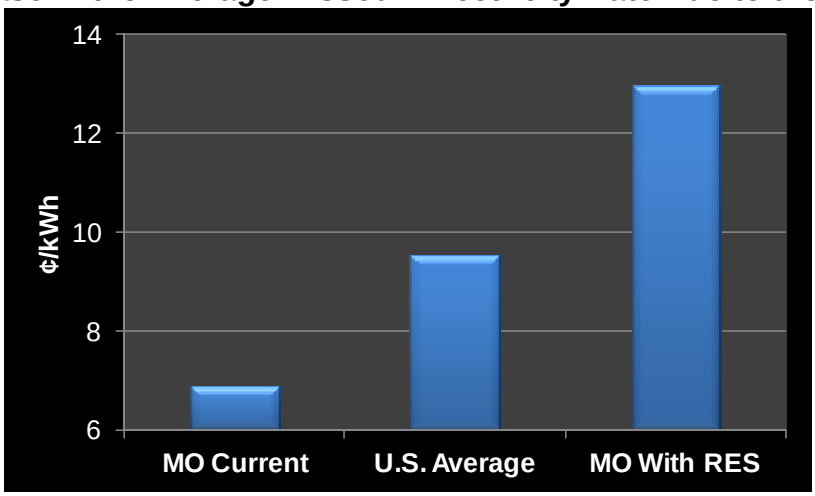
Basically, Missouri electricity rates will increase because the lowest cost electricity generation source – coal – is being displaced by electricity generation sources with much higher costs – renewables. That is, existing coal generation, which generates electricity at about 4¢/kWh will, under the RES, be replaced by renewable energy generation sources that are orders of magnitude more expensive (see Figure III-

2. The inevitable result will be, of necessity, very large increases in Missouri electricity rates for all ratepayers.

To derive an estimate of the magnitude of the rate increase when the RES would be fully implemented by 2026, we assumed that most of the mandated 25 percent renewable generation would be from wind and that much smaller shares would be derived from solar, biomass and the other renewable sources.

The precise magnitude of the rate increase depends on the detailed distribution of the renewable generation among the different renewable energy sources. Nevertheless, given the huge disparity in generation costs between coal and all of the renewable sources, our estimates indicate that a 25 percent shift in generation by 2026 from coal to renewables would increase the average Missouri electricity rate by about 80 – 90 percent. That is, the net effect of implementing the RES would be to nearly double Missouri electricity costs and rates, and Missouri would change from having average electric rates that are 30 percent less than the U.S. average to rates that are 40 percent higher than the U.S. average – Figure IV-2.

Figure IV-2
Increase in the Average Missouri Electricity Rate Due to the RES



Source: U.S. Energy Information Administration and Management Information Services, Inc.

Even this cost estimate may be conservative and optimistic, since experience has shown that actual renewable energy costs are often significantly underestimated. For example:

- A recent study found that Ontario, Canada, ratepayers could end up paying some of the highest costs for electricity in the developing

world because providing wind and solar energy will cost about 40 per cent more than the government estimated.[26]

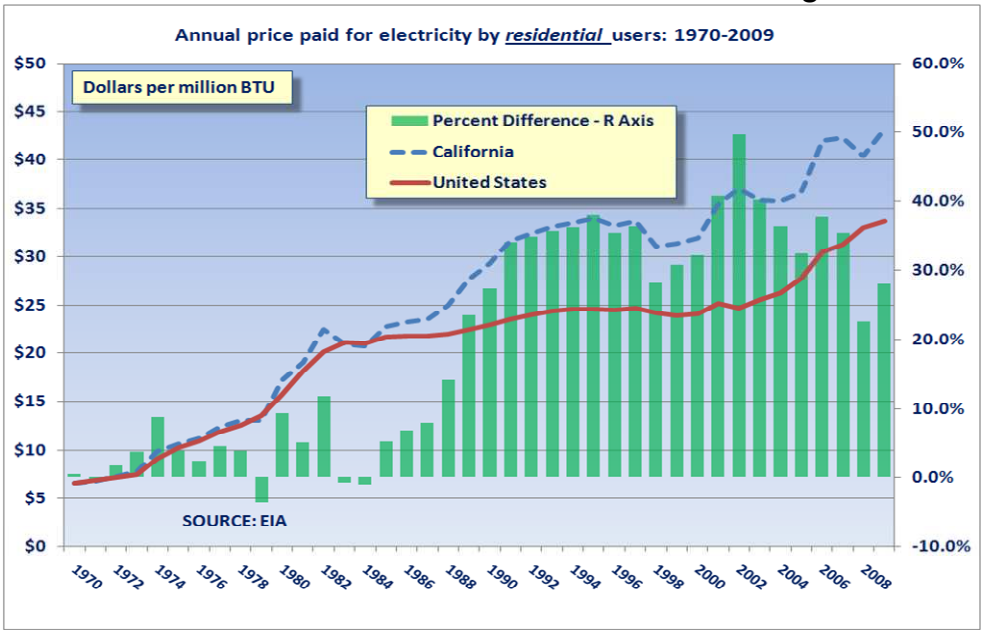
- A study for Massachusetts found that the state's major green energy mandates, programs, and incentives will cost ratepayers $10 billion over the next decade – much more than the state government originally estimated.[27]
- An investigation by *The Oregonian* found that Oregon state officials deliberately underestimated the cost of renewable energy programs and subsidies, with the result that they are 40 times more expensive than lawmakers were told – at the same time that voters were being asked to raise income taxes because the state budget did not have enough to pay for schools and other programs.[28]
- The cost of building transmission in Texas to bring wind power to load centers has already escalated nearly 40 percent, to $6.8 billion, from the initial estimate and "construction costs continue on an upwards spiral."[29]
- The city of Durango, Colorado powered its government buildings for two years by purchasing electricity from nearby wind farms, but found that it could no longer afford producing wind power and saved the city $45,000 by reverting back to coal-fired electricity. According to the city manager, "It's very hard for us to lay off an employee to justify green power. Those are the trade-offs you have to face."[30]

[26]Maria Babbage, "Cost of Green Energy 40% Higher Than Government Estimates, Study Says," *Toronto Star*, October 17, 2011.
[27]Paul Bachman, Benjamin Powell, David Tuerck, and Rick Weber, *The High Cost of Green Energy Programs in Massachusetts*, The Beacon Hill Institute at Suffolk University, Boston, Massachusetts, October 2010.
[28]Harry Esteve, "Oregon 'Green' Tax Breaks Cost More Than Predicted," *The Oregonian*, November 2, 2009.
[29]Richard A. Kessler, Texas Transmission Buildout to Cost 38% Over First Estimate, www.rechargenews.com/energy/wind, August 27, 2011.
[30]Alan Gomez, "Going Green Can Cost Too Much Green," *USA Today*, May 4, 2009, and Associated Press, "Durango Goes to Windmills," Denver Post, April 13, 2007.

V. LESSONS FOR MISSOURI OF THE CALIFORNIA EXPERIENCE

The relative magnitude of the impact of the RES that we estimate is corroborated by the California experience over the past three decades. In brief, since the late 1970s, California has followed energy and environmental policies that have resulted in electricity prices rising higher and more rapidly than the national average – see Figures V-1, V-2, and V-3.[31] The result is that, at present, California's electricity rates are much higher than the national average and than those of surrounding states – Figure V-4.[32] California uses little coal to generate electricity, and there is a strong correlation between a state's use of coal and its electricity rates – Figure V-5.

Figure V-1
California Residential Electricity Rates Have Increased Much Faster Than the U.S. Average



[31] U.S. Energy Information Administration, "Average Price of Electricity by State, 1990 – 2010," April 2011.
[32] U.S. Energy Information Administration, "Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State," *Electric Power Monthly*, 2011.

Figure V-2
California Industrial Electricity Rates Have Increased Much Faster Than the U.S. Average

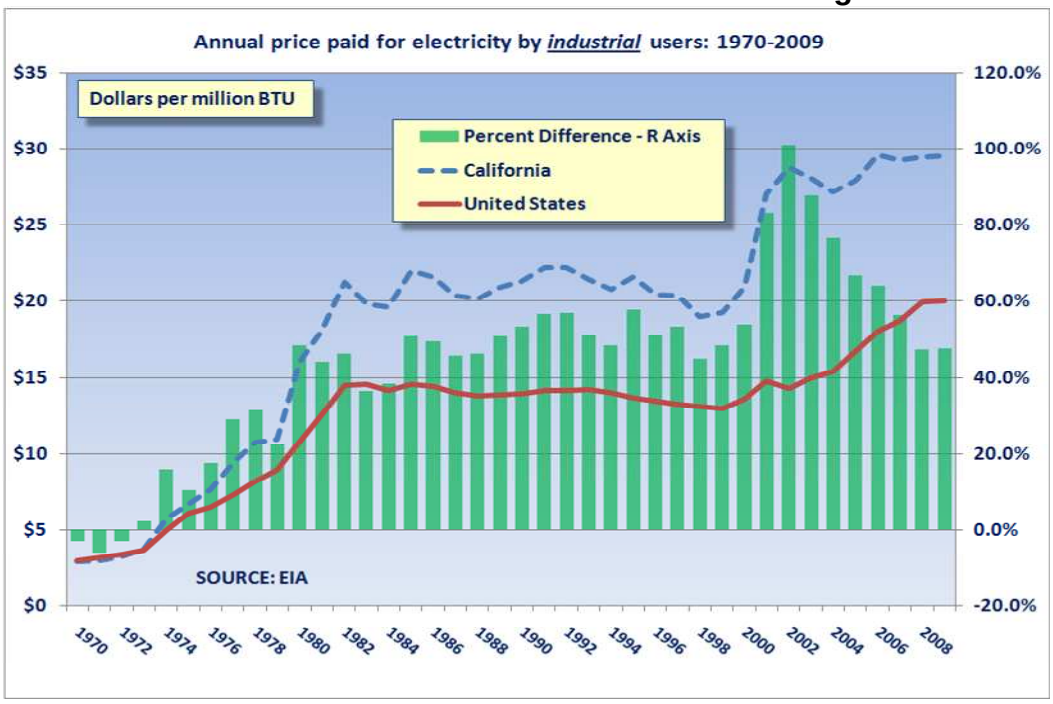


Figure V-3
California Commercial Electricity Rates Have Increased Much Faster Than the U.S. Average

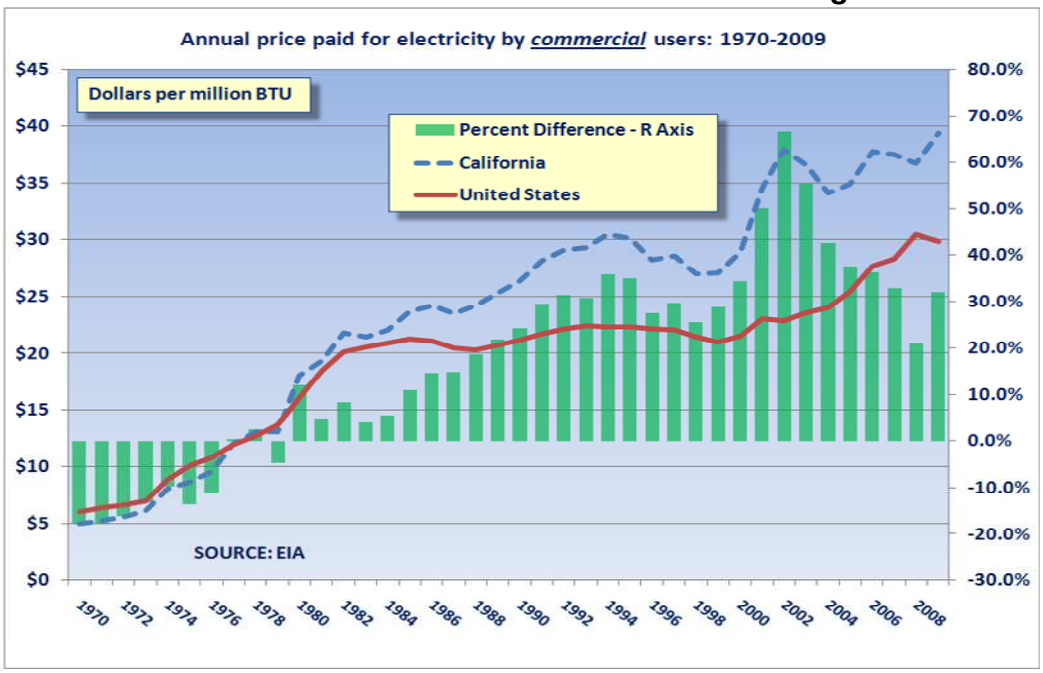
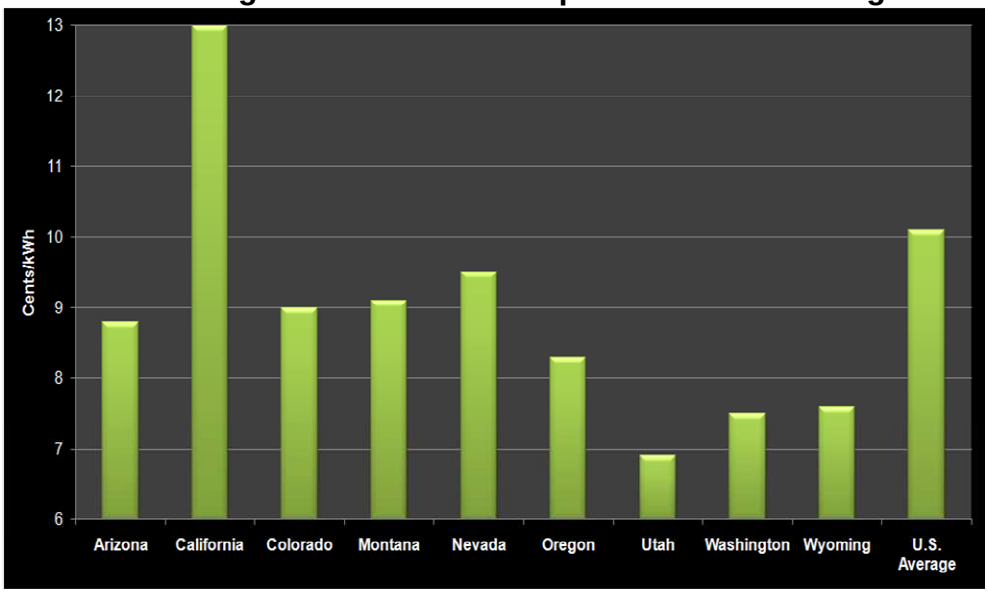
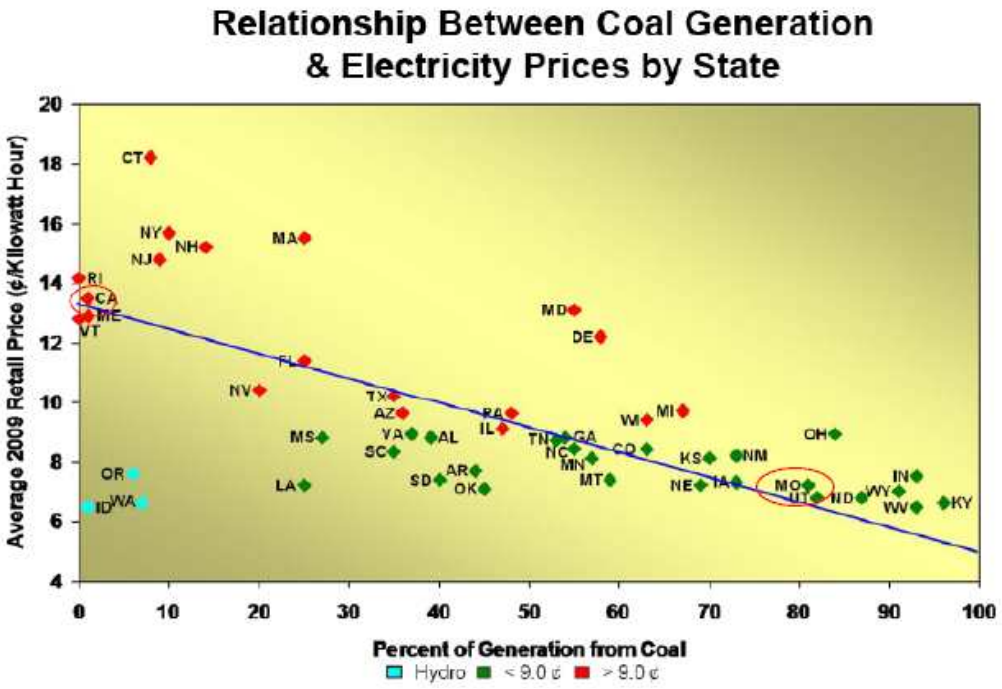


Figure V-4
California Average Electric Rate Compared to Surrounding States



Source: U.S. Energy Information Administration.

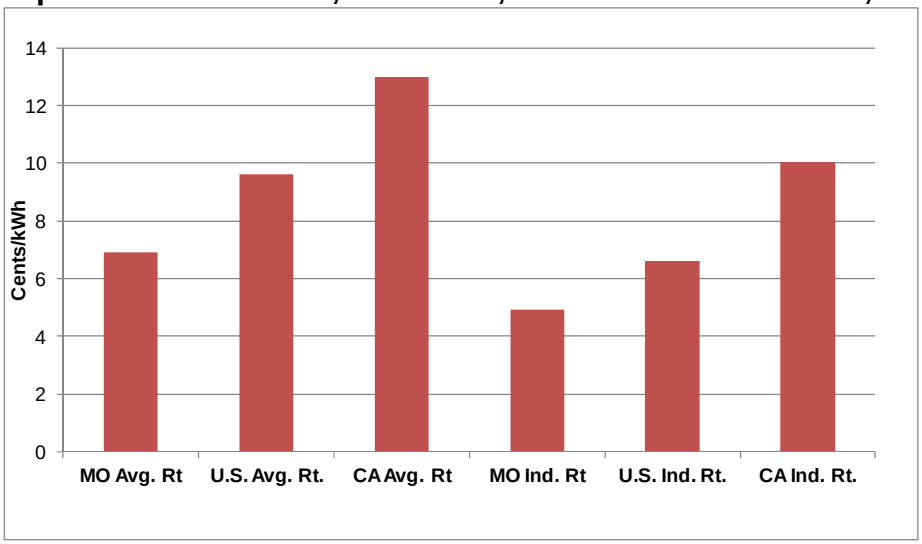
Figure V-5



Source: U.S. Energy Information Administration.

The implications for Missouri are evident in Figure V-6, which shows current California, Missouri, and U.S. average electric rates. It is seen that California's electricity rate is nearly twice that of Missouri and is 40 percent higher than the U.S. average – and California's industrial electricity rates are 50 percent higher than the U.S. average and nearly twice as high industrial electricity rates in Missouri.[33]

Figure V-6
Comparison of Missouri, California, and U.S. Electric Rates, 2010



Source: U.S. Energy Information Administration.

In California, the cumulative effects of misguided energy and environmental policies that have made electricity increasingly scarce and expensive have been devastating:

- As noted, California's electricity rates are much higher than the national average and are poised to increase even more in the near future due to renewables and environmental mandates[34]
- Job losses have been severe and continuing, and California's unemployment rate exceeds the national average[35]

[33]U.S. Energy Information Administration, "Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through May 2011 and 2010," 2011.
[34]A law enacted in April 2011 requires the state to obtain 33% of its electricity from renewables by 2020.
[35]The current (September 2011) unemployment rate in California is 11.9%, compared to the U.S. of 9.1% and the Missouri rate of 8.7%. See U.S. Bureau of Labor Statistics, "Employment Situation Summary," October 2011; U.S. Bureau of Labor Statistics, "Unemployment Rates for States, October 2011.

- There is a continuing, and increasing, exodus of industry and jobs out of California to other states with lower electricity costs – including Missouri (Exhibits V-1 and V-2)[36]
- California is currently experiencing the fastest rate ever recorded of companies leaving, including major firms such as Intel, eBay, McAfee, Toyota, DIRECTV, Northrop Grumman, Ryder, Unilever, Kaiser Aluminum, SAIC, Genentech, Hilton, and many others[37]
- California is losing businesses at a 3:1 ratio, and energy costs are cited as a major reason[38]
- Even Google and Facebook – poster children for Silicon Valley – are locating major facilities outside of California in states where electricity rates are lower[39]
- California companies already pay 50 percent more for electricity than in other states and expect costs to increase much more.

Exhibit V-1

[36]See references cited in footnotes 9 and 10.

[37]Seana Smith, "Companies Bid Farewell to California, FoxBusiness.com, October 20, 2010; Seiler, op. cit.; Jan Norman, "List Names 100 Companies Leaving California," *Orange County Register*, February 24, 2010; John Fund, "California Dreamin' -- of Jobs in Texas," *Wall Street Journal*, April 22, 2011; Jan Norman, "State Lost 47,000 employers in 2008," *Orange County Register*, December 12, 2009; Joseph Vranich, "California Business Departures Increasing -- Now Five Times Higher Than In 2009," Thebusinessrelocationcoach.com, June 20, 2011; Abbas P. Grammy, "Business Leaving California," www.csub.edu, March 21, 2011; Katherine Tam, "Even 'Green' Businesses Leaving California," *Contra Costa Times*, June 5, 2010; "Understanding California's Electricity Prices," op. cit.; Jan Norman, "69 More Firms Move Jobs, Facilities Out of California," op. cit.

[38]Joseph Vranich, "Record in 2010 for Calif. Companies Departing or Diverting Capital: 204 Four Times Last Year's Level," The Business Relocation Coach, January 26, 2011;

[39]Antone Gonsalves, "Facebook Breaks Ground on Oregon Data Center," *InformationWeek*, January 22, 2010; "Coal Fired Power in Oregon," portlandwiki.org, June 28, 2011; "Welcome to Googleville: America's Newest Information Superhighway Begins on Oregon's Silicon Prairie," *Willamette Week Newspaper*, July 17, 2010; "Google Picks N.C. for $600 Million Data Center, up to 210 Jobs," *WRAL Tech Wire*, January 19, 2007; Patrick Thibodeau, "Apple, Google, Facebook Turn N.C. Into Data Center Hub," *Computerworld*, June 3, 2011; Rich Miller, "It's Official: Facebook is Oregon's Company X," *Data Center Knowledge*, January 21, 2010.

WHERE DO CALIFORNIA COMPANIES GO?

- Genentech to **Oregon**: Ind. elec. rate ~ 70% CA
- Adobe Systems to **Utah**: Ind. elec. rate ~ ½ CA
- Toyota to **Texas**: Ind. elec. rate ~ ½ CA
- Redbarn Pet Products to **Kansas**: Ind. elec. rate < 60% CA
- Unilever to **Missouri**: Ind. elec. rate < 60% CA
- First American Corp. to **Arizona**: Ind. elec. rate < 60% CA
- Amonix to **Nevada**: Ind. elec. rate ~ 70% CA
- DIRECTV to **Iowa**: Ind. elec. rate ~ ½ CA
- InsulTech to **Wyoming**: Ind. elec. rate ~ 60% CA

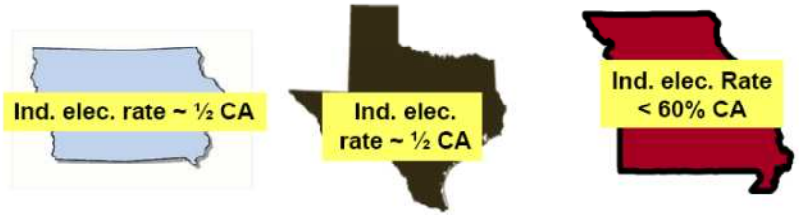


Exhibit V-2

CALIFORNIA JOB EXODUS

Examples of job relocations out of CA:

- **Intel**: 1,000 high-tech factory jobs to Oregon
- **Adobe** Systems: ~ 300 high tech jobs to Utah
- **Toyota**: 4,700 factory jobs to Texas & Canada
- **Abraxis Health**: 200 jobs to Arizona
- **LegalZoom.com** Inc.: 600 jobs to Texas
- **Northrop Grumman**: 300 jobs to Virginia
- **Redbarn Pet Products**: 200 jobs to Arkansas
- **Structured Solutions** Inc.: 200 jobs to Nebraska
- **Amonix** Inc.: 300 jobs to Nevada
- **Ditech**: 300 jobs to Pennsylvania
- **Edwards Lifesciences**: 1,000 high-tech jobs to Utah
- **Genentech**: 200 high-tech jobs to Oregon
- **Facebook**: 200 jobs to Texas
- **Rockwell Collins**: 600 jobs to Oregon & Iowa

And, with respect to California electricity, the worst is to yet to come:[40]

[40]Robert Peltier, "Turning Gold into Lead," *POWER Magazine*, June 1, 2011; "Understanding California's Electricity Prices," Bloomenergy," April 2011; "Business Leaving California in Record Numbers – a Message to CARB on AB 32 Implementation From SCLC," Southern California Leadership Council, October 28, 2010; Sanjay B. Varshney and, Dennis H. Tootelian, "Cost of AB 32 on California Small

- California electric rates will increase further due to state's energy and environmental legislation
- The California Public Utilities Commission forecasts that electric rates will increase five to seven percent annually through 2020
- The California Global Warming Solutions Act requires GHG caps starting in 2012
- California has mandated a 33 percent renewable portfolio standard by 2020
- California natural gas prices are projected to double by 2020

The California Manufacturers and Technology Association notes that California commercial electric rates are already 50 percent higher than in the rest of U.S. However, a law enacted April 12, 2011 requires utilities to obtain 1/3 of their power from renewable sources within nine years. Thus "The stage is set for California to lose additional companies and jobs in the future because the business environment worsened when Governor Brown signed law requiring utilities to obtain 1/3 of California electricity from renewable sources.[41] Such new burdens set potentially overwhelming obstacles to California companies as they try to meet competition based in other states and in foreign nations."[42]

Businesses," report prepared for the California Small Business Roundtable by Varshney & Associates, June 2009.

[41]Daniel B. Wood, "Renewable Energy: Will New Law Help or Hurt California Economy? *Christian Science Monitor*, April 13, 2011.

[42]John Seiler, "California Business Exodus Accelerates," CalWatchDog, April 14, 2011; Jan Norman, "69 More Firms Move Jobs, Facilities Out of California," *Orange County Register*, April 15, 2011; "CA State Governor Signs Legislation Making State's Renewable Energy Mandate Most Stringent in Nation," *JD Journal*, April 13, 2011.

VI. ECONOMIC IMPACTS IN MISSOURI

VI.A. Electricity Price Impacts

Electricity price increases act like a tax increase, reducing incomes of energy consumers and ratepayers.[43] The supply-side impacts from price increases depress business development and economic output, and there will be adverse affects on the Missouri economy and jobs:

- First, businesses in Missouri will face increased competitive disadvantages
- Second, some businesses in Missouri will leave the state
- Third, new businesses will not locate in Missouri
- Fourth, electric customers will have less money to spend

Even worse, it is a tax increase for which people receive no benefit: No road or infrastructure improvements are made, no schools are built, no police or firefighters are hired, etc.

It is worth noting that Missouri, like many other states, has been a beneficiary of the massive company and job exodus from California. As noted, California's commercial electricity rates are nearly twice those of Missouri's, while California's industrial electricity rates are more than twice those of Missouri's. It is thus not surprising that some of the companies leaving California are relocating to Missouri; for example:

- Consumer goods giant Unilever closed its personal care manufacturing facility in Industry, California, and transferred production to Unilever's manufacturing facilities in Jefferson City, Missouri. The production involves some of the company's most iconic personal care brands, including Axe, Suave, and Dove, which are supplied throughout the North American market.
- Soy Labs LLC closed its facilities in Fairfield, California, and relocated to the Plant Science Center in Mexico, Missouri. Soy Labs conducts cutting-edge research and develops manufacturing processes for ingredients and finished products for nutraceuticals, functional foods, and plant biotechnology industries.
- Most recently, and perhaps most ironically, Nordic Windpower USA, a wind turbine manufacturer based in Berkeley, California, is relocating to Kansas City, Missouri. The move – by a "green" company away from Berkeley, one of the purportedly "greenest"

[43] See Roger H. Bezdek, "Long Term Prospects For Fossil Fuels: Challenges and Uncertainties," Keynote presented at the 2011 American Association of Petroleum Geologists Meeting, Oklahoma City, Oklahoma, October 2010.

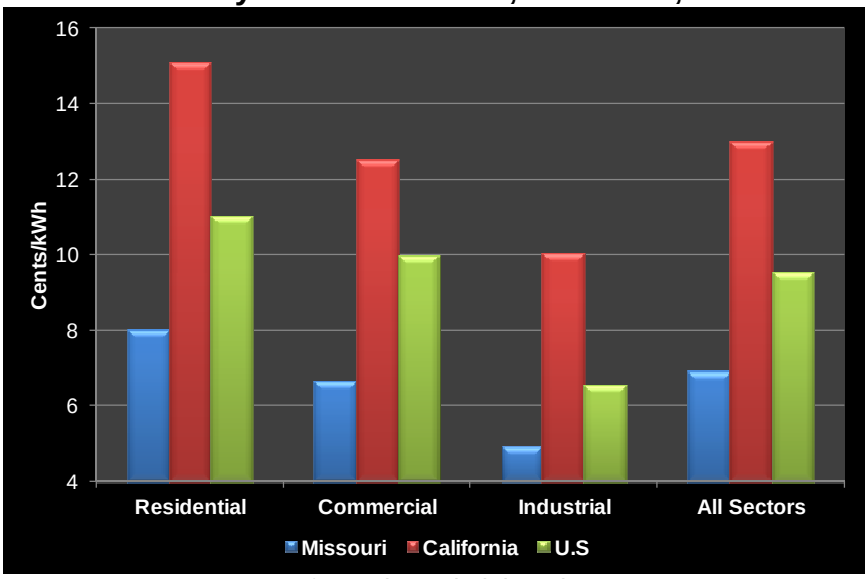
communities in the U.S. -- will involve a capital investment of $16 million and the creation of more than 200 local jobs over the next six years.

It is important to realize that, if Missouri's electricity rates increase significantly, relocation of companies from California (or elsewhere) to Missouri to take advantage of lower electricity costs will cease. Missouri will thus forfeit a key competitive advantage it currently possesses.

California's experience corroborates the estimates derived in Section IV of the likely impact in Missouri of enacting the RES. As shown in Figure VI-1, California electricity rates are much higher than those in Missouri and the U.S. averages. In 2010:

- California's residential electricity rate was 15.09¢/kWh, compared to 8.02¢/kWh in Missouri and a U.S. average of 11.02¢/kWh
- California's commercial electricity rate was 12.54¢/kWh, compared to 6.67¢/kWh in Missouri and a U.S. average of 9.972¢/kWh
- California's industrial electricity rate was 10.02¢/kWh, compared to 4.92¢/kWh in Missouri and a U.S. average of 6.57¢/kWh
- California's average electricity rate for all sectors was 12.96¢/kWh, compared to 6.90¢/kWh in Missouri and a U.S. average of 9.55¢/kWh

Figure VI-1
Comparative Electricity Rates: Missouri, California, and the U.S., 2010

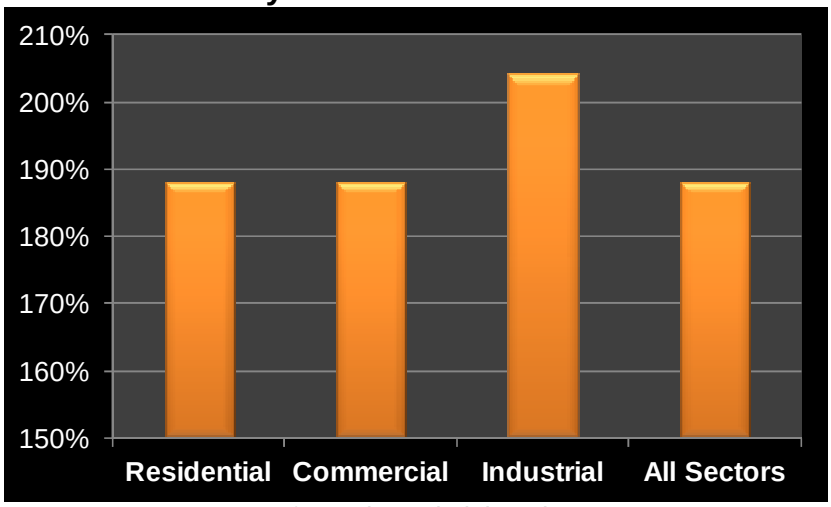


Source: U.S. Energy Information Administration.

As shown in Figure VI-2, California electricity rates are nearly twice as high as those in Missouri. In 2010:

- California residential and commercial electricity rates were 88% higher than those in Missouri
- The California industrial electricity rate was 104% higher than that in Missouri
- The California average electricity rate for all sectors was 88% higher than that in Missouri

Figure VI-2
California Electricity Rates as a Percent of Missouri Rates



Source: U.S. Energy Information Administration.

This tends to confirm the estimates derived here that enactment of the proposed RES in Missouri will increase the state's electricity rates to levels where they approach those currently existing in California. As estimated, Missouri's electricity rates would nearly double.

VI.B. Economic Effects of Energy Prices

Energy and energy prices – specifically electricity and electricity prices -- matter to the economy and, in general, more abundant, efficient, and less expensive electricity is desirable and preferred and provides significant economic and jobs benefits.[44]

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

Electricity is a mainstay of the U.S. economy and a critical factor of production, so this is straightforward and noncontroversial.[45]

To quantify the relationship between electricity prices and the economy, we utilized the elasticity of GDP with respect to electricity prices. Extensive review of the literature indicates that a reasonable long run value for this elasticity is about -0.10 – see the Appendix. This indicates that a ten percent increase in electricity prices will result in a decrease in GDP (or GSP) of one percent. 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.[46] In fact, it is a conservative estimate.[47]

There is a quantifiable relationship between economic activity and jobs – between the level of GDP/GSP and jobs. Basically, GDP and jobs are closely, positively correlated.[48]

The effects on other Missouri economic parameters (tax revenues, manufacturing output, etc.) are estimated on the basis of the GSP impacts. Impacts on jobs and unemployment rates were estimated using Missouri employment data; impacts on tax revenues were estimated using Missouri tax and tax rate data; impacts on specific population groups (low-income, elderly, minorities) can be estimated using Missouri demographic and income data; and so forth.[49]

The salient point is that existing coal plants produce inexpensive electricity and replacing them with much higher cost renewable facilities will, inevitably, cause electricity costs and rates to increase significantly.[50] On the basis of the estimated

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

[46]See the Appendix.

[47]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.

[48]This is relatively noncontroversial. We assume that the relationship is linear, but changes over time as productivity increases: Increasing the number of jobs created per billion dollars of GDP of GSP implies slower productivity growth, while decreasing the number of jobs created per billion dollar of GDP implies more rapid productivity growth. See 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.

[49]For example, 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.

[50]All indications are that new builds will generate LCOEs that could be orders of magnitude higher than LCOEs from existing coal plants.

derived in Section III, as corroborated by the experience in California, by the time the full RES mandate goes into effect in 15 years, it is likely that average electric rates in Missouri will be nearly 90% higher than they would be in the absence of the mandate. Thus, for example, for ratepayers in the St. Louis area:[51]

- Average monthly residential bills could increase from about $70 per month to over $130 per month – an increase of more than $600 per year
- Average monthly commercial bills could increase from about $25,000 per month to nearly $48,000 per month – an increase of over $275,000 per year
- Average monthly industrial bills could increase from about $1.6 million per month to over $3.25 million per month – an increase of nearly $20 million per year

Overall, as illustrated in Figures VI-3 and VI-4, the impact on the Missouri economy would be devastating:

- Missouri would change from having electric rates that are 30 percent lower than the U.S. average to having rates that are nearly 50 percent higher than the U.S. average
- Missouri gross state product (GSP) would be reduced by $21 billion annually
- Nearly 200,000 annual FTE jobs would be lost[52]
- The jobs losses resulting from the would be more than 12 times as large as total 2010 Missouri job losses
- The Missouri unemployment rate could increase by more than 75 percent[53]
- Annual Missouri manufacturing output could be reduced by over $1 billion[54]

[51]These estimates are based on data from the St. Louis Regional Chamber and Growth Association "2010 Utility Bill Comparisons for Selected U.S. Cities: Electricity, Natural Gas, Water and Wastewater," 2011. Other data indicate that St. Louis average electric bills are significantly higher. For example, the City of St. Louis estimated that the average household electric bill in the city is about $125 – see Missouri State Auditor's Office, "Initiative Petition From Henry Robertson Regarding a Proposed Amendment to Chapter 393 of the Missouri Revised Statutes," Fiscal Note (08-12), February 11, 2008. If this is accurate, then the impact of the RES mandate would be to increase the average household electric bill by about $700 per year.

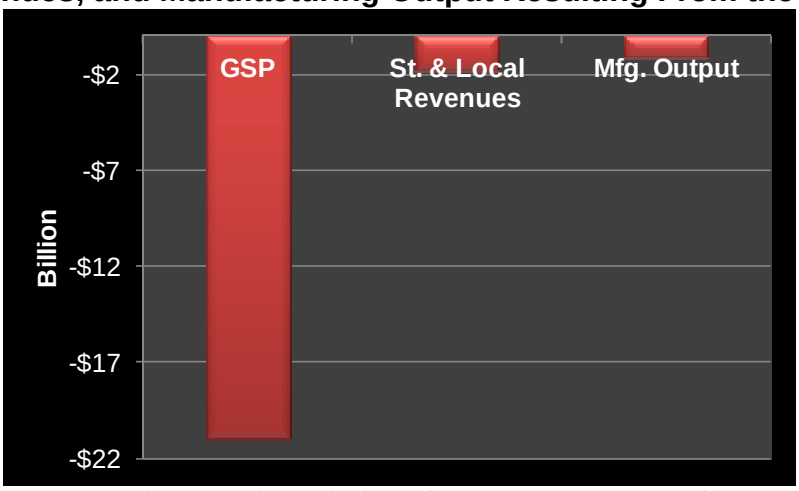
[52]An FTE (full time equivalent) job is defined as 2,080 hours worked in a year's time, and adjusts for part time and seasonal employment and for labor turnover. Thus, for example, two workers each working six months of the year would be counted as one FTE job.

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

[54]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

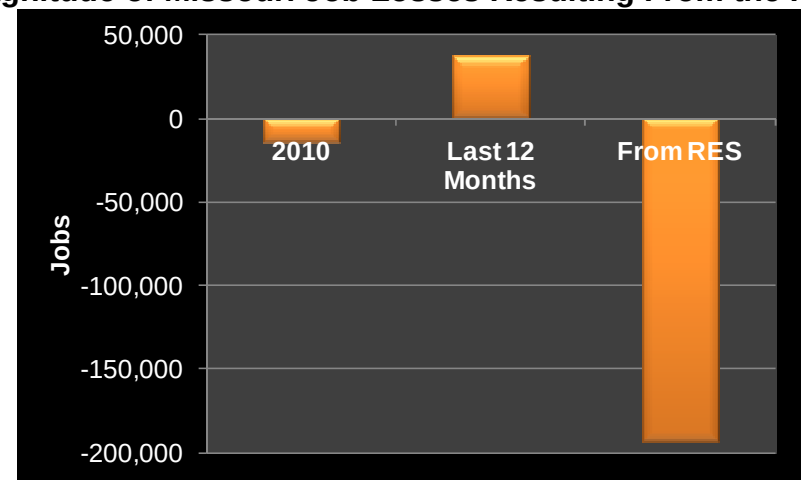
- Annual Missouri state and local government tax revenues could be reduced by nearly $2 billion

Figure VI-3
Annual Dollar Losses in Missouri GSP, State, and Local Government Revenues, and Manufacturing Output Resulting From the RES



Source: U.S. Bureau of Economic Analysis and Management Information Services, Inc.

Figure VI-4
Magnitude of Missouri Job Losses Resulting From the RES



Source: U.S. Bureau of Labor Statistics and Management Information Services, Inc.

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. This has been the experience in California; see Wood, op. cit. Also note that California industrial electricity rates are more than twice those in Missouri.

The impact on Missouri small businesses will be especially severe:

- These businesses are especially vulnerable to energy costs
- The RES will result in a "tax" on small businesses

The writing is on the wall (see California), and enactment in Missouri of the RES initiative will harm the state, harm industry, destroy jobs, harm state and local governments, and negatively impact those who can least afford it: Low income persons and the elderly living on modest fixed incomes. In Missouri, the electricity rate increases resulting from the RES will harm low income groups, the elderly, minorities, and those living on fixed incomes:

- They must allocate larger shares of their budgets for energy
- Rising energy costs have a serious negative effect on them

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.[55] 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.

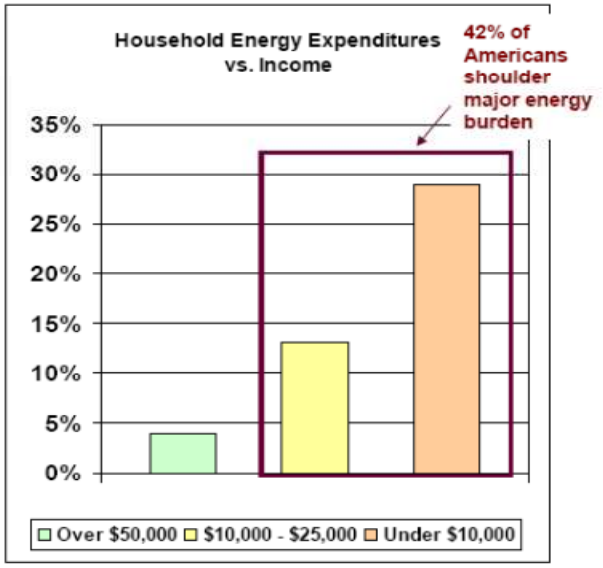
As shown in Figure VI-5:

- 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.

[55]The "energy burden" is defined as the percentage of gross annual household income that is used to pay annual residential energy bills. It is a widely used and accepted term and is officially defined in the *Code of Federal Regulations* and in numerous federal and state documents. Energy burden is an important statistic widely used by policy-makers in assessing the need for energy assistance and can be defined broadly as the burden placed on household incomes by the cost of energy, or more simply, the ratio of energy expenditures to household income. The CFR defines the residential energy burden as residential expenditures divided by the annual income of that household. See 10 CFR 440.3 - Definitions. - *Code of Federal Regulations* - Title 10: Energy - PART 440. Also see U.S. Department of Energy, *Buildings Data Energy Book*, 2.9.2., "Energy Burden Definitions," March 2011.

Figure VI-5



Source: American Association of Blacks in Energy.

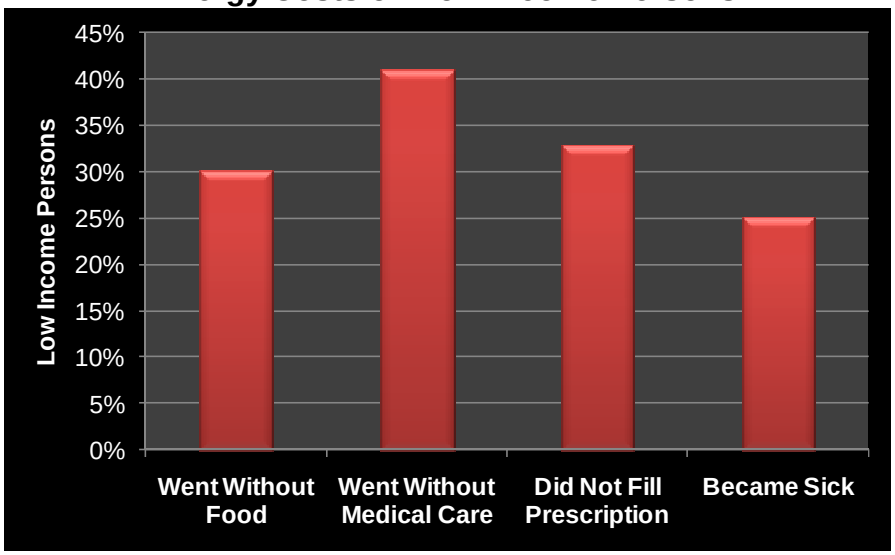
Cost increases for any basic necessity are regressive in nature, since expenditures for essentials such as energy consume larger shares of the budgets of low-income families than they do for those of higher-income families. Whereas higher-income families may be able to trade off luxury goods in order 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. Low-income households are often on a fixed income, and households at the lowest income level are often on a fixed income from Social Security, disability, or retirement. When energy prices escalate, their incomes do not keep pace, and they have little flexibility in their budgets to address increases in energy costs. 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.[56]

[56]For example, see the discussion in Joy Moses, *Generating Heat Around the Goal of Making Home Energy Affordable to Low Income Americans: Current Challenges and Proposed Solutions*, Center for American Progress, Washington, D.C., December 2008.

VII. HEALTH IMPACTS

As discussed, a major impact of the RES will be to significantly increase Missouri electricity costs and rates. This will make electricity more expensive and less affordable, especially to those with limited incomes, and being unable to afford energy bills can be harmful to one's health – as illustrated in Figure VII-1. Many people are forced to purchase less medicine when their utility bills increase. Other health hazards can occur if inside temperatures are too low or too high as a result of shut-offs or efforts to lower bills by reducing the use of heating and cooling equipment. Surveys have found that nearly one-third of households with incomes at or below 150 percent of poverty kept their homes at a temperature that was unsafe or unhealthy at some point during the year. Similarly, so also did 24 percent of those between 151 percent and 250 percent of poverty.[57]

Figure VII-1
Potential Health Impacts of Increased
Energy Costs on Low Income Persons



Source: National Energy Assistance Directors' Association.

Temperature extremes can be damaging to vulnerable populations, including the elderly, the disabled, and small children. These groups 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.[58] Young children are particularly at risk from extreme temperatures because their small size makes it

[57]Energy Programs Consortium and National Energy Assistance Directors' Association, "2008 Energy Costs Survey," June 2008.
[58]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.

difficult for them to maintain body heat.[59] Small children in households that are struggling to afford energy costs are more likely to be in poor health, have a history of hospitalizations, be at risk for developmental problems, and be food insecure. Compared with families receiving energy assistance, families who are eligible for such benefits but not receiving them are more likely to have underweight babies and 32 percent more likely to have their children admitted to the hospital.[60]

High energy burdens among older, low-and moderate-income households, expose them to the risks of going without adequate heating or cooling, frequently resulting in adverse health and safety outcomes, including premature death – Figure VII-1.[61] Unaffordable home energy undermines state and national priorities for seniors to age in place and avoid institutional care.[62] Households at the lowest income level are often on a fixed income from Social Security, disability, or retirement. When energy prices escalate, their incomes do not keep pace, and they have little flexibility in their budgets to address increases in energy costs.[63]

Further, the job losses and price increases resulting from the RES would reduce incomes as firms, households, and governments spend more of their budgets on electricity and less on other items, such as home goods and services. The loss of disposable income also reduces the amount families can spend on critical health care, especially among the poorest and least healthy.[64]

More generally, a substantial body of literature has developed examining the potential impacts of energy and environmental regulations on GDP, energy prices, income, and employment. It has been estimated, for example, that initiatives requiring expanded use of high cost energy alternatives such as renewables would increase the cost of energy to the point that per-capita income and employment rates would decrease in a quantitatively predictable manner. Assuming these estimates to be approximately correct, and given the epidemiological findings on socioeconomic status and health, it follows that policies such as the RES would bring about a net increase in

[59]Children's Sentinel Nutrition Assessment Program and Citizens Energy Corporation, "Fuel for Our Future: Impacts of Energy Insecurity on Children's Health, Nutrition, and Learning," September 2007.
[60]Ibid.
[61]The "energy burden" is defined as the percentage of gross annual household income that is used to pay annual residential energy bills.
[62]"Home Energy Costs: The New Threat to Independent Living for the Nation's Low-Income Elderly," *Journal of Poverty Law and Policy*, January-February 2008.
[63]Ibid.
[64]Randall Lutter and John F. Morrall. "Health-Health Analysis: A New Way to Evaluate Health and Safety Regulation", *Journal of Risk and Uncertainty*, 8(1), 43-66 (1994); Ralph L. Keeney, "Mortality Risks Induced by Economic Expenditures", *Risk Analysis* 10(1), 147-159 (1990); Krister Hjalte et al. (2003). "Health–health Analysis -- an Alternative Method For Economic Appraisal of Health Policy and Safety Regulation: Some Empirical Swedish Estimates," *Accident Analysis & Prevention* 35(1), 37-46; W. Kip Viscusi "Risk-Risk Analysis," *Journal of Risk and Uncertainty* 8(1), 5-17 (1994); see also Viscusi and Richard J. Zeckhauser, "The Fatality and Injury Costs of Expenditures", *Journal of Risk and Uncertainty* 8(1), 19-41 (1994).

population mortality.[65] Thus, a major impact of the RES, as compared to not implementing it, will be to increase Missouri mortality rates.

Socioeconomic-status findings demonstrate that changes in the economic status of individuals produce subsequent changes in the health and life spans of those individuals. Research shows that decreased real income per capita and increased unemployment have consequences that lead to increased mortality in U.S. and European populations. The research uses econometric analyses of time-series data to measure the relationship between changes in the economy and changes in health outcomes. Studies have found that declines in real income per capita and increases in unemployment lead to elevated mortality rates over a subsequent period of six years. For example, a study by the Joint Economic Committee of the U.S. Congress found that a one-percentage-point increase in the unemployment rate (e.g., from five percent to six percent) would lead to a two percent increase in the age-adjusted mortality rate.[66] The growth of real income per capita also shows a significant correlation to decreases in mortality rates (except for suicide and homicide), mental hospitalization, and property crimes.[67] The European Commission has supported similar research showing comparable results throughout the European Union.[68]

EPA has acknowledged that "People's wealth and health status, as measured by mortality, morbidity, and other metrics, are positively correlated. Hence, those who bear a regulation's compliance costs may also suffer a decline in their health status, and if the costs are large enough, these increased risks might be greater than the direct risk-reduction benefits of the regulation."[69]

In addition to EPA, the Office of Management and Budget, the Food and Drug Administration, and the Occupational Safety and Health Administration use similar methodology to assess the degree to which their regulations induce premature death amongst those who bear the costs of federal mandates.[70]

Upward trends in real income per capita represented the most important factor in decreased U.S. mortality rates over the past half-century. Also, the unemployment rate continued to bear a significant correlation to increased mortality rates, such that an increase the unemployment rate eventuates in a statistically significant increase in the

[65]Harvey Brenner, "Health Benefits of Low-Cost Energy: An Econometric Study," *Environmental Management*, November 2005, pp 28 – 33.
[66]Harvey Brenner, *Estimating the Effects of Economic Change on National Health and Social Well-Being*; Joint Economic Committee, U.S. Congress: Washington, DC, 1984.
[67]Ibid.
[68]See Harvey Brenner, *Estimating the Social Cost of Unemployment and Employment Policies in the European Union and the United States*; European Commission Dir.-Gen. for Employment, Industrial Relations, and Social Affairs: Luxembourg, 2000; Harvey Brenner, *Unemployment and Public Health in Countries of the European Union*; European Commission Dir.-Gen. for Employment, Industrial Relations, and Social Affairs: Luxembourg, 2003.
[69]U.S. Environmental Protection Agency, "On the Relevance of Risk Analysis to Policy Evaluation," August 16, 1995.
[70]Ibid.

age-adjusted mortality rate, estimated cumulatively over at least the subsequent decade.[71]

As discussed in section VI, implementation of the RES would cause an increase in the Missouri unemployment rate of about five percentage points. On the basis of the econometric and epidemiological research discussed above, we estimate that this would increase the Missouri mortality rate by approximately seven percent. Missouri deaths currently total about 55,000 annually.[72] We thus estimate that a major impact of the RES would be to increase deaths in Missouri (compared to not implementing the RES) by about 3,900 per year – or 39,000 over a decade. Below, we put these estimates into perspective by comparing them to the annual deaths in Missouri caused by major diseases and the populations of some major cities in Missouri.

The RES (compared to not implementing it) will increase the number of deaths in Missouri by about 3,900 per year. The relative magnitude of this increase is illustrated in Figure VII-2, which compares the annual deaths in Missouri resulting from the RES with the annual lives lost in the state to some of the leading causes of death.[73] This figure shows that implementation of the RES will have significant, negative impacts on Missouri mortality – impacts that are comparable to, or greater than, deaths caused by major diseases. For example, the number of annual deaths in Missouri attributable to the RES is:

- Significantly larger than the number of deaths from Stroke or from Respiratory Diseases
- More than twice as many as the number of deaths from Alzheimer's Disease or from Diabetes
- More than three times as many deaths as from Kidney Disease
- Nearly four times as many deaths as from traffic accidents
- More than four times as many deaths as from Breast Cancer

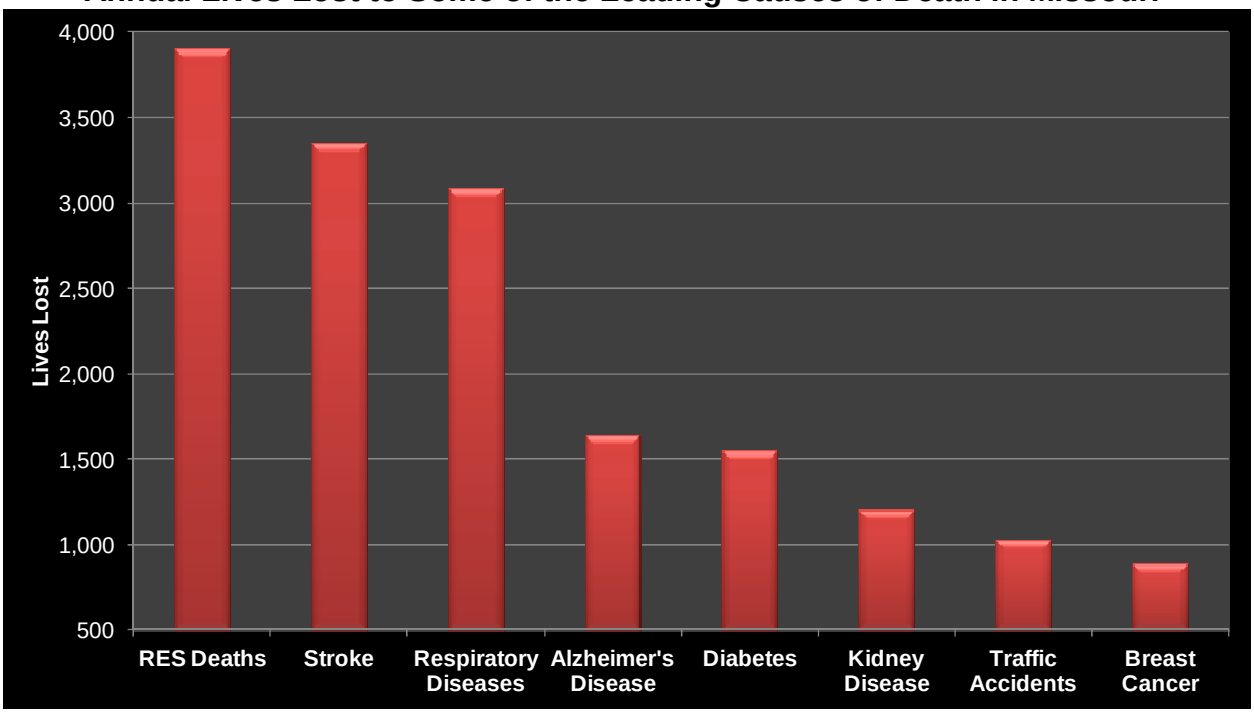
Second, over a decade the RES would increase deaths in Missouri (compared to not implementing the RES) by about 39,000. The relative magnitude of this number is illustrated in Figure VII-3, which compares the lives lost in Missouri over a decade due to the RES with the populations of some major Missouri cities.[74] This figure illustrates that the number of deaths attributable to the RES is:

- About 80 percent of the population of Joplin
- Nearly equal to the population of Jefferson City
- Larger than the populations of Cape Girardeau, Oakville, or University City

[71]"Health Benefits of Low-Cost Energy: An Econometric Study," op. cit.
[72]National Center for Health Statistics, 2011.
[73]Mortality estimates in Missouri from leading causes of death were obtained from National Center for Health Statistics, *NCHS State Profiles 2009*, 2010.
[74]City population data obtained from the U.S. Census Bureau.

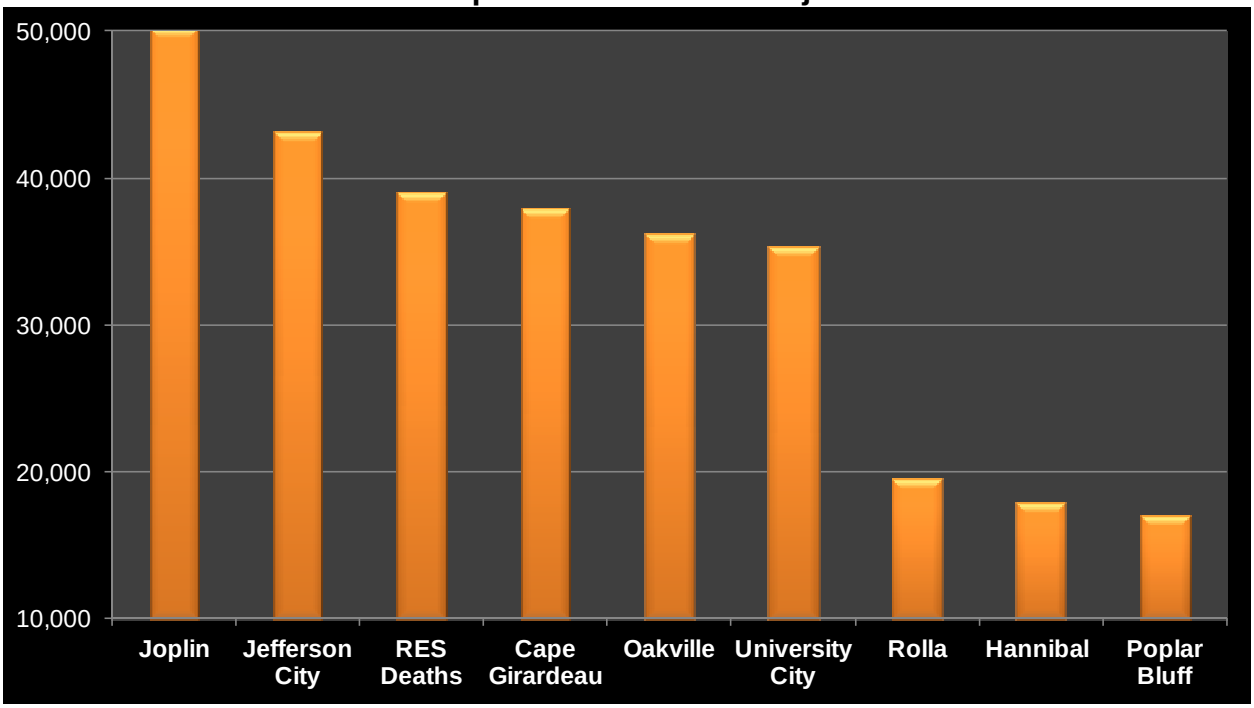
- Twice the population of Rolla
- More than twice the population of Hannibal or Poplar Bluff

Figure VII-2
Comparison of the Annual Lives Lost Due to the RES With the Annual Lives Lost to Some of the Leading Causes of Death in Missouri



Source: National Center for Health Statistics and Management Information Services, Inc.

Figure VII-3
Comparison of the Lives Lost Over a Decade Due to the RES With the Populations of Some Major Missouri Cities



Source: U.S. Census Bureau and Management Information Services, Inc.

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For more information, please visit the MISI web site at www.misi-net.com.

APPENDIX: REVIEW OF ELASTICITY ESTIMATES IN THE LITERATURE

Numerous studies have developed estimates of the elasticity of GDP with respect to energy and electricity prices. Examples of these are summarized in Table A-1, and include the following:

- In 2010, Lee and Lee analyzed the demand for energy and electricity in OECD countries. They estimated that the elasticities range between -0.01 and -0.19.[1]
- In 2010, Baumeister, Peersman, and Van Robays examined the economic consequences of oil shocks across a set of industrialized countries over time. They estimated that the elasticity was approximately -0.35.[2]
- In 2010, Brown and Hunnington employ a welfare-analytic approach to quantify the security externalities associated with increased oil use, which derive from the expected economic losses associated with potential disruptions in world oil supply. They estimated that the elasticity ranged between -0.01 and -0.08.[3]
- In 2009, Blumel, Espinoza, and Domper used Chilean data to estimate the long run impact of increased electricity and energy prices on the nation's economy.[4] They estimated that the elasticity ranged between -0.085 and -0.16.
- In 2008, in a study of the potential economic effects of peak oil, Kerschner and Hubacek reported elasticities in the range of -0.17 to -0.03 – although they noted that sectoral impacts are more significant.[5]
- In 2008, Sparrow analyzed the impacts of coal utilization in Indiana, and estimated electricity elasticities in the range of about -0.3 for the state.[6]
- In 2007, in a study of energy price GDP relationships, Maeda reported a range of elasticity estimates between -0.03 to -0.075.[7]
- In 2007, in a study of the relationship between energy prices and the U.S. economy, Citigroup found that in the long run, protracted high energy prices can have an economic impact and reported elasticities in the range of -0.3 to -0.37 between 1995 and 2005.[8]
- In 2007, in a study of oil-price GDP elasticities, Lescaroux reported a range of elasticities between -0.1 and -0.6.[9]
- In 2006, in an analysis of the likely impacts of coal utilization for electricity generation on the economies of the 48 contiguous states in the year 2015, Rose and Wei estimated the electricity elasticity to be -0.1[10] They also reported that more recent studies for the state of Georgia and the UK yield similar results.

Table A-1
Summary of Energy- and Electricity-GDP Elasticity Estimates

Year Analysis Published	Author	Elasticity Estimate
2010	Lee and Lee	-0.01 and -0.19
2010	Brown and Huntington	-0.01 to -0.08
2010	Baumeister, Peersman, and Robays	-0.35
2009	Blumel, Espinoza, and Domper	-0.085 to -0.16
2008	Kerschner and Hubacek	-0.03 to -0.17
2008	Sparrow	-0.3
2007	Maeda	-0.03 to -0.075
2007	Citigroup	-0.3 to -0.37
2007	Lescaroux	-0.1 to -0.6
2006	Rose and Wei	-0.1
2006	Oxford Economic Forecasting	-0.03 to -0.07
2006	Considine	-0.3
2006	Global Insight	-0.04
2004	IEA	-0.08 to -0.13
2002	Rose and Young	-0.14
2002	Klein and Kenny	-0.06 to -0.13
2001	Rose and Ranjan	-0.14
2001	Rose and Ranjan	-0.05 to -0.25
1999	Brown and Yucel	-0.05
1996	Hewson and Stamberg	-0.14
1996	Rotemberg and Woodford	-0.25
1996	Gardner and Joutz	-0.072
1996	Hooker	-0.07 to -0.29
1995	Lee and Ratti	-0.14
1995	Hewson and Stamberg	-0.5 and -0.7
1982	Anderson	-0.14
1981	Rasche and Tatom	-0.05 to -0.11

Source: Management Information Services, Inc., 2011.

- In 2006, in a study of energy price impacts in the UK, Oxford Economic Forecasting found elasticities to range between about -0.11 and -0.21.[11]

- In 2006, in a study that analyzed the economic impacts from coal Btu energy conversion, Considine estimated an electricity elasticity of -0.3.[12]
- In 2006, in a study of the impact of energy price increases in the UK, Global Insight estimated the elasticity to be -0.04.[13]
- In 2004, IEA employed energy-economic model simulation to calculate how much the increase in oil prices reduces GDPs in several countries. It found that the elasticity estimates ranged between -0.08 to -0.13.[14]
- In 2002, in a study of the economic impact of coal utilization in the continental U.S. Rose and Yang estimated the GDP electricity price elasticity of at -0.14.[15]
- In 2002, Klein and Kenny analyzed the results of six studies of the impacts of energy prices on the U.S. economy conducted between 1997 and 2002 and reported electricity elasticity estimates that ranged between -0.6 and -1.3.[16]
- In 2001, Rose and Ramjan analyzed the impact of coal utilization in Wisconsin. They calculated a price differential between coal and natural gas in electricity production, and then estimated how much economic activity is attributable to this cost saving. They used an economy-wide elasticity of output with respect to energy prices, which they estimated to be -0.14.[17]
- In 2001, Rose and Ranjan surveyed recent studies of the impacts of energy prices on GDP and reported elasticities in the range of -0.5 to -0.25.[18]
- In 1999, Brown and Yucel surveyed a number of studies and reported an average elasticity of about -0.05.[19]
- In 1996, Rotemberg and Woodford analyzed the effects of energy price increases on economic activity and reported an elasticity of -0.25.[20]
- In 1996, Gardner and Joutz analyzed the relationship between economic growth, energy prices, and technological innovation, found that the real price of energy is negatively related to output in the US , and estimated that the elasticity is -0.72.[21]
- In 1996, in a study of the impact of electricity prices on manufacturing, Hewson and Stamberg estimated an electricity elasticity of -0.14.[22]
- In 1996, in studying postwar energy-GDP relationships, Hooker estimated that the elasticity ranges between -0.07 and -0.29.[23]
- In 1995, in a study of macroeconomic oil shocks, Lee and Ratti estimated the elasticity to be -0.1.4.[24]
- In 1995, in a study of the impact of NO_x control programs in 37 states, Hewson and Stamberg estimated electricity elasticities ranging between -0.5 and -0.7.[25]

- In 1982, in a study of industrial location and electricity prices, Anderson estimated the elasticity to be -0.14.[26]
- In 1981, Rasche and Tatom found that an energy price shock modifies the optimal usage of the existing stock of capital, modifying the optimal capital-labor ratio and generating an upward shift on the aggregate supply curve and a decline in potential output. They estimated that the elasticity of output with respect to the real price of energy ranges between -0.05 and -0.11.[27]

In addition, numerous studies have examined the relationship between energy prices and GDP and found strong causality; for example:

- In 2008, Chontanawat found that the causality relationship is stronger in developed countries rather than developing countries.[28]
- In 2008, Bekhet and Yusop examined the long run relationship between oil prices, energy consumption, and macroeconomic performance in Malaysia over the period 1980-2005. Their findings indicated that there is a stable long-run relationship between oil prices, employment, economic growth, and the growth rate of energy consumption and also substantial short run interactions among them. The linkages and causal effects among prices, energy consumption and macroeconomic performance have important policy implications, and they found that the growth of energy consumption has significant impacts on employment growth.[29]
- In 2006, Soytas and Sari analyzed the causal relationship between energy consumption and GDP in G-7 countries and found that causality runs from energy consumption to GDP in these countries. They argued that energy conservation in some countries could negatively impact economic growth.[30]
- In 2006, Chontanawat, Hunt, and Pierse tested for causality between energy and GDP using a consistent data set and methodology for 30 OECD and 78 non-OECD countries.[31] They found that causality from aggregate energy consumption to GDP and GDP to energy consumption is found to be more prevalent in the developed OECD countries compared to the developing non-OECD countries. This implies that a policy to reduce energy consumption aimed at reducing GHG emissions is likely to have greater impact on the GDP of the developed rather than the developing world.
- In 1995, Finn found that in the U.S. the Solow residual tends to fall when energy price rises, implying a direct link between energy and production.[32]

- In 1987, Erol and You found a causal relationship running from energy consumption to output in a large set of industrialized countries.[33]

Other studies that came to similar conclusions include Al-Faris,[34] Al-Iriani,[35] Apergis, and Payne,[36] Burniaux and Jean Chateau,[37] Chien-Chiang and Jun-De Lee,[38] Coffman,[39] Cournède,[40] Davis and Haltiwanger,[41] Gausden,[42] Gronwald,[43] Harris,[44] Lee,[45] Manjulika and Koshal,[46] Narayan and Smyth,[47] Oligney,[48] Soytas and Sari,[49] Stern,[50] Stern and Cleveland,[51] and Wolde-Rufael.[52]

Dahl has conducted extensive studies of NEMS elasticities and provided summaries of the elasticities within NEMS.[53] She noted that, since elasticities are a convenient way to summarize the responsiveness of demand to such things as own prices, cross prices, income, or other relevant variables, a substantial amount of resources have been devoted to estimating demand elasticities, at various levels of aggregation using a variety of models. Nevertheless, she found that considerable variation in the estimates at the aggregate and disaggregate levels remains.

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The State Auditor's office did not receive a response from the **Attorney General's office**, the **Department of Elementary and Secondary Education**, the **Department of Public Safety**, the **Department of Transportation**, **Adair County**, **Cole County Public Works**, **Jackson County Legislators**, **St. Charles County**, **St. Louis County**, the **City of Kirksville**, the **City of St. Louis**, the **City of Springfield**, the **City of West Plains**, **Cape Girardeau 63 School District**, **Hannibal 60 School District**, **Rockwood R-VI School District**, **University of Missouri**, **St. Louis Community College**, and the **Public Service Commission**.

Fiscal Note Summary

State governmental entities estimated annual implementation costs of $90,000. State and local governmental entities said the proposal may cause an unknown increase in their electric utility costs. Utilities estimated that increase would be at least $4 million annually. Higher utility costs may negatively impact the state's economy including state and local governmental revenues.