THE LOCAL IMPACTS OF ENVIRONMENTAL REGULATIONS

STRATA

October 2017

Primary Investigators:

Landon Stevens, MPP, Strata Policy

Michael Jensen, MS, Strata Policy

Student Research Associates:

Camille Harmer

Jason Dahlin

Shiloah Kline

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"Let us accustom ourselves, then, not to judge things solely by what is seen, but rather by is not seen."[1]

-Frédéric Bastiat, 1850

1 Bastiat, Frederic. (n.d.). Selected Essays on Political Economy. *Library of Economics and Liberty.* Retrieved from http://www.econlib.org/library/Bastiat/basEss1.html

Regulation Requires Tradeoffs

Affordable and reliable energy allows us to travel quickly, feed large populations, provide modern health care, and keep our homes warm in the winter and cool in the summer. Yet, the energy we use to create higher standards of living can negatively impact our environment. Measuring environmental costs can be challenging, and policymakers assigned to understand and mitigate those costs face a difficult task.

When policymakers address the environmental costs of using fossil fuels, they face tradeoffs. Because we have limited resources to draw upon, using time, money, and other resources to fix an environmental problem means that those same resources cannot be used for other publicly-financed programs, regardless of how equally deserving they may be. Thus, when state and local policymakers must expend resources to comply with EPA policies, they lose the opportunity to devote those same resources to addressing other pressing concerns.

This study answers the following question: What are the tradeoffs that local government leaders face when budgeting for more expensive electricity? To do this, we examine EPA's projections of how five of its regulations will affect the price of electricity. We then compare the increase in the amount a city must budget for electricity to the alternative uses of that same amount of money.

When adjusting a municipal budget to accommodate higher electricity prices, local policymakers (such as the mayor and city council members) have several options to choose from to keep their budgets in balance: they may increase taxes, increase energy efficiency, reduce spending elsewhere and shift those funds to the electricity budget, or some combination of these options.

For simplicity, this report will only assess the tradeoffs that local policymakers may confront when they decide to pay for higher electricity costs by cutting spending elsewhere. Though local government leaders may respond to higher electricity prices differently than the manner presented in this report, the message remains the same: in a world of limited resources, we cannot fix every problem and so we must make tradeoffs. Although environmental regulations may have worthwhile goals, they also create costs for local policymakers. Understanding the tradeoffs that these costs create is essential to fully understanding the costs and benefits of a particular regulation.

Motivation for this Study

During the Obama administration, EPA issued a series of regulations targeting fossil-fuel fired power plants. EPA's representation of the costs and benefits of these regulations, however, is not even-handed. Though EPA presented both the costs and benefits in terms of dollars, EPA also expressed the benefits in a relatable, human way that it did not do with the costs.

Like EPA did with the benefits of this regulation, it would have been fair for EPA to include an estimate of the human costs, such as the number of jobs that will be lost.[2] The benefits of regulations like MATS may outweigh the costs, but the rule may still have negative effects. Ultimately, people bear the costs of this regulation and we should not ignore the people whose lives will be negatively impacted by the implementation of MATS or any other regulation, even if everyone else benefits.

2 Chapter 6 of EPA's Regulatory Impact Analysis (RIA) for the MATS rule is devoted to analyzing the effect of the rule on employment, but for some reason EPA decided to not make those estimates as readily available as it does the benefits of MATS. For the MATS RIA, see https://www.epa.gov/sites/production/files/2015-11/documents/matsriafinal.pdf

In addition to understanding the costs of EPA regulations, and relating those costs in terms of how people's lives may be affected, it is important to understand the opportunity costs of EPA regulations.[3] Understanding opportunity costs is useful for putting the trade-offs of any choice into perspective, which ultimately should help in decision-making.

Understanding Opportunity Cost

In his 1850 essay titled "That Which Is Seen, and That Which Is Not Seen," French economist Frédéric Bastiat discussed the importance of thinking carefully about the effects of any economic action. Bastiat argued that a good economist seeks not to understand only the visible benefits of any economic action, but also the unintended costs—the consequences of a choice that are difficult to see or understand.[4] In this report, we are interested in understanding what the unseen effects of EPA regulation may be at the local government level.

Understanding the unseen effects of regulation helps us identify the opportunity cost of choosing to regulate any industry or particular action, and understanding opportunity cost is necessary to understanding the message of this report.

Opportunity cost is the value of the next-best use of a resource. Economist Russell Roberts stated, "opportunity cost is what you have to give up to get something."[5] As a simple example, consider the following: The real cost of college is more than tuition. The opportunity cost of college includes the money a person could potentially make had he or she chosen to get a job instead. Thus, the real cost of college is tuition plus the wages a student chose to forego when he or she decided to go to college.[6]

The opportunity cost of EPA regulation that increases the price of electricity is the value of the option local policymakers must give up to pay for the more expensive electricity. That is, if a city must give up or forego hiring two police officers because the city must instead use that money to pay for electricity, then the opportunity cost of an EPA regulation is the value that would have been created by employing two police officers.

Understanding the opportunity cost of an action helps to put a choice in perspective, relative to the other things we value. In a world of limited resources, this helps clarify values and priorities, because we do not have unlimited resources to rely upon to fix every problem we face.

In this report, we analyze the opportunity costs of five regulations issued by EPA. That is, we will show how local government leaders could have otherwise spent taxpayer dollars on local priorities, such as employing teachers or housing the homeless, if they had not been obligated to use that money to pay for more expensive electricity. Our analysis considers the Cross-State Air Pollution rule, the Coal Combustion Residuals rule, the Cooling Water Intake Structures rule, the Mercury and Air Toxics Standards, and the Clean Power Plan.[7]

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3 EPA acknowledges there are opportunity costs of regulation and defines the social cost of regulation as "the sum of all opportunity costs incurred due to [a] regulatory action." Though EPA has attempted to quantify the social cost of carbon, EPA does not extend the same effort to quantifying the social cost of its regulation, choosing instead to only "use compliance costs as a proxy for social costs." See EPA's "Regulatory Impact Analysis of the Cross-State Air Pollution Rule (CSAPR) Update for the 2008 National Ambient Air Quality Standard for Ground-Level Ozone," September 2016, page 4-26, retrieved from https://www3.epa.gov/ttn/ecas/docs/ria/transport_ria_final-csapr-update_2016-09.pdf

4 Bastiat, Frederic. (n.d.). Selected Essays on Political Economy. *Library of Economics and Liberty*. Retrieved from http://www.econlib.org/library/Bastiat/basEss1.html

5 Roberts, Russell. (2017, February 5). Getting the Most Out of Life: The Concept of Opportunity Cost." *Library of Economics Liberty.* Retrieved from http://www.econlib.org/library/Columns/y2007/Robertsopportunitycost.html

6 *Ibid.*

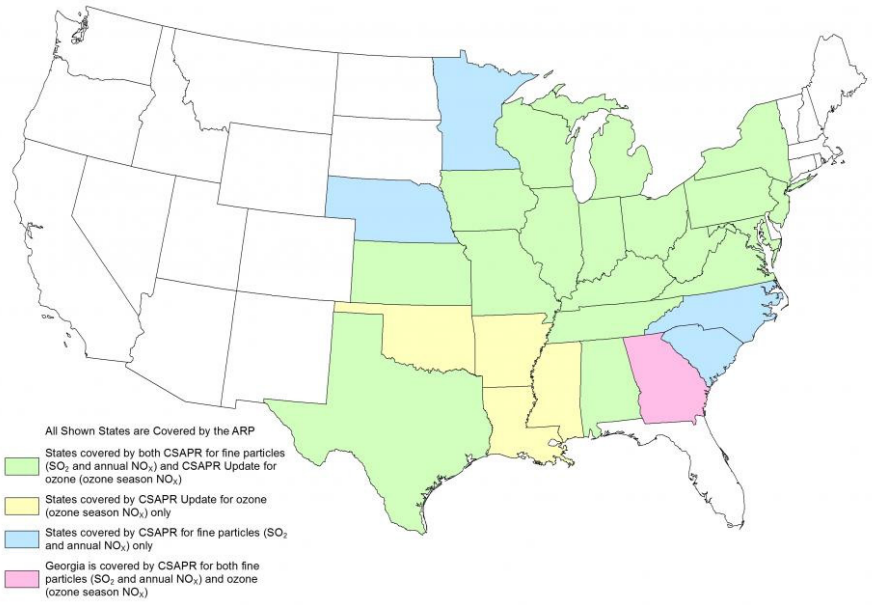
7 As of the publication of this report, the Cross-State Air Pollution rule, the Coal Combustion Residuals Rule, the Cooling Water Intake Structures rule, and the Mercury and Air Toxics Standards are current regulations. The Clean Power Plan, a program set in motion by the Obama administration, was dismantled at the beginning of the Trump administration. We included it in our report as an illustrative example of the unseen costs of regulations.

Regulation and the Price of Electricity

Cross-State Air Pollution Rule

In 2015, EPA implemented the Cross-State Air Pollution Rule (CSAPR) to reduce the amount of pollution from power plants that crosses state lines. Because pollution travels, states that are downwind from heavily polluting states struggled to comply with certain 2008 National Ambient Air Quality Standards (NAAQS).[8] The Clean Air Act, a 1970 law put in place to help regulate pollution from vehicles, factories, power plants, etc., requires EPA to set standards to regulate potentially harmful air pollutants. These standards are updated as EPA sees the need to raise or lower air quality standards for certain pollutants. To comply with NAAQS and, by extension, the Clean Air Act, CSAPR requires 27 states to meet standards for sulfur dioxide, nitrous oxide, and ozone emissions.[9] Figure 1 shows the states that are regulated under CSAPR.

Figure 1: States Regulated by the Cross-State Air Pollution Rule[10]



Source: U.S. Environmental Protection Agency

CSAPR replaces EPA's Clean Air Interstate Rule (CAIR), which was in effect from 2005 through 2012.[11] A December 2008 court decision deemed CAIR insufficient at regulating the interstate travel of pollution and EPA

8 U.S. Environmental Protection Agency (EPA). (n.d.) Overview of the Cross-State Air Pollution Rule (CSAPR). Retrieved from https://www.epa.gov/csapr/overview-cross-state-air-pollution-rule-csapr

9 The 27 states are: Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.
U.S. Environmental Protection Agency (EPA). (n.d.) States that are Affected by the Cross-State Air Pollution Rule (CSAPR). Retrieved from https://www.epa.gov/csapr/states-are-affected-cross-state-air-pollution-rule-csapr

10 U.S. Environmental Protection Agency (EPA). (2016, September 15). Map of States Covered by CSAPR. Retrieved from https://www.epa.gov/airmarkets/map-states-covered-csapr

11 U.S. Environmental Protection Agency (EPA). (September, 2016). FACT SHEET: The Cross-State Air Pollution Rule. Retrieved from https://www.epa.gov/sites/production/files/2016-09/documents/csaprfactsheet.pdf

replaced the rule with CSAPR.[12] EPA implemented CSAPR on January 1, 2015.[13] CSAPR gives states an emissions budget for sulfur dioxide, nitrous oxide, and ozone emissions, and permits states in the CSAPR region to trade emissions allowances with other states to comply with the standard. Because states are able to trade emissions allowances, states and power generators can determine if it will be most cost effective for them to meet the standard, or continue emitting at their current level and purchase allowances from states and power generators that emit less than their limit. By allowing states to trade allowances, EPA intends to reduce the cost of the program while still meeting the overall standard.[14]

EPA projected that by 2014, CSAPR would prevent up to 34,000 premature deaths, 19,000 cases of acute bronchitis, 15,000 nonfatal heart attacks, 19,000 hospital and emergency room visits, 1.8 million missed school and work days, 400,000 cases of aggravated asthma, and 420,000 cases of upper and lower respiratory symptoms. In addition, the rule is expected to improve air quality in state and national parks, and protect specific ecosystems in the regulated region.[15]

CSAPR's implementation will impact the price of electricity in the states that it regulates as well as states that buy electricity generated within the CSAPR region. Although the impact of the regulation may vary from state to state, EPA estimates that CSAPR will increase the average national price of electricity by 0.9 percent by 2020.[16]

Coal Combustion Residuals Rule

A by-product of burning coal to produce electricity is coal ash, formally called coal combustion residuals (CCRs). If improperly disposed of, or if containment facilities are improperly constructed, CCRs can contaminate water and decrease air quality. On October 4, 2016, EPA put into effect a rule regulating the CCR disposal process. This rule sets standards for ash containment facilities to record and report the CCRs stored there. In addition, the rule encourages responsible recycling of CCRs by differentiating between waste CCRs and CCRs that may have a beneficial use.[17] CCRs must meet several requirements to qualify as having a beneficial use. Among other things, CCRs must be substituted for virgin materials and have a functional purpose. CCRs are most commonly used in building materials, such as concrete, drywall, and bricks, and can also be used to build roads.[18]

The rule is primarily a response to a catastrophic CCR spill from the Kingston Fossil Plant in Tennessee in 2008. The coal ash containment area of a Tennessee Valley Authority power plant leaked, causing a spill that covered

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12 *Ibid*.

13 EPA finalized an update to CSAPR in 2016. The update is meant to regulate the emission of ozone from May through September in the 22 states it applies to. EPA projects that the update will prevent over 67,000 asthma attacks, nearly 56,000 days of missed work and school, over 240 hospital and emergency room visits, and up to 60 premature deaths. Like the original rule, the update is projected to improve visibility and air quality in public lands in the regulated area. EPA estimates that the update will increase the price of electricity by 0.1% by 2020. Our analysis ignores the costs and benefits of this update to CSAPR and focuses only on the original rule. See:
U.S. Environmental Protection Agency (EPA). FACT SHEET - Key Changes and Improvements: Final Cross-State Air Pollution Rule Update for the 2008 NAAQS. n.d. Retrieved from https://www3.epa.gov/airmarkets/CSAPRU/FINAL_FinalCSAPRUR_KeyChangesFactSheet.pdf
U.S. Environmental Protection Agency. "Regulatory Impact Analysis of the Cross-State Air Pollution Rule (CSAPR) Update for the 2008 National Ambient Air Quality Standards for Ground-Level Ozone." September 2016. p. 4-24. Retrieved from https://www3.epa.gov/ttn/ecas/docs/ria/transport_ria_final-csapr-update_2016-09.pdf; U.S. Environmental Protection Agency (EPA). (September, 2016). FACT SHEET: The Cross-State Air Pollution Rule. Retrieved from https://www.epa.gov/sites/production/files/2016-09/documents/csaprfactsheet.pdf

14 U.S. Environmental Protection Agency (EPA). (n.d.). FACT SHEET Final Cross-State Air Pollution Rule Update for the 2008 NAAQS. Retrieved from https://www3.epa.gov/airmarkets/CSAPRU/FINAL_FinalCSAPRUR_Factsheet.pdf; U.S. Environmental Protection Agency (EPA). (September, 2016). FACT SHEET: The Cross-State Air Pollution Rule. Retrieved from https://www.epa.gov/sites/production/files/2016-09/documents/csaprfactsheet.pdf

15 U.S. Environmental Protection Agency (EPA). (September, 2016). FACT SHEET: The Cross-State Air Pollution Rule. Retrieved from https://www.epa.gov/sites/production/files/2016-09/documents/csaprfactsheet.pdf

16 U.S. Environmental Protection Agency (EPA). (June, 2011). Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States; Correction of SIP Approvals for 22 States. Retrieved from https://www3.epa.gov/ttn/ecas/docs/ria/transport_ria_final-csapr_2011-06.pdf

17 U.S. Environmental Protection Agency (EPA). (n.d.). Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. Retrieved from https://www.epa.gov/coalash/coal-ash-rule

18 U.S. Environmental Protection Agency (EPA). (n.d.) Coal Ash Reuse. Retrieved from https://www.epa.gov/coalash/coal-ash-reuse

roughly 300 acres, cost $1.178 billion, and took almost six years to clean up.[19] By placing more strict regulations on the containment of CCRs, EPA estimates that the rule will save between $232 and $289 million per year by preventing groundwater contamination, the structural failure of CCR containment areas, and the use of virgin materials. Additionally, EPA expects the CCR rule to reduce coal dust in areas near coal ash impoundments, prevent groundwater contamination, and ensure the construction of safer containment sites.[20]

Since this rule applies to all coal-fired power plants in the United States, it may affect the price of electricity in all states in the contiguous U.S. that consume electricity from coal-fired power plants. EPA estimates that the Coal Combustion Residuals rule will increase the average national price of electricity by 0.18 percent by 2020.[21]

Cooling Water Intake Structures Rule

The Cooling Water Intake Structures rule, commonly known as Section 316(b), was created to address the environmental concerns that a cooling water intake structure (CWIS) creates. Power plants use a cooling water intake structure (CWIS) to remove heat from their industrial equipment.[22] The CWIS circulates water from streams, rivers, and lakes, through pipes to absorb heat produced by power plants. The heated water is then either returned to the natural source or passed through a cooling tower and then reused in the cooling process.[23]

The two main environmental concerns that a CWIS creates are entrainment and impingement. Entrainment occurs when fish and other organisms enter the structure and become trapped. Impingement occurs when organisms become trapped against the screens found at the openings of the structure. Table 1 shows the number of fish deaths recorded in 2006 in different regions of the U.S. due to entrainment and impingement.

Table 1: 2006 Fish Entrainment and Impingement Death Totals by Region[24]

Region	Number of Fish Deaths
California	1,710,000
North Atlantic	2,310,000
Mid-Atlantic	86,420,000
South-Atlantic	42,120,000
Gulf of Mexico	35,770,000
Great Lakes	31,540,000
Inland	65,110,000
National Total	264,990,000

19 U.S. Environmental Protection Agency (EPA). (n.d.). U.S. Environmental Protection Agency and Tennessee Valley Authority Kingston Coal Ash Release Site: Project Completion Fact Sheet. Retrieved from https://semspub.epa.gov/work/04/11015836.pdf

20 U.S. Environmental Protection Agency (EPA). (2016, July 27). Frequent Questions about the Coal Ash Disposal Rule: What does EPA believe will be the benefits of the rule?. Retrieved from https://www.epa.gov/coalash/frequent-questions-about-coal-ash-disposal-rule

21 U.S. Environmental Protection Agency (EPA). (2014, December 17). Appendix X to the Regulatory Impact Analysis (RIA) for EPA's 2015 Coal Combustion Residuals (CCR) Rule. Retrieved from https://www.regulations.gov/document?D=EPA-HQ-SFUND-2015-0781-1771; note that Appendix X is attached to the document titled "Regulatory Impact Analysis: EPA's 2015 RCRA Final Rule Regulating Coal Combustion Residuals (CCR) Landfills and Surface Impoundments At Coal-Fired Electric Utility Power Plants."

22 Burnett, J., Englert, T. (2011, November 1) Understanding 316(b). *Power Engineering*. Retrieved from http://www.power-eng.com/articles/print/volume-115/issue-11/features/understanding-316b.html

23 Center for Climate and Energy Solutions. (n.d.) Cooling Water Intake Structures. Retrieved from https://www.c2es.org/federal/executive/epa/Cooling-Water-Intake-Structures

24 U.S. Environmental Protection Agency (EPA). (June, 2006). Regional Benefits Analysis for the Final Section 316(b) Phase III Existing Facilities Rule. Retrieved from https://www.epa.gov/sites/production/files/2015-04/documents/cooling-water_phase-3_regional-benefits_2006.pdf

The CWIS rule applies to both existing and new power plants and was rolled out in three phases. The first phase began in 2001, the second in 2004, and the third in 2006. In 2007 the portions of the rule that regulated existing power plants were sent back to EPA for further review due to legal challenges by industry petitioners, who claimed that the costs associated with implementing the new technologies in their power plants were too burdensome.[25]

EPA issued the final CWIS rule in 2014. Facilities that are subject to the final CWIS rule are required to obtain a National Pollutant Discharge Elimination System permit. This will require the facility to implement one of the seven options provided to them by EPA to meet BTA standards.[26] The permits last up to five years. Electricity generators must reapply for the permit before it expires.[27]

EPA believes that Section 316(b) will increase the amount of fish available at recreational and commercial fisheries, create a healthier ecosystem, and better protect any threatened or endangered species.[28] Based on EPA's reports, the Government Accountability Office (GAO) estimates that the effect of the CWIS rule on the average price of electricity will be 0.1 percent.[29]

Mercury and Air Toxics Standards

The Mercury and Air Toxic Standards (MATS) rule was created by EPA to set national emission standards for hazardous air pollutants produced by coal and oil-fired power plants. The MATS rule aims to reduce mercury, arsenic, cadmium, lead, and nickel.[30] New and existing coal and oil-fired power plants that produce 25 megawatts of electricity or more are subject to these standards. There are approximately 1,400 power plants across the U.S. that fall into this category.[31]

In 2015 the Supreme Court heard a case against the MATS rule. The case dealt with whether EPA sufficiently considered costs when setting the standards to reduce hazardous air pollutants. The court ruled 5-4 that EPA failed to consider the cost to power plants in making its decision on the rule. The MATS rule was returned to the D.C. Circuit Court for revisions.[32] On April 14, 2016, EPA issued the final finding that "it is appropriate and necessary to set standards for emissions of air toxics from coal- and oil-fired power plants."[33]

EPA's cost-benefit analysis shows that the MATS rule could prevent 11,000 premature deaths, 4,700 heart attacks, and 130,000 cases of aggravated asthma a year. EPA quantifies these benefits as being equal to a health savings of

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25 Rodriquez, J. (2016, June 21). EPA's 40-year Battle for Water Cooling Regs: A Cheat Sheet. Retrieved from http://www.law360.com/articles/807361/epa-s-40-year-battle-for-water-cooling-regs-a-cheat-sheet

26 Wilson, C., Brill, M. (2014, June 3). EPA Promulgates Final Standards for Cooling Water Intake Structures. *K&L Gates*. Retrieved from http://www.klgates.com/epa-promulgates-final-standards-for-cooling-water-intake-structures-06-03-2014/

27 U.S. Environmental Protection Agency (EPA). (n.d.). National Pollutant Discharge Elimination System (NPDES): NPDES Permit Basics. Retrieved from https://www.epa.gov/npdes/npdes-permit-basics

28 Copeland, C. (2011, July 19). Cooling Water Intake Structures: Summary of EPA's Proposed Rule. *Congressional Research Service*. Retrieved from http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R41786.pdf

29 United States Government Accountability Office. "EPA Regulations and Electricity: Better Monitoring by Agencies Could Strengthen Efforts to Address Potential Challenges." July 2012. Page 39. Retrieved from http://www.gao.gov/assets/600/592542.pdf

30 U.S. Environmental Protection Agency (EPA). (December, 2011). Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards. Retrieved from https://www3.epa.gov/ttnecas1/regdata/RIAs/matsriafinal.pdf

31 U.S. Environmental Protection Agency (EPA). (December, 2011). Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards. Retrieved from https://www3.epa.gov/ttnecas1/regdata/RIAs/matsriafinal.pdf

32 Bade, G. (2015, December 15). Court ruling lets EPA enforce MATS rule despite Supreme Court rejection. Retrieved from http://www.utilitydive.com/news/court-ruling-lets-epa-enforce-mats-rule-despite-supreme-court-rejection/410862/

33 U.S. Environmental Protection Agency (EPA). (n.d.). Regulatory Actions - Final Mercury and Air Toxics Standards (MATS) for Power Plants. Retrieved from https://www.epa.gov/mats/regulatory-actions-final-mercury-and-air-toxics-standards-mats-power-plants

between $37 billion and $90 billion.[34] EPA estimates the Mercury and Air Toxics Standards rule will increase the price of electricity in the contiguous United States by two percent by 2020.[35]

Clean Power Plan

The Clean Power Plan (CPP) is an energy regulation set in motion by the Obama administration in 2014. The plan aims to reduce carbon dioxide (CO_2) emissions from fossil fuel fired power plants in the United States, which are the largest source of stationary pollution in the U.S.[36] EPA estimated that the final rule would reduce carbon dioxide emissions by 30 percent by 2030.[37] Under the plan, each state that has a fossil fuel burning power plant would have to submit a plan to EPA that reflects the "best system of emission reduction."[38]

Each state's plan was due on September 6, 2016, but many states challenged the CPP. On February 9, 2016, the Supreme Court granted a stay on the plan for the duration of the litigation.[39] On March 28, 2017, President Donald Trump issued an executive order requiring EPA to conduct further reviews of the CPP and, if necessary, "take lawful action to suspend, revise, or rescind" the plan.[40] As a legal battle between states that support the CPP and EPA ensues, it is uncertain whether the CPP will be implemented or not. As EPA further examines the plan, it is crucial for them to examine the full extent of the costs of the project. We included the CPP in our analysis to illustrate the local impacts that the plan could have if it is implemented.

All but three states would be affected by the rule. Alaska and Hawaii are not required to submit a plan for limiting emissions because EPA does not have "enough information to draw up targets" and Vermont has no fossil-fueled power plants that would be affected.[41] The rule places an especially heavy burden on states that rely on the coal industry. Wyoming, for example, provides about 40 percent of the nation's coal supply, meaning that it would be hit harder by the rule than states that are less-dependent on coal, such as Washington and Oregon.[42]

The rule is EPA's first venture into regulating CO_2 emissions from existing power plants. EPA claimed that the rule was tailored to each state, giving states the flexibility to reduce pollutants to the EPA-mandated rate in the manner they found to be most effective.[43] EPA also claimed the rule would utilize existing clean energy trends to support investment in alternative power options and build on work that cities were already doing, such as the 45

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34 Democratic Policy and Communications Center. (n.d.). Fact Sheet: EPA's Mercury and Air Toxics Standards (MATS). Retrieved from http://www.dpc.senate.gov/docs/fs-112-2-121.pdf?

35 U.S. Environmental Protection Agency (EPA). (December, 2011). Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards. Retrieved from https://www3.epa.gov/ttnecas1/regdata/RIAs/matsriafinal.pdf

36 U.S. Environmental Protection Agency (EPA). (2015, October 23). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. *Federal Register 80(205)* pp. 64774-64775. Retrieved from https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf

37 U.S. Environmental Protection Agency (EPA). (n.d.). Fact Sheet: Clean Power Plan. Retrieved from https://archive.epa.gov/epa/cleanpowerplan/fact-sheet-clean-power-plan-overview.html

38 Ramseur, J., McCarthy, J. (2016, September 27). EPA's Clean Power Plan: Highlights of the Final Rule. *Congressional Research Service*. Retrieved from https://www.fas.org/sgp/crs/misc/R44145.pdf

39 *Ibid*.

40 Exec. Order No. 13783, 82 FR 15607, (2017).

41 Evans, S. (2015, August 4). A Detailed Q&A On Obama's Clean Power Plan. *Carbon Brief*. Retrieved from https://www.carbonbrief.org/a-detailed-qa-on-obamas-clean-power-plan

42 Godby, R., Coupal, R. (August 2015). A Comparison of Clean Power Plan forecasts for Wyoming Coal: What impact do modeling choices make? Estimated Impacts on Wyoming Coal Production, Employment and State Revenues of the Clean Power Plan using EIA Simulation Data. Center for Energy Economics and Public Policy, University of Wyoming. Retrieved from http://www.uwyo.edu/cee/_files/docs/ej%20-%20eia%20cpp%20impact%20analysis-8-27-2015_rc-corrected.pdf

43 U.S. Environmental Protection Agency (EPA). (n.d.). FACT SHEET: Overview of the Clean Power Plan. Retrieved from https://www.epa.gov/cleanpowerplan/fact-sheet-overview-clean-power-plan

percent reduction of CO_2 emissions that New York has achieved since implementing the Regional Greenhouse Gas Initiative in 2005.[44]

EPA estimated that the rule would cost $8.4 billion per year while creating benefits of $34-$54 billion starting in 2030, but skeptics say the cost could be as high as $39 billion per year.[45]

The American Coalition for Clean Coal Electricity analyzed the Clean Power Plan and concluded that by 2050 it would reduce global temperatures by .006°C, which is the equivalent of reducing sea level rise by the width of two human hairs.[46] When asked if she considered small reductions in temperature to be "enormously beneficial," EPA Administrator Gina McCarthy responded, saying that "the value of [the Clean Power Plan] is not measured" by how much it actually decreases climate change, but rather by "showing strong domestic action, which can actually trigger global action" to address climate change.[47]

EPA estimated that the Clean Power Plan would avoid 3,600 premature deaths, 90,000 asthma attacks, 1,700 heart attacks, and 300,000 missed school/work days per year.[48] According to NERA Economic Consulting, the rule would increase existing electricity costs by up to 14 percent. The Electric Reliability Council of Texas estimated an increase of up to 16 percent.[49] In this study, we relied on conservative estimates from EPA of three percent by 2020.[50]

Combined Costs of EPA Regulation

As a reference number for the combined effect of the five EPA regulations, the national average increase in electricity prices is about eight percent. As mentioned earlier, EPA cautions against simply adding up the price increase estimates from each regulation because of differences in how the numbers were calculated. Still, for policy makers considering how these five regulations may affect the decisions they must make, an estimate of eight percent is not unreasonable and is in line with estimates from other studies.

NERA Economic Consulting studied the combined effects of CSAPR, the CCR Rule, the CWIS rule, and MATS, and determined that states in the Northwest may only experience a 0.1 percent increase in electricity prices but that coal-dependent states, such as Kentucky and Tennessee, may see a 13.5 percent increase. Additionally, MISO Energy also studied the combined effect of the same four regulations and concluded that its region would be affected by electricity rate increases of seven percent or more.[51]

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44 New York State. (n.d.). *Federal Clean Power Plan*. Department of Environmental Conservation. Retrieved from http://www.dec.ny.gov/energy/97799.html

45 U.S. Environmental Protection Agency (EPA). (2015, August 13). FACT SHEET: Clean Power Plan By The Numbers. Retrieved from http://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-numbers; Harrison D., et al. (2015, November 7). Energy and Consumer Impacts of EPA's Clean Power Plan. NERA Economic Consulting. Page 5. Retrieved from http://www.americaspower.org/wp-content/uploads/2015/11/NERA-CPP-Final-Nov-7.pdf

46 American Coalition for Clean Coal Electricity. (n.d.). "Climate Effects" of EPA's Final Clean Power Plan. Retrieved 29 March 2017 from http://www.americaspower.org/wp-content/uploads/2015/09/Climate-Effects-Paper-August-6-2015.pdf

47 Gina McCarthy. (2015, July 9). Full Committee Hearing - Examining EPA's Regulatory Overreach. Congressional testimony to House Committee on Science, Space, & Technology. Retrieved from https://science.house.gov/legislation/hearings/examining-epa-s-regulatory-overreach

48 U.S. Environmental Protection Agency (EPA). (n.d.). FACT SHEET: Overview of the Clean Power Plan. Retrieved from https://www.epa.gov/cleanpowerplan/fact-sheet-overview-clean-power-plan

49 Harrison D., et al. (2015, November 7). Energy and Consumer Impacts of EPA's Clean Power Plan. NERA Economic Consulting. Retrieved from http://www.americaspower.org/wp-content/uploads/2015/11/NERA-CPP-Final-Nov-7.pdf; Electric Reliability Council of Texas (ERCOT). (2015, October 16). ERCOT Analysis of the Impacts of the Clean Power Plan: Final Rule Update. Retrieved from http://www.ercot.com/content/news/presentations/2015/ERCOT_Analysis_of_the_Impacts_of_the_Clean_Power_Plan-Final_.pdf

50 U.S. Environmental Protection Agency (EPA). "Regulatory Impact Analysis for the Clean Power Plan Final Rule." October 23, 2015. Page 3-37. Retrieved from https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf; Note that we used the more conservative mass-based estimate rather than the rate-based estimate.

51 United States Government Accountability Office (GAO). (July 2012). EPA Regulations and Electricity: Better Monitoring by Agencies Could Strengthen Efforts to Address Potential Challenges. Retrieved from http://www.gao.gov/assets/600/592542.pdf

Opportunity Cost Estimates

Government services usually fall into the categories of safety, education, health and well-being, and infrastructure. To understand how an EPA policy may limit local-level public services, we chose six ways to show how cities might have otherwise used the money they spend on more expensive electricity due to regulations. These alternative uses, which are some of the opportunity costs of the environmental regulations we examine, are the number of teachers, police officers, and firefighters that local governments could have hired, the number of potholes that could have been filled, and the number of days that shelters could have housed a homeless individual or pet.[52] Though a loss of a few police officers in a city with thousands of police may seem insignificant, we intend to conceptualize the tradeoffs required by an increase in electricity prices and to show what those tradeoffs mean in terms of the services provided by local governments.

The costs of these six alternative uses are national averages, so actual costs will vary by location. Additionally, some local governments may not budget for some of the six opportunity costs. This would be true, for example, in the case where a city is part of a larger school district and does not have the ability to manipulate the budget for teachers to pay for higher electricity prices.

The values of the six measures of opportunity cost we use in this study are:

K-12 Teacher:..... $56,760 per year[53]

Police and Detectives: ..... $61,600 per year[54]

Firefighters: ..... $48,030 per year[55]

Shelter Costs for a Homeless Individual: .....$35 per person per day[56]

Shelter Costs for a Homeless Pet: ..... $10 per animal per day[57]

Pothole Repair:.....$21.78 per pothole[58]

52 For an example of tradeoffs in the New York City budget, see pages 5-6 of "Understanding New York City's Budget: A Guide," found at: http://www.ibo.nyc.ny.us/iboreports/understandingthebudget.pdf

53 This number was obtained by averaging the salaries of a K-8 teacher and a 9-12 teacher. Source for K-8 teacher salary: 2016 median pay. Bureau of Labor Statistics (BLS). (2016)."Kindergarten and Elementary School Teachers: Summary. Retrieved from http://www.bls.gov/ooh/education-training-and-library/kindergarten-and-elementary-school-teachers.htm; Source for 9-12 teacher salary: 2015 median pay. Bureau of Labor Statistics (BLS). (2016). High School Teachers: Summary. Retrieved from http://www.bls.gov/ooh/education-training-and-library/high-school-teachers.htm

54 2016 median pay. Bureau of Labor Statistics (BLS). (2016). Police and Detectives: Summary. Retrieved from http://www.bls.gov/ooh/protective-service/police-and-detectives.htm

55 2016 median pay. Bureau of Labor Statistics (BLS). (2016). Firefighters: Summary. Retrieved from http://www.bls.gov/ooh/protective-service/firefighters.htm

56 Average costs. U.S. Department of Housing and Urban Development. (2016). Retrieved from https://www.huduser.gov/publications/pdf/Costs_Homeless.pdf; the $35 estimate is an average of all the costs listed in Exhibit 3.1, under the heading "Average Cost Per Person Per Day."

57 This number was determined by taking an average of several estimates for boarding fees associated with local-government funded animal shelters, some of which were operated at the county level. Not all cities operate or fund animal shelters. See:
My Nevada County. (2012, April 17). Animal Control and Shelter Fees. Retrieved from https://www.mynevadacounty.com/nc/sheriff/Pages/Animal-Control-and-Shelter-Fees.aspx,
Wake County Government. (n.d.). Adoption & Reclaim Fees. Retrieved from http://www.wakegov.com/pets/shelter/pages/fees.aspx,
County of Madera. (2012). Animal Service Fees. Retrieved from http://www.madera-county.com/index.php/animal-service-fees,
Macomb County Government. (2016). Fees Schedule. Retrieved from http://animalcontrol.macombgov.org/AnimalControl-Fees,
The City of Waco Texas. (n.d.). Animal Shelter Fees. Retrieved from http://www.waco-texas.com/animal-control-fees.asp,
The Humane Society of Greenwood. (n.d.). Animal Shelter FAQs. Retrieved from http://www.gwdhumanesociety.org/save-a-life/animalshelter-faqs/

58 Office of the City Auditor. (April, 2013). Performance Audit of the Streets Division's Pothole Repair Operations. *City of San Diego*. Retrieved from https://www.sandiego.gov/sites/default/files/13-012_potholes.pdf; Cost is an average of estimates from five cities (using $14 as the midpoint for the estimate from Los Angeles).

Regulation and Local Government Budgets

Methodology

We assume that local government leaders respond to higher electricity prices by decreasing government services elsewhere. Thus, an increase in the amount local policymakers budget for electricity would be equal to the amount taken from elsewhere in the budget. We then calculate the alternative uses of the money spent on more expensive electricity to illustrate the opportunity cost of the five EPA regulations detailed above.

Our methodology is as follows:

1. Obtain or estimate municipal electricity expenses.

2. Multiply the electricity expense by the estimated percent increase in electricity due to each of the five EPA regulations to obtain the amount needed to cover the increased cost of electricity.

3. Divide the amount needed to cover the increased cost of electricity by each of the six alternative-use estimates to get the opportunity cost of the EPA regulation.

Policymakers have several options when adjusting the budget to account for increased electricity costs: they may choose to increase taxes, increase energy efficiency, decrease spending elsewhere and shift those funds to the electricity budget, or choose some combination of these options.

For simplicity, we only assess the tradeoffs that local policymakers may choose when they decide to pay for higher electricity costs by decreasing spending elsewhere. Though local government leaders may respond differently than the manner presented in this report, the message remains the same: in a world of limited resources, devoting resources to one purpose requires tradeoffs in another area.

Example

To demonstrate how our methodology works, we can calculate the opportunity cost of the Cross-State Air Pollution Rule (CSAPR) using a hypothetical city. EPA estimates that CSAPR will lead to an increase in the national average electricity price increase of 0.9 percent. If we assume a city has a total budget of $1,000,000,000 and spends $10,000,000 on its electricity needs, then our calculation of the opportunity cost of the increase in costs due to CSAPR is as follows:

1. City's electricity costs: $10,000,000.

2. Multiply the $10,000,000 electricity expense by the increase in electricity price due to CSAPR to get the extra amount needed to cover electricity costs:

    a. $10,000,000 x 0.9% = $90,000

3. Divide the increased amount needed to cover electricity costs by each of the six alternative uses to get the opportunity cost of implementing CSAPR:

    a. $90,000 / $55,875 = 1.6 teachers

    b. $90,000 / $60,270 = 1.5 police officers

    c. $90,000 / $46,870 = 1.9 firefighters

    d. $90,000 / $35 = 7 years of shelter for a homeless individual

e. $90,000 / $10 = 24.7 years of shelter for a homeless pet

f. $90,000 / $21.78 = 4132.2 potholes repaired

Limitations and Assumptions

As mentioned above, under ideal circumstances we would be able to collect a historical list of each municipality's electricity bill. Because this information is not available for every city, our limitations and assumptions are as follows:

1. Municipalities often lump the amount spent on electricity with other costs, such as the cost of other utilities or contracted services. A city may spend $1,000,000 on electricity, for example, but lump that cost into a general utilities budget of $3,000,000. These are the best available estimates, however, so we use these and acknowledge that our opportunity cost estimates for the EPA regulations may have an upward bias.

2. The estimated effect of each of the five regulations on the cost of electricity cannot be added together. Some studies estimated the increase in cost over a certain number of years and others gave an estimated price increase after a given year, such as after 2020 or 2030. We have not attempted to chain every estimate to the same dollar value in a given year and we do not consider the effect of a regulation on electricity prices on or after 2030.

   Instead, we are interested in the short-term effect of an increase in electricity prices and therefore will also assume that each regulation takes effect in the same year, such that our estimates would show the combined effect of all five regulations.[59] Because of variations in both baseline figures and analysis years for each regulation, EPA has determined that simply stacking regulations to determine a total price increase estimate is "inappropriate."[60] While we acknowledge these variables and realize that a certain percentage of costs may be shared across regulations, we feel that this report offers a valuable opportunity to provide a relatable estimate of associated costs.

   Additionally, though EPA deems it inappropriate to count the total price increase of each regulation and conclude that the total effect of the regulations is equal to the sum of the individual effects, studies by NERA Economic Consulting and Midcontinent Independent System Operator (MISO) indicate that doing so provides a reasonable expectation for the total increase in electricity prices.[61]

   NERA studied CSAPR, the CCR Rule, the CWIS Rule, and MATS, and determined that though Northwestern states may only see a 0.1 percent increase in electricity prices, coal-dependent states like Kentucky and Tennessee may see an increase in electricity rates of 13.5 percent.[62] MISO's study of the same four regulations projected an increase of seven percent or more.[63]

3. Though groups other than EPA attempted to quantify the effect on electricity price of at least one or more of the five EPA regulations we studied, for consistency we relied upon EPA's estimates for how each regulation would increase the price of electricity.

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59 Note that footnote number 66 on page 38 of the Government Accountability Office study states: "EPA officials told us that it would be inappropriate to add together its price increase estimates from these regulations because of differences in baselines and analysis years. EPA did not prepare an estimate of the overall impact of the four regulations." This primary purpose of our report, therefore, is to illustrate our point that there are costs and benefits, and that it would be helpful for EPA to state both the costs and benefits in terms of what the regulation means for people. See: http://www.gao.gov/assets/600/592542.pdf

60 United States Government Accountability Office (GAO). (July, 2012). EPA Regulations and Electricity: Better Monitoring by Agencies Could Strengthen Efforts to Address Potential Challenges. Retrieved from http://www.gao.gov/assets/600/592542.pdf

61 *Ibid.*

62 *Ibid.*

63 *Ibid.*

The intent of this report is to provide a rough calculation that allows people to see how the benefits that EPA projects for a regulation compare to the tradeoffs that local government leaders may make as they adjust city budgets for the effects of EPA regulation. Given the large number and scope of assumptions made in this report, these findings lack the empirical foundation to be considered conclusive, and so we invite further study.

Our study is meant to illustrate the point that in a world of scarce resources there are tradeoffs that must be made when we pursue a policy outcome. Those tradeoffs mean that some people or causes win and some lose, and it would be helpful for EPA to state the costs in terms of what society loses when more stringent environmental regulations are enacted, not just what it gains.

Local Opportunity Costs of EPA Regulation

Based on the methodology described above, Table 2 below shows our estimates of the combined opportunity costs of the five EPA regulations in seven cities. These cities were chosen to provide a sample of cities of different sizes and from different locations across the country. For clarity, we walk through the opportunity costs of Houston, Texas as an example. If the City of Houston did not have to pay the higher costs of electricity for public buildings, the city could employ 57 additional teachers, 53 policy officers, or 68 firefighters. Alternatively, they could provide shelter for a homeless person for about 251 years, shelter a homeless pet for 877 years, or repair 147,015 potholes. Detailed breakdowns of these opportunity costs, sorted by regulation for each city, are included in Appendix A.

Table 2: Estimated opportunity costs of the five EPA regulations

	Teachers	Police	Firefighters	Years of Shelter for a Homeless Person	Years of Shelter for a Homeless Pet	Repaired Potholes
Houston, TX	57	53	68	251	877	147,015
Chicago, IL	108	100	129	472	1,653	276,984
Los Angeles, CA	36	34	43	159	558	93,491
Denver, CO	29	27	34	126	442	74,103
Miami, FL	13	12	15	55	193	32,376
Logan, UT	2	2	2	9	32	5,281
Mobile, AL	3	3	3	12	41	6,927

Conclusion

Though it may not be the responsibility of EPA to present the opportunity costs of the regulations they implement, considering the full cost of a regulation is crucial to both the public and legislators when deciding if a regulation should be implemented. As we have demonstrated, EPA regulations could potentially have a significant impact on the services that local governments provide. Though the opportunity costs of EPA regulations presented in this report may not be the actual tradeoffs that local policymakers choose, these estimates provide a benchmark for thinking about the human costs and benefits of regulation.

EPA does a disservice to policymakers and the public by presenting the benefits of a regulation in relatable terms and failing to do the same for the costs of the regulation. Further, by ignoring the opportunity costs of a regulation, they fail to recognize the full cost of the regulation. When EPA does this, it highlights those who benefit and leaves unseen those who will be negatively affected by a regulation. No matter how well intentioned environmental regulations are, policymakers should carefully consider the opportunity costs of a policy before enacting additional regulations.

Appendix A: Local Opportunity Costs of EPA Regulation

Symbols

 : K-12 Teacher

 : Police

 : Firefighter

 : Years of Shelter for a Homeless Individual

 : Years of Shelter for a Homeless Pet

 : Potholes Repaired

Houston, Texas

City Budget[64]

Fiscal Year	Electricity Expenditures	City Expenditures	Percent of Budget
2010	$54,533,717	$1,916,387,314[65]	2.85%
2011	$50,657,504	$1,900,875,563[66]	2.66%
2012	$52,123,504	$1,810,550,855[67]	2.88%
2013	$50,269,249	$1,945,652,537[68]	2.58%
Average	$51,895,994	$1,893,366,567	2.74%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	8	2	1	18	27	56
	8	2	1	17	25	52
	10	2	1	22	32	67
	37	7	4	81	122	251
	128	26	13	284	427	877
	21,445	4,289	2,144	47,655	71,482	147,015

64 Operating expenditures from the adopted budget.

65 City of Houston. (n.d.). Adopted Budget Volume I: Fiscal Year 2012. Retrieved from http://www.houstontx.gov/budget/12budadopt/vol_1.pdf

66 City of Houston. (n.d.). Adopted Operating Budget Volume I: For the Period July 1, 2012 to June 30, 2013. Retrieved from http://www.houstontx.gov/budget/13budadopt/vol_1.pdf

67 City of Houston. (n.d.). Adopted Operating Budget Volume I: For the Period July 1, 2013 to June 30, 2014. Retrieved from http://www.houstontx.gov/budget/14budadopt/vol_1.pdf

68 City of Houston. (n.d.). Adopted Operating Budget Volume I: For the Period July 1, 2014 to June 30, 2015. Retrieved from http://www.houstontx.gov/budget/15budadopt/vol_1.pdf

Chicago, Illinois

City Budget[69]

Fiscal Year	Utility Expenditures[70]	City Expenditures	Percent of Budget
2013	$91,000,000	$6,540,100,000[71]	1.39%
2014	$97,100,000	$6,977,000,000[72]	1.39%
2015	$101,000,000	$7,339,200,000[73]	1.38%
2016	$102,000,000	$7,838,000,000[74]	1.30%
Average	$97,775,000	$7,173,575,000	1.36%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	16	3	2	34	52	106
	14	3	1	32	48	98
	18	4	2	41	61	126
	69	14	7	153	230	472
	241	48	24	536	804	1,653
	40,403	8,081	4,040	89,784	134,676	276,984

69 Operating (local fund) expenditures from the proposed city budget, excluding grants.

70 Sources for utility and city expenditures are the same. Utility expenditures include the price of electricity and natural gas.

71 City of Chicago. (n.d.). 2013 Budget Overview. Retrieved from https://www.cityofchicago.org/content/dam/city/depts/obm/supp_info/2013%20Budget/2013Overview.pdf

72 City of Chicago. (n.d.). 2014 Budget Overview. Retrieved from https://www.cityofchicago.org/content/dam/city/depts/obm/supp_info/2014%20Budget/2014Overview.pdf

73 City of Chicago. (n.d.). 2015 Budget Overview. Retrieved from https://www.cityofchicago.org/content/dam/city/depts/obm/supp_info/2015Budget/OV_book_2015_ver_11-24.pdf

74 City of Chicago. (n.d.). 2016 Budget Overview. Retrieved from https://www.cityofchicago.org/content/dam/city/depts/obm/supp_info/2016Budget/2016BudgetOverviewCoC.pdf

Los Angeles, California

City Budget[75]

Fiscal Year	Electricity Expenditures[76]	City Expenditures	Percent of Budget
2014	$31,913,000	$7,685,509,310[77]	0.42%
2015	$33,295,000	$8,122,942,937[78]	0.41%
2016	$32,930,000	$8,582,562,666[79]	0.38%
2017	$33,870,000	$8,776,961,274[80]	0.39%
Average	$33,002,000	$8,291,994,047	0.4%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	5	1	1	12	17	36
	5	1	<1	11	16	33
	6	1	1	14	21	42
	23	5	2	52	77	159
	81	16	8	181	271	558
	13,637	2,727	1,364	30,305	45,457	93,491

75 Operating expenditures from the adopted budget.

76 Sources for electricity and city expenditures are the same. Electricity expenditure is the sum of the General Services Electricity, Sanitation Electricity, Street Services Electricity, and Library Electricity budget items. Los Angeles has several departments that operate their own funds, including the Department of Recreation and Parks. We did not include the "Water and Electricity" budget items from these departments in our electricity expenditures estimate.

77 City of Los Angeles. (2013, May 29). Budget: Fiscal Year 2013-2014. Retrieved from https://d3n8a8pro7vhmx.cloudfront.net/controllergalperin/pages/278/attachments/original/1451511146/2013-2014_Adopted_Budget.pdf?1451511146

78 City of Los Angeles. (2014, May 27). Budget: Fiscal Year 2014-15. Retrieved from https://d3n8a8pro7vhmx.cloudfront.net/controllergalperin/pages/277/attachments/original/1451510583/2014-2015_Adopted_Budget.pdf?1451510583

79 City of Los Angeles. (2015, May 26). Budget: Fiscal Year 2015-16. Retrieved from https://d3n8a8pro7vhmx.cloudfront.net/controllergalperin/pages/268/attachments/original/1451502630/20152016budget.pdf?1451502630

80 City of Los Angeles. (2016, May 25). Budget: Fiscal Year 2016-17. Retrieved from https://d3n8a8pro7vhmx.cloudfront.net/controllergalperin/pages/389/attachments/original/1475704791/20162017Budget.pdf?1475704791

Denver, Colorado

City Budget[81]

Fiscal Year	Utility Expenditures[82]	City Expenditures	Percent of Budget
2013	$25,590,415	$1,377,859,000[83]	1.86%
2014	$27,254,529	$1,484,824,000[84]	1.84%
2015	$25,630,104	$1,179,766,448[85]	2.17%
Average	$26,158,349	$1,347,483,149	1.94%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	4	1	<1	9	14	28
	4	1	<1	8	13	26
	5	1	<1	11	16	34
	18	4	2	41	61	126
	65	13	6	143	215	442
	10,809	2,162	1,081	24,021	36,031	74,103

81 Actual budget.

82 Sources for utility and city expenditures are the same.

83 City and County of Denver. (n.d.). City and County of Denver: Mayor's 2015 Budget. Retrieved from https://www.denvergov.org/content/dam/denvergov/Portals/344/documents/Budget/Mayors_2015_Budget.pdf

84 City and County of Denver. (n.d.). City and County of Denver: Mayor's 2016 Budget Volume 1. Retrieved from https://www.denvergov.org/content/dam/denvergov/Portals/344/documents/Budget/2016/Mayors_2016_Budget.pdf

85 City and County of Denver. (n.d.). City and County of Denver: Mayor's 2017 Budget. Retrieved from https://www.denvergov.org/content/dam/denvergov/Portals/344/documents/Budget/2017/2017%20Budget%20Book_October%20Draft_Web%20Version.pdf

Miami, Florida

City Budget[86]

Fiscal Year	Utility Expenditures[87]	City Expenditures	Percent of Budget
2014	$10,729,700	$896,959,900[88]	1.2%
2015	$11,034,300	$936,459,100[89]	1.18%
2016	$11,613,000	$942,586,500[90]	1.23%
2017	$12,337,000	$979,351,100[91]	1.26%
Average	$11,428,500	$938,839,150	1.22%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	2	<1	<1	4	6	12
	2	<1	<1	4	6	11
	2	<1	<1	5	7	15
	8	2	1	18	27	55
	28	6	3	63	94	193
	4,723	945	472	10,494	15,742	32,376

86 Operating expenditures from the adopted budget.

87 Utility expenditures and city expenditures are from the same sources. We use the "Utility Services" budget item as an estimate for electricity expenditures.

88 City of Miami. (n.d.). Adopted Operating Budget: Fiscal Year 2013-2014. Retrieved from http://www.miamigov.com/Budget/pages/budget_books/FY14/FY14_Book_Adopted.pdf

89 City of Miami. (n.d.). Adopted Operating Budget: Fiscal Year 2015-2016. Retrieved from http://www.miamigov.com/Budget/pages/20152016/FY2016%20Adopted%20Operational%20Budget%20Book%20Final.pdf

90 City of Miami. (n.d.). Adopted Operating Budget: Fiscal Year 2015-2016. Retrieved from http://www.miamigov.com/Budget/pages/20152016/FY2016%20Adopted%20Operational%20Budget%20Book%20Final.pdf

91 City of Miami. (n.d.). Adopted Operating Budget: Fiscal Year 2016-2017. Retrieved from http://www.miamigov.com/Budget/pages/budget_books/FY17/FY17PROPOSEDBUDGET.pdf

Logan, Utah

City Budget[92]

Fiscal Year	Utility Expenditures[93]	City Expenditures	Percent of Budget
2012	$1,968,569	$97,858,690[94]	2.01%
2013	$2,026,527	$107,536,929[95]	1.88%
2014	$1,924,973	$103,379,651[96]	1.86%
2015	$1,537,341	$105,613,810[97]	1.46%
Average	$1,864,353	$103,597,270	1.8%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	<1	<1	<1	1	1	2
	<1	<1	<1	1	1	2
	<1	<1	<1	1	1	2
	1	<1	<1	3	4	9
	5	1	<1	10	15	32
	770	154	77	1,712	2,568	5,281

92 Expenditures from the actual budget.

93 Sources for utility and city expenditures are the same. Electricity expenditure estimate obtained by adding up all the "Utilities" budget items.

94 City of Logan. (n.d.). Council Adopted Budget: Fiscal Year 2014. Retrieved from https://docs.google.com/spreadsheets/d/1UI6tFBP9tY0t8HLIETOO2xHPjvDtb7qtw0S8ScDT0xo/edit#gid=454906596

95 City of Logan. (n.d.). Council Adopted Budget: Fiscal Year 2015. Retrieved from http://www.loganutah.org/departments/finance/budget/CouncilAdopted2015.pdf

96 City of Logan. (n.d.). Council Adopted Budget: Fiscal Year 2016. Retrieved from http://www.loganutah.org/departments/finance/budget/Council%20Final%20Budget%20FY%202016.pdf

97 City of Logan. (n.d.). Council Adopted Budget: Fiscal Year 2017. Retrieved from http://www.loganutah.org/departments/finance/budget/CouncilAdoptedFY17.pdf

Mobile, Alabama

City Budget[98]

Fiscal Year	Electricity Expenditures[99]	City Expenditures	Percent of Budget
2012	$2,447,875	$254,771,407[100]	0.96%
2013	$2,429,201	$268,584,797[101]	0.9%
2014	$2,407,790	$253,764,384[102]	0.95%
2015	$2,496,648	$256,583,342[103]	0.97%
Average	$2,445,379	$258,425,983	0.95%

Opportunity Costs of EPA Regulation

	CSAPR	CCR	CWIS	MATS	CPP	Total:
	<1	<1	<1	1	1	3
	<1	<1	<1	1	1	2
	<1	<1	<1	1	2	3
	2	<1	<1	4	6	12
	6	1	1	13	20	41
	1,010	202	101	2,246	3,368	6,927

98 Governmental fund (operating) expenditures from the actual budget.

99 Sources for electricity and city expenditures are the same. Electricity estimates found under the budget item labeled "Electricity."

100 City of Mobile. (n.d.). Comprehensive Annual Financial Report: For the Fiscal Year Ended September 30, 2012. Retrieved from http://www.cityofmobile.org/announcement_files/city_of_mobile_fy_2012_cafr.pdf

101 City of Mobile. (n.d.).Comprehensive Annual Financial Report: For the Fiscal Year Ended September 30, 2013. Retrieved from http://www.cityofmobile.org/announcement_files/fy_2013_cafr_final.pdf

102 City of Mobile. (n.d.). Comprehensive Annual Financial Report: For the Fiscal Year Ended September 30, 2014. Retrieved from http://www.cityofmobile.org/announcement_files/fy14_cafr_final.pdf

103 City of Mobile. (n.d.). Comprehensive Annual Financial Report: For the Fiscal Year Ended September 30, 2015.Retrieved from http://www.cityofmobile.org/announcement_files/FY15%20CAFR%20FINAL.pdf