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WHITE PAPER

Health and Economic Benefits of Clean Air Regulations

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Created in the 1970s during a unique period of environmental awareness across many facets of society, the U.S. Environmental Protection Agency (EPA) has been working ever since to make the air we breathe healthier for all Americans. Because of emissions reductions resulting from rules and regulations that the EPA has put in place over the past 40 years, it has been estimated that by 2020, 230,000 people per year will live longer and healthier lives than they would have in the absence of regulations. While this achievement didn't come without costs, it turns out we've netted at least \$1 trillion in health benefits.

Sadly however, despite progress, the air we breathe remains unhealthy in many parts of America. Tiny particles and gasses emitted by cars, trucks, factories, and power plants find their way deep into our lungs, leading to asthma attacks in the short run, and to heart diseases and lung cancer in the long run. While going indoors can help to avoid breathing the ozone smog that blankets urban areas in summer, there is literally no escape from the more deadly fine particles, which pass freely into our homes, schools and workplaces. Thus there is a pressing need for continued efforts to reduce outdoor air pollution, particularly in urban areas where concentrations are often highest.

In the past few years, another even bigger air pollution challenge has entered our consciousness: that of climate change. We understand that many of the same polluting sources that make cities unhealthy today are also emitting gases that heat up the entire planet now and into the far distant future. For cities already plagued by heat waves and floods, we can look forward to longer and more intense heat waves, bigger storms with more intense downpours, and a range of other potential consequences that we are only beginning to understand.

The EPA, recognizing the gravity of this new threat to human health, concluded in 2009 that it must begin regulating the warming pollutants (Greenhouse Gases, or GHGs) most responsible for climate change. EPA's argument was both simple and persuasive—failing to act will be bad for our health. EPA has also recognized the close interconnectedness of air quality, climate change and human health, and as a result has increasingly linked these issues in its proposed air quality regulations.

The imperative for clean, healthy air to breathe is everyone's concern. However, the burdens of adverse health impacts from both air pollution and climate change fall disproportionately in urban areas, where the air is dirtiest and where many of the most vulnerable populations reside. African Americans represent a particularly vulnerable subgroup both because they are more likely than other Americans to live in urban areas and also because they have higher rates of asthma and heart disease, predisposing factors for air pollution vulnerability.

To continue on the path towards the goal of healthy air for all, EPA continues to identify ways that the air can be made cleaner and healthier. In proposing new air quality regulations, EPA assesses and quantifies both the health benefits and the control costs that can be expected.¹ Translated into dollar terms, these assessments help us to compare the costs and benefits, asking the question, "Does it make economic sense for society to invest in cleaner air?"

In the next section of this white paper, we briefly summarize recent air quality-related rulemaking efforts of the EPA, highlighting the relationships between benefits and costs. This is followed by a discussion of equity considerations in air quality control. Finally, we discuss these findings in relation to public opinions on air quality and climate issues expressed in a new poll of African Americans living in three cities.

¹ In some instances, the Clean Air Act requires action regardless of the outcome of any cost-benefit assessment, such as in the case of setting National Ambient Air Quality Standards (NAAQS), which must be set a level that is protective of public health.

NEW EPA CLEAN AIR PROGRAMS: WHAT ARE THE COSTS AND BENEFITS?

Six new air quality regulations have been proposed and/or implemented by the EPA that are of primary interest from a human health perspective. All of these rules have either been finalized in 2011, or are currently in ongoing discussion periods. These are:

MOTOR VEHICLE RULES

Control of Greenhouse Gas Emissions from Medium and Heavy-Duty Vehicles a.k.a. Heavy-duty Vehicles GHG Emissions Standards

This is the first program of its kind aimed at reducing GHG emissions and improving fuel efficiency of medium- and heavy-duty vehicles. The proposed rule is aimed at addressing the interwoven challenges of dependence on oil, energy security, and climate change through the issuance of fuel consumption standards and emissions standards.

2017-2025 Model Year Light-Duty Vehicle Greenhouse Gas Emissions and CAFE Standards

This rule will apply to passenger cars, light trucks, and medium-duty passenger vehicles built in model years 2017-2025. Together, these vehicle categories are responsible for approximately 60 percent of all U.S. transportation-related fuel consumption and GHG emissions.

POWER PLANT RULES

Mercury and Air Toxics Standards (MATS or Utility Air Toxics Rule)

This rule will establish, for the first time, federal limits on emissions of hazardous air pollutants (HAPs), such as mercury and toxic acid gases, from all existing and new coal and oil-fired power plants. Numerical emission limits on mercury, particulate matter (as the surrogate for toxic non-mercury metals), and hydrogen chloride (as the surrogate for toxic acid gases).

Cross-State Air Pollution Rule (CSAPR)

This rule requires 27 states to significantly improve air quality by reducing power plant emissions that cross state lines and contribute to ozone and fine particle pollution in other states. This will be accomplished by requiring reductions in emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), which contribute to downwind particulate matter and/or ozone pollution.

INDUSTRIAL RULES

Emissions Standards for Boilers and Process Heaters and Commercial / Industrial Solid Waste Incinerators (Boiler MACT)

This rule provides first-time emissions standards that will control toxic air emissions, including mercury, acid gases, and toxic metals, from nearly 200,000 boilers, 100 industrial solid waste incinerators, and 200 sewage sludge incinerators.

Standards of Performance for Petroleum Refineries

This rule would modify existing standards of performance for petroleum refineries. These proposed standards reflect demonstrated improvements in emissions control technologies and work practices that have occurred since enactment of the current standards.

COSTS AND BENEFITS

The societal costs and benefits of each rule are estimated through a Regulatory Impact Analysis (RIA). The EPA writes and releases RIAs as part of the development of national air pollution regulations. RIAs contain descriptions of the potential social benefits and social costs of a regulation, including those that cannot be quantified in monetary terms and a determination of the potential net benefits of the rule including an evaluation of the effects that are not monetarily quantified.

Impact analyses are usually concerned with examining the types of costs (e.g., direct compliance costs, administrative costs, and recordkeeping costs) and the distribution of costs and benefits (e.g., among small businesses and individuals of various race, age, and income categories). They go beyond a strict benefit-cost analysis to examine various aspects of the composition and distribution of benefits and costs.

From a health perspective, there are several key health outcomes that are examined in each RIA. The primary health outcome that is of interest is premature air pollution-related deaths that can be avoided by enactment of the proposed rule. Other health outcomes that are commonly examined as a part of the RIA process are:

- Potential for avoiding cancer outcomes in the general public
- Emergency department visits and hospital admissions
- Development/progression of cardiovascular disease
- Acute / chronic bronchitis
- Exacerbation of asthma

A related way of measuring the impact of a proposed regulation involves calculating the amount of time that a person is required to spend away from school or work due to illness from pollution. While this is not a direct measure of health, it can be a useful proxy for understanding how bad health is impacting an individual, particularly from an economic perspective, because time away from work gives a quantifiable impact (the amount of money lost that would have been made, if a person had worked as usual).

Measuring the benefits that a piece of legislation can accrue represents a tricky problem, for exactly this reason.

The economics of health are not always immediately apparent. For example, what is the dollar amount of the benefit associated with one premature death due to a fatal heart-attack? Is the cost of medical care a sufficient measure for assessing the value of avoiding one visit to the emergency department for a child with asthma? These and other questions must be carefully analyzed in order to obtain an estimate of the benefits of a proposed rule on air quality.

Estimating the health benefits that are likely to occur due to a proposed regulation involves a multi-step analysis, involving the following components:



The monetized health benefits estimated via this procedure are then compared with the costs of achieving the air quality reductions, such as the cost of installation of air pollution control equipment on sources, and corresponding increases in costs to consumers.

EPA analyzed each of the six new air rules summarized above using this methodology, with extensive documentation available online on detailed methods and results. The table below, as well as the graph that follows, illustrate the overall costs and benefits of each of these pieces of legislation.

TABLE 1. Costs and Benefits^a of Proposed / Enacted Air Pollution Regulations

| | STATUS | COSTS | BENEFITS | CLIMATE / HEALTH IMPACT | TIME HORIZON |
|---|--------------------|-------------------------------------|------------------------------------|--|--|
| Motor Vehicle Rules | | | | | |
| Heavy duty vehicles GHG Emissions Standards | Final | \$8 billion (2009\$) | \$57.3 billion (2009\$) | Reduce GHG emissions by 270 million tons of CO ₂ -equivalent Save 530 million barrels of oil AQ will improve and health impacts will be reduced; est. health-related benefits ranging from \$1.3 to \$4.2 billion | Over the lifetime of vehicles sold between 2014-2018 Health Benefits estimate in 2030 |
| Light-Duty Vehicle GHG Emissions & CAFE Standards (2017-25) | Proposed | \$140 billion (2009\$) | \$561 billion (2009\$) | Reduce GHG emissions by almost 2 billion tons of CO ₂ -equivalent Save 3.9 billion barrels of oil Health benefits related to non-greenhouse gas pollutants | Over the lifetime of vehicles sold between 2017-2025 |
| Power Plant Rules | | | | | |
| Mercury & Air Toxics Standards (MATS or Utility Air Toxics Rule) | Proposed | \$10.9 billion (2007\$) | \$59-140 billion (2007\$) | Reduction in toxic air pollution 6.8-17 thousand avoided premature deaths | Annual |
| Cross-State Air Pollution Rule (CSAPR) | Final | \$2.4 billion ^b (2007\$) | \$120-280 billion (2007\$) | 6.4 million tons per year of SO ₂ - a 73% reduction 1.4 million tons per year of NO _x - a 54% reduction 13-34 thousand avoided premature deaths ^c | By 2014; annual |
| Industrial Rules | | | | | |
| Emission Standards for Boilers & Process Heaters and Commercial / Industrial Solid Waste Incinerators | Final ^e | \$1.4 billion (2008\$) | \$22-54 billion (2008\$) | Reduction in toxic air pollution 2.6 thousand avoided premature deaths ^d | In 2014; annual |
| Standards of Performance for Petroleum Refineries | Proposed | \$31 million (2006\$) | \$220 million-1.9 billion (2006\$) | Reduction of benzene emissions by 53 thousand tons annually Reduction of VOC emissions by 277 thousand tons annually Avoided premature mortality calculated referencing literature, based on emissions reductions | 5th year after proposal is enacted |

^a All discounted at 3% to net present value

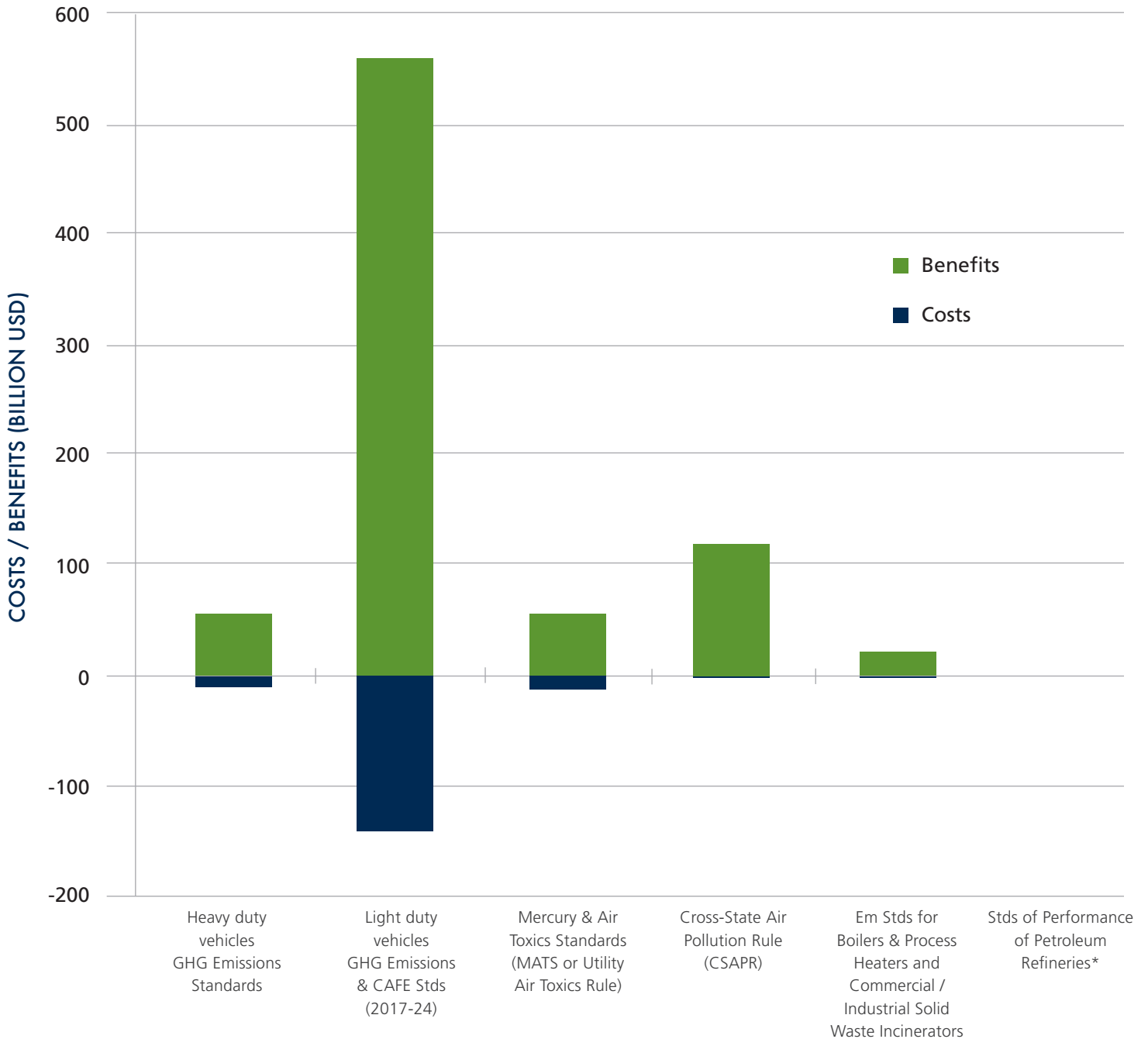
^b \$1.6 billion in capital expenditures, \$800 million annual costs

^c Also quantified reduction in non-fatal heart attacks, hospital and ER visits, acute bronchitis, Upper and Lower Respiratory illness, aggravated asthma, and lost work / school days

^d Also quantified reduction in non-fatal heart attacks and asthma attacks

^e EPA proposed revisions to the final rule through the reconsideration process; rule for major sources is stayed pending finalization of these changes

FIGURE 1. Maximum Costs and Minimum Benefits associated with each Air Pollution regulation, as listed above (see table for details)



*Note: The costs and benefits associated with Standards of Performance for Petroleum Refineries are in millions, and therefore appear close to 0 on the scale of this figure.

We see from these results that all six new rules demonstrate substantial excesses of benefits over costs, suggesting that the rules make good economic sense. Of particular importance for urban residents are the two motor vehicle rules. Urban air pollution tends to be dominated by motor

vehicle emissions; thus reductions of those emissions can be particularly beneficial for people living in cities. The most beneficial of these rules is the light-duty vehicle rule, with \$561 billion in benefits and \$140 billion in costs, yielding net societal benefits of \$421 billion.

In July 2010, the EPA released their Interim Guidance document for “Considering Environmental Justice (EJ) during the Development of an Action”. The guidance was designed to help the EPA staff incorporate EJ into the process the EPA uses for developing regulations. Although the guidance does not specifically address the steps of the RIA process, it does provide ways of identifying disproportionately high and adverse effects of alternative actions and recommends specific methods to analyze the effects of a regulatory action on minority and low-income populations.

EPA defines “environmental justice” (EJ) as the **fair treatment** and **meaningful involvement** of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA’s implementation of its EJ program has expanded the concept of fair treatment to include not only the consideration of how burdens are distributed across all populations, but also how benefits are distributed. Thus, EPA seeks to not only evaluate the distribution of burdens by paying special attention to populations that have historically borne a disproportionate share of environmental harms and risk, but also is encouraged to look at the distribution of the positive environmental and health consequences from human activities.

Based on a review of the six RIAs discussed here, it is clear that EPA has yet to incorporate EJ considerations into its assessment of the costs and benefits of proposed air quality regulations. This is not to say that these regulations will not benefit minority and low income communities, but rather that EPA has not yet systematically assessed or quantified the possible disproportionate costs and benefits. To the extent that minority and low income communities currently bear the brunt of elevated air pollution concentrations and associated health risks, such communities also would likely benefit the most from new emissions controls. This general statement would be particularly true for reductions in motor vehicle emissions, the dominant air pollution source in most urban areas.

Only the CSAPR RIA specifically incorporated EJ considerations. Potential impacts on low-income, minority, and tribal communities were examined in several ways, including:

- A. The structure of the rule and responses to comments received on the proposed rule on issues specific to these communities;
- B. Expected SO₂ and NO_x emission reductions;
- C. Expected PM_{2.5} and ozone air quality improvements;
- D. Expected health benefits, including asthma and other health effects of particular concern for environmental justice communities; and
- E. Quantitative assessments of the expected socioeconomic distribution of a key health benefit (reduction in premature mortality).

The distributional analysis (E) estimated the particle-associated mortality risks according to race, income, and educational attainment before and after implementation of the Transport Rule. Based on their assessment, the EPA concluded that the final CSAPR will provide significant health and environmental benefits to low income, minority, and tribal individuals in both rural areas and inner cities in the region affected by this rule. This includes, among others, people with asthma, people with heart disease, and people living in ozone or fine particle (PM_{2.5}) nonattainment areas.

The EJ analysis included in the CSAPR RIA represents an important step in the right direction. A recent paper authored by EPA scientists discussed some of the challenges and examined further methods for assessing the distribution of health benefits in low income, minority communities based on a case study in Detroit, MI.

WHAT DO PEOPLE THINK?

In conjunction with this White Paper, the Joint Center for Political and Economic Studies conducted a survey of African American adults in three cities (Atlanta, Cleveland and Philadelphia) regarding views about air quality, climate change, and the need for regulations to control these problems. As described in the research brief by Dr. David A. Bositis, the survey questions probed respondents about the air quality where they lived, the sources of pollution, and also about their views of EPA regulations that seek to reduce health risks and costs. The questions about EPA regulations were clearly framed to present both costs and benefits to the American public.

Though the survey and White Paper were not designed in such a way that the findings could be directly linked, it is interesting to note that, by and large, the survey results support the analytical findings presented in the current paper. In particular, a strong majority of survey respondents view air pollution and climate change as serious issues that warrant government action. Approximately 80 percent of survey respondents feel that air pollution and greenhouse gas regulations are a good investment, in spite of the associated costs. This agrees remarkably well with the careful analyses reported in the paper showing that benefits far outweigh costs for new regulations.

The close correspondence between public opinion and analytical findings pointing to the health and economic benefits of further air quality improvements should provide a strong mandate for action by the federal government.

CONCLUSION

Beginning the 1970s, the U.S. Environmental Protection Agency has been working to make the air we breathe healthier for all Americans. However, despite considerable progress, the air we breathe remains unhealthy in many parts of America. Tiny particles and gasses emitted by cars, trucks, factories, and power plants find their way deep into our lungs, leading to asthma attacks in the short run, and to heart diseases and lung cancer in the long run. There is a pressing need for continued efforts to reduce outdoor air pollution, particularly in urban areas where concentrations are often highest.

Towards this end, EPA continues to identify ways that the air can be made cleaner and healthier. In proposing new air quality regulations, EPA assesses and quantifies both the health benefits and the control costs that can be expected. Translated into dollar terms, these assessments help us to compare the costs and benefits, asking the question, “Does it make economic sense for society to invest in cleaner air?”

Careful, scientifically rigorous regulatory impact analyses show that air quality improvements typically result in benefits that far outweigh costs. While differential benefits for low income and minority communities may be realized, these have not typically been addressed in EPA’s analyses to-date. Opinions expressed by African Americans in three large US cities generally support the notion that clean air is worth paying for.

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Patrick L. Kinney is Professor of Environmental Health Sciences and Director of the Columbia University's Mailman School of Public Health's Program on Climate and Health. Professor Kinney's teaching and research address issues at the intersection of global climate, air quality, urbanization, and human health. He has published on the health effects of air pollution, and on future health impacts of alternative climate change and pollutant emissions scenarios. Professor Kinney received his masters and doctoral degrees at the Harvard School of Public Health.

Amruta A. Nori-Sarma is currently a Masters candidate in the Environmental Health Sciences program at Columbia University's Mailman School of Public Health. Her research interests focus on air quality impacts on health, and the influence of climate change on this relationship. Prior to joining Mailman, Amruta worked in Investment Banking, publishing financial research at the intersection of environmental and social governance and socially responsible investing. Amruta has BSE in Civil and Environmental Engineering from Princeton University.

ABOUT THE JOINT CENTER

The Joint Center for Political and Economic Studies is the nation's leading public policy and research institution focusing on issues of concern to African Americans and other communities of color. Founded in 1970 in wake of the Voting Rights Act's passage, the Joint Center plays a key role in encouraging civic and political participation in the African American community and strengthening the leadership skills of black elected officials. Through its scholarly research, distinctive analyses of issues and convening of forums and networking opportunities, the Joint Center helps guide the policy process toward practical solutions on America's most challenging issues—and toward a better future for all Americans.

Ralph B. Everett is the President and CEO of the Joint Center for Political and Economic Studies, a leading think tank that focuses on issues of concern to African Americans and other people of color. In heading the Joint Center, he has strengthened the organization's research

and policy activities in the areas of economic opportunity and health equity, while expanding the organization's focus into new areas such as broadband access and energy and environment. He previously spent 18 years as a specialist in telecommunications and transportation policy at the law firm of Paul, Hastings, Janofsky & Walker LLP, where he became its first African American partner and served as Managing Partner of the Washington, DC Office for a number of years. Prior to that, Mr. Everett had worked in the U.S. Senate for more than a decade, including serving as staff director and chief counsel of the Committee on Commerce, Science and Transportation.

He is currently on the boards of Cumulus Media Inc., Duke University School of Law Board of Visitors, the National Coalition on Black Civic Participation, and Independent Sector. He is also a member of the Economic Club of Washington, Alpha Phi Alpha Fraternity and Sigma Pi Phi Fraternity. In 1998, President Clinton appointed Mr. Everett as U.S. Ambassador to the International Telecommunications Union's Plenipotentiary Conference. That year, he was also chosen to lead the U.S. Delegation to the Second World Telecommunication Development Conference in Malta, joining participants from more than 190 nations. In 2008, Mr. Everett was a team lead for the Obama-Biden Transition Project Agency Review Working Group responsible for overseeing the U.S. Department of Commerce. His past service includes being a member of the boards of the National Urban League, Connected Nation, Center for National Policy, the Federal Communications Commission's Advisory Committee on Diversity for Communications in the Digital Age and the President's Board of Advisors on Historically Black Colleges and Universities.

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