Regulatory Policy

How agencies justify their rules is an area of growing focus, particularly as environmental economics has evolved to contemplate the co-benefits of rulemakings. In this piece, the NERA consultancy's Scott Bloomberg details why EPA's projections of regulatory impacts do not take cleaner air into account and do not appropriately acknowledge uncertainties.

EPA's Particulate Matter Co-Benefits: A Case of Ever-Declining Credibility

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Regulatory impact analyses are required for major federal regulations. A central feature of a regulatory impact analysis is comparison of a rule's estimated benefits to its estimated compliance costs. The benefits attributed to a rule may include ''co-benefits''— beneficial impacts that are not the direct objective of the regulation. One might expect co-benefits to play only a subsidiary role in the justification for a new regulation. But the opposite has become the norm in impact analyses for EPA's air rules, in which direct benefits of each new rule are, more frequently than not, over-

whelmed by estimates of co-benefits from ambient fine particulate matter (PM-2.5).

The dominant role of PM-2.5 co-benefits in EPA's regulatory analyses has been questioned for many years, including in Supreme Court oral arguments last year regarding EPA's 2011 power plant rule on emissions of mercury and air toxics. In that case, *Michigan v. EPA*, Chief Justice John Roberts questioned the "disproportionate" nature of the mercury and air toxics rule's PM-2.5 co-benefits, suggesting they might represent an "end run around" national ambient air quality standards. The chief justice's questioning focused on the appropriateness of a pollutant that already has its own regulatory framework taking on such a dominant role as a co-benefit for another type of pollutant.

In this commentary, I wish to bring attention to a separate and additional concern related to the *credibility* of those co-benefit estimates. Issues also have been raised about the credibility of the mercury rule regulatory impact analyses co-benefits, but the point is that the credibility of $PM_{2.5}$ co-benefits also is declining as they accumulate in more and more impact analyses. The cause of the declining credibility lies in the inconsistent manner in which EPA calculates PM-2.5 co-benefits relative to EPA's ambient air standards determination and the fact that the air is getting cleaner.

This issue, while certainly present in the mercury impact analysis, is even more troubling in regulatory impact analyses submitted to the Office of Information and Regulatory Affairs since 2011. To make the point, the focus should be on one of the most recent impact analyses containing PM-2.5 co-benefits estimates–the Clean Power Plan or climate rule regulatory analysis finalized in 2015. The climate rule targets CO_2 emissions, so any benefits ascribed to CO_2 reductions would be "benefits," whereas any benefits attributable to reductions in other emissions (such as PM-2.5 and ozone precursors like SO_2 and NO_x) would be "co-benefits."

What Is the Nature of the Inconsistency?

In a recent article in the journal *Risk Analysis*, Anne Smith identifies inconsistencies between the way EPA calculates criteria pollutant benefits and co-benefits in its impact analyses and the reasoning that the EPA administrator applies when determining the level at which to set the air standards. Smith notes that co-benefits estimates are exceptionally susceptible to the credibility issues that arise from such inconsistency, pointing to both the mercury and the climate rule for power plants' co-benefits as examples.

As detailed in Smith's article, the Clean Air Act requires the air standards be set at a level that the EPA administrator determines is "requisite to protect the public health" with "an adequate margin of safety," based on the best available scientific evidence on health effects. But the epidemiological associations that are the basis for the PM-2.5 NAAQS are not able to define a clear point at which public health is protected (*i.e.*, no threshold has yet been identified). In that situation, the EPA administrator turns to the question of "confidence" in the continuation of those associations below the observed range of concentrations to help draw a line:

In reaching decisions on alternative standard levels to propose, the administrator judged that it was most appropriate to examine where the evidence of associa- *tions observed in the epidemiological studies was strongest and, conversely, where she had appreciably less confidence in the associations observed in the epidemiological studies.*

In 2013, after reviewing the scientific information, EPA set the annual PM-2.5 National Ambient Air Quality Standards at 12 ig/m³ because the Administrator determined that to be the point. . .

. . . where her confidence in the magnitude and significance of the associations is reduced to such a degree that a standard set at a lower level would not be warranted to provide requisite protection that is neither more nor less than needed to provide an adequate margin of safety.

These "associations" are the very foundation of EPA's co-benefits calculations, and thus the above statement strongly implies a near-zero confidence in continued health risks calculated at ambient concentrations of $PM_{2.5}$ below the ambient air quality standards. Logically, this can be translated to mean that the expected health risk change from a given unit of change in PM-2.5 at an ambient PM-2.5 concentration of 5 $\mu g/m^3$ would be significantly less than from the same unit of change starting at 13 $\mu g/m^3$.

As demonstrated in Smith's article, however, EPA's methodology for calculating health co-benefits ignores this lack of confidence in health risks continuing below the level of the PM-2.5 air standard, and instead assigns an equal confidence (*i.e.*, 100 percent confidence) that the PM-2.5-mortality associations hold true all the way down to a zero concentration. This is the primary source of EPA's inconsistency with the air standard determination, and she explains how this results in substantial overstatement of expected benefits, particularly in the case of PM-2.5 health co-benefits.

Overstatement of PM-2.5 Co-Benefits Increasing

Smith's article notes that this overstatement is extremely large when the calculation is for co-benefits rather than direct benefits of the air quality standard itself, citing the co-benefits in the mercury and climate rule as two recent examples. She does not, however, note that the degree of overstatement is even larger for the climate rule than the mercury case. However, that is the logical implication of the inconsistency problem. As the ambient air in the U.S. gets cleaner, a greater share of the population will be living in areas where confidence in the continued association between $PM_{2.5}$ and mortality is near zero. Thus, the degree of overstatement in co-benefits estimates from one regulatory analysis to the next has been increasing over time and will continue to do so. Let's illustrate how this works using these same two regulatory impact analyses.

In both the mercury and climate rule impact analyses, EPA estimated PM-2.5 co-benefits in the tens of billions of dollars per year. The diminished confidence of the EPA Administrator that the PM-2.5-mortality association continues below the ambient air quality standard, however, is not reflected in any manner in EPA's calculations of these co-benefits.

For the mercury rule, these co-benefits accounted for more than 99 percent of total benefits, which was the basis for Chief Justice Roberts' concern regarding their "disproportionate" share. Their inclusion was the only

reason EPA could justify the rule on a benefit-cost basis. In the CPP, approximately 50 percent of total benefits is attributable to co-benefits, primarily from PM-2.5, but also from ozone. While the share of total benefits attributable to co-benefits is lower in the climate than in the mercury rule, the climate rule's co-benefits estimates are actually more unreliable.

In the mercury RIA, EPA provides data showing that essentially all of the co-benefits are associated with avoided deaths in areas projected to already be below the annual PM-2.5 standard of 12 $\mu g/m^3$ (89 percent are below 10 $\mu g/m^3$ and 27 percent are below 7.5 $\mu g/m^3$). EPA did not provide similar information for the climate rule, but in a recent study for the Virginia Department of Environmental Quality, NERA determined that 99 percent of the 2025 PM-2.5 precursor emission reductions in the proposed climate rule were projected to occur in counties with an expected PM-2.5 concentration in 2020 less than 12 ig/m^3, of which 97 percent are below 10 ig/m^3 and 55 percent are below 7.5 $\mu g/m^3$.

Thus, compared to the mercury co-benefits, the proposed climate rule has double the co-benefits in areas with expected PM-2.5 concentrations very far below the ambient air quality standards (55 percent versus 27 percent in areas less than 7.5 ig/m^3), while the fraction of co-benefits in areas at least 15 percent below the air standard (*i.e.*, less than 10 ig/m^3) has also increased substantially (*i.e.*, to 97 percent from 89 percent). The simple reason for this is that the mercury co-benefits were based on air quality projected in 2015, while the Clean Power Plan co-benefits were based on air quality from 2020 and later—a much cleaner environment due to a very large number of emissions regulations poised to take effect after 2015.

While some, including Chief Justice Roberts, have questioned the ''legitimacy'' of EPA's co-benefits in the mercury rule, the PM-2.5 co-benefits in the climate rule are even more unreliable and overstated because a far greater share of those co-benefits are associated with ever lower PM-2.5 concentrations for which the EPA itself has significantly reduced confidence in PM-2.5-mortality associations. The continuing decline of SO_2 and NO_X emissions, and hence, ambient PM-2.5 concentrations, over time will continue to increase the degree of overstatement of EPA's PM-2.5 co-benefits in each incremental air regulatory impact analysis going forward.

Conclusion

Smith's article in *Risk Analysis* has brought attention to the fact that the PM-2.5 co-benefits that pervade EPA's regulatory analyses for air standards are misleadingly presented because they do not reflect EPA's own diminished confidence in risks in areas of the country with air quality that already easily meets EPA's own public health standards. Her article cites the co-benefits in the mercury and climate impact analyses as examples. This commentary explains how the PM-2.5 co-benefits in each successive new regulatory analysis are becoming less credible, as they are increasingly affected by the inconsistencies first described by Smith. This situation can lead to false benefit-cost comparisons, particularly as EPA has been relying on health co-benefits for an increasing share of its total benefits over the last decades.

Until EPA's method for assessing benefits in its regulatory impact analyses is made to be consistent with its own regulatory determinations, one can only expect criteria pollutant co-benefits to become even more overstated and unreliable over time. While the mercury rule impact analysis is a prime example of excessive over-reliance on co-benefits, the co-benefits EPA has attributed to the regulatory analysis of the Clean Power Plan are subject to an even greater degree of overstatement.