# **Environmental Economics**

## **ISSUE SUMMARY:**

Benefit-cost analysis (BCA) and other economic analyses have been an integral part of executive branch rulemaking for decades. EPA's environmental economic expertise supports economic analysis in its regulatory and other programs. EPA routinely values the social costs of its regulations as well as the environmental and public health benefits, including reductions in premature deaths and reduced impacts of climate change. However, other important benefit categories, such as those related to reduced toxic chemicals (e.g., to support Toxic Substance Control Act (TSCA) implementation) or improvements in water quality have remained limited in EPA's analyses and will require further research to support their inclusion. In addition to analyzing aggregate costs and benefits, EPA frequently includes analyses of potential employment and environmental justice impacts in its regulatory analyses, which typically reflect assessments of baseline conditions. While EPA has been successful at improving the consistency and quality of its employment and environmental justice analyses, extending the analyses to evaluate how policies affect these baseline conditions will require research to fill data and methodological gaps.

#### BACKGROUND:

Presidents since the 1970s have issued executive orders requiring agencies to analyze the economic consequences of regulations as part of the rulemaking development process. The most recent iteration of these requirements, Executive Order 14094 issued in 2023, supplements and reaffirms the principles, structures, and definitions governing regulatory review established in Executive Order 12866 issued in 1993. In addition, the Office of Management and Budget recently updated general guidance to federal agencies for conducting benefit-cost analysis and other types of economic analyses for rulemakings, referred to as Circular A-4. EPA is in the process of updating its economic guidelines (*EPA's Guidelines for Preparing Economic Analyses*) that provide agency analysts with SAB-reviewed guidance on best practices regarding the analysis and presentation of benefits, costs, and distributional impacts of regulatory and non-regulatory EPA actions. These economic analyses provide key information for decision makers and serve as a report to the public on the expected environmental and health benefits, costs, and impacts that expected to result from investing in environmental protection.

#### **Recent Accomplishments:**

The EPA maintains an economy-wide model of the United States named SAGE, which is a recursive acronym for Applied General Equilibrium Model. The SAGE model provides the agency with a powerful analytic tool for understanding of the economic impacts of the agency's environmental policies and regulations. The model was built in response to advice the agency received in a 2017 final report from the Science Advisory Board on the role of economy-wide models to inform regulatory analysis. The SAB's 2020 review of the SAGE model commended the agency on its development of a well-designed open-source model for use in regulatory analysis. The EPA used SAGE for the first time in support of a rulemaking in 2024 (the 111b and 111d rules on the electricity sector), which facilitated analysis of the expected sectoral and macroeconomic shifts in addition to the distribution of economic impacts. Current work aims to expand the model's capacity to ensure its continued ability to evaluate the economy-wide implications of environmental regulations, including integrating additional details for key

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economic sectors (e.g., electricity), linking the SAGE model to EPA's sector-level engineering and economic models, and transitioning to fully open-source data for greater transparency. EPA's economy-wide modeling also provides a platform to investigate the economic benefits of reducing environmental hazards, such as climate change.

In December 2023, EPA completed a comprehensive update of the Social Cost of Greenhouse Gas (SC-GHG) estimates used in EPA analyses. The SC-GHG metric allows decision makers and the public to better understand and evaluate the climate change effects of a policy action and its alternatives. The update incorporates the best available science and economics and the recommendations of the National Academies of Sciences, Engineering and Medicine. Following the completion of a public comment period and external peer review, this set of SC-GHG estimates has been applied in numerous EPA regulatory impact analyses and are starting to be used by a range of other entities, including other Federal regulatory agencies, states, and Canada.

The EPA has improved its ability to more fully quantify the benefits of regulating toxic chemicals in recent regulatory analyses. The EPA has applied findings from peer-reviewed epidemiological and economics studies to expand the set of avoided health effects it is able to quantify and value, such as cardiovascular mortality, attention deficit hyperactivity disorder, and low infant birth weight from reductions in lead and PFAS exposure. In addition, the EPA, as part of a cross-country effort under the OECD, has developed new empirical estimates of the value of avoiding health effects such as kidney disease, infertility, and very low birth weight. However, there remain many cases where EPA is unable to quantify and value the benefits of avoided health effects.

The EPA is also revising technical guidance (Technical Guidance for Assessing Environmental Justice in Regulatory Analysis) to assist Agency analysts in assessing environmental justice for Agency regulatory development. This latest guidance considers EPA's past experience in evaluating environmental justice as part of the rulemaking analytic process and underscores the EPA's ongoing commitment to ensuring the just treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The EPA is in the process of updating the technical guidance to reflect the current state of the science, new peer-reviewed Agency guidance, and new terminology, priorities, and direction (including Executive Order 14096). The document is under expert review by the Science Advisory Board. Finalization of the revised guidance is expected by the end of 2024.

#### KEY EXTERNAL STAKEHOLDERS:

# ☑ Congress☑ NG0

☑ Industry☑ States☑ Local Governments

□ Tribes
□ Media
○ Other Federal Agency
○ Other (name of stakeholder) <u>Academia</u>

- Congress, industry, states, and NGOs are frequently interested in EPA's economics work.
- Other federal agencies are engaged in the social cost of greenhouse gases work.
- DOT, FDA, and CPSC, as well as industry, states, and media will be interested in EPA's mortality risk valuation work.

## MOVING FORWARD:

EPA currently uses BCA routinely to quantify the benefits from reductions in criteria air pollutants and

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greenhouse gases; however, future regulatory activity (e.g., EPA's implementation of the bipartisan reform of TSCA) will require further research in the near-term to be able to quantify the benefits from reductions in toxic chemicals and more fully inform the implementation process. A challenge that remains is quantifying health effects from reduced exposure to chemicals for which there is robust evidence from animal studies about harmful effects, but epidemiological evidence in human populations is lacking. The World Health Organization has developed methods to use animal experimental evidence to estimate dose-response functions in humans accounting for many dimensions of uncertainty. The EPA is well poised to build its capacity to apply these methods in future regulations. Through increased collaboration across program offices EPA could ensure that this capacity is developed and applied in future regulatory analyses.

Continued research on climate change damages to address the longer-term recommendations of the National Academies will be important to maintaining a rigorous analytical foundation for the SC-GHG estimates for use in designing and evaluating regulations affecting GHG emissions. Research on climate change damages not yet represented in the SC-GHG estimates will also improve understanding of the domestic effects of climate change, which could aid in analysis, communication, and evaluations of adaptation strategies.

While EPA's regulatory analyses increasingly quantify employment and environmental justice implications of regulatory proposals, additional investments can help address data and methodological challenges eto improve and broaden the types of rules that are able to quantify benefits and economic impacts.

Moving forward, EPA will need guidance and decisions on the following:

- to determine how aggressively to pursue investments in better benefits quantification, as well as in enhanced employment impact and environmental justice analyses;
- on the priority for more comprehensive benefits assessments in the rule making process and the extent to which investments should be made in benefits assessment of toxic chemicals.

## LEAD OFFICE/REGION: OP OTHER KEY OFFICES/REGIONS: OAR, OW, OCSPP, OLEM, ORD