

# The Role of Benefit Cost Analysis at EPA

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This presentation reflects the view of the author and not necessarily the views of the U.S. Environmental Protection Agency.

I'm going  
to talk  
about...

How Benefit  
Cost Analysis  
fits into the  
rulemaking  
process

Benefit  
Analysis leads  
to a better  
Regulatory  
Agenda

The Ways  
BCA  
contributes to  
better  
decision  
making

Expanding  
our WQ  
benefits  
capability is  
crucial

# Regan's Executive Order 12291 (1981)

- Probably intended to impede regulation
  - Required OMB review of all significant regulations
  - Required a Benefit Cost Analysis for all “Economically Significant Regulations”
- EPA was not ready; nor was environmental economics. EPA did not have economists. Nor did we have the body of research needed to quantify benefits (or costs) properly.
- The E.O. clearly changed policy making. But probably not in the way the Regan Administration intended. (We don't know the counterfactual).
  - Integrity of the OMB economists and desk officers
  - Success of Benefits estimation enterprise – I have commented before that EPA is the retail operation, but the academic research community is the wholesale operation. Together, we have been remarkably successful quantifying benefits.
  - Benefits transfer shows EPA where to find “net benefits” and hence provides direction for the regulatory agenda.
- Every President since has had similar Executive Orders.

# President Clinton's Executive Order 12866

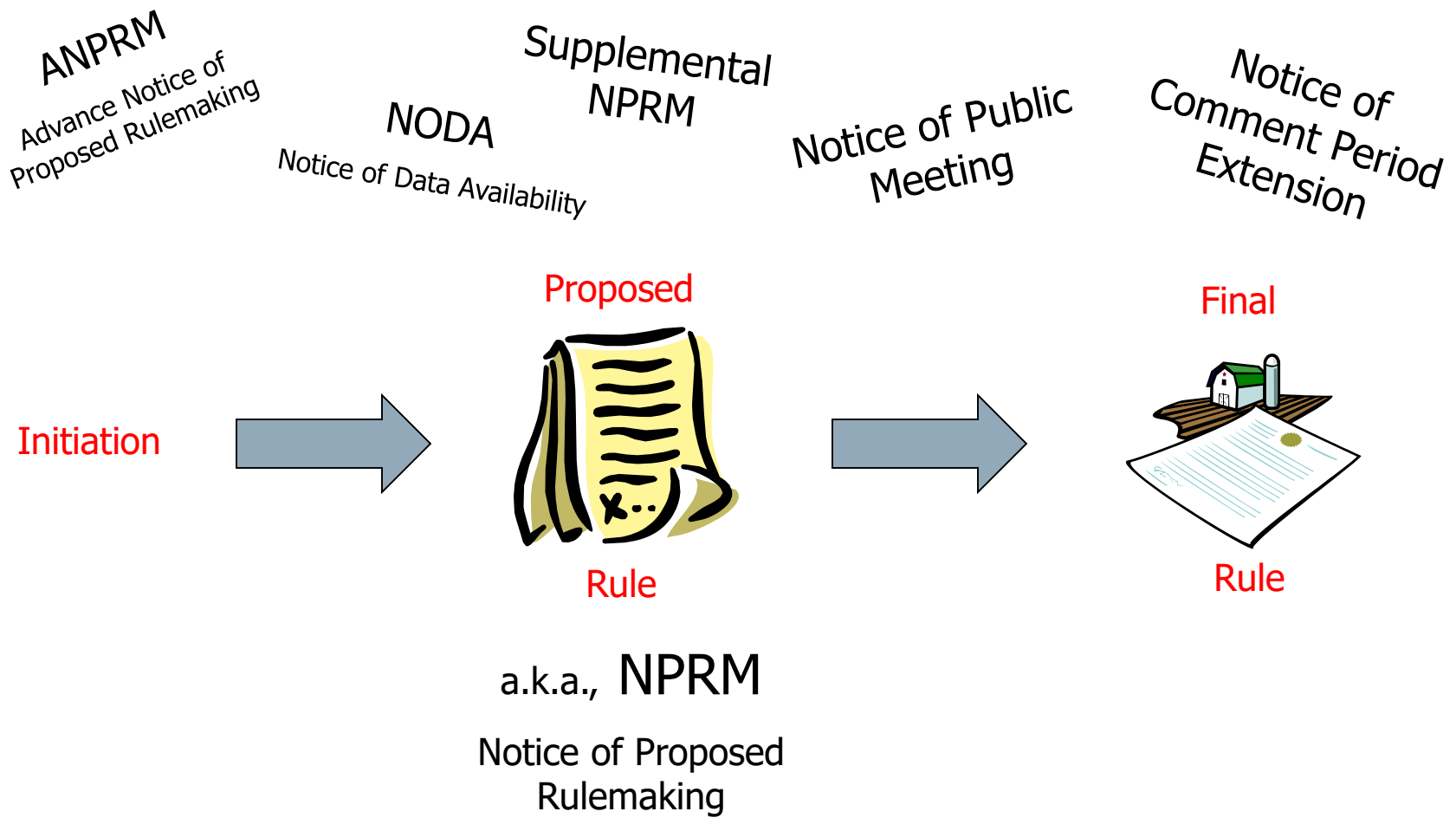
- In Deciding Whether and How to Regulate
  - Assess all costs and benefits of all alternatives
  - Include option of not regulating
  - Both quantifiable and non-quantifiable measures
- Benefits are more expansive. They include:
  - Economic
    - Distributive impacts
  - Environmental
    - Equity
  - Public health and safety
- Propose Regulation
  - “Upon a reasoned determination that the benefits of the intended regulation justify its costs”

# Successful Benefit Analysis Often leads to additional regulation. Examples

- **More rapid phaseout of lead in Gasoline (mid 1980s)**
  - EPA survey data suggested wide-spread cheating – burning leaded gas in cars with catalytic converters.
  - EPA undertook a BCA. Effort developed methods for quantifying lead benefits still in use today.
  - Would not have been possible but for the BCA.
  - **Subsequent efforts led to regulations limiting lead in drinking water, plumbing fixtures, lead free solder, lead dust in home, lead NAAQS (2008)**
- **Particulate Matter Regulations (In pursuit of large net benefits)**
  - John Graham in the George W. Bush Administration prompted EPA to do more PM regulation.
  - Our press releases and summaries of these regulations routinely include statements about benefits and costs.
  - Mercury Air Toxics rule, Clean Air Interstate rules (Transport rule), Nox SIP calls, PM NAAQS, diesel exhaust, sulfur in diesel
  - Emphasis on PM reductions continues to the present.

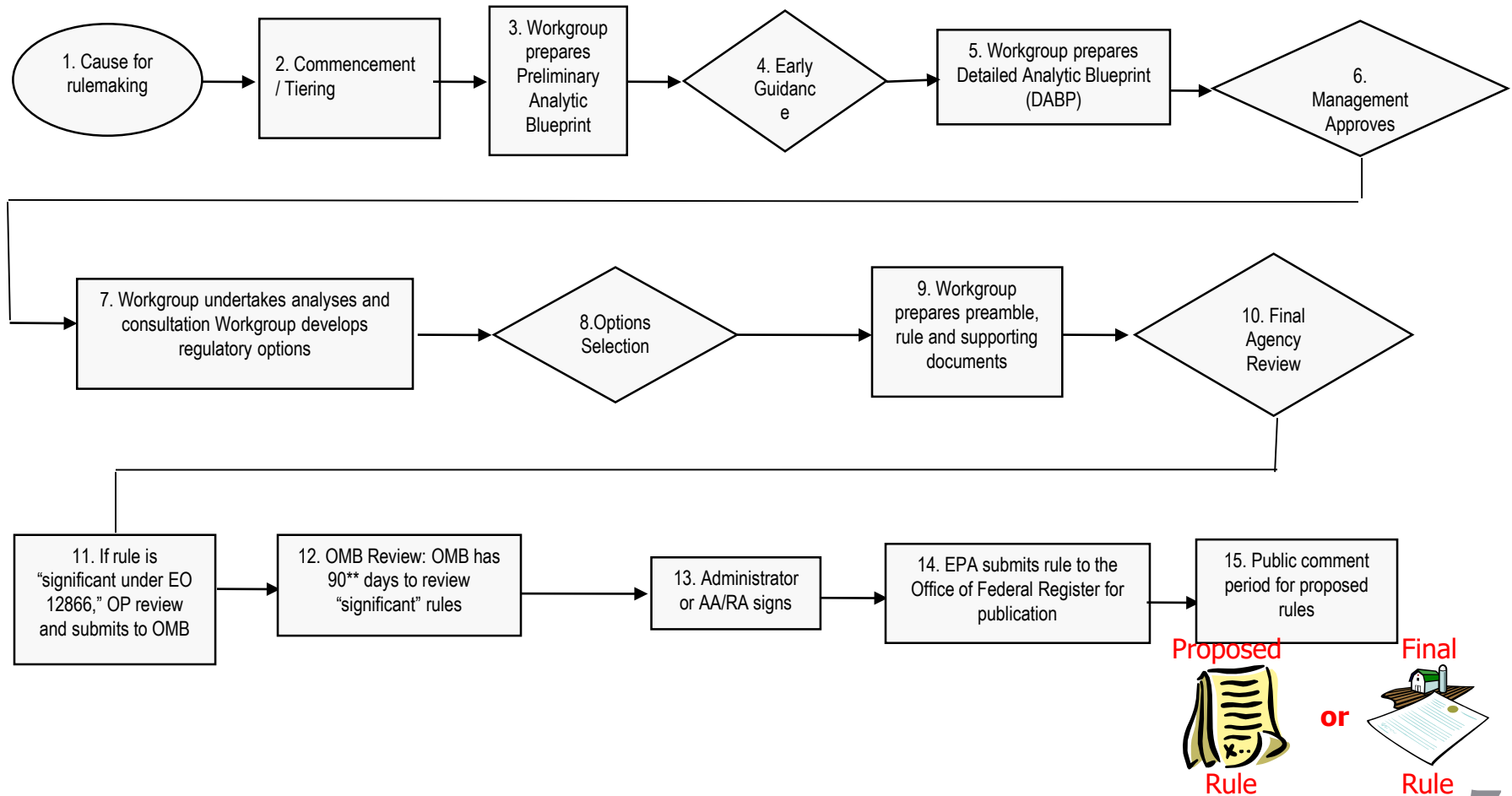
# How EPA Rules Fit into Lawmaking

- The General Regulatory Products -



# Action Development Process (ADP)

## ADP for Tier 1 and Tier 2 Actions



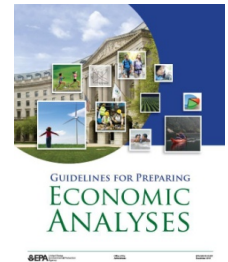
# Benefit-Cost (net benefits) Is One of Several Decision Criteria

- Political Concerns
- Statutory instruction
- Institutional Feasibility
- Technical Feasibility
- Enforceability
- Ethics
  - Distributive Justice
  - Environmental Justice
- Sustainability
- Benefits and Costs (Economic Efficiency)



# EPA Guidelines on presenting the benefits analysis

## 1: Checklist of what is included



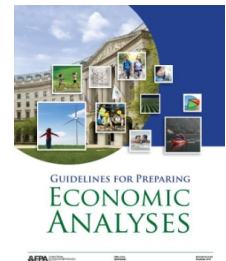
**Table 11.1 - Template for Regulatory Benefits Checklist**

| Overview of Benefits  |   |   |   |
|---|---|---|---|
| Benefits  | Effect can be Quantified?<br>(put in numeric terms) | Effect can be Monetized?<br>(put in dollar terms) | More Information<br>(e.g., reference to section of the economic analysis) |
| <b>Improved Human Health</b>  |   |   |   |
| <ul style="list-style-type: none"> <li>• <b>Reduced incidence of adult premature mortality</b> from exposure to PM<sub>2.5</sub></li> </ul> | ✓   | ✓   | e.g., see Section 5.2 of the economic analysis                            |
| <ul style="list-style-type: none"> <li>• <b>Reduced incidence of fetal loss</b> from reduced exposure to disinfection byproducts</li> </ul> | ✓   | --  | <i>Notes and reference to section of the economic analysis</i>            |
| <ul style="list-style-type: none"> <li>• <b>Unquantified human health benefit</b> with a brief description</li> </ul>                       | --  | --  | <i>Notes and reference</i>  |
| <b>Improved Environment</b>   |   |   |   |
| <ul style="list-style-type: none"> <li>• <b>Fewer fish killed</b> from reduced nutrient loadings into waterways</li> </ul>                  | ✓   | ✓   | <i>Notes and reference</i>  |

# EPA Guidelines on presenting the benefits analysis

## 2: Non-monetary description of benefits

Table 11.2 - Template for Quantified Regulatory Benefits



| Quantified Benefits   |   |                                |   |
|---|---|--------------------------------|---|
| Benefits  | Quantified Benefits<br>(confidence interval or range) | Units                          | More Information<br><i>(w/possible reference to section of the economic analysis)</i> |
| <b>Improved Human Health</b>  |   |                                |   |
| <ul style="list-style-type: none"> <li>• <b>Reduced incidence of adult premature mortality</b> from exposure to PM<sub>2.5</sub></li> </ul> | estimate<br><i>(range)</i>                            | expected<br>premature<br>per   |   |
| <ul style="list-style-type: none"> <li>• <b>Reduced incidence of fetal loss</b> from reduced exposure to disinfection byproducts</li> </ul> | estimate<br><i>(range)</i>                            | expected average<br>fetal loss | confidence interval<br>cannot be estimated.<br>Range based on<br>alternative studies  |
| <ul style="list-style-type: none"> <li>• <b>Unquantified human health benefit</b> with a brief description</li> </ul>                       | *   | *                              | e.g., data do not allow<br>for quantification   |
| <b>Improved Environment</b>   |   |                                |   |
| <ul style="list-style-type: none"> <li>• <b>Fewer fish killed</b> from reduced nutrient loadings into waterways</li> </ul>                  | estimate<br><i>(range)</i>                            | thousands of fish<br>per year  | Notes<br><i>(reference)</i>   |

Note that this table includes benefits that can't be quantified. We don't want to omit an expected benefit even if we cannot quantify it.

# Benefits tables

Summary of which effects are quantified and monetized

From [2015 Ozone Transport Rule RIA](#)

**Table 5-1. Health Effects of Ambient Ozone and PM<sub>2.5</sub>**

| Category  | Effect  | Effect Quantified                                  | Effect Monetized | More Information    |
|---|---|--|------------------|---------------------|
| Premature mortality from exposure to PM <sub>2.5</sub>  | Adult premature mortality based on cohort study estimates and expert elicitation estimates (age 65-99 or age 30-99) | ✓  | ✓                | PM ISA              |
|   | Infant mortality (age <1)   | ✓  | ✓                | PM ISA              |
|   | Heart attacks (age > 18)  | ✓  | ✓ <sup>1</sup>   | PM ISA              |
|   | Hospital admissions—cardiovascular (ages 65-99)   | ✓  | ✓                | PM ISA              |
|   | Emergency department visits— cardiovascular (age 0-99)  | ✓  | ✓                | PM ISA              |
|   | Hospital admissions—respiratory (ages 0-18 and 65-99)   | ✓  | ✓                | PM ISA              |
|   | Emergency room visits—respiratory (all ages)  | ✓  | ✓                | PM ISA              |
|   | Cardiac arrest (ages 0-99; excludes initial hospital and/or emergency department visits)                            | ✓  | ✓ <sup>1</sup>   | PM ISA              |
|   | Stroke (ages 65-99)   | ✓  | ✓ <sup>1</sup>   | PM ISA              |
|   | Asthma onset (ages 0-17)  | ✓  | ✓                | PM ISA              |
|   | Asthma symptoms/exacerbation (6-17)   | ✓  | ✓                | PM ISA              |
|   | Lung cancer (ages 30-99)  | ✓  | ✓                | PM ISA              |
|   | Nonfatal morbidity from exposure to PM <sub>2.5</sub>   | Allergic rhinitis (hay fever) symptoms (ages 3-17) | ✓                | ✓                   |
| Lost work days (age 18-65)  |   | ✓  | ✓                | PM ISA              |
| Minor restricted-activity days (age 18-65)  |   | ✓  | ✓                | PM ISA              |
| Hospital admissions—Alzheimer’s disease (ages 65-99)  |   | ✓  | ✓                | PM ISA              |
| Hospital admissions—Parkinson’s disease (ages 65-99)  |   | ✓  | ✓                | PM ISA              |
| Other cardiovascular effects (e.g., other ages)   |   | —  | —                | PM ISA <sup>2</sup> |
| Other respiratory effects (e.g., pulmonary function, non-asthma ER visits, non-bronchitis chronic diseases, other ages and populations) |   | —  | —                | PM ISA <sup>2</sup> |
| Other nervous system effects (e.g., autism, cognitive decline, dementia)  |   | —  | —                | PM ISA <sup>2</sup> |
| Metabolic effects (e.g., diabetes)  |   | —  | —                | PM ISA <sup>2</sup> |
| Reproductive and developmental effects (e.g., low birth weight, pre-term births, etc.)  |   | —  | —                | PM ISA <sup>2</sup> |
| Cancer, mutagenicity, and genotoxicity effects  |   | —  | —                | PM ISA <sup>2</sup> |

# Benefits tables

Summary of unquantified and non-monetized health and welfare benefits

From [2015 Ozone Transport Rule RIA](#)

**Table 5-9. Unquantified Health and Welfare Benefits Categories**

| Category  | Effect  | Effect Quantified | Effect Monetized | More Information                     |
|---|---|-------------------|------------------|--------------------------------------|
| Improved Human Health   |   |                   |                  |                                      |
| Reduced incidence of morbidity from exposure to NO <sub>2</sub>   | Asthma hospital admissions  | —                 | —                | NO <sub>2</sub> ISA <sup>1</sup>     |
|   | Chronic lung disease hospital admissions  | —                 | —                | NO <sub>2</sub> ISA <sup>1</sup>     |
|   | Respiratory emergency department visits   | —                 | —                | NO <sub>2</sub> ISA <sup>1</sup>     |
|   | Asthma exacerbation   | —                 | —                | NO <sub>2</sub> ISA <sup>1</sup>     |
|   | Acute respiratory symptoms  | —                 | —                | NO <sub>2</sub> ISA <sup>1</sup>     |
|   | Premature mortality   | —                 | —                | NO <sub>2</sub> ISA <sup>1,2,3</sup> |
|   | Other respiratory effects (e.g., airway hyperresponsiveness and inflammation, lung function, other ages and populations)            | —                 | —                | NO <sub>2</sub> ISA <sup>2,3</sup>   |
|   |   |                   |                  |                                      |
| Reduced incidence of mortality and morbidity through drinking water from reduced effluent discharges.               | Bladder, colon, and rectal cancer from halogenated disinfection byproducts exposure.  | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Reproductive and developmental effects from halogenated disinfection byproducts exposure.   | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Neurological and cognitive effects to children from lead exposure from fish consumption (including need for specialized education). | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Possible cardiovascular disease from lead exposure  | —                 | —                | SE ELG BCA <sup>4</sup>              |
| Reduced incidence of morbidity and mortality from toxics through fish consumption from reduced effluent discharges. | Neurological and cognitive effects from in-utero mercury exposure from maternal fish consumption                                    | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Skin and gastrointestinal cancer incidence from arsenic exposure  | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Cancer and non-cancer incidence from exposure to toxic pollutants (lead, cadmium, thallium, hexavalent chromium etc.                | —                 | —                | SE ELG BCA <sup>4</sup>              |
|   | Neurological, alopecia, gastrointestinal effects, reproductive and developmental damage from short-term thallium exposure.          | —                 | —                | SE ELG BCA <sup>4</sup>              |
| Reduced incidence of morbidity and mortality from recreational water exposure from reduced effluent discharges.     | Cancer and Non-Cancer incidence from exposure to toxic pollutants (methyl-mercury, selenium, and thallium.)                         | —                 | —                | SE ELG BCA <sup>4</sup>              |

# Benefit Cost Analysis in Decision Making

- **How BCA can influence decisions**
  - **Nearly all Administrators want to know what the benefits and costs of options are. Who wouldn't?**
    - Imagine asking the Administrator to approve a regulation that will cost \$1 billion a year without providing information on benefits.
    - Typically, it is a very deep discussion of how benefits are generated.
    - Health benefits (reduced premature mortality) are easily conveyed and valued. But for water quality regulations and other regulations that convey a variety of ecological benefits, valuation becomes critical.
    - NMV helps give meaning and context to many environmental benefit categories, particularly in the ecosystem/water quality areas.
    - Distribution of benefits also matters

# Benefit Cost Analysis in Decision Making

- **The benefit cost analysis becomes part of the public record. EPA takes public comment on the BCA, including whether it supports the regulatory decision.**
  - Even if the decision maker wants to ignore the BCA, it is difficult to do so.
  - Works both ways. Those wishing to repeal regulations must deal with the record, less the court finds their action arbitrary and capricious.
  - Outside stakeholders use the BCA to argue their positions.
  - Regulated industries sometimes produce reports on the costs of EPA regulations; benefits assessment provides the basis for a response.

# The Changing Legal Landscape for Benefit Cost Analysis

- Increasingly, the courts are finding that consideration of costs and benefits in regulatory decision making is not only permissible but often required.
  - **Michigan v. EPA (2015)** EPA must consider costs before deciding whether to regulate power plants. Justice Kagan dissent concluded the majority opinion essentially finds the EPA's decision unreasonable because the EPA did not conduct a thorough cost benefit analysis as the initial step of its decision making.
  - **Entergy Corp. v. Riverkeeper Inc. (2009)** SCOTUS held that US EPA permissibly relied on cost-benefit analysis in setting standards for cooling water intake structures.
- I defer to our luncheon speaker on the significance of these and other developments. I will observe that the legal profession (both inside and outside EPA) spends a great deal more time on benefit cost analysis.
- Also note that President Biden recently nominated Richard Revesz to be the Administrator of OIRA in OMB.

# Need More NMV for Water Quality and Ecological Benefits

- The analysis informs the workgroup of promising regulatory options, including those that may have significant co-benefits or co-disbenefits.
  - Rules routinely quantify air “co-benefits.” No reason why air-related rules should not include WQ benefits (when relevant)
- Cancer Prevention Agency vs. Environmental Protection Agency. BCA (and NMV in particular) give voice to ecological benefits.
- Estimating the Social Cost of GHG – Better NMV would greatly expand the scope of damages included in the SC-GHG. Climate-related mortality dominates damages.
- Limiting discharges from many sources will need compelling benefits (agriculture, biofuels, animal feeding operations, etc.) . Important to have more complete NMV.



# Environmental Justice and BCA

- One pillar of EJ holds that no group of people should bear a disproportionate share of the negative environmental consequences.
- EJ analyses are now routine at EPA under the Biden Administration
- Assessing how the benefits are distributed provides valuable insights into how regulatory options enhance or hinder Environmental Justice.
- Nonmarket valuation is particularly valuable when considering EJ impacts of water quality.

# Scientific Integrity, BCA, and Nonmarket Valuation

- As a general matter, the estimation of benefits is a scientific endeavor and must be free from political interference. At the same time, we cannot misrepresent the science to support a policy conclusion we think is correct.
- Publishing, peer review, transparency, public comment all help to foster scientific integrity in regulatory analyses.
- Developing robust models (integrated assessment models) that are routinely used, updated, and peer reviewed is also critical. If a model is well known and used often, it is harder to exclude its use. e.g.,
  - Ban the use of Stated Preference methods
  - Drop the quantification of a well-founded benefits category