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**U.S. Environmental Protection Agency
Science Advisory Board
Economic Guidelines Review Panel (EGRP)**

**Compilation of Preliminary Comments on the
EPA’s revised Guidelines for Preparing Economic Analyses**

Current as of May 11, 2020

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Introduction:

This document is compilation of preliminary comments presented by members of the EGRP. Some panelists have included recommendations within their response and defined their priority using the following tiers.

- Tier 1: Key Revisions – Recommendations that are necessary in order to improve the critical scientific concepts, issues and/or narrative within the guidelines.
- Tier 2: Suggestions – Recommendations that are encouraged for EPA to adopt in order to strengthen the scientific concepts, issues and/or narrative within the guidelines, but other factors (e.g., Agency need) should be considered by EPA before undertaking these revisions.
- Tier 3: Future Considerations – Useful and informative scientific exploration that may inform future evaluations of key science issues and/or the development of future guidelines. These recommendations are likely outside the immediate scope and/or needs of the current assessment under review.

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Dr. Caroline Cecot

A. Chapter 1

1. *Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?*

Yes. I appreciated the reorganization of Chapter 1. It is well written, and it foreshadows important issues in preparing economic analyses.

2. *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?*

Yes. The checklist is a good addition.

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

No, but there is a typo that warrants correction. In the box on p. 1-4, 5th question: “. . . used in the RIA provided TO the public . . .”

B. Chapter 2

2. *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?*

Yes. Table 2.1 is a great addition.

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

There are at least two requirements that might warrant discussion.

Guidelines on federal investments in water resources. One public commentator, David Buland (an economist at the USDA), informed the panel that, since the 2010 Guidelines, some EPA programs are newly covered by guidelines on analyzing federal investments in water resources. But this chapter explicitly limits itself to directives for conducting economic analysis that “may apply to all EPA programs,” p. 2-1, 8, reminding analysts to separately consider additional program-specific requirements that are not discussed in the chapter. This new requirement for EPA water-related programs appears to be one of those program-specific requirements excluded from the chapter. Nonetheless, it might be worthwhile for the Guidelines to list some of these potentially relevant program-specific requirements in a footnote or appendix table at least.

The Congressional Review Act (statute, 5 U.S.C. §§601 et seq.). It might be worthwhile to mention the CRA as a relevant statute. The CRA requires agencies to report on their

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rulemaking activities to Congress, and it has been used prominently in the first few months of the Trump Administration. For rules OIRA deems “major,” the CRA requires the comptroller general to prepare and submit to relevant congressional committees a report that contains “an assessment of the agency’s compliance with procedural steps,” including making available any cost-benefit analysis of the rule (see 5 U.S.C. § 801(a)(2)(A)). The CRA, however, does not require the agency to prepare any analyses beyond those requires by other statutes and executive orders, so it might not be within the scope of this chapter.

C. Chapter 3

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

Yes. Footnote 63, on p. 3-6, should be moved up to the text. In general, it is useful to identify separate categories of benefits and costs and their sources, especially when some categories might not be quantified or monetized but nonetheless deemed important. But the Guidelines should be very clear that useful economic analysis requires consideration of all expected impacts of different regulatory alternatives. And just as it is important to consider other (realistic and potentially more efficient) ways of achieving different benefits, it is important to consider when pollutants are best regulated jointly (whether most realistically or most efficiently) to achieve net benefits.

D. Chapter 4

1. *Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?*

For the most part, yes. For topics that warrant more discussion, see my comments in response to charge question 4 (below).

2. *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?*

For the most part, yes. For topics that warrant more discussion, see my comments in response to charge question 4 (below).

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

Yes. See my comments in response to charge question 4 (below).

4. *Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?*

4.1.2 Cost-effectiveness, p. 4-2, line 22.

The Guidelines leads with the following sentence: “A policy is considered cost-effective when marginal abatement costs are equal across all polluters.” This refers to the least-cost

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theorem—that a given total level of pollution abatement is achieved at least cost when the marginal cost of abatement is equalized over all polluting firms (in practice, meaning that those firms with initially lower costs of abatement abate more and those with higher costs abate less). But the sentence strikes me as a bit obscure without additional explanation. I suggest moving it back to the end of the paragraph (its location in the 2010 Guidelines) or cutting it out entirely.

4.4.3 Liability rules—in particular, CERCLA liability, p. 4-16.

On p. 4-16, lines 6-7, the Guidelines states, “[S]trict liability rules can create disincentives for the redevelopment of contaminated land because newly involved firms become liable for past contamination.” But strict liability does not cause this disincentive. Instead, the reason “newly involved firms become liable for past contamination” under the statute known as CERCLA is because CERCLA defines current owners as “potentially responsible parties” (PRP) and limits the defenses PRPs can invoke to avoid liability. A strict liability regime, generally speaking, still requires plaintiffs to prove causation; the regime just means that a firm taking reasonable precautions is still liable for damages caused by its actions.ⁱ Therefore, I suggest removing this inaccurate sentence about strict liability from that paragraph. Moreover, it is odd to bring up strict liability here (at lines 6-7) before defining the term (lines 11-12) and confusing to comment on disincentives of a specific statute (at lines 6-7) before introducing the statute (lines 18-19). A version of this sentence can be added to **4-16, line 20**, right after CERCLA is first introduced, as follows:

“The scope of liability may be relevant for economic efficiency. Under CERCLA, for example, new owners of contaminated land are defined to be potentially responsible parties liable for past pollution, creating disincentives for the redevelopment of contaminated land (Jenkins, Kopits, and Simpson 2009).”

This sentence would fit well with the next sentence on statutory changes that were made to encourage the redevelopment of brownfields.

4.4.4 Behavioral economics and “nudge” approaches, p. 4-16.

The Guidelines contains a valuable new section on behavioral nudges as a regulatory option. One commentator, Jason Schwartz of the Institute for Policy Integrity, raised a concern that it is misleading to construe behavioral economics as relevant only to nudges; behavioral economics can also provide justification for standard regulatory approaches when it identifies deviations from profit maximizing behavior. I agree that insights from behavioral economics, if they identify robust deviations from profit-maximizing behavior, could affect the chosen level of regulatory stringency, which can be implemented through prescriptive or market-

ⁱ Strict liability means that firms that take reasonable precautions would still be liable for causing a harmful release of pollution, while in a negligence regime those firms that take reasonable precautions would avoid liability altogether. But *in either regime*, firms would adopt reasonable precautions to minimize their liability. In other words, strict liability does not introduce the distortion referred to in the study—holding firms liable that did not cause the harmful release of pollution altogether.

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based approaches (and not just nudges). For this reason, the potential relevance of behavioral economics should be discussed in chapters on costs/benefits and on the justifications for regulatory intervention. (Chapter 5 (on benefits) does contain some discussion about using behavioral economics in this context (pp. 5-14 to 5-16), but I think that discussion could be clearer.) Nonetheless, because *this* chapter is focused on regulatory and nonregulatory “*approaches*,” the focus on “nudging”—an approach that is potentially effective as a result of behavioral phenomena—strikes me as appropriate. But I would rename the section “4.4.4 “Nudge” Approaches” (removing “behavioral economics”) to remove any implication that the relevance of behavioral economic insights is limited to informing nudge approaches.

4.5 Voluntary approaches, pp. 4-18 to 4-20.

I urge rewriting the section in an economics framework to more clearly identify when and why voluntary programs could be effective/efficient. Currently, the section opens with congressional priorities from the Pollution Prevention Act, but the relevance of these priorities is not clear for this section.ⁱⁱ Instead, the section could provide direct guidance for when voluntary approaches might be useful. For example, the current section suggests that voluntary approaches could be useful when little information is known about practices that reduce pollutants at the source; it states that voluntary programs encourage information sharing, peer education, and resource sharing among participants. It could also discuss the implications of the literature questioning the effectiveness of these programs for their use in different contexts or for their optimal design.

4.6 Selecting the appropriate policy approach, 4-20 to 4-24.

The sections on market-based approaches in the new Guidelines no longer contain some of the discussion on the relative advantages/disadvantages of each approach compared to other approaches (monitoring costs, feasibility at setting the cap or the tax at the efficient level, etc.). As one example, the 2010 Guidelines contained the following paragraph in the emissions tax section, which has now been removed:

Despite the apparent usefulness of such a tax, true emissions taxes — those set equal or close to marginal external damages — are relatively rare in the United States.¹⁷ This is because taxing emissions directly may not be feasible when emissions are difficult to measure or accurately estimate, when it is difficult to define and monetarily value marginal damages from a unit of emissions (which is needed to properly set the tax), or when taxes are applied to emissions that are difficult to monitor and/or enforce. In addition, attempts to measure and tax emissions may lead to illegal dumping.¹⁸ Other considerations when contemplating the use of emission taxes include the potential imposition of substantially different cost burdens on polluters

ⁱⁱ Unless this reference is about authorization for a voluntary approach. But statutory authorization is a separate concern relevant to all approaches and might vary by statute.

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as compared with other regulatory approaches, political incentives to set the tax too low, and the collection of revenues and distribution of economic rents that result from such programs.

It is worthwhile to note the advantages and disadvantages of different approaches to aide analysts when choosing between them and assessing their expected benefits and costs. Some of this information should return to the chapter. It might make more sense, however, in the section on selecting the appropriate policy approach (4.6). Already, that section contains a subsection on uncertainty (which provides guidance on choosing between quantity-based and priced-based market approaches, prodding analysts to consider the relative uncertainty associated with damages and with economic costs or the relative stakes of setting an *inappropriate* price or quantity) and a section on monitoring and enforcement. It would be useful to expand these discussions to include specific information about relative advantages and disadvantages of different market-based approaches as compared to each other and to other regulatory approaches.

4.6.8 The goals of the policy maker, p. 4-24.

This section, which was also in the 2010 Guidelines, is a little unclear. In particular, who are the “policy makers”?

Congress? If the section is about congressional authorization, then it should be explicitly titled as such. The focus should then be about evaluating statutory directives regarding implementation and whether these directives constrain the agency’s ability to adopt an efficient approach. Economic analysts should not be the ones to interpret the constraints of the statute, but any economic analysis should discuss relevant statutory constraints on available options (which might result in adopting an approach that is not efficient).

The President? If the section is about presidential priorities, then it should be titled as such. Some statutes leave discretion for agencies to implement statutory objectives after considering several different factors. It is possible that a presidential administration might choose to weight some noneconomic considerations (such as distributional equity) more than some purely economic considerations. If so, such choices should be disclosed and explained.

4.7 Measuring the effectiveness of regulatory approaches or voluntary initiatives, p. 4-24.

I couldn’t understand whether this section is meant to summarize different considerations for deciding on an approach or whether it is meant to aide in designing approaches to enable meaningful retrospective review. The economic analysis should include information about the expected (ex ante) costs and benefits associated with different regulatory and nonregulatory approaches. There is also an opportunity here to encourage designing programs that allow for meaningful retrospective review (ex post) that could be used to refine ex ante estimates going forward, such as ensuring that there are measurable environmental goals and commitments for periodic review to evaluate the true costs and benefits.

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Small corrections:

- Make citations consistent, especially the use of commas after author names. See, e.g., “Burtraw et al. 2005,” p. 4-7, 3, and “Fell, et al. 2012,” p. 4-7, 14. (The inconsistencies continue throughout the chapter.)
- Fix typo on p. 4-11, 38: “incentive” should be “incentivized”
- Replace “have either” with “either have” on p.4-19, line 8.
- On p. 4-20, line 4, add the word “that” after the word “reductions” to read “to account for reductions *that* would have occurred”
- Fix space between lines 3 and 4 on p. 4-23.

5. *Are the definitions provided in the glossary accurate? Please identify any in need of revision.*

Overall, the glossary definitions are clear and helpful. I have suggestions for the following terms:

Externality: I suggest removing the word “unintended” from the definition at i-10, 2. This word suggests that intention matters; it does not. It might be useful to use a definition from a standard economic textbook; these definitions focus on “unpriced”/uncompensated effects or simply effects on parties outside of the agreement. Some examples:

- An externality is “the impact of one person’s actions on the well-being of a bystander” (Mankiw, N.G., *Principles of Economics* (2004)).
- “An externality is present whenever the well-being of a consumer or the production possibilities of a firm are directly affected by the actions of another agent in an economy . . . exclud[ing] any effects that are mediated by prices” (Mas-Colell, Whinston, and Green, *Microeconomic Theory* (1995)).
- An externality is “[t]he effect that an action of any decision maker has on the well-being of other consumers or producers, beyond the effects transmitted by changes in prices” (Besanko, D., and Braeutigam, R.R., *Microeconomics* (2014)).
- “Externalities are costs or benefits to society of byproducts of consumption or production that are not factored into the original market price” (Hillman, T., *Economics* (2014))

Value of Statistical Life (VSL): I appreciate the example, which also appears in the 2010 version of the Guidelines, because it helps readers understand the calculation. But the current example does not provide context, and it is somewhat misleading because it suggests a much lower VSL than the one actually used in EPA analyses. Instead of the text at i-12, 40-43, I propose something along the following lines:

For example, imagine 10,000 individuals who each face an annual fatality risk of 1/10,000—in other words, on average one of them would be killed in the coming year. If they are each willing to pay \$1,000 to eliminate the risk to themselves, then the total amount these 10,000 individuals are willing to pay to avoid the statistical fatality equals \$1,000 times 10,000—or \$10 million. Note that this does not mean that any single identifiable life is valued at this amount. Rather, the VSL reflects the total amount the exposed population

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would be willing to pay to avoid the small fatality risk that each would otherwise face—thereby saving one statistical life. The VSL is typically calculated using information about workers’ risk-wage tradeoffs in the labor market.

Value of Statistical Life Year (VSLY): This definition strikes me as somewhat confusing. The VSLY is essentially an annualized VSL, where the VSL is the net present value of remaining VSLYs. In the last year of life, the VSL and the VSLY would both equal the annualized number.ⁱⁱⁱ

In policy, however, the VSL is not adjusted for age; it is a static value that is typically estimated based on preferences of workers, who are on average thirty-five to forty years old. The VSLY value, then, is essentially the annualized version of that average VSL for the average worker, usually calculated by dividing the VSL by average worker remaining life expectancy (about 30 years). I suggest adding the word “average” to “remaining life expectancy” at i-13, 3—or simply defining VSLY as the annualized VSL.

Dr. John Graham:

A. Comments for Chapters 5, 7, and 8 : Ancillary Benefits and Countervailing Risks

Public commenters suggested that we look at the Draft Guidance to ensure that the analytic treatment of "ancillary benefits" and "countervailing risks" (as the terms are used in OMB Circular A-4) are addressed appropriately. I have requested that my comments on this question be included with the assembly of comments for Chapters 5, 7 and 8, since it is not yet apparent which chapter(s) will address these issues.

Point 1. I concur with public commenters that the text of the Guidance should include an unequivocal endorsement of OMB's call for identification and consideration of "ancillary benefits" and "countervailing risks". The issue should not be "buried" in footnotes. It should be located in a free-standing section of Chapter 5, and then followed up with some specific discussion in Chapters 7 (Benefits) and 8 (Costs). We (SAB) should not address how much policy or legal weight to give to such issues because policy and legal weighting are outside our purview.

Recommendation #1: The text of the Guidelines, in Chapter 5, should call for analysis of ancillary benefits and countervailing risks, as suggested in OMB Circular A-4.

Point 2. The term "ancillary benefits" is a broader umbrella than "co-benefits" because the term co-benefit has come to connote the situation where reducing the target pollutant also

ⁱⁱⁱ See, e.g., Joseph E. Aldy & W. Kip Viscusi (2007), *Age Differences in the Value of Statistical Life: Revealed Preference Evidence*, Review of Environmental Economics and Policy 1(2), p. 247 n.9.

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reaps benefits from reducing non-targeted pollutants. Whether a pollutant is a "target" pollutant seems to be related to the statutory objective of the rulemaking in question. There is also a literature on health co-benefits in climate economics/policy where the term "health co-benefits" is used to refer to collateral reductions in conventional pollutants that result from measures to reduce greenhouse gases. (e.g., see JJ West et al. Co-Benefits of Mitigating Global Greenhouse Gas Emissions for Future Air Quality and Human Health. *Nat. Clim. Chang.* 3. 2013, 885-889). Such co-benefits are potentially valid illustrations of ancillary benefits, but I see the term ancillary benefits as encompassing a much broader range of beneficial regulatory consequences such as the following:

--an environmental regulation to reduce pollution from a stationary industrial sector has the side effect of stimulating R&D and leading to productivity improvements in the sector (this occurred with EPA's early dioxin regulations of the pulp and paper industry);

--an environmental performance standard for a consumer product designed to reduce pollution stimulates innovation in product design that leads to enhanced product performance (this occurred with EPA's early CO/HC standards for new cars via direct fuel injection and catalysts);

--a regulation designed to reduce GHG emissions leads to energy-efficiency gains that reduce private energy-expenditures by businesses and/or consumers (this is an issue that often arises in analysis of GHG regulations).

Note that all three examples, if known in advance by the agency, should be included in the RIA. None of the three examples involve reduction in a non-targeted pollutant, though such ramifications could also occur some of these examples.

Recommendation #2: It is best to use the terminology in OMB Circular A-4, "ancillary benefits," because it is more inclusive and because a proliferation in terminology can lead to confusion, especially in interagency, interagency and stakeholder discussions.

Point 3: The hard challenge for analysts is to predict ancillary beneficial effects ex ante, and to incorporate them properly in the analysis. Complications arise because, if businesses and consumers also predict them in advance, market adjustments may diminish their roles in the regulatory analysis. Likewise, interactions with other regulatory programs can impact the magnitude of ancillary benefits and how they are experienced by the public (more on this point below).

The starting point for good analysis of ancillary benefits is to think broadly and identify a possible list of ancillary benefits. Then, for each possible ancillary benefit, the analyst should think through how important it might be in the overall analysis, and how feasible it is to quantify it. A short paragraph of rationale in the RIA on each ancillary benefit should explain why the analyst decided for or against quantification.

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Recommendation #3: Chapter 7 should call for analysts to qualitatively identify the possible ancillary benefits associated with the rule-making action. For each possible ancillary benefit that is identified, the RIA should explain whether it is quantified in the RIA and why or why not.

2. The term "countervailing risks", as defined in OMB Circular A-4, is a form of regulatory "cost" (adverse consequence) that is typically not intended by the regulator and is expressed through increased risk to public health, safety and/or the environment. A customary treatment of compliance costs will rarely uncover countervailing risks; they require -- like ancillary benefits -- some "out of the box" thinking. The 50-year history of agency decision making contains numerous examples of countervailing risks, some that were anticipated by the agency and addressed ex ante, and some that were not. Here are a few examples:

--early versions of the catalytic converter, installed due to EPA tailpipe emissions standards, led to unexpected increases in sulfuric acid pollution that were later solved with catalyst refinement and low-sulfur fuels;

--lead-free gasoline is a public health success story but the replacement of lead with alternative octane enhancers (e.g., MTBE, ethanol and the BTEX Complex) led to a complex array of countervailing health and environmental risks that are still not fully addressed;

--the establishment of stricter pollution standards on new sources than existing sources often leads to market responses that lengthen the life of existing sources (this example can be thought of as an "offset" in benefits analysis or a countervailing risk, or both);

--a commonly analyzed ancillary risk operates through the "rebound effect", where energy-efficient technologies are used more intensively than less efficient technologies; the more intensive use of plug-in electric vehicles (due to low operating costs) can exacerbate traffic congestion. (Note that this countervailing risk is accompanied by an ancillary benefit, enhanced mobility in daily life).

The current version of Chapter 8, "Analyzing Costs", appears to be silent on countervailing risks. (I did not check the other Chapters to see if they are covered elsewhere in the draft Economic Guidance). A separate section in Chapter 8 should cover countervailing risks since they are important costs of rulemaking action.

Recommendation #3: Chapter 8 should call for a qualitative identification of possible "countervailing risks" associated with the rule-making action, since these are costs. For each possible countervailing risk that is identified, the RIA should explain whether the risk has been quantified, and why or why not.

Point 4: Proper analytic treatment of ancillary benefits and countervailing risks needs to consider possible interactions with the normal operation of other local, state, federal and international regulatory programs. Here are some illustrations where interactions with other

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regulatory programs might be important and commentary about how the regulatory analysis might address them.

--a GHG standard results in such large or abrupt downweighting of vehicles that compliance with NHTSA crash-protection standards is an issue (e.g., an RIA for GHG/CAFE standards introduced compliance caps on downweighting of vehicles to minimize countervailing safety risks to motorists).

Comment:

The regulatory analysis was designed to minimize the countervailing safety risk but it is not apparent whether the analytic caps on downweighting were actually implemented by the regulated industry; that is a useful topic for retrospective regulatory evaluation.

--a federal air-toxics regulation results in an ancillary benefit of reduced emissions of criteria air pollutants because the same control technology that reduces air toxics also controls some emissions of criteria air pollutants or the regulated business shifts to a cleaner process that reduces criteria air pollutants.

Comment:

The analyst's challenge is whether to express the bonus pollution-control benefit as a health/environmental benefit or as a savings in compliance cost for future emitters covered by criteria air pollution control programs, or some combination of the two. Criteria air pollution in many communities in the US is effectively capped due to non-attainment status, fear of entering non-attainment status, or existing PSD programs. A screening-level approach is to prepare one calculation that assumes all of the benefit will occur in the form of public health/environmental protection; the other calculation assumes all of the benefit occurs in the form of future savings in compliance costs for emitters that do not need to control emissions as much as they would have otherwise. In most RIAs, those bounding calculations will be sufficient, since results of the analysis are typically the same regardless of which approach is used. A more precise estimate requires understanding of where (geographically) the criteria air pollutants are reduced and whether those areas are subject to implicit or explicit caps on criteria air pollution control.

--a federal/state regulatory program to stimulate deployment of plug-in electric vehicles leads to increased demand for cobalt (a desired material in lithium-ion battery design) but mining of cobalt occurs predominantly in a developing country that is not in compliance with international child-labor standards.

Comment:

By investigating this possible countervailing risk, the analyst may learn that there are more costs to using cobalt than a standard compliance-cost analysis would suggest. In order for cobalt suppliers and customers to comply with international child-labor standards, tracing systems must be put in place to ensure that cobalt is not coming from mines that subject

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children to inhumane labor conditions. Some customers are moving to cobalt substitutes instead, which means that an entirely different material (possibly nickel) should be included in the regulatory cost analysis.

--a GHG regulation results in a more fuel-efficient engine/transmission, causing "engine-out" emissions of criteria air pollutants to decline. The question is how to address the criteria air pollutant change in the RIA.

Comment:

The general practice in RIAs is not to count the reduction in engine-out emissions as an ancillary health/environmental benefit because post-combustion exhaust treatment systems are used to meet the applicable gram/mile EPA/CARB standards. The engine supplier/vehicle manufacturer does not want to spend any more money on emissions control than is required by EPA/CARB emissions-control standards. If engine-out emissions are reduced, the manufacturer can install a somewhat smaller catalyst or make an alternative cost-saving adjustment to the exhaust treatment system. The proper analytic approach is probably to count those compliance cost savings rather than assume a public health or environmental benefit from the reduced engine-out emissions.

Recommendation #4: When analyzing ancillary benefits and countervailing risks, the RIA should take account, whenever possible, the normal operation of existing local, state, federal and international regulatory programs. When interactions occur with other programs, the analyst should consider one presentation that assumes public health/environmental impacts and another that assumes changes in compliance-cost expenditures.

B. Suggested refinements to Chapter 11.

1. p. 11-1, 11-12 : Please retain the sentence "Environmental statutes sometimes mandate criteria other than economic efficiency." Keep the point general.
The "such as" clause should be deleted since recent court decisions have allowed more consideration of economic analysis under technology-based standards; it is best for the Guidelines not to opine on what is (or is not) an example of statutory criteria other than economic efficiency, since this could change with judicial interpretations over the next decade.
2. p.11-2, 4: Recommend use of ecological example where monetization is generally recognized as difficult, given current evidence. The example provided, expected number of adverse health effects avoided, is one where monetization is usually feasible.
3. p. 11-2, 7-10: Recommend a footnote be added" "OMB is required to supply such accounting statements in its Annual Report to Congress on the Costs and Benefits of Federal Regulation. Cite statute. For illustrations of how OMB frames the accounting statement for Congress, see most recent version of the OMB annual report (link)."

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4. p. 11-2, 33: Recommend use of an ecological example where monetization is generally recognized as difficult, given current evidence. The example provided, "avoided adverse health impacts", is one where monetization is usually feasible.
5. p. 11-3, 1-2: The example "technological innovation" is important in RIA but it is not a conceptually appropriate benefit or cost category, as it typically leads to both benefits and costs and is an intermediate process in an economic analysis. An alternative example should be provided, such as a subcategory of ecological benefits, that is typically difficult to quantify in physical units.
6. The summary template information (Tables 11.1 through 11.4) is heavily weighted toward presentation of benefit information compared to cost information. Insofar as benefit information is more complex or multi-faceted than cost information, greater emphasis on benefit explanation is appropriate. However, at least one summary Table should be dedicated to presentation of the cost information, including the list of potential costs identified by the agency, coupled with an indication of which cost impacts were quantified and monetized in the analysis. Examples of possible identified costs are compliance costs to firms, loss of consumer/producer surpluses, the adverse health and environmental impacts of the rulemaking (e.g., due to transfer of pollution from one media to another), diminished (or foregone improvements in) product quality, greater concentration of firms in the regulated industry, diversion of R&D effort from industrial productivity improvements, increased paperwork/transactions costs within the industry, adjustment costs from employment dislocations, stranded capital, increased litigation costs, and so forth. It should be noted that, if a rulemaking reduces some of these cost items (which is fairly common), they should be treated in the summary presentation as either a "negative cost" (savings) or as a benefit item in the benefits analysis.
7. p.11.4, 4-5 : There appears to be a missing word or phrase in the sentence. Please edit for clarity. The underlying idea seems fine.
8. p. 11-10, 11-17: Insofar as theoretically correct weights for different health endpoints cannot be obtained from willingness-to-pay (WTP) information, it is feasible for the agency to utilize the integrated health indices from the peer-reviewed public health and medical literatures. They are widely used around the world in medical and health economics. Such indices do have limitations, but their use may offer some useful insight when WTP-based weights are not available. The IOM, 2006 reference cited in the draft Guidance is appropriate and should also be cited here. The Guidance should not mandate their use but acknowledge that they provide a feasible analytic strategy that may offer insight in a particular rulemaking.

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9. p 11-11, 4: The word "quantitative" should be replaced by the word "probabilistic". A single-variable sensitivity analysis is a quantitative form of uncertainty analysis but it is not responsive to OMB's probabilistic analysis requirement for \$1B rules.
10. p. 11-11, 8-10: Please clarify that Monte Carlo analysis (and related probabilistic tools) can be used to shed light on both statistical variability and incomplete understanding of important relationships. In both cases, scientific judgment is required to inform which input distributions are used in the Monte Carlo simulations. The formal expert elicitation tools can be used to inform which statistical variability distributions are used as inputs and how incompletely understood relationships are characterized as input distributions. I recommend that a textbook treatment of probabilistic uncertainty analysis be cited here (e.g., M Granger Morgan. *Uncertainty: A Guide to Dealing with Uncertainty in Quantitative Risk and Policy Analysis*. Cambridge University Press. New York, 1992. Check whether revised edition is available).
11. p. 11-11: suggested insert after line 18, before section 11.2.

The Guidance should provide more specific indications of the various levels and types of uncertainty analysis, including some references to classic literature and concrete illustrations. The following paragraph is recommended. Some useful references are provided.

"A basic level of uncertainty analysis is deterministic sensitivity analysis, where each uncertain input to the regulatory analysis is varied one at a time, and the impacts on net benefits are computed and displayed. A scatter plot/diagram can be used to illustrate which uncertain inputs have the strongest influence on net benefits. It is sometimes useful to present a "switchpoint value" for an uncertain input, the value that leads to zero net benefits, or the value that leads to one regulatory alternative having larger net benefits than another regulatory alternative. A deeper level of uncertainty analysis allows for two or more uncertain inputs to be varied at the same time, usually with a focus on the most important variables identified in the single-variable sensitivity analysis. If the results of the analysis are highly sensitive to more than two uncertain inputs, it is sometimes preferable to move to a probabilistic (Monte-Carlo like) form of uncertainty analysis. When the results of an economic analysis are highly uncertain, it may be appropriate to incorporate additional research and development (R&D) as a rulemaking option, and assess the expected monetary value of information (VOI) from the R&D strategy. VOI analyses formally account for the costs and benefit of delaying a rule-making decision until specified R&D studies are undertaken. The depth of uncertainty analysis should be adjusted by the resources and time available to the agency and the extent of scientific uncertainty."

References:

- A recent illustration of deterministic sensitivity analysis, including both one-variable and two-variable analyses, is a 2019 MIT study that addressed the benefits and costs to owners of plug-in electric vehicles compared to gasoline vehicles. Without

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commenting on the validity of the results, the EPA Guidance could advise analysts to examine how the results of the MIT analysis are presented, including the 16 uncertain input variables in Table 4.6 and the scatterplot of net-benefit results from the 16 single-variable sensitivity analyses in Figure 4.24.

- Four illustrations of insightful two-variable sensitivity analyses are presented in Figures 4.19, 4.21, 4.22 and 4.23. See MIT Energy Institute. *Insights into Future Mobility. A Report from the Mobility of the Future Study.* Cambridge, MA. 2019, 84-93. <http://energy.mit.edu/insightsintofuturemobility>.
- On the theory of VOI analysis, see Howard Raiffa, *Decision Analysis, Introductory Lectures on Choices Under Uncertainty.* Random House, New York. 1968.
- The classic applied illustration is R Howard, JE Matheson, WD North. *The Decision to Seed Hurricanes.* *Science.* 176. 1972, 1191-1202.
- On one of the early VOI applications in the environmental field, see AM Finkel, JS Evans. *Evaluating the Benefits of Uncertainty Reduction in Environmental Health Risk Management.* *Journal of Air Pollution Control Association.* 37(10). 1987, 1164-1171.
- Numerous more recent examples of environmental VOI analysis are contained in the journal *Risk Analysis.* EPA staff may wish to consult experts in this field such as Kim Thompson, Alison Cullen, Igor Linkov and Chris Frey

12. p. 11-13, 25-26: The sentence, as written, does not make logical sense. By definition, if the sole guide to policy is economic efficiency (a rare situation), then social costs and social benefits would define the best policy. More thought needs to be given to what is intended here.

Dr. Dan Black:

A. Chapter 9

1. *Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?*

Yes, I thought so. Some of the issues I raise below could be up here, but I thought this was well done.

2. *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?*

I think there are three issues here.

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- A. **Perfect competition versus other industrial structure.** The analysis here is quick to go to perfect competition. While this is certainly a model that is well understood, I do wonder how relevant this model is for large polluters, especially outside of farming. I probably would want discussions of alternative market structures.
- B. **Heterogeneity of impacts.** This will be a theme for my remarks. Primarily, I am most concerned about communities that are reliant on a limited number of industries, workers in these communities, and older workers.

One way to think about the impact of regulations on workers is that the regulation destroys (or renders valueless) some of their human capital, just as the regulation destroys some of the physical capital of the firm. When a worker is young this destruction is less important than when the worker is older. If the worker is, say, 25, there is plenty of time to reinvest in human capital and obtain the returns. If the worker is, say, 55, then the loss is much larger for at least two reasons. First, often older workers have accumulated more human capital so presumably their losses are larger. Second, the payback period is much shorter for these individuals. Thus, I would suspect losses would be much larger for older workers.

- C. **Capital market imperfections.** If capital markets are perfect, shocks arising from the regulations would reduce lifetime wealth, but they would not generate any short-term crisis. Sadly, capital markets are not perfect, and people with limited wealth will presumably suffer more. We might hope that the safety net would mitigate some of these short-term effects, but this should be discussed.

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

I focus mostly on the heterogenous impact of the regulations on workers. I suspect this is largely the issues that worried Cheren and Lampman in their public comments. Let me mention 6 issues.

- A. **Land markets – renters versus property owners.** If there are benefits from pollution reductions, presumably landowners should benefit from the increase in property prices. (Of course, in declining places this may not occur.) If property prices do increase, notice that renters tend to get a double hit: they suffer adverse labor market impacts and they must pay higher rent, too.
- B. **Jacobsen, LaLonde, and Sullivan paper:** In this paper, the authors look at steel plant closures in Pennsylvania. They found tremendous losses particularly to older workers. It has generated a minor industry, but these papers need to be discussed. They generally find that older workers get clobbered.
- C. **Norway paper:** Sullivan and von Watcher is certainly relevant, but Rege, Telle, and Votruba beat them to it. This paper should be cited and discussed.

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D. **Migration section 9.5.3 and 9.5.4.** This is a delicate issue, but one that needs to be discussed. The coal producing areas of Appalachia are not coming back if we properly price carbon admissions and pollution. That means there are too many people in this region, and it will have to shrink. This places a financial burden on these communities and can be devastating for the residents of these communities, especially property owners.

E. **Spillovers with safety net program:** The dislocation of workers has big spillovers to social programs. This should be discussed. While it is complicated, shifting the burden between states and the federal government, it also provides some relief to displaced workers and their families.

F. **Unifying theme of human capital.** I think the impact on workers could be summarized a bit better by discussing the human capital considerations of the dislocation. People often think of labor as the malleable input that can be used anywhere. The human capital model provides a nice lens to discuss the heterogeneity with respect to age of the impact of worker dislocation.

4. *Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?*

I only read a couple of other chapters, but I thought they were consistently discussed in the chapters I considered.

5. *Are the definitions provided in the glossary accurate? Please identify any in need of revision.*

I have not seen the glossary yet.

References:

Browning, Martin, Anne Moller Dano, and Eskil Heinesen, "Job Displacement and Stress-Related Health Outcomes," *Health Economics*, 15 (2006), 1061–1075.

Burgard, Sarah, Jennie Brand, and James House, "Toward a Better Estimation of the Effect of Job Loss on Health," *Journal of Health and Social Behavior*, 48 (2007), 369–384.

Chan, Sewin, and Ann Huff Stevens, "Job Loss and Employment Patterns of Older Workers," *Journal of Labor Economics*, 19 (2001), 484–521.

Jacobson, Louis, Robert LaLonde, and Daniel Sullivan, "Earnings Losses of Displaced Workers," *American Economic Review*, 83 (1993), 685–709.

Rege, Mari, Kjetil Telle, and Mark Votruba, "The Effect of Plant Downsizing on Disability Pension Utilization," *Journal of European Economic Association*, 2009 7(4), p. 754-785.

Walker, W. Reed. "The Transitional Cost of Sectorial Reallocation: Evidence from the Clean Air Act and the Workforce" *Quarterly Journal of Economics* 2013 1787-35

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Dr. Arik Levinson

A. General comments

1. [Tier 2] Emphasize the point on the bottom of page 1-3. “Ultimately, from the perspective of economic theory, the 37 treatment of disbenefits and avoided costs in the analysis is primarily a communications issue and should not affect efficiency analysis and whether net benefits are positive or negative.”

The distinction between benefits and negative costs (or costs and negative benefits) is at times arbitrary. Here’s an example:

- a. The RIA for MY 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards lists fuel savings separately from Costs and Benefits, but as a positive number, so implicitly as a benefit. (Executive summary Table 1).
- b. But in that same rule, the “increased accidents, noise, and congestion associated with additional vehicle use due to the rebound effect” as a negative benefit rather than as a cost (Table 7.3-4).

One could easily make the case for fuel savings as being a subtraction for costs, and/or accidents and congestion being an addition to costs.

This is why we use net benefits (B-C) instead of benefit/cost ratios (B/C). The distinction between benefits and negative costs doesn’t matter for the difference but matters for the ratio.

B. Glossary

1. [Tier 2] Somewhere draw a distinction between all the rates of discounting:
 - a. Social opportunity cost of capital
 - b. Social rate of time preference
 - c. Shadow cost of capital
2. [Tier 1] Annualized value. An annualized value is a constant stream of benefits or costs. The annualized cost is the ****constant**** amount that a party would have to pay at the end of each period t to add up to the same cost in present value terms as the ****varying**** stream of costs being annualized.
3. [Tier 1] Benefit-cost ratio. The draft should note that B-C ratios are discouraged in cost-benefit analysis. Harvey Rosen’s writes in his textbook *Public Finance* “As a basis for comparing admissible projects, however, the benefit-cost ratio is virtually useless.” The reason is that the definition of what is a cost rather than a negative benefit, or vice versa, is sometimes ad-hoc. This doesn’t matter for net benefits, but changes the B-C ratio in arbitrary ways.
4. [Tier 1] Economic efficiency. Add that Economic Efficiency is equivalently defined as the situation where marginal benefit equals marginal cost, or alternatively where the sum of consumer and producer surpluses is maximized.

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5. [Tier 1] Elasticity of demand. In the last sentence, write “Hence gasoline ****demand**** would be price inelastic ...”
6. [Tier 1] Elasticity of supply. I am not sure why “developing competitive products that can substitute” amounts to a supply increase. (Isn’t that a demand reduction?)
7. [Tier 2] Social benefits. Describes WTP as the preferred measure. But versus what? WTA? OMB Circular A-4 mentions both. Are the guidelines making an income-effect point here? If so, the reason given is imprecise.
8. [Tier 1] Subsidy. I would not include “trade barrier” as an example of financial assistance. That gives a benefits to domestic producers, at a cost to domestic consumers.
9. [Tier 2] Tax-subsidy. By “profit tax” does the Guidelines mean “corporate tax”? (Also don’t hyphenate.)

C. Chapter 1. Introduction

1. [Tier 1] Page 1-3, line 16. This paragraph defines “benefits” as arising from non-market changes, and “costs” as those arising from market changes. That seems unusual, and worth comment by the SAB. That would mean that an RIA for relaxing a regulation would include cost-savings as negative costs, not benefits, and increased environmental damage as a negative benefit rather than a cost. It’s also inconsistent with page 1-2, line 24, which describes benefits as positive changes and costs as opportunities foregone. The bottom of page 1-3 makes it clear: “Ultimately, from the perspective of economic theory, the treatment of disbenefits and avoided costs in the analysis is primarily a communications issue and should not affect 38 efficiency analysis and whether net benefits are positive or negative.”
(And Appendix A.3: “The favorable effects of a regulation are the benefits, and the 25 foregone opportunities or losses in utility are the costs.”)

D. Appendix A

1. [Tier 2] Figures 1 and 2 describe demand and supply curves for “an individual.” Figure 3, according to the text, describes aggregate market demand and supply curves. But the figures are labeled exactly the same.
2. [Tier 1] Footnote 494 suggests Benefit-costs ratios may be used in the presence of a budget constraint. But the example doesn’t make sense. The first option has net benefits of \$1000. Doing the other four has collective net benefits of \$2000. Net benefits is still a better metric, and doesn’t have the problem associated with defining benefits or costs.
3. [Tier 2] A.6, page A-15. Perhaps update the references to graduate and undergraduate textbooks.

E. Chapter 8. Analyzing Costs

1. [Tier 2] Page 8-3, line 5. “Market responses to the regulation may include reduced industry output or higher prices as firms pass on some costs directly to consumers.” Be clear that costs passed on to consumers are not social costs unless they result in reduced output. If firms pass along 100 percent of the compliance costs because consumer demand is inelastic, then compliance costs are the appropriate measure.

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2. [Tier 1] Footnote 242. “market distortions are ... move consumers or firms away from what would occur under perfect competition *be economically efficient.*”
3. [Tier 1] Footnote 244. Producers surplus is profits ****plus fixed costs****. The area under the supply curve is total private *variable* costs, not total private costs.
4. [Tier 1] Figures 8.1 and 8.2 are confusing.
 - a. Figure 8.1 describes “a competitive market before the imposition of an environmental regulation.” Why is a regulation being imposed on a competitive market? Do these figures depict the regulated market, or some other (competitive) market?
 - b. Figure 8.2. I wouldn’t call the black triangle “deadweight loss.” There was an implied deadweight loss in Figure 8.1 that the regulation is designed to correct. The regulation eliminates a deadweight loss. Instead, call the triangle “lost CS+PS above and beyond compliance costs.” Also page 8-4 lines 15 and 20.
5. [Tier 2] Text Box 8.1 should make the following point. Retrospective analysis of regulations may be no less difficult than prospective analysis. For *prospective* analysis, the Agency must forecast two alternative future scenarios: the world with the regulation and the world without the regulation. For *retrospective* analysis, the Agency knows what the world looks like with the regulation in place, but still must forecast what the world would have looked like had the regulation not been imposed. The most intriguing and potentially useful part of this box is the last paragraph. But I am not sure what analytic requirements the authors have in mind.
6. [Tier 2] Page 8-7 “addition, analysts should ensure that: (1) the information supporting cost estimation is relevant for its intended use.” This is not always completely possible. And “relevant” is in the eye of the reader. Just as RIAs sometimes apply benefits derived from one context to another (“benefits transfer”), they also must be allowed to transfer costs, where no other options are viable.
7. [Tier 2] Footnote 262 seems one-sided. Using a lower bound cost estimate could result in artificially high levels of stringency.
8. [Tier 2] Page 8-10, line 15 ff. “However, when environmental regulation interacts with them in ways that distort behavior relative to what would occur absent government intervention in the marketplace, the welfare loss from these distortions should be included in an estimate of cost.”

I don’t understand this sentence. Is this about rent-seeking? Are there any examples of RIAs that include this or should have included this?
9. [Tier 2] Footnote 269. I am not sure about the characterization of the EV/CV distinction. I would have said “The difference between them is based on whether one assumes the beneficiaries are being asked to pay for the regulated improvement (CV), or whether they are entitled to the improvement and must be paid to forego it (EV). It is the difference between willingness-to-pay (WTP) for environmental quality and willingness-to-accept (WTA) compensation for environmental degradation.

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10. [Tier 1] Page 8-11, line 3 ff. It's good to list the reasons GDP is not a good measure of welfare, but there are a few more. GDP doesn't include environmental cost or benefits. If people get sick from pollution and go to the doctor more, that increases GDP. GDP is a flow measure of expenditure, and it omits changes to capital stocks. If a pollutant damages buildings and people spend more money repairing and painting them, that increases GDP.
11. [Tier 2] Clarification: Page 8-13, line 7. Is this true? "when a dynamic general equilibrium model is used to estimate social costs, any displacement of investment due to the regulation has already been accounted for and the social cost estimates should only be compared to present value estimates of benefits discounted at the consumption discount rate."
12. [Tier 2] Footnote 278. A more recent citation would be Chan, Cropper and Muller, "The Impact of Trading on the Costs and Benefits of the Acid Rain Program" *Journal of Environmental Economics and Management*, 88, 180-209, March 2018.
13. [Tier 2] Page 8-14, line 12. Suggest adding something like the following. "In this full-employment, low-transition-cost setting, any extra employment required to comply with a regulation are part of the costs of that regulation. Those jobs represent work displaced from other productive activities." (This point is often lost on policymakers who want to count "green jobs" as part of a regulation's benefits.)
14. [Tier 2] Section 8.2.3.6 *Effects on Market Structure and Entry and Exit*. It's not clear why this section is in the Chapter 8, Costs. No mention is made as to why a change in market power would be a cost of a regulation. If it doesn't affect social costs, the section might be more appropriate in Chapter 9, on other Economic Impacts.
15. [Tier 2] Suggestion. Page 8-16, line 30 asserts without explanation that "Input-output and input-output econometric models should not be used to estimate social cost." Also, page 8-23, line 22. (The answer comes later, in section 8.3.4.1.)
16. [Tier 2] Page 8-19, line 40. I'm not sure I understand this. "In circumstances where producer and consumer behavior are appreciably affected, these models are not able to provide estimates of changes in industry prices and output resulting from the imposition of a regulation." Is that referring to the consumer demand response from increased prices, which would be in the lost CS?
17. [Tier 2] Clarification. Page 8-21, line 7. Is this true? I would have written that LP models cannot calculate social cost when demand or supply *quantities* change in response to price or cost changes. "While the estimated change in expenditures incurred by the regulated sector may be of policy interest, it is not equal to social cost when input or output prices change. If the linear programming model captures changes in market prices in response to the policy, then it is possible to use the model outputs to estimate a partial equilibrium estimate of social cost (e.g., changes in producer and consumer surplus)."
18. [Tier 1] Page 8-23, line 19. Add "Limitations" of CGE models. Among the most important: lack of transparency.
19. [Tier 2] Why so many pages and boxes devoted to I-O analysis, which is not recommended for use?

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Dr. Richard Williams

A. Overall comment

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

The guidelines are described as prescribing best practices for economic analysis and detailing the different EO's and other laws that impose requirements for those analyses. Many years ago, the Office of Personnel Management had guidelines for policy analysts. Here's an excerpt from 1981.

The policy analyst, as defined in this guide, is set apart from other participants in the decision-making process by his or her professional objectivity, nonpartisanship, balance, and ability to provide comprehensive advice and analysis. The policy analyst serves the political decision-making process by providing comprehensive, balanced information and analysis to all sides of policy issues rather than by advancing the ideas of a single decision maker, philosophy, or point of view.ⁱ

This requirement was changed from earlier views that subject matter experts be used to “defend” policy makers decisions.ⁱⁱ

Confusion begins with the economic Executive Orders. The latest one requires that “costs are justified by benefits.” That is not an instruction to a subject area expert, e.g., an economic analyst; that is an instruction to the policy maker. Some federal economists, attorney's and others have interpreted that requirement to mean, not that actual costs should be justified by benefits, but that the economic analysis should *show* that costs are justified by benefits, i.e., by making the analysis conform to the decision. The rest of the Executive Order explains how economic analysis should be done; an instruction clearly directed toward the analyst.

People outside of government have long charged that economists have been making decisions and economic executive orders may perpetuate that falsehood. Correcting the misperception, as well as the incentive to make analyses conform to decisions, can be corrected in these guidelines.

To help ensure that economists are not charged with defending decisions that are outside of their subject area expertise, explanations of why decisions were made should be either in the preamble of the rule in a separate section from the RIA or, if within the RIA, in a separate section so that the appropriate experts, e.g., lawyers or decision makers, can make that

ⁱ <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gspolanl.pdf>

ⁱⁱ IBID.

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argument.ⁱⁱⁱ From a perception point of view, it would be better to keep it in an entirely different place than the RIA. Wherever the discussion is located, it should also include how the decision was *informed* by the results of the RIA.

Without a great deal of work, this guidance could be expanded to provide analysts information on how they should conduct the preparation of their analyses and, for higher grade economists, advise policy makers. It could, for example, make note of the fact that economists should always be able to brief policy makers in jargon free, easy to understand advice on key margins, not just overall costs and benefits. They should also be aware that written RIA's are to advise anyone and everyone in all branches of government and the public of the consequences of a choice to intervene in markets and the results of various options. They should be prepared, internally and to other parts of the executive branch, to defend their analyses vigorously. This is particularly true when challenged to make their analysis support a pre-chosen decision.

Just as important, however, they should be careful never to try and influence a decision by biasing an analysis or inserting themselves into decision making roles. One way this can be done is to treat the analysis of all regulatory options equally by laying out, particularly for salient options, the benefits and costs without prejudice or in fact, even identifying the proposed option which allows readers to make their own judgments based on benefits and costs of all options.

Economists should also be aware that different decisions may require different types of analysis. In the draft guidelines, benefit-cost analysis is covered, as is distributional analysis and risk/risk analysis. Another form of analysis not covered is health/health, alternatively known as health/wealth analysis which provides a different perspective, particularly for regulations for which cost analysis is not legally allowed.

The Guidance should also specify that economists will be judged in their performance reviews by conformance to these principles.

Charge question 4: Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?

To make this document clearer, elimination of redundancy would help such as combining all uncertainty and sensitivity analyses into one section.

B. Chapter 1

1. Text Box 1.1 - Agency Checklist for Regulatory Impact Analysis

ⁱⁱⁱ EO 12866 only requires that an explanation of why the regulatory action is preferable to other alternatives and why it is consistent with a statutory mandate. It does not specify the location of those discussions. The previous EO 12291, on the other hand, said that information should be in the PRIA and RIA.

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Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

There should be a different checklist for PRIA's and RIA's guidance on how final RIAs should respond to comments. Some typical responses to comments found in previous documents, whether responding to individual or grouped comments, should be avoided. For example, "The commenter did not supply sufficient data to change the analysis." This presumes that the burden is on a commenter to supply large amounts of data that would be needed to change the analysis. Yet, if there is a sufficient amount of data provided to *question* whether the analysis needs to be changed, the agency should follow-up to look for additional data to ascertain whether the commenter, who may not have the same level of agencies resources, is correct.

Another common response is, "We are not convinced by the comment." This is insufficient. The burden should be on the agency to explain why they are not convinced, why is the commenter wrong?

Comments on specific questions in the Text Box 1.1 - Agency Checklist for Regulatory Impact Analysis checklist:

Does the RIA include a reasonably detailed description of the need for regulatory action? This should say..." need for regulatory action including whether there is a market failure and, if so, explain the evidence for the existence of the failure. It may also include a description of the government failure.

Does the RIA use an appropriate baseline?

This should say..."Does the RIA use the same baseline for changes in behavior for both the benefits and costs and use the same changes by key participants likely to occur without regulation?"

Is the information in the RIA based on the best reasonably obtainable scientific, technical, and economic information and is it presented in an accurate, clear, complete, and unbiased manner?

This should say..." accurate, clear, complete and unbiased manner such that it can be replicated by a competent economist?"

Does the RIA assess the potentially effective and reasonably feasible alternatives?

This should read ..." reasonably feasible alternatives, including those not currently lawful."

Does the RIA explain and support a reasoned determination that the benefits of the intended regulation justify its costs?

This question should not be asked of an analyst. That is the job of a decision maker, particularly because they must apply their own valuations associated with unquantified benefits and costs and managing uncertainties.

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A better question is, “Does the RIA provide decision makers with a balanced view of the marginal benefits and costs of a sufficiently wide array of options to help maximize the net benefits of the decision.

Does the RIA consider setting different requirements for large and small firms?

This should probably be the job of the PRFA and RFA. Perhaps a better question for the RIA is: “Does the RIA address target specific industries to the extent feasible?”

Does the preferred option have the highest net benefits – unless a statute requires a different approach?

Again, this question should not be asked of analysts. Given that there are virtually always some benefits or costs not quantified, determining and justifying the preferred option is the job of the person who chooses that option. In fact, the analysis should evaluate all regulatory options equally without regard to the agency’s preferred option, including the situation where the preferred option is chosen prior to completion of the analysis.

Holley Doremus writes “The decision-making agencies are not inclined to help the public sort out the policy judgments in their decisions. To the contrary, they have every incentive to hide those judgments.”^{iv} Agencies often try to hide complicated decisions behind science but, by forcing economists to provide a rationale for the choices decision-makers have made, they put the onus on economists to either make their analysis conform to the decision or to explain how a decision-maker weighed them against competing interests of law (including precedents), politics, ethics, additional weight given to sensitive subgroups, agency resources and the decision-makers private preferences – particularly with respect to uncertainties in the analysis. However, explanation for the decision, including how the economics analysis was used to *inform* the decision, belongs in the preamble to the rule.

Does the RIA include an explanation of why the planned regulatory action is preferable to the identified potential alternatives?

This question does not belong in an RIA and it invites non-economists, including attorney’s and decision makers, to edit RIA’s. An alternative is to have a short summary of the quantified and unquantified benefits and costs of each option analyzed so that those who wish to know can quickly grasp the outcome of the RIA. This could be in this section: Does the analysis include a clear, plain language executive summary, including an accounting statement that summarizes the benefit and cost estimates...as well as this “Does the analysis include a clear and transparent table presenting anticipated benefits and costs?”

2. Section 1.4 Principles for Conducting Economic Analysis

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

^{iv} Wagner, Wendy et. al., editors, *Rescuing Science form Politics: Regulation and the Distortion of Scientific Research*, Cambridge University Press, Cambridge, Mass, 2006, p. 154/

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First bullet - This is so important it probably needs more emphasis. For example, some non-economist reviewers may believe that changes in behavior that should be modeled are precisely what is required by the regulation and object to other behavioral changes that economists predict. For example, if a new label says, “this product is dangerous to children,” to a non-economist, the cost is putting on a new label. To an economist, there would be reformulation or not making the product to avoid putting that statement on that label.

Second bullet – Again, this captures some of the advice about how economists should perform but it may get lost here. Suggest capturing this in a complete section.

Third bullet - Data should be made publicly available in accordance with the Transparency Regulation.

C. Chapter 2

It might be helpful to try and lump similar or same requirements into one section that cites the various statutes, orders and memo’s requiring them.

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

It should be noted in this section that OMB’s OIRA makes the final determination of significance for RIA’s.

1. Section 2.1.2 Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”

As mentioned below, the requirements include “economic, and social effects, of federal actions.” This includes costs to these subpopulations. This point is made in comments on Chapter 10.

2. Section 2.1.3 Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks”

Again, it asks economists to explain why an alternative is preferable, that is a decision makers job.

3. Section 2.1.7 Executive Order 13563, "Improving Regulation and Regulatory Review

Agencies are required to develop plans for retrospective review of significant rules. There needs to be guidance on how to do this. For example, the plan should specify factors to prioritize rules for review where there are larger costs or benefits and a lot of uncertainty.

4. Section 2.2.2 Unfunded Mandates Reform Act of 1995 (UMRA) (P.L. 104-4)

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It should be noted that, although the agency must “publish with the final rule an explanation of why such alternative was not chosen,” that should not be included in the economic analysis of unfunded mandates, it should be in the preamble.

D. Chapter 3

1. Section 3.1 The Statement of Need.

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Regulations address “market failures, government failures and overriding social needs.”^v Government failures can be, for example, unintended consequences. In the first paragraph, it suggests that economists provide “a justification for federal action” to address a market failure. Equally important, economists should describe an alternative reason for addressing a problem when there is no market failure and state that there is no market failure. When there is no market failure, benefits cannot exceed costs, no matter which policy option is chosen.

Although obvious to economists, lack of a regulation is not a market or government failure, and this should be discussed.

A market failure must be a systemic problem, not one that is a one-off issue that the market may handle. Analysts must provide evidence of a failure, not just assert it. Evidence may come in the form of randomized control studies, statistical studies, or before and after studies or case studies.^{vi}

This is also the point at which the goal of the regulation should be *explicitly stated*. For example, the goal is not to reduce the smoke out of a smokestack, the goal is to reduce the risks to people from smoke coming out of a smokestack.

2. Textbox 3.1 – Coase Solution

Charge question 1: Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

This section could use some modern updating, particularly talking about how Coase solutions have been augmented by the rise of the internet. As discussed in Clay Shirky’s *Here Comes Everybody*, the internet provides consumers with robust search and monitoring tools that lowers search and transactions costs. Using social platforms like

^v McLaughlin, Patrick A. et. al., “REGULATORY REFORM IN FLORIDA: AN OPPORTUNITY FOR GREATER COMPETITIVENESS AND ECONOMIC EFFICIENCY,” FSU Business Review, 2014, p. 109

^{vi} IBID.

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Facebook, Twitter and Flickr, it is easier for groups to discover one another and to arrive at bargained solutions.^{vii} The Web also goes a long way to ameliorating information asymmetries. Coase solutions may emerge over time and can be included in the baseline correcting a temporary market failure.

3. Section 3.1.3 Need for Federal Action

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Where there is a federal statute that requires federal intervention, economists should evaluate a regulatory option that allows states or localities to address problems that maximizes net benefits, noting that it is currently not legal.

4. Section 3.2 General Guidance on Policy Options to Evaluate

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

This is where the guidance should discuss options not currently allowed by law. RIA's can point political appointees in the executive or legislative branch to seek changes in laws. There is some discussion about "statutory requirement limitations and options not available but it should be explicitly stated. It should also be emphasized that this is an economic, not a legal document.

Lines 3-4, "It is not adequate to solely evaluate the preferred option," should be changed to "The analysis should not refer to a "preferred option" but rather analyze that option along with others.

Lines 18-19 "...and how the preferred option satisfies them" should be struck.

Lines 8-17 should also include different degrees of stringency, different sets of industries/firms, market-oriented approaches (even ones that are not available to the agency like taxes and subsidies), and information measures.

E. Chapter 4

Again, the guidelines emphasize what is statutorily allowed and what is not. This discussion inhibits analysis of efficient options.

1. Section 4.2.1 Technology or Design Standards

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

^{vii} Shirky, Clay, *Here Comes Everybody*, Penguin Press, New York, NY, 2008.

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Discussion of command and control options should differentiate between a general pollution limit and a prescription for specific types of control equipment. The latter is likely to generate more rent seeking by producers of the equipment and current users.^{viii}

2. Section 4.2.2 Performance-Based Standards

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

This discussion should include a short discussion of guidance for smaller enterprises on “safe harbor” practices that can help them to achieve the standard.

3. Section 4.3.1 Allowance Trading Systems

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Trading permits for airplane landing slots have been hoarded because airlines are worried about future price increases.^{ix} I don’t know if this is a problem for pollution rules.

4. Section 4.4.2 Information Disclosure

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Before analyzing the benefits of information disclosure, two things should be kept in mind.

1. A large percentage of the population is either illiterate or marginally literate.^x
2. EPA’s information is not peer reviewed and can be extremely misleading. For example, see the CAST paper by Winter, Carl et. al. “Interpreting Pesticide Residues in Food,” 66 Oct 2019. Compare that to “Human Health Issues Related to Pesticides” on EPA’s website.

5. Section 4.4.4 Nudges

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

Another reason why a subject matter expert should not have to explain why a decision was made is when the policy maker’s decision is the result of a behavioral anomaly – such as anchoring on a past practice or decision. One place that this may come up is

^{viii} See Bruce Yandle on this.

^{ix} See, for example, Daniel, Joseph, “The Untold Problems with Airport Slot Constraints” ResearchGate, Jan 2009. Or Dempsey, Paul Stephen, “Airport Landing Slots: Barriers to Entry and Impediments to Competition,” Research Gate, Feb 2001.

^x See, *More Than You Wanted to Know*, by Schneider and Ben-Sharar.

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nudging consumers to abandon one set of practices but starting a practice that is at least as risky, if not more so – a risk/risk issue.

Second, what consumers “like” may be a completely different option than what they are good at using. FDA labeling studies showed that.

6. Section 4.6.4

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Perhaps here or elsewhere there should be a discussion of a policy option of an experimental or pilot program on a limited scale to check for effectiveness prior to an economy wide rule.

7. Section 4.6.8

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

One thing should be mentioned in this section. The goal of the policy maker must be written down clearly in the RIA and it should be an “outcome goal,” i.e., something that will benefit consumers.

8. Section 4.7

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

These questions should be repeated in the analysis with answers and be used for future regulatory reviews.

F. Chapter 5

1. Section 5.1.1 Standing

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

If, in cases where the scope is international, the analysis should be clear that all international benefits and costs are counted.

2. Section 5.2.1 Standing

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

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It is important to note that the baseline may show that, over time, the market will correct itself and solve the problem. A regulation may speed up a solution, however but then the burden is on the analyst to show why the government solution is as good as the private solution.

3. Section 5.4 Time Horizon of Analysis

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

For timing for both benefits and costs, note that although existing firms may comply with costs quickly, costs do not end because new firms may come onto the market within the rule's analytical time frame and also have to comply with the rule's costs.

4. Section 5.5.1 Behavioral Response

Charge question 2: Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

Responses to regulations from expected behavior without regulation (the baseline) determines both benefits and costs and those responses must be consistent for calculating both.

5. Section 5.5.3 Technological Change

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Technological change can be captured in the baseline and it can affect costs as well as benefits. For example, global climate change scenario's often estimate benefits 30 years out. In these cases, any human health impacts should account for current efforts in genetic engineering which have the potential to prevent, attenuate or cure negative human health effects.^{xi}

G. Chapter 10: Environmental Justice and Life Stage 2 Considerations

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

There are a large number of ways to divide up the population and the effects of regulations, but it is not clear how, if a particular division becomes a concern, a policy option to correct that concern can be constructed. It may be the case that by analyzing the effects, either

^{xi} For example, see KN.C, "How genetic engineering will reshape humanity," *The Economist*, Apr 25, 2019.

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policy makers or the public through comments may create a policy correction. However, as the Guidelines are written, there is an asymmetry between efficiency objectives and potential policy options that can move toward maximizing net benefits and the dearth of policy options to correct distributional effects.

This chapter needs to recognize the income effects of EPA's environmental regulations. On page 1-5 it does say, "Consideration of costs may also be relevant in such analyses" but that should read "costs are relevant. In such analysis."

As a component of cost impacts, the chapter needs to emphasize that "wealth/health," otherwise known as "health/health" implications of EPA rules.^{xii} There are three possible ways for income and wealth to affect the health of individuals who ultimately pay for them, particularly workers and consumers.

1. Loss of income can lead to reduction in private expenditures on risk reduction such as losing access to health insurance, not going to doctors, buying less safe cars, fewer baby gates, eating less healthy meals or living in more dangerous neighborhoods
2. Increasing risky behaviors including alcoholism, drug taking, spousal abuse and suicide.
3. Displacing risk reducing expenditures by companies such as expending resources to improve worker safety.

In these cases, people directly affected by rules may enjoy benefits while others pay the costs and the attendant risk increases.

For example, Diana Thomas^{xiii} notes that:

- Regulations act like a regressive sales tax, with middle- and lower-income households bearing much of the cost of rules that focus on the risk preferences of wealthier households, since they all pay the same, higher prices.
- Cost of regulation as a share of income is estimated to be as much as six to eight times higher for low-income households than for high-income households.
- Thomas estimates that households can mitigate the same level of mortality risks privately for about one fifth of the cost of public risk-reduction strategies.^{xiv}

For example, energy is a much bigger component of household income for the poorest quintile than for the richest. "Households in the very lowest income quintile spend 22% of their after-tax income on residential utilities and gasoline,... This compares with 5% for households in the top income quintile."^{xv}

^{xii} See, for example, Lutter, Randall and John Morrall, "Health-health analysis: A new way to evaluate health and safety regulation," *Journal of Risk and Uncertainty*, Jan 1994.

^{xiii} Thomas, Diana, "Regressive Effects of Regulation," Mercatus Working Papers, Nov 27, 2012.

^{xiv} IBID.

^{xv} <file:///D:/2020/EPA/Family-Energy-Costs-2016.pdf>

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Studies have shown that there will be a larger effect on less well-off households or workers from expensive regulations than on more well-off households or workers.^{xvi}

Nowhere is this more apparent than air pollution regulations. The net worth of those that are under the age of 35 is \$76,200 (median \$11,400). For those ages 65-74, it is \$1,066,000 (median \$224,100).^{xvii} The average number of months of life lost from air pollution regulations is 64 days for women and 48 days for men.^{xviii} When regulations, like air regulations, are paid for by all cause the young to suffer health consequences through the income channel while the old are saved via the target regulation channel, that is a regressive tax.

The last summary report of EPA on the cost of clean air regulations reports that costs of the program are expected to be \$65 billion per year by this year. According to one recent report, just the first of the three health/health effects, loss of income causing fewer risk reducing purchases by individuals, causes 1 life to be lost per \$100 million of expenditures.^{xix} This would cause a loss of 650 lives. However, that figure does not include losses from increased risk taking and crowding out of private business expenditures. It does also not include morbidity.

This analysis might also show distributional effects of less skilled, lower income workers being laid off, and the ensuing health consequences, and more highly skilled, higher income workers are hired to comply with EPA regulations.

1. Section 10.2.3.2 Low Income Populations

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

There does not seem to be any discussion of federal or states assistance programs which increases overall income.^{xx}

2. Section 10.2.7.5 Risk Considerations

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

Amongst the factors mentioned, the microbiome should also be included.

^{xvi} See, for example, Kuchler, et. al., “Health Transfers: An Application of Health-Health Analysis to Assess Food Safety Regulations,” 10 Risk. Health, Safety & Environment 315 [Fall 1999].

^{xvii} <https://www.thestreet.com/personal-finance/average-net-worth-by-age-14730772>

^{xviii} Bennett, James E., et. al., “Particulate matter air pollution and national and county life expectancy loss in the USA: A spatiotemporal analysis,” *PLOS Medicine*, July 23, 2019.

^{xix} <https://www.mercatus.org/publications/regulation/death-regulation-how-regulations-can-increase-mortality-risk>

^{xx} <https://poverty.umich.edu/2019/10/18/spending-on-government-anti-poverty-efforts-healthcare-expenditures-vastly-outstrip-income-transfers/>

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H. Chapter 11: Presentation of Analysis and Results

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

There is an assertion in the second paragraph that is often not true. Many policy makers dismiss out of hand the findings in RIAs. A better way to address this is that the Executive Order is an instruction from the President to policy makers to use the results of RIAs in their decision making.

It could be useful, particularly for newer analysts, to describe how to present these analyses in in-person meetings. In many cases, decision makers may listen for one or two minutes to a verbal presentation and then interrupt. It is necessary for economists to start their briefing with the most important finding, whatever it is. Often this will be a margin that can be easily adjusted, is obvious (e.g., costs vastly exceed benefits), and can bring benefits closer to justifying costs.

This should also be the case for distributional analyses, there may be one group that suffers from higher risk or larger costs and the analyst can suggest a remedy.

The same is true of a written summary, it should begin with the most important finding.

1. Section 11.2.1. Data

Charge question 3: Are there topics that warrant more discussion or elaboration in the chapter?

This section should refer to the EPA Information Quality Guidelines.^{xxi}

Dr. Craig E. Landry

Chapter 7, Analyzing Benefits

The Chapter on Analyzing Benefits is well written and well organized. It's clear that a great deal of effort went into the draft, and the authors are to be commended. The Chapter covers theoretical and conceptual bases for benefit assessment in a way that should be accessible for non-experts; offers a typology and description of the types of benefits relevant for EPA analyses; provides an overview of common revealed and stated preference methods as applied to ecological endpoints (including combining RP and SP); provides a cursory overview of benefit transfer; and provides some guidance on non-quantitative approaches to benefits assessment. I offer feedback in what follows.

^{xxi} <https://www.epa.gov/quality/epa-information-quality-guidelines>

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A. Major Comments:

- Clarification, 7-1: Willing To Accept [WTA] Compensation is also compatible with potential Pareto Criterion; later in this chapter, WTP is noted to indicate both welfare measures, but that condition is not established on page 7-1.
- Point of clarification, 7-7, Step 3: *Estimate the monetary value of endpoints* – Representative agent approaches are often used, but models can incorporate heterogeneity in some cases. For example, it is sometimes possible to incorporate underlying subject heterogeneity (using finite mixture or random parameter approaches) in the valuation analysis. In such cases, it may be possible to estimate a range of values for different kinds of households and scale up the estimates using inference on population proportions from the sample that is used to conduct benefit estimation.
- Additional details possibly needed, 7-10, line 9: A short summary of standard assumptions underlying the existence of preference relations that give rise to utility structures could be useful before turning to money-metric utility measures.
- Further details needed, 7-11: WTA and WTP also make implicit assumptions about property rights; if utilizing initial utility as reference levels, the welfare implicitly assumes property rights exist in the initial state; alternatively, if subsequent utility is reference, property right exists to this state. These details can be important in some applications.
- Further details, 7-11: critical appraisal of divergence of WTP and WTA (at least a citation or two)
- Additional method that could be discussed, 7-22: choice models [RUMs] can be used to assess tradeoffs associated with any selection among multi-attribute private or public goods. If the attributes of the good include pollution level, risk, or some other non-market benefit, the model can be used to value that benefit. Examples: choice of neighborhoods with different pollution levels; choice of food products with potential health risks; choice of private goods that certify low ecological impacts or creation of ecological benefits (e.g. organic); choice of driving/ walking/ biking route with view amenities; etc.
- Probably deserves additional emphasis, 7-23, line 12: suitability of prices for welfare analysis is directly dependent on structure of market; Q: are there any rules of thumb or heuristics used to judge levels of competition or potential degree of price manipulation?
- More details, 7-25, line 1: complications arising from the role of taxation in benefit assessment; discussion unclear
- Point of clarification, 7-25, line 18; 7-26, line 25: The literature typically describes 3 or 4 types of rec demand models that utilize travel distance and implicit costs as a source of preference identification: 1) single site demand models, 2) system of demand equations, 3) site choice models, and possibly (4) repeated site choice models; Hellerstein and Mendelsohn (*AJAE* 1993) have a nice paper that explores the theoretical connection between site choice (extensive margin) and quantity of trips (intensive margin)
- Point of clarification, 7-25, line 32: opportunity cost is often assumed 1/3 of the “household wage rate”, which is usually backed out of income assuming a single primary wage earner (e.g. working 2000 hours a year with 2 weeks vacation). There is potential

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for improvements here, inquiring about employment status of all adults & contributions to household income; analyst would still need to know which household members travel.

- Correction, 7-26, line 18: time onsite is not usually included in most estimates of travel cost; it's only travel time. Onsite time and expenditures are separate decisions that have received little attention in the literature (Bell and Leeworthy 1990; McConnell 1992; Larson 1993; Berman and Kim 1999; Landry and McConnell 2007). There is also a recent working paper by English, et al. (2018).
- Suggestion, 7-26: Chapter should address issue of operating vs. full monetary cost of travel; AAA reports both; most researchers consider operating costs as the more relevant measure, but if a household maintains a car primarily for recreation trips (e.g. someone that lives in a big city, mostly utilized public transportation day-to-day, but maintains a recreational vehicle for camping trips), full monetary costs could be more accurate.
- Suggestion, clarification, 7-26, line 30: the role of substitute prices in demand modeling is complicated; if recreation demand trips to various sites are separable in the utility function (from other consumption goods), their demands represent a system of demand equations with theoretical cross-equation linkages. That system must be 1) homogeneous of degree zero in travel costs and income (or recreation budget); 2) abide the Cournot and Engel aggregations; and 3) conform to the Slutsky Substitution Matrix. In regard to the latter, restrictions on substitute price parameters are very strict (most straightforward interpretation for commonly used semi-log model is that the substitute coefficient must equal zero) (LaFrance 1990; von Haefen 2002; Landry, et al. 2016). This result applies whether are not you estimate one or all equations in the separable part of the utility function. Alternatively, you can assume other recreation trips as separable in utility from the site your analyzing. In this case, Slutsky imposes no restrictions on the substitute price parameter (but this is less compelling from a theoretical perspective).
- Question, 7-27, line 10: how common is it that researcher treat site choice & intensive margin simultaneously? I can't think of any papers that take this approach (but could be in a different literature). Please add citations.
- Point of clarification, 7-29, line 7: Parsons (not sure about YEAR) suggests including a multi-purpose dummy and use the parameter estimate to negate multiple trips during welfare analysis.
- Point of clarification, 7-29, line 9: Many papers consider single and multi-day trips as separate goods and analyze them in separate models; multi-day models usually don't fit as well (much more noise/ unexplained variation).
 - Side note: I'm not aware of any multi-day valuations that find per day values greater than single-day trips; it's a stylized fact that single trip day values exceed the value of an average day on a multi-day trip.
 - Side note: again, there has been limited treatment of onsite time (Bell and Leeworthy 1990; McConnell 1992; Larson 1993; Berman and Kim 1999; Landry and McConnell 2007 English, et al. 2018). McConnell (1992) and Landry and McConnell (2007) argue that as long as the system of endogenous variables (e.g. trips, onsite time, onsite expenditures) is optimized, welfare analysis can focus on one equation (e.g. trips).

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- Suggestion, 7-32: Spatial regressions have mostly fallen out of favor in environmental economics and typically are just used for robustness checks. (Mostly Useless Spatial Econometrics – Gibbons and Overman 2012)
- Point of clarification, 7-33: significant complication in many averting behavior analyses is that output level (e.g. health) is unobserved and may change when aversion is engaged. This complicates calculation of WTP (Compensating Variation).
- Note, 7-36: NOAA report generally recognized as outdated
- Note, 7-36: Good paper on validity & suitability of SP in response to JEP papers: Haab, et al. (2013).
- Point of clarification, 7-43: an additional *ex ante* bias correction that has received lots of attention and seen some positive results is known as “consequentialism” - highlighting consequences to survey respondents in such a way that the respondents may perceive that their choices could be binding (in some probabilistic sense) (Cummings and Taylor 1998; Carson and Groves 2007; Landry and List 2007; Vossler and Evans 2009; Herriges et al. 2010; Vossler and Watson 2013)
- Point of clarification, 7-43: experiments have (to varying degrees) successfully simulated public good provision in various ways (Carson et al. 2001; List et al. 2004; Landry and List 2007; Vossler and Evans 2009; Vossler et al. 2012)

B. Minor Comments:

- 7-1: footnote 178 is labeled “1” (pg. 127)
- Strange phrasing, 7-11: WTP can *also* be non-linear? I don’t think the chapter ever suggested it was (or should be) linear (but perhaps I missed that).
- Suggestion, 7-38/40: under-researched approach = 1.5 bound (good idea, theory, but has seen little application and assessment)

Citations

- Bell, F.W., and V.R. Leeworthy. 1990. “Recreational Demand by Tourists for Saltwater Beach Days.” *Journal of Environmental Economics and Management* 18: 189-205.
- Berman, M.D., and H.J. Kim. 1999. “Endogenous Onsite Time in the Recreation Demand Model.” *Land Economics* 75: 603-19.
- Carson, R. T. & Groves, T. (2007). Incentive and informational properties of preference questions. *Environmental and Resource Economics*, 37, 181-210.
- Carson, R. T., Flores, N. E. & Meade, N. F. (2001). Contingent valuation: Controversies and evidence. *Environmental and Resource Economics*, 19, 173-210.
- Cummings, R.G. and L.O. Taylor. (1998.) Does realism matter in contingent valuation surveys? *Land Economics*. 74. 203-215.
- Daniel Hellerstein; Robert Mendelsohn “A Theoretical Foundation for Count Data Models” *American Journal of Agricultural Economics*, Vol. 75, No. 3. (Aug., 1993), pp. 604-611
- Herriges, J., Kling, C., Liu, C.-C. & Tobia, J. (2010). What are the consequences of consequentiality? *Journal of Environmental Economics and Management*, 59, 67-81.
- English, E, KE McConnell, RH von Haefen, F Lupi. 2018. Should single day and multiple day trips be pooled when estimating travel cost models? working paper, May 30

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- Gibbons, S. and H.G. Overman. 2012. “Mostly Pointless Spatial Econometrics” *Journal of Regional Science* 52(2): 172 - 191.
- Timothy C. Haab, Matthew G. Interis, Daniel R. Petrolia, John C. Whitehead, From Hopeless to Curious? Thoughts on Hausman's “Dubious to Hopeless” Critique of Contingent Valuation, *Applied Economic Perspectives and Policy*, Volume 35, Issue 4, December 2013, Pages 593–612, <https://doi.org/10.1093/aep/ppt029>
- Craig E. Landry and Kenneth E. McConnell. 2007. “Hedonic Onsite Cost Model of Recreation Demand” *Land Economics* 83(2): 253-67.
- Craig E. Landry and John A. List. 2007. “Using *Ex Ante* Approaches to Obtain Credible Signals of Value in Contingent Markets: Evidence from the Field” *American Journal of Agricultural Economics* 89(2): 420-32.
- Craig E. Landry, Alyson R. Lewis, Haiyong Liu, and Hans Vogelsong. 2016. “Economic Value and Economic Impact of Visitation to Cape Hatteras National Seashore: Addressing Onsite Sampling” *Marine Resource Economics* 31(3): 301-22.
- Larson, D.M. 1993. “Joint Recreation Choices and Implied Values of Time.” *Land Economics* 69: 270-86.
- LaFrance, J. 1990. “Incomplete Demand Systems and Semilogarithmic Demand Models” *Australian Journal of Agricultural Economics*, Vol. 34, No. 2: 118-31
- List, J. A., Berrens, R., Bohara, A. & Kerkvilet, J. (2004). Examining the role of social isolation on stated preferences. *American Economic Review*, 94, 741-752.
- McConnell, K.E. 1992. “Onsite Time in the Demand for Recreation.” *American Journal of Agricultural Economics* 74: 918-25.
- von Haefen, Roger H. 2002. A complete characterization of the linear, log-linear, and semi-log incomplete demand system models. *Journal of Agricultural and Resource Economics* 27(2): 281-319.
- Vossler, C., Doyon, M. & Rondeau, D. (2012). Truth in consequentiality: Theory and field evidence on discrete choice experiments. *American Economic Journal: Microeconomics*, 4, 145-171.
- Vossler, C. & Evans, M. F. (2009). Bridging the gap between the field and the lab: Environmental goods, policymaker input, and consequentiality. *Journal of Environmental Economics and Management*, 58, 338-345.
- Vossler, C. and S.B. Watson. (2013). Understanding the consequences of consequentiality: Testing the validity of stated preferences in the field. *Journal of Economic Behavior & Organization*. 86. 137– 147.

Dr. Karen Clay

A. Chapter 5

1. Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?

Tier 1 The treatment of co-benefits in Chapters 5 and 7 was raised commenters and is an issue worth discussing. It would be desirable to make a clearer statement regarding the

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inclusion of all benefits and costs in Chapter 5. The theoretical and empirical literature is clear that all benefits and costs of a regulation should be considered. Currently much of the discussion is a bit vague (section 5.5.6) or has appeared in footnotes (eg footnote 129 on page 5-18; footnote 182 on page 7-5).

B. Chapter 7

1. *Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?*

Tier 1 Figure 7-1 (page 7-2) and Table 7-1 (page 7-3) and the accompanying discussion appear to be unnecessarily narrow. Specifically, the transition from changes in environmental contaminants or stressors to changes in environmental quality in Figure 7-1 appears to exclude non-environmental benefits such as cost savings. Similarly, Table 7-1 does not have a row under other benefits that allows for cost savings.

Tier 1 The treatment of co-benefits in Chapters 5 and 7 was raised by commenters and is an issue that worth discussing. It would be desirable to make a clearer statement regarding the inclusion of all benefits in Chapter 7. The theoretical and empirical literature is clear that all benefits and costs of a regulation should be considered. Currently much of the discussion is a bit vague (section 5.5.6) or has appeared in footnotes (eg footnote 129 on page 5-18; footnote 182 on page 7-5).

Tier 2 Chapter 7 would benefit from a discussion of the age distributions for mortality. Commenters raise the issue of reporting VSL alone vs. reporting VSL together with additional measures such as VSLY/QALY. EPA (2007) guidance is to focus on VSL. EPA (2007) goes on to say (p. ii) “However, we also urge the Agency to report the age distribution of statistical lives saved and the average remaining life expectancies of persons in each age group.” Although there are mentions of age distribution in other chapters of the Guidelines, including Appendix B, it would be useful to discuss the reporting of age distribution in the text of Chapter 7.

Tier 3 The COI illness section highlights a general issue with the treatment of morbidity in RIAs. As the text notes on page 7-34, COI is likely to be too low in most circumstances. WTP estimates are expensive to develop, but it may be worthwhile having the EPA, perhaps in conjunction with other federal agencies, invest in estimation of estimates for the most significant sources of morbidity. Otherwise one is left with a situation where the vast majority of benefits in RIAs accrue from mortality and relatively little accrue from morbidity. This can lead to an undervaluation of regulations that primarily reduce morbidity.

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2. *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?*

Yes, the chapter contained an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described. Smaller comments are listed below.

Tier 2 The discussion of VSL starting on line 31 of page 7-13 seems a bit dated. Many of the papers cited in the discussion of VSL are from 2010 and before. Given the importance of VSL for calculation of benefits, updating of the discussion seems warranted.

Tier 2 The unit value transfer discussion may want to reference Boardman et al. (2011).

Tier 2 Line 33 on page 7-23 is confusing. “Note a fourth equivalent way to estimate environmental effects on production possibilities.”

3. *Are there topics that warrant more discussion or elaboration in the chapter?*

Tier 2 The main takeaways from a number of the textboxes are not clear. Part of the issue is that the goal of the textboxes is unclear. The goal may be to provide readers who are less familiar with a topic some background and direct guidance. If direct guidance is part of the goal, it seems to often be missing. In addition to clarifying the main takeaways, it may be helpful to bold/italicize or otherwise highlight the takeaways.

Tier 2 With respect to Textbox 7-1 (page 7-4), for example, the takeaway is unclear. One possibility given the evolving nature of IAM and greenhouse gases, might be for policymakers to consult with NCEE on the current best practice or current best estimates of GHG. Instead the last paragraph leaves the reader guessing as to what they should do: “IAMs used to estimate the SC-CO₂ and other GHGs are necessarily highly simplified and limited by the current state of the rapidly expanding climate economics literature. In January 2017, The National Academies of Sciences, Engineering, and Medicine issued a report recommending specific criteria for future updates to the SC-CO₂ estimates, a modeling framework, and both near-term updates and longer-term research needs pertaining to various components of the estimation process. *

Notes:

- Since the framework used to estimate the social cost of methane and nitrous oxide is the same as that used for SC-CO₂, the Academies’ recommendations on how to update many of the underlying modeling assumptions also apply to the estimates of the social cost of non-CO₂ GHGs.”

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Tier 2 Although Textbox 7-2 (page 7-8) has a substantial discussion of economics and risk assessment, the main points are less than clear. The main point *might* be that coordination is necessary between economists and risk assessors. More specifically, the main point *might* be that it is particularly important to “to produce expected or central estimates of risk, rather than bounding estimates as in safety assessments. At a minimum, any expected bias in the risk estimates should be clearly described.” It may be that these are not the main points. In any case, the main points should be clarified.

Tier 2 Textbox 7-3 (page 7-16), which discusses non-willingness to pay measures, misses an opportunity for clearer guidance in the box or in the text. It says “Measures of economic value that do not measure WTP and cannot be related to changes in utility are not valid. Others should be used only in a limited set of circumstances.” It would be helpful to offer more detail on the list of circumstances or at least more clearly point the reader to such a description. For example, the COI discussion in the textbox ends with “Section 7.3.1.5 provides more details on the COI method and its use in benefits analysis.” If the limited circumstances are discussed here, then the text should say this.

4. *Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?*

No inconsistencies were noticed.

5. *Are the definitions provided in the glossary accurate? Please identify any in need of revision.*

Tier 2 The definition of VSLY could be clarified. Here is the glossary definition of VSLY: “The VSLY is an estimated dollar value for a year of statistical life. In practice this metric is typically derived by dividing a VSL estimate by remaining life expectancy or discounted remaining life expectancy. This approach usually assumes that each year of life over the life cycle has the same value.” Both VSL and VSLY are likely in theory and empirically to vary with the characteristics of the individuals involved, particularly age. While in practice some authors have assumed each year has the same value, this appears to be both theoretically and empirically incorrect (Aldy and Viscusi, 2008).

Dr. Scott Farrow

A. Chapter 4

1. Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?
 - a. *(Tier 1) Page 4-2: Section 4.1.2 Cost-effectiveness*

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The current lead sentence “A policy is considered cost-effective when marginal abatement costs are equal across all polluters” is not generally true.

Discussion: The theoretical and empirical peer reviewed literature carefully distinguishes different types of pollutants, especially uniformly mixed and non-uniformly mixed. The given statement is only true for uniformly mixed pollutants and may mislead regulatory designers toward equal marginal costs of control when it is not warranted. The prior guidelines had a more nuanced discussion on its page 4-2 regarding efficiency and cost effectiveness and did not lead off the paragraph with this special case (see earlier guidelines, p. 4-2).

Citations to support: Tietenberg, Emissions Trading, (2nd ed), p. 34; Phaneuf and Requate, A course in Environmental Economics, 2017, implicit on p. 177, eqn 8.4; Muller and Mendelsohn, “Efficient Pollution Regulation”, AER, 2009 (for cost-effective, just choose “tax” to be different than optimal).

Suggested shift in location and additional wording in yellow: (delete opening line, then begin paragraph) The efficiency of a policy option differs from its cost-effectiveness. ...but net benefits may not be maximized if the emissions limit was set either too high or too low. A policy is considered cost-effective when marginal abatement costs are equal across all polluters in the simplest case involving a uniformly mixed pollutant. More complex conditions, such as non-uniformly mixed pollutants, may require unequal marginal abatement costs across sources.

2. Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?

a. *(Tier 2) Page 4-10, section 4.3.2 Emissions Tax*

Comment: This section raises the issue about using revenues from taxes to offset other taxes. Ok. But parallel to grandfathering permits, there are tax mechanisms that can affect the political economy of the alternative.

Suggestion: incorporate a foreshadowing sentence here to point toward Hybrid approaches further in the chapter. Suggested insert in red: The government collects revenue that it may use to address other environmental problems, reduce other distorting taxes, or redistribute to finance other public services. **Alternatively, the government can choose the amount of revenue collected by using hybrid approaches as discussed in Section 4.4.1.3.**

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Citation: Pezzey and Jotzo, “Taxes versus Trading and Efficient Revenue Recycling”, JEEM, 64(2), p. 23.

b. (Tier 2) p. 4-13, Section 4.4.1.3 Safety Valve Systems

Recommendation: Return to heading from prior version as being clearer: **Combining Standards and Pricing**, then following suggestion above, insert consistent material here.

Suggested Insertion in red: In the case of a prescriptive standard and tax combination, an emissions standard is imposed on all polluters, but polluters pay a unit tax for emissions in excess of the standard, **a mechanism that potentially modifies government revenue and taxes paid by the polluter [Pezzey and Jotzo,].**

Citation: several different cites could be used but the Pezzey and Jotzo (JEEM, 2012, 64(2), p. 230-278) is relatively clear in its modeling of a revenue recycling parameter that affects distribution (and efficiency).

3. Are there topics that warrant more discussion or elaboration in the chapter?

a. (Tier 3) P. 4-16, lines 11-22. Liability- Should this discussion include "joint and several" and "retroactive" with any links to economics? epa location <https://www.epa.gov/enforcement/superfund-liability>.

b. (Tier 1) p. 4-18 and 4-19: Pollution Prevention Hierarchy. Existing discussion of Pollution Prevention prioritization as one environmental policy. I'm not sure what this policy statement serves here as in general, such policy statements don't seem included elsewhere in the document. Perhaps more importantly, the prioritization listed is not that usually associated with an economic allocation across multiple ways of dealing with pollution control which would generally equate marginal cost across methods of reducing the same pollutant or some similar marginal condition.

Citations: Helfand, G. “Pollution Prevention as Public Policy: An Assessment”, Contemporary Economic Policy, October, 1994 p. 104-113. The EPA library also has Helfand, G., “The Simple Economics of Pollution Prevention”, Toxic Substances Journal, 1992.

Recommendation: delete hierarchical policy priorities at bottom of 4-18 and top of 4-19 for this economic document.

c. (Tier 1) page 4-20, lines 12-23. Selecting Policy Approach. This lists a set of topics on selecting the policy approach. It seems to come from a set of citations listed in the footnote. I find it odd that that the goals of the policy maker are the last. I would have thought that constraints or direction on policy options that are provided by statute are an early limitation on choice. Only if there are no constraints in the statute, an important element in economic choice and guidance, as well as some flexibility in method do the various options come into play. The vague goals of a policy maker could be more clearly

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specified...EPA, Presidential, distributional, equity? No discussion of how BCA could be used to help identify choice among alternatives.

Recommend: Renaming the sub-section something like **Statutory Constraints and Goals of the Policy Maker**. Should be more than just the 1 sentence in the top paragraph about opportunities and limitations imposed by statute and a somewhat different take in section 4.6.8 that elaborates on the issue. Further recommend that early use of BCA may help assess alternative regulatory scenarios.

- d. (Tier 2) page 4-24, Measuring the Effectiveness.... Suggest this section should be **Measuring and Incorporating Evidence on the Effectiveness....** This section currently provides guidance on planning evaluations. Ok. However, this is also a useful location to ask when or how such updated information should (guidance) be included in revised or future analyses of the same or a different regulation. Is it a value of information concept such that the evaluation information can change decisions? Citations could include work published by EPA economists on retrospective studies at the Journal of Benefit-Cost Analysis or studies done by RfF and might have been relevant guidance for the latest Mercury rule.

4. Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?

- a. (Tier 2) P. 4-19, line 11. Line starts out as “Voluntary”...., but then the first illustration is 1) “require”. This seems inconsistent.

5. Are the definitions provided in the glossary accurate? Please identify any in need of revision.

Minor issues: Spence and Weitzman, 1978. Not in list of references. P. 4-13.

B. Chapter 5

1. Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?

- a. (Tier 2) page 5-2, line 10. Can be useful to clarify “separately” to at least mean a sensitivity analysis. For instance, it may be that Congress has passed a relevant statute that in effect changes the OMB policy presumption of domestic standing to also be motivated by international impacts and thus guide at least a sensitivity analysis of standing. Border environmental issues or climate change may or may not meet such criteria.

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Suggestion: insert , “as in a sensitivity analysis (see section 11.2.3)” at the end of the identified line and check that Chapter 11 on presentation of results is consistent.

- b. (Tier 1) page 5-16, line 34-38 and 5-18, line 12-14. Compliance. Establishes default assumption of 100% compliance. As this section focuses on economic behavior, behavioral evidence should be provided to support the assumption. Or perhaps literature suggests compliance related to size and number of firms. This assumption is more likely a random variable with an expected value less than 100% but 100 compliance might well be a sensitivity analysis. Acknowledging variable compliance (which occurs later in the section) may also open the door to improved design that considers alternatives that address monitoring or enforcement that may affect compliance.

Recommendation: provide an evidence-based default, perhaps with several categories in place of 100% compliance. Similarly, adjust text-box 5-1 for final regulations such that “firms will comply at a rate supported by evidence” and section 5.5.4 page 5-16 for the full compliance assumption.

- c. (Tier 2) page 5-19, Section 5.6 Uncertainty: This section focuses on statistical uncertainty which is indeed important with elements of model uncertainty at the end. However, there is one sentence related to risk preferences and decision-making under uncertainty, namely “Most analyses specify baseline and policy scenarios based on the expected value or most plausible outcomes.” A separate paragraph could deal with the difficult issue of whether risk neutrality is to be used for individual modeling (probably not) although the expected value of the resulting risk preferences might be reported. The guidance could affirm that analysts should use expected value outcomes (so that at least expected value of a sum or random variables is the sum of the expected values). Expected Value might also be included in the glossary so that it is understood that it is being used in the formal and not a colloquial sense. Also, for model uncertainty, consider Farrow (2012) “A missing error term in in BCA”, ES&T when there are no models to average.

Recommend: new paragraph on uncertainty in decision-making including modifying existing sentence as: Analysts should specify baseline and policy scenarios based on the expected or most plausible outcomes to the extent possible.

2. Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?

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- a. (Tier 1) page 5-2 line 11 - Scoping: The subsections of Scoping are- standing, market effects, and externalities. BCA textbooks (e.g. Boardman, et al, p. 5) and government guidance (e.g. A-94, A-4, and EO 12866) address the importance of identifying impacts comprehensively or “all” impacts. Here that is stated in the 2nd paragraph of the section but a later section (5.5.6 Changes in Other Environmental Contaminants) is also related to the issue. Further, the issue of “markets” and “externalities” seem to be a sub-set of the comprehensiveness of the BCA providing guidance on extent of the markets to be considered and extra-market (external) effects.

Recommendation: Create Section 5.2 as “Comprehensiveness” with subsection 5.2.1 Markets and 5.2.2 Externalities. For material to start section 5.2, I suggest: 1) moving the existing 2nd paragraph down from Scoping, and 2) moving the material in section 5.5.6 up. The overall guideline would thus call out “Comprehensiveness” as including all benefits and costs to the extent practicable, with additional discussion on issues related to various terms such as ancillary or co-. (Such terms also suggested below to be defined in the glossary).

The sections on Markets and Externalities in “Scoping” then become a subset of comprehensiveness.

Some variations: could use a word like “completeness” or some other word in place of “comprehensive” although that word clearly appears several times in A-94, especially p. 6.

Suggested wording as below (almost all the wording is taken from the existing paragraphs described above with highlighted words added for transparency in addition to the re-organization of paragraphs.)

5.2 Comprehensiveness

(existing wording) Analysts should consider all the potential benefits and costs of the regulatory action to avoid potentially misleading conclusions regarding the net benefits and relative rankings of the analyzed regulatory options. In practice, however, not all changes in economic welfare can be quantified and monetized due to constraints in available tools, data, and resources. The analyst should also expect the scope of impacts to evolve over the course of time as new information is found. Consequently, the results of a BCA should be interpreted with care, evidence for welfare effects that cannot be quantified and monetized should be described, and any analytic limitations and omissions should be explicitly documented and discussed. While this section provides guidance on the scope of a BCA, Chapters 9 and 10 provide guidance on the scope of economic impact and distributional analysis.

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Various terms have been used to separate some types of benefits and costs including ancillary, co- and other terms. While some categories of benefits and costs may usefully be separated to inform the decision-maker, the goal remains to comprehensively consider benefits and costs that change with and without the action which almost always include environmental contaminants but which may include a variety of other impacts. For instance, [existing section 5.5.6 moved here in its entirety] decreases or increases in environmental contaminants that are not the subject of the regulation may occur for a variety of reasons that the analyst should consider.

Then new sub-section of Comprehensiveness as they exist

5.2.1 Market Effects

5.2.2 Externalities

3. Are there topics that warrant more discussion or elaboration in the chapter?
 - a. (Tier 1) page 5-9, section 5.3.1 Linked Rules. The discussion of linked rules omits the potential rules linked by existing regulation, guidance or standard practice. Where rules are linked by law, guidance or standard practice, the benefits and costs of the rule being studied should include impacts that result from the linkage to another regulation. As an example, MCL's for drinking water appear to be "in-situ clean-up standards where either surface or groundwater is or *may* be used for drinking" (<https://semspub.epa.gov/work/HQ/174076.pdf>, p. 4-8). Discussing how to handle this linkage in a way consistent with taking all benefits and costs into account should be a part of this section.
 - b. (Tier 3) page 5-22, section 5.6.2 (uncertainty/quasi-option value): A related concept, real option value (Dixit and Pindyck; Traeger, 2014, Resource and Energy Economics) may be important for industry behavior. In real options which involves decision-making under uncertainty, sunk costs can matter such that a firm (or consumer) may be slower to exit (or enter) an activity including polluting or purchasing. Such an insight may be useful for a BCA in some particular circumstances.
4. Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?
 - a. (Tier 2) p. 11-11 and 11-12. Data: Should section 11.2.1 on Data quality be moved to chapter 5 as an initial scoping concern or before the baseline section of Chapter 5? One does not want to get to the presentation of results and then have problems with Data Quality Assurance. I also note that private health and education data as well as confidential business data identified might be called out in this section (page 11-11 line 28).

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5. Are the definitions provided in the glossary accurate? Please identify any in need of revision.
Suggested items to add with possible definition for consistency with chapters:

Ancillary benefit or cost: an identifying term sometimes used for an included cost or benefit not directly identified as a stated statutory purpose of a proposed regulation.

Co- benefit or cost: an identifying term sometimes used for an included cost or benefit not directly identified as a stated statutory purpose of a proposed regulation.

Expected Value: the probabilistically weighted outcome that defines a statistical mean. In practice, this may be an objective or a subjective measure.

C. Chapters 1-3, 6-Appendix: Farrow

General comment: (Tier 2) Guidance communication: often the actual guidance is buried in a paragraph, can there be a way to call it out using headings, boxes, or something? A strong example is on VSL as on page 7-14, line 6 (agency policy is to apply a single VSL....ok, but that is important).

1. Are the statements and analytic recommendations made in the chapter consistent with the theoretical and empirical peer-reviewed economics literature?
 - a. (Tier 3) p. 7-47: Regarding Unit values: What about Boardman, et al, (Chapter on values from Secondary sources) which also includes cite to original studies and to their peer reviewed publication on selecting a value? At the same time, the Guidelines caution on comparing transfer and policy case and so forth still apply.

2. Does the chapter contain an objective, balanced, and reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described?
 - a. (Tier 1): Pages 7-1 through 7-7 especially. I don't find this discussion on the process of benefits modeling to be fully consistent with my understanding of the economics literature as it focuses on benefits coming only from changes in environmental contaminants and their end points. While these environmental changes are expected to be dominant, other benefits (or later costs) should be considered as alluded regarding Comprehensiveness in chapter 5. If the authors think their approach is consistent with the peer reviewed econ literature, some citations should be provided. I found section 7.1 from the existing (old) guidelines discussing an "effect by effect" approach to be more consistent with the general literature and practice.

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p. 7-1, Figure 1 and its discussion: Seems unusually limited in contrast to the “effects by effects” discussion of the existing (old) guidelines. I find the figure to lack consideration that things other than changes in environmental quality can generate benefits (an example is in Table 11-1 showing cost savings benefits from fuel economy and comments also related to general equilibrium benefits). At the least, each circle in Figure 7-1 could be divided into parts; one part environmental and one part non-environmental (which might be smaller). For instance, if fuel cost savings result from a regulation, those are non-environmental benefits. A more normal process, as in Boardman, et al., 2018, would be to identify all the impact categories that result from each policy option; some may be characterized as environmental, others not. A different graphic might also have policy action feeding into markets, non-markets and environment causing changes in environmental and non-environmental categories.

Similarly, Table 7-1 is incomplete without another “non-environmental benefit” category if you choose to stay with the 4 “environmental” categories presented.

Similarly Step 1, page 7-5; omits non-environmental end-points.

b.(Tier 2) Chapter 7: General comment: The valuation approach is generally that of micro-economics of the consumer leading into a partial equilibrium approach. However, just as Chapter 8 on costs spends a fair bit of time discussing partial and general equilibrium and CGE modeling, I think that the benefits chapter It is possible that the uneven development of cost side CGE models compared with benefit side CGE models would lead to biased results (see Carbone and Smith).

Recommendation: Briefly reflect some of the recent SAB report on Multi-industry/CGE estimation such that benefits estimation in a CGE context remains relatively uncommon and resource intensive, but a benefit side of CGE models exist to parallel the greater development on the cost side. (e.g. Multi-industry SAB report, page 5, section 1.2 Measurement of Benefits; Carbone and Smith, 2008, J. Public Economics). At a minimum there could be a call-out to Text box 8-4.

3. Are there topics that warrant more discussion or elaboration in the chapter?

a. (Tier 2) Page 6-2, footnote 139: Real vs nominal dollars. The footnote distinguishes real from nominal, a topic that I think is a sufficient source of confusion that a sub-section or at least a separate paragraph should be focused on it. Further, what rate of inflation? Is there EPA guidance on index to be used? On timing (mid-year, end of year)? The issue is also not resolved about “future values” when retrospective analyses are done. Should

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an actual, nominal, interest rate be used to “inflate” retrospective values to a present value year? What interest rate? Actual nominal or real rates of return? Or ? The only paper I know of on this topic is Howard, James “a Note on Retrospective Discount rates” https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3061880

- b. (Tier 2) Chapter 8-14, lines 19-27: Unemployment. I don’t think this discussion on unemployment is quite balanced although citing some of the more recent literature. There clearly are papers that link unemployment effects to BCA including ones within the symposium cited already as Smith (2015). In my view, this could be rebalanced a bit with the default assumption being zero unemployment costs but in some circumstances a sensitivity analysis could well be justified and also provide a link to the economic impact discussions for instance by saying on line 26, page 8-14 “typically are not included *but may usefully be considered in some sensitivity analysis when conditions warrant.*” One may indeed want to be careful in analyzing relatively long-term regulations. For instance, note how fast the US economy has gone from significant unemployment to full employment and back to large unemployment. See individual papers in symposium (Smith, 2015) especially Bartik; see also Haveman, R., & Weimer, D. (2015). Public Policy Induced Changes in Employment: Valuation Issues for Benefit-Cost Analysis. *Journal of Benefit-Cost Analysis*, 6(1), 112-153. doi:10.1017/bca.2015.5.
- c. (Tier 1) Page 8-20, Table 8.2. I think the table over-simplifies when CGE would be better than partial equilibrium. Partial Equilibrium could possibly get a “check” for both incorporating demand and computing welfare effects as most textbooks describe [e.g. Boardman, et al., 2018, Farrow and Rose as already cited in Guidelines]. And CGE should not get a full check for “welfare”, instead saying “sometimes” (like PE). This is because externalities are seldom incorporated in CGE (see SAB multi-industry report) and often, though not always, make the same competitive market assumptions that in fact would justify partial equilibrium. As this figure stands, it looks like CGE is a “no brainer” when my reading of the later chapter sections, the SAB report and other literature the choice much more complex than this graphic seems to convey.

4. Are there any inconsistencies in the way an issue or topic is discussed either within or across chapters?

See comment on CGE/benefits.

5. Are the definitions provided in the glossary accurate? Please identify any in need of revision.

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Dr. Art Fraas

A. Chapter 5

1. Treatment of "co-benefits"

Section 5.1.3 on Externalities (p 5-3) starts out stating that the aim of BCA "is to evaluate all benefits and costs resulting from the regulation"; The rest of this section largely focuses on distinguishing--and discriminating--between the benefits associated with the primary statutory objective versus other welfare effects--particularly changes in other environmental contaminants. Chapter 5 returns to this issue in Section 5.5.6. Overall, these two sections provide a rather tortured discussion. Could this discussion be consolidated? Why separate out other environmental contaminants from other benefit categories?

In addition, there is little discussion of the appropriate treatment of other types of co-benefits. For example, in the case of fuel economy standards, "co-benefits" could include fuel savings, safety, and congestion effects. Are these benefit categories also to be designated as belonging in the "other" class as well?

In terms of the suggestion (p 5-19) that "if the regulation is expected to induce large benefits from changes in environmental contaminant(s) beyond those arising from the primary statutory objective of the regulation, an analysis of a policy option where those contaminant(s) are regulated, either separately or simultaneously with the contaminants that are the primary statutory objective of the regulation, it may be useful to determine whether there are more economically efficient or appropriate ways of obtaining these unrelated benefits." If this text remains in the final draft, a source to bolster this suggestion is: Dudley et al. Consumers Guide to Regulatory Impact Analysis: Ten Tips for Being an Informed Policymaker (JBCA)

2. Treatment of "Bundled" rules vs "Linked" rules

Many rules include several provisions--hence, "bundled" rules. Chapter 5 includes at p 5-9 a discussion of "Linked" rules. This section ought to address "bundled" rules, as well--for example, MATS established emission limits for several HAPs, including mercury and acid gases--a major share of the benefits and cost of the rule are associated with the acid gas provision. Bundling several requirements in a single BCA can disguise significant differences in the net benefits of the individual requirements. The guidance should require that the RIA should present separate BCA for each of the major components within the rule.

Of course, these bundled rulemakings could be done thru separate rules--i.e., linked rules. Linked rules might have a broader scope, as well. For example, a drinking water standard may be used as a standard for cleanup of RCRA & Superfund sites. In all of these cases, a separate BCA should be done for each of the several individual components. The requirement that RIAs provide a separate BCA for each major regulatory requirement cannot be emphasized enough.

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A possible source for this issue (see p 3):

Shapiro, Stuart (2018). Case Studies in the classroom: Lessons Learned, in S. Farrow (ed), Teaching Benefit-Cost Analysis, Edward Elgar, Cheltenham, UK.

Treatment of Uncertainty analysis

Within Section 5. a paragraph on p 5-20 states that "probabilistic methods can be challenging to implement when data needed to characterize distributions are limited" and then proposes simpler sensitivity analysis as a more transparent and defensible approach. Tagged on to this paragraph, the last sentence notes that: "... for rules with annual economic effects of \$1 billion or more, OMB Circular A-4 requires a formal quantitative uncertainty analysis that provides some estimate of the probability distribution of benefits and costs."

This Circular A-4 requirement deserves separate attention with guidance to the analyst explaining what needs to be done to satisfy the requirement. The current placement and context effectively downplays the Circular A-4 requirement.

In addition, this would be an appropriate point to insert some discussion of expert elicitation to help develop information to characterize distributions for key parameters. [The current draft introduces expert elicitation in the Glossary and offers a brief reference in Chapter 11--that's it.]

3. Selection of Time Horizon

Section 5.4 (p 5-13) states that: "...it may be analytically challenging to estimate benefits and costs over the entire time horizon and benefits and/or costs are estimated for only a few representative periods. In these cases, the analysis should still identify the entire time horizon over which the representative periods of analysis are applicable and discuss any limitations or uncertainty introduced by this approach. In addition, the representative periods of analysis should be chosen such that they adequately identify the relative net benefits of the various options under consideration." EPAs RIAs often select a year at the end of the time horizon for BCA--a time when the rule has been fully implemented. There are cases where there are important implementation/transition issues and the guidelines should require the RIA to include the transition period in the BCA.

4. Model Choice

Finally, Box 5.2 includes this sentence (p 5-15): "When possible, models and their underlying data should be publicly available." Why "when possible"? Why not move to using models that are publicly available (or at least begin to move toward this goal). [I understand that there are issues with requiring the availability of data for key studies used by the agency.]

5. Treatment of private cost savings: Chapter 5 & 6 discussion of private cost savings.

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Chapter 5 provides guidance to the analyst on the importance of assessing the validity of large cost savings (pp 5-14 to 5-16). That is, for example, are there "hidden" costs, or widespread suboptimal behavior that result in the over-statement of cost savings? [Or, the overstatement of cost savings based on ideal conditions or ideal behavior.] If the analyst concludes there will be net cost savings, then, these private cost savings should be included in the baseline--and the rule should not be credited with any of the estimated cost savings. Chapter 6 concludes that private discount rates should be used in modeling the behavior of firms or households in response to the rule--but the BCA should use social discount rates in developing estimates of the NPV for social benefits and costs.

It would be useful to explain in an additional sentence or so that benefits & costs that can be attributed to behavior associated with the rule should be valued consistent with BCA principles--not in terms of private valuation. Thus, for example in terms of fuel economy, the value of the fuel saving should be the value of the next highest use for the fuel (ie, the valuation of the resources released to the economy)--not the private household valuation. In addition, to be consistent with BCA, the appropriate discount rates are the social discount rates, not private discount rates.

B. Chapter 6

OMB Circular A-4 calls for the use of discount rates of 3 and 7 percent. The 3 percent discount rate serves as a proxy for the the consumption rate of interest; the 7 percent discount rate is a proxy for the social opportunity cost of capital. I assume the basic RIA analysis will continue to use these discount rates in developing estimates of the NPV of benefits and costs.

However, in cases where the policy has a long time horizon (and most benefits accrue to one generation and the costs accrue to another), the current draft guidance recommendation appears to restrict discounting for intergenerational analysis to the consumption rate of interest along with additional approaches, including:

- using an estimated declining schedule of discount factors
- discounting at a constant rate somewhat lower than that used in the conventional case

This recommendation appears to replace the Circular A-4 guidance and exclude using a higher discount rate than the consumption rate of interest for benefit categories with intergenerational benefits (or costs).

There are several reasons for using a discount rate greater than the consumption rate of interest.

- OMB Circular A-4 calls for the use of discount rates of 3 and 7 percent. [Of course, if there are future revisions to the OMB guidance, EPAs guidance should incorporate such revisions.

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-- The 7 percent discount rate is a proxy for the social opportunity cost for capital. One of the key arguments for using the opportunity cost of capital is that with this approach everyone is left no better or worse off--it ensures that there are not other uses of funds that would enable everyone to be even better off (thereby satisfying the objective that a Pareto improvement is possible).*/ Thus Viscusi argues that if BCA uses a lower discount rate for effects for future generations and in fact both generations have the same higher discount rate**, then, "subsequent policy distortions will lead to policy outcomes that are not consistent with the within-generation intertemporal preferences that future generations would have with respect to impacts on their generation."

*/ The draft guidelines express the concern in other chapters that environmental regulations could operate to reduce capital accumulation, reducing economic output and welfare. See for example, p 8-12 and p 5-16.

**/ Note that the social opportunity cost of capital has been remarkably stable over the last century. OMB has calculated a long-term pre-tax opportunity cost of capital of 7 percent. The guidelines note (p 6-16, fn 156) that: "Similar to the approach taken by OMB (2003), the CEA (2017) estimated real rates of return to capital to be around 7 percent based on National Accounts data but noted that approach may be subject to measurement error leading to an overestimate."

-- In addition, the draft guidelines express the concern in later chapters that environmental regulations could operate to reduce capital accumulation, reducing economic output and welfare. See for example, p 8-12 and p 5-16.

-- The IAWG report (2010) providing estimates for the Social Cost of Carbon (SCC) adopted a discount rate of 5 percent "to represent the possibility that climate damages are positively correlated with market returns." (p 23) The report added that the higher rate could also be justified by the higher interest rates that many consumers use to smooth consumption across periods.

-- Finally, there is an awkwardness associated with the current practice of using one set of discount rates for intragenerational benefit categories and a separate discount rate for "intergenerational" benefit categories.***/

***/ The Chapter 6 recommendations include the following bullet (6-24): "Regardless of the approach or rate selected, the same discount rate should be applied to all benefits and costs that occur in the same year, independent of whether the policy has intra- or intergenerational consequences, to ensure consistency in the analysis." Does this mean that the intragenerational climate change benefit (and cost) streams would be discounted at 3 and 7 percent? While the intergenerational benefits (and costs)--say beyond 40 years--would be discounted at 3 percent and some smaller/lower discount rate? What discount rates would be used to bring the NPV of the intergenerational streams at 40 years back to the present?

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Sources

David Burgess (2018), The Appropriate Measure of the Social Discount Rate and its Role in the Analysis of Policies with Long-run Consequences, Mercatus Symposium

IAWG (2010), Social Cost of Carbon for Regulatory Impact Analysis Under EO 12866.

Mark Freeman, Ben Groom, & Michael Spackman (2018), Social Discount Rates for Cost-Benefit Analysis: A Report for HM Treasury

Viscusi, W. Kip. 2019. "Responsible Precautions for Uncertain Environmental Risks" Journal of Benefit-Cost Analysis, 10(2). <https://doi.org/10.1017/bca.2019.14>

C. Chapter 4

1. Selecting the Appropriate Policy Approach

Section 4.6 (p 4-20) outlines a set of factors to consider in selecting a policy approach. It does not include the suggestion that a BCA could inform the selection of a policy approach. For example, BCA could inform (1) selection of an information strategy or (2) deference to State/local government decisions or even (3) whether to adopt an economic incentive approach in place of direct EPA technology-based control regulation. The text ought to encourage the use of BCA to inform the selection of an appropriate policy.

2. Treatment of dead weight losses associated w/ the collection/expenditure of tax revenues

The following sentence is buried in a paragraph on p 4-11: "Analysts should always consider the opportunity costs associated with collecting and spending public funds." This is an important issue; it deserves more than a sentence buried in a paragraph in Chapter 4. I searched the document and found only a few sentences addressing this issue--effectively suggesting that this is a complicated issue--and providing no guidance to the analyst.

3. Other Chapter 4 comments

- a. Information Programs - This section (p 4-15) includes the following sentences: "There is some evidence in the literature regarding the impact of TRI reporting on firm value: the most polluting firms experience small declines in stock prices on the day TRI emission reports are released to the public. Firms that experienced the largest drop in their stock prices also reduced their reported emissions by the greatest quantity in subsequent years (Hamilton, 1995)." This appears to have been more of a one-time shock effect. There is a broader literature--decidedly mixed--on the effectiveness of TRI-type programs in reducing emissions that could be added to this paragraph.

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- b. Goals of Policy Makers - This section should include a discussion of the impact and constraints imposed by statutory authority--it is a prominent element in selecting the appropriate policy approach (p 4-20)
- c. Voluntary Programs - This section includes a sentence saying that the efficacy of voluntary programs is "decidedly mixed". But, the section only reports more favorable results from the literature--nothing on the literature contesting claims of the effectiveness of these programs.
- d. Final sentence (p 4-20) states that: "when the threat of regulation is strong, levels achieved are closer to those under optimal conditions." Can you say this? Or, instead, would it be better to say "closer to the goals of the program".

D. Chapter 7

1. Timing issues:

Chapter 7 (p 7-12) states, in terms of valuation, that the analyst should account for timing issues, including income growth over time. Typically, this includes using an estimate for annual growth of (say) 2 percent. Over time, this projected annual growth results in substantial changes in the valuation of the affected benefit categories. However, note that for the last 2(?) decades there has been little growth in real income for much of the population. Should there be more guidance to the analyst on income distribution issues in this context--that is, the effect of income growth on valuation of future benefits.

2. The Benefits Analysis Process

Step 3 (p 7-7) in Section 7.1 presents 5 bullets outlining issues analysts should address in estimating monetary values. These bullets include: "Describe source of estimates and extent of confidence" and "Characterize uncertainty". These important issues should also be presented as part of Step 2 (p 7-6). The current draft embeds these issues in Box 7.2-- but they ought to be explicitly set out as key elements of Step 2.

E. Chapter 8

Section 8.2.1 discusses compliance costs. But, the focus appears to be on the costs incurred by firms. The discussion does not address consumer loss (or downstream producer loss) associated with reduction in the quality of a good (eg, the quality of shoe leather) or the ban of a product. There should be some discussion in Section 8.2.1 alerting the analyst to these potential costs.

F. Chapter 11

The second paragraph of Section 11.3 ends with this sentence: "Even if the criterion of economic efficiency were the sole guide to policy decisions, social benefit and cost estimates alone would not be sufficient to define best policies." Why not?

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Dr. Spencer Banzahf

A. Over-arching comments

- These guidelines are extremely comprehensive and clearly reflect an enormous, impressive effort. The staff at NCEE deserve credit for producing a first draft of what doubtlessly is going to be an outstanding roadmap for the agency.
- "Comprehensive" is good, but sometimes I wonder if the overall document isn't too long and if some EPA staff won't be intimidated. I could be wrong. But my gut tells me that we should be looking for material that can be cut or moved to an appendix. Ch. 4 is one big candidate, to my thinking.
- Here and there, the Guidelines jump into some secondary or even tertiary issues in the measurement of welfare, such as discounting or even more arcane concepts like "quasi-option value," but they reserve the big-picture concept of consumer surplus and economic rents to Appendix A. Reading the document, it feels like we missed a step. The appendices I feel should have advanced details, but not remedial material. So, somewhere, maybe in Ch. 5 (or Ch. 7, but then 7 should come before 6), there should be a broad overview of the concepts of economic value. The material from A1-A3 (or at least A1 and A3) could be moved up there. That will make it easier to read some of the other chapters.

B. Chapter 1

- p. 1-3: "Social cost analyses evaluate the welfare losses experienced by individuals...." This sentence is a bit misleading. For example, how would we think about tax revenue (or the "budget impacts" mentioned on p. 2-3)? These are "welfare losses experienced by individuals" but not social costs.
- Section 1.3.2 is good.

C. Chapter 2

I thought this was a good chapter. Very helpful.

D. Chapter 3

- p. 3-2: "Technically, externalities occur when non-monetary variables chosen by one individual enter the utility or production function of another." The word non-monetary here is not clear. I understand that it is supposed to convey the fact that it is an effect not passing through markets, but I do not think most readers will understand that. How about, "when actions taken by one individual enter the utility or production function of another without passing through markets or contracts."
- There also is a lot of confusing language to the effect that "externalities are not externalities when they are internal." For example, on p. 3-2, instead of "the mere existence of an externality is not enough to justify a regulation," how about "the mere

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existence of an effect on other parties is not enough..." And in the next line, "ERSTWHILE externalities can be internalized by the free market." Finally, at line 34, "external effects" can be replaced by "effects." "External effects that function through the price system" are not external, as explained in the above definition.

- FN 48. If we are going to have Scitovsky [spelled wrongly, by the way] and Mishan, we should probably have Buchanan and Stubblebine (1962) and Bator (1958):

Bator, Francis M. "The anatomy of market failure." *Quarterly Journal of Economics* 72.3 (1958): 351-379.

Buchanan, James M., and Wm. Craig Stubblebine, "Externality." *Economica* 29.116 (1962): 371-384.

- P. 3-3. The paragraph beginning "when left unaddressed..." is debatable. If high transactions costs prevent internalizing externalities, then internalizing them doesn't lead to increased welfare. Really, it's just another way of saying it would fail a benefit-cost test. Perhaps what is meant here is that *private* parties cannot profitably internalize an externality because of transactions costs, but regulation can (at lower costs). If so, that should be clarified.
- Given the last comment, would it be appropriate, in the box on p. 1-4, to include alternative institutional approaches in the alternative for comparison, and not just less or more stringent rules?

E. Chapter. 4

Frankly, I thought this chapter did not seem to fit into the document very well. It seems more about designing policy rather than evaluating policy proposals. Too, some of the more useful material is redundant. Section 4.1, for example, basically recovers the ground from 1.3.

I recommend we delete this whole chapter. The Guidelines are awfully thick as it is, so this would help trim them down. A compromise would be to make this an appendix.

F. Chapter 5

- The adding up condition is not correctly explained on p. 5-11. It is not the case that "the sum of the estimated benefits (and costs) from a set of small regulations analyzed separately should the same as the benefits (and costs) from the same actions evaluated jointly." The separate analysis must condition on each other sequentially. That is, let A,B,C be three policies and $N(\)$ a net benefit function. There is absolutely nothing in economic theory that says $N(A,B,C) = N(A)+N(B)+N(C)$. What is true is that $N(A,B,C) = N(A)+N(B|A)+N(C|A,B)$. That is the value of A plus the incremental value of adding B given we already have A, plus the incremental value of adding C given we already have A and B -- all that should equal the total value of A, B, and C.
- Also, the historical claim that it was originally proposed in the context of CV is not really right. Maybe by that name of "adding up" and maybe as a test of the validity of non-

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market valuation. But the idea of thinking about how joint costs could be related to individual costs goes all the way back to the Green Books of 1950 and 1958, the first "guidelines"-type document for US BCA. They also relate to the idea of the Shapley value.

- Section 5.5.2, par. beginning l. 28. We should also state that one should be broad-minded about the utility or profit functions and use the most flexible ones possible. For example, Ketchum, Kuminoff, and Powers (2016) show how presumed violations of self-interest are often really just violations of a utility function that an analyst had picked, whereas other utility functions could have justified the observed choices.

Ketcham, Jonathan D., Nicolai V. Kuminoff, and Christopher A. Powers. "Choice inconsistencies among the elderly: Evidence from plan choice in the Medicare Part D program: Comment." *American Economic Review* 106.12 (2016): 3932-61.

- Above, I made a more general cross-chapter comment that I'll repeat here. Here and there, the Guidelines jump into some secondary or even tertiary issues in the measurement of welfare, such as quasi-option value mentioned at p. 5-22, but they reserve the big-picture concept of consumer surplus and economic rents to Appendix A. Reading the document, it feels like we missed a step. Somewhere, maybe in Ch. 5, there should be a broad overview of the concepts of economic value. The material from A1-A3 (or at least A1 and A3) could be moved up there.

G. Chapter 7

- The chapter could clarify the relationship between integrated assessment models and benefit transfer. IAMs are really just a kind of "disaggregate transfer" where transfers are made at multiple linkages in a causal chain.
- The Kuminoff and Pope (2010) paper was published in the IER in 2013. I have commented on their interpretation in some of my own work. In my view, it is unclear what is meant by a "capitalization effect," but if it means the change in price resulting from the policy, then it is very hard to identify. However, difference-in-difference designs can identify a movement along an ex post hedonic price function, which is interpretable as a lower bound on welfare.

Banzhaf, H. Spencer. "Difference-in-differences hedonics."
https://www.nber.org/appendix/w21485/Diff-in-Diff_Hedonics_Aug_2019.pdf
(2018).

- I appreciate the bonus citation but actually I was not an author on the Johnson et al. study on cardiovascular health. The correct author list is "Johnson, F.R., M.R. Banzhaf, and W.H. Desvousges."

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H. Chapter 9

I have several comments here. Below, I'll present the comments in order that they arise in the Chapter, but first I'll highlight four issues that I see in the big picture. First and foremost, somewhere between Chapters 9 and 10, I recommend a more holistic analysis of distributional effects. As noted at the beginning of Ch. 10, Circular A-4 states that regulatory analyses "should provide a separate description of distributional effects (i.e. how both benefits and costs are distributed...)." Yet Ch. 10 is focused almost exclusively on the distribution of environmental *effects* (neither benefits nor costs) and Ch. 9 is focused mostly on 18th and 19th century classifications of land-labor-capital more than income distributions. Accordingly, I recommend a major revision that would discuss the possibility of using a range of social welfare functions over income distributions. This approach also would account simultaneously for the distribution of costs and benefits in one synthesized distributional analysis. Although any such social welfare function would be arbitrary, so is the current assumption that society is indifferent between a dollar "to whomsoever it may accrue." Really, it would be no more arbitrary that other work that assumes e.g. a functional form for utility when computing willingness to pay. As I envision it, Adler (2012), cited in Ch. 10, could be a basis for that section, as could Adler (2019, *Measuring Social Welfare: An Introduction*, Oxford). I have made some suggestions for more pragmatic (arguably ad hoc) compromises, such as combining heterogeneous willingness to pay for environmental improvements with distributional weights, both of which are part of the more formal social welfare approach (Banzhaf 2012).

Banzhaf, H. Spencer. "Regulatory Impact Analysis of Environmental Justice Effects." *J. of Land Use & Environmental. Law* 27 (2011): 1-27

Second, the Guidelines should be clear about the fact that price changes are transfers between groups. That is an over-arching point that should be made absolutely clear in this chapter. Third, the discussion of pass-through (p. 9-12) is a little light. It generally relies a lot on a perfectly competitive model. Fourth, the discussion of the social costs of job loss is very light relative to its importance; it should not be relegated to a "text box."

- p. 9-2, l. 4. The Guidelines might emphasize, "Transfers, *including price changes*, must be excluded from a BCA ... but may be included or even be key within an EIA"
- At several points, this chapter confused the idea of "price changes" with "impacts on consumers." But a change in price is always, to a first-order approximation, just a transfer of economic wealth from one party to another, so if it affects consumers, it equally affects sellers. Examples include p. 9-2, l. 17, p. 9-4, l. 4, all of section 9.5.1 (pass through and other issues related to price changes are distributional on both sides of the market).
- FN 322 seems out of place. This is a major idea that belongs in Ch. 4 or maybe Ch. 7, not a side note in Ch. 9. This relates to comments I've made elsewhere.
- P. 9-4. The Guidelines could unintentionally be giving the impression this is about price-based policies. That could be clarified. Fullerton and Heutel (2010) has a nice framework for analyzing the incidence of other kinds of regulations.

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Fullerton, Don, and Garth Heutel. "The general equilibrium incidence of environmental mandates." *American Economic Journal: Economic Policy* 2.3 (2010): 64-89.

- p. 9-7. In the list of attributes to consider, I recommend including "existing pollution burdens." That creates a link to Ch. 10.
- In light of my comment about prices changes affecting producers as well as consumers, I suggest a re-ordering of the sub-sections in 9.5. *First* consider the direct impact on producers. *Then*, note that firms respond by changing their production processes, including the level of inputs, which leads to effects on factors of production through changes in factor demands, and output, which leads to effects on consumers through changes in supply.
- More could be said about pass through at p. 9-12. When there is monopoly power, costs can come out of their rents rather than be passed on to consumers. A good example of this is Louis Preonas, "Market Power in Coal Shipping and Implications for U.S. Climate Policy," working paper, 2019 (https://www.louispreonas.com/s/preonas_jmp.pdf). Too, I believe there is a large literature on how various kinds of regulations on the electricity sector do or do not get passed through electricity prices depending on whether there is regulated average-cost pricing (e.g. an auctioned pollution permit vs. a grandfathered permit, with the same market value, will get passed on differently depending on the regulatory structure). Dave Evans at NCEE knows all this well.
- p. 9-17 The Fullerton material cited earlier in the chapter fits in with the Berman-Bui paper.
- Text Box 9.1. This is too big a topic to be shunted to a side textbook. The chapter needs much more coverage of the social costs of job loss, in my opinion. As noted in the conference call, EPA recently sponsored a workshop on such issues, but I did not see the papers cited. They include Kuminoff et al. (2015) and Bartik (2015)

Bartik, Timothy J. "The social value of job loss and its effect on the costs of US environmental regulations." *Review of Environmental Economics and Policy* 9.2 (2015): 179-197.

Kuminoff, Nicolai V., Todd Schoellman, and Christopher Timmins. "Environmental regulations and the welfare effects of job layoffs in the United States: A spatial approach." *Review of Environmental Economics and Policy* 9.2 (2015): 198-218.

Also, Walker (2013), cited elsewhere, documents the long-run effects on income.

- Another social cost, in addition to health, is the impact of job loss on family life:

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Banzhaf, Melissa Ruby. "When It Rains, It Pours: Under What Circumstances Does Job Loss Lead to Divorce." *Southern Economic Journal* 85.2 (2018): 349-77.

- The last par. in the text box looks out of place. Should it be moved up to the third par.?
- 9.5.2.5. Impacts on land prices do not only come about through factor markets (i.e. firms' demand for land). They also arise through amenity effects and households' demand for land. There is a large literature showing that environmental improvements are "capitalized" into real estate values. Such price changes have the same distributional consequences as the factor-market discussion mentioned here. It can, for example, mean that environmental policies may benefit landowners more than renters. The Sieg et al. (2004), Banzhaf and McCormick (2012) and Grainger (2012) papers cited in Ch. 12 all speak to that point. The Kuminoff and Pope (2013) paper cited in Ch. 7 is relevant for estimating such effects.
- 9.5.3. Out migration and consequent effects on land prices fit in here as well.
- 9.5.5. Economy wide impacts. The agency might consider including a discussion of Keynesian multiplier effects when the economy is below full employment. Smith (2015) would be a relevant citation:

Smith, V. Kerry. "Should benefit–cost methods take account of high unemployment? Symposium introduction." *Review of Environmental Economics and Policy* 9.2 (2015): 165-78.

I. Chapter 10

I will repeat here the main comment I had on Ch. 9, which really bridges both chapters. Namely somewhere between Chapters. 9-10, I recommend a more holistic analysis of distributional effects. As noted at the beginning of Ch. 10, Circular A-4 states that regulatory analyses "should provide a separate description of distributional effects (i.e. how both benefits and costs are distributed...)." Yet Ch. 10 is focused almost exclusively on the distribution of environmental effects (neither benefits nor costs) and Ch. 9 is focused mostly on 18th and 19th century classifications of land-labor-capital more than income distributions. Accordingly, I recommend a major revision that would discuss the possibility of using a range of social welfare functions over income distributions. Although any such social welfare function would be arbitrary, so is the current assumption that society is indifferent between a dollar "to whomsoever it may accrue." Really, it would be no more arbitrary that other work that assumes e.g. a functional form for utility when computing willingness to pay. As I envision it, Adler (2012), cited in Ch. 10, could be a basis for that section, as could Adler (2019, *Measuring Social Welfare: An Introduction*, Oxford). I have made some suggestions for more pragmatic (arguably ad hoc) compromises, such as combining heterogeneous willingness to pay for environmental improvements with distributional weights, both of which are part of the more formal social welfare approach (Banzhaf 2012).

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Banzhaf, H. Spencer. "Regulatory Impact Analysis of Environmental Justice Effects." *J. of Land Use & Environmental. Law* 27 (2011): 1-27

This approach would also account simultaneously for the distribution of costs and benefits in one synthesized distributional analysis. This is a particularly striking shortcoming of Ch. 10, which currently focuses more on the distributional effects of environmental *effects* than either benefits or costs, let alone net benefits.

- Along these lines, I suggest a new section, perhaps between the current 10.2.2 and 10.2.3, which will highlight costs as well as health effects. Or perhaps this will be in Ch. 9, if there is a major re-organization.
- A related point is that economic costs are not just about lost money. As Viscusi has shown (Broughel and Viscusi 2017 is one more recent statement), lost income translates into worse health. Thus, there is a health-health tradeoff implicit in any health-income tradeoff.

Broughel, James, and W. Kip Viscusi. "Death by regulation: How regulations can increase mortality risk." (2017).

J. Minor or detailed comments...

- The Bento and Freedman paper is interesting but its citation at p. 10-6 is a bit discordant. Much of the point of Banzhaf and Walsh (JUE 2013) (which, incidentally, should be cited instead of Banzhaf et al. 2012) and of Depro et al. (2015) is that you cannot use their econometric strategy to understand whether or not there was re-sorting.
- FN 409 seems unnecessary.
- I did not understand Section 10.2.6. Are we talking about empirical estimation here or the analysis of benefits? To understand how a group is affected by a policy, why do I need to know how other groups are affected? It is not a relative comparison.
- Textbox 10.1 The last sentence of the 3rd. par. is not correct, or at least it is misleading. Inequality indices are not cardinal; they are ordinal. Rates of tradeoff (how much society would be willing to give up) are not related to cardinality. Ordinal functions have cardinal rates of tradeoff.
- P. 10-20. Baden et al. (2007) should be included in the refs near the end of the first full paragraph.

Baden, Brett M., Douglas S. Noonan, and Rama Mohana R. Turaga. "Scales of justice: Is there a geographic bias in environmental equity analysis?." *Journal of Environmental Planning and Management* 50.2 (2007): 163-85.