

Science Advisory Board (SAB) Draft Report (June 2, 2020) to Assist Meeting Deliberations -- Do Not Cite or Quote -- This draft is a work in progress, does not reflect consensus advice or recommendations, has not been reviewed or approved by the chartered SAB and does not represent EPA policy.

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EPA-SAB-xx-xxx

The Honorable Andrew Wheeler
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Subject: Transmittal of the Science Advisory Board Report titled “SAB Peer Review of EPA’s Revised Guidelines for Preparing Economic Analyses”, dated [Click or tap to enter a date..](#)

Dear Administrator Wheeler,

Please find enclosed the final report from the Scientific Advisory Board (SAB). The EPA’s National Center for Environmental Economics (NCEE) requested that the SAB review their revised Guidelines for Preparing Economic Analysis. In response to the EPA’s request, the SAB assembled a panel with subject matter experts to conduct the review.

The SAB- Economic Guidelines Review Panel (later referred to as EGRP or Panel) convened three public meetings to conduct a peer review of the EPA’s revised document. Meetings were held on May 18, 2020, May 21, 2020, and May 26, 2020. Oral and written public comments were considered throughout the advisory process. The Panel also met on June 9, 2020 to discuss its draft report. Oral and written public comments were considered throughout the advisory process. This report conveys the consensus advice of the SAB.

While the SAB includes several recommendations within this report, we would like to highlight the following.

- *
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*

As the EPA finalizes its draft guidelines, the SAB encourages the Agency to address the concerns raised in the enclosed report and consider the presented SAB advice and recommendations . The SAB appreciates this opportunity to review the revised Guidelines for Preparing Economic Analysis and looks forward to the EPA’s response to these recommendations.

Sincerely,

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Chair
EPA Science Advisory Board

Chair
EPA Committee/Panel

1 Enclosure:
2

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NOTICE

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This report has been written as part of the activities of the EPA Science Advisory Board, a public advisory committee providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide balanced, expert assessment of scientific matters related to problems facing the Agency. This report has not been reviewed for approval by the Agency and, hence, the contents of this report do not represent the views and policies of the Environmental Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor does mention of trade names or commercial products constitute a recommendation for use. Reports of the EPA Science Advisory Board are posted on the EPA website at <http://www.epa.gov/sab>.

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ACRONYMS AND ABBREVIATIONS

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CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGE	Computable general equilibrium
CV	Compensating variation
DWL	Deadweight loss
EIA	Economic impact analysis
EO	Executive Order
EPA	Environmental Protection Agency
EV	Equivalent variation
GDP	Gross domestic product
GHG	Greenhouse Gas
MATS	Mercury and air toxics standards
NCEE	National Center for Environmental Economics
OIRA	Office of Information and Regulatory Affairs
OMB	Office of Management and Budget
PRP	Potentially responsible parties
RIA	Regulatory impact analysis
SAB	Science Advisory Board
SL	Supply of labor
WTA	Willingness-to-accept
WTP	Willingness-to-pay

1. INTRODUCTION

The Environmental Protection Agency (EPA) National Center for Environmental Economics (NCEE) requested that the Science Advisory Board (SAB) conduct a peer review of its draft revised document titled “Guidelines for Preparing Economic Analyses” (later referred to as Guidelines). The purpose of the document is to define and describe best practices for economic analysis grounded in the economics literature. It also describes Executive Orders and other documents that impose analytic requirements and provides detailed information on selected important topics for economic analyses.

In response to the EPA’s request, the SAB convened a panel of subject matter experts to conduct the review. The Science Advisory Board Economic Guidelines Review Panel (later referred to as EGRP or Panel) convened three public meetings to conduct a peer review of the EPA’s revised document. Meetings were held on May 18, 2020, May 21, 2020, and May 26, 2020. The Panel also met on June 9, 2020 to discuss its draft report. Oral and written public comments were considered throughout the advisory process.

This report is organized by the revised Guidelines chapters to state each charge question raised by the agency followed by the SAB’s consensus response and recommendations. Charge questions were specified for chapters 1 -10 of the revised Guideline document. In order to provide a thorough review of the document overall, the Panel also provided comments on chapter 11 and appendixes A and B. Recommendations are prioritized to indicate relative importance during EPA’s revisions. Prioritizes are defined as follows:

- Tier 1: Key Revisions – Recommendations that are necessary in order to improve the critical scientific concepts, issues and/or narrative within the assessment.
- Tier 2: Suggestions – Recommendations that are encouraged for EPA to adopt in order to strengthen the scientific concepts, issues and/or narrative within the assessment, 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 assessments. These recommendations are likely outside the immediate scope and/or needs of the current assessment under review.

When the SAB was unable to reach consensus, members with differing opinions were asked to provide responses and recommendations separately. All dissenting opinions (or additional comments) are presented within appendix B. All materials and comments related to this report are available at: <https://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCalBOARD/A7E98FA28E40593A852585520058733A?OpenDocument>.

2. RESPONSE TO CHARGE QUESTIONS

2.1. Chapter 1: Introduction.

This chapter provides an overview of how to do economic analysis for EPA regulations.

Laws and Executive Orders (EO) govern how and when economic analyses are done providing insights to analysts. They also provide guidance to decision makers on how decisions to use economic analysis are written. In particular, instructions like “maximize net benefits,” “choose the least cost option,” and “costs should be justified by benefits” are written for decision makers. Alternatively, Regulatory Impact Analyses (RIA) and other economic analyses are written *for anyone* who is involved in EPA decisions including EPA managers and the Administrator, the President and Executive Branch staff, Congress, the Courts, stakeholders and the general public. The SAB suggests that these Guidelines be written solely for subject matter experts, people with a background in economic analysis.

Many years ago, the Office of Personnel Management set guidelines for policy analysts. An excerpt from 1981 concludes:

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.¹

This requirement was changed from earlier views that subject matter experts be used to “defend” policy makers decisions.² The SAB agrees that subject matter experts defend their analysis, both internally and externally without trying to defend a particular decision, as is currently required throughout the Guidelines.

The SAB recommends that all questions or instructions targeted towards policy makers be moved to the policy section of preambles. As an example, the questions below (listed in Text Box 1, should be moved.

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

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

If the location of the questions cannot be altered, the SAB recommends that the questions be revised to reflect something like the following:

Does the analysis provide sufficient information for the policy maker to Identify the option that has the highest net benefits?

The SAB concludes that separating the instructions for analysis and policy decision makers would have several positive effects. First, they will help to remove pressure on economists to make analyses

¹ <https://www.opm.gov/policy-data-oversight/classification-qualifications/classifying-general-schedule-positions/functional-guides/gspolanl.pdf>

² IBID.

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conform to decisions. Second, by making the Guidelines public, it will help to allay the suspicion that economists are making decisions based on their own relatively narrow paradigm of evaluating the efficiency of regulatory options, i.e., choosing the regulatory option that maximizes net benefits (benefits minus costs).

The SAB notes that decision makers often use other criteria to drive decisions including what is perceived as the intention of Congress, the law, distributional equity such as protecting highly sensitive or highly exposed subpopulations, agency resources or ethical considerations. Options chosen using these alternate criteria may or may not be the most efficient option.

2.1.1. Charge Question 1:

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

[BLANK]

2.1.2. 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?

On page 1-5, the Guidelines states “adhere to applicable directives in EOs.”, but a statute might preclude consideration of costs. The SAB finds that “adherence” is too strong a word.

2.1.3. Charge Question 3:

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

The SAB finds that the Guidelines should distinguish between proposed and final rules. The SAB recommends that in the proposed rule the options singled out is called the “proposed” rule to distinguish it from other options. Similarly, in the final rule, the SAB suggests that the final option is referred to as the “selected” rule.

The SAB concludes that defense of decision options should be put into the preamble of the rule, not in either the PRIA or the FRIA. That defense may include how the economic analysis informed the decision. The SAB recommends that this receive strong emphasis in the opening to Chapter 1.

The SAB finds that economists should never try and bias an analysis for any reason, including and in particular, to defend a decision. The SAB recommends that this receive strong emphasis in the opening to Chapter 1.

One page 1-3, the SAB suggests that EPA ensure that the Guidelines differentiate between personal welfare losses that are not social costs as opposed to those that are social costs.

Several changes are suggested for clarity of questions included in Text Box 1:

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1 *Does the RIA include a reasonably detailed description of the need for regulatory action?* The
2 SAB suggests that the text read "... need for regulatory action including whether there is a
3 market failure and, if so, explain the evidence for the existence of the failure."

4 *Does the RIA use an appropriate baseline?* The SAB suggests new language - ... "Does the RIA
5 use the same baseline for changes in behavior for both the benefits and costs and use the same
6 changes by key participants likely to occur without regulation?"

7 *Is the information in the RIA based on the best reasonably obtainable scientific, technical, and*
8 *economic information and is it presented in an accurate, clear, complete, and unbiased manner?*
9 The SAB suggests new language - "...accurate, clear, complete and unbiased manner such that it
10 can be replicated by a competent economist?"

11 *Does the RIA assess the potentially effective and reasonably feasible alternatives?* The SAB
12 suggests new language - ..." reasonably feasible alternatives, including those not currently
13 lawful."

14 *Does the RIA explain and support a reasoned determination that the benefits of the intended*
15 *regulation justify its costs?* The SAB suggests new language - "Does the RIA provide enough
16 information to help the policy maker make a reasoned determination that the benefits of the
17 intended regulation justify its costs?"

18 *Does the preferred option have the highest net benefits – unless a statute requires a different*
19 *approach?* The SAB suggests new language - "Does the RIA provide enough information to help
20 a policy maker determine which option has the highest net benefits?"

21 *Does the RIA include an explanation of why the planned regulatory action is preferable to the*
22 *identified potential alternatives?* The SAB suggests removing this.

23 Finally, the SAB suggests that the Text Box include a reference to unquantified and qualitative costs and
24 benefits.

25 **2.1.4. Charge Question 4:**

26 *Are there any inconsistencies in the way an issue or topic is discussed either within or across*
27 *chapters?*
28

29 There are direct benefits and costs, co-benefits and costs, and countervailing benefits and costs. Some
30 are market driven and some are nonmarket driven. The distinction between benefits and negative costs
31 (or costs and negative benefits) is at times arbitrary. Here's an example:
32

33 *The RIA for MY 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and*
34 *Corporate Average Fuel Economy Standards lists fuel savings separately from Costs and*
35 *Benefits, but as a positive number, so implicitly as a benefit. (Executive summary Table 1).*
36 *But in that same rule, the "increased accidents, noise, and congestion associated with additional*
37 *vehicle use due to the rebound effect" as a negative benefit rather than as a cost (Table 7.3-4).*
38 *One could easily make the case for fuel savings as being a subtraction for costs, and/or*
39 *accidents and congestion being an addition to costs. This is why we use net benefits (B-C)*

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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.

The SAB recommends that EPA create consistent definitions, perhaps including standardized names. The placement of those terms within the Guidance will be covered in subsequent comments.

In Text Box 1.1, the SAB suggests that EPA provide cross references to places in the document answers to these questions might be found. In addition, Text Box 1.1 is adapted from the Office of Management and Budget (OMB) checklist and the SAB suggests that it could be helpful to point out which sections of the text box are written just for EPA analyses. Finally, there is a tremendous amount of redundancy across chapters. The SAB suggests that the document could be shortened considerably by putting references to appropriate sections where a complete explanation is made. For the electronic version, this could consist of a link.

2.1.5. Charge Question 5:

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

[BLANK]

The following recommendations are noted for Chapter 1:

Tier 1- Key Revisions

- The SAB recommends not using the term “preferred” for the option it has chosen. Alternatively, the SAB suggests that in the proposed rule the option singled out is called the “proposed” rule to distinguish it from other options. Similarly, in the final rule, the SAB suggests that the final option is referred to as the “selected” rule.
- The SAB concludes that defense of decision options should be put into the preamble of the rule, not in either the PRIA or the FRIA. That defense may include how the economic analysis informed the decision. The SAB recommends that this receive strong emphasis in the opening to Chapter 1.
- The SAB finds that economists should never try and bias an analysis for any reason, including and in particular, to defend a decision. The SAB recommends that this receive strong emphasis in the opening to Chapter 1.

Tier 2 - Suggestions

- The SAB recommends that EPA create consistent definitions for benefits, costs, co-benefits and costs, and countervailing benefits and costs.
- The SAB recommends some language changes (above) in Text Box 1. It also recommends that it add in a reference to unquantified benefits.

Tier 3- Future Considerations

- The SAB suggests that in the future, this document could be shortened by either using cross references so as not to be redundant or make it an electronic document only with links.

1
2 **2.2. Chapter 2: Executive Order and Statutory Requirements for Conducting Economic**
3 **Analyses.**
4

5 Chapter 2 provides a list of all Executive Orders and Laws that govern the work of EPA economists.
6 There are many different requirements and, if possible, this chapter can suggest where complying with
7 the same requirements might be lumped together. Overall, the SAB finds this chapter helpful and well
8 written.
9

10 **2.2.1. Charge Question 1:**

11 *Are the statements and analytic recommendations made in the chapter consistent with the*
12 *theoretical and empirical peer-reviewed economics literature?*
13

14 BLANK
15

16 **2.2.2. Charge Question 2:**

17 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
18 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
19 *methods described?*
20

21 BLANK
22

23 **2.2.3. Charge Question 3:**

24 *Are there topics that warrant more discussion or elaboration in the chapter?*
25

26 The SAB suggests that in section 2.1.1 on whether an RIA is significant, it should conclude with noting
27 that, whatever Office of Information and Regulatory Affairs (OIRA) says is “significant” is the final
28 determination. The reasoning for the determination of significance is whether it triggers an OIRA
29 review. In footnote 12, it mentions EO 13563, the OMB guidelines for regulatory review. The SAB
30 finds that that this footnote should be expanded to cover more of what is in the OMB EO and move it up
31 into the main text.
32

33 The SAB suggests that EPA include new guidelines for analyzing federal investments in water sources.
34 In Section 2.1.7 Executive Order 13563, "Improving Regulation and Regulatory Review the SAB
35 suggests that EPA prioritize rules for review where there are high costs or benefits with large
36 uncertainties.
37

38 **2.2.4. Charge Question 4:**

39 *Are there any inconsistencies in the way an issue or topic is discussed either within or across*
40 *chapters?*
41

42 The SAB suggests that Section 2.1.2 mention costs to minority and low-income subpopulations and refer
43 to Chapter 9 and 10 for further information. In Sections 2.1.3 and 2.2.2 , the Guidelines ask that
44 explanations for policy choices be included. The SAB finds that these requirements should be rewritten
45 to say that the analysis supplies information to policy makers or remove it. The SAB further suggests

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that this chapter would be a good place to determine what information will be needed to do further analysis.

2.2.5. Charge Question 5:

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

BLANK

The following recommendations are noted for Chapter 2:

Tier 1- Key Revisions

- Expand footnote 12 to cover more of what is in the EO and move it to the main text.
- In Section 2.1.7 Executive Order 13563, "Improving Regulation and Regulatory Review, the SAB finds that EPA identify rules for review where there are high costs or benefits with large uncertainties.

Tier 2 - Suggestions

- The SAB suggests that, in the section on whether an RIA is significant, it should conclude by noting that OIRA makes the final determination, which triggers an OMB review.
- In the Section 2.1.2, the SAB suggests that this section mention costs to minority and low-income subpopulations and refer to Chapter 9 and 10 for further information.

Tier 3- Future Considerations

- The SAB suggests that this chapter would be a good place to determine what information will be needed to do further analysis in a future guideline.

2.3. Chapter 3: Need for Regulatory Action and Evaluation of Policy Options.

This chapter provides an overview of evaluating the need for regulatory intervention into private markets and analyzing options for solving problems. Market failures are not one-off issues but rather systemic problems that are expected to continue to occur into the future. Every market failure is also a market opportunity and may be in the process of self-correcting at the point at which government is considering intervening. Also, assertion of market failure requires that evidence be produced, it is not enough to theoretically speculate on failures. Some theoretical market failures of the past may no longer be so, particularly given the existence of the internet.

While the draft Guidelines contain guidance on the severity of potential interventions, they do not provide sufficient detail on the scope of regulatory options and suggestions are made for a new section to cover this.

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1 **2.3.1. Charge Question 1:**

2 *Are the statements and analytic recommendations made in the chapter consistent with the*
3 *theoretical and empirical peer-reviewed economics literature?*
4

5 For Section 3.1, the SAB finds that the discussion of market failure may lead some to conclude that a
6 market failure can be a “one-off” issue. In fact, market failures must be systemic, and the SAB finds
7 that evidence needs to be provided to prove the existence of a market failure. Where the market does
8 not fail, benefits cannot exceed costs, with the possible exception internalities.
9

10 **2.3.2. Charge Question 2:**

11 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
12 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
13 *methods described?*
14

15 BLANK
16

17 **2.3.3. Charge Question 3:**

18 *Are there topics that warrant more discussion or elaboration in the chapter?*
19

20 The SAB has concluded that this chapter needs a new section – Section 3.1.4 Possible Scope of
21 Regulatory Action with the following information:

22 A key issue in regulatory design is the scope (also called coverage) of the regulatory
23 action. Scope refers to the breadth of a regulation's applicability, which will influence how many
24 entities or persons are covered by the requirements and what the magnitudes of benefits and
25 costs might be. The concept of stringency is different than scope/coverage because stringency
26 (how demanding an environmental-protection requirement is for a covered entity) is relevant
27 only for entities covered by the regulation.
28

29 Here are some key issues that commonly arise in scope/coverage determinations:
30

31 *--Should the regulatory action cover all sectors of the economy or only a subset (e.g., electric*
32 *utilities, manufacturing, agriculture and so forth)?*
33

34 If the environmental problem is concentrated in one or two economic sectors, it may make sense
35 to have a somewhat narrow focus but if the problem is significant in all sectors, broader coverage
36 may be appropriate. Regulations that cover sectors without significant problems may create
37 costly monitoring and reporting requirements without commensurate environmental benefits. In
38 some situations, sufficient information exists to justify prompt coverage of one sector, but further
39 inquiry is necessary to determine whether other sectors should be covered. The preamble to a
40 proposed rule may seek public comment on which sectors of the economy should be included.
41 The SAB finds that coverage of a sector should not be based on potential risks, but rather
42 existing risks based on the available evidence.
43

44 *--Should the regulatory action cover only new products/processes or should it cover existing*
45 *products/processes already in use or operation?*
46

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1 It is frequently less expensive to incorporate environmental innovations into new products and
2 new production processes than to retrofit them on existing products or processes. Moreover, the
3 environmental benefits of a retrofit approach may be limited if the remaining life of the product
4 or process is limited. The practice of covering only new products/processes in a rulemaking
5 action, while common, has some drawbacks. It may inadvertently discourage investments into
6 new products/processes, since they are subject to regulatory scrutiny, and cause existing products
7 and processes to be used longer. In some cases, the costs and benefits are so different that a
8 separate rulemaking action is appropriate for new versus existing products/processes.
9

10 --Should the regulatory action cover all regions of the country or only a limited number of
11 regions, states or localities?
12

13 A federal rulemaking action may be limited in coverage by certain criteria that focus compliance
14 activities on entities located in certain regions, states and localities. Some clean-air requirements
15 are applicable only in regions of the country that do not meet national air-quality
16 standards. Environmental science may suggest that the same pollutant emitted in some cities
17 generates more smog than the same pollutant generated in another city, due to differences in
18 sunlight, weather and other factors. Since the costs and benefits of rulemaking action may vary
19 widely by location, the geographic and jurisdictional scope of a rulemaking is an important
20 economic issue.
21

22 --Should the regulatory action cover all businesses or only businesses larger than a certain
23 size?
24

25 These are issues that are typically addressed in a Regulatory Flexibility Analysis and have
26 different requirements, including for example, how a regulation will affect small entity profits.
27 The costs and benefits of including small businesses may be quite different than larger business,
28 particularly when there are large fixed costs. Consultation with the Office of Advocacy Office of
29 the Small Business Administration is appropriate at the early stages of a regulation,
30

31 The SAB concludes that regulations can address market failures, government failures or overriding
32 social needs (McLaughlin 2014). In the latter case, the SAB recommends that it is clearly stated that
33 there is *no market failure* and identify the exact overriding social need.
34

35 Regarding Text Box 3.1, the SAB suggests that this section be updated to reflect newer literature as well
36 as new technologies. As discussed in Clay Shirky's *Here Comes Everybody* (2008), the internet
37 provides consumers with robust search and monitoring tools that lowers search and transactions costs.
38 Using social platforms like LinkedIn, Facebook, Twitter and Flickr, it is easier for groups to discover
39 one another and to arrive at bargained solutions. The Web also goes a long way to ameliorating
40 information asymmetries. Coase solutions may emerge over time and can be included in the baseline
41 correcting a temporary market failure.
42

43 For Section 3.2, the SAB recommends that this section contain emphasis that RIAs may, but are not
44 required to, contain options that are not currently legal. This may be particularly true when economic
45 theory points to clearly superior options than those allowed by law. It should be emphasized here that
46 RIAs and other economic analyses are written for a broad audience beyond the EPA.
47

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1 The SAB finds that footnote 63, on p. 3-6, should be moved up to the text. In general, it is useful to
2 identify separate categories of benefits and costs and their sources, especially when some categories
3 might not be quantified or monetized but nonetheless deemed important. But the Guidelines should be
4 clear that useful economic analysis requires consideration of all expected impacts of different regulatory
5 alternatives. And just as it is important to consider other (realistic and potentially more efficient) ways
6 of achieving different benefits, it is important to consider when pollutants are best regulated jointly
7 (whether most realistically or most efficiently) to achieve net benefits.
8

9 Regarding footnote 48, the SAB suggests that the EPA include Buchanan and Stubblebine (1962) and
10 Bator (1958), along with Scitovsky and Mishan.

11
12 On page 3.-2, the SAB suggests better language such as "when actions taken by one individual enter the
13 utility or production function of another without passing through markets or contracts." On page 3.3, the
14 SAB suggests clarifying language. The paragraph beginning "when left unaddressed..." is debatable. If
15 high transactions costs prevent internalizing externalities, then internalizing them doesn't lead to
16 increased welfare. It's just another way of saying it would fail a benefit-cost test. Perhaps what is meant
17 here is that private parties cannot profitably internalize an externality because of transactions costs, but
18 regulation can (at lower costs). If so, that should be clarified.
19

20 **2.3.4. Charge Question 4:**

21 *Are there any inconsistencies in the way an issue or topic is discussed either within or across*
22 *chapters?*
23

24 BLANK
25

26 **2.3.5. Charge Question 5:**

27 *Are the definitions provided in the glossary accurate? Please identify any in need of revision.*
28

29 BLANK
30
31

32 ***The following recommendations are noted for Chapter 3:***

33 Tier 1- Key Revisions

- 34 • The SAB finds that an expanded definition of market failures be provided that discusses the
35 systemic nature of market failures and provision of evidence to demonstrate them.
36
- 37 • The SAB suggests that a new section, perhaps Section 3.1.4. be included to discuss different
38 options for the scope of regulations.
39
- 40 • The SAB notes that coverage of an industrial sector should not be based on a possible future risk
41 but rather an existing, demonstrable risk.
42
- 43 • The SAB suggests that guidance be given that analysts should specify when a rule is
44 promulgated for which there is no market failure and, in turn, identify the exact reason for
45 government intervention, e.g., to protect a sensitive subpopulation.
46

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- The SAB finds that options may include, but are not required to include, options that are currently not legal.
- On page 3.2, the SAB suggests better language such as "when actions taken by one individual enter the utility or production function of another without passing through markets or contracts."

Tier 2 - Suggestions

- In Text Box 3.1, the SAB suggests that this section be updated to reflect the influence of the Web on remedying past market failures such as asymmetric information and Coase solutions for externalities.
- The SAB suggests that footnote 63 be expanded and moved up to the text.
- The SAB suggests adding Buchanan and Stubblebine (1962) and Bator (1958) to footnote 48.
- The SAB suggests clarifying language on page 3.3 that differentiates between government intervention and private parties internalizing externalities.

Tier 3- Future Considerations

- The SAB has no recommendations for this tier.

2.4. Chapter 4: Regulatory and Non-Regulatory Approaches to Pollution Control.

Chapter 4 describes several different regulatory and non-regulatory approaches used in environmental policymaking. It also includes a discussion of criteria used to evaluate these approaches. The chapter helps economic analysts design reasonable policy options and anticipate the welfare implications from the choice of approach.

Overall, the SAB commends the EPA on its revision of the chapter. In particular, we applaud the inclusion of additional approaches and the reorganization of some of the discussion. The SAB recommends, however, that the chapter refocuses on describing the relative costs and benefits of each approach. We also recommend balancing the discussion and including additional approaches. Finally, the SAB recommends removing discussion of issues and considerations that are either irrelevant to economic analysis or redundant or inconsistent with information in other chapters.

2.4.1. Charge Question 1:

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

The statements in the chapter are largely consistent with the theoretical and empirical peer-reviewed economics literature. There are two statements, however, that are inconsistent or at least misleading in their current form. The first statement asserts that cost-effective policies always result in equal marginal abatement costs across polluters. The second statement asserts that strict liability rules create disincentives for land redevelopment. We discuss each of these in turn.

1. The SAB recommends that EPA remove the first sentence in the discussion in section 4.1.2 (Tier 1).

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1 Section 4.1.2 on cost-effectiveness begins with the following statement: “*A policy is considered*
2 *cost-effective when marginal abatement costs are equal across all polluters*” (p. 4-2, line 22). This
3 statement, however, is not generally true. The theoretical and empirical peer-reviewed literature
4 carefully distinguishes different types of pollutants, especially uniformly mixed and non-uniformly
5 mixed pollutants. The given statement is true for uniformly mixed pollutants. For non-uniformly
6 mixed pollutants, where damages vary based on location, a cost-effective policy would have
7 marginal abatement costs that vary across sources according to the degree of damage caused
8 (Montgomery, 1972; Tietenberg, 2006; Muller and Mendelsohn, 2009; Phaneuf and Requate, 2017).
9 The current statement may mislead regulatory designers toward equal marginal abatement costs in
10 cases where such a design would not be cost-effective.

11
12 The SAB recommends that EPA remove this sentence from the discussion (Tier 1). Alternatively,
13 EPA should move this sentence back to the end of the paragraph on cost-effectiveness (its location in
14 the 2010 Guidelines) with the caveat that the statement refers to the case of uniformly mixed
15 pollutants. The Guidelines should then explain as follows: “*More complex cases, such as those*
16 *involving non-uniformly mixed pollutants with damages that vary based on location, may require*
17 *unequal marginal abatement costs across sources.*”

- 18
19 2. The SAB recommends that EPA correct the discussion of the effects of strict liability in section 4.4.3
20 (Tier 1).

21 Section 4.4.3 discusses the use of liability rules. On p. 4-16, lines 6-7, the Guidelines states, “[S]trict
22 liability rules can create disincentives for the redevelopment of contaminated land because newly
23 involved firms become liable for past contamination.” This statement is incorrect; strict liability does
24 not introduce the distortion referred to in the study. The reason “newly involved firms become liable
25 for past contamination” under the Comprehensive Environmental Response, Compensation, and
26 Liability Act (CERCLA) is because CERCLA defines current owners as “potentially responsible
27 parties” (PRP), embraces joint and several liability, and limits the defenses PRPs can invoke to avoid
28 liability. These features, specific to CERCLA, are not necessary features of a strict liability regime.³
29 In addition, the Guidelines should not discuss strict liability here (at lines 6-7) before defining the
30 term (lines 11-12) and should not comment on the disincentives of a specific statute (at lines 6-7)
31 before introducing the statute (lines 18-19).

32
33 The SAB recommends that EPA remove this sentence about strict liability from that paragraph (Tier
34 1). A version of the sentence can be added to 4-16, line 20, right after CERCLA is first introduced,
35 as follows: “*The scope of liability may be relevant for economic efficiency. Under CERCLA, for*
36 *example, new owners of contaminated land are defined to be potentially responsible parties that can*
37 *be held liable for past pollution, creating disincentives for the redevelopment of contaminated land*
38 *(Jenkins, Kopits, and Simpson 2009).*” This sentence would fit well with the next sentence on
39 statutory changes that were made to encourage the redevelopment of brownfields.

- 40
41 3. The SAB suggests that the EPA rename section 4.4.1.3 as “Combining Standards and Pricing” and
42 streamline the discussion (Tier 2).

43

³ Under a strict liability regime, a firm taking reasonable precautions is, nonetheless, liable for damages caused by its actions, while in a negligence regime, such a firm would avoid responsibility. But in either regime, firms would be incentivized to adopt reasonable precautions to minimize their liability.

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1 Section 4.4.1.3 is newly titled “Safety Valve Systems.” The heading in the 2010 Guidelines—
2 “Combining Standards and Pricing”—is clearer because the literature (and the discussion in the
3 section) refers to these systems as combining standards and taxes/pricing mechanisms. The SAB also
4 suggests streamlining the section and discussing the implications for government revenue (and its
5 use). We refer EPA to Pezzey and Jotzo (2012) for a clear discussion on the welfare and
6 distributional effects of revenue recycling.
7

8 **2.4.2. Charge Question 2:**

9 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
10 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
11 *methods described?*
12

13 The chapter contains a mostly objective, balanced, and reasonable presentation of the literature. But
14 there are key improvements that EPA could make to the presentation to promote objectivity, balance,
15 and reasonableness. Most importantly, the SAB recommends that EPA be more consistent in its
16 discussion of the relative costs and benefits of different approaches. We also recommend several
17 specific changes to some sections. Each is discussed in turn.
18

- 19 1. The SAB recommends that EPA consistently present the relative advantages and disadvantages of
20 each of the approaches.
21

22 The relative advantages and disadvantages of the approaches are the key useful insights for economic
23 analysis from this chapter. But the chapter does not consistently discuss relative advantages and
24 disadvantages of each of the approaches, making the treatment seem unbalanced and arbitrary. The
25 SAB recommends that EPA thoroughly describes relative advantages and disadvantages for each
26 approach (Tier 1). Below we identify a few specific examples that warrant more consistent treatment
27 within the chapter.
28

29 At times, the chapter describes an issue as a disadvantage of a particular approach even though the
30 issue is relevant to other (or all) approaches. For example, it mentions grandfathering only on page 4-
31 3 in the context of discussing prescriptive regulations. But other approaches, including market-based
32 ones, might also provide for preferential treatment for existing sources for a number of reasons. For
33 example, a cap-and-trade system might freely allocate permits to existing sources based on their
34 historical emissions. Such decisions are related to policy coverage and scope and will have welfare
35 implications under all approaches. The Guidelines should provide the analyst with objective
36 information of these kinds of cross-cutting issues for all approaches and discuss their relative
37 importance.⁴
38

39 This inconsistent treatment occurs in the description of market-based approaches, too. The chapter
40 suggests that illegal dumping, rent seeking, political incentives, and revenue-collection concerns are
41 unique to market-based approaches (pages 4-4 to 4-5). But, again, these are important considerations
42 for any regulatory approach. Compliance, monitoring, and enforcement are common concerns, and all
43 approaches face political pressures; for example, prescriptive regulations that require a specific type
44 of control equipment make compliance monitoring easier but are likely to generate rent seeking by

⁴ Regarding regulatory coverage and scope of policy proposals, in particular, the Guidelines should devote a section in an earlier chapter to this issue (see our recommendations for Chapter 3).

1 producers of the equipment and current users. The chapter should not single out market-based
2 approaches as having these special considerations; instead, it should discuss these considerations for
3 all approaches and focus on relative effects. Similarly, the chapter fails to discuss persistent
4 challenges faced by policymakers implementing market-based approaches, especially quantity-based
5 ones. For example, many cap-and-trade markets have experienced challenges with setting an initial
6 cap too high or allowing too many banked allowances, leading to persistently low allowance price,
7 little trading, and lower than expected environmental gains. An objective discussion of
8 implementation challenges and the importance of initial allocations and allowance prices would be
9 useful given the significant experience with market-based approaches both within the United States
10 and across the world.

11
12 The chapter also fails to discuss relative advantages of approaches in a consistent way. For example,
13 it discusses the role of different kinds of uncertainty in choosing between quantity-based and price-
14 based instruments. It fails to mention, however, that prescriptive policies can provide increased
15 certainty regarding quantity and price, which can be an advantage in some situations.

16
17 Overall, there are common issues of scope, flexibility, information availability, implementation,
18 enforcement, compliance, monitoring, and uncertainty that all have welfare implications, but these
19 issues may affect each approach differently. The chapter should consistently identify these issues and
20 explain their relative effect on different approaches.

- 21
22 2. The SAB recommends that EPA provide consistent information on relative advantages and
23 disadvantages of the approaches (Tier 1).

24
25 The SAB suggest that EPA create a summary table that presents this important information clearly
26 (Tier 2). In the future, EPA should consider moving the background information on approaches to an
27 appendix and focusing entirely on relative advantages and disadvantages of the approaches,
28 preferably as a summary table included with Chapter 3 (Tier 3).

- 29
30 3. The SAB recommends that EPA remove section 4.6, especially section 4.6.8 (Tier 1).

31
32 Section 4.6 discusses various considerations for selecting the most appropriate policy approach. Some
33 of these relate to relative advantages and disadvantages of approaches from an economic perspective.
34 These considerations should be clearly and consistently discussed for each approach (Tier 1), see
35 recommendation above). These considerations include the type of market failure, nature of
36 environmental problem, degree of available information, degree of uncertainty, and monitoring and
37 enforcement issues. Alternatively, this entire section could be reformatted into a table that
38 summarizes how each of these criteria relate to different approaches (Tier 2).

39
40 Section 4.6.8, in particular, should be clarified or moved to another chapter (Tier 1). It currently
41 discusses the influence of “policy makers” and their goals in selecting an appropriate instrument. It
42 does not define policy makers, so the intention of the discussion is unclear.⁵ Statutory constraints

⁵ If “policy makers” refers to Congress, then this section refers to statutory authorization. It should be explicitly titled as such, and the focus should be about whether statutory directives constrain the agency’s choice of alternatives to analyze and its ability to adopt an efficient approach. But any such discussion about how statutory directives can constrain economic analysis would fit better in Chapter 1. If instead “policy makers” refers to presidential priorities, then the discussion should be clear about this and, again, would fit better in Chapter 1.

1 might limit the available set of options that the agency is authorized to ultimately implement and,
2 given scarce resources, may limit the set that the agency will choose to analyze. Further, political
3 officials at agencies, to the extent permitted by statute, might pursue other goals beyond aggregate
4 welfare maximization or cost-effective achievement of a particular end when they choose an option.
5 Any discussion of these issues and their effect on the economic analysis should be clear. This
6 discussion, because it pertains to other chapters, too, might fit best in an earlier chapter, such as
7 Chapter 1 (Tier 2).
8

9 The SAB recognize that statutory constraints may play a particular role in selecting the set of
10 alternatives. But alternatives include other stringency levels in addition to other regulatory or non-
11 regulatory approaches—and statutory constraints are relevant to both categories. Thus, information
12 about the role of statutory constraints in choosing the set of alternatives to analyze is particularly
13 relevant to multiple chapters and not just Chapter 4. In general, the SAB believes that there is value to
14 describing the effects of stringency levels and approaches that are not currently allowed under a
15 statute, especially when those other stringency levels or approaches are efficient. But in some cases,
16 especially when the overall stakes of the regulation are low, deploying scarce resources to evaluating
17 unavailable alternatives may be unwarranted. The SAB agrees with the Guidelines that the
18 alternatives analyzed should be reasonable, which sometimes could include currently unavailable
19 options and sometimes would not. A discussion of this nuanced issue—who decides which options
20 should be analyzed, when is this decision made, and on what basis—would be useful at the outset of
21 the Guidelines, in Chapter 1 (Tier 2).
22

- 23 4. The SAB recommends that EPA provide a more balanced discussion of information disclosure in
24 section 4.4.2 (Tier 1).
25

26 Section 4.4.2 on information disclosure should outline the necessary conditions for such interventions
27 to be effective and welfare-improving, including that target populations must understand the
28 information and that the information must not be misleading. In addition, while the section describes
29 evidence that TRI reporting can be effective in reducing emissions, it omits the broader literature that
30 is mixed on the effectiveness. This literature is focused on whether any associated reductions are
31 persistent as opposed to one-time shocks.
32

- 33 5. The SAB recommends that EPA rewrite section 4.5 using an economic framework and ensure
34 balanced discussion of the economic literature evaluating the efficacy of voluntary initiatives (Tier 1).
35

36 Section 4.5 on voluntary initiatives is currently organized around congressional priorities from the
37 Pollution Prevention Act (4-18 to 4-20).⁶ The SAB recommends that EPA rewrite this section
38 focusing on an economic framework. The section should provide analysts with guidance for when
39 voluntary approaches might be effective/efficient and how these initiatives should be designed based
40 on the economic literature. The current discussion presupposes “four general methods to achieve
41 environmental improvements” and describes them in turn, without discussing any literature on their
42 effectiveness. When the discussion finally turns to the economic literature, it reports only the more
43 favorable results from the literature, despite admitting that the efficacy of voluntary programs is
44 “decidedly mixed” (page 4-20, line 1). The last sentence, in particular, is confusing and unsupported.

⁶ No other section opens with such policy considerations and priorities. If the purpose is to demonstrate statutory authorization, then it is odd to include this discussion only in this section. Statutory authorization is a separate concern that is relevant to all approaches and might vary by statute.

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1 The section concludes that “*when the threat of regulation is strong, levels achieved are closer to*
2 *those under optimal conditions*” (page 4-20, line 10-11). But the section does not explain what it
3 means by optimal conditions and, whatever its meaning, why a voluntary approach would be pursued
4 under those circumstances. These issues can be resolved or clarified by rewriting this section in an
5 economic framework. The SAB refers the EPA to sources such as Helfand (1994; 1992) to improve
6 the framing of this discussion.
7

8 6. The SAB suggests that EPA clarify the broader relevance of behavioral economics (Tier 2).
9

10 The SAB applauds the addition of section 4.4.4 on behavioral nudges, an approach to designing
11 regulatory interventions that draws on insights from behavioral economics. As discussed in Chapter 5
12 (pages 5-14 to 5-16), behavioral economics can also provide a justification for standard regulatory
13 approaches when it identifies robust deviations from profit-maximizing behavior; for example,
14 insights from behavioral economics could affect the chosen level of regulatory stringency, which can
15 be implemented through prescriptive or market-based approaches (and not just nudges). The SAB
16 suggests, then, that EPA remove any suggestion that behavioral economics is relevant *only* to nudge
17 approaches.
18

19 **2.4.3. Charge Question 3:**

20 *Are there topics that warrant more discussion or elaboration in the chapter?*
21

22 This chapter is valuable for the list of approaches it provides for achieving environmental objectives.
23 The SAB recommends several topics that warrant inclusion or more discussion.
24

25 1 The SAB recommends that EPA include a discussion of additional approaches, such as insurance
26 mechanisms, licensing programs, and pilot programs (Tier 1).
27

28 In order for the chapter to provide a comprehensive list of available approaches, The SAB
29 recommends inclusion of a few additional topics. Mandating insurance coverage or assurance bonds,
30 for example, could help achieve compliance with environmental goals under certain conditions.
31 Meanwhile, licensing schemes could generate useful information for regulators on environmental
32 risk, which could be useful in contexts when there is little information about the risk. And similarly,
33 pilot programs could provide valuable information about implementation challenges and impacts.
34 These approaches could bridge the gulf between doing nothing and doing too much when
35 information on costs and benefits is unavailable or highly uncertain.
36

37 2 The SAB recommends that EPA include more discussion of prescriptive approaches (Tier 1).
38

39 The chapter devotes two pages to prescriptive regulation and more than eight pages to market-based
40 approaches. But prescriptive regulation is more common, and the chapter should provide more
41 guidance on how to design and evaluate different forms of prescriptive regulation. Meanwhile, some
42 of the background information on market-based approaches could be moved to an appendix.
43

44 3 The SAB recommends that EPA revisits its discussion of emissions taxes to reflect the importance of
45 the use of tax revenue, in light of opportunity costs and deadweight loss (Tier 1).
46

1 Section 4.3.2 on emissions taxes recognizes that “[a]nalysts should always consider the opportunity
2 costs associated with collecting and spending public funds” (page 4-11). But this issue, sometimes
3 called the Marginal Cost of Public Funds (e.g., Boardman et al. 2018), is important and deserves
4 more discussion. The chapter should provide more guidance to analysts on how to evaluate the
5 deadweight loss associated with different taxes and how the revenue is used.

6 7 **2.4.4. Charge Question 4:**

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

10
11 The SAB recommends the following actions based on inconsistencies that we have identified:

- 12
13 1 The SAB recommends that EPA remove section 4.1, evaluating environmental policy, because it is
14 inconsistent/redundant with the discussion in Chapter 1 (Tier 1). Alternatively, The SAB
15 recommends that EPA make this section consistent with Chapter 1.

16
17 This section starts by explaining that policymakers must sometimes take into account non-
18 efficiency-based considerations when evaluating approaches, such as statutory constraints and
19 “policy goals.” We understand that these considerations are undoubtedly relevant to a policymaker’s
20 choice of regulatory or non-regulatory approach. But they are not relevant to economic analysis of
21 approaches, which is the focus of this chapter and the Guidelines in general. In addition, as
22 potentially important noneconomic considerations, they are not specifically relevant to Chapter 4
23 and the choice of approach. If EPA would like to include a discussion of these kinds of overarching
24 constraints in its Guidelines for Economic Analysis, then a list of these constraints belongs in
25 Chapter 1, ideally before section 1.3 (economic framework for analysis).

26
27 The section then singles out two “economic concepts” that are useful for “framing the discussion and
28 comparing the options”: “economic efficiency” and “cost-effectiveness.” Section 4.1.1 on economic
29 efficiency, however, is redundant with Chapter 1, section 1.3, which discusses the framework for
30 economic analysis and focuses on efficiency. And the discussion of cost-effectiveness, section 4.1.2,
31 should not be limited to Chapter 4. Cost-effectiveness is a potentially useful way to compare policy
32 alternatives in general, not just when they vary based on approach. Cost-effectiveness, therefore,
33 should be discussed in Chapter 1, along with efficiency (section 1.3.1) and distributional analysis
34 (1.3.2). Finally, it is odd, then, that “economic and distributional impacts,” included in Chapter 1,
35 section 1.3.2, as considerations that are “important to policy evaluation” (page 1-4), are not also
36 included in this list in Chapter 4, as these considerations are also useful in comparing approaches. If
37 this section is purposefully duplicative of Chapter 1, section 1.3, then the discussion should be
38 consistent and include this distributional consideration as well.

39
40 Our recommendation is to remove this discussion from Chapter 4. These considerations are not
41 specific to comparing approaches and should be instead discussed in Chapter 1 as overarching
42 considerations. If the discussion remains in Chapter 4, the SAB recommends that the discussion in
43 the two chapters be made consistent—and preferably, the discussion in Chapter 4 would be shorter
44 and refer readers back to Chapter 1.

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2 The SAB recommends that EPA remove section 4.7 because it is redundant (Tier 1). Alternatively, the SAB recommends that EPA use this section here or in another chapter to discuss how policy options can be designed to promote effective retrospective review (Tier 3).

This section again outlines criteria for comparing approaches (ways to measure their effectiveness). Some of the criteria are redundant with information in Chapter 1 section 1.3 or, if it remains, Chapter 4 section 4.1 (rewritten to include environmental effectiveness, economic efficiency, and distributional or equity impacts). Other criteria should be expressly and consistently discussed within the chapter as relative advantages or disadvantages of different approaches (reductions in administrative, monitoring, and enforcement costs, and inducement of innovation). Therefore, the SAB recommends that EPA remove this section entirely (Tier 1).

The SAB notes, however, that there is an opportunity for EPA to provide guidance for designing programs that allow for meaningful retrospective review (ex post), which could provide information that could be used to refine ex ante estimates going forward. In particular, regulatory and non-regulatory approaches should identify measurable environmental goals and include a commitment to periodic reviews to evaluate the true benefits, costs, and distributional effects, which would generate information for later analyses. Such a presentation could appear in a revised section 4.7 or in another chapter. The SAB refers the EPA to the literature on retrospective review.

3 The SAB recommends that EPA consistently present the relative advantages and disadvantages of each of the approaches (Tier 1) (discussed under Charge Question 2).

As discussed under Charge Question 2, the chapter does not consistently discuss the relative advantages and disadvantages of different approaches. The SAB refers the EPA to the discussion under Charge Question 2 and our recommendation that the agency remedy this issue.

2.4.5. Charge Question 5:

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

The word “externality,” which appears in Chapter 4, is not accurately defined in the glossary. In particular, the SAB recommends that EPA remove the word “unintended” from the definition at i-10, line 2 (Tier 1). This word incorrectly suggests that intention matters. We suggest that EPA use a definition from a standard economic textbook (Tier 2). For example, Hillman (2014) defines externalities as “costs or benefits to society of byproducts of consumption or production that are not factored into the original market price” and Mas-Colell et al. (1995) explain that “[a]n 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.”

The following recommendations are noted for Chapter 4:

Tier 1- Key Revisions

- The SAB recommends that EPA refocus this chapter on the relative advantages and disadvantages of different regulatory and non-regulatory approaches.

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- 1 • The SAB recommends that EPA remove redundant, irrelevant, or inconsistent material. In
2 particular:
 - 3 ○ Remove section 4.1 (or make the discussion consistent with Chapter 1, section 1.3).
 - 4 ○ Remove Section 4.6, especially section 4.6.8.
 - 5 ○ Remove section 4.7 (or substantially reframe to address retrospective review).
- 6
- 7 • The SAB recommends that EPA provide a consistent and balanced discussion of relative
8 advantages and disadvantages of different approaches.
- 9
- 10 • The SAB recommends that EPA discuss additional approaches such as insurance mechanisms
11 and licensing schemes.
- 12
- 13 • The SAB recommends that EPA fix inaccuracies related to the implications of a strict liability
14 regime.
- 15
- 16 • The SAB recommends that EPA reframe the discussion of voluntary initiatives.
- 17
- 18 • The SAB recommends that EPA provide a more balanced discussion of information disclosure
19 approaches.
- 20
- 21 • The SAB recommends that EPA remove the word “unintended” from the definition of
22 “externality” in the glossary.
- 23

24 Tier 2 - Suggestions

- 25 • The SAB suggests that EPA add a summary table of the relative advantages and disadvantages
26 of different approaches.
- 27
- 28 • The SAB suggests that EPA make clear at the outset what questions this chapter will answer.
- 29
- 30 • The SAB suggests that EPA discuss the role of statutory constraints on selecting the set of
31 alternatives in an earlier chapter or, if it remains in this chapter, that EPA discuss the issue in a
32 clearer way.
- 33 • The SAB suggests that EPA include more discussion of prescriptive approaches.
- 34
- 35 • The SAB suggests that EPA rename section 4.4.1.3 as “Combining Standards and Pricing,”
36 which was the heading name from the 2010 Guidelines.
- 37
- 38 • The SAB suggests that EPA clarify the broader relevance of behavioral economics.
- 39

40 Tier 3- Future Considerations

- 41 • The SAB recommends that EPA move background material on approaches to an appendix so that
42 the chapter can focus on relative advantages and disadvantages of the approaches.
- 43
- 44 • The SAB recommends that EPA distill the relative advantages and disadvantages into a summary
45 table that can be included at the end of Chapter 3, removing the need for a separate Chapter 4.

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- The SAB recommends that EPA generate guidance on designing approaches for effective retrospective review, which can shed light on the impacts of adopted policies and improve ex ante estimation going forward.

2.5. Chapter 5: Setting the Foundation: Scope, Baseline, and Other Analytic Design Considerations.

Chapter 5 contains information on some standard foundational aspects of a benefit-cost analysis and some non-standard items that may be of specific usefulness to an EPA analyst. The standard elements of the chapter include issues such as standing, comprehensiveness, time frame and considerations that go into baseline estimation. The non-standard elements relevant to EPA analysts include additional issues for the baseline such as the treatment of regulations in various stages of development and their linkages. The topic of “Uncertainty” included here, is often presented later in a sequence but fits well here as cross-cutting stage setting for more detailed chapters. Finally, there are a number of specific topics which seem to appear as a result of EPA’s experience and challenges in developing RIAs. These topics are primarily under a catch-all section on Representing Economic Behavior which includes guidance on topics such as technological change, compliance, and changes in other environmental contaminants.

EPA indicated that this chapter has a substantial amount of new material compared to the previous guideline and that is worthy of particular review. In general however, the chapter covers topics important to analysts and with some exceptions, is appropriately grounded in the economics literature. Recommendations are identified by the charge number and its sequence within the charge.

2.5.1. Charge Question 1:

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

The statements in the chapter are largely consistent with the theoretical and empirical peer-reviewed economics literature. There are five topics, however, that are inconsistent or at least misleading in their current form which include: 1) Comprehensiveness, 2) Ancillary benefits and countervailing costs, 3) Compliance, 4) a single year time horizon, and 5) the adding up condition. A recommendation on each topic is followed by a discussion based on the SAB panel deliberations.

1. Create a new section 5.1.1 titled “Comprehensiveness” to clearly emphasize that the dominant guidance is to include all significant and feasible costs and benefits in an unbiased manner (Tier 1). Supplemental guidance on topics such as ancillary (co) benefits and costs and countervailing risks are recommended to be included to the extent appropriate by deleting section 5.5.6 and including relevant material in this new section.

Discussion: page 5-1 line 19 and later - The subsections of the existing draft section 5.1 Scoping are: Standing, Market effects, and Externalities. BCA text-books (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 the “all impacts” guidance is currently stated in the 2nd paragraph of the Scoping section (which could be re-used in the new section) but a later section (5.5.6 Changes in Other Environmental Contaminants) is relevant to

1 the issue as it discusses impacts which count equally in a BCA but which may be identified
2 separately for policy purposes. In any event, the guidance should make clear that there are no
3 second-class categories of benefits or costs. While Comprehensiveness is the ideal goal;
4 knowledge, data, budget, and scale of the regulation may all alter the level of detail included in
5 an RIA, but priority should be given to the most significant categories and such variation should
6 not affect the unbiasedness of the estimates.
7

- 8 2. In the discussion of some components of benefits or costs relative to ancillary benefits and
9 countervailing risks, it is best to use the terminology in OMB Circular A-4, "ancillary benefits,"
10 because it is more inclusive and because a further proliferation in terminology can lead to
11 confusion, especially in intra-agency, interagency and stakeholder discussions. Similarly,
12 "countervailing risks" may usefully be elaborated as a possible element of comprehensive cost
13 item (Tier 1).
14

15 Discussion: The term "ancillary benefits" is a broader umbrella than "co-benefits" because the
16 term co-benefit has come to connote the situation where reducing the target pollutant also yields
17 benefits by reducing non-targeted pollutants. Whether a pollutant is a "target" pollutant seems to
18 be related to a legal interpretation of the statutory objective of the rulemaking in question. The
19 objective of the rule and the statutory authority are (generally) set out in the preamble of the rule
20 (although it can also be discussed in the "Problem to be Solved" portion of the RIA. While "co-
21 benefits", as defined above, fall within the scope of ancillary benefits, the term ancillary benefits
22 has both a link to Circular A-4 and appears to encompass a much broader range of beneficial
23 regulatory impacts.
24

25 The term "countervailing risks", as defined in OMB Circular A-4, is one form of regulatory
26 "cost" (adverse consequence) that is typically not intended by the regulator and is expressed
27 through increased risk to public health, safety and/or the environment. A customary
28 treatment of compliance costs will rarely uncover countervailing risks; they require -- like
29 ancillary benefits -- some "out of the box" thinking. Here are two examples: 1) early versions of
30 the catalytic converter, installed due to EPA tailpipe emissions standards, led to unexpected
31 increases in sulfuric acid pollution that were later solved with catalyst refinement and low-sulfur
32 fuels and 2) lead-free gasoline is a public health success story but the replacement of lead with
33 alternative octane enhancers (e.g., MTBE, ethanol and the BTEX Complex) led to a complex
34 array of countervailing health and environmental risks that are still not fully addressed.
35

- 36 3. Change the default compliance rate of 100 percent to an evidence-based default with guidance to
37 inform changes to such a default. Make appropriate adjustments in related sections such as Text
38 Box 5-1 and section 5.5.4. (Tier 1)
39

40 Discussion: The Compliance section currently establishes a default compliance rate of 100%
41 which is, in fact, an upper bound. The compliance rate is almost certainly a random variable

1 with an expected value less than 100% (<https://www.epa.gov/aboutepa/about-office-enforcement-and-compliance-assurance-oeca>, Farrow and Viscusi, 2011, p. 11). Evidence based
2 guidance should be provided on a compliance default rate different than 100 percent as well as
3 characteristics that may guide the analyst to consider integrated regulatory design issues which
4 might affect the compliance rate. A sensitivity analysis might investigate 100% compliance.
5
6

- 7 4. The guidance should generally not support use of a single out year time period at full
8 implementation so that the topic of this section (Selection of Time Horizon, page 5-13) could be
9 retitled Time Horizon and Period of Analysis. (Tier 1)
10

11 Discussion: The section is primarily concerned with start and end dates, the time horizon.
12 However, this section is an appropriate place to discuss both the period and what might be called
13 eras of analysis. Regarding the period of analysis, the ideal consideration involves multiple
14 equally spaced time periods that capture the dynamics of the regulation and which can be
15 appropriately discounted. Alternatives may exist such as presenting estimates for two or more
16 years depending on the length of the implementation period and then a steady state beyond,
17 during which there may also be new entrants (or exits). This discussion could be referred to in
18 Chapter 6 on discounting and annualization. Discussion on this topic also occurred in regard to
19 Chapter 11 where it was noted that using a single year of implementation in place of an
20 annualized value was not correct.
21

- 22 5. Adding up condition, p. 5-11. Clarify the definition of the “adding up” condition. (Tier 2).
23

24 Discussion: The economics literature generally uses the adding-up condition to refer to the sum
25 of *incremental* impacts which means that each impact is conditioned on prior events, not the
26 unconditional sum (e.g. Desvouges et al., 2015 but also see Johnson, et al., 2017)
27

28 **2.5.2. Charge Question 2:**

29 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
30 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
31 *methods described?*
32

33 The chapter contains a mostly objective, balanced, and reasonable presentation of the literature. But
34 there are key improvements that the SAB recommends to EPA in order to promote objectivity, balance,
35 and reasonableness. The topic areas are the material related to: 1) Standing, 2) Externalities, and 3)
36 Technological change. Each is discussed in turn.

- 37 1. Standing (previously Section 5.1.1, now recommended 5.1.2 per Comprehensiveness
38 recommendation). Expand guidance related to the default standing of domestic impacts, the
39 potential role of the legal context in defining standing including impacts beyond national
40 borders, and the nature of a separate analysis when evaluating impacts beyond national borders.
41 (Tier 1).
42

1 Discussion: The draft treatment of standing basically refers to Circular A-4 with little
2 elaboration while stating that standing is a policy decision. First, it can be useful to clarify for
3 analysts what is expected when reporting “separately” beyond national borders. While this may
4 mean a sensitivity analysis for both benefits and costs that takes into account impacts beyond
5 national borders, there are a number of analytical issues regarding both international benefits and
6 costs which may add complexity. This complexity might include whether the benefits gained
7 from other countries should be counted if an international agreement exists and whether US
8 citizens express value for impacts beyond US citizens and residents. Further, the “policy”
9 decision regarding standing can be informed by legislation such as the existence of Senate
10 ratified treaties where a regulation may be one aspect of the treaty. It may be that the Preamble
11 or the “Problem to be Solved” portion of the RIA identifies an international component for the
12 analyst in which case supplemental analyses may be called for in particular cases. In any case,
13 per Circular A-4, analysis of international effects (while including domestic effects) should be
14 separate from the default analysis of domestic effects.
15

- 16 2. (see also 5-1.1 above). Externalities (existing section 5.1.3, recommended 5.1.4 per the
17 Comprehensiveness recommendation). Rebalance this section to supplement core examples and
18 guidance on Externalities (including a consistent and correct definition of externalities as
19 identified in Chapter 4). Tier 1.
20

21 Discussion: This section is unbalanced by implicitly invoking an incorrect definition of
22 externalities as pointed out in Chapter 4. Working with a consistent definition, provide basic
23 examples as to how “externalities” are a central part of what is to be comprehensively analyzed,
24 whether or not related to environmental contaminants. The imbalance can be seen numerically
25 and substantively in that currently, 3 lines refer to the basic inclusion of externalities while 22
26 lines have a convoluted discussion of primary or other regulatory purposes which has no clear or
27 well explained link to externalities and is outside the purview of the analysis where monetary
28 values are treated equally. If Appendix A is deleted as has been discussed, some of that
29 explanatory material may usefully be moved into this section. While the appendix material on
30 externalities may be most directly relevant, if the appendix is deleted then EPA may wish to
31 incorporate some of the appendix discussion of value in undistorted markets to set the stage for
32 externalities. Further, it may usefully be elaborated that at an optimum point, externalities may
33 be “internalized” into the market by the regulation and either no longer exist as externalities or
34 exist as residual real effects that are not economically desirable to reduce. However, partial
35 incorporation of externalities into a market may not be economically sufficient, an example
36 being recent positive net present value estimates for further reduction in particulate emissions, or
37 externalities may be over-incorporated in the market in which case the RIA if done correctly
38 would indicate negative net benefits.
39

- 40 3. Technological change (page 5-16). Suggest other factors that may importantly and specifically
41 influence technological change related to the proposal such as changes in health prevention or
42 mitigation or expanded virtual capability. (Tier 2)
43

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Discussion: Technological changes occur in areas other than production techniques or pollution control. The analyst may be encouraged to consider whether technological changes in other parts of society may affect the baseline and impacts of the regulation.

2.5.3. Charge Question 3:

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

The SAB recommends the following six topics for inclusion or more discussion covering: 1) Linked rules, 2) Bundled rules, 3) Models and Data, 4) Cost Savings, 5) Uncertainty, and 6) In-progress and Retrospective Analyses. Each topic is discussed in turn.

1. Linked Rules (page 5-9, section 5.3.1). Change title to “Bundled and Linked” Rules. Where rules are linked by law, regulation or guidance; the RIA should include significant effects from the normal operation of linked existing local, state, federal and international regulatory programs. (Tier 1)

Discussion: When significant federal, state, local and international rules are linked by law, regulation or guidance then the causal link is at least as clear as many economic behaviors that are associated with a regulation. As an example, regulations creating Maximum Contaminant Levels (MCL’s) for drinking water appear to be linked to CERCLA clean-up standards as the MCL’s appear to be the “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). Another example may be a GHG standard that results in such large or abrupt down-weighting of vehicles that compliance with NHTSA crash-protection standards is affected. Or, a federal/state regulatory program to stimulate deployment of plug-in electric vehicles may lead 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. Discussing how to handle these typically non-market linkages in a way consistent with taking all significant benefits and costs into account would help the analyst.

2. Bundled Rules. The guidance should establish that separate BCAs be developed for each of the major components bundled within the rule. (Tier 1)

Discussion: Bundled rulemakings could be done thru separate rules--i.e., linked rules, but are sometimes just reported as an aggregate. Bundling several requirements in a single BCA can disguise significant differences in the net benefits of the individual requirements. For example, a rule may establish emission limits for several different pollutants each with distinct control technologies and separate benefits. In this case, the RIA should present separate BCAs for each requirement. This is stated in Chapter 3 (p. 3-5 and 3-6) but can be elaborated upon here.

- 1 3. Models and Data. Improve integration of model selection and data issues (Text Box 5-2) and
2 explain standard situations where private or government data may not be available. (Tier 2).
3

4 Discussion: Text box 5-2 contains some of the most explicit guidance for the analyst and yet is
5 not discussed in the vaguely named Section 5.5.1 Behavioral Response. Text Box 5-2 and its 7
6 questions for the analyst about models only appears at the end of a paragraph referring the reader
7 to the box. A summary of the issues within the regular guidance text may help focus the reader
8 on the text box if that is the preferred method of presentation. This text-box seems to be the
9 main coverage of material that otherwise is delayed until Chapter 11.2 on presentation and data
10 quality issues which are important in their own right. Substantively, regarding model
11 transparency, the statement that models and “underlying data should be publicly available” to
12 improve understanding of the analysis and to allow for potential replication. However, there are
13 certain legal and other situations where the data may not be publicly available but still of great
14 use including personal health data, occupational injury data, disaggregated census data and so on
15 which could be used as non-exhaustive examples of exclusions. Further, the issue of assessing
16 model validity should be incorporated.
17

- 18 4. Cost Savings. Add wording that the modeled behavior may appear inconsistent due to the
19 functional forms chosen, perhaps not the actual behavior. (Tier 2)
20

21 Discussion: It has been shown in the literature that sometimes apparent “irrationality” can be the
22 result of an inflexible functional form chosen by the analyst. For example, Ketchum, Kuminoff,
23 and Powers (AER, 2016) show how presumed violations of self-interest are often just violations
24 of a utility function that an analyst had picked, whereas other utility functions could have
25 justified the observed choices.
26

- 27 5. Uncertainty (page 5-19, Section 5.6). Make this section and sub-sections an expanded and
28 better structured touchstone for more detailed treatment of issues related to Uncertainty in later
29 chapters. Topics to be expanded include: a) default uncertainty stance for decision-makers for
30 RIAs (expected value), b) uncertainty stance for economic factors such as consumers or firms
31 (reflected in their actual behavior to the extent possible), c) additional topics in estimation and
32 uncertainty including but not limited to guidance on establishing an “alternatives” (scenario?)
33 analysis (page 11-12), expanding guidance to comply with the A-4 requirements for very large
34 regulations (greater than \$1 billion per year), and issues related to improving uncertain
35 information such as pilot or monitoring programs (perhaps in provision of information section
36 along with concept of value of information), expert elicitation (perhaps in lay and expert
37 opinions) and real options (perhaps in quasi-option) as it may pertain to compliance and capital
38 decisions. (Tier 1)
39

40 Discussion: Uncertainty (and risk) is central to both conceptual structuring and estimation. The
41 analysis of risk preferences of decision-makers, consumers, and firms are important underlying

1 assumptions of analysis about which guidance could be provided. While the discussion of
2 empirical sensitivity analysis in the existing draft appears quite useful, the analyst may benefit
3 from additional guidance of standard practices or examples. Further, an Alternatives analysis
4 appears in Chapter 11 which would seem to be relevant in the Uncertainty section but it is not
5 discussed in this location. Finally, for major rules (annual effects >\$1 billion), Circular A-4
6 requires that RIAs present a formal quantitative uncertainty analysis. This section should
7 provide guidance on complying with this requirement. Real options, an established approach in
8 private investment but more of a frontier approach for public investment, (Dixit and Pindyck;
9 Traeger, 2014, Resource and Energy Economics) may be important to understand industry
10 compliance behavior and adaptation to technological change.

- 11
- 12 6. Create a core section on In-Progress and Retrospective analyses either in this chapter or in
13 another appropriate chapter. Such a section could discuss issues in regulatory design that
14 facilitate in-progress or retrospective analysis and the incorporation of new information into
15 revisions of the regulation. (Tier 2).

16

17 Discussion: Retrospective analysis currently appears in Chapters 2, 4, 8. The material in
18 Chapter 8 does not really focus clearly on costs but focuses on PACE data. While Chapter 5 is a
19 possible place to set out general analytical principles and approaches, such a section could be
20 placed in other chapters including an expanded treatment in Chapter 4. General issues might
21 include guidance to the analysts on an array of retrospective studies for example updating one or
22 a limited number of pieces of data from a prospective RIA, generating an entirely new analysis,
23 or addressing details such as whether one uses a discount rate based on realized data. Further,
24 guidance could be provided on the potential uses of such updated information.

25

26 **2.5.4. Charge Question 4:**

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

29

30 See response for Charge Question 2 on Externalities.

31

32 **2.5.5. Charge Question 5:**

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

34

35 Suggested items to add with possible definitions for consistency with chapters:

- 36
- 37 • Alternatives analysis: (to be provided by EPA)
 - 38 • Ancillary benefit or cost: an identifying term sometimes used for an included cost or benefit not
39 directly identified as an explicit stated statutory purpose of a proposed regulation.
- 40

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- Co-benefit or cost: an identifying term sometimes used for an included cost or benefit not directly identified as an explicit stated statutory purpose of a proposed regulation.
- Expected Value: the probabilistically weighted outcome that defines a statistical mean. In practice, this may be a data based or a subjective measure.
- Externality: see chapter 4 suggestions.

The following recommendations are noted for Chapter 5:

Tier 1- Key Revisions

- **Comprehensiveness.** Create a new section 5.1.1 titled Comprehensiveness to clearly emphasize that the dominant guidance is to include all significant and feasible costs and benefits in an unbiased manner. Supplemental guidance on topics such as ancillary (co) benefits and costs and countervailing risks are recommended to be included to the extent appropriate by deleting section 5.5.6 and including relevant material in this new section.
- **Ancillary Benefits and Countervailing Risks.** In the discussion of some components of benefits or costs, it is best to use the terminology in OMB Circular A-4, "ancillary benefits," because it is more inclusive and because a further proliferation in terminology can lead to confusion, especially in intra-agency, interagency and stakeholder discussions. Similarly, "countervailing risks" may usefully be elaborated as a possible element of comprehensive cost items.
- **Compliance (Section 5.5.4).** Change the default compliance rate of 100 percent to an evidence-based default with guidance to inform changes to such a default. Make appropriate adjustments in related sections such as Text Box 5-1 and section 5.5.4
- **Selection of Time Horizon (p 5-13).** The guidance should generally not support use of a single out year time period at full implementation so that the topic of this section could be retitled Time Horizon and Period of Analysis.
- **Standing (previously Section 5.1.1, now recommended 5.1.2).** Expand guidance related to the default standing of domestic impacts, the potential role of the legal context in defining standing including impacts beyond national borders, and the nature of a separate analysis when evaluating impacts beyond national borders.
- **Externalities (existing section 5.1.3, recommended 5.1.4).** Rebalance this section to supplement core examples and guidance on Externalities as introduced in Chapter 4 (along with a corrected definition of externalities).
- **Linked Rules (page 5-9, section 5.3.1).** Change title to "Bundled and Linked" Rules. Where rules are linked by law, regulation or guidance; the RIA should include significant effects from the normal operation of linked existing local, state, federal and international regulatory programs.

- Bundled Rules. The guidance should establish that separate BCAs be developed for each of the major components bundled within the rule.
- Uncertainty (page 5-19, Section 5.6). Make this section and sub-sections an expanded and better structured touchstone for more detailed treatment of issues related to Uncertainty in later chapters. Topics to be expanded include: a) default uncertainty stance for decision-makers for RIAs (expected value), b) uncertainty stance for economic factors such as consumers or firms (reflected in their actual behavior to the extent possible), c) additional topics in estimation and uncertainty including but not limited to guidance on establishing an “alternatives” (scenario?) analysis (page 11-12), expanding guidance to comply with the A-4 requirements for very large regulations (greater than \$1 billion per year), and issues related to improving uncertain information such as pilot or monitoring programs (perhaps in provision of information section along with concept of value of information), expert elicitation (perhaps in lay and expert opinions) and real options (perhaps in quasi-option) as it may pertain to compliance and capital decisions.

Tier 2 - Suggestions

- Adding up condition, p. 5-11. Clarify the definition of the “adding up” condition.
- Technological change (page 5-16). Suggest other factors that may importantly and specifically influence technological change related to the proposal such as changes in health prevention or mitigation or expanded virtual capability.
- Models and Data. Improve integration of model selection and data issues (Text Box 5-2) and explain standard situations where private or government data may not be available.
- Cost Savings. Add wording that the modeled behavior may appear inconsistent due to the functional forms chosen, perhaps not the actual behavior.
- Create a core section on In-Progress and Retrospective analyses either in this chapter or in another appropriate chapter. Such a section could discuss issues in regulatory design that facilitate in-progress or retrospective analysis and the incorporation of new information into revisions of the regulation.

Tier 3- Future Considerations

- The SAB has no recommendations for this tier.

2.6. Chapter 6: Discounting Future Benefits and Costs.

Chapter 6 presents guidance on how to employ discounting to address the variation in timing of the benefits and costs of a given regulation or policy in order to convert the streams of monetized impacts

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over time into today's terms. The chapter addresses the fundamental mechanics of calculating net present value and annualized value measures, the rationale for social discounting, the differences in the consumption rate of interest and the opportunity cost of capital, the estimation of the shadow cost of capital, considerations in intergenerational discounting, and the role of private discount rates in characterizing individual and firm behavior. The chapter closes with a series of recommendations and principles.

2.6.1. Charge Question 1:

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

The SAB concurs that the chapter is generally consistent with the theoretical and empirical peer-reviewed economics literature.

2.6.2. 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?

The SAB concurs that the chapter contains a reasonable presentation and interpretation of the peer-reviewed theoretical and empirical economics literature, as well as any analytic methods described.

2.6.3. Charge Question 3:

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

The SAB finds that some aspects of the chapter would benefit from clarification, additional discussion, or elaboration.

1. Choice of Discount Rates for Intergenerational Impacts:

The discount rate used for RIAs is one of the few parameters in regulatory analysis that OMB specifically prescribes through Circular A-4. How EPA's guidance on the discount rate squares with the OMB guidance merits some careful elaboration. This guidance should be a bit more general in its deference to Circular A-4. For example, it specifically references 3% and 7% multiple times. A future OMB may update the guidance, and these rates may change. If the OMB circular is updated, with revised discount rates, then this guidance should automatically adjust.

The SAB recommends the use of an upper end discount rate for intergenerational benefits and costs (p. 6-24). 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 (p 6-24) recommends restricting discounting for intergenerational analysis to the consumption rate of interest along with two additional approaches – a declining discount rate and a lower constant discount rate. The draft recommendation on p. 6-24 would preclude the use of a higher discount rate for intergenerational benefits and costs than the consumption rate of interest.

There are several reasons for using a discount rate greater than the consumption rate of interest. First, OMB Circular A-4 calls for the use of discount rates of 3 and 7 percent. The 7 percent discount rate is a proxy for the social opportunity cost for capital. One of the key arguments for using the

1 opportunity cost of capital is that everyone is left no better or worse off with this approach – it
2 ensures that there are not other uses of investment capital that would enable everyone to be even
3 better off (thereby satisfying the objective that a Pareto improvement is possible) (e.g., refer to
4 Viscusi et al. 2019 and Burgess 2018).

5
6 The draft guidelines express in other chapters the concern that environmental regulations could
7 operate to reduce capital accumulation, reducing economic output and welfare. For example, refer to
8 pages 8-12 5-16. This would highlight the importance of considering the opportunity cost of capital
9 in selecting discount rates.

10
11 In a similar vein, Viscusi et al. (2019) argue that if BCA uses a lower discount rate for effects for
12 future generations and in fact both generations have the same higher discount rate, then, "subsequent
13 policy distortions will lead to policy outcomes that are not consistent with the within-generation
14 intertemporal preferences that future generations would have with respect to impacts on their
15 generation" (p. 313). For similar lines of thought, refer to Birdsall and Steer (1993) and Wildavsky
16 (1988), among others in the literature.

17
18 Note that the social opportunity cost of capital has been remarkably stable over the last
19 century. OMB has calculated a long-term pre-tax opportunity cost of capital of 7 percent. The draft
20 guidelines note that: "[s]imilar to the approach taken by OMB (2003), the CEA (2017) estimated real
21 rates of return to capital to be around 7 percent based on National Accounts data" (footnote 156, p.
22 6-16). CEA noted that this approach may be subject to measurement error leading to an
23 overestimate.

24
25 Second, extending the Ramsey framework in the intergenerational context to account for potential
26 catastrophic impacts or for the potential that the benefits of the regulation would be correlated with
27 market returns would result in a higher discount rate relative to the risk-free measure of the
28 consumption rate of interest estimated in the Ramsey framework (Stern 2008; Interagency Working
29 Group on the Social Cost of Carbon 2010; Freeman et al. 2018). This is in a sense a "precautionary"
30 argument. It has the effect of adding to the Ramsey framework an adjustment for project (or policy)
31 risk – effectively, a risk premium (Freeman et al. 2018). The rationale for adding a risk premium: (1)
32 to reflect the fact that the returns from climate change projects are positively correlated with the
33 macroeconomy (IWGSCC 2010) or (2) to reflect a non-trivial threat of a major catastrophe, such as
34 depression, war, or a pandemic (Stern 2008).

35
36 To provide policy-world context, note that the Interagency Working Group on the Social Cost of
37 Carbon (2010) produced SCC estimates for multiple discount rates, including a rate of 5 percent. In
38 its justification of this rate, the IWGSCC noted that "[t]he upper value of 5 percent is included to
39 represent the possibility that climate damages are positively correlated with market returns.
40 Additionally, this discount rate may be justified by the high interest rates that many consumers use
41 to smooth consumption across periods" (p. 23). Stern (2008) accounted for extinction risk by
42 increasing the discount rate by 0.1% per year in his assessment of the economics of climate change.
43 The French Government has adopted a discounting approach that explicitly accounts for such a risk
44 premium (Freeman et al. 2018).

45
46 The intergenerational context may merit consideration of an alternative discount rate, as described in
47 the guidelines. In this context, SAB recommends that EPA employ the OMB prescribed rates for the

1 consumption rate of discount and the opportunity cost of capital. Alternative rates for analysis, as
2 described on p. 6-24, could be used in addition to these OMB-prescribed rates. In these cases, EPA
3 should be clear in explaining its rationale for adopting another rate for such analysis.
4

5 2. Employing a Common Discount Rate for Impacts Realized at a Common Point in Time

6 The SAB concurs with the first principle identified at the close of the recommendations section:
7 "Regardless of the approach or rate selected, the same discount rate should be applied to all benefits
8 and costs that occur in the same year, independent of whether the policy has intra- or
9 intergenerational consequences, to ensure consistency in the analysis" (p. 6-24). This is important
10 given the frequent past practice in RIAs of employing multiple discount rates within a given analysis
11 for impacts occurring in a common year.
12

13 It's not clear why this is identified as a "principle" that "should be kept in mind" (p. 6-24) and
14 separate from the recommendations presented starting on p. 6-23. This principle should be given the
15 same weight and emphasis as the preceding recommendations. It will also help address the potential
16 confusion associated with considering alternative discount rates (as discussed on the bottom of p. 6-
17 23 and in our preceding comment) by making clear that regardless of the choice of discount rate, the
18 benefits and costs occurring in any given year will be given the same weight in calculating the
19 present value.
20

21 3. Full-Year Implementation "Snapshot" Analysis vs. Net Present Value

22 The draft guidance correctly emphasizes the importance of estimating the present values of the
23 streams of benefits and costs in order to evaluate a given regulation or policy. In most of EPA's
24 practice in evaluating regulations, however, the agency presents annual benefits based on a
25 representative year after full implementation and annualized costs constructed from the stream of
26 costs over some timeframe (this is not always transparent in the analysis). In our recent review of
27 about 40 Clean Air Act RIAs for major rules issued since 1997, more than 80% presented monetized
28 benefits and costs in this manner (Aldy et al. 2020). This is an apples and oranges comparison.
29 Indeed, for most benefits categories in these RIAs, discounting is moot for the benefits analysis – a
30 future year's benefits are presented for that year without any consideration of how far that year is in
31 the future (in some cases, the full implementation year is more than two decades after the rule
32 promulgation date in the RIA). The notable exceptions are for fine PM premature mortality, which
33 EPA has modeled in some RIAs with a five-year latency and is thus discounted back to that future
34 year (but not to the year of promulgation), and the social cost of carbon.
35

36 Given the varying time horizons across EPA regulations and policies, there is value to the various
37 audiences of EPA economic analyses in presenting both the present value of benefits and costs and
38 annualized measures of benefits and costs. The guidelines are very clear in the second bullet of 6.5
39 that such comparisons of representative year benefits to annualized costs are not adequate proxies for
40 a comparison of the present values of benefits and costs. This explicit description of doing so as
41 inappropriate should be highlighted earlier in the chapter as well, such as when the annualization
42 calculations are introduced.
43

44 4. Selecting Time Horizons

45 The time periods chosen for the analysis matter for discounting for several reasons. First, they affect
46 the annualization of costs, which is common in EPA RIAs. Second, they could influence the
47 discount rate if one opts to account for discount rate uncertainty by employing a certainty equivalent

1 discount rate for long-term policies over which discount rates may be plausibly considered uncertain.
2 As Box 6-5 clearly illustrates, the certainty equivalent discount rate can decline considerably as one
3 extends the time horizon of analysis. The time period assumption in such analysis should be made
4 based on an understanding of the economic and regulatory context. In addition to the discussion of
5 factors that may inform the choice of time horizon in section 6-1, the likely lifetime of the rule
6 should be accounted for. For example, if a rule will be periodically reviewed and updated (e.g., a
7 NAAQS, or tailpipe standard, or NSPS under the Clean Air Act), then it may not be appropriate to
8 use a long time horizon. In such cases, a long time horizon is likely to be overlapped by a future
9 rule-making updating the current rule under consideration. This illustrates again the importance of
10 selecting baselines for analysis, as discussed in other chapters of the guidelines. To enhance the
11 clarity of a given analysis, the reader would benefit from a transparent discussion of the choice of
12 time horizon for the analysis, including justification for the time horizon selected and discussion of
13 the robustness of the findings to this decision.

14
15 5. Clarify the Value to the Reader of the Text Boxes

16 Text Box 6.1: What is the objective of a text box in the guidelines? Does this hypothetical policy –
17 with benefits 30 years in the future – have a real-world analog? GHG regulations? Title VI
18 regulations under the Clean Air Act? It would be better to illustrate practice with real-world policies
19 to make the calculations more salient for the reader. It is also important to be clear about the take-
20 away for the box. What is actionable from the material presented in the box? Why does it need
21 separate treatment in the chapter? The answers to these questions are not obvious to me here or in
22 the boxes in chapter 7 on benefits.

23
24 Text Box 6.2: Why use a hypothetical market rate of return? Why not use estimated rates in practice,
25 for example, you could refer to Figure 5 in this 2017 CEA report on discounting:
26 [https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_b](https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf)
27 [rief.pdf](https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf). Again, using real-world examples instead of hypotheticals would be more effective. It may
28 also help make it more clearer to the reader what the take-away point is for this box.

29
30 Text Box 6.3: Is EPA recommending an application of the Ramsey framework? It's not clear what
31 the take-away is here.

32
33 Text Box 6.6: The mathematical equation in this text box needs to be corrected. This text box could
34 also use an additional paragraph that explicitly addresses how new information and the updating of
35 declining discount rates over time could be incorporated in a DDR schedule in a manner that is not
36 time inconsistent (see Arrow et al. 2014 pp. 159-160).

37
38 6. Clarify Base Year Dollars

39 The chapter references inflation briefly in footnote 139 on page 6-2. The SAB recommends that EPA
40 explicitly call attention to the importance of employing a common base year dollar for presenting all
41 information in an economic analysis. The agency should clearly communicate this base year. In
42 addition, the agency should clearly communicate how measures were converted into a common base
43 year. For example, suppose that an analysis of an air quality regulation presents monetized costs
44 denominated in 2020 dollars. The agency should deflate the value of statistical life, which in this
45 guidance is denominated in 2006 dollars (Table B-1 on page B-2), such that it is also in 2020 dollars
46 and identify the selected deflator. In the context of retrospective analysis, EPA should also convert
47 various measures into a common base year and should clearly identify the selected deflator.

1
2 **2.6.4. Charge Question 4:**

3 *Are there any inconsistencies in the way an issue or topic is discussed either within or across*
4 *chapters?*
5

6 The SAB recommends that EPA explicitly state the importance of employing common underlying
7 assumptions related to long-term economic growth. This has implications for the discount rate in those
8 cases in which EPA employs a discount rate based on long-term per capita consumption growth (e.g., in
9 a Ramsey-style framework). It likewise has implications for estimating the social cost of carbon (chapter
10 7), for adjusting the value of statistical life over time with an income elasticity (chapter 7) and for
11 estimating the economic costs of a regulation, which may depend on how economic growth affects the
12 market(s) in which regulated firms operate (chapter 8).
13

14 **2.6.5. Charge Question 5:**

15 *Are the definitions provided in the glossary accurate? Please identify any in need of revision.*
16

17 In the Glossary, consumption rate of interest is defined as: "Consumption rate of interest is the rate at
18 which individuals are willing to exchange consumption over time. Simplifying assumptions, such as the
19 absence of taxes on investment returns, imply that the consumption rate of interest equals the market
20 interest rate, which also equals the rate of return on private sector investments." The second sentence is
21 unnecessary and draws attention to a hypothetical that does not occur in real-world practice (while also
22 abstracting from other factors that contribute to the divergence between the rate of return on investment
23 and the consumption rate of interest). The SAB recommends defining the consumption rate of interest
24 based on the first sentence of the draft guidelines definition such that the glossary would read:
25 "Consumption rate of interest is the rate at which individuals are willing to exchange consumption over
26 time."
27

28 This identical definition should also be used on p. 6-9 where the guidelines define the consumption rate
29 of interest and other discount-related concepts.
30

31 ***The following recommendations are noted for Chapter 6:***

32
33 Tier 1- Key Revisions

- 34 • The SAB recommends that EPA employ the consumption rate of interest and opportunity cost of
35 capital discount rates consistent with OMB guidance, which is currently 3% and 7%, in its
36 economic analyses. In cases in which EPA presents additional analyses based on alternative
37 rates, especially in intergenerational contexts, the SAB recommends that EPA clearly explain the
38 rationale for the alternative rates.
39
- 40 • The SAB recommends that EPA employ a common discount rate for all benefits and costs that
41 accrue in a given year. This will require elevating a "principle" to a "recommendation" in section
42 6.5.
43
- 44 • The SAB recommends that EPA emphasize that full-implementation year analysis in lieu of a
45 present value analysis or an annualized value analysis fails to comply with economic guidelines
46 and standard practice for benefit-cost analysis.

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- The SAB recommends that EPA highlight the importance of communicating the time horizon for the analysis, especially in the context of communicating the annualization of benefits and/or costs.
- The SAB recommends that EPA explicitly note the importance of employing common assumptions that may influence the discount rate, measures of benefits, and measures of costs within a given analysis.
- The SAB recommends using a common, streamlined definition of the consumption rate of interest in the glossary and the chapter.

Tier 2 - Suggestions

- The SAB suggests that EPA could revise the chapter's text boxes to make it clear to the audience what the take-away messages are from each of the text boxes.
- The SAB suggests that EPA clarify the importance of employing a common base year dollar in its analyses.

Tier 3- Future Considerations

- The EPA may consider developing a declining discount rate schedule, which could help address the time horizon problem, for intergenerational policy contexts. In doing so, the agency may consider developing the criteria for periodic updating of the schedule and present the necessary information such that independent analysts could understand and replicate the agency's work. This effort could account for the suggestions in Arrow et al. (2014) and EPA may benefit from convening a SAB panel to review this work.
- The EPA should consider identifying a published RIA to designate as a template for good practice in undertaking discounting (and, beyond the scope of this chapter, for other dimensions of economic analysis) as a resource for EPA staff and contractors.

2.7. Chapter 7: Analyzing Benefits.

The chapter covers a large amount of ground in a well-organized and thoughtful way. The EPA is to be commended on the quality of the work.

2.7.1. Charge Question 1:

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

The SAB finds the statements and analytic recommendations made in the chapter are, with a few exceptions, consistent with the theoretical and empirical peer-reviewed economics literature. These exceptions are discussed below.

General Valuation Theory and Methods

1. Clarification on page 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.

2. 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.
3. 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 has appeared in footnotes (e.g. footnote 182 on page 7-5).
4. Additional method that should 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 *and some associated private cost*, 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.
5. Point deserving additional emphasis, 7-23, line 12: suitability of prices for welfare analysis is *directly dependent on structure of market*; if markets are not sufficiently competitive, it takes additional research/calculations to establish opportunity costs of inputs or products.

Human Health: Value of Statistical Life

1. 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.
2. The primary VSL reflects a dated survey of the literature. Table B1 lists the 26 studies that serve as the basis for the agency’s primary VSL of \$7.4 billion (2006\$). The average publication date of these studies is 1985 and the most recent paper in this table was published in 1991. Not a single one of the labor market hedonic papers employs measures of occupational fatality risk based on the BLS Census of Fatal Occupational Injuries, which BLS initiated in 1992. As noted in Viscusi (2004), occupational fatality risk data that pre-date the CFOI suffer from numerous deficiencies that undermine statistical estimation. The contingent valuation studies also predate significant improvements in CV methods. Moreover, 5 of the 26 studies address risk-income trade-offs in non-U.S. contexts, which further raises questions about their applicability for U.S. policy and regulatory analysis.

In 2007, the SAB was asked to address the potential role of meta-analysis in constructing a VSL estimate for use by the agency. Here is an excerpt from the SAB’s response:

1 *“In answer to the meta-analysis charge questions, the SAB does not believe that*
2 *metaregression—a particular form of meta-analysis—is an appropriate way to combine*
3 *VSL estimates for use in policy analyses. The SAB does, however, agree that meta-*
4 *regression is a useful statistical technique for identifying various aspects of study design*
5 *or population characteristics that are associated with differences in VSL estimates.*
6 *Once important sample characteristics, model and estimation factors affecting the VSL*
7 *have been identified, the Agency must determine a set of criteria for what constitutes a*
8 *set of acceptable empirical studies of the VSL. The SAB urges the Agency to establish*
9 *such criteria. The Agency must also determine which studies are appropriate for*
10 *estimating the VSL in a specific policy context, depending on the nature of the risk*
11 *addressed by a policy and the population affected. Once these criteria have been*
12 *determined, and an acceptable sample of VSL estimates from the literature has been*
13 *formed, appropriate statistical techniques can be used to combine these estimates” (SAB*
14 *2007).*

15
16 It’s difficult to imagine any of these 26 studies satisfying the criteria that the agency would put
17 forward for “what constitutes a set of acceptable empirical studies.” Not only would it be unlikely
18 that they would satisfy standards on current, acceptable empirical methods grounds, five of them
19 seem unlikely to be acceptable on the grounds that they estimate VSLs for a non-U.S. population
20 (two UK, one Canada, one Australia, and one Japan study). There have been more recent EPA SAB
21 efforts focused on the value of statistical life (e.g., SAB 2017).

22 The discussion of the VSL should reflect some of the more recent literature and highlight the
23 importance of updating VSLs over time. Indeed, EPA does this as a regular practice already with
24 adjustments for growth in per capita incomes and it is a topic addressed in SAB (2017). While EPA
25 may not be in a position now to change the primary VSL for economic analysis, it should avoid
26 giving the potentially misleading impression that this literature has been stagnant since 1991. Some
27 of the more recent literature includes publications in the subsequent comment on Heterogeneity in
28 VSLs as well as the following: Viscusi (2015, 2018a, 2018b); Viscusi and Gentry (2015); Gentry
29 and Viscusi (2016); Kniesner and Viscusi (2019). In the context of the VSL income elasticity,
30 several recent publications include: Viscusi and Masterman (2017) and Masterman and Viscusi
31 (2018).

- 32
33 3. Heterogeneity in VSLs. The discussion of the Heterogeneity in Risk and Population Characteristics
34 on p. 7-13 (and related text in Appendix B) requires revision. Lines 36 and 37 state: “The empirical
35 and theoretical literature on the effect of many of these characteristics or willingness to pay is
36 incomplete or ambiguous.” This statement and the following discussion of the literature as it pertains
37 to how VSLs vary over the life cycle do not do justice to the literature.

38
39 First, this should be framed in terms of how willingness to pay for reductions in mortality risk vary
40 over the life cycle. It is not simply as a function of life expectancy, or an issue for the elderly, or a
41 “senior discount” as once described in the context of the Clear Skies Initiative.

42
43 Second, the theoretical literature – which includes simulations based on calibrated models – is not
44 ambiguous about how the value of reducing mortality risk varies over the life cycle. Shepard and
45 Zeckhauser (1984) does an excellent job of illustrating two extreme cases that illustrates that the
46 value of reducing mortality risk may decline over the life cycle or may take an inverted-U shape
47 over the life cycle. Most of the rest of what is an extensive literature falls within these two cases and

1 illustrate how the life-cycle pattern of consumption coupled with life expectancy influences the life-
2 cycle pattern of willingness to pay to reduce mortality risk. The bottom line is that at some point in
3 the life cycle, WTP to reduce mortality risk begins to decline for a given population of individuals as
4 they move from middle age to later ages in the life cycle. Let us note some of these papers: Arthur
5 1981, Cordoba and Ripoli 2017, Hall and Jones 2007, Johansson 2002, Murphy and Topel 2006,
6 Rosen 1988, Shepard and Zeckhauser 1984.

7
8 Third, the discussion of the revealed preference and stated preference literatures is incomplete and
9 misleading. I recommend citing Aldy and Viscusi (2008) in addition to the Viscusi and Aldy
10 (2007a). The former is the original research published in the *Review of Economics and Statistics*, and
11 the latter is more of a survey paper in the *Review of Environmental Economics and Policy*. The 2008
12 paper presents VSL estimates over most of the adult life cycle (the age 18-62 segment of the life
13 cycle), while the empirical illustration in the 2007a paper is focused on a single EPA policy proposal
14 in which the epidemiological outputs were for only two age groups. The claim that “older population
15 have higher WTP” does not fully represent the findings in the Kniesner et al. 2006 paper. They find
16 an inverted-U over the life cycle (working years’ segment of life cycle) – older populations have
17 higher WTP than young adults, but lower WTP than middle-aged adults. Appendix B cites Viscusi
18 and Aldy (2003) in footnote 513 and note that in this paper’s review of the literature, only 5 of 8
19 papers that included age-risk interactions in labor market hedonic studies found negative,
20 statistically significant coefficient estimates on the interaction. The three insignificant findings are
21 for an Indian sample (used in two papers) and a Canadian sample in the other. The revealed
22 preference literature discussion of life-cycle heterogeneity could also include more recent references,
23 such as Evans and Schaur 2010, O’Brien 2018, and Aldy 2019.

24
25 The discussion of the stated preference literature references the Alberini et al (2004) paper. This
26 section should also reference Krupnick (2007), which provides an excellent review of more than two
27 dozen CV studies that evaluate how VSLs vary with age. The evidence is much more mixed than
28 what is implied by citing only the Alberini et al paper. It would also be worth exploring the more
29 recent CV literature, including Robinson and Hammitt (2016). In the context of VSLs for early life-
30 cycle risks (i.e., those applied to children), refer to Robinson et al. (2019).

31
32 Several of the papers cited above support for the claim on lines 28-29 of p. 7-13 that a constant
33 VSLY is not consistent with the literature. E.g., Hall and Jones (2007) in the theoretical/simulation
34 literature and Aldy and Viscusi (2008) in the revealed preference literature.

35 36 *Recreation Demand/ Travel Cost Models*

- 37 1. Point of clarification, 7-25, line 18; 7-26, line 25: The literature typically describes 3 or 4 types of
38 rec demand models that utilize travel distance and implicit costs as a source of preference
39 identification: 1) single site demand models, 2) system of demand equations, 3) site choice models,
40 and possibly (4) repeated site choice models; Hellerstein and Mendelsohn (*AJAE* 1993) have a nice
41 paper that explores the theoretical connection between site choice (extensive margin) and quantity of
42 trips (intensive margin).
- 43
44 2. Point of clarification, 7-25, line 32: opportunity cost is often assumed 1/3 of the “household wage
45 rate”, which is usually backed out of income assuming a single primary wage earner (e.g. working
46 2000 hours a year with 2 weeks’ vacation). There is potential for improvements here, inquiring about

- 1 employment status of all adults & contributions to household income; analyst would still need to
2 know which household members travel.
3
- 4 3. Correction, 7-26, line 18: time onsite is not usually included in most estimates of travel cost; it's
5 only travel time. Onsite time and expenditures are separate decisions that have received little
6 attention in the literature (Bell and Leeworthy 1990; McConnell 1992; Larson 1993; Berman and
7 Kim 1999; Landry and McConnell 2007). There is also a recent working paper by English, et al.
8 (2018).
9
- 10 4. Suggestion, 7-26: Chapter should address issue of operating vs. full monetary cost of travel; AAA
11 reports both; most researchers consider operating costs as the more relevant measure, but if a
12 household maintains a car primarily for recreation trips (e.g. someone that lives in a big city, mostly
13 utilized public transportation day-to-day, but maintains a recreational vehicle for camping trips), full
14 monetary costs could be more accurate.
15
- 16 5. Suggestion, clarification, 7-26, line 30: the role of substitute prices in demand modeling is
17 complicated; if recreation demand trips to various sites are separable in the utility function (from
18 other consumption goods), their demands represent a system of demand equations with theoretical
19 cross-equation linkages. That system must be 1) homogeneous of degree zero in travel costs and
20 income (or recreation budget); 2) abide the Cournot and Engel aggregations; and 3) conform to the
21 Slutsky Substitution Matrix. In regard to the latter, restrictions on substitute price parameters are
22 very strict (most straightforward interpretation for commonly used semi-log model is that the
23 substitute coefficient must equal zero) (LaFrance 1990; von Haefen 2002; Landry, et al. 2016). This
24 result applies whether are not you estimate one or all equations in the separable part of the utility
25 function. Alternatively, you can assume other recreation trips as separable in utility from the site
26 your analyzing. In this case, Slutsky imposes no restrictions on the substitute price parameter (but
27 this is less compelling from a theoretical perspective). Unfortunately, this is barely simmering in the
28 peer-reviewed literature, but could be a focus of future research.
29
- 30 6. Point of clarification, 7-29, line 7: Parsons and Wilson (1997) suggest including a multi-purpose
31 dummy and use the parameter estimate to negate multiple trips during welfare analysis. Empirical
32 literature has followed this recommendation in many instances.
33
- 34 7. Point of clarification, 7-29, line 9: Many papers consider single and multi-day trips as separate goods
35 and analyze them in separate models. There has been limited treatment of onsite time (Bell and
36 Leeworthy 1990; McConnell 1992; Larson 1993; Berman and Kim 1999; Landry and McConnell
37 2007 English, et al. 2018). Building on the work of Bockstael and McConnell (various papers),
38 McConnell (1992) and Landry and McConnell (2007) argue that as long as the system of
39 endogenous variables (e.g. trips, onsite time, onsite expenditures) is optimized, welfare analysis can
40 focus on one equation (e.g. trips). If single-day trips are generally seen as a distinct good from
41 multiple-day trips, it makes sense to analyze them separately.
42

43 *Hedonic Price Analysis*

44 Suggestion, 7-32: Spatial regressions have mostly fallen out of favor in environmental economics and
45 typically are just used for robustness checks. (see, e.g., Mostly Useless Spatial Econometrics – Gibbons
46 and Overman 2012)
47

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1 *Averting Behavior*

2 Point of clarification, 7-33: significant complication in many averting behavior analyses is that output
3 level (e.g. health) is unobserved and may change when aversion is engaged. This complicates
4 calculation of WTP (Compensating Variation).

5
6 *Cost of Illness*

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

14
15 *Stated Preference Methods*

- 16 1. Note, 7-36: NOAA report generally recognized as outdated.
17
18 2. Note, 7-36: Good paper on validity & suitability of SP in response to JEP papers: Haab, et al. (2013).
19
20 3. Point of clarification, 7-43: an additional *ex ante* bias correction that has received lots of attention
21 and seen some positive results is known as “consequentialism” - highlighting consequences to
22 survey respondents in such a way that the respondents may perceive that their choices could be
23 binding (in some probabilistic sense) (Cummings and Taylor 1998; Carson and Groves 2007; Landry
24 and List 2007; Vossler and Evans 2009; Herriges et al. 2010; Vossler and Watson 2013).
25
26 4. Point of clarification, 7-43: experiments have (to varying degrees) successfully simulated public
27 good provision in various ways (Carson et al. 2001; List et al. 2004; Landry and List 2007; Vossler
28 and Evans 2009; Vossler et al. 2012).

29
30 **2.7.2. Charge Question 2:**

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

34
35 The SAB concurs that the chapter contains a reasonable presentation and interpretation of the peer-
36 reviewed theoretical and empirical economics literature, as well as any analytic methods described.
37

38 **2.7.3. Charge Question 3:**

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

40
41 The SAB finds that some aspects of the chapter could benefit from clarification, additional discussion,
42 or elaboration. These aspects are discussed below.

- 43
44 1. The chapter opens on p. 7-1 with text that could give the impression that only environmental benefits
45 merit consideration. Why limit benefits analysis to the “social benefits resulting from environmental
46 changes”? If “environmental changes” means “environmental regulations” or “environmental
47 policy,” then that would be fine. Rules and policies can influence social benefits beyond

1 environmental and/or public health dimensions. In particular, a notable omission in this chapter in
2 general and in Table 7-1 in particular are the non-environmental impacts associated with improving
3 fuel economy, such as changes in consumer fuel expenditures, energy security, congestion, and
4 traffic accidents that have been quantified and monetized in RIAs for joint EPA/NHTSA rules
5 addressing fuel efficiency and tailpipe carbon dioxide emissions. There are important considerations
6 in estimating and monetizing several of these endpoints that could be usefully addressed in this
7 chapter.
8

- 9 2. Chapter 7 does not directly discuss the assumptions of rationality that underlie most valuation
10 methods. It would be beneficial to discuss these assumptions and provide examples of situations
11 where violation of these assumptions might affect estimates. For example, estimates from hedonic
12 models will only capture health effects if consumers are fully informed about health endpoints.
13
- 14 3. Chapter 8 contains fairly extensive discussion of computable general equilibrium (CGE) models and
15 their use in estimating costs. Chapter 7 would benefit from a short parallel discussion of CGE
16 models and their use in estimating benefit.
17
18
- 19 4. Chapter 7 would benefit from explicitly encouraging analysts to consider, whenever possible, the
20 normal operation of existing local, state, federal and international regulatory programs. For
21 example, the general practice in RIAs is not to count the reduction in engine-out emissions as an
22 ancillary health/environmental benefit because post-combustion exhaust treatment systems are used
23 to meet the applicable gram/mile EPA/CARB standards. The engine supplier/vehicle manufacturer
24 does not want to spend any more money on emissions control than is required by EPA/CARB
25 emissions-control standards. If engine-out emissions are reduced, the manufacturer can install a
26 somewhat smaller catalyst or make an alternative cost-saving adjustment to the exhaust treatment
27 system. The proper analytic approach is probably to count those compliance cost savings rather than
28 assume a public health or environmental benefit from the reduced engine-out emissions.
29
- 30 5. The discussions of uncertainty and of breakeven and bounding in Chapter 7 overlap with Chapters 5
31 and 6. It would be useful to consolidate the discussion in those chapters and include a pointer to that
32 discussion in Chapter 7.
33
- 34 6. The main takeaways from a number of the textboxes are not clear. Part of the issue is that the goal
35 of the textboxes is unclear. The goal may be to provide readers who are less familiar with a topic
36 some background and direct guidance. If direct guidance is part of the goal, it seems to often be
37 missing. In addition to clarifying the main takeaways, it may be helpful to bold/italicize or otherwise
38 highlight the takeaways.
39
- 40 a. With respect to Text Box 7-1 (page 7-4), for example, the takeaway is unclear. One possibility
41 given the evolving nature of IAM and greenhouse gases, might be for policymakers to consult
42 with NCEE on the current best practice or current best estimates of GHG. Instead the last
43 paragraph leaves the reader guessing as to what they should do:
44 *“IAMs used to estimate the SC-CO₂ and other GHGs are necessarily highly simplified*
45 *and limited by the current state of the rapidly expanding climate economics literature. In*
46 *January 2017, The National Academies of Sciences, Engineering, and Medicine issued a*
47 *report recommending specific criteria for future updates to the SC-CO₂ estimates, a*

1 *modeling framework, and both near-term updates and longer-term research needs*
2 *pertaining to various components of the estimation process.**

3 Notes: Since the framework used to estimate the social cost of methane and nitrous oxide
4 is the same as that used for SC-CO₂, the Academies' recommendations on how to update
5 many of the underlying modeling assumptions also apply to the estimates of the social
6 cost of non-CO₂ GHGs."
7

- 8 b. Although Text Box 7-2 (page 7-8) has a substantial discussion of economics and risk assessment,
9 the main points are less than clear. The main point *might* be that coordination is necessary
10 between economists and risk assessors. More specifically, the main point *might* be that it is
11 particularly important to “to produce expected or central estimates of risk, rather than bounding
12 estimates as in safety assessments. At a minimum, any expected bias in the risk estimates should
13 be clearly described.” It may be that these are not the main points. In any case, the main points
14 should be clarified.
15
- 16 c. Text Box 7-3 (page 7-16), which discusses non-willingness to pay measures, misses an
17 opportunity for clearer guidance in the box or in the text. It says “Measures of economic value
18 that do not measure WTP and cannot be related to changes in utility are not valid. Others should
19 be used only in a limited set of circumstances.” It would be helpful to offer more detail on the
20 list of circumstances or at least more clearly point the reader to such a description. For example,
21 the COI discussion in the textbox ends with “Section 7.3.1.5 provides more details on the COI
22 method and its use in benefits analysis.” If the limited circumstances are discussed here, then the
23 text should say this.
- 24 7. Point of clarification, 7-7, Step 3: *Estimate the monetary value of endpoints*. Representative agent
25 approaches are often used, but models can incorporate heterogeneity in some cases. For example, it
26 is sometimes possible to incorporate underlying subject heterogeneity (using finite mixture or
27 random parameter approaches) in the valuation analysis. In such cases, it may be possible to estimate
28 a range of values for different kinds of households and scale up the estimates using inference on
29 population proportions from the sample that is used to conduct benefit estimation.
30
- 31 8. Additional details possibly needed, 7-10, line 9: A short summary of standard assumptions
32 underlying the existence of preference relations that give rise to utility structures could be useful
33 before turning to money-metric utility measures.
34
- 35 9. Further details needed, 7-11: WTA and WTP also make implicit assumptions about property rights;
36 if utilizing initial utility as reference levels, the welfare implicitly assumes property rights exist in
37 the initial state; alternatively, if subsequent utility is reference, property right exists to this state.
38 These details can be important in some applications.
39
- 40 10. Further details, 7-11: critical appraisal of divergence of WTP and WTA (at least a citation or two);
41 perhaps some guidance on when to use one or the other.
42
- 43 11. More details, 7-25, line 1: complications arising from the role of taxation in benefit assessment;
44 discussion unclear
45

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2.7.4. Charge Question 4:

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

The EPA treatment of topics is, with a few exceptions, consistent. These exceptions are discussed below.

1. The treatment of the opportunity cost of nonwork time appears to be inconsistent in places. For examples it differs in Chapter 7 (p. 7-25, 7-26, 7-36) and in Chapter 8 (p. 8-16). Further, the discussion on page 7-25 is confusing given the Department of Transportation’s approach and the Department of Health and Human Services approach (not mentioned). Further, the discussion on page 7-26 seems to permit the inclusion or exclusion of children’s time. In contrast, the Department of Health and Human Services applies its post-tax wage figure to children’s time costs as well as seniors and other adults who may not be employed. It would be useful to more clearly explain why the values differ from other agencies and why the valuations appear to vary within the document.
2. The SAB recommends explicit, consistent text throughout the report on the importance of accounting for all benefits associated with a regulation or policy, regardless of whether any given benefit was the intended target of the regulation. The draft guidelines are much too vague about the inclusion of ancillary impacts – co-benefits and co-costs – in economic analysis. Chapter 7 on benefits does not address in any way co-benefits or ancillary benefits. Indeed, these terms only appear in a brief footnote (#129) on p. 5-18, and even in this case, the characterization is unnecessarily constrained. In the footnote, co-benefits are defined as “changes in environmental contaminants other than those related to the statutory objective of the regulation,” but this excludes co-benefits unrelated to environmental contaminants. For example, RIAs for rules targeting CO2 emissions in mobile sources include monetized benefits associated with fuel savings, energy security, traffic accidents, congestion, and noise (note that some of these measures have negative signs, which some analysts may label as disbenefits or co-costs).

Consider the contrast between the 2014 updated version of the Economic Guidelines and this draft:
2014: “An economic analysis of regulatory or policy options should present all identifiable costs and benefits that are incremental to the regulation or policy under consideration. These should include directly intended effects and associated costs, as well as ancillary (or co-) benefits and costs” (EPA 2014, p. 11-2).

This Draft: “An economic analysis of regulatory or policy options should present all identifiable costs and benefits that are incremental to the regulation or policy under consideration” (p. 11-1).

There is no credible reason for increasing ambiguity by dropping the second sentence from the 2014 draft in this revision. Indeed, given the confused commentary about this topic among non-economists in the public sphere, it is all the more important to explicitly state the importance of accounting for the economic effects of all changes that result from an EPA rule in comparison with its baseline.

In addition, the guidelines could be more explicit about important considerations in the evaluation of co-benefits. For example, the guidelines could address double-counting, regulatory rebound, and

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related regulatory baseline issues. The guidelines could also consider alternatives analysis that examine alternative regulations that target so-called co-benefits in tandem with alternatives analysis of regulatory approaches that address the so-called targeted pollutant. Such an alternatives analysis would be in the spirit of including assessments of policy approaches beyond EPA’s current statutory authority that could highlight for Congress, key stakeholders, and the public the potential for legislative reforms to improve the efficacy and/or economic efficiency of environmental law.

2.7.5. Charge Question 5:

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

Terms specific to this chapter are, with a few exceptions, identified correctly in the glossary. These exceptions are discussed below.

1. Baseline – described status quo, but definition also mentions evolution of state; I would term the latter a counterfactual; draft alternative?
2. BCA – refers to evaluation of regulation, but also applies to *projects, programs, and policies*; draft alternative?
3. Elasticity of Demand & Supply – append “Price” at the beginning to be clear about what kind of elasticity is being defined.
4. Marginal Benefit – second sentence describes *average benefit*; draft alternative?
5. Marginal Cost – second sentence describes *average cost*; draft alternative?
6. Market Failure – also refer to existence of public goods & common pool resources; draft alternative?
7. Opportunity Cost – value of foregone allocation during some resource economic decision; the value of foregone allocation is often described as “value of the next best alternative use” of the resource.
8. Value of Statistical Life Year – The SAB recommends striking the second and third sentences in the definition in the glossary. These two sentences are unnecessary to convey the key point and restrict the consideration of VSLY in a way that is inconsistent with the revealed preference, stated preference, and theoretical/simulation literatures (e.g., Aldy and Viscusi 2008; Cameron and DeShazo 2013; Hall and Jones 2006).

The following recommendations are noted for Chapter 7:

Tier 1- Key Revisions

- Page 7-1: When introducing measures of economic value, discuss both WTA, Compensation and WTP as compatible with potential Pareto Criterion.
- Include cost savings in Figure 7-1 (page 7-2) and Table 7-1 (page 7-3) and the discussion of the table and figure.
- Clearly state the need to consider all benefits, both direct and ancillary.

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- Page 7-11: As economic value constructs, WTA and WTP 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 and should be highlighted in the chapter.
 - Page 7-11: The chapter should include critical appraisal of divergence of WTP and WTA (at least a citation or two) and perhaps some guidance on when to use one or the other.
 - Page 7-22: An additional method that deserves some discussion is Revealed Preference (RP) choice models [RUMs] that 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 *and some associated private cost*, 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.
 - Page 7-23, line 12: Clarify that the suitability of prices for welfare analysis is *directly dependent on structure of market*; if markets are not sufficiently competitive, it takes additional research/calculations to establish opportunity costs of inputs or products.
 - Ensure that the discussion of nonwork time is consistent within and across Chapters 7 and 8.
 - Page 7-26, line 18: Time onsite is not usually included in the estimate 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).
 - Building on the work of Bockstael and McConnell (various papers), 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).
 - Page 7-29, line 9: Many papers consider single- and multi-day trips as separate goods and analyze them in separate models. English et al. (2018) explore combining single- and multi-day trips into a single model.
 - Page 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.
 - Page 7-36: Additional citation should be included on validity and suitability of stated preference methods that fits into the context of the *Journal of Economic Perspectives* discussion (in

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response to Deepwater Horizon and Exxon Valdez): Haab, Interis, Petrolia, and Whitehead, *Applied Economic Perspectives and Policy* (2013).

- Page 7-43: The chapter should include brief description and commentary on an additional *ex ante* bias correction method, “consequentialism”, that has received lots of attention and seen some positive results in the empirical and experimental literatures. This design highlights potential 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) on payment and/or provision of public goods or management of externalities.

Tier 2 - Suggestions

- Include a brief discussion of the assumptions of rationality that underlie most valuation methods and examples of situations where violation of these assumptions might affect estimates.
- Include a discussion of CGE models.
- Encourage analysts to take into account, whenever possible, the normal operation of existing local, state, federal and international regulatory programs.
- Consolidate the discussion of breakeven and bounding in Chapter 5 and include a pointer to that discussion in Chapter 7.
- Text Box 7.1, 7.2, and 7.3 should be revised to clarify the main takeaways.
- Page 7-7, Step 3: 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. This can be an important part of distributional analysis.
- Page 7-10, line 9: The chapter could include a short summary of standard assumptions underlying the existence of preference relations that give rise to utility structures before turning to money-metric utility measures.
- Page 7-12: EPA should reevaluate how it is accounting for income growth in its primary VSL. The agency adjusts the VSL over time to account for inflation (i.e., updating base year dollars) and for growth in income per capita with an income elasticity (see discussion on pp. B-4 – B-5). For example, the 2002 EPA rule “Control of Emissions From Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based)” (RIN 2060-AI11) adjusted VSLs for income growth for its year 2030 full-implementations snapshot of the rule’s public health benefits. If it’s appropriate for accounting for income growth over 2002-2030, then it should also be appropriate to account for income growth over 1985-2020 (the period of time for the average VSL study in the set of 26 used by EPA for its primary VSL). This is not inconsequential. For example, personal income per capita (<https://fred.stlouisfed.org/series/A792RC0A052NBEA>),

1 deflated with CPI-Urban (<https://fred.stlouisfed.org/series/CPIAUCSL#0>), shows a 59% real
2 growth in income over 1985-2019. With an income elasticity of 0.4 (the middle of three values
3 EPA uses), that implies a 23% increase in the VSL due to income growth relative to the \$7.4
4 billion (2006\$) that is the EPA default. EPA should ensure consistency in accounting for income
5 growth over time across the various components of a given analysis. The same rate of growth
6 should be applied for updating a VSL for a future year as is used in the regulatory cost of
7 compliance dimension of the analysis, the social cost of carbon calculation, any potential
8 adjustments to long-term discount rates, etc.

- 9
- 10 • Page 7-13 to 7-14: Discuss the reporting of the age distribution in the text of the chapter.
- 11
- 12 • Page 7-23, line 33: text is confusing. *“Note a fourth equivalent way to estimate environmental*
13 *effects on production possibilities.”*
- 14
- 15 • Page 7-25, line 1: Consider clarifying the discussion on complications arising from the role of
16 taxation in benefit assessment.
- 17
- 18 • Page 7-25, line 18; page 7-26, line 25: The literature typically describes 3 or 4 types of
19 recreation demand models that utilize travel distance and implicit costs as a source of preference
20 identification: 1) single site demand models, 2) system of demand equations, 3) site choice
21 models, and possibly (4) repeated site choice models; note, Hellerstein and Mendelsohn (*AJAE*
22 1993) have a nice paper that explores the theoretical connection between site choice (extensive
23 margin) and quantity of trips (intensive margin)
- 24
- 25 • Page 7-26, line 30: Recognize complications in treatment of substitute prices in Marshallian
26 recreation demand models. The support space for substitute price parameters can be highly
27 restricted (e.g. null), depending upon the presumed structure of utility and demand equations
28 (LaFrance 1990; von Haefen 2002; Landry, et al. 2016).
- 29 • Page 7-29, line 7: One way to incorporate recreation demand data with single-purpose and multi-
30 purpose trips is to include a dummy variable accounting for differences in multi-purpose trips
31 (Parsons and Wilson 1997). The dummy variable can be interacted with travel cost and income
32 to permit flexibility in the model, without dropping observations on multi-purpose trips (which
33 could make the difference between utilizing data for welfare analysis or having to employ benefit
34 transfer).
- 35
- 36 • Page 7-32: Given unobserved and unverifiable nature of spatial correlations, spatial regressions
37 have mostly fallen out of favor in environmental economics and typically are just used for
38 robustness checks. (see, e.g., Mostly Useless Spatial Econometrics – Gibbons and Overman
39 2012)
- 40
- 41 • Page 7-33: A significant complication in many averting behavior analyses is that output level
42 (e.g. health) is unobserved and may change when aversion is engaged. This complicates
43 calculation of WTP (Compensating Variation).
- 44
- 45 • Page 7-36: The NOAA report is generally recognized as outdated; there may some literature
46 updating recommendations or caveats on when NOAA recommendations should apply.
- 47

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- Page 7-43: The chapter could clarify that 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).
- Page 7-47: The unit value transfer discussion may want to reference Boardman et al. (2011).

Tier 3- Future Considerations

- The EPA may consider updating the literature it employs for estimating a primary VSL for its economic analysis. This could require work in response to SAB (2017) and convening a new SAB panel for guidance and review. As a part of this effort, EPA may also review and update its application of an income elasticity for updating VSLs over time as well as consider how the value of statistical life varies over the life cycle.
- The EPA, perhaps in conjunction with other federal agencies, may want to invest in studies to estimate WTP for the most significant sources of morbidity.
- Additional research and further synthesis of results on valuing opportunity cost of travel time is warranted. Typical heuristics presume time is valued at a fraction (often assumed 1/3) of the “household wage rate”, but time costs likely vary across households and trips in ways that can be informed by additional theory and empirical research. Time costs can be a significant portion of travel costs, so value-of-time can have a large impact on welfare estimates. (Page 7-25, line 32)

2.8. Chapter 8: Analyzing Costs.

With a few exceptions, which are noted below, this is a comprehensive and detailed overview of the challenges and potential solutions analysts face when trying to estimate the social costs of environmental regulations. The SAB commends the authors—both the current and past NCEE staff—for their work.

In general, our overarching concerns about the Chapter are the same as for the Guidelines in general.

1. Audience. Sometimes the Guidelines seems to address a readership of economic novices, as on page 8-3 when it describes market equilibria: “The intersection of the supply (S0) and demand (D) curves determines the equilibrium price (P0) and quantity (Q0).” At other times, the Guidelines contains language that might be cryptic even for experienced economists. For example, in the first paragraph of section 8.2.3.4 when the Guidelines reference unbiased and biased technical change.

The SAB suggests that the authors comb through Chapter 8 and the rest of the Guidelines with a focus on its target audience, eliminating elementary material and moving technical material to appendices.

2. Categorization of costs and benefits. The SAB suggests that Chapter 7 (“Benefits”) and Chapter 8 (“Costs”) begin with a description of what each category includes. The distinction is arbitrary, because compliance costs of a regulation would become the benefits of an ensuing deregulatory action. And similarly, the health benefits of a regulation would become the costs of deregulation. Even within a regulation the distinction can be blurry. If regulating one pollutant causes an increase in another, are the damages from that secondary pollutant “co-costs” or negative “co-benefits”?

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1 After reading Chapters 7 and 8 it becomes clear that the EPA’s categorization is based on the tools
2 of analysis. Chapter 7 discusses the models and analyses used to measure the monetary value of
3 changes in environmental endpoints, whether they be positive or negative. Chapter 8 contains the
4 models and analyses used to identify changes in more standard economics valuations consumers and
5 producers place on activities.

6
7 Early, on page 1-3, the Guidelines recognize that “Ultimately, from the perspective of economic
8 theory, the treatment of disbenefits and avoided costs in the analysis is primarily a communications
9 issue and should not affect efficiency analysis and whether net benefits are positive or negative.” But
10 perhaps Chapters 7 and 8 might begin by clarifying what each chapter includes.

- 11
12 3. Length. The Guidelines are a daunting 343 pages – longer than many RIAs. Moving technical
13 discussion to an appendix would help, as would eliminating elementary material. Another suggestion
14 would be to provide an executive summary with key things an analyst should consider, with links to
15 the appropriate places in the document where details could be found. That could consist of one
16 overall executive summary, or one for each chapter, or both. While in principle that might make the
17 Guidelines longer, it would ease the burden on readers.

18 19 **2.8.1. Charge Question 1:**

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

22
23 The SAB recommends much greater discussion of imperfect competition—both for the market being
24 regulated as well as input markets. As shown in Fowlie, Reguant, and Ryan (JPE 2016), welfare effects
25 of a regulation may differ in the short and long run depending on the extent of market power. This is an
26 important point that the chapter does not make as clearly as it should. The point is probably relevant to a
27 wide range of EPA regulations, such as many regulations for the industrial sector. Fowlie et al. also
28 discuss the possibility that regulation can affect market structure and competition, and that these effects
29 can have important welfare consequences. This possibility is discussed only briefly in 8.2.3.6.
30 Moreover, the literature on the Acid Rain Program has highlighted the importance of imperfect
31 competition in input markets, such as coal, and more broadly, standard IO textbooks discuss double
32 marginalization. Considering the attention that the chapter devotes to pre-existing distortions due to
33 taxes, it would be appropriate given the recent literature on imperfect competition to elevate that topic to
34 roughly the same level. In other words, accounting for imperfect competition could have profound
35 welfare consequences that would be missed if one assumes price-taking firms and consumers.

36
37 Chapter 4 discusses behavioral economics including nudges. This discussion should be expanded to note
38 other aspects of behavioral economics relevant to benefit-cost analysis, such as externalities and loss
39 aversion.

40
41 The section on model parameterization includes some important suggestions. However, the section
42 muddles the point that the empirical strategy for parameter estimation needs to be consistent with the
43 model being used for the cost analysis. The statement that “inconsistencies between the underlying
44 structure of the model and the empirical analyses from which values are drawn can lead to inaccuracies”
45 may be unclear readers who do not have a PhD. in economics and may not understand what it means for
46 the underlying structure of econometric analysis to be consistent with an economic model. Moreover,
47 this sentence it should not be stuck in the middle of the paragraph. Footnote 304 offers a solution to this

1 problem, but that should be stated more clearly in the text. Moreover, the problem pertains not just to
2 situations in which parameters are taken from the literature. It is also relevant when the analysts estimate
3 the parameters themselves rather than taking the estimates from the literature. In that case, the
4 assumptions used to identify the parameters need to be consistent with the assumptions in the model
5 being used for the welfare analysis. The recent light-duty fuel economy/Greenhouse Gas (GHG) RIA
6 makes this mistake in the estimation of vehicle scrappage decisions because the econometric model used
7 to estimate scrappage decisions implicitly assumes that fuel costs affect vehicle ownership decisions,
8 whereas the computational model used for benefit-cost analysis assumes that fuel costs does not affect
9 choices among new vehicles.

10
11 Figure 8.2. (p. 8-3) The black triangle should not be labeled “deadweight loss.” There was an implied
12 deadweight loss in Figure 8.1 that the regulation is designed to correct. The regulation eliminates a
13 deadweight loss. Instead, call the triangle “lost CS+PS above and beyond compliance costs.” Also see
14 page 8-4 lines 15 and 20, which describe the triangle in Figure 8.2 as a deadweight loss. This is the first
15 place in the document that uses the term deadweight loss. In fact, the term never appears in Chapter 7,
16 “Analyzing Benefits.”

17
18 Footnote 244. (p. 8-3) Producers surplus is profits ***plus fixed costs***. . The area under the supply
19 curve is total private variable costs, not total private costs.

20
21 The SAB are confused about Figure 8.3. It seems as though a change in price of the regulated good
22 should shift the supply of labor (SL) curve. This looks to us like a standard public finance figure drawn
23 for a new tax on the other market, with a preexisting tax in the labor market. The new tax on the other
24 market exacerbates the deadweight loss (DWL) from the preexisting tax in the labor market. But in this
25 case the regulation on the other market corrects a market failure. The original SL curve in the labor
26 market was inefficient, because goods prices were inefficiently low. Perhaps it would help to add a
27 second panel to 8.3 that shows a labor market without a pre-existing distortion, to clarify how much
28 larger is the change in DWL when there’s a pre-existing distortion.

29
30 Page 8-10, line 15 ff. The meaning of these two sentences is unclear:

31 *“For example, taxes are generally thought of as transfers between households or firms and*
32 *government. However, when environmental regulation interacts with them in ways that distort*
33 *behavior relative to what would occur absent government intervention in the marketplace, the*
34 *welfare loss from these distortions should be included in an estimate of cost.”*

35 Is this about rent seeking? Are there any examples of RIAs that include this or should have included
36 this?

37
38 Footnote 269, Page 8-10. The characterization of the Equivalent variation (EV)/ Compensating variation
39 (CV) distinction could be improved. The footnote says: “The difference between them is based on
40 whether one assumes that the change will occur (EV) or is not yet in place (CV).” Instead, the text
41 might read: “The difference between them is based on whether one assumes the beneficiaries are being
42 asked to pay for the regulated improvement (CV), or whether they are entitled to the improvement and
43 must be paid to forego it (EV). It is the difference between willingness-to-pay (WTP) for environmental
44 quality and willingness-to-accept (WTA) compensation for environmental degradation.”

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1 **2.8.2. Charge Question 2:**

2 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
3 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
4 *methods described?*
5

6 In practice, RIAs use the compliance cost and partial equilibrium approaches more commonly than the
7 computable general equilibrium (CGE) approach. This chapter would be strengthened by adding specific
8 discussion about when it may be reasonable to use a partial equilibrium or compliance cost approach,
9 rather than CGE. Frequently, the chapter says something like CGE is appropriate when the regulation
10 may affect multiple sectors. But when is that likely to happen? Can the chapter provide some rough
11 criteria to help practitioners understand when CGE would be preferable? Frequently the document
12 mentions data limitations as a reason why partial equilibrium or compliance cost approach is used rather
13 than CGE. Other reasons include assumptions in CGE (e.g., market structure, CES) and existence of a
14 suitable model. Although these limitations are discussed on the subsection specifically about CGE
15 models, the chapter does not treat CGE models consistently, in that much of the chapter appears to favor
16 CGE models over other approaches.
17

18 Page 8-23, line 19. According to communication from NCEE staff, the bullet points on the
19 “Limitations” of CGE models was omitted inadvertently. This should be fixed, and the list should also
20 include lack of transparency. In general, the chapter does a good job contrasting pros and cons of the
21 compliance cost and partial equilibrium approaches. The discussion of CGE models is somewhat less
22 balanced, however. For example, and continuing the theme of imperfect competition, most CGE models
23 assume price-taking firms and consumers, which contrasts with many partial equilibrium models in
24 which firms have market power. This limitation of CGE models should be noted in textbox 8.2 as well
25 as table 8.2 and under “Limitation” on page 8-23. Moreover, the end of 8.3.3 does not list the
26 disadvantages of CGE models that were discussed in the preceding text, such as aggregation across
27 firms, sectors, and regions as well as a simplified characterization of abatement opportunities. The
28 authors should check that the lists of limitations of these approaches include all of the limitations that
29 are discussed in the main text.
30

31 **2.8.3. Charge Question 3:**

32 *Are there topics that warrant more discussion or elaboration in the chapter?*
33

34 The SAB finds that the following areas warrant addition discussion:

- 35 1. Text Box 8.1 (p.8-7): The text box is informative and provides a useful discussion about the
36 challenges facing retrospective analysis. However, the purpose of this textbox in the “Guidelines for
37 Preparing Economic Analyses” is unclear, and it is unclear why it belongs in Chapter 8 Analyzing
38 Costs. The main purpose seems to be to note that retrospective analysis is valuable and hampered by
39 lack of data. Both are true of prospective analyses. The last paragraph recommends that the EPA
40 identify analytic requirements when a regulation is promulgated, which seems to us like a good
41 recommendation, but this chapter in these Guidelines may not be the right setting.
42

43 The text also appears to include the assumption that such retrospective analysis will use some sort
44 of econometric analysis. Alternatively, structural or computational models could be used (including
45 whatever model(s) EPA might have used for the prospective analysis), which could circumvent some
46 of the econometric and data challenges that the textbox discusses. Of course, the structural and

- 1 computational models have their own limitations, and the suggestion here is to provide some balance
2 here, discussing pros and cons of the different approaches.
3
- 4 2. Page 8-11, line 3 ff. It's good to list the reasons Gross Domestic Product (GDP) is not a good
5 measure of welfare, but there are a few more:
6 a. GDP doesn't include environmental cost or benefits.
7 b. If people get sick from pollution and go to the doctor more, that increases GDP.
8 c. GDP is a flow measure of expenditure, and it omits changes to capital stocks. If a pollutant
9 damages buildings and people spend more money repairing and painting them, that increases
10 GDP.
11
- 12 3. Footnote 276 (p. 8-13) provides citations cites for realized costs of 1990 CAA Amendments. A more
13 recent citation would be Chan, Cropper and Muller, "The Impact of Trading on the Costs and
14 Benefits of the Acid Rain Program" Journal of Environmental Economics and Management, 88,
15 180-209, March 2018.
16
- 17 4. Regarding section 8.4.3 (Model Parameterization), the text should emphasize the need to include the
18 most recent data available and parameters estimated using recent data. These points may appear to
19 be obvious, but they are particularly relevant in the current context of deregulatory actions. In fact,
20 the chapter might benefit from including a section (or text box) about particular issues that arise
21 when considering deregulation (or, potentially, re-regulation). In this situation, analysts should
22 update assumptions on model inputs to incorporate the best available information, and they should
23 distinguish sunk costs that have already been incurred from other costs—i.e., the issues that appear
24 to have been ignored in the recent Mercury and Air Toxics Standards (MATS) rule.
25
- 26 5. Uncertainty over future regulation or market conditions can affect compliance decisions. For
27 example, firms may have two compliance options, one of which includes large sunk costs and the
28 other does not—such as choosing to install a scrubber or switch to low-sulfur coal to reduce sulfur
29 dioxide emissions. Because uncertainty creates an incentive to choose the reversible option, failing
30 to account for the effect of uncertainty on decision making could cause the analyst to over-predict
31 investment in the technology with sunk costs. Note that this issue is distinct from using scenario
32 analysis to quantify uncertainty, because scenario analysis misses the fact that uncertainty itself
33 affects compliance decisions. This consideration may be at the research frontier now, but like lots of
34 other frontier topics, soon it could become standard practice in the literature to include decision-
35 making under uncertainty in regulatory analysis. If this occurs before a new revision to the
36 Economic Guidelines, the EPA should adopt it without waiting for new guidelines. This suggestion
37 to continually update analysis applies equally to benefits chapter.
38
- 39 6. Page 8-3, line 8. The reference to "market power" in the parentheses should be deleted. The rest of
40 the paragraph is correct, that partial equilibrium may be accurate if markets outside the analysis
41 aren't affected. But the existence of market power is really a separate issue and including it as an
42 example may be confusing.
43
- 44 7. First full paragraph of 8.2. The text states that costs incurred to meet other regulations are not
45 included in the incremental costs of the regulation being analyzed. This is certainly true. But it
46 would also be appropriate to exclude future costs expected to be incurred for other regulations, but
47 which haven't already been incurred. For example, there will be costs of meeting tier 3 tailpipe

- 1 standards in the future, which shouldn't be included in the incremental costs of a hypothetical tier 4.
2 Footnote 259 hints at this point, but this should be more explicit in the main text.
3
- 4 8. Section 8.2.1.1. Footnote 263 defines sunk costs, which is useful. The text should explain that
5 typically a large share of fixed costs is sunk, such as R&D costs. As noted above, the text should
6 discuss how to treat sunk costs in an RIA for a deregulatory action.
7
- 8 9. Section 8.2.2, first two paragraphs. The paragraphs refer to a utility function, which comes out of
9 nowhere, since previous discussions of consumer welfare in this chapter referred to consumer
10 surplus without referencing an underlying utility function.
11
- 12 10. Section 8.2.3.2. Another reason to conduct a dynamic analysis is that the effects of the regulation
13 itself may vary over time. For example, a regulation may cause some firms to exit, which would
14 increase equilibrium output prices unless/until other firms enter the market or remaining firms
15 increase production. Other parts of the chapter discuss transitional costs, which is related to the point
16 here about entry and exit.
17
- 18 11. Section 8.2.3.4. In the first full paragraph, references to unbiased and biased technical change may
19 be cryptic to some readers. These terms should be defined, or perhaps replaced with less technical
20 language.
21
- 22 12. Section 8.2.3.6. Both in the section heading and the main text, there should be a more careful
23 distinction between two issues related to market power and competition. The first is that market
24 power can create distortions that have large welfare consequences—see in particular Fowlie et al.
25 referenced in a previous comment. This point could be made by adding a graph similar to 8.3 that
26 shows the pre-existing wedge that exists between price and marginal costs in an imperfectly
27 competitive market. The second issue is that the regulation itself may affect market structure. This
28 point is already made in the text, but it would be helpful to distinguish it more clearly from the first.
29
30
- 31 13. Introduction to section 8.3. The introduction to this section has a useful list of criteria for selecting
32 an appropriate model. Whether a model has been peer-reviewed, either in the academic literature or
33 otherwise, is also a consideration that should be added to this list. That may be obvious, but it
34 wouldn't hurt to state it in these guidelines.
35
- 36 14. Text box 8.4. This text box contains a nice discussion about separability of benefits and costs,
37 although it could be helpful to provide the example of climate change. In particular, a policy that
38 reduces GHG emissions causes global temperature to drop, which can reduce demand for electricity
39 used for air conditioning. Lower electricity demand would affect factor prices and compliance costs.
40
- 41 15. Section 8.4.4. It would be helpful if this subsection can include some suggestions about how to
42 characterize uncertainty. Typically, RIAs using deterministic models report results under alternative
43 sets of parameter assumptions, which is fine. Some partial equilibrium and CGE models include
44 uncertainty explicitly, which can be an important advantage of these models over deterministic ones.
45
- 46 16. The chapter focuses on compliance costs of firms. The chapter should include discussion of costs to
47 consumers, such as changes in product quality or elimination of products caused by regulation. For

1 example, there has been some research on the effects of energy efficiency standards for home
2 appliances on product quality.

3
4 17. The cost of public funds should be discussed, since it is in chapter 4—maybe just to say it’s
5 complicated.

6
7 18. The benefits chapter should discuss retrospective analysis to provide balance with the costs chapter.
8 The document should discuss the Retrospective analysis: Nothing in benefits chapter on
9 retrospective. The guidelines should discuss the Evidence Based Policy Act of 2018, which could be
10 interpreted as giving EPA a mandate to do retrospective.

11
12 19. This chapter (along with chapter 9) discusses employment effects of regulation and transitional
13 costs. Estimating these costs could be included in sensitivity analysis.

14
15 20. For consistency with the benefits chapter and the last chapter on presentation, chapter 8 should start
16 with an accounting perspective on cost. The analyst identifies each item of cost attributable to the
17 regulatory action, including a list of those cost items and an indication as to whether the cost has
18 been quantified and monetized. EPA should include a box with a draft template for cost
19 identification, perhaps using for illustration purposes a hypothetical rule requiring GHG reductions
20 from new motor vehicles. The illustration should include direct costs, ancillary costs and
21 countervailing risks to human health, safety, and the environment. Costs incurred by regulated
22 entities are included but also costs to consumers, workers and the public. Here is a partial list of cost
23 items that might be included in the illustrative box:

- 24 a. initial technology costs (e.g., new electric propulsion system)
- 25 b. maintenance and repair costs (e.g., battery replacement)
- 26 c. technological waste management, including materials separation/recycling costs (e.g., re-use
27 of cobalt and other valuable materials)
- 28 d. psychic costs to consumer (e.g., diminished performance)
- 29 e. safety risks of technology (e.g., lightweight materials and occupant crash protection)
- 30 f. occupational risks (workers during mining of cobalt and lithium for batteries and assembly of
31 battery packs)
- 32 g. environmental risks of toxic pollution (during mining and processing of inputs to lithium ion
33 batteries)
- 34 h. costs associated with rebound effect (e.g., traffic congestion, safety, pollution)
- 35 i. costs associated with slower fleet turnover (e.g., safety, pollution).
- 36 j. paperwork/reporting/administrative costs of the rule. A paragraph should be added that the
37 chapter is written from the perspective of a rulemaking action that is imposing costs to
38 achieve environmental protection. When the action is deregulatory in nature, the avoidance
39 of costs become benefits, and the lost benefits become costs.

40 41 **2.8.4. Charge Question 4:**

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

44
45 The SAB finds that the following areas warrant addition discussion:

- 46 • Footnote 242. (p.8-3) “market distortions are ... move consumers or firms away from what would
47 occur under perfect competition be economically efficient.”

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- 1
- 2 • Section 8.2.3.6 (p.8-14 ff) *Effects on Market Structure and Entry and Exit*. It's not clear why this
- 3 section is in the Chapter 8, Costs. No mention is made as to why a change in market power would be
- 4 a cost of a regulation. If it doesn't affect social costs, the section might be more appropriate in
- 5 Chapter 9, on other Economic Impacts.
- 6
- 7 • Why are so many pages and boxes devoted to I-O analysis, which is not recommended for use? [p.
- 8 8-23, Section 8.3.4]
- 9
- 10 • "However, these methods should not be used to estimate the social cost of environmental policy
- 11 (U.S. EPA 2017)."
- 12
- 13 • The chapter should discuss the use of public data for parameter estimation or about model selection.
- 14 Chapter 5 discusses the choice of publicly available and documented models, and it may be
- 15 appropriate to adopt the same criteria to data as to models.
- 16
- 17 • The current version of Chapter 8, "Analyzing Costs", appears to be silent on countervailing risks. A
- 18 separate section in Chapter 8 should call for a qualitative identification of possible "countervailing
- 19 risks" associated with the rule-making action, since these are costs. For each possible countervailing
- 20 risk that is identified, the RIA should explain whether the risk has been quantified, and why or why
- 21 not.
- 22
- 23 • The chapter contains little discussion about where models are chosen from. In some cases, EPA has
- 24 used a model for a long time, like IPM. What are possible sources for models? Chapter 5 discusses
- 25 this, so chapter 8 could simply refer readers to that chapter.
- 26
- 27 • The chapter should include a comprehensive list of supporting EPA guidance. Or this information
- 28 could be put in chapter 2, following the list of EOs and laws.
- 29 • Public commenters suggested that the SAB look at the Draft Guidance to ensure that the analytic
- 30 treatment of "ancillary benefits" and "countervailing risks" (as the terms are used in OMB Circular
- 31 A-4) are addressed appropriately. The text of the Guidance should include an unequivocal
- 32 endorsement of OMB's call for identification and consideration of "ancillary benefits" and
- 33 "countervailing risks". The issue should not be "buried" in footnotes. It should be located in a free-
- 34 standing section of Chapter 5, and then followed up with some specific discussion in Chapters 7
- 35 (Benefits) and 8 (Costs). SAB should not address how much policy or legal weight to give to such
- 36 issues because policy and legal weighting are outside our purview.
- 37
- 38 • When analyzing ancillary benefits and countervailing risks, the RIA should take account, whenever
- 39 possible, the normal operation of existing local, state, federal and international regulatory programs.
- 40 When interactions occur with other programs, the analyst should consider one presentation that
- 41 assumes public health/environmental impacts and another that assumes changes in compliance-cost
- 42 expenditures.
- 43

44 **2.8.5. Charge Question 5:**

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

46

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Based on discussions in chapter 8, the SAB finds that the glossary would benefit from the inclusion of the following:

- a distinction between all the rates of discounting (social opportunity cost of capital, social rate of time preference and shadow cost of capital).
- annualized value as 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.
- elasticity of supply where "... quantity supplied can be increased by ... developing competitive products than can substitute."

The SAB is unclear as to why "developing competitive products that can substitute" amounts to a supply increase. Perhaps the agency is referring to a demand reduction?

The following recommendations are noted for Chapter 8:

Tier 1- Key Revisions

-

Tier 2 - Suggestions

-

Tier 3- Future Considerations

-

2.9. Chapter 9: Regulatory and Non-Regulatory Approaches to Pollution Control.

This chapter presents methods for identifying the disparate impacts of environmental regulations on various groups.

As stated in Section 9.2, analysis of these disparate impacts is rooted in OMB's Circular A-4 (U.S. OMB 2003). According to Section 9.3, although "virtually any economic measure of the consequences of a regulation may be included in an economic impact analysis (EIA)," "frameworks ... presented in terms of welfare effects are useful for understanding parts of an EIA because they illustrate the different pathways through which regulatory costs are distributed across population groups." Such frameworks structured around the distribution of welfare effects are appropriate because they have been part of federal benefit-cost guidance for 50 years. OMB's Circular A-4 is explicit about this. For example, it recommends that "You should study alternative levels of stringency to understand more fully the relationship between stringency and the size *and distribution of benefits and costs among different groups*" (emphasis added).

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1 After a brief discussion of analytic components in 9.4, Section 9.5 provides the meat of the chapter with
2 a discussion of impact categories. Overall, the section provides a good framework for thinking through
3 the various effects that have distributional consequences. The list of effects is good and much of the
4 discussion is excellent. As detailed below, some of these individual areas are not always discussed with
5 an up-to-date evaluation of the peer-reviewed literature, so there is some room for improvement with
6 respect to balance.

7
8 More generally, though, Section 9.5 does not live up to the framework set out in Section 9.2 and 9.3. In
9 particular, despite the emphasis in A-4 and elsewhere on the distribution of benefits and costs, this
10 chapter does not lay out a framework for doing so (nor does any other chapter). Subsection 9.5.6 comes
11 closest, discussing the distribution of benefits and the importance of considering heterogeneity across
12 groups in the effects of pollution changes on health. However, as a whole, the chapter stops at
13 identifying some of the channels through which the distribution could be affected, leaving it to a set of
14 "effects" that are neither compared nor reconciled.

15
16 The fundamental question this chapter should address is how best to incorporate distributional effects
17 into EIAs. That in turn will depend on the distributional objective -- equality, yes, but equality of what?
18 Of exposure to a particular contaminant? Of environmental health? Or, most generally, overall
19 welfare? Ultimately, the most fundamental distributional objective is equity in welfare, as implied by
20 Circular A-4. Because it is the most fundamental, it is this objective that should guide the EPA's
21 thinking about distributional effects.

22 23 **2.9.1. Charge Question 1:**

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

26
27 As noted in our introductory comments, the basic framework for the impacts discussed in this chapter is
28 the effect of a proposed regulation on the distribution of benefits and costs among different groups. The
29 peer-reviewed economics literature on this subject is over 100 years old, but the chapter generally
30 ignores it in favor of documenting various "effects" taken separately. As a starting point for thinking
31 about distributional effects, one could consider a social welfare function (see e.g. Adler 2012, 2019 for
32 an up-to-date presentation). A social welfare function essentially involves two stages. In the first stage,
33 each group has its own definition of welfare, which is impacted by the various effects set out in this
34 chapter. In the second stage, the groups are weighted to account for distributional concerns. The second
35 stage is generally the most controversial. However, the literature has long suggested the possibility of
36 setting out just the first stage. The net benefits for each group can be calculated and displayed in a table.
37 These net benefits would take into account social costs falling on the group, price changes and other
38 transfers, environmental and other benefits, and any other relevant effects. Benefits would be evaluated
39 by group-specific WTP.

40
41 Turning to the discussion of specific, individual effects, the statements and recommendations in this
42 chapter are, on the whole, consistent with existing and theoretical frameworks. This does not mean
43 there are not difficult issues to consider.

44
45 First, the economics literature has established that there is not a one-for-one relationship between effects
46 on prices and effects on groups. However, the chapter frequently speaks as if a price change maps only

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1 into an effect on consumers (p. 9-2 l. 17, p. 9-4, l. 4, § 9.5.1). In fact, a price change impacts both sides
2 of the market symmetrically.

3
4 Second, the discussion of effects on capital and on employment is not consistent with the most relevant
5 parts of the economics literature. The issue of how fast an asset may return to production is an integral
6 part of the evaluation of the economic impact of a policy. Regulations may strand assets. For instance,
7 a mine that closes will not reopen as a manufacturing site; consequently, the asset becomes valueless, or
8 even represent a liability. This is a much different occurrence than the closure of a warehouse in a
9 transportation hub that will be soon refitted and used in another industry.

10
11 While labor at first glance may appear fundamentally different, workers and firms make investments in
12 human capital that is often not portable across firms or across location. One way to think about the
13 impact of regulations on workers is that the regulation destroys (or renders valueless) some of their
14 human capital, just as the regulation destroys some of the physical capital of the firm. When a worker is
15 young this destruction may be less important than when the worker is older. If the worker is, say, 25,
16 there is plenty of time to reinvest in human capital and obtain the returns from the investment. If the
17 worker is, say, 55, then the loss is much larger for at least two reasons. First, often older workers have
18 accumulated more human capital so presumably their losses are larger. Second, the payback period is
19 much shorter for these individuals. In our mine example, workers from the closed mine have usually
20 made substantial investments in learning the skills of mining, skills that are now rendered valueless with
21 the closing of the mine. The failure to account for these losses will cause us to understate the cost of the
22 regulation.

23
24 The impact on workers could be summarized by discussing these human capital considerations of the
25 dislocation. People often think of labor as the malleable input that can be used anywhere. The human
26 capital model provides a nice lens to discuss the heterogeneity with respect to age of the impact of
27 worker dislocation. The literature on worker dislocation is extensive, the classic reference is Jacobson,
28 LaLonde, and Sullivan (1993). The work by Walker (2013), though cited elsewhere in the chapter, is
29 particularly relevant to the discussion at page 9-20. More references are provided at the bottom.

30 31 **2.9.2. Charge Question 2:**

32 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
33 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
34 *methods described?*
35

36 The EPA should be commended for its careful review and consideration of many technical issues in the
37 literature. Given the complexities involved, it is not surprising that there are some issues overlooked,
38 which are highlighted in our comments.

39 40 *Perfect competition versus other industrial structure*

41 The analysis is quick to go to perfect competition. While this is certainly a model that is well
42 understood, we question how relevant this model is for large polluters, especially outside of farming. If
43 there is market power, then there may be incomplete transfer of increased marginal costs from producers
44 to buyers (e.g. Preonas 2019). Too, there is a large literature on how various kinds of regulations on the
45 electricity sector do or do not get passed through electricity prices depending on whether there is
46 regulated average-cost pricing. A discussion of these issues by the *Guidelines* would provide more
47 guidance to the analysts.

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1
2 *Heterogeneity of impacts*

3 A firm closure is not the same in the booming economy of the Silicon Valley as it is in a declining town
4 of the rust belt. Nor is losing a job with large investments in human capital the same in the two
5 locations. The document does not provide any help to analysts attempting to deal with the
6 heterogeneity.

7
8 *Capital market imperfections*

9 If capital markets are perfect, shocks arising from the regulations would reduce lifetime wealth, but they
10 would not generate any short-term crisis. Sadly, capital markets are not perfect, and people with limited
11 wealth will presumably suffer more.

12
13 To see why the assumption matters, consider the loss \$100,000 in lifetime income at either age 25 or age
14 65. With perfect capital markets, workers would be indifferent between the two possible events. If it
15 occurs when the worker is young, the worker will borrow money around the age to smooth consumption.
16 If capital markets are imperfect, a worker may not be able to carry out such a transaction, and we would
17 see welfare decline.

18
19 A general result is that the poor and the young suffer more than older, wealthier workers. One might
20 hope that the safety net would mitigate some of these short-term effects. A discussion of the assumption
21 of perfect capital markets would aid the analyst in thinking about the impact of the regulations. A full
22 treatment of the issues of imperfect capital markets is a Tier 3 suggestion.

23
24 *Labor market impacts*

25 The SAB has already noted that labor market impacts can be better modeled through recognition of
26 changes in the value of the stock of human capital. Recent advances in the economic evaluation of job
27 losses include Bartik (2015) and Kuminoff, Schoellman, and Timmins (2015).

28
29 Additionally, Text Box 9.1 understates the literature on the social cost of job loss. In addition to the
30 work of Sullivan and von Wachter, Rege, Telle, and Votruba (2009) also is highly relevant. M. Banzhaf
31 (2018) documents the effects of job loss on divorce.

32
33 *Impact on declining places*

34 When firms and jobs are removed from declining places they are often not replaced, speeding the
35 decline of the declining areas. The impact on declining places is extremely complex because it affects
36 labor markets, real estate markets, and the provision of local public services. It would be useful to
37 analysts to have these issues discussed.

38
39 *Health-Health (or risk-risk) tradeoffs*

40 Regulations that affect real incomes will have feedback effects on health that may undermine any direct
41 effects on health of environmental improvements. Viscusi and Broughel (2020) discuss this issue.

42
43 **2.9.3. Charge Question 3:**

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

45
46 The SAB finds that three areas within chapter 9 warrant additional discussion.

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1 *Land markets – renters versus property owners*

2 Section 9.5.2.5 discusses impacts on land, but only as a "productive factor"—that is, only through the
3 channel of firm's demands for land as a factor input in production. However, as the large literature on
4 "hedonic pricing" shows, if there are benefits from pollution reductions in a particular location, then
5 households' demand for residential land in that location increases relative to other areas. Thus, those
6 landowners should benefit from the increase in property prices. If property prices do increase, renters
7 tend to get a double hit: they suffer adverse labor market impacts and they must pay higher rent, too.

8
9 *Migration section 9.5.3 and 9.5.4*

10 This is a delicate issue, but one that needs to be discussed. For instance, if the coal producing areas of
11 Appalachia are not coming back (perhaps because we price carbon emissions or pollution emissions
12 more highly) then there are more people in the region relative to an efficient distribution. Thus, the area
13 will shrink. This places a financial burden on these communities and can be harmful for the incumbent
14 residents of these communities, especially property owners. A discussion of the issues associated with
15 migration would greatly help the analysts.

16
17 *Spillovers with safety net program*

18 The dislocation of workers has big spillovers to social programs. While it is complicated, shifting the
19 burden between states and the federal government, it also provides some relief to displaced workers and
20 their families. Some direction on how the analysts should deal with these issues would be useful.

21
22 **2.9.4. Charge Question 4:**

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

25
26 The major inconsistency within this chapter, as highlighted above, is that it is rooted in a framework of
27 the distributional effects of benefits and costs; but provides no guidance on the distribution of net
28 benefits.

29
30 A minor inconsistency is that Chapter 10 discusses environmental justice as a distributional effect at
31 least partly related to the distribution of baseline pollution burdens, but pollution burdens are not
32 mentioned as an important baseline socioeconomic characteristic in Section 9.4.1 (p. 9-7, l. 16-20).

33
34 **2.9.5. Charge Question 5:**

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

36
37 BLANK

38
39 *The following recommendations are noted for Chapter 9:*

40
41 Tier 1- Key Revisions

- 42 • Our central recommendation for revision is that EPA follow through on the route sketched out in
43 Sections 9.2 and 9.3 and perform, whenever justified by the significance of the regulation, a
44 distributional analysis of net benefits across relevant groups. This analysis should account for all
45 costs, including social costs as they fall on each group as well as transfers across groups through
46 price and other effects. It also should account for environmental benefits as they fall on each
47 group. To the extent practicable, environmental benefits accruing to each group should be

1 evaluated using group-specific WTP functions. For example, different age groups could have
2 different VSLYs. Subsection 9.5.6 already opens the door to this issue, but it is not fully
3 developed. For example, suppose the effect of the policy is to change environmental quality by
4 dQ . The effect of a small change in Q on health for a specific group is dH/dQ . The value of that
5 change in health is dW/dH . Then the value for each group would be $dQ*(dH/dQ)*(dQ/dH)$.
6 Section 9.5.6 considers group specific dH/dQ suggesting group-specific values for dQ . Group
7 specific dQ/dH functions would only be an additional piece of the same picture.
8

9 Accounting for such heterogeneity is absolute essential for understanding distributional effects.
10 Indeed, assuming homogeneity in WTP when it does not exist only masks important social
11 transfers, sweeping the problem under the rug. This point is very general to economics and is
12 not specific to environmental analyses. For example, a policy that gave everybody a nice new
13 car and charged them \$25,000 for it is, in one sense, very equitable. Everybody is treated the
14 same. But in another, very important sense, it is not at all equitable. Households who are willing
15 to pay at least \$25,000 for the car benefit from the policy, while those who do not want to pay
16 that much for the car (or do not have the ability to pay it) are harmed by the policy.
17

18 The current literature supports such distributional analyses.
19

20 Tier 2 - Suggestions

- 21 • Price effects should be treated as transfers between groups, not just as effects on consumers. To
22 facilitate this change, it might be helpful to switch sections 9.5.1 and 9.5.2 but also combine
23 consumers with factors of production. First the direct effect on the regulated firm can be
24 discussed. Then, the question arises as to whether the firm can pass on the effects to consumers
25 and/or to factors of production, respectively down- and upstream from the regulated firm.

- 26 • Additionally, when evaluating price effects, more allowance should be made for the possibility
27 of non-competitive conditions.

- 28 • More consideration should be given to the social consequences of job loss, following the
29 literature cited above.

- 30 • Additionally, capital market imperfections should be introduced into comparative analyses of
31 costs. If agents are borrowing constrained, the timing of an income shock in the lifecycle can
32 matter. Younger, poorer households can be harmed more by the same dollar shock as older,
33 richer households.

- 34 • More consideration should be given to the effects on land and real estate. Land prices are
35 affected not only through factor demands (as rightly suggested by 9.5.2.5) but also through
36 amenity effects on household demand. Like all price effects, these effects differentially impact
37 buyers and sellers, in this case landlords and renters.

- 38 • More consideration should be given to impacts on communities, especially declining
39 communities. An important consideration here is out-migration which can affect the value of
40 land and capital, as noted above.

- 41 • The dislocation of workers has big spillovers to social programs. This should be discussed.
42
43
44

1
2 Some very specific suggestions:

- 3 • p. 9-2, l. 4. The Guidelines might emphasize, "Transfers, including price changes, must be
4 excluded from a BCA ... but may be included or even be key within an EIA"
5
- 6 • FN 322 seems out of place. This is a major idea that belongs in Chapter 4 or maybe Chapter 7,
7 not a side note in Chapter 9. This relates to comments I've made elsewhere.
8
- 9 • P. 9-4. The Guidelines could unintentionally be giving the impression this is about price-based
10 policies. That could be clarified. Fullerton and Heutel (2010) has a nice framework for
11 analyzing the incidence of other kinds of regulations.
12
- 13 • For consistency with Chapter 10 and with subsection 9.5.6, pollution burdens should be
14 mentioned as an important baseline socioeconomic characteristic in Section 9.4.1 (p. 9-7, l. 16-
15 20).
16
- 17 • The last par. of text box 9.1 seems out of place. Should it be third from last?
18

19 Tier 3- Future Considerations

- 20 • Our Tier-1 suggestion was for EPA to document net benefits across groups using heterogenous
21 WTP for environmental improvements. This can be thought of as the "first stage" input that
22 would be needed for an overall study of the impacts on social welfare that account for
23 distribution. Future consideration might be given to consider such broader impacts (Adler 2012,
24 2019).
25

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1 **2.10. Chapter 10: Environmental Justice and Life Stage Considerations.**
2

3 According to the introduction, this chapter is about the effects stemming from changes in environmental
4 quality, in contrast to Chapter 9 which is about the effects of compliance costs.
5

6 Most of the chapter is focused on environmental justice considerations, which is sensible given
7 executive orders governing this topic and existing EPA guidance. Less attention is given to children's
8 health, but the coverage is adequate. Intergenerational concerns receive only two paragraphs at the end,
9 giving the impression of being an afterthought. As discussed in more detail below, the relationship
10 between Chs. 9 and 10 is not always clear, nor is the relationship between costs or benefits, or effects
11 stemming from compliance vs. the quality of the environment.
12

13 **2.10.1. Charge Question 1:**

14 *Are the statements and analytic recommendations made in the chapter consistent with the*
15 *theoretical and empirical peer-reviewed economics literature?*
16

17 The SAB has some doubts on whether Subsection 10.2.6 is consistent with the economic literature. To
18 establish that, we first ask a clarifying question: Is the section meant to address empirical estimation or
19 the analysis of benefits? While *statistical estimation* of effects on specific groups may require a control
20 group, *documentation* of how a group is affected by a policy does not require comparison. The effect is
21 just the effect; it is not a relative comparison.

22 Some of the discussion in the last par. of Section 10.2.1 is a bit across purposes. The point of Banzhaf et
23 al. (2012), Banzhaf and Walsh (2013), and Depro et al. (2015) is that, when equilibrium relationships
24 change, one cannot use a basic difference-in-difference design to identify sorting or re-sorting effects.

25 In Textbox 10.1, the last sentence of the third paragraph is not correct, or at least it is misleading.
26 Inequality indices are not cardinal; they are ordinal. The distinction is that ordinal functions have
27 cardinal rates of tradeoff. It is always true, in a utility function, social welfare function, etc., that the
28 function itself is ordinal, but the rate of trading off two arguments in the function, at a constant level, is
29 cardinal.

30 Page 10-20, l. 17. Baden et al. (2007) also is relevant to the issue of sensitivity to the geographic area of
31 analysis.
32

33 **2.10.2. Charge Question 2:**

34 *Does the chapter contain an objective, balanced, and reasonable presentation and interpretation*
35 *of the peer-reviewed theoretical and empirical economics literature, as well as any analytic*
36 *methods described?*
37

38 The SAB finds the chapter to be objective and balanced.
39

40 **2.10.3. Charge Question 3:**

41 *Are there topics that warrant more discussion or elaboration in the chapter?*
42

43 Subsection 10.2.3.2 could use more discussion of cash and non-cash government transfers in measures
44 of deprivation. Also, it does not necessarily need more elaboration, but it could be more decisive about

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its recommendation. Several options are given, but what is the guidance about how to measure income and poverty?

Subsection 10.2.7.5 – In terms of underlying risk factors, this discussion could be updated to include the microbiome where the distribution of gut microbes may vary by sociological group.

2.10.4. Charge Question 4:

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

On the whole, the discussion is objective and balanced.

2.10.5. Charge Question 5:

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

The chapter is inconsistent in its treatment of costs. Page 10-1 suggests it covers "impacts that stem from changes in environmental quality." Subsection 10.2.2.2 opens the door to consideration of costs and the possibility that "economic costs of the regulatory action will be concentrated among particular types of households." If we put these two together, does that mean that we are only considering costs that stem from changes in environmental quality, such as gentrification effects on rental values, but not other costs that stem from regulation, such as employment effects or energy prices? It strikes the SAB as odd and inconsistent to include costs through one channel and not the other.

More broadly, and most importantly, the chapter is inconsistent with Chapter 9. On one hand, its relationship to Chapter 9 is ambiguous. In some ways it is a special case of Chapter 9, which considers the distributional effects on different groups, where here in Chapter 10 those groups are defined by environmental justice considerations or intergenerational considerations. In other ways, it is very different because it is much more focused on changes in environmental quality alone, and not the larger array of effects considered in Chapter 9 (although as noted in the previous point the chapter is not always consistent here).

On the other hand, if we take at face value the comments that Chapter 9 is about distributional effects stemming from compliance whereas Chapter 10 is about effects stemming from changes in environmental quality, then two additional inconsistencies arise. First, the groups considered in Chapter 9 for compliance cost impacts do not align with those considered in Chapter 10 for quality changes. Second, economic parameters simultaneously affecting by both sides are not treated harmoniously. For example, land values might be affected by changes in firms' factor input demands (as noted in Chapter 9), but also by amenity effects and gentrification (as noted in Chapter 10). The *joint* effect of these two channels is ultimately what matters, but apparently the two would never be brought together.

Our tier-1 recommendation (below) addresses these inconsistencies.

The following recommendations are noted for Chapter 10:

Tier 1- Key Revisions

- The relationship between the activities described by Chapters 9 and 10 should be made clearer, especially in light of our comments on Chapter 9. SAB recommends that Chapter 9 give broader

1 guidelines on documenting a wide array of benefits and costs across groups, as currently
2 discussed in the chapter. As noted in our comments on that chapter, we also recommend that
3 EPA extend those guidelines to an analysis of net benefits across groups. In that analysis, the
4 groups may or may not include the environmental justice communities highlighted in Chapter 10.
5 Given that recommendation, and given the above comments about the inconsistencies across
6 Chapters 9 and 10, we recommend the following simple solution.
7

8 First, as suggested in our recommendations for it, Chapter 9 should give guidance on how to
9 document benefits and costs for relevant groups, stemming from compliance costs, quality
10 changes, and the joint price effects from the two. This would be Second, the very short
11 discussion of intergenerational effects, which have the quality of an afterthought in subsection
12 10.4.2, should be cut from Chapter 10 and moved to Chapter 9. Generations or age groups can
13 be considered as one example of group-specific comparison of benefits and costs. Third, with
14 these changes, then Chapter 10 can be constructed much more narrowly around guidance for a
15 separate, more modest exercise: the quality-of-the-environment effects, including health effects,
16 on two groups of specific concern: environmental justice communities and children. As part of
17 that narrowing, Section 10.2.2.2 and Text Box 10.1 can then be cut or moved to Chapter 9.
18 These changes would have the merit of mapping Chapter 9 into an analysis that addresses the
19 distributional analysis of costs and benefits, called for by Circular A-4 and other documents, in a
20 holistic way, while mapping Chapter 10 into an analysis that specifically addresses the health
21 and other environmental effects on environmental justice communities and children, as called for
22 by EO 12898, EO 13045, and other documents.
23

24 Tier 2 - Suggestions

- 25 • Because EPA's definition of environmental justice includes "Meaningful Involvement" of
26 disadvantaged groups, SAB recommends that, when comparing alternative policy approaches for
27 addressing an environmental harm, EPA include a comparative analysis of the potential for
28 ongoing input and feedback. That is, "meaningful involvement" does not just come at the stage
29 of public comments about a regulation. Different policy approaches might have different
30 opportunities for ongoing feedback.
31
- 32 • The point should be made somewhere that, with tragic exceptions, children grow to adults.
33 Thus, if a policy were enacted that improves infant health at a cost falling on adults, this would
34 benefit all generations moving forward but also impose costs on each of those generations (with
35 delay, of course). After a transitional stage, effects by age are not the same as effects by
36 generation.
37
- 38 • Section 10.2.6 should be revised as indicated above.
39
- 40 • The expression "environmental justice perspective" (e.g. p. 10-1) should not be used. It is not a
41 perspective but a topic, on which there are many perspectives.
42

43 Tier 3- Future Considerations

- 44 • The SAB has no recommendations for this tier.
45

46 **2.11. Chapter 11: Presentation of Analysis and Results.**

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1 The EPA’s charge to the SAB provided questions specific to chapters 1 – 10. As such, the SAB did not
2 perform an in-depth analysis of this chapter. The SAB did review the chapter for completeness and has
3 prepared several recommendations for improvements.
4

5 Chapter 11 calls for useful summary tables that organize information about regulatory costs and
6 benefits. Three of the tables address regulatory benefits and one combines information on benefits and
7 costs. No templates are provided for cost information. Although regulatory benefits are sometimes
8 more complicated than regulatory costs, a “Template for Regulatory Costs Checklist” should be
9 presented. The Cost Checklist should contain the conventional categories of regulatory costs
10 (compliance costs for regulated entities, adverse impacts on consumers, adverse impacts on workers, and
11 administrative costs/paperwork/reporting burdens) plus several categories of countervailing/ancillary
12 risks (public health, safety, and environmental risks induced by rulemaking action). The structure of the
13 new table could be similar to the structure of Table 11.1 Template for Regulatory Benefits Checklist,
14 with columns on whether the impact could be quantified (in natural units) and whether the impact can be
15 monetized (put in dollar terms); the final column could contain notes and references to appropriate text.
16

17 A “Template for Quantified Regulatory Costs and Ancillary Risks” should also be presented. The
18 structure of the new table could be similar to the structure of Table 11.2 – Template for Quantified
19 Regulatory Benefits, or it could combine the types of information in Tables 11.2 and 11.3 into one table.
20 If the number of summary tables needs to be reduced, it might be feasible to combine Tables 11.2 and
21 11.3 on regulatory benefits into a single table.
22

23 Compared to the previous version of the EPA Economics Guidelines, Chapter 11 of the revised
24 Guidelines was edited to reduce the emphasis on ancillary benefits (co-benefits); ancillary costs (e.g.,
25 countervailing risks) are not emphasized in this draft or the previous version. The SAB believes that the
26 text of Chapter 11 should have a strong paragraph on comprehensiveness, possibly a separate section,
27 calling for analysts to investigate, analyze and report information on the ancillary benefits and costs
28 (including countervailing risks) of rulemaking action. The natural tendency of regulatory analysts will
29 be to focus only on those benefits and costs that relate directly to the statutory purpose of the rulemaking
30 and are of concern to the regulated entities. If “tunnel vision” occurs, important ancillary impacts may
31 be ignored in the analysis. Good economic analysis includes a comprehensive assessment of ancillary
32 benefits (e.g., co-benefits) and ancillary costs (e.g., countervailing risks to human health, safety and the
33 environment) of rulemaking action. This recommendation of the Panel is consistent with the analytic
34 directions provided in OMB Circular A-4.
35

36 ***The following recommendations are noted for Chapter 11:***

37
38 Tier 1- Key Revisions

- 39 • The SAB recommends that a “Template for Regulatory Costs and Ancillary Risks Checklist” is
40 added.
- 41 • The SAB recommends that a “Template for Quantified Regulatory Costs and Ancillary Risks”
42 should be added, modeled after Table 11.2 for Quantified Regulatory Benefits.
- 43 • The narrative for Chapter 11 should include strong language calling for the analyst to investigate
44 and present information on ancillary benefits (co-benefits) and ancillary costs (including
45 countervailing risks).
46

1 Tier 2 - Suggestions

- 2 • Page 11-2 and 11-3. In the discussion of non-quantified and non-monetized impacts, several
3 parenthetical examples refer to avoided adverse health impacts even though it is often feasible to
4 quantify and monetize such impacts. It might be better to use ecological examples that are
5 difficult to quantify and/or monetize.
6
- 7 • Page 11-3, lines 1-2. “Technological innovation” is described as an important category of
8 benefit or cost. While technological innovation is important in regulatory analysis, it is not a
9 conceptually appropriate category of benefits or costs. It is an intermediate process leading to
10 benefits and costs. In this discussion of benefit and cost categories that can be described only
11 qualitatively, a more appropriate example should be provided.
12
- 13 • Page 11-3, line 16. Please mention non-quantified costs and ancillary risks as well. Here is also
14 a good place to re-emphasize ancillary benefits (co-benefits) of rulemaking action.
15
- 16 • Page 11-4. Before discussing the suggested templates in Tables 11.1 to 11.4, the reader should
17 be reminded that the templates presume that the rulemaking action is designed to achieve health
18 and environmental-protection benefits, albeit at some cost. In the case of a deregulatory action,
19 the structure of the templates may need to be reversed if the costs are foregone environmental
20 benefits and the benefits are avoided regulatory costs and ancillary risks.
21
- 22 • Page 11-10. In addition to their accepted use in CEA, there is another use of health-indices in
23 CBA that is worthy of mention. If WTP information on certain types of health impacts is not
24 available, insights about potential WTP may be gleaned by consulting health-status indices for
25 those health effects and comparing them to indices for health impacts where WTP information is
26 available. The HHS Guidelines on economic analysis provide a good discussion on this use of
27 health indices. The IOM, 2006 reference included in the draft Guidelines is also relevant.
28
- 29 • There are two sections related to uncertainty, 11.1.4 and 11.2. It may be worth consolidating the
30 two sections.
31
- 32 • Page 11-11, lines 2-4. For \$1 billion rules, the OMB requirement is for “probabilistic” analysis
33 of uncertainties, not simply quantitative analysis of uncertainties (which is readily accomplished
34 with simple sensitivity analysis).
35
- 36 • Page 11.1.4 In addition to the IEC 2004 reference, it might be useful to cite a textbook treatment
37 of uncertainty analysis such as text authored by M Granger Morgan (YEAR).
38
- 39 • Page 11-13, top. For rulemaking actions plagued with a high degree of uncertainty about costs
40 and benefits, this chapter should emphasize the importance of considering a policy alternative
41 that entails gathering more data/evidence on the key uncertainties prior to making a regulatory
42 decision. The tools of value-of-information analysis are well suited to analyzing such situations,
43 since they combine the costs/risks of delayed rulemaking (including R&D costs) and compare

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1 them to expected benefits of making the rulemaking decision based on a stronger information
2 base. Our recommendations on uncertainty in Chapter 5 should provide a foundation for the
3 brief paragraph on value-of-information analysis appropriate for Chapter 11.

4
5 Tier 3- Future Considerations

- 6 • The SAB has no recommendations for this tier.

7
8 **2.12. Appendix A: Economic Theory.**

9
10 The EPA’s charge to the SAB provided questions specific to chapters 1 – 10. As such, the SAB did not
11 perform an in-depth analysis of this appendix. Rather than updating this Appendix periodically, the
12 SAB recommends that the agency consider referring the reader to appropriate sections of well-
13 established textbooks.

14
15 *The following recommendations are noted for Appendix A:*

16
17 Tier 1- Key Revisions

- 18 • The SAB has no recommendations for this tier.

19
20 Tier 2 - Suggestions

- 21 • The SAB has no recommendations for this tier.

22
23 Tier 3- Future Considerations

- 24 • The SAB recommends that the EPA create a reference list to appropriate sections of well-
25 established textbooks.

26
27 **2.13. Appendix B: Mortality Risk Valuation Estimates.**

28
29 The EPA’s charge to the SAB provided questions specific to chapters 1 – 10. As such, the SAB did not
30 perform an in-depth analysis of this appendix. Once the agency has performed an up-to-date review of
31 the available literature, it may be appropriate to request a specialized SAB panel to review the agency's
32 new position.

33
34 *The following recommendations are noted for Appendix B:*

35
36 Tier 1- Key Revisions

- 37 • The SAB has no recommendations for this tier.

38
39 Tier 2 - Suggestions

- 40 • The SAB has no recommendations for this tier.

41
42 Tier 3- Future Considerations

- 43 • Should the EPA perform an up-to-date review of available literature, the SAB recommends that a
44 peer review of that information be conducted.

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APPENDIX A: EDITORIAL CORRECTIONS

The SAB recommends that the following editorial corrections be addressed for the final draft.

- 1 Page 1-4: In the Text Box please correct the typo within the 5th question: “. . . used in the RIA
provided to the public . . .”
- 2 Page 10-9 l. 12 contains a typo: a stray "is".
- 3 Roberts and Spence (1976), J. Pub. Ec. Cited in existing guidance but missing in reference list.

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APPENDIX B: ADDITIONAL COMMENTS