OFFICE OF MANAGEMENT AND BUDGET

Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations

AGENCY: Office of Management and Budget, Executive Office of the President.

ACTION: Notice and request for comments.

SUMMARY: OMB requests comments on the attached Draft Report to Congress on the Costs and Benefits of Federal Regulation. The Draft Report is divided into two chapters. Chapter I presents estimates of the costs and benefits of Federal regulation and paperwork with an emphasis on the major regulations issued between October 1, 2001 and September 31, 2002. Chapter II requests comments from the public in three areas: (1) Guidelines for regulatory analysis; (2) Analysis and management of emerging risks; and (3) Improving analysis of regulations to homeland security.

DATES: To ensure consideration of comments as OMB prepares this Draft Report for submission to Congress, comments must be in writing and received by OMB no later than April 3, 2003.

ADDRESSES: We are still experiencing delays in the regular mail, including first class and express mail. To ensure that your comments are received, we recommend that comments on this draft report be electronically mailed to *OIRA_BC_RPT@omb.eop.gov,* or faxed to (202) 395–7245. Comments on the OMB Draft Guidelines for the Conduct of Regulatory Analysis and the Format of Accounting Statements (Appendix C) should be e-mailed to *OIRA_ECON_GUIDE@omb.eop.gov*, or faxed, with the title ''Comments on Draft Guidelines'' identified in the transmittal page, to (202) 395–7245.

You may also submit comments to Lorraine Hunt, Office of Information and Regulatory Affairs, Office of Management and Budget, NEOB, Room 10202, 725 17th Street, NW., Washington, DC 20503.

FOR FURTHER INFORMATION CONTACT: Lorraine Hunt, Office of Information and Regulatory Affairs, Office of Management and Budget, NEOB, Room 10202, 725 17th Street, NW., Washington, DC 20503. Telephone: (202) 395–3084.

SUPPLEMENTARY INFORMATION: Congress directed the Office of Management and Budget (OMB) to prepare an annual Report to Congress on the Costs and Benefits of Federal Regulations. Specifically, Section 624 of the FY2001 Treasury and General Government Appropriations Act, also know as the ''Regulatory Right-to-Know Act,'' (the Act) requires OMB to submit a report on the costs and benefits of Federal regulations together with recommendation for reform. The Act says that the report should contain estimates of the costs and benefits of regulations in the aggregate, by agency and agency program, and by major rule, as well as an analysis of impacts of Federal regulation on State, local, and tribal government, small business, wages, and economic growth. The Act also states that the report should go through notice and comment and peer review.

John D. Graham,

Administrator, Office of Information and Regulatory Affairs.

Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulation

Executive Summary

This Draft Report to Congress on regulatory policy was prepared pursuant to the Regulatory Right-to-Know Act (Section 624 of the Treasury and General Government Appropriations Act, 2001), which requires such an account each year. It provides a statement of the costs and benefits of federal regulations and recommendations for regulatory reforms. The report will be published in its final form after revisions to this draft are made based on public comment, external peer review, and interagency review.

The major feature of this report is the estimates of the total costs and benefits of regulations reviewed by OMB. Major federal regulations reviewed by OMB from October 1, 1992 to September 30, 2002 were examined to determine their quantifiable benefits and costs. The estimated annual benefits range from $135 billion to $218 billion while the estimated annual costs range from $38 billion to $44 billion.

OMB seeks public comment on all aspects of this Draft Report. OMB is specifically interested in public comment in the following three areas:

• Guidelines for regulatory analysis. In order to make continued improvements in the quality of the regulatory analyses prepared by agencies, OIRA initiated in 2002 a process to refine the OMB guidelines for regulatory analysis. The OIRA Administrator and a member of the Council of Economic Advisers (CEA) are serving as co-chairs of this effort. OMB and CEA staff have drafted proposed revised guidelines which are presented in Appendix C of this report. We are requesting comment on these draft guidelines for regulatory analysis.

• Analysis and management of emerging risks. An Interagency Work Group on Risk Management, co-chaired by the OIRA Administrator and the Chairman of the White House Council on Environmental Quality has been formed to foster Administration-wide dialogue and coordination on the management of emerging risks to public health, safety and the environment. To assist in the Work Group's efforts, OMB requests comments on current U.S. approaches to analysis and management of emerging risks.

• Improving analysis of regulations related to homeland security. In light of the significant interest in regulations related to homeland security, OMB is seeking public comment on how to more effectively evaluate the benefits and costs of these proposals, including how agencies might better forecast the anti-terrorism benefits and the direct and indirect costs of such rules, including time, convenience, privacy, and economic productivity.

Chapter I: The Costs and Benefits of Federal Regulations

Section 624 of the FY 2001 Treasury and General Government Appropriations Act, the ''Regulatory Right-to-Know Act,'' [1] requires OMB to submit ''an accounting statement and associated report'' including:

(1) An estimate of the total annual costs and benefits (including quantifiable and nonquantifiable effects) of Federal rules and paperwork, to the extent feasible:

(A) In the aggregate;

(B) By agency and agency program; and

(C) By major rule;

(2) An analysis of impacts of Federal regulation on State, local, and tribal government, small business, wages, and economic growth; and

(3) Recommendations for reform.[2]

This chapter presents the accounting statement. It revises the benefit-cost estimates in last year's report by updating the estimates to the end of fiscal year 2002 (September 30, 2002) and including new estimates from Ocotober 1, 1992 to March 31, 1995. Our new estimates are now based on the major regulations reviewed by OMB over the last ten years. All of the

[1] 31 U.S.C. 1105 note, Pub. L. 106–554, Section 1(a)(3) [Title VI, section 624], Dec. 21, 2000, 114 Stat. 2763, 2763A–161 (see Appendix F).

[2] Recommendations for reform are discussed in Chapter II.

estimates presented in this chapter are based on agency information or transparent modifications of agency information performed by OIRA. We have not provided new information on the impacts of Federal regulation on State, local, and tribal government, small businesses, wages, and economic growth in this draft report. The 2002 Report issued in December 2002 includes discussions of these issues (see pages 41 to 46). We request public comment and any additional information on these impacts for this year's final report.

We also include in this chapter a discussion of major rules issued by independent regulatory agencies, although OMB does not review these rules under Executive Order 12866. This discussion is based on data provided by these agencies to the General Accounting Office (GAO) under the Congressional Review Act.

A. Estimates of the Total Benefits and Costs of Regulations Reviewed by OMB [3]

Table 1 presents estimates by agency of the costs and benefits of major rules reviewed by OMB over the period October 1, 2001 to September 30, 2002. We reviewed 31 final major rules over that period. These 31 rules represent less than ten percent of the 330 final rules reviewed by OMB and less than one percent of the 4,153 final rules documents published in the **Federal Register** during this 12-month period. However, OIRA believes that the costs and benefits of major rules are quantitatively more important than all other rules combined.

Of the 31 rules, 25 implemented Federal budgetary programs, which caused income transfers from one group to another. The remaining six regulations were ''social regulations'', requiring substantial additional private expenditures and/or providing new social benefits.[4] Four of these six ''social regulations'' imposed mandates on State and local entities or the private sector. The other two ''social regulations'' were enabling regulations that did not impose mandates.

Of the six ''social regulations,'' we are able to present estimates of both monetized costs and benefits for three rules.[5] We did not include the 3 other rules that did not have monetized estimates for either costs or benefits or both. Three agencies, DOE, DOT, and EPA issued 3 major regulations adding a combined $2.0 billion to $6.5 billion in annual benefits and $1.6 billion to $2.0 billion in annual costs.

TABLE 1.—ESTIMATES OF THE ANNUAL BENEFITS AND COSTS OF MAJOR FEDERAL RULES, OCTOBER 1, 2001 TO SEPTEMBER 30, 2002

[Millions of 2001 dollars]

Agency	Benefits	Costs
Energy	710	636.
Transportation	409 to 944	749 to 1,206.
Environmental Protection Agency	913 to 4,818	192.
Total	2,032 to 6,472	1,577 to 2,034.

Table 2 presents an estimate of the total costs and benefits of all regulations reviewed by OMB over the ten-year period from October 1, 1992 to September 30, 2002 that met two conditions.[6] Each rule generated costs or benefits of at least $100 million annually, and a substantial portion of its costs and benefits were quantified and monetized by the agency or, in some cases, monetized by OMB. The estimates are therefore not a complete accounting of all the costs and benefits of all regulations issued by the Federal government during this period. We have expanded the number of years covered by our estimates to ten from the six and half years presented in last year's report. We provide estimates of the cost and benefits of social regulation (health, safety and environmental regulation) for each rule for the periods covering October 1, 1992 to March 31, 1995 and October 1, 2001 to September 30, 2002 in Appendix A.[7] OMB has chosen a 10-year period for aggregation because pre-regulation estimates prepared for rules adopted more than ten years ago are of questionable relevance today. The estimates of the costs and benefits of Federal regulations over the period October 1, 1992 to September 30, 2002 are based on agency analyses subject to public notice and comments and OMB review under E.O. 12866.

In last year's report, the aggregate costs of regulations fell within the range of the estimated benefits—albeit at the lower end of the range. The aggregate benefits reported in Table 2, however, are roughly three to five times the aggregate costs and are substantially larger than the aggregate benefits reported in our 2002 report. There are two reasons for this. First, the additional rules added to cover a 10-year period included EPA's rule implementing the sulfur dioxide limits of the acid rain provisions in the 1990 Amendments to the Clean Air Act. This rule adds calculated benefits of over $70 billion per year to the aggregate benefits estimate. Second, in reviewing our estimates, we inadvertently subtracted incorrect cost estimates for EPA's rules establishing National Ambient Air Quality Standards for Ozone and Particulate Matter. This correction reduces the aggregate cost of the rules covered over the 10-year period by roughly $20 billion per year.

It is important to note that four EPA rules—two rules limiting particulate matter and NO_X emissions from heavy duty highway engines, the Tier 2 rule limiting the emissions from light duty vehicles, and the Acid Rain rule cited above—account for a substantial fraction of the aggregate benefits reported in Table 2. These four EPA rules have estimated benefits of $96 to $113 billion per year and costs of $8 to

[3] In previous reports, we presented detailed discussions about the difficulty of estimating and aggregating the costs and benefits of different regulations over long time periods and across many agencies. We do not repeat those discussions here. Our previous reports are on our Web site at <*http://www.whitehouse.gov/omb/inforeg/regpol.html*>.

[4] Rules that transfer Federal dollars among parties are not included because transfers are not social costs or benefits. If included, they would add equal amounts to benefits and costs.

[5] We used agency estimates where available. If an agency quantified estimates but did not monetize, we used standard assumptions to monetize as explained in Appendix A.

[6] We calculated Table 2 estimates by adding the estimates in Table 1 above and the estimates from Table 6 in Appendix A to Table 8 of the 2002 OMB report.

[7] Agency estimates of the cost and benefits of major regulations for October 1, 1992 to March 31, 1995 are provided in Appendix B. Appendix A contains revised estimates.

$8.8 billion per year.[8] The aggregate benefits and costs for the other 103 rules are $38 to $104 billion and $30 to $35 billion, respectively. Table 3 provides additional information on aggregate benefits and costs for select agency programs.

Based on the information released in previous reports, the total costs and benefits of all Federal rules now in effect (major and non-major, including those adopted more than 10 years ago) could easily be a factor of ten or more larger than the sum of the costs and benefits reported in Table 2. More research is necessary to provide a stronger analytic foundation for comprehensive estimates of total costs and benefits by agency and program. OMB's examination of the benefits and costs of Federal regulation supports the need for a common-sense approach to modernizing Federal regulation that involves the expansion, modification, and rescission of regulatory programs as appropriate.

TABLE 2.—ESTIMATES OF THE ANNUAL BENEFITS AND COSTS OF MAJOR FEDERAL RULES, OCTOBER 1, 1992 TO SEPTEMBER 30, 2002

[Millions of 2001 dollars]

Agency	Benefits	Costs
Agriculture	3,108 to 6,203	1,649 to 1,679.
Education	658 to 816	363 to 612.
Energy	4,704 to 4,722	2,473.
Health & Human Services	8,733 to 11,724	3,168 to 3,337.
Housing & Urban Development	527 to 601	796.
Labor	1,808 to 4,200	1,057.
Transportation	6,150 to 9,465	4,313 to 6,812.
Environmental Protection Agency	108,858 to 179,757	23,867 to 27,028.
Total	134,547 to 217,539	37,686 to 43,794.

TABLE 3.—ESTIMATES OF ANNUAL BENEFITS AND COSTS OF MAJOR FEDERAL RULES: SELECT PROGRAMS AND AGENCIES, OCTOBER 1, 1992–SEPTEMBER 30, 2002

[Millions of 2001 dollars]

Agency	Benefits	Costs
Energy: Energy Efficiency and Renewable Energy	4,704 to 4,772	2,473.
Health & Human Services: Food and Drug Administration	2,021 to 4,558	482 to 651.
Labor: Occupational Safety and Health Administration	1,808 to 4,200	1,057.
Transportation:		
National Highway Traffic Safety Administration	4,330 to 7,645	2,795 to 5,295.
Coast Guard	68	1,282.
Environmental Protection Agency:		
Office of Air	106,010 to 163,893	18,362 to 20,978.
Office of Water	891 to 8,103	2,424 to 2,937.

In order for comparisons or aggregation to be meaningful, benefit and cost estimates should correctly account for all substantial effects of regulatory actions, including potentially offsetting effects, which may or may not be reflected in the available data. We have not made any changes to agency monetized estimates other than connecting them to annual equivalents. Any comparison or aggregation across rules should also consider a number of factors which our presentation does not address. To the extent that agencies have adopted different methodologies—for example, different monetized values for effects, different baselines in terms of the regulations and controls already in place, different treatments of uncertainty—these differences remain embedded in the table 2. While we have relied in many instances on agency practices in monetizing costs and benefits, our citation of or reliance on agency data in this report should not be taken as an endorsement of all the

[8] These four EPA rules will reduce ambient levels of fine particulate matter by reducing direct PM emissions and/or the emissions of precursor pollutants like SO_2 and NO_x that contribute to the formation of fine PM. Many studies show an association between both short- and long-term exposure to fine PM and a variety of adverse health effects ranging from increases in the frequency of hospital admissions to premature mortality. There are, however, important uncertainties associated with these benefit estimates. For example key assumptions underlying the benefit estimates associated with premature mortality include the following: (1) The benefits analysis assumes there is a causal association between inhalation of fine particles and such health effects as premature mortality at exposure levels near those experienced by most Americans on a daily basis. While the biological mechanisms for this effect have not yet been definitively established, EPA has concluded that the weight of the available epidemiological and toxicological evidence supports an assumption of causality; (2) The benefits analysis assumes that all fine particles, regardless of their chemical composition, are equally toxic. This is an important assumption because fine particles from power plant emissions are chemically different from those emitted from both mobile sources and other industrial facilities. However, no clear scientific grounds exist for supporting differential effects estimates by particle type; (3) The benefits analysis assumes that the concentration-response function for fine particles is approximately linear within the range of ambient concentrations under consideration. Thus, the estimates include health benefits from reducing fine particles in areas that are in attainment with the fine particle standard and those that do not meet the standard; (4) The benefits analysis assumes that the forecasts for future emissions and associated air quality modeling are valid. The EPA's analyses are based on peer-reviewed scientific literature and up-to-date assessment tools. However such models are themselves based on an evolving understanding and research continues to provide the data necessary for model evaluation; and (5) The valuation of estimated reduction in mortality risk is largely taken from studies of the tradeoff associated with the willingness to accept risk in labor markets. Alternative estimates may, however, be more relevant for rules addressing air pollution. Further information on these benefits estimates can be found at *http://www.epa.gov/air/clearskies/tech_adden.pdf*, *http://www.whitehouse.gov/omb/inforeg/costbenefitreport1998.pdf*, *http://www.whitehouse.gov/omb/inforeg/2000fedreg-report.pdf*.

varied methodologies used to derive benefits and cost estimates.

B. Estimates of Benefits and Costs of This Year's ''Major'' Rules

In this section, we examine in detail the benefits and costs of each ''major'' rule, as required by section 624(a)(1)(C). We have included in our review those final regulations on which OMB concluded review during the 12-month period October 1, 2001 through September 30, 2002.

The statutory language that categorizes the rules we consider for this report differs from the definition of ''economically significant'' in Executive Order 12866 (section 3(f)(1)). It also differs from similar statutory definitions in the Unfunded Mandates Reform Act and subtitle E of the Small Business Regulatory Enforcement Fairness Act of 1996—Congressional Review of Agency Rulemaking. Given these varying definitions, we interpreted section 624(a)(1)(C) broadly to include all final rules promulgated by an Executive branch agency that meet any one of the following three measures:

- Rules designated as ''economically significant'' under section 3(f)(1) of Executive Order 12866;
- Rules designated as ''major'' under 5 U.S.C. 804(2) (Congressional Review Act); and
- Rules designated as meeting the threshold under Title II of the Unfunded Mandates Reform Act (2 U.S.C. 1531–1538)

Of the 31 rules received by OMB, USDA submitted four; the Veterans Administration, DOE, EPA, OMB, the Social Security Administration, and SBA each submitted one; HHS eight; The Departments of Interior, Justice, Defense, and FEMA each submitted two; and DOT five.

Social Regulation

Of the 31 economically significant rules reviewed by OMB, six are regulations requiring substantial additional private expenditures and/or providing new social benefits. Table 4 summarizes the costs and benefits of these rules and provides other information taken from rule preambles and agency RIAs. Of the six regulations received by OMB, EPA and DOE each submitted one, and DOI and DOT each submitted two. Agency estimates and discussion are presented in a variety of ways, ranging from a mostly qualitative discussion—for example, the NHTSA light truck corporate average fuel economy (CAFE) standard—to a more complete benefit-cost analysis, such as DOE's central air conditioner rule.

1. Benefits Analysis

Agencies monetized at least some benefit estimates for five of the six rules. In the case of EPA's recreational engines rule, the agency provides some monetized benefit estimates, but discusses other benefits qualitatively. In one case—NHTSA's tire pressure monitoring systems (TPMS) rule—the agency did not monetize all of the quantified benefits. In another case—NHTSA's CAFE rule—the agency did not report any quantified or monetized benefit estimates.

2. Cost Analysis

For three of the six rules, agencies provided monetized cost estimates. These include DOE's air conditioner rule, NHTSA's TPMS rule and EPA's recreational vehicle rule. For the remaining three rules, both DOI migratory bird hunting rules and NHTSA's CAFE rule, the agencies did not estimate costs.

3. Net Monetized Benefits

Three of the six rules provided at least some monetized estimates of both benefits and costs. Of these, the estimated monetized benefits of both the DOE air conditioner rule and the EPA recreational engine rule exceed the estimated monetized costs. The magnitude of the net benefits varies from $75 million per year for the air conditioner rule to as much as $4.6 billion for the recreational engine rule. One rule, NHTSA's TPMS rule, has negative net monetized benefits ranging from approximately $706 to $862 million per year.

4. Rules Without Quantified Effects

One rule, NHTSA's CAFE rule, is classified as economically significant even though the agency did not provide any quantified estimates of their effects.

TABLE 4.—SUMMARY OF AGENCY ESTIMATES FOR FINAL RULES 10/01/2001–9/30/02

[As of Date of Completion of OMB Review]

Agency	Rule	Benefits	Costs	Other Information
DOE	Energy Conservation Standards for Central Air Conditions and Heat Pumps.	$9.1 billion (present value) in energy savings between 2006 and 2030.	$7.3 billion (present value) for purchases between 2006 and 2030.	Monetized benefit and cost values are obtained from the ''National Energy Savings/Net Present Value/Shipments'' spreadsheet, available on DOE's web site: *http://www.eren.doe.gov/buildings/codes_standards/applbrf/central_air_conditioner_3.html* DOE projects a cumulative reduction in nitrogen oxide emissions of 119.3 thousand metric tons (undiscounted) over the period 2006–2030 and a cumulative reduction in carbon dioxide equivalent emissions of 53.8 million metric tons (undiscounted) over the period 2006–2030 [DOE Technical Support Document Appendix M, Table M.9].
DOI	Early Season Migratory Bird Hunting Regulations 2002–2003.	$50 million to $192 million/yr.	Not estimated	The analysis was based on the 1996 National Hunting and Fishing Survey and the U.S. Department of Commerce's County Business Patterns, from which it was estimated that migratory bird hunters would spend between $429 million and $1,084 million at small businesses [67 FR 54704]. The listed benefits represent estimated consumer.
DOI	Late-Season Migratory Bird Hunting Regulations 2002–2003.	$50 million to $192 million/yr.	Not estimated	The analysis was based on the 1996 National Hunting and Fishing Survey and the U.S. Department of Commerce's County Business Patterns, from which it was estimated that migratory bird hunters would spend between $429 million and $1,084 million at small businesses [67 FR 54704]. The listed benefits represent estimated consumer.

TABLE 4.—SUMMARY OF AGENCY ESTIMATES FOR FINAL RULES 10/01/2001–9/30/02—Continued

[As of Date of Completion of OMB Review]

Agency	Rule	Benefits	Costs	Other Information
DOT	Light Truck Average Fuel Economy Standard, Model Year 2004.	Not estimated	Not estimated	''* * * [T]he agency has been operating under a restriction on the use of appropriations for the last six fiscal years. The restriction has prevented the agency from gathering and analyzing data relating to fuel economy capabilities and the costs and benefits of improving the level of fuel economy. Particularly since that restriction was lifted only on December 18, 2001, the agency has been unable to prepare a separate economic analysis for this rulemaking. The agency notes, however, that the standard it is setting for the 2004 model year will not make it necessary for the manufacturers with a substantial share of the market to change their product plans.'' [67 FR 16059]
DOT	Tire Pressure Monitoring Systems (TPMS).	79–124 fatalities and 5,176– 8,722 injuries prevented per year; $43–$344 million per year in fuel savings and reduced tire wear.	$749–$1,206 million/yr	Unquantified Benefits: ''The agency cannot quantify the benefits from a reduction in crashes associated with hydroplaning and overloading vehicles. The primary reason that the agency has been unable to quantify these benefits is the lack of crash data indicating tire pressure and how often these conditions are the cause or contributing factors in a crash. The agency does not collect tire pressure in its crash investigations. NHTSA also has not been able to quantify the benefits associated with reductions in property damage and travel delays that will result from fewer crashes or reductions in the severity of crashes.'' [67 FR 38739] Unquantified Costs: ''The agency anticipates that there may be other maintenance costs for both direct and indirect TPMS. For example, with indirect TPMSs, there may be problems with wheel speed sensors and component failures. With direct TPMSs, the pressure sensors may be broken off when tires are changed. The agency requested comments on this issue in the NPRM, but received none. Without estimates of these maintenance problems and costs, the agency is unable to quantify their impact. The agency also notes that in order to benefit from the TPMS, drivers must respond to a warning by re-inflating their tires. To accomplish this, most drivers will either make a separate trip to a service station or take additional time to inflate their tires when they are at a service station for fuel. The process of checking and re-inflating tires is relatively simple, and probably would take from three to five minutes. The time it would take to make a separate trip to a service station would vary depending on the driver's proximity to a station at the time he or she was notified.'' 67 FR 38741]
EPA	Control of Emissions From Nonroad Large Spark-Ignition Engines, and Recreational Engines.	$410 million/yr. in reduced engine operation costs; $900 million to $7.88 billion in air quality benefits in calendar year 2030.	$192 million/yr	EPA also lists a variety of other benefit categories which it was not able to quantify or monetize, ranging from infant mortality to damage to urban ornamental plants. [67 FR 68328].

Transfer Regulations

Of the 31 economically significant rules reviewed by OMB, Table 5 lists the 25 that implement Federal budgetary programs. The budget outlays associated with these rules are ''transfers'' to program beneficiaries. Of the transfer rules, HHS promulgated eight rules, most of which implement Medicare and Medicaid policy. Four are USDA rules. Of the four, three are crop assistance and disaster aids for farmers and one is a food stamp program rule. The Department of Transportation issued three transfer rules. The Departments of Defense, Justice, and the Federal Emergency Management Administration issued two each. The Social Security Administration, Veterans Administration, Small Business Administration and Office of Management and Budget each promulgated one rule.

TABLE 5.—AGENCY TRANSFER RULES: 10/01/01 TO 9/30/02

[As of date of completion of OMB review]

Office of Management and Budget (OMB)

Regulation for Air Carrier Guaranteed Loan Program.

Dept. of Agriculture (USDA)

2000 Crop Agricultural Disaster and Market Assistance.
2002 Farm Bill Regulations: Sugar Program.
Peanut Quota Buyout Program.
Work Provisions of the PRWORA of 1996 and the Food Stamp Provisions of the Balance Budget Act of 1997.

Dept. of Defense

CHAMPUS/TRICARE: Partial Implementation of Pharmacy Benefits Programs; NDAA for FY 2001.
TRICARE: Sub-Acute Care Program; Uniform Skilled Nursing Benefit; Home Healthcare Benefit; Medicare Payment Methods for Skilled Nursing Facilities.

Dept. of Health and Human Services (HHS)

Contraception and Infertility Research Loan Repayment Program.
Medicare Program: Revisions to Payment Policies and 5-Year Review and Adjustments to the Relative Value Units Under the Physician Fee Schedule for CY 2002.
Medicare Program: Prospective Payment System for Hospital Outpatient Services for CY 2002 and Pro Rata Reduction on Transitional Pass-Through Payments.
Medicaid Program: Modification of the Medicaid Upper Payment Limit for Non-State, Government-Owned or Operated Hospitals.
Medicare Program: Modifications to Managed Care Rules Based on Payment Provisions in BIPA and Technical Corrections.
Medicare Program: Notice of Modification of Beneficiary Assessment Requirements for Skilled Nursing Facilities.
Changes to Hospital Inpatient Prospective Payment Systems and FY 2003 Rate.
Medicaid Managed Care; New Provisions.

Social Security Administration

Revised Medical Criteria for Determination of Disability Musculoskeletal System and Related Criteria.

Department of Justice

Claims Under the Radiation Exposure Compensation Act Amendments of 2000.
September 11 Victim Compensation Fund of 2001.

Dept. of Transportation

Procedures for Compensation of Air Carriers.
Imposition and Collection of Passenger Civil Aviation Security Fees in the Wake of September 11.
Aviation Security Infrastructure Fees.

Veterans Administration

Diseases Specific to Radiation-Exposed Veterans.

Federal Emergency Management Administration

Assistance to Firefighters Grant Program.
Disaster Assistance; Federal Assistance to Individuals and Households.

Small Business Administration

Disaster Loan Program.

Major Rules for Independent Agencies

The congressional review provisions of the Small Business Regulatory Enforcement Fairness Act (SBREFA) require the General Accounting Office (GAO) to submit reports on major rules to the committees of jurisdiction, including rules issued by agencies not subject to Executive Order 12866 (the ''independent'' agencies). We reviewed the information on the costs and benefits of major rules contained in GAO reports for the period of October 1, 2001 to September 30, 2002. GAO reported that three independent agencies issued eight major rules during this period. Two agencies did not conduct benefit-cost analyses. One agency considered benefits and costs of the rules. OIRA lists the agencies and the type of information provided by them (as summarized by GAO) in Table 6. The Securities and Exchange Commission consistently considered benefits and costs in their rulemaking processes while the Federal Communications Commission and the Nuclear Regulatory Commission did not prepare benefit-cost analyses.

In comparison to the agencies subject to E.O. 12866, the independent agencies provided relatively little quantitative information on the costs and benefits of the major rules. As Table 6 indicates, three of the eight rules included some discussion of benefits and costs. Three of the eight regulations had monetized cost information; one regulation monetized benefits. It is difficult to discern, however, whether the rigor and the extent of the analyses conducted by the independent agencies are similar to those of the analyses performed by agencies subject to the Executive Order.

TABLE 6.—RULES FOR INDEPENDENT AGENCIES (OCTOBER, 2001–SEPTEMBER, 2002)

Agency	Rule	Information on benefits or costs	Monetized benefits	Monetized Costs
FCC	Broadcast Services; Digital Television	No	No	No.

TABLE 6.—RULES FOR INDEPENDENT AGENCIES (OCTOBER, 2001–SEPTEMBER, 2002)—Continued

Agency	Rule	Information on benefits or costs	Monetized benefits	Monetized Costs
FCC	Ultra-Wideband Transmission Systems	No	No	No.
FCC	Assessment and Collection of Regulatory Fees for Fiscal Year 2002	No	No	No.
FCC	Order to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Authorize Subsidiary Terrestrial Use of the 12.2–12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and in Re-Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. in the 12.2–12.7 GHz Band.	No	No	No.
NRC	Revision of Fee Schedules; Fee Recovery for FY 2002	No	No	No.
SEC	Books and Records Requirements for Brokers and Dealers Under the Securities Exchange Act of 1934.	Yes	Yes	Yes.
SEC	Certification of Disclosure in Companies' Quarterly and Annual Reports	Yes	No	Yes.
SEC	Acceleration of Periodic Report Filing Dates and Disclosure Concerning Web Site Access to Reports.	Yes	No	Yes.

Chapter II. Developing Better Regulation

In addition to estimates of the cost and benefits of Federal rules and paperwork, the Regulatory Right-to-Know Act requires OMB to publish ''recommendations for reform.'' In response to this requirement, OMB seeks public comment in the following three areas.

A. Guidelines for Regulatory Analysis

The evaluation of both the benefits and costs of alternative options through regulatory analysis helps agency policymakers arrive at sound regulatory decisions and also helps the public, Congress, and the courts understand those decisions. Although the preparation of such an analysis may require significant investments of agency staff and resources, carefully completed analyses will result in well-designed regulations and larger net benefits to society as a whole. To help support the development of better analysis, OMB has provided guidance to the agencies since the 1980s on how to conduct regulatory analysis. The current OMB guidelines were issued in 1996 as a ''best practices'' document and were revised and issued as guidance in 2000.

In order to make continued improvements in the quality of the regulatory analyses prepared by agencies, OIRA initiated in 2002 a process to refine these guidance documents. The OIRA Administrator and a member of the Council of Economic Advisers (CEA) are serving as co-chairs of this effort. OMB and CEA staff have drafted proposed revised guidelines which are presented in Appendix C. Through these proposed guidelines, we seek to establish more uniform analytic guidance for the agencies to follow in preparing their regulatory analysis. We will also incorporate new insights and recent innovations in what constitutes a good analysis. Finally, we expect the guidelines to increase the transparency of the analysis of prospective regulations to both technical and nontechnical readers.

While these proposed guidelines include some additional requirements on the agencies in performing RIAs, we believe that adherence to the proposed revisions will yield improvements in the information provided by these analyses. Improved analyses will strengthen the regulatory development process, resulting in better designed regulations and potentially large net benefits to society as a whole.

The key changes in the proposed guidelines include the following:

- The proposal encourages agencies to perform both cost-effectiveness analysis and benefit-cost analysis of major rules because the two techniques offer regulators somewhat different but useful perspectives. In addition, however, we recognize that cost-effectiveness analysis will be feasible in certain situations where a benefit-cost analysis may not be feasible.
- The proposal recommends that agencies report analytic results based on two discount rates—3 percent and 7 percent—for major rules whose effects will be felt primarily within this generation (*i.e.*, the next 20 or 30 years). If benefits and costs are expected to last beyond the current generation, the proposal permits additional sensitivity analysis with discount rates as low as 1 percent.
- The proposal requires agencies to support rulemakings with formal probabilistic analysis of the key scientific and economic uncertainties regarding costs and benefits for rules with economic effects that exceed more than $1 billion per year. In particular, the analysis must present a probability distribution for the estimated benefits and costs, unless the benefits and costs are known with a high degree of certainty.

The draft guidelines are being released today for a 60-day public comment period as well as independent peer review by leading academic experts in the field of regulatory analysis. We also plan to conduct an interagency review of the draft guidelines following public and peer review comments.

We will continue to use our current guidance until we complete this review process and publish revised guidelines.

B. Request for Comment on U.S. Approaches to Analysis and Management of Emerging Risks

Regulators often must decide on an appropriate course of action to protect public health, safety or the environment before science has resolved all the key factual questions about a potential hazard. The appropriate level of precaution in risk assessment and management is complicated by the need to balance efforts to mitigate these potential risks with countervailing risks that may arise from other sources. For example, policies to facilitate the growth of the diesel-engine market may be desirable from a global environmental and energy security perspective since diesel offers significant fuel efficiency advantages over gasoline-powered vehicles, and would likely lead to less reliance on importation of foreign oil and reduce the emission of greenhouse gases. However, diesel fuels pose greater risk to public health and environment from smog and soot caused by relatively higher emission of particles and nitrogen dioxide than conventional gasoline.

U.S. regulators rely on various science-based precautionary approaches in assessing potential hazards and taking protective actions. These

approaches have evolved over time and reflect statutory requirements, agency specific policy decisions, and advancements in scientific understanding. For purposes of collecting and analyzing current risk assessment and management practices in federal agencies, with an emphasis on the role of precaution in risk policy and regulation, the Administration has formed an Interagency Work Group on Risk Management co-chaired by James L. Connaughton, Chairman of the White House Council on Environmental Quality and John D. Graham, Administrator, Office of Information and Regulatory Affairs, Office of Management and Budget. The Work Group includes representatives from the Department of Agriculture, the Department of Commerce, the Department of Health and Human Services, the Department of Interior, the Environmental Protection Agency, and the Office of Science and Technology Policy.

To assist in the Work Groups efforts, OMB requests comments for the next 60 days on current U.S. approaches to analysis and management of emerging risks. Specifically, we seek public input on:

- Ways in which ''precaution'' is embedded in current risk assessment procedures through ''conservative'' assumptions in estimation of risk, or through explicit ''protective'' measures in management decisions as required by statutory requirements as well as agency judgments.
- Examples of approaches in human and ecological risk assessment and management methods addressed by U.S. regulatory agencies (*e.g.*, consumer product safety, drug approval, pesticide registration, protection of endangered species) which appear unbalanced.
- How the U.S. balances precautionary approaches to health, safety and environmental risks with other interests such as economic growth and technological innovation.

C. Request for Comment on Improving the Analysis of Regulations Related to Homeland Security

In last year's final Report to Congress, OMB noted that 58 significant new federal regulations had been enacted in the aftermath of September 11th to protect national security and provide post-attack assistance. As an integral part of the expedited issuance of these rules, OIRA conducted its full regulatory review and coordination function under Executive Order 12866. These efforts made sure that all the rules related to September 11th received priority attention from the appropriate reviewers, and that the Administration's best solutions to respond to potential terrorist attacks were implemented.

Looking to the future, OMB expects additional homeland-security proposals from federal agencies covering concerns ranging from airline safety and immigration to food safety. For example, USDA and HHS will propose new regulations required to implement the Bioterrorism Preparedness and Control Act of 2002. Similarly, the Department of Homeland Security will face major challenges in developing sensible regulations covering many facets of American society. In light of the significant interest in these regulations, OMB is seeking public comment for the next 60 days on how to more effectively evaluate the benefits and costs of these proposals. OMB seeks comment on how agencies might assess the probability of future terrorist attacks and the likely damages, and the resulting effectiveness of new federal regulations in preventing future attacks, reducing America's vulnerability, or mitigating the damage of attacks which do occur. OMB seeks comment on how agencies might better identify, quantify and weigh the direct and indirect costs of such rules, including impacts on time, convenience, privacy and economic productivity. OMB also seeks comment on how evaluation of such regulation could include auxiliary benefits not directly related to the homeland security purpose of the regulation. OMB's request for comment is concerned with these issues as they apply to future rulemakings and is not intended to address a specific rulemaking.

Appendix A.—Calculations of Benefits and Costs: Explanation

Chapter I presents estimates of the annual costs and benefits of selected final major regulations reviewed by OMB between October 1, 1992 and September 30, 2002. The explanation of the calculations for the major rules reviewed by OMB between April 1, 1995 and March 31, 1999 can be found in Chapter IV of our 2000 report (OMB 2000). Table 19, Appendix E, of the 2002 Report presents OIRA's estimates of the benefits and costs of the 20 individual rules reviewed between April 1, 1999 and September 30, 2001. All benefit and cost estimates were adjusted to 2001 dollars.

In assembling estimates of benefits and costs, OIRA has:

(1) Applied a uniform format for the presentation of benefit and cost estimates in order to make agency estimates more closely comparable with each other (for example, annualizing benefit and cost estimates); and

(2) Monetized quantitative estimates where the agency has not done so (for example, converting Agency projections of quantified benefits, such as, estimated injuries avoided per year or tons of pollutant reductions per year to dollars using the valuation estimates discussed below).

The adoption of a uniform format for annualizing agency estimates allows, at least for purposes of illustration, the aggregation of benefit and cost estimates across rules. While OIRA has attempted to be faithful to the respective agency approaches, the reader should be cautioned that agencies have used different methodologies and valuations in quantifying and monetizing effects. Thus, this aggregation involves the assemblage of benefit and cost estimates that are not comparable.

TABLE 7.—ESTIMATE OF BENEFITS AND COSTS OF 47 MAJOR RULES OCTOBER 1, 1992 TO MARCH 31, 1995

[Millions of 2001 dollars]

Regulation	Agency	Benefits	Costs	Explanation
Nutrition Labeling of Meat and Poultry Products.	USDA—FSIS	205	25–32	Present value estimates amortized over 20 years.
Food Labeling (combined analysis of 23 individual rules).	HHS—FDA	438–2,637	159–249	Present value estimates amortized over 20 years.
Real Estate Settlement Procedures	HUD	258–332	135	
Manufactured Housing Wind Standards ...	HUD	79	511	
Confined Spaces	DOL–OSHA	540	250	We valued each fatality at $5 million and each lost-workday injury at $50,000. We did not value non-lost-workday injuries.

TABLE 7.—ESTIMATE OF BENEFITS AND COSTS OF 47 MAJOR RULES OCTOBER 1, 1992 TO MARCH 31, 1995—Continued

[Millions of 2001 dollars]

Regulation	Agency	Benefits	Costs	Explanation
Occupational Exposure to Asbestos	DOL–OSHA	92	448	We assumed a 20-year latency period between exposure and the onset of cancer or asbestosis and valued each death and each case of asbestosis at $5 million.
Vessel Response Plans	DOT–Coast Guard.	8	324	Present values amortized over 30 years. We valued each barrel of oil not spilled at $2,000.
Double-Hull Standards	DOT–Coast Guard.	15	641	Present values amortized over 30 years. We valued each barrel of oil not spilled at $2,000.
Controlled Substances and Alcohol Use and Testing.	DOT–FHWA	1,539	114	
Prevention of Prohibited Drug Use in Transit Operations.	DOT	107	37	Present values amortized over 10 years.
Stability Control of Medium and Heavy Vehicles During Braking.	DOT–NHTSA	1,650–2,539	694	We valued each ''equivalent fatality'' at $3 million.
Oil and Gas Extraction	EPA	35–129	35	First-year costs amortized costs over 15 years and added to annual (15th year) costs.
Acid Rain Permits Regulations	EPA	76,854–77,206	1,109–1,871	We valued SO_2 reductions at $7,300 per ton.
Vehicle Inspection and Maintenance (I/M)	EPA	219–992	671	We used the estimates of and cost and emission reductions of the new I/M program compared to the baseline of no I/M program. We valued VOC reductions at $520–$2360 per ton. We did not assign a value to CO reductions.
Evaporative Emissions from Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles..	EPA	243–1,104	161–248	We assumed the VOC emission reductions began in 1995 and rise linearly until 2020, after which point they remain at the 2020 level. Annualizing this stream results in an average of 468,000 tons per year. We valued these tons at $520–$2360 per ton.
Onboard Diagnostic Systems	EPA	421–2,383	226	Emission reductions and costs amortized over 15 years. We valued VOC reductions at $520–$2360 per ton and NO_X reductions at $700–$4900 per ton.
Phase II Land Disposal Restrictions	EPA	26	240–272	We valued each cancer case at $5 million.
Phase-out of Ozone-Depleting Chemicals and Listing of Methyl Bromide.	EPA	1,260–3,993	1,681	Present values amortized over 16 years.
Reformulated Gasoline	EPA	184–637	1,085–1,395	Estimates are for Phase II, which include Phase I benefits and costs. We used the benefit estimates that assume the enhanced I/M program is in place. We valued VOC reductions at $520–$2360 per ton and NO_X reductions at $700–$4900 per ton. We valued each cancer case at $5 million. We assumed the phase II aggregate costs are an additional 25 percent of the Phase I costs based on EPA's reported per-gallon cost estimates.
Acid Rain NO_X Title IV CAAA	EPA	661–4,725	372	Values are for Phase II. We valued NO_X reductions at $350–$2500 per ton.
Hazardous Organic NESHAP	EPA	520–2,360	292–333	We valued VOC emissions at $520–$2360 per ton and NO_X emissions (which are a cost in this instance) at $350–$2500 per ton. We did not value changes in CO emissions.
Refueling Emissions from Light-Duty Vehicles.	EPA	148–673	33	We assumed Stage II controls will remain in place and valued VOC emissions at $520–$2360 per ton.

TABLE 7.—ESTIMATE OF BENEFITS AND COSTS OF 47 MAJOR RULES OCTOBER 1, 1992 TO MARCH 31, 1995—Continued

[Millions of 2001 dollars]

Regulation	Agency	Benefits	Costs	Explanation
Non-Road Compression Ignition Engines	EPA	412–2,881	29–70	We annualized the NO_X emissions which yielded an average annual emission reduction of 588,000 tons beginning in 2000. We valued NO_X emissions at $700–$4900 per ton.
Bay/Delta Water Quality Standards	EPA	2–26	37–248	
Deposit Control Gasoline	EPA	374–1,480	197	We valued estimates of combined emission reductions at $520–$2360 per ton. Present value cost estimates amortized over 5 years.
Total		86,290–106,708	9,506–11,087	

TABLE 8.—ESTIMATE OF BENEFITS AND COSTS OF 3 MAJOR RULES, OCTOBER 1, 2001 TO SEPTEMBER 30, 2002

[Millions of 2001 dollars]

Regulation	Agency	Benefits	Costs	Explanation
Energy Conservation Standards for Central Air Conditioners and Heat Pumps.	DOE	710	636	Present value estimates amortized over 24 years. We valued NO_X emission reductions at $350–$2500 per ton.
Tire Pressure Monitoring Systems (TPMS)	DOT	409–944	749–1,206	We valued each equivalent fatality (see p. iv of the Executive Summary of the Final Economic Assessment) at $3 million.
Control of Emissions From Nonroad Large Spark-Ignition Engines, and Recreational Engines.	EPA	913–4,818	192	We amortized the benefit estimates in proportion to the estimated NO_X emission reductions. The lower end of the range reflects the alternative approach to valuing benefits of EPA rules discussed elsewhere.
Total		2,032–6,472	1,577–2,034	

Assumptions: 7 percent discount rate unless another rate explicitly identified by the agency. For DOL: $5 million VSL assumed for deaths averted when not already quantified. Injuries averted valued at $50,000 from Viscusi.[9] All values converted to 2001 dollars. All costs and benefits stated on a yearly basis.

[9] W. Kip Viscusi, Fatal Tradeoffs: Public & Private Responsibilities for Risk. New York, NY, Oxford University Press, 1992, p. 65.

Valuation Estimates for Regulatory Consequences [10]

Agencies continue to take different approaches to monetizing benefits for rules that affect small risks of premature death. As a general matter, we continue to defer to the individual agencies' judgment in this area. In cases where the agency both quantified and monetized fatality risks, we have made no adjustments to the agency's estimate. In cases where the agency provided a quantified estimate of fatality risk, but did not monetize it, we have monetized these estimates in order to convert these effects into a common unit.

The following is a brief discussion of OIRA's valuation estimates for other types of effects that agencies identified and quantified, but did not monetize. As a practical matter, the aggregate benefit and cost estimates are relatively insensitive to the values we have assigned for these rules because the aggregate benefit estimates are dominated by those rules where EPA provided quantified and monetized benefit and cost estimates.

Injury. For NHTSA's rules, we adopted NHTSA's approach of converting nonfatal injuries to ''equivalent fatalities.'' These ratios are based on NHTSA's estimates of the value individuals place on reducing the risk of injury of varying severity relative to that of reducing risk of death.[11] For the OSHA rules, we monetized only lost workday injuries using a value of $50,000 per injury averted.

I. Change in Gasoline Fuel Consumption. We valued reduced gasoline consumption at $.80 per gallon pre-tax. This equates to retail (at-the-pump) prices in the $1.10–$1.30 per gallon range.

II. Reduction in Barrels of Crude Oil Spilled. OIRA valued each barrel prevented from being spilled at $2,000. This is double the sum of the most likely estimates of environmental damages plus cleanup costs contained in a published journal article [Brown and Savage, ''The Economics of Double-Hulled Tankers,'' Maritime Policy and Management, Volume 23(2), 1996, pages 167–175].

III. Change in Emissions of Air Pollutants. We used estimates of the benefits per ton for reductions in hydrocarbon and nitrogen oxide emissions derived from recent EPA regulatory analyses, as follows (1996$):

Hydrocarbon: $520 and $2360 per ton
Nitrogen Oxide (stationary): $350 and $2500 per ton
Nitrogen Oxide (mobile): $700 and $4900 per ton
Sulfur Dioxide: $7300 per ton

The estimates for reductions in hydrocarbon emissions were obtained from EPA's RIA for the 1997 rule revising the primary NAAQS for ozone and fine PM. OIRA has revised the estimates for reductions in NO_X emissions to reflect a range of estimates from recent EPA analyses for several rules and for proposed legislation. In particular, OIRA has adopted different benefit transfer estimates for NO_X reductions from stationary sources (*e.g.*, electric utilities) and from mobile sources. EPA believes that there are a number of reasons to expect that reductions in NO_X emissions from utility sources achieve different air quality

[10] The following discussion updates the monetization approach used in previous reports and draws on examples from this and previous years.

[11] National Highway Traffic Safety Administration, *The Economic Cost of Motor Vehicle Crashes, 1994,* Table A–1. *http://www.nhtsa.dot.gov/people/economic/ecomvc1994.html.*

improvements relative to reductions from ground-level mobile sources. For example, mobile source tailpipe emissions are located in urban areas at ground level (with limited dispersal) while electric utilities emit NO_X from ''tall stacks'' located in rural (remote) locations with substantial geographic dispersal (Letter to Don Arbuckle, Deputy Administrator, OIRA from Tom Gibson, Associate Administrator, Office of Policy, Economics and Innovation, EPA, May 16, 2002.) There remain considerable uncertainties with the development of these estimates. The discussion below outlines the various EPA analyses serving as the basis for the NO_X benefit transfer values presented above and discusses the uncertainties that attend these estimates.

Analysis of recent EPA rules yield several estimates for the NO_X benefits per ton from electric utility sources. (See the Regulatory Impact Analyses for the ''NO_X SIP Call'' and the Section 126 rules, available on the Web at *http://www.epa.gov/ttn/ecas/econguid.html.* In addition, see Memo to NSR Docket from Bryan Hubbell, Senior Economist, Innovative Strategies and Economics Group, EPA.) Based on these studies, the upper end of the range for the benefits of NO_X reductions from stationary sources (electric utilities) is $2500 per ton. These studies also developed estimates for the benefits associated with reductions in SO_2 from electric utilities. Based on an analysis outlined in a June 20, 2001 EPA memo to the file, ''Benefits Associated with Electricity Generating Emissions Reductions Realized Under the NSR Program,'' we used $7300 per ton SO_2 emissions for the 1992 EPA Acid Rain rule.

For mobile sources, EPA recently published the final Tier 2/Gasoline Sulfur rule RIA (EPA, 1999) and Heavy Duty Engine/Diesel Fuel RIA (EPA, 2000). For the Tier 2 rule, which affects light-duty vehicles, NO_X reductions account for around 90 percent of PM precursor emissions and 86 percent of ozone precursor emissions. Based on the final Tier 2/Gasoline Sulfur RIA, EPA estimates that NO_X reductions will yield benefits of $4,900/ton (1996$). EPA believes this analysis provides a more appropriate source for the NO_X benefit transfer value for mobile sources. (Letter from Tom Gibson, pp. B2 and B3, May 16, 2002.) Additional details on the Tier 2 benefits analysis are available in the Tier 2/Sulfur Final Rulemaking RIA, available on the Web at *http://www.epa.gov/oms/fuels.htm.*

The Heavy Duty Engine/Diesel Fuel benefits analysis examined the impacts in 2030 of reducing SO_2 emissions by 141,000 tons and NO_X emissions by 2,750 thousand tons, as well as a 109,000 ton reduction in direct PM emissions. Based on this analysis, EPA estimates a value for NO_X reductions of $10,200/ton in 2030. (Letter from Tom Gibson, p. B3, May 16, 2002.) Complete details of the emissions, air quality, and benefits modeling conducted for the HD Engine/Diesel Fuel Rule can be found at *http://www.epa.gov/otaq/diesel.htm* and *http://www.epa.gov/ttn/ecas/regdata/tsdhddv8.pdf.* Because the Heavy Duty Engine/Diesel Fuel estimate includes an adjustment for income growth out to 2030 and involves reductions in several PM-related pollutants, OIRA has adopted a value of $4900 per ton from EPA's analysis of the Tier 2 rule as a benefits transfer value for reductions in NO_X emissions from mobile sources.

Reductions in the risk of premature mortality dominate the benefits estimates in all of these analyses. The size of the mortality risk estimates from the underlying epidemiological studies, the serious nature of the effect itself, and the high monetary value ascribed to prolonging life make mortality risk reduction the most important health endpoint quantified in these analyses.[12] Because of the importance of this endpoint and the considerable uncertainty among economists and policymakers as to the appropriate way to value reductions in mortality risks, EPA has developed alternative estimates for its ''Clear Skies'' legislation that show the potential importance of some of the underlying assumptions. (See ''Human Health and Environmental Benefit Achieved by the Clear Skies Initiative'' at *http://www.epa.gov/clearskies.*) OIRA has used this analysis to identify an alternative estimate of the benefits from NO_X reductions. In its Clear Skies analysis, EPA presented alternative benefits estimates of $14 billion and $96 billion per year in 2020, or a difference in the estimates of roughly a factor of seven.[13] Using this ratio, an alternative estimate of the benefits of NO_X reductions from stationary sources would be $350 per ton from stationary sources and $700 per ton from mobile sources.

OIRA recognizes that there are potential problems and significant uncertainties that are inherent in any benefits analysis based on $/ton benefit transfer techniques. The extent of these problems and the degree of uncertainty depends on the divergence between the policy situation being studied and the basic scenario providing the benefits transfer estimate. Examples of other factors include sources of emissions, meteorology, transport of emissions, initial pollutant concentrations, population density, and population demographics, such as the proportion of elderly and children and baseline incidence rates for health effects. Because of the uncertainties associated with benefits transfer, OIRA decided not to include three mobile source rules that are projected to achieve substantial reductions in SO_2 and PM emissions that OIRA included in previous years in the monetized estimates presented in Tables 5 and 6 of the 2002 Report.[14]

Adjustment for Differences in Time Frame Across These Analyses

Agency estimates of benefits and costs cover widely varying time periods. The differences in the time frames used for the various rules evaluated generally reflect the specific characteristics of individual rules such as expected capital depreciation periods or time to full realization of benefits. In order to allow us to provide an aggregate estimate of benefits and costs, we developed benefit and cost time streams for each of the rules. Where agency analyses provide annual or annualized estimates of benefits and costs, we used these estimates in developing streams of benefits and costs over time. Where the agency estimate provided only annual benefits and costs for specific years, we used a linear interpolation to represent benefits and costs in the intervening years.[15]

Further Caveats

In order for comparisons or aggregation to be meaningful, benefit and cost estimates should correctly account for all substantial effects of regulatory actions, including potentially offsetting effects, which may or may not be reflected in the available data. We have not made any changes to agency monetized estimates. To the extent that agencies have adopted different monetized values for effects—for example, different values for a statistical life or different discounting methods—these differences remain embedded in the tables. Any comparison or aggregation across rules should also consider a number of factors which our presentation does not address. For example, these analyses may adopt different baselines in terms of the regulations and controls already in place. In addition, the analyses for these rules may well treat uncertainty in different ways. In some cases,

[12] There are several key assumptions underlying the benefit estimates for reductions in NO_X emissions, including:

1. Inhalation of fine particles is causally associated with premature death at concentrations near those experienced by most Americans on a daily basis. While no definitive studies have yet established any of several potential biological mechanisms for such effects, the weight of the available epidemiological evidence supports an assumption of causality.

2. All fine particles, regardless of their chemical composition, are equally potent in causing premature mortality. This is an important assumption, because fine particles from power plant emissions are chemically different from directly emitted fine particles from both mobile sources and other industrial facilities, but no clear scientific grounds exist for supporting differential effects estimates by particle type.

3. The concentration-response function for fine particles is approximately linear within the range of outdoor concentrations under policy consideration. Thus, the estimates include health benefits from reducing fine particles in both attainment and non-attainment regions.

4. The forecasts for future emissions and associated air quality modeling are valid.

5. The valuation of the estimated reduction in mortality risk is largely taken from studies of the tradeoff associated with the willingness to accept risk in the labor market.

[13] The difference between the estimates reflects several assumptions, including differences in the estimation and valuation of mortality risk and the valuation of a reduction in the incidence of chronic bronchitis.

[14] These are: Municipal Waste Combustors (1995), Emission Standards for New Locomotives (1997) and Emission Standards for Non-Road Diesel Engines (1998).

[15] In other words, if hypothetically we had costs of $200 million in 2000 and $400 million in 2020, we would assume costs would be $250 million in 2005, $300 million in 2010, and so forth. For example, for the Regional Haze rule, EPA provided only an estimate of benefits and costs in 2015. To develop benefit and cost streams, we used a linear extrapolation of benefits and costs beginning in 2009 and scaling up to the reported 2015 estimates.

agencies may have developed alternative estimates reflecting upper- and lower-bound estimates. In other cases, the agencies may offer a midpoint estimate of benefits and costs. In still other cases the agency estimates may reflect only upper-bound estimates of the likely benefits and costs. While we have relied in many instances on agency practices in monetizing costs and benefits, our citation of or reliance on agency data in this report should not be taken as an OIRA endorsement of all the varied methodologies used to derive benefits and cost estimates.

Appendix B. Agency Estimates of Benefits and Costs

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Nutrition labeling of meat and poultry products.	USDA–FSIS	$1.75 billion (NPV)	$218–272 million (NPV) ..	20-year NPV discounted at 7%.
Food Labeling: Use of Nutrient Content Claims for Butter.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Declaration of Ingredients.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling, Declaration of Ingredients: Common or Usual Name Declaration for Protein Hydrolysates and Vegetable Broth in Canned Tuna ''and/or'' Labeling for Soft Drinks.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Declaration of Ingredients for Dairy Products and Maple Syrup.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Nutrient Content Claims, Definition of Term Healthy.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Label Statements on Foods for Special Dietary Use.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims, Zinc and Immune Function in the Elderly.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling, Reference Daily Intakes and Daily Reference Values (Decision).	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements, Sodium and Hypertension.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements: Omega-3 Fatty Acids and Coronary Heart Disease.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements, Dietary Fat and Cancer.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims, Calcium and Osteoporosis.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statement, Antioxidant Vitamins and Cancer.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Food Labeling: Health Claims and Label Statements, Dietary Saturated Fat and Cholesterol and Coronary Heart Disease.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Regulation Impact Analysis of the Final Rules to Amend the Food Labeling Regulations.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements, Folic Acid and Neural Tube Defects.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS–FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS–FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements, Dietary Fiber and Cardiovascular Disease.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling: Health Claims and Label Statements, Dietary Fiber and Cancer.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling, General Requirements for Health Claims for Food.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling, Mandatory Status of Nutrition Labeling and Nutrient Content Revision, Form for Nutrition Label.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling, Nutrient Content Claims, General Principles, Petitions, Definition of Terms, Definitions of Nutrient Content Claims for the Fat, Fatty Acid, and Cholesterol.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling Regulation Implementing the Nutrition Labeling and Education Act of 1990, Opportunity for Comments.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Food Labeling—Metric Labeling Requirements.	HHS–FDA	$4.4–$26.5 billion	$1.4–$2.3 billion plus $163 million in costs to Federal government.	HHS-FDA performed one analysis for the food labeling requirements imposed by this rule and the other 22 HHS-FDA rules in this table related to food labeling.
Real Estate Settlement Procedures Act (Regulation X), FR–1942.	HUD	$119,014,950 annually in greater competition in title insurance business; $89.1–148.5 million net benefit annually in reducing transaction costs by packaging services with affiliated services.	Cost of duplicate good-faith estimates: $56,824,627 per year; Cost of new disclosure for controlled business arrangements: $48,147,000 per year; Cost of computerized loan originations: $3,607,890 per year; Cost of two additional years for storage (discount rate = 6%): $24,305.	
Manufactured Housing Construction and Safety Standards.	HUD	Net Benefit: $300 million per year present value in energy savings; $50–160 million per year present value in reduced NO_X, SO_X, and PM emission.		

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Final frameworks for early-season migratory bird hunting regulations.	DOI	Not Estimated	Not Estimated.	
Migratory bird hunting, final frameworks for late-season migratory bird hunting regulations.	DOI	Not Estimated	Not Estimated.	
The Family and Medical Leave Act of 1993.	DOL-ESA	Not Estimated	$674 million annually	Estimate provided by U.S. General Accounting Office (Parental Leave: Estimated Costs of H.R. 925, the Family and Medical Leave Act of 1987—GAO/HRD–88–34, Nov. 10, 1987).
Permit Required Confined Spaces.	DOL–OSHA	Reduced annually: 54 fatalities; 5,931 lost-workday injury and illness cases; 5,908 non-lost-workday cases.	$202.4 million annually	''OSHA anticipates that improved worker productivity as a result of the standard will help to lower production costs and contribute to higher quality output. Although OSHA did not quantify these cost offsets, the Agency believes they will be substantial'' (RIA, pp. I–10, I–13). ''OSHA anticipates that greater use of mechanical ventilation to reduce atmospheric hazard in permit spaces may result in additional release of hazardous substances to the air. Incremental release quantities related to the permit space standard are not determinable at present, but are expected to be minor relative to current overall releases'' (RIA, pp. I–17—I–18).
Lead Exposure in Construction.	DOL–OSHA	Near-term avoided annual health effects; Reduced nerve conduction velocity: 16,199–22,831 cases; Reduced blood ALA–D levels: 130,056–164,044 cases; Increased urinary ALA: 60,389–78,676 cases; Gastrointestinal disturbances: 1,135–4,413 cases; Detected blood-lead levels above MRP trigger: 24,262–35,163 cases. Long-term avoided health effects over 10 years; Fatal/nonfatal infractions: 2,164–2,322 cases; Fatal/nonfatal stroke: 644–698 cases; Renal disease: 1,258–2,157 cases.	$365–445 million annually plus one-time start-up costs of $150–$183 million.	
Response Plans for Marine Transportation-Related Facilities.	DOT-USCG	58,838 barrels of oil not spilled (NPV).	$176,105,666 (NPV)	Timeline of the analysis: 1996–2025 Discount Rate: 7%; $1996.
Vessel Response Plans ...	DOT–USCG	50,312 barrels of oil not spilled (NPV).	$3,245,869,985 (NPV)	Timeline of the analysis: 1996–2025 Discount Rate: 7%; $1996.
Light Truck Average Fuel Economy Standard for Model Year 1995.	DOT	Not Estimated	Not Estimated.	

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Water quality standards regulation: Compliance with CWA Section 303(C)(2)(B) Amendments.	EPA	Not Estimated	Not Estimated	''The analysis performed was limited to assessing only the potential reduction in cancer risk; no assessment of potential reductions in risks due to reproductive, developmental, or other chronic and subchronic toxic effects was conducted. However, given the number of pollutants, there could be: (1) Decreased incidence of systemic toxicity to vital organs such as liver and kidney; (2) decreased extent of learning disability and intellectual impairment due to the exposure to such pollutants as lead; and (3) decreased risk of adverse reproductive effects and genotoxity.'' (57 FR 60848–). ''The ecological benefits that can be expected from today's rule include protection of both fresh and salt water organisms, as well as wildlife that consume aquatic organisms * * * In addition, the rule would result in the propagation and productivity of fish and other organisms, maintaining fisheries for both commercial and recreational purposes. Recreational activities such as boating, water skiing, and swimming would also be preserved along with the maintenance of an aesthetically pleasing environment'' (57 FR 60848–). ''EPA acknowledges that there will be a cost to some dischargers for complying with new water quality standards as those standards are translated into specific NPDES permit limits * * * Revised wasteload allocations may result in adjustments to individual NPDES permit limits for point source dischargers, and these adjustments could result in increased wastewater treatment costs or other pollution control activities such as recycling or process changes. The magnitude of these costs depends on the types of treatment or other pollution control, the number and type of pollutants being treated, and the level of control that can be achieved by technology-based effluent limits for each industry. Similar sources of costs and the variables affecting costs may also apply to indirect industrial dischargers to the extent that the industrial discharger is a source of toxic pollutants discharged by the POTW * * * Nonpoint sources of toxic pollutants may also incur increased costs to the extent that best management practices need to be modified or applied to more sources to reflect the revised water quality standards. Although there is no Federal permit program for nonpoint sources comparable to that for point sources, there are State regulatory programs to control nonpoint source discharges. Monitoring programs are another source of potential incremental costs to dischargers and States.'' (57 FR 60848–).

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Coastal nonpoint pollution control program development and approval guidance (EPA, NOAA), guidance specifying management measures for sources of nonpoint * * * Section 6217.	EPA	Not Estimated	$389,940,000–$590,640,000 (annualized).	The RIA identified generally the types of ''off-site benefits'' that could be related to water quality improvements, including 4 use benefits (in-stream, near stream, option value, and diversionary) and 3 non-use (intrinsic) benefits (aesthetic, bequest, and existence).
Oil and Gas Extraction Point Source Category, Offshore Subcategory, Effluent Limitations Guidelines and New Source Performance Standards (Final Rule).	EPA	$28.2–103.9 million per year.	Total annualized BAT and NSPS costs: 1st year = $122 million, 15th year = $32 million.	''Other benefits that are quantified, to the extent possible, but not monetized due to lack of appropriate data, include: (1) Human health risk reductions associated with systemics other than lead, pH-dependent leach rates, carcinogens for which there are no risk factors available, exposure to pollutants via sediment or food chair; (2) ecological risk reductions; (3) fishery benefits; and (4) intrinsic benefits * * * The non-quantified, non-monetized benefits assessed in this RIA include increased recreational fishing, increased commercial fishing, improved aesthetic quality of waters near the platform, and benefits to threatened or endangered species [the Kemp's Ridley Turtle and the Brown Pelican] in the Gulf of Mexico.'' (58 FR 12454–).
Acid Rain Permits, Allowance System, Emissions Monitoring, Excess Emissions and Appeals Regulations Under Title IV of the Clean Air Act Amendments of 1990.	EPA	10 million tons/year reduction in SO_2 emission (mandated by Title IV); Cost savings: $689–973 million (annualized).	$894–1,509 million (annualized).	SO_2 emission reductions are expected to: (1) reduce acidification of surface waters, thereby increasing the presence and diversity of aquatic species; (2) improve visibility by reducing haze; (3) may improve human health as lower SO_2 emissions reduce air concentrations of acid sulfate aerosols and thus acute and chronic exposure to the acid aerosols that adversely affect human health may even affect even mortality; (4) eliminate damage to forest soils and foliage, especially of high-elevation spruce trees in the eastern U.S. and allow recovery of previously damaged tree populations; (5) may reduce damage to auto paint, reduce soiling of buildings and monuments, and thus the life of some materials and structures may be extended and the costs of maintenance or repair reduced (RIA, pp. 1–5 to 1–6, and 6–1 to 6–3). Engineering costs associated with CEM retrofit were not analyzed (RIA, pp. 4–18). ''The annualized costs of the implementation regulations are estimated to increase the annual costs of generating electricity by 0.5 to 1.2 percent.'' (58 FR 3590–).

TABLE 9.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1992 to September 30, 1993]

Rule	Agency	Benefits	Costs	Other information
Vehicle Inspection and Maintenance Requirements for State Implementation Plan (Final Rule).	EPA	Emission reductions from continuing current I/M program unchanged (baseline = no I/M program) in 2000: 116016 tons VOC, 1566395 tons CO (annual tons in 2000); Emission reductions from new I/M program in 2000 (baseline = no I/M program): 420415 tons VOC, 2845754 tons CO (annual tons in 2000).	Continuing current I/M program: NET COST = $894 million ($2000); New I/M program: NET COST = $541 million ($2000).	''These repairs have been found to produce fuel economy benefits that will at least partially offset the cost of repairs. Fuel economy improvements of 6.1% for repair of pressure test failures and 5.7% for repair of purge test failures were observed. Vehicles that failed the transient short test at the established cutpoints were found to enjoy a fuel economy improvement of 12.6% as a result of repairs.'' (57 FR 52950–). ''In conclusion, today's action may cause significant shifts in business opportunities. Small businesses that currently do both inspections and repairs in decentralized I/M programs may have to choose between the two. Significant new opportunities will exist in these areas for small businesses to continue to participate in the inspection and repair industry. This will mean shifts in jobs but an overall increase in jobs in the repair sector and a small to potentially large increase in the inspection sector, depending on state choices.'' (57 FR 52950–).
Evaporative emission regulations for gasoline-fueled and methanol-fueled light duty vehicles, light-duty trucks, and heavy-duty vehicles—SAN 2969.	EPA	Total VOC Reduction in 2020: 1,120,000 metric tons.	Annual total program cost without fuel savings: $130–200 million ($1992, NPV to the year of the sale).	''[Emission] projections are made for the year 2020 in order to provide benefit predictions for a fully turned-over fleet and to factor in other known trends, such as the effects of other new Clean Air Act programs. These new programs include high-technology inspection and maintenance and reformulated gasoline. Reformulated gasoline achieving a 25 percent overall VOC emission reduction standard is assumed to be used in 40 percent of the nation.'' (58 FR 16002–). ''[The cost] estimate does not include the offsetting fuel savings.'' (58 FR 16002–).
Control of air pollution from new motor vehicles and new motor vehicle engines, regulations requiring on-board diagnostic systems on 1994 and later model year light-duty vehicles.	EPA	4.0 million tons HC, 30.8 million tons CO, 2.5 million tons NO_X (NPV).	$16.6 billion (NPV) ($1993).	Discount rate: 7% (58 FR 9468–) Timeline: 2005–2020 (58 FR 9468–).''EPA has not been able to adequately quantify some potential cost savings not included in these estimates. Potential cost savings can accrue due to early repairs of malfunction which, if left undetected and unrepaired, could result in the need for even more costly repairs in the future. Also, improved repair effectiveness should reduce the potential for a part to be unnecessarily replaced in attempting to fix a problem. Repair facilities should also benefit from the availability of generic tools for accessing and using the OBD system in problem diagnosis and repair. These service facility benefits could be passed along to the consumer in the form of lower repair costs.'' (58 FR 9468–).

TABLE 10.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES

[October 1, 1993 to September 30, 1994]

Rule	Agency	Benefits	Costs	Other information
Manufactured Home Construction and Safety Standards on Wind Standards.	HUD	$63,726,314 annually ...	$412,106,180 annually	The cost estimates do not include costs associated with ''out of pocket expenses related to deductibles or non-covered losses'' (RIA, pp. 1–2). Non-quantified benefits include: ''purchasers will experience less dislocation caused by damage to or destruction of their manufactured homes. Fourth, residents who choose to remain in their units during storms will suffer fewer injuries and deaths'' (RIA, p. 1) Discount rate used = 6.64 percent (RIA, p. 8) Basis for public benefit assessment: Hurricane Andrew (RIA, p. 9).
Designate critical habitat for four endangered Colorado River fishes.	DOI	Net benefit: $7.92 million.	.....	Increase employment by 710 jobs, increase earnings by $6.62 million, increase government revenue by $3.20 million from 1995–2020 (59 FR 13374–).
Occupational Exposure to Asbestos.	DOL–OSHA	Reduction in annual cancer risk: 2.12 cancer deaths in general industry, 40.48 cancer deaths in construction industry, 14.2 cancers among building occupants. Reduction in asbestosis: 14 cases annually.	$361.4 million annually	Non-quantified benefits include: avoided cases of asbestosis for building occupants and others secondarily exposed, reduced risks of cancer and fires (from rages contaminated with solvent), more rapid building reoccupation, reduced probability of asbestos-related lawsuits (RIA, pp 52–57).
Financial Responsibility for Water Pollution (Vessels).	DOT–USCG	525,316 barrels of oil not spilled (NPV).	$451,440,918 (NPV)	Timeline of the analysis: 1996–2025; Discount Rate: 7%; $1996.
Antidrug Program for Personnel Engaged in Specified Aviation Activities.	DOT–FAA	$206.64 million (NPV) ..	$138.13 million (NPV) ..	Timeline of the analysis: 1994–2003 (RIA, p. 12); $1992 (RIA, p. 12); Discount rate = 7% (RIA, p. 20).
Controlled Substances and Alcohol Use and Testing.	DOT–FHWA	Reduced fatal accidents: $680 million in 1st year, $952 million per year in 2nd and subsequent years. Reduced injury cost: $152.4 million in 1st year, $213.4 million per year in 2nd and subsequent years assuming the highest deterrence scenario. Reduced property damage: $47.5 million in 1993, $66.5 million per year from 1994–2002. Reduced traffic delays: $3.5 million in 1993, $4.9 million per year thereafter assuming highest deterrence rate; Reduced other costs of freeway accidents: $1.9 million in 1995 and $2.7 million thereafter.	$93,947,750 in 1995, and $92,453,950 per year in 1996 and thereafter.	
Light Truck Average Fuel Economy standards, Model Years 1996–1997.	DOT	Not Estimated	Not Estimated.	
Prevention of Prohibited Drug Use in Transit Operations.	DOT	$608,520,643 (NPV)	$208,970,087 (NPV)	Timeline: 1995–2004; Discount rate: 7%; $1991.

TABLE 10.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1993 to September 30, 1994]

Rule	Agency	Benefits	Costs	Other information
Land disposal restrictions phase II, universal treatment standards and treatment standards for organic toxicity, characteristic wastes, and newly listed wastes.	EPA	0.22 cancer cases per year avoided from groundwater, 0.037 cancer cases per year avoided from air; $20 million avoided property value damage (annualized).	$194–219 million (annualized).	''The timeframe to which these benefits are attributable begins 30 years following promulgation of the rule.'' (59 FR 47982–). ''However, there are some benefits which the Agency has not attempted to quantify which are potentially attributable to today's rule. For example, the agency has not attempted to quantify any potential non-use-value benefits from protection of resources through treatment of hazardous wastes. Furthermore, the risk analysis performed by the Agency for today's rule does not account for many other potential benefits from today's rule. Ecological risk reduction from treatment of wastes under today's rule has not been quantified. Nor do the Agency's air and groundwater benefit estimates account for karst terrain, complex flow situations, or other factors which could contribute to underestimates of benefits.'' (59 FR 47982–).
Accelerated phase-out of ozone depleting chemicals and listing and phase-out of methyl bromide.	EPA	Ozone depleting chemicals: $8–24 billion (NPV) Methyl Bromide: $1.6–6.4 billion (NPV).	Ozone depleting chemicals: $12 billion (NPV); Methyl Bromide: $0.8 billion (NPV).	Discount rate: 7% (58 FR 65018–). Timeline for methyl bromide cost: 1994–2010 (58 FR 65018–). Timeline for methyl bromide benefits: 1994–2001 (58 FR 65018–).
Fuel and fuel additives: standards for reformulated gasoline.	EPA	Phase I—Summertime VOC emission reduction: 90–140 thousand tons per year; Reduction in cancer incidence: 16 per year (assuming enhanced I/M in place) or 24 per year (assuming basic I/M in place). Phase II—(incremental to Phase I): Summertime VOC emission reduction: approximately 42,000 tons Summer time NO_x emission reduction: approximately 22,000 tons Number of cancer avoided: 3–4 fewer cancer incidence per year.	Phase I—Annual costs: $700–940 million. Phase II—(incremental to Phase I): Increase gasoline production cost by 1.2 cents/gallon during the VOC control period, since only the toxics standard changes, and there is not expected to be a cost for year-round toxics control above that required for Phase I; EPA doesn't expect non-production related costs, such as distribution costs, recordkeeping and reporting costs, etc., to increase isgnificantly relative to Phase I.	''Reductions in mobile source emissions of the air toxics addressed in the reformulated gasoline program (benzene, 1,3-butadiene, formaldehyde, acetaldehyde and POM) may result in fewer cancer incidences. A number of adverse noncancer health effects have also been associated with exposures experience in particular microenvironments such as parking garages and refueling stations. These other health effects include blood disorders, heart and lung diseases, and eye, nose and throat irritation. Some of the toxics may also be developmental and reproductive toxicants, while very high exposure can cause effects on the brain leading to respiratory paralysis and even death. The uses of reformulated gasoline meeting the Phase II standards will likely help to reduce some of these health effects as well.'' (59 FR 7716–). Phase I: The cost of producing reformulated gasoline is expected to increase by approximately 3–5 cents per gallon in 1995. (59 FR 7716–). The cost of testing, enforcement, and recordkeeping not reflected in the annual cost estimate. (59 FR 7716–).

TABLE 10.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1993 to September 30, 1994]

Rule	Agency	Benefits	Costs	Other information
Acid Rain NO_X Regulations under Title IV of the Clean Air Act Amendments of 1990.	EPA	Phase I: 400,000 tons NO_X reduced Phase II: 1.89 million tons NO_X reduced.	Phase I: $77 million/year Phase II: $300 million/year.	Qualitative human health benefits: Lower ambient levels of NO_X (and associated lower PM and lower ozone levels) may mean fewer lost school days, fewer disability days for children; for all, less eye irritation and its associated acute and chronic health effects; for exercising asthmatics, improved pulmonary function. Also ambient concentrations of nitrates will be lower and fewer toxic nitrogenous compounds will be formed. (RIA, pp. 9–1 to 9–4) Qualitative welfare effects: reduced materials damage, increased visibility that is associated with enhanced enjoyment of vistas and fewer aircraft and motor vehicle accidents. The potential ecological effect include minimizing the adverse effects of excess nitrogen deposition in forest soils and surface waters, including the ''acid pulses'' that precede fish kills and consequently, reduced biodiversity. (RIA, pp. 9–1 to 9–4) ''Moreover, EPA expects that most or all utility expenses from meeting NO_X requirements will be passed along to ratepayers * * * Under today's rule the cost to ratepayers is very small, relative to their current expenditures on electricity. The average increase in electric rates across the United States is estimated to be only 0.03 and 0.13 percent under Phases I and II respectively.'' (59 FR 13538–).
Hazardous Organic NESHAP (HON) for the Synthetic Organic Chemical Manufacturing Industry (SOCMI) and Other Processes Subject to the Negotiated Regulation for Equipment Leaks.	EPA	HAP reduction: 510,000 tons/year; VOC reduction: 1,000,000 tons/year.	Total nationwide annual cost: $230 million/year ($1989); CO emission increase: 1,900 tons/year; NO_x emission increase: 19,000 tons/year.	''Thus, the estimates represent annual impacts occurring in the fifth year.'' (59 FR 19402–). ''As discussed in section III.B.3 of this preamble, the EPA has deferred the final decision regarding control of medium-sized storage vessels at existing sources. Therefore, emission reductions for storage vessels shown in Table 1, and consequently the total, may be slightly overstated.'' (59 FR 19402–). ''Because of the EPA's deferral of a final decision on control of medium-sized storage vessels at existing sources, as discussed in section III.B.3 of this preamble, the cost impacts for storage vessels, and consequently the total cost impact, may be slightly overstated.'' (59 FR 19402–). ''Market analyses for a subset of 21 of the chemicals estimated price increases from 0.1 percent to 3.9 percent and quantity decreases from 0.1 percent to 4 percent.'' (59 FR 19402–).
Control of air pollution from new motor vehicles and new motor vehicle engines, refueling emission regulations for light-duty vehicles and trucks and heavy-duty vehicles.	EPA	Without Stage II controls, average VOC annual emission reductions: over 420,000 tons per year; With Stage II phase-out when ORVR and Stage II would cover the same percent of fuel, average annual emission reduction: 378,000 tons; If retain Stage H controls, an incremental emission reduction: 285,000 tons.	Without Stage II controls, the average annual cost: −$6 million (1998–2020); With Stage II and phasing out at 2010, the average annual cost: $2 million (1998–2020); With Stage II and no phase out, the average annual cost: $27 million (1998–2020); In 1998 NPV, costs are $102 million, $264 million and $435 million respectively.	''It should be noted that the RIA was completed prior to EPA's decision to delay the requirements for LDTs and to exclude HDVs. These controls were included in the analysis and were assumed to begin in 1998. EPA expects that inclusion of these items in the analysis has no significant effect on the results and does not affect the conclusions which are based on the analysis.'' (59 FR 16262–). ''In the cases where costs are negative, it is because the value of the recovery credits exceeds the hardware and R, D, & T costs.'' (59 FR 16262–).

TABLE 10.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

[October 1, 1993 to September 30, 1994]

Rule	Agency	Benefits	Costs	Other information
Determination of significance for nonroad sources and emission standards for new nonroad compression ignition engines at or above 37 kilowatts, control of air pollution * * *—SAN 3112.	EPA	NO_X annual reduction in 2010: 800,000 tons; NO_x annual reduction in 2025: over 1,200,000 tons.	Average annual cost: $29–70 million (59 FR 31306).	''EPA maintains that the impact of this rule on fleet average fuel consumption will be minimal.'' (59 FR 31306–).

TABLE 11.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES

Rule	Agency	Benefits	Costs	Other information
The Family and Medical Leave Act of 1993.	DOL–ESA	Not Estimated	$674 million annually	Estimate provided by U.S. General Accounting Office (Parental Leave: Estimated Costs of H.R. 925, the Family and Medical Leave Act of 1987—GAO/HRD–88–34, Nov. 10, 1987).
Double Hull Standards for Vessels Carring Oil in bulk.	DOT–USCG	94,172 barrels of oil not spilled (NPV).	$6,413,027,637 (NPV)	Timeline of the analysis: 1996–2025.
FMVSS: Stablity and Control of Medium and Heavy Vehicles During Braking.	DOT–NHTSA	Equivalent fatalities forgone: 415–683 per year; Forgone property damage: $327–394.9 million annually.	Total consumer cost = $560.5 million annually.	Discount rate: 7%.
Bay/Delta water quality standards.	EPA	$2.1–21.5 million annually in economic benefits to commercial and recretional fisheries and have associated employment gains of an estimated 145–1585 full-time equivalent jobs annually (RIA ES–7).	For the urban sector, $4.3 million/yr on average and $15.8 million/yr during dry years; $28.3 million/yr on average gains $165.3 million/yr during dry years without water transfers or waterbanks. For agriculture sector, $27 million/yr on average, $43 million/year in the driest 10% of years (RIA ES–5) If using sharing approach (spread water supply impacts to entities diverting water from the Sacramento and San Joaquin River systems), −$0.5 million/yr average years, −$5.5 million/yr for dry years for agricultural sector, −$10.5 million/yr for average years and −$54 million/yr for day years (RIA ES–6).	''Important benefits of the water quality regulations include the following: Biological productivity and health for many estuarine species are expected to increase. The decline of species is expected to be reversed and the existence of species unique to the Bay/Delta, such as Delta smelt, winter-run Chinook salmon, long fin smelt, and Sacramento splittail, will be protected. Populations of a variety of estuarine species are expected to increase; although the extent of the population increases has not been determined for all species, the increases are anticipated to benefit the recreational and commercial fisheries.'' (60 FR 4703–)

TABLE 11.—AGENCY ESTIMATES OF BENEFITS AND COSTS OF MAJOR RULES—Continued

Rule	Agency	Benefits	Costs	Other information
Water quality guidance for Great Lakes system.	EPA	Given the site-specific nature of water quality benefits and the unavailability of site-specific data across the Great Lakes Basin, only case study monetized benefits are estimated in the RIA. Average monetized benefits across the three case studies evaluated are $0.3 million per year to $6.2 million per year, with a midpoint of $2.9 million per year (in 1996 dollars); average annual costs across case studies are also $2.8 million per year (1996 dollars)..	$64.0–394.6 million ($1996, annualized).	''The benefit analysis is based on a case study approach, suing benefits transfer applied sources to three case studies . . . The case studies include: (1) the lower Fox River drainage, including Green Bay, located on Lake Michigan in northeastern Wisconsin; (2) the Saginaw River and Saginaw Bay, located on Lake Huron in Northeastern Michigan; and (3) the Black River, located on Lake Erie in north-central Ohio . . . EPA did attempt to calculate longer-term benefits to human health, wildlife, and aquatic life once the final Guidance provisions are fully implemented by nonpoint sources as well as point sources and the minimum protection levels are attained in the ambient water.'' (60 FR 15382). ''The three case studies combine to account for nearly 14 percent of the total cost of the final Guidance, nearly 17 percent of the loadings reductions, and from four percent to 10 percent of the benefits proxies (i.e.,. basin-wide population, recreational angling, nonconsumptive recreation, and commercial fishery harvest.'' (60 FR 15382). ''In addition to the cost estimates described above, EPA estimated the cost to comply with requirements consistent with the antidegradation provisions of the final Guidance. This potential future cost is expressed as a 'lost opportunity' cost for facilities impacted by the antigradation requirements. This cost could result in the addition of about $22 million each year.'' (60 FR 15381).
Interim Requirements for Deposit Control Gasoline Additives, Regulations of Fuels and Fuel Additives.	EPA	HC, CO and NO_X reduction during the 18-month interim period: 700,000 tons (59 FR 54678–); HC, CO and NO_X reduction after the interim period: 600,000 tons per year (59 FR 54678–) Fuel economy savings: 390 million gallons in 1995–2000 (59 FR 54678–).	$650 million (NPV, discount rate = 7%, 1995–2000 (59 FR 54678–)).	

Appendix C. OMB Draft Guidelines for the Conduct of Regulatory Analysis and the Format of Accounting Statements

Preface

This Circular provides OMB's guidance to federal agencies on the development of regulatory analysis as required under Executive Order No. 12866 and a variety of related authorities. The Circular also provides guidance to agencies on the regulatory accounting statements that are required under the Regulatory Right-to-Know Act.

This draft Circular refines OMB's ''best practices'' document of 1996 *http://www.whitehouse.gov/omb/inforeg/riaguide.html,* which was issued as a guidance in 2000 *http://www.whitehouse.gov/omb/memoranda/m00–08.pdf,* and reaffirmed in 2001 *http://www.whitehouse.gov/omb/memoranda/m01–23.html.* It will replace both the 1996 ''best practices'' and the 2000 guidance. Before issuing the Circular, this draft will go through a process of peer review, public comment and interagency review.

Introduction

These guidelines are designed to help analysts in the regulatory agencies by encouraging good regulatory impact analysis—called either ''regulatory analysis'' or ''analysis'' for brevity—and standardizing the way benefits and costs of Federal regulatory actions are measured and reported.

Why Analysis of Proposed[16] Regulatory Actions Is Needed

Regulatory analysis is a tool regulatory agencies use to anticipate and evaluate the likely consequences of their actions. It provides a formal way of organizing the evidence on the key effects—good and bad—of the various alternatives that should be considered in developing regulations. The motivation is to (1) learn if the benefits of an action are likely to justify the costs or (2) discover which of various possible alternatives would be the most cost-effective. By choosing actions that maximize net

[16] We use the term ''proposed'' to refer to any regulatory actions under consideration regardless of the stage of the regulatory process.

benefits, agencies direct resources to their most efficient use.

A good regulatory analysis informs the public and other parts of the Government as well as the agency conducting the analysis of the effects of alternative actions. Regulatory analysis will sometimes show that a proposed action is misguided, but it can also demonstrate that well-conceived actions are reasonable and justified.

Where all significant benefits and costs can be quantified and expressed in monetary units, benefit-cost analysis provides decisionmakers with a clear indication of the most efficient alternative, that is, the alternative that generates the largest net benefits to society ignoring distributional effects. This is useful information for the public to receive, even when economic efficiency is not the only or the overriding public policy objective.

It will not always be possible to assign monetary values to all of the important benefits and costs, and when it is not, the most efficient alternative will not necessarily be the one with the largest net-benefit estimate. In such cases, you should exercise professional judgment in determining how important the non-quantifiable benefits or costs may be in tipping the analysis one way or the other, but you should not use non-quantifiables as ''trump cards,'' especially in cases where the measured net benefits overwhelmingly favor a particular alternative. When there are other competing public policy objectives, as there often are, they must be balanced with efficiency objectives.

What Should Go Into a Regulatory Analysis?

A good regulatory analysis should include the following three basic elements:

(1) A statement of the need for the proposed action.

(2) An examination of alternative approaches.

(3) An evaluation of the benefits and costs of the proposed action and the main alternatives identified by the analysis.

To properly evaluate the benefits and costs of regulations and their alternatives, you will need to do the following:

- Explain how the actions required by the rule are linked to the expected benefits. For example, indicate how additional safety equipment will reduce safety risks. A similar analysis should be done for each of the alternatives.
- Identify a baseline. Benefits and costs are defined in comparison with a clearly stated alternative. This is normally a ''no action'' baseline, what the world would be like if the proposed rule was not adopted.
- Identify the expected undesirable side-effects and ancillary benefits of the proposed regulatory action and the alternatives. These should be added to the direct costs and benefits as appropriate.

With this information, you should be able to assess quantitatively the benefits and costs of the proposed rule and its alternatives. When your analysis is complete, you should present a summary of the benefit and cost estimates for each alternative, sometimes called a ''regulatory accounting statement,'' so that readers can evaluate them.

As you proceed through your regulatory analysis, you should seek out the opinions of those who will be directly affected by the regulation you are considering as well as the views of those individuals and organizations with special knowledge or insight into the regulatory issues. Consultation can be useful in making sure your analysis addresses all of the relevant issues and that you have access to all the pertinent data. Early consultation can be especially helpful. You should not limit consultation to the final stages of your analytical efforts.

A good analysis is transparent. It should be possible for anyone reading the report to see clearly how you arrived at your estimates and conclusions. For transparency's sake, you should state in your report what assumptions were used, such as the discount rates or the monetary value of a statistical life. It is usually helpful to provide a sensitivity analysis to reveal whether, and to what extent, the results of the analysis are influenced by plausible changes in the main assumptions.

You will find that you cannot conduct a good regulatory analysis according to a formula. The conduct of high-quality analysis requires competent professional judgment. Different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions.

I. Why Regulatory Action is Needed

Before proceeding with a regulatory action, you must demonstrate that the proposed action is necessary. Executive Order 12866 states that ''Each agency shall identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action) as well as assess the significance of that problem.'' This means that you should try to explain whether the action is intended to address a significant market failure or to meet some other compelling public need such as improving governmental processes or promoting distributional fairness, privacy, or personal freedom. If you are trying to correct a significant market failure, the failure should be described both qualitatively and (where feasible) quantitatively, and you should show that a government intervention is likely to do more good than harm. For other interventions, you should also provide a demonstration of compelling social purpose and the likelihood of effective action.

If your regulatory intervention results from a statutory or judicial directive, you should describe the specific authority for your action, the extent of discretion available to you, and the regulatory instruments you might use.

A. There Is a Market Failure or Other Social Purpose To Address

The major types of market failure include: externality, market power, and inadequate or asymmetric information. Correcting market failures is a reason for regulation, but it is not the only reason. Other possible justifications include improving the functioning of government, removing distributional unfairness, or promoting privacy and personal freedom.

1. Externality

An externality occurs when one party's actions impose uncompensated benefits or costs on another. Environmental problems are a classic case of externality—for example, the smoke from a factory may adversely affect the health of local residents while soiling the property in nearby neighborhoods. Common property resources that may become congested or overused, such as fisheries or the broadcast spectrum, represent a second example. ''Public goods,'' such as defense or basic scientific research, provide a positive externality, where provision of the good to some individuals cannot occur without providing the same benefits free of charge to other individuals.

2. Market Power

Firms exercise market power when they reduce output below what would be offered in a competitive industry. They may exercise market power collectively or unilaterally. Government action can be a source of market power, for example, if regulatory actions exclude low-cost imports. Generally, regulations that increase market power should be avoided. However, there are some circumstances in which government may choose to validate a monopoly. If a market can be served at lowest cost only when production is limited to a single producer—local gas and electricity distribution services, for example—a natural monopoly is said to exist. In such cases, the government may choose to approve the monopoly and to regulate its prices and production decisions.

3. Inadequate or Asymmetric Information

Market failures may also result from inadequate or asymmetric information. The market will often supply less than the appropriate level of information because it is infeasible to exclude people from reaping the benefits from the information others have provided even though they have not paid for the information. The providers will not willingly supply the socially optimal quantity of information, unless they are paid for it, and that may not be possible.

Because information, like other goods, is costly, your evaluation will need to do more than demonstrate the possible existence of less than optimal or asymmetric information. Even though the market may supply a less than an optimal amount of information, the amount it does supply may be reasonably adequate and therefore not require government regulation. Sellers do have an incentive to provide information through advertising that can increase sales by highlighting distinctive characteristics of their products. Buyers may also obtain reasonably adequate information about product characteristics through other channels, for example, if a buyer's search costs are low (as when the quality of a good can be determined by inspection at the point of sale), if a buyer has previously used the product, if the seller offers a warranty, or if adequate information is provided by third parties.

In the case of uncertain information about low-probability high-consequence events,

markets may underreact or overreact depending on the rules-of-thumb and other mental assumptions that people use to cope with difficult issues. Regulators should be aware of such mental quirks and not adopt policies based on a misunderstanding of the underlying reality.

4. Other Social Purposes

There are justifications for regulations in addition to correcting market failures. A regulation may be appropriate when you have a clearly identified measure that can make government operate more efficiently. In other cases, regulation may be used to reduce unfairness. Regulatory action may also be appropriate to protect privacy or to promote civil rights or permit more personal freedom.

B. Showing That Regulation at the Federal Level Is the Best Way To Solve the Problem

Even where a market failure clearly exists, you should consider other means of dealing with the failure before turning to regulation. Alternatives to regulation include the courts acting through the product liability system, antitrust enforcement, consumer-initiated litigation, or workers' compensation systems.

In assessing whether Federal regulation is the best solution, you should also consider the possibility of regulation at the State or local level. In some cases, the nature of the market failure may itself suggest the most appropriate governmental level of regulation. For example, problems that spill across State lines (such as acid rain whose precursors are transported widely in the atmosphere) are probably best addressed by Federal regulation. More localized problems, including those that are common to many areas, may be more efficiently addressed locally.

A diversity of regulation may generate gains for the public as governmental units compete with each other to serve the public, but duplicative regulations can also be costly. Where Federal regulation is clearly appropriate, for example, to address interstate commerce issues, you should try to examine whether it would be more efficient to reduce State and local regulation. For example, the burdens on interstate commerce arising from different State and local regulations such as compliance costs for firms operating in several States, may exceed any advantages associated with the diversity of State and local regulation. Your analysis should consider the possibility of reducing as well as expanding State and local rulemaking.

The role of federal regulation in facilitating U.S. participation in global markets should also be considered. Harmonization of U.S. and international rules may require a strong Federal regulatory role. Concerns that new U.S. rules could act as non-tariff barriers to imported goods should be evaluated carefully.

C. The Presumption Against Economic Regulation

Government actions can be unintentionally harmful, and even useful regulations can impede the efficiency with which markets function. For this reason, there is a presumption against certain types of regulatory action. In light of both economic theory and actual experience, a particularly demanding burden of proof is required to demonstrate the need for any of the following types of regulations:

- Price controls in competitive markets;
- Production or sales quotas in competitive markets;
- Mandatory uniform quality standards for goods or services if the potential problem can be adequately dealt with through voluntary standards or by disclosing information of the hazard to buyers or users; or
- Controls on entry into employment or production, except (a) where indispensable to protect health and safety (*e.g.,* FAA tests for commercial pilots) or (b) to manage the use of common property resources (*e.g.,* fisheries, airwaves, Federal lands, and offshore areas).

II. Alternative Approaches To Consider

Once you have determined that Federal regulatory action is appropriate, you will need to consider alternative regulatory approaches. Ordinarily, it will be possible to eliminate some alternatives through a preliminary analysis, leaving a manageable number of alternatives to be evaluated according to the formal principles of the Executive Order. The number and choice of alternatives selected for detailed analysis is a matter of judgment. There must be some balance between thoroughness and the practical limits on your analytical capacity. With this qualification in mind, you should nevertheless explore modifications of some or all of a regulation's attributes or provisions to identify appropriate alternatives. The following is a list of alternative regulatory actions that you should consider:

A. Different Choices Defined by Statute

When a statute establishes a specific regulatory requirement and the agency plans to exercise its discretion to adopt a more stringent standard, you should examine the benefits and costs of reasonable alternatives that reflect the range of the agency's statutory discretion, including the specific statutory requirement.

B. Different Compliance Dates

The timing of a regulation may also have an important effect on its net benefits. For example, costs of a regulation may vary substantially with different compliance dates for an industry that requires a year or more to plan its production runs efficiently. In this instance, a regulation that provides sufficient lead time is likely to achieve its goals at a much lower overall cost than a regulation that is effective immediately, although delay would also typically lower the value of the benefits.

C. Different Enforcement Methods

Compliance alternatives for Federal, State, or local enforcement include on-site inspections, periodic reporting, and compliance penalties structured to provide the most appropriate incentives. When alternative monitoring and reporting methods vary in their costs and benefits, you should consider promising alternatives in identifying the most appropriate enforcement framework. For example, in some circumstances random monitoring or parametric monitoring will be less expensive and nearly as effective as continuous monitoring in achieving compliance.

D. Different Degrees of Stringency

In general, both the benefits and costs associated with a regulation will increase with the level of stringency (although marginal costs generally increase with stringency, whereas marginal benefits may decrease). 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.

E. Different Requirements for Different Sized Firms

You should consider setting different requirements for large and small firms basing any difference in the standards on perceptible differences in the costs of compliance or in the expected benefits. The balance of costs and benefits can shift depending on the size of the firms being regulated. Small firms may find it more costly to comply with regulation, especially if there are large fixed costs required for regulatory compliance. On the other hand, it is not efficient to place a heavier burden on one segment of a regulated industry solely because it can better afford the higher cost; this has the potential to load costs on the most productive firms, costs that are disproportionate to the damages they create.

You should also remember that a rule with a significant impact on a substantial number of small entities will trigger the requirements set forth in the Regulatory Flexibility Act.

F. Different Requirements for Different Geographic Regions

Rarely do all regions of the country benefit uniformly from government regulation and it is also unlikely that costs will be uniformly distributed across the country. Where there are significant regional variations in costs and/or benefits, you should consider the possibility of setting different requirements for the different regions.

G. Performance Standards Rather Than Design Standards

Performance standards are generally superior to engineering or design standards because performance standards give the regulated parties the flexibility to achieve regulatory objectives in the most cost-effective way. This is only possible, of course, if there is more than one feasible way to meet the performance standard. In general, you should consider setting a performance standard if performance can be measured or reasonably imputed and where controlling performance provides a scope appropriate to the problem the regulation seeks to address. For example, compliance with air emission standards can be allowed on a plant-wide, firm-wide, or region-wide basis rather than vent by vent, provided this does not produce unacceptable local air quality outcomes (such as ''hot spots'' from local pollution concentration).

H. Market-Oriented Approaches Rather Than Direct Controls

Market-oriented approaches that use economic incentives should be explored. These alternatives include fees, penalties, subsidies, marketable permits or offsets, changes in liability or property rights (including policies that alter the incentives of insurers and insured parties), and required bonds, insurance or warranties.

I. Informational Measures Rather Than Regulation

If intervention is contemplated to address a market failure that arises from inadequate or asymmetric information, informational remedies will often be the preferred approach. Measures to improve the availability of information include government establishment of a standardized testing and rating system (the use of which could be made mandatory or left voluntary), mandatory disclosure requirements (*e.g.*, by advertising, labeling, or enclosures), and government provision of information (*e.g.*, by government publications, telephone hotlines, or public interest broadcast announcements). A regulatory measure to improve the availability of information (particularly about the concealed characteristics of products) provides consumers a greater choice, than a mandatory product standard or ban.

Specific informational measures should be evaluated in terms of their benefits and with a comprehensive view of their costs. Some effects of informational measures are easily overlooked. For example, the costs of a mandatory disclosure requirement for a consumer product will include not only the cost of gathering and communicating the required information, but also the loss of net benefits of any information displaced by the mandated information, the effect of providing too much information that is ignored or information that is misinterpreted, and inefficiencies arising from the incentive that mandatory disclosure may give to overinvest in a particular characteristic of a product or service.

Where information on the benefits and costs of alternative informational measures is insufficient to provide a clear choice between them, you should consider the least intrusive informational alternative sufficient to accomplish the regulatory objective. For example, to correct an informational market failure it may be sufficient for government to establish a standardized testing and rating system without mandating its use, because competing firms that score well according to the system should thereby have an incentive to publicize the fact.

III. Analytical Approaches

Both benefit-cost analysis (BCA) and cost-effectiveness analysis (CEA) provide a systematic framework for identifying and evaluating the likely outcomes of alternative regulatory choices. A major rulemaking should be supported by both types of analysis wherever possible. Specifically, you should prepare a CEA for all major rulemakings for which the primary benefits are improved public health and safety. You should also perform a BCA for major health and safety rulemakings to the extent that valid monetary values can be assigned to the expected health and safety outcomes. For all other major rulemakings, you should carry out a BCA. If some of the primary benefit categories cannot be expressed in monetary units, you should also conduct a CEA.

A. Benefit-Cost Analysis

The distinctive feature of BCA is that both benefits and costs are expressed in monetary units, which allows you to evaluate different regulatory options with a variety of attributes using a common measure. This can be especially helpful in choosing the appropriate scope for your regulatory intervention. By measuring incremental benefits and costs of successively more stringent regulatory alternatives, you can identify the alternative that maximizes societal net benefits.

The size of net benefits, the absolute difference between total benefits and total costs, is the key to determining whether one policy is more efficient than another. That will be achieved at the point where the cost of a marginal increment in regulatory stringency is just matched by the marginal benefit. The ratio of total benefits to total costs is not a meaningful indicator of net benefits and should not be used for that purpose. It is well known that considering such ratios alone can yield misleading results.

Even when a benefit or cost cannot be expressed in monetary units, you should still try to measure it in terms of its physical units, and if it is not possible to measure the physical units, you should still describe the benefit or cost qualitatively. When important benefits and costs cannot be expressed in monetary units, BCA is less useful, and it can even be misleading, because the calculation of net benefits in such cases does not provide a full evaluation of all relevant benefits and costs.

You should exercise professional judgment in identifying the importance of non-quantifiable factors, where they exist, and assess as best you can how they might change the ranking of alternatives based on estimated net benefits. Non-quantifiable benefits or costs may be important in tipping an analysis one way or the other, but you should not use non-quantifiables as ''trump cards,'' especially in cases where the measured net benefits overwhelmingly favor a particular alternative.

B. Cost-Effectiveness Analysis (CEA)

Cost-effectiveness analysis provides a rigorous way to identify options that achieve the most effective use of the resources available without requiring you to monetize all of the relevant benefits or costs. Generally, cost-effectiveness analysis is most helpful for comparing a set of regulatory actions with the same primary outcome (*e.g.*, an increase in the acres of wetlands protected) or multiple outcomes that can be integrated into a single numerical index (*e.g.*, units of health improvement).

Cost-effectiveness results based on averages need to be treated with great care. They suffer from the same drawbacks as benefit-cost ratios. The alternative that exhibits the smallest cost-effectiveness ratio may not be the one that maximizes net benefits, just as the alternative with the highest benefit-cost ratio is not always the one that maximizes net benefits. Incremental cost-effectiveness analysis (discussed below) can help to avoid mistakes that can occur when policy choices are based on average cost-effectiveness.

CEA can also be misleading when the ''effectiveness'' measure does not weight appropriately the consequences of each of the alternatives. For example, when effectiveness is measured in tons of reduced pollutant emissions, cost-effectiveness estimates will be misleading unless the reduced emissions of diverse pollutants result in the same health and environmental benefits.

When you have identified a range of alternatives (*e.g.*, different levels of stringency), you should determine the cost-effectiveness of each option compared with the baseline as well as its incremental cost-effectiveness compared with successively more stringent requirements. Ideally, your CEA would present an array of cost-effectiveness estimates that would allow comparison across different alternatives. However, analyzing all possible combinations is not practical where there are many options (including possible interaction effects). In these cases, you should use your judgment to choose reasonable alternatives for careful consideration.

Accuracy of CEA depends on the consistency of analysis across a diverse set of possible regulatory actions. To achieve consistency, you need to construct very carefully the two key components of any CEA: The cost and the ''effectiveness'' or performance measures for the alternative policy options.

With regard to measuring costs, you should be sure to include all the relevant costs to society—whether public or private. Rulemakings may also yield cost savings (*e.g.*, energy savings associated with new technologies). The numerator in the cost-effectiveness ratio should reflect net costs, defined as the gross cost incurred in meeting the requirements (sometimes called ''total'' costs) minus any cost savings.

Where regulation may yield several different beneficial outcomes, a cost-effectiveness comparison becomes more difficult to interpret because there is more than one measure of effectiveness to incorporate in the analysis. To arrive at a single measure you will need to weigh the value of disparate benefit categories, but this computation raises some of the same difficulties you will encounter in BCA. If you can assign a reasonable monetary value to all of the regulation's different benefits, then you should do so, but in that case you will be doing BCA not CEA.

When you can estimate the monetary value of some but not all of the ancillary benefits of a regulation, but cannot assign a monetary value to the primary measure of effectiveness, you should subtract the monetary estimate of the ancillary benefits from the gross cost estimate to yield an estimated net cost. This net cost estimate for the rule may turn out to be negative—that is, the other benefits exceed the cost of the rule. If you are unable to estimate the value of

some of the ancillary benefits, the cost-effectiveness ratio will be overstated, and this should be acknowledged in your analysis. CEA does not yield an unambiguous choice when there are benefits that have not been incorporated in the net cost estimates.

You also may use CEA to compare regulatory alternatives in cases where the statute specifies the level of benefits to be achieved.

C. The Effectiveness Metric for Public Health and Safety Rulemakings

The validity of cost-effectiveness analysis depends on the application of appropriate ''effectiveness'' or performance measures that permit comparison of the regulatory options being considered. Agencies currently use a variety of methods for determining effectiveness, including number of lives saved, number of equivalent lives saved, and number of quality-adjusted life years saved. It is difficult for OMB to draw meaningful cost-effectiveness comparisons between rulemakings that employ different cost-effectiveness measurements. As a result, agencies should provide OMB with the underlying data, including mortality and morbidity data, the age distribution of the affected population, and the severity and duration of disease conditions or trauma, so that OMB can make apples-to-apples comparisons between rulemakings that employ different measures.

D. Evaluating Distributional Effects

Both benefit-cost analysis and cost-effectiveness analysis tend to focus on economic efficiency. Decision-makers may desire (or be required) to consider other values as well such as fairness. Your regulatory analysis should provide a separate description of distributional effects (*i.e.*, how both benefits and costs are distributed among sub-populations of particular concern) so that decisionmakers can properly consider them along with the effects on economic efficiency. E.O. 12866 authorizes this approach. The presentation of distributional effects is especially important when you have reason to believe that there will be significant disparities in how your regulatory actions may affect different groups of people. Effects that fall most heavily on those least able to bear the cost should be highlighted for policymakers' attention. Actions that benefit small groups at the expense of the larger public also deserve special scrutiny.

IV. Identifying and Measuring Benefits and Costs

This Section provides guidelines for your preparation of the benefit and cost estimates required by Executive Order No. 12866 and the ''Regulatory Right-to-Know Act.'' The preliminary analysis described in Sections I, II and III will help you identify a workable number of alternatives for consideration in your analysis and an appropriate analytical approach to use.

A. How To Develop a Baseline

1. General Issues

You need to measure the benefits and costs of a rule against a baseline. This baseline should be the best assessment of the way the world would look absent the proposed action. The choice of a proper baseline may require consideration of a wide range of potential factors, including:

- Evolution of the market,
- Changes in external factors affecting expected benefits and costs,
- Changes in regulations promulgated by the agency or other government entities, and the degree of compliance by regulated entities with other regulations.

You may often find it reasonable to forecast that the world absent the regulation will resemble the present. If this is the case, however, your baseline should reflect the future effect of current programs and policies. For review of an existing regulation, a baseline assuming ''no change'' in the regulatory program generally provides an appropriate basis for evaluating reasonable regulatory alternatives. When more than one baseline is reasonable and the choice of baseline will significantly affect estimated benefits and costs, you should consider measuring benefits and costs against alternative baselines. In doing so you can analyze the effects on benefits and costs of making different assumptions about other agencies' regulations, or the degree of compliance with your own existing rules. In all cases, you must evaluate benefits and costs against the same baseline. You should also discuss the reasonableness of the baselines used in these sensitivity analyses.

EPA's 1998 final PCB disposal rule provides a good example. EPA used several alternative baselines, each reflecting a different interpretation of existing regulatory requirements. In particular, one baseline reflected a literal interpretation of EPA's 1979 rule and another the actual implementation of that rule in the year immediately preceding the 1998 revision. The use of multiple baselines illustrated the substantial effect changes in EPA's implementation policy could have on the cost of a regulatory program. In the years after EPA adopted the 1979 PCB disposal rule, changes in EPA policy—especially allowing the disposal of automobile ''shredder fluff'' in municipal landfills—reduced the cost of the program by more than $500 million per year.

In some cases, substantial portions of a rule may simply restate statutory requirements that would be self-implementing even in the absence of the regulatory action. In these cases, you should use a pre-statute baseline. If you are able to separate out those areas where the agency has discretion, you may also use a post-statute baseline to evaluate the discretionary elements of the action.

2. Evaluation of Alternatives

You should decide on and describe the number and choice of alternatives available to you and discuss the reasons for your choice. Alternatives that rely on incentives and offer increased flexibility are often more cost-effective than more prescriptive approaches. For example, user fees and information dissemination may be good alternatives to direct command-and-control regulation. Within a command-and-control regulatory program, performance-based standards generally offer advantages over standards specifying design, behavior, or manner of compliance.

You should carefully consider all appropriate alternatives for the key attributes or provisions of the rule. Section II above outlines examples of appropriate alternatives.

Where there is a ''continuum'' of alternatives for a standard (for example, the level of stringency), you should generally analyze at least three options:

- The option serving as a focus for the Agency or program office regulatory initiative;
- A more stringent option that achieves additional benefits (and presumably costs more) beyond those realized by the preferred option; and
- A less stringent option that costs less (and presumably generates fewer benefits) than the preferred option.

You should choose options that are reasonable alternatives deserving careful consideration. In some cases, the regulatory program will focus on an option that is near or at the limit of technical feasibility or that fully achieves the objectives of the regulation. In these cases, the analysis would not need to examine a more stringent option. For each of the options analyzed, you should compare the anticipated benefits to the corresponding costs. It is not adequate to simply compare the Agency's preferred option to a ''do nothing'' or ''status quo'' option.

Whenever you can compare the benefits and costs of alternative options, you should present them in terms of both total and incremental benefits and costs. You must measure total benefits and costs against the same baseline. By contrast, you should present incremental benefits and costs as differences from the corresponding estimates associated with the next less-stringent alternative.[17] It is important to emphasize incremental effects are simply differences between successively more stringent alternatives.

In some cases, you may decide to analyze a wide array of options. For example, DOE's 1998 rule setting new energy efficiency standards for refrigerators and freezers analyzed a large number of options and produced a rich amount of information on their relative effects. This analysis—examining more than 20 alternative performance standards for one class of refrigerators with top-mounted freezers—enabled DOE to select an option that produced $200 more in net benefits per refrigerator than the least attractive option.

You should analyze the benefits and costs of different regulatory provisions separately when a rule includes a number of distinct provisions. If the existence of one provision affects the benefits or costs arising from another provision, the analysis becomes more complicated, but the need to examine provisions separately remains. In this case, you should evaluate each specific provision by determining the net benefits of the proposed regulation with and without it.

[17] For the least stringent alternative, you should estimate the incremental benefits and costs relative to the baseline. Thus, for this alternative, the incremental effects would be the same as the corresponding totals.

Analyzing all possible combinations of provisions in this way is impractical if their number is large and interaction effects are widespread. You need to use judgment to select the most significant or relevant provisions for such analysis.

You should also discuss the statutory requirements that affect the selection of regulatory approaches. If legal constraints prevent the selection of a regulatory action that best satisfies the philosophy and principles of Executive Order No. 12866, you should identify these constraints and estimate their opportunity cost.

B. How To Develop Benefit and Cost Estimates

1. Some General Considerations

You should discuss the expected benefits and costs of the selected regulatory option and any reasonable alternatives for each rule. How is the proposed action expected to provide the anticipated benefits and costs? What are the monetized values of the potential real incremental benefits and costs to society? To present your results, you should:

- Include separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs and express the estimates in this table in constant, undiscounted dollars (for more on discounting see part C below).
- List the benefits and costs you can quantify, but cannot monetize, including their timing.
- Describe benefits and costs you cannot quantify.
- Identify or cross-reference the data or studies on which you base the benefit and cost estimates.

Similarly, you should discuss the expected cost of the selected regulatory option and any reasonable alternatives.

When benefit and cost estimates are uncertain (for more on this see part D below):

- You should calculate benefits (including benefits of risk reductions) and costs that reflect the full probability distribution of potential consequences. Where possible, present probability distributions of benefits and include the upper and lower bound estimates as complements to central tendency and other estimates.
- If fundamental scientific disagreement or lack of knowledge prevents construction of a scientifically defensible probability distribution, you should describe benefits under plausible assumptions and characterize the evidence underlying each alternative.

2. The Key Concepts Needed To Estimate Benefits and Costs

''Opportunity cost'' is the appropriate concept for valuing both benefits and costs. The principle of ''willingness-to-pay'' (WTP) captures the notion of opportunity cost by measuring what individuals are willing to forgo to enjoy a particular benefit. In general, economists tend to view WTP as the most appropriate measure of opportunity cost, but an individual's ''willingness-to-accept'' (WTA) compensation for not receiving the improvement can also provide a valid measure of opportunity cost. WTP and WTA are comparable measures when the change being evaluated is small and especially where there are reasonably close substitutes available. WTP is generally considered to be more readily measurable and to provide a more conservative measure of benefits. Adoption of WTP as the measure of value implies that individual preferences of the affected population should be a guiding factor in the regulatory decision and that the existing distribution of income is acceptable.

Market prices provide the richest data for estimating benefits based on willingness-to-pay if the goods and services affected by the regulation trade in well-functioning free markets. The opportunity cost of an alternative includes the value of the benefits forgone as a result of choosing that alternative. The opportunity cost of banning a product—a drug, food additive, or hazardous chemical—is the forgone net benefit (*i.e.*, lost consumer and producer surplus [18]) of that product, taking into account the mitigating effects of potential substitutes. The use of any resource has an opportunity cost regardless of whether the resource is already owned or has to be purchased. That opportunity cost is equal to the net benefit the resource would have provided in the absence of the requirement. For example, if regulation of an industrial plant affects the use of additional land or buildings within the existing plant boundary, the cost analysis should include the opportunity cost of using the additional land or facilities. To the extent possible, you should monetize any such forgone benefits and add them to the other costs of that alternative. You should also try to monetize any costs averted as a result of an alternative and either add it to the benefits or subtract it from the costs of that alternative.

Estimating benefits and costs when market prices are hard to measure or markets do not exist is more difficult. In these cases, regulatory analysts need to develop appropriate proxies that simulate market exchange. Estimates of willingness-to-pay based on observable and replicable behavior generally are the most reliable. As one example, analysts sometimes use ''hedonic price equations'' based on multiple regression analysis of market behavior to simulate market prices for the commodity of interest.[19] Going through the analytical process of deriving benefit estimates by simulating markets may also suggest alternative regulatory strategies that create such markets.

Other approaches may be necessary when a commodity is not directly or indirectly traded in markets. Valuation estimates developed using these approaches are less certain than estimates derived from market transactions or based on behavior that is observable and replicable. While innovative estimation methods are sometimes necessary, they increase the need for quality control to ensure that estimates conform closely to what would be observed if markets did exist.

Ultimately, the method selected to develop a monetized estimate should focus on a value for the specific attribute or end-point of interest (for example, lost school-days). As a cautionary note, the transfer of a valuation estimate from an unrelated context (say, for example, the valuation of lost work-days from labor market studies) as a measure of the value of the attribute (lost school-days) may yield an incorrect benefits estimate.

You also need to guard against double-counting, since some attributes are embedded in other broader measures. For example, when a regulation improves the quality of the environment in a community, the value of real estate in the community generally rises to reflect the greater attractiveness of living in a better environment. Simply adding the increase in property values to the estimated value of improved public health would be double counting if the increase in property values reflects the improvement in public health. To avoid this problem you should separate the embedded effects on the value of property arising from improved public health. At the same time, of course, valuation estimates that fail to incorporate the consequence of land use changes will not capture the full effects of regulation.

3. How To Use Market Data Directly

Economists ordinarily consider market prices as the most accurate measure of the value of goods and services to society. In some instances, however, market prices may not reflect the true value of goods and services. If a regulation involves changes to goods or services where the market price is not a good measure of the value to society, you should use an estimate that reflects the true value to society (often called the ''shadow price''). For example, suppose a particular air pollutant damages crops. One of the benefits of controlling that pollutant is the value of the increase in crop yield as a result of the controls. That value is typically measured by the price of the crop. If the price is held above the market price by a government program that affects supply, however, a value estimate based on this price would overstate the true benefits of controlling the pollutant. In this case, you should calculate the value to society of the increase in crop yields by estimating the

[18] Consumers' surplus is the difference between what a consumer pays for a unit of a good and the maximum amount the consumer would be willing to pay for that unit. It is measured by the area between the price and the demand curve for that unit. Producers' surplus is the difference between the amount a producer is paid for a unit of a good and the minimum amount the producer would accept to supply that unit. It is measured by the area between the price and the supply curve for that unit.

[19] The hedonic technique allows analysts to develop an estimate of the price for specific attributes associated with a product. For example, houses are a product characterized by a variety of attributes including the number of rooms, total floor area, and type of heating and cooling. If there are enough data on transactions in the housing market, it is possible to develop an estimate of the implicit price for specific attributes, such as the implicit price of an additional bathroom or for central air conditioning. This technique can be extended, as well, to develop an estimate for the implicit price of public goods that are not directly traded in markets. For example, the analyst can develop implicit price estimates for public goods like air quality and access to public parks by adding measures for these attributes to the hedonic price equation for housing.

shadow price, which reflects the value to society of the marginal use of the crop. If the marginal use is for exports, you should use the world price. If the marginal use is to add to very large surplus stockpiles, you should use the value of the last units released from storage minus storage cost. If stockpiles are large and growing, the shadow price may be low or even negative.

4. Indirect Uses of Market Data

Some benefits or costs correspond to goods or services that are indirectly traded in the marketplace. Their value is reflected in the prices of related goods that are directly traded. Examples include reductions in health and safety risks, the use-values of environmental amenities (for example, recreational fishing or hiking and camping), and the value of improved scenic visibility. You should use willingness-to-pay measures as the basis for estimating the monetary value of such indirectly traded goods. When practical obstacles prevent the use of direct ''revealed preference'' methods based on actual market behavior to measure willingness-to-pay, you may consider the use of alternative ''stated preference'' methods based on survey techniques. As discussed below, you may use alternative methods where there are practical obstacles to the accurate application of direct willingness-to-pay methodologies.

A variety of methods have been developed for estimating indirectly traded goods or services. Examples include estimates of the value of environmental amenities derived from travel-cost studies, hedonic price models that measure differences or changes in the value of land, and statistical studies of occupational-risk premiums in wage rates. Under each of these methods, care is needed in designing protocols for reliably estimating the value of these attributes. For example, the use of occupational-risk premiums can be a source of bias because the risks, when recognized, may be voluntarily rather than involuntarily assumed,[20] and the sample of individuals upon which premium estimates are based may be skewed toward more risk-tolerant people.

Many goods that are affected by regulation—such as preserving environmental or cultural amenities—are not traded directly in markets. These ''non-market'' values arise both from use and non-use. Estimation of these values is difficult because of the absence of an organized market. However, overlooking or ignoring these values in your regulatory analysis may significantly understate the benefits of regulatory actions.

a. Use Values—the value an individual derives from directly using the resource now (or in the future). Use values are associated with activities such as swimming, hunting, and hiking where the individual comes into direct contact with the environment. These values also include commercial uses of natural resources, such as fishing, and consumptive uses, such as clean air and drinking water.

[20] Distinctions between ''voluntary'' and ''involuntary'' are arbitrary and should be treated with care. These terms are merely a proxy for differences in the cost of avoiding risks.

b. Nonuse Values—the value an individual places on an environmental resource even though the individual will not use the resources now or in the future. Non-use value includes bequest, existence and option values.

Use values are typically estimated through ''revealed'' preference models, which rely on observed behavior. It is important that you utilize revealed preference models that adhere to economic criteria that are consistent with utility maximizing behavior [example of RUM study]. Examining averting or defensive expenditures (as distinct from avoided cost of compliance with other regulatory requirements) is another way to estimate use values. This approach may reveal a minimum willingness to pay, particularly if there is reason to believe the market for averting behavior is not in equilibrium.

5. Contingent Valuation

Contingent valuation (CV) methods have become increasingly common for estimating indirectly traded benefits. However, the reliance of these methods on stated preferences regarding hypothetical scenarios and the complexities of the goods being valued by this technique raise issues about its accuracy in estimating willingness to pay compared to methods based on (indirect) revealed preferences. Accordingly, value estimates derived from contingent-valuation studies require greater analytical care than studies based on observable behavior. For example, the contingent valuation instrument must portray a realistic choice situation for respondents—where the hypothetical choice situation corresponds closely with the policy context to which the estimates will be applied. Below we provide a more complete list of important criteria that affect the reliability of results from contingent valuation surveys. The practice of contingent valuation is rapidly evolving, and agencies relying upon this tool for valuation should judge the reliability of their estimates using this technique in light of advances in the state of the art.

Some types of goods, such as preserving environmental or cultural amenities apart from their use and direct enjoyment by people, are not traded directly or indirectly in markets. The practical obstacles to accurate measurement are similar to (but generally more severe than) those arising with respect to indirectly traded goods and services, principally because there are no related market transactions to provide data for willingness-to-pay estimates.

For many of these goods, particularly goods providing a substantial ''nonuse'' component of value, contingent-valuation methods may provide the only analytical approaches currently available for estimating values. The absence of observable and replicable behavior with respect to the good or service, combined with the complex and often unfamiliar nature of the goods being valued, argues for great care in the design and execution of surveys, rigorous analysis of the results, and a full characterization of the uncertainties in the estimates to meet best practices in the use of this method. Current ''best practices'' for CV surveys include the following:

Sampling, etc.

- Probability sampling: this usually requires the guidance of a professional sampling statistician;
- Low non-response rate: high non-response rates would make the results unreliable;
- Personal interview: face-to-face and telephone interviews may elicit more reliable information.

Survey Instrument Design

- Accurate description: adequate information must be provided to respondents about the good or amenity they are being asked to value;
- Reminder of substitute commodities: respondents must be reminded of substitute commodities, and this reminder should be introduced forcefully and directly prior to the main valuation question;
- Reminder of alternative expenditure possibilities: respondents must be reminded that their willingness to pay would reduce their expenditures for other goods;
- Deflection of transaction value: the survey should be designed to deflect the general ''warm glow'' of giving or a particular dislike of the source of the problem being addressed.

Transparency and Replicability of Results

- Reporting: CV studies should make clear the definition of population sampled, sampling frame used, overall sample non-response rate, and item non-response rate on all important questions; the report should also include the exact wording and sequence of questionnaire and other communications to respondents;
- Data quality: special care should be taken to ensure compliance with OMB's ''Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies' (''data quality guidelines'') *http://www.whitehouse.gov/omb/fedreg/reproducible.html;*
- Since there is no economic theory that can describe hypothetical behavior, it is important to assure the respondents that their decisions are consequential and may influence policy.

As with all other estimates of benefits and costs, your CV results should be consistent with economic theory. First, as price increases and the amount of the good is held constant, the number of respondents willing to pay a particular price should fall. This is akin to negative own-price elasticity for a marketed good. Second, respondents should be willing to pay more for a larger amount (or higher quality) of the good. This is often referred to as being sensitive to scope. If your only test of consistency with economic theory is a scope test, it should be an external (split sample) test rather than an internal (within sample) test.

6. Benefit Transfer Methods

In many cases, conducting an original study may not be possible due to the time and expense involved. The alternative to an original study is the use of benefit transfer methods. Benefit transfer is defined as the practice of transferring existing estimates of

non-market values from the context of study to a new context.

Although benefit transfer offers a quick, low cost approach for establishing values for goods and attributes of goods, you should consider it as a last resort option. Several studies have documented difficulties in applying benefit transfer methods. If a benefit transfer approach is necessary, you should adopt the approach of transferring the entire demand function (referred to as benefit function transfer) rather than adopting a single point estimate (referred to as benefit point transfer). The former approach has been shown to yield more precise estimates than the latter approach.

In conducting benefit transfer, the first step is to specify the value to be estimated at the policy site. The analyst should identify the relevant measure of the policy change at this initial stage. For instance, you can derive the relevant willingness-to-pay measure by specifying an indirect utility function. This identification allows an analyst to ''zero in'' on key aspects of the benefit transfer.

The next step is to identify appropriate studies to conduct benefit transfer. In selecting transfer studies for either point transfers or function transfers, you should base your choices on the following criteria:

a. The selected studies should be based on adequate data, sound empirical methods and defensible empirical techniques.

b. The selected studies should document parameter estimates of the valuation function.

c. The study context and policy context should have similar populations (*e.g.*, demographic characteristics, target population size).

d. The good, and the magnitude of change in that good, should be similar in the study and policy contexts.

e. The relevant characteristics of the study and the policy contexts should be similar. For example, are they similar in the following respects?

- The reversibility of the policy change
- The degree of embedding of other values
- The order in which the good is supplied
- The functional relationship between the consumer surplus and its determinants.

f. The distribution of property rights should be similar so that the analysis uses the same welfare measure. If the property rights in the study context support the use of willingness-to-accept (WTA) measures while the rights in the policy context support the use of willingness-to-pay (WTP) measures, benefit transfer is not appropriate.

g. The availability of substitutes across study and policy contexts should be similar.

Clearly, all of these criteria are difficult to meet. However, you should attempt to satisfy as many as possible when choosing studies from the existing economic literature. In addition to the above criteria, an analyst should keep in mind some of the difficulties in transferring benefit estimates or functions from one context to another:

- Is the policy change irreversible?
- Does the order in which the good is supplied affect valuation?
- Is the embedding problem significant?
- Is the assumed functional relationship between the consumer surplus measure and its determinants explicit and appropriate?

Finally, you should not use benefit transfer in estimating benefits if:

- Resources are unique or have unique attributes.
- If the study examines a resource that is unique or has unique attributes, you should not transfer benefit estimates or functions to value a different resource and vice versa. For example, if a study values visibility improvements at the Grand Canyons, these results should not be used to value visibility improvements in urban areas.
- There are significant problems with applying an ex ante valuation estimate to an ex post policy context. If a policy yields a significant change in the attributes of the good, you should not use the study estimates to value the change using a benefit transfer approach.
- You also should not use a value developed from a study involving, small marginal changes in a policy context involving large changes in the quantity of the good.

7. Methods for Treating Nonmonetized Benefits and Costs

Sound quantitative estimates of benefits and costs are preferable to qualitative descriptions of benefits and costs to help decision-makers understand the full effects of alternative actions. Although we prefer that agencies use acceptable monetized benefit and cost estimates, we recognize that monetizing some of the effects of regulations is difficult, and even quantifying some effects may not be feasible.

a. What To Do With Benefits and Costs That Are Difficult To Monetize?

You should monetize quantitative estimates whenever possible. Use sound and defensible values or procedures to monetize costs and benefits, and ensure that key analytical assumptions are defensible. If monetization is impossible, explain why and present all available quantitative information. For example, if you can quantify, but cannot monetize, improvements in water quality and increases in fish populations resulting from water quality regulation, you can describe benefits in terms of stream miles of improved water quality for boaters and increases in game fish populations for anglers. You should describe the timing and likelihood of such effects and avoid double-counting of benefits when estimates of monetized and physical effects are mixed in the same analysis. You should also apply the discounting procedures described above to all quantified effects, whether or not you are able to monetize them.

b. What To Do With Benefits and Costs That Are Difficult To Quantify?

If you are not even able to quantify the effects, you should present any relevant quantitative information along with a description of the unquantifiable effects. Such descriptions could include ecological gains, improvements in quality of life, and aesthetic beauty. For cases in which the presence of unquantifiable benefits or costs affects a policy choice, you should provide a clear explanation of the rationale behind the choice. Such an explanation could include detailed information on the nature, timing, likelihood, location, and distribution of the unquantified benefits and costs. Also, please include a summary table that lists all the unquantifiable benefits and costs, ordered by expected magnitude, if possible.

8. Monetizing Health and Safety Benefits and Costs

We expect you to provide a benefit and cost analysis of major health and safety rulemakings in addition to a CEA. The BCA provides additional insight because (a) it provides some indication of what the public is willing to pay for improvements in health and safety and (b) it offers additional information on preferences for health using a different research design than is used in CEA. Since the health-preference methods used to support CEA and BCA have some different strengths and drawbacks, it is important that you provide decision makers with both perspectives.

In monetizing health benefits, a willingness-to-pay measure is the conceptually appropriate measure as compared to other alternatives (*e.g.*, cost of illness or lifetime earnings), in part because it attempts to capture pain and suffering and other quality-of-life effects. Using the willingness-to-pay measure for health and safety allows you to directly compare your results to the other costs and benefits in your analysis, which will also typically be based on willingness to pay.

If well-conducted, revealed-preference studies of relevant health and safety risks are available, you should consider using them in developing your monetary estimates. If appropriate revealed-preference data are not available, you may consider whether valid and relevant data from stated-preference studies are available. You will need to use your professional judgement when you are faced with limited information on revealed preference and substantial information based on stated preference studies.

A key advantage of stated-preference and health-utility methods (compared to revealed preference) is that they can be tailored in their design to address ranges of probabilities, types of health risks and specific populations affected by your rule. In many rulemakings there will be no relevant information from revealed-preference studies. In this situation you should consider commissioning a stated-preference study or using values from published stated-preference studies. For the reasons discussed in the section above IVB5, you should be cautious about using values from stated-preference studies and describe in the analysis some of the inherent drawbacks of this approach.

a. Nonfatal Health and Safety Risks

With regard to nonfatal health and safety risks, there is enormous diversity in the nature and severity of impaired health states. A minor traumatic injury that can be treated effectively in the emergency room without hospitalization or long-term care is different from a traumatic injury resulting in paraplegia. Severity differences also are important in evaluation of chronic diseases. A severe bout of bronchitis, though perhaps less frequent, is far more painful and debilitating than the more frequent bouts of

mild bronchitis. The duration of an impaired health state, which can range from a day or two to several years or even a lifetime (*e.g.*, birth defects inducing mental retardation), need to be considered carefully. Information on both the severity and duration of an impaired health state are necessary before the task of monetization can be performed.

When monetizing nonfatal health effects, it is important to consider two components: (1) The private demand for prevention of the nonfatal health effect, to be represented by the preferences of the target population at risk, and (2) the net financial externalities associated with poor health such as net changes in public medical costs and any net changes in economic production. Revealed-preference or stated-preference studies are necessary to estimate the private demand; health economics data from published sources can typically be used to estimate the financial externalities of poor health. If you use literature values to monetize nonfatal health and safety risks, it is important to make sure that the values you have selected are appropriate for the severity and duration of health effects to be addressed by your rule.

If data are not available to support monetization, you might consider an alternative approach that makes use of health-utility studies. Although the economics literature on the monetary valuation of impaired health states is growing, there is a much larger clinical literature on how patients, providers and community residents value diverse health states. This literature typically measures health utilities based on the standard gamble, the time tradeoff or the rating scale methods. This health utility information may be combined with known monetary values for well-defined health states to estimate monetary values for a wide range of health states of different severity and duration. If you use this approach, you should be careful to acknowledge your assumptions and the limitations of your estimates.

b. Premature Mortality Risks

The adoption of a monetary value for projected reductions in premature mortality is the subject of continuing research and discussion within the economics and policy analysis communities. Although there is a substantial academic literature on this topic, the methods used and resulting estimates vary substantially. The two most widely used measures consider the number of statistical lives saved and the number of expected years of life saved and their associated monetary values. Both of these measures are applicable to settings where a rule changes small probabilities of death faced by the public.

The phrase ''statistical life'' is widely used in the technical literature but it can be misleading and easily misinterpreted. Unlike an identified life, whose name and background are known (*e.g.*, a trapped coal miner or patient dying of kidney failure), a statistical life refers to the sum of risks experienced by a population. For example, if 10,000 people each face a risk of 1 in 10,000 of immediate death, one statistical life is expected to be lost. Statistical lives that are lost are real people but, given the background rate of fatal events in the population, it is not feasible to determine which actual lives will be saved or lost by a specific rule.

The monetary value of saving a statistical life (VSL) is derived by assessing the public's willingness to pay to avert one statistical fatality. The bulk of the studies in the literature, which address wage premiums for hazardous jobs, are based on revealed preference. A small but growing number of stated-preference studies have also been used to derive VSLs. The estimates of VSL in the literature vary considerably but this is not surprising because VSL is not expected to be a universal constant. Economic theory predicts that VSLs may vary in different lifesaving contexts depending upon factors such as the magnitude of the probabilities and the health preferences of the target population.

You should not use a VSL estimate without considering whether it is appropriate for the size and type of risks addressed by your rule. Studies aimed at deriving VSL values for middle-aged populations are not necessarily applicable to rules that address lifesaving among children or the elderly. Moreover, VSL values based on fatal cancers or heart attacks are not necessarily relevant to a rule that prevents fatal causes of trauma, violence, or infectious disease. If you choose to apply a VSL derived in one setting to a different setting, you should disclose the salient differences in the lifesaving contexts and, where feasible, make appropriate quantitative adjustments to the VSL value.

Since everyone is expected to die sooner or later, it has been suggested that the VSL be replaced or augmented by the monetary value of a statistical life year (VSLY). The assumption is that the public is willing to pay more money for a rule that saves an average of 10 life years per person than a rule that saves one life year per person. A key assumption implicit in this approach is that public willingness to pay for risk reduction is strictly proportional to the number of life years at risk. This may not always be the case. For example, the elderly may have substantial willingness to pay for reductions in their mortality risk precisely because they have relatively few life years remaining. Where there is good reason to believe that these values are not strictly proportional, you should attempt to develop appropriate estimates. In all instances, whether or not you are able to develop ideal estimates, agencies should consider providing estimates of both VSL and VSLY, while recognizing the developing states of knowledge in this area.

In summary, you should use valid, relevant data and methods to assign monetary values to changes in the risk of premature death, illness or injury. Some of the key issues include:

- Whether the monetary valuations have been shown to be appropriately sensitive to the scope of the health change, considering probability, severity and longevity.
- Whether the specific data and methods used for monetization are relevant to the specific health change induced by a proposed regulation.

The valuation of fatal and nonfatal risk reduction is an evolving area in terms of research design, methods and results. You should utilize valuation methods that you consider appropriate for the regulatory circumstances. You should present estimates based on alternative approaches, and if you monetize mortality risk reduction, you should do so on a consistent basis to the extent feasible. You should clearly indicate your methodology and document your choice of a particular methodology. If you use different methodologies in different rules, you should clearly disclose the fact and explain your reasons.

C. What Discount Rate To Use

Benefits and their associated costs do not always take place in the same time period, and when they do not, it is usually incorrect simply to add up all of the expected benefits or costs without taking account of when they actually occur. If benefits or costs are delayed or otherwise separated in time from each other, the difference in timing should be reflected in your analysis.

As a first step, you should present the annual time stream of benefits and costs expected to result from the rule, clearly identifying when the benefits and costs are expected to occur. The beginning point for your stream of estimates should be the year in which the final rule will begin to have effects, even if that is expected to be some time in the future. In presenting the stream of benefits and costs, it is important to measure them in constant dollars. That way you avoid the misleading effects of inflation on your estimates. If the benefits or costs are initially measured in prices reflecting expected future inflation, you can convert them to constant dollars by dividing through by an appropriate inflation index, one that corresponds to the inflation rate underlying the initial estimates of benefits or costs.

Once these preliminaries are out of the way, you can begin to adjust your estimates for differences in timing. This is a separate calculation from the adjustment needed to remove the effects of future inflation. Whether or not inflation is expected, it is generally true that the sooner benefits occur the more valuable they are. Resources that are invested will normally earn a positive return, so current consumption is more expensive than future consumption, because you are giving up that expected return when you consume today. Looking at it another way, postponed benefits have a cost because people are impatient and generally prefer present to future consumption. Also, if consumption continues to increase over time, as it has for most of U.S. history, an increment of consumption will be less valuable in the future than it would be today, because as total consumption increases, its marginal value tends to decline. These are all reasons for valuing future costs and benefits less than those occurring in the present.

A discount factor should be used to adjust the estimated costs and benefits for differences in timing . The further in the future the costs and benefits are expected to occur, the larger is this discount factor. The discount factor can be calculated given a discount rate. The formula is $1/(1+\text{the discount rate})^{t}$ where ''t'' measures the number of years in the future that the benefits or costs are expected to occur. Benefits or costs that have been adjusted in

this way are called discounted present values. Once the estimated benefits and costs have been discounted, they can be combined to determine the overall value of net benefits.

OMB's basic guidance on the discount rate is provided in OMB Circular A–94. This Circular states that a real discount rate of 7 percent should be used as a base-case for regulatory analysis. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital and is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. OMB revised Circular A–94 in 1992 after extensive internal review and following public comment. The average rate of return to capital remains near the 7 percent rate estimated in 1992. Circular A–94 also recommends using other discount rates to show the sensitivity of the estimates to the discount rate assumption.

The effects of regulation do not always fall exclusively on the allocation of capital. When regulation primarily affects private consumption (*e.g.*, through higher consumer prices for goods and services), a lower discount rate may be appropriate. The alternative most often used is called the ''social rate of time preference.'' This simply means the rate at which ''society'' discounts future consumption flows to their present value. Economic distortions, including taxes on capital, create a divergence between this social rate and the private rate of return to capital. If we take the rate that the average saver uses to discount future consumption as our measure of the social rate of time preference, then the real rate of return on long-term government debt may provide a fair approximation. This rate has averaged around 3 percent since the mid-1950s.

For regulatory analysis, you should provide estimates of net benefits using both 7 percent and 3 percent. An example of this approach is EPA's analysis of its 1998 rule setting both effluent limits for wastewater discharges and air toxic emission limits for pulp and paper mills. In this analysis, EPA developed its present discounted value estimates using real discount rates of 3 and 7 percent applied to benefit and cost streams that extended forward for 30 years. (*See* EPA, Economic Analysis, October 1997, pages 10–3 and 10–4.) You should present a similar sensitivity analysis in your own work.

In some instances, if there is reason to expect that the regulation will cause resources to be reallocated away from private investment in the corporate sector, then the opportunity cost may be appreciably greater than the 3 to 7 percent discount rate. For example, Tresch suggests that rates in the range of 10 to 25 percent may be appropriate to reflect this opportunity cost, depending on the sector affected by the regulation. If you are uncertain about the nature of the opportunity cost, then you should present benefit and cost estimates using a higher discount rate as a sensitivity analysis as well as using 3 percent and 7 percent.

Circular A–94 points out that the analytically preferred method of handling timing differences between benefits and costs would be to adjust all the benefits and costs to reflect their value in equivalent units of consumption.[21] Due to distortions in the economy such calculations require you to value the costs and benefits using shadow prices, especially for capital goods. If all costs and benefits are measured in terms of consumption equivalents, it is appropriate to discount them using the social rate of discount. Any agency that wishes to tackle this challenging analytical task should check with OMB before proceeding.

When future benefits or costs are health-related, some have questioned whether discounting is appropriate. Although some of the rationales for discounting money may not seem to be applicable to health (*e.g.*, lives saved today cannot be invested in the bank to save more lives in the future, although the resources that would have been used to save those lives can often be saved with a higher pay-off in future lives saved). However, people do prefer health gains that occur immediately to identical health gains that occur only in the future, which would justify discounting the future gains. Also, if future health gains are not discounted while future costs are, then the following perverse result occurs: an attractive investment today in future health improvement can always be made more attractive by delaying the investment. For such reasons, there is a professional consensus that future health effects, including both benefits and costs, should be discounted at the same rate as generally used in both BCA and CEA.

A common challenge in health-related analyses is to quantify the time lag between when a rule takes effect and when the resulting physical improvements in health status will be observed in the target population. In such situations, you must carefully consider the timing of health benefits before present-value calculations are performed. It is not reasonable to assume that all of the benefits of reducing chronic diseases such as cancer and cardiovascular disease will occur immediately when the rule takes effect. For rules addressing traumatic injury, this lag period may be short while for chronic diseases it may take years or even decades for a rule to induce its full beneficial effects in the target population. When a time period between exposure to a toxin and increased probability of disease is likely (*e.g.*, a so-called latency period), it is also likely that there will be a lag between exposure reduction and reduced probability of disease. This latter period has sometimes been referred to as a ''cessation lag'' and it may or may not be the same as the latency period. As a general matter, cessation lags will apply only to populations with at least some higher-level exposure (*i.e.*, before the rule takes effect). For populations with no such prior exposure, such as those born after the rule takes effect, only the latency period will be relevant.

Ideally, your exposure-risk model would allow calculation of reduced risk for each year following exposure cessation, perhaps incorporating total cumulative exposure and age at the time of exposure reduction into the calculation as well. The present value calculation of benefits could then reflect an appropriate discount factor for each year's risk reduction. Recent analyses of the cancer benefits of reducing public exposure to radon in drinking water have adopted this approach, supported by formal risk-assessment models that allow estimates of how the timing of lung cancer incidence and mortality are affected by different radon exposure levels. In many cases, you will not have the benefit of such detailed risk assessment modeling. You will need to use your professional judgement as to the average cessation lag for the chronic diseases affected by your rule. In situations where information exists on latency but not on cessation lags, it may be reasonable to use latency as a proxy for the cessation lag, unless there is reason to believe, based on data, modeling, or knowledge of the mechanism of action, that the two are different. When the average lag time between exposures and disease is unknown, a range of alternative yet plausible values for the time lag should be used in your analysis.

Special ethical considerations arise when comparing benefits and costs across generations. Although most people demonstrate in their own consumption behavior a preference for consumption now rather than in the future, it may not be appropriate for society to demonstrate a similar preference when deciding between the well-being of current and future generations. Future citizens who are affected by such choices cannot take part in making them, and today's society must act in their interest. One way to do this would be to follow the same discounting techniques described above, but to supplement the analysis with an explicit discussion of the intergenerational concerns and how they will be affected by the regulatory decision. Policymakers would be provided with additional information when the analysis covers many generations, but without changing the general approach to discounting.

Some have argued, however, that it is ethically impermissible to discount the utility of future generations. On this view, government should treat all generations equally. Even under this approach, it would still be correct to discount future costs and consumption benefits, although perhaps at a lower rate than for intragenerational analysis. There are two reasons for thinking that a nonzero discount rate is the appropriate assumption for intergenerational analysis, even when all generations are to be treated equally. First, future generations are likely to be wealthier than those currently living, so a marginal dollar of benefits or costs will be worth less to them than it would be to those alive today, at least on average. If that holds true, it is appropriate to discount future benefits and costs relative to currently consumed benefits and costs even if the welfare of future generations is not being discounted. Estimates of the discount rate

[21] A thorough discussion of this approach to discounting is provided in Robert C. Lind (ed.), Discounting for Time and Risk in Energy Policy, Baltimore: The Johns Hopkins University Press for Resources for the Future, 1982.

appropriate in this case made in the 1990s ranged from 1 to 3 percent per annum.[22]

A second reason for discounting the benefits and costs accruing to future generations at a lower rate is increased uncertainty about the appropriate value of the discount rate, the longer the horizon for the analysis. Aversion to uncertainty discourages any such long-term investments. Private market rates provide a reliable reference for determining how society values time within a generation, but for extremely long time periods no comparable private rates exist. Symmetric uncertainty would have the effect of lowering the discount factor applied to future costs and benefits. Again the reasonable range might be expanded to include rates as low as 1 percent per annum.

If you choose to use a lower discount rate for intergenerational analysis, you should still be sure to show the calculated net benefits using discount rates of 3 and 7 percent as well. Discounting is appropriate whether you are doing a BCA or a CEA. Even costs and benefits that are not expressed in monetary units should be discounted if they are separated in time. This also includes health benefits for reasons discussed above. For example, in its 1998 rule, ''Control of Emissions from Nonroad Diesel Engines,'' EPA estimated cost-effectiveness by discounting both the monetary costs and the emission reduction benefits over the useful expected life of the engines at the 7 percent real rate recommended in OMB Circular A–94.

It may be possible in some cases to avoid discounting non-monetized benefits, if the expected flow of benefits begins as soon as the cost is incurred and if it is expected to be constant over time. In such cases, annualizing the cost stream is sufficient, and further discounting of benefits is unnecessary. As an example, such an analysis might produce an estimate of the annualized cost per ton of reducing emissions of a pollutant.

D. Treatment of Uncertainty

The precise consequences (benefits and/or costs) of regulatory options are not always known for certain, but the probability of their occurrence can often be predicted. The important uncertainties connected with your regulatory decisions need to be analyzed and presented as part of the overall regulatory analysis. Your analysis of uncertainty should consider both the quantifiable risk associated with the potential outcomes of alternative regulatory actions (for example, the expected change in the distribution of automobile accidents that might result from a change in automobile safety standards) and the incomplete knowledge or uncertainty about the relevant relationships (for example, the uncertain science of how some economic activities might affect future climate change).

The treatment of uncertainty must be guided by the same principles of full disclosure and transparency that apply to other elements of your regulatory analysis. Any data and models that you use to analyze uncertainty should be fully identified. Inferences and assumptions used in your analysis should also be identified, and your analytical choices should be explicitly evaluated and adequately justified. Your presentation should explain how your analytical choices have affected your analysis.

Uncertainty arises from various and fundamentally different sources. These include the fundamental unpredictability of various natural and social phenomena, but they also include lack of data and the lack of knowledge about key relationships resulting from limitations in fundamental scientific knowledge (both social and natural). The different sources of uncertainty suggest different approaches for dealing with it. For example, when the uncertainty is due to a lack of data, you might consider deferring the decision, as an explicit regulatory alternative, pending further study to obtain sufficient data. We recognize that delaying a decision will also have costs, as will further efforts at data gathering and analysis. You will need to weigh the benefits of delay against these costs in making your decision. Formal tools for assessing the value of additional information are now well developed in the applied decision sciences and can be used to help resolve this type of complex regulatory question.

In some cases, the level of scientific uncertainty may be so large that you can only present discrete alternative scenarios without assessing the relative likelihood of each scenario quantitatively. For example, in assessing the potential outcomes of an environmental effect, there may be a limited number of scientific studies with strongly divergent results. In such cases, you might present results from a range of plausible scenarios, together with any available information that might help in qualitatively determining which scenario is most plausible.

Your analysis should include two fundamental components: A quantitative analysis characterizing the probabilities of the relevant outcomes and an assignment of economic value to the projected outcomes. It is essential that both parts be conceptually consistent. In particular, the quantitative analysis should be conducted in a way that permits it to be applied within a more general analytical framework, such as BCA. Similarly, the general framework needs to be flexible enough to incorporate the quantitative analysis without oversimplifying the results. For example, you should address explicitly the implications for benefits and costs of any probability distributions developed in your analysis.

1. Quantitative Analysis of Uncertainty

Examples of quantitative analysis, broadly defined, would include formal estimates of the probabilities of environmental damage to soil or water, the possible loss of habitat, or risks to endangered species as well as probabilities of harm to human health and safety. There are also uncertainties associated with estimates of economic benefits and costs, *e.g.*, the cost savings associated with increased energy efficiency. Your analysis should be credible, objective, realistic, and scientifically balanced. In your presentation, you should delineate its strengths along with any lingering uncertainties about its conclusions. You should describe the assumptions and the models you used and their impact on the overall analysis. You should also discuss the quality of the available data used.

As with other elements of regulatory analysis, you will need to balance thoroughness with the practical limits on your analytical capabilities. Your analysis does not have to be exhaustive, nor is it necessary to evaluate each alternative at every step. In the absence of adequate data, you will need to make assumptions. These should be clearly identified and consistent with the relevant science. Your analysis should provide sufficient information for decision-makers to grasp the degree of scientific uncertainty and the robustness of estimated probabilities, benefits, and costs to changes in key assumptions. For major rules involving threshold costs of $1 billion, you should present a formal quantitative analysis of the relevant uncertainties.

In your analysis, you should try to provide some estimate of the probability distribution of risks with and without the regulation, and you must do this for rules that exceed the $1 billion threshold. In characterizing the probability distributions quantitatively, you should provide some estimate of the central tendency (*e.g.*, mean and median) along with any other information you think will be useful such as ranges, variances, specified low-end and high-end percentile estimates, and other characteristics of the distribution.

Your estimates cannot be more precise than their most uncertain component. Thus, your analysis should report estimates in a way that reflects the degree of uncertainty and not create a false sense of precision. Your analysis should not reflect any unstated or unsupported preferences, even for such worthy objectives as protecting public health or the environment. Unstated assumptions can affect the analysis in unsuspected ways, making it difficult for decision-makers to evaluate the true magnitude of the uncertainties involved.

Acceptable Analytical Approaches: Whenever possible, you should use appropriate statistical techniques to determine a probability distribution of the relevant outcomes, and for rules that exceed the $1 billion threshold a formal quantitative analysis is required.

You may consider the following analytical approaches. They entail increasing levels of complexity:

- Disclose qualitatively the main uncertainties in each important input to the calculation of benefits and costs. These disclosures should address the uncertainties in the data as well as in the analytical results. However, major rules above the $1 billion threshold require a formal treatment.
- Use a numerical sensitivity analysis to examine how the results of your analysis vary with plausible changes in assumptions, choices of input data, and alternative analytical approaches. Sensitivity analysis is especially valuable when the information is

[22] Approaches to discounting across generations are discussed in a recent symposium volume published by Resources for the Future. Paul R. Portney and John P. Weyant (eds.), Discounting and Intergenerational Equity, Washington, DC: Resources for the Future, 1999.

lacking to carry out a formal probabilistic simulation. Sensitivity analysis can be used to find ''switch points''—critical parameter values at which estimated net benefits change sign or the low cost alternative switches. Sensitivity analysis usually proceeds by changing one variable or assumption at a time, but it can also be done by varying a combination of variables simultaneously to learn more about the robustness of your results to widespread changes. Again, however, major rules above the $1 billion threshold require a formal treatment.

• Apply a formal probabilistic analysis of the relevant uncertainties—possibly using simulation models and/or expert judgment as revealed, for example, through Delphi methods. Such a formal analytical approach is appropriate for complex rules where there are large multiple uncertainties whose analysis raises technical challenges, or where the effects cascade, and it is required for rules that exceed the $1 billion threshold. For example, in the analysis of regulations addressing air pollution, there is uncertainty about the effects of the rule on future emissions, uncertainty about how the change in emissions will affect air quality, uncertainty about how changes in air quality will affect health, and finally uncertainty about the economic and social value of the change in health outcomes. You should make a special effort to portray the probabilistic results—in graphs and/or tables—clearly and meaningfully.

• New methods may become available in the future. This document is not intended to discourage or inhibit their use, but rather to encourage and stimulate their development.

2. Assigning Economic Values to Uncertain Outcomes

Uncertainty affects the values that you assign to the costs and benefits of regulatory actions. Because the outcome of regulatory action is not certain, but is instead best represented by a probability distribution of potential outcomes, the value assigned to the expected outcome from this probability distribution may be different from that for an expected outcome of the same magnitude that is certain to occur. In the financial world, for example, riskier instruments must generally earn a higher rate of return, and investors receive a higher expected reward for bearing uncertainty. This principle can carry over to the analysis of regulations depending on who bears the uncertainties from regulatory decisions.

When reporting benefit and cost estimates, where there is a distribution of outcomes, you will often find it useful to emphasize summary statistics or figures that can be readily understood and compared to achieve the broadest public understanding of your findings. It is a common practice to compare the ''best estimates'' of both benefits and costs with those of competing alternatives. These ''best estimates'' are usually the average or the expected value of benefits and costs. Emphasis on these expected values is appropriate as long as society is ''risk neutral'' with respect to the regulatory alternatives. This, however, may not always be the case. For a risk-averse individual, the certainty equivalent of an uncertain net benefit stream is less than its expected cash value, because the uncertainty itself is valued negatively.

E. Other Key Considerations

1. Other Cost Considerations

You should include these effects in your analysis and provide estimates of their monetary values wherever possible.

- Private-sector compliance costs;
- Government administrative costs;
- Losses in consumers' or producers' surpluses;
- Discomfort or inconvenience; and
- Loss of time.

Estimates of costs should be based on credible changes in technology over time. For example, a slowing in the rate of innovation or of adoption of new technology because of delays in the regulatory approval process or the setting of more stringent standards for new facilities than existing ones may entail significant costs. On the other hand, a shift to regulatory performance standards and incentive-based policies may lead to cost-saving innovations that should be taken into account. The weight you give to a study of past rates of cost savings resulting from innovation (including ''learning curve'' effects) should depend on both their timeliness and their direct relevance to the processes affected by the regulatory alternative under consideration. In some cases agencies are limited under statute to considering only technologies that have been demonstrated to be feasible. In these situations, it may also be useful to estimate costs and cost savings assuming a wider range of technical possibilities.

Occasionally, one or more components of the analysis address cost savings to one of the parties directly affected by the rule. For example, a requirement that manufacturers reduce emissions from engines they produce may lead to technologies that improve fuel economy. These fuel savings will normally accrue to the purchasers of the engines. There is no apparent market failure with regard to the market value of fuel saved because one would expect that consumers would be willing to pay for increased fuel economy that exceeded the cost of providing it. When these cost savings are substantial, and particularly when you estimate them to be greater than the cost associated with achieving them, it is incumbent on you to demonstrate convincingly why the market has not already captured these gains. As a general matter, any costs that are averted as a result of an alternative should be monetized wherever possible and either added to the benefits or subtracted from the costs of that alternative.

2. The Difference Between Costs (or Benefits) and Transfer Payments

Distinguishing between real costs and transfer payments is an important, but sometimes difficult, problem in cost estimation. Cost and benefit estimates should reflect real resource use. Transfer payments are monetary payments from one group to another that do not affect total resources available to society. For example, a regulation that restricts the supply of a good, causing its price to rise, produces a transfer of income from buyers to sellers. The reduction in the total value of the supply of the good is a real cost to society, but the transfer of income from buyers to sellers resulting from the higher price is not. You should not include transfers in the estimates of the benefits and costs of a regulation.[23] Instead, address them in a separate discussion of the regulation's distributional effects.

Examples of transfer payments include the following:

- Scarcity rents and monopoly profits.
- Insurance payments.
- Indirect taxes and subsidies.
- Distribution expenses.

3. Alternative Assumptions

If benefit or cost estimates depend heavily on certain assumptions, you should make those assumptions explicit and carry out sensitivity analyses using plausible alternative assumptions. If the value of net benefits changes from positive to negative (or vice versa) or if the relative ranking of regulatory options changes with alternative plausible assumptions, you should conduct further analysis to determine which of the alternative assumptions is more appropriate. Because different estimation methods may have hidden assumptions, you should analyze estimation methods carefully to make any hidden assumptions explicit.

V. Specialized Analytical Requirements

In preparing analytical support for your rulemaking, you should be aware that there are a variety of analytic requirements imposed by law and Executive order. In addition to the regulatory impact analysis requirements of E.O. 12866, you should also consider whether your rule will need specialized analysis of any of the following issues.

A. Impact on Small Businesses and Other Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. chapter 6), agencies must prepare a proposed and final ''regulatory flexibility analysis'' (RFA) if the rulemaking could ''have a significant impact on a substantial number of small entities.'' Your agency should have guidelines on how to prepare an RFA and you are encouraged to consult with the Chief Counsel for Advocacy of the Small Business Administration on expectations concerning what is an adequate RFA. Executive Order 13272 (67 FR 53461, August 16, 2002) requires you to notify the Chief Counsel for Advocacy of any draft rules that might have a significant economic impact on a substantial number of small entities. E.O. 13272 also directs agencies to give every appropriate consideration to any comments provided by the Advocacy Office.

B. Analysis of Unfunded Mandates

Under the Unfunded Mandates Act (2 U.S.C. 1532), you must prepare a written statement about costs and benefits prior to issuing a proposed or final rule (for which

[23] However, transfers from the United States to other nations should be included as costs, and transfers from other nations to the United States as benefits.

your agency published a proposed rule) that may result in expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more in any one year (adjusted annually for inflation). Your analytical requirements under Executive Order 12866 are similar to the analytical requirements under this Act, and thus the same analysis may permit you to comply with both analytical requirements.

C. Information Collection, Paperwork and Recordkeeping Burdens

Under the Paperwork Reduction Act (44 U.S.C. chapter 35), you will need to consider whether your rulemaking (or other actions) will create any additional information collection, paperwork or recordkeeping burdens. These burdens are permissible only if you can justify the practical utility of the information for the implementation of your rule. OMB approval will be required of any new requirements for a collection of information imposed on 10 or more persons and a valid OMB control number must be obtained for any covered paperwork. Your agency's CIO should be able to assist you in complying with the Paperwork Reduction Act.

D. Information Quality Guidelines

Under the Information Quality Law, agency guidelines, in conformance with the OMB government-wide guidelines (67 FR 8452, February 22, 2002), have established basic quality performance goals for all information disseminated by agencies, including information disseminated in support of proposed and final rules. The data and analysis that you use to support your rule must meet these agency and OMB quality standards. Your agency's CIO should be able to assist you in assessing information quality. The Statistical and Science Policy Branch of OMB's Office of Information and Regulatory Affairs can provide you assistance.

E. Environmental Impact Statements

The National Environmental Policy Act (42 U.S.C. 4321–4347) and related statutes and executive orders require agencies to consider the environmental impacts of agency decisions, including rulemakings. An environmental impact statement must be prepared for ''major federal actions significantly affecting the quality of the human environment.'' You must complete NEPA documentation before issuing a final rule. The White House Council on Environmental Quality has issued regulations (40 CFR 1500–1508) and associated guidance for implementation of NEPA, available through CEQ's Web site (see NEPANet).

F. Impacts on Children

Under Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks,'' each agency must, with respect to its rules, ''to the extent permitted by law and appropriate, and consistent with the agency's mission,'' each agency must ''address disproportionate risks to children that result from environmental health risks or safety risks.'' For any substantive rulemaking action that ''is likely to result in'' an economically significant rule that concerns ''an environmental health risk or safety risk that an agency has reason to believe may disproportionately affect children,'' the agency must provide OMB/OIRA ''an evaluation of the environmental health or safety effects of the planned regulation on children,'' as well as ''an explanation of why the planned regulation is preferable to other potentially and reasonably feasible alternatives considered by the agency.''

G. Energy Impacts

Under Executive Order 13211 (66 FR 28355, May 22, 2001), agencies are required to prepare and submit to OMB a Statement of Energy Effects for significant energy actions, to the extent permitted by law. This Statement is to include a detailed statement of ''any adverse effects on energy supply, distribution, or use (including a shortfall in supply, price increases, and increased use of foreign supplies)'' for the action and reasonable alternatives and their effects. You need to publish the Statement or a summary in the related NPRM and final rule. For further ''Guidance on Implementing E.O. 13211,'' see OMB Memorandum 01–27 (July 13, 2001), available on OMB's Web site.

VI. Accounting Statement

You need to provide an accounting statement with tables reporting benefit and cost estimates for each major final rule for your agency. You should use the guidance outlined above to report these estimates. We have included a suggested format for your consideration.

Categories of Benefits and Costs

To the extent feasible, you should quantify all potential incremental benefits and costs. You should report benefit and cost estimates within the following three categories:

- Monetized
- Quantified, but not monetized; and
- Qualitative, but not quantified.

These categories are mutually exclusive and exhaustive. Throughout the process of listing preliminary estimates of costs and benefits, agencies should avoid double-counting. This problem may arise if more than one way exists to express the same change in social welfare.

Quantifying and Monetizing Benefits and Costs

Yes, you should develop quantitative estimate and covert them to dollar amounts if possible. In many cases, quantified estimates are readily convertible, with a little effort, into dollar equivalents.

Treatment of Benefits and Costs Over Time

You should monetize and quantify effects as real, undiscounted streams of estimates for each year over the entire period for which you have estimated them. You should also annualize these same effects using real discount rates of 3 and 7 percent. The stream of annualized estimates should begin in the year the final rule is published even if the rule does not take effect immediately. Please report all monetized effects in 2000 dollars. You may convert dollars expressed in different years to 2000 dollars using the GDP deflator.

Treatment of Risk and Uncertainty

You should provide central tendency or primary estimates as well as distributions about the estimates, where such information exists. When you provide only upper and lower bounds (in addition to best estimates), you should, if possible, use the 95 and 5 percent confidence bounds. Although we encourage you to develop estimates that capture the distribution of plausible outcomes for a particular alternative, detailed reporting of such distributions is not required.

The principles of full disclosure and transparency apply to the treatment of uncertainty. Where there is significant uncertainty and the resulting inferences and/or assumptions have a critical effect on the benefit and cost estimates, you should describe the benefits and costs under plausible alternative assumptions. You may add footnotes to the table as needed to provide documentation and references, or to express important warnings.

In our discussion in Section I above, we identified some of the issues associated with developing estimates of the value of reductions in premature mortality risk. Based on this discussion, you should present alternative primary estimates where you use alternative estimates for valuing reductions in premature mortality risk.

Precision of Estimates

Reported estimates should reflect, to the extent feasible, the precision in the analysis. For example, an estimate of $220 million implies rounding to the nearest $10 million and thus a precision of ±$5 million; similarly, an estimate of $222 million implies rounding to the nearest $1 million and thus, a precision of ±$0.5 million.

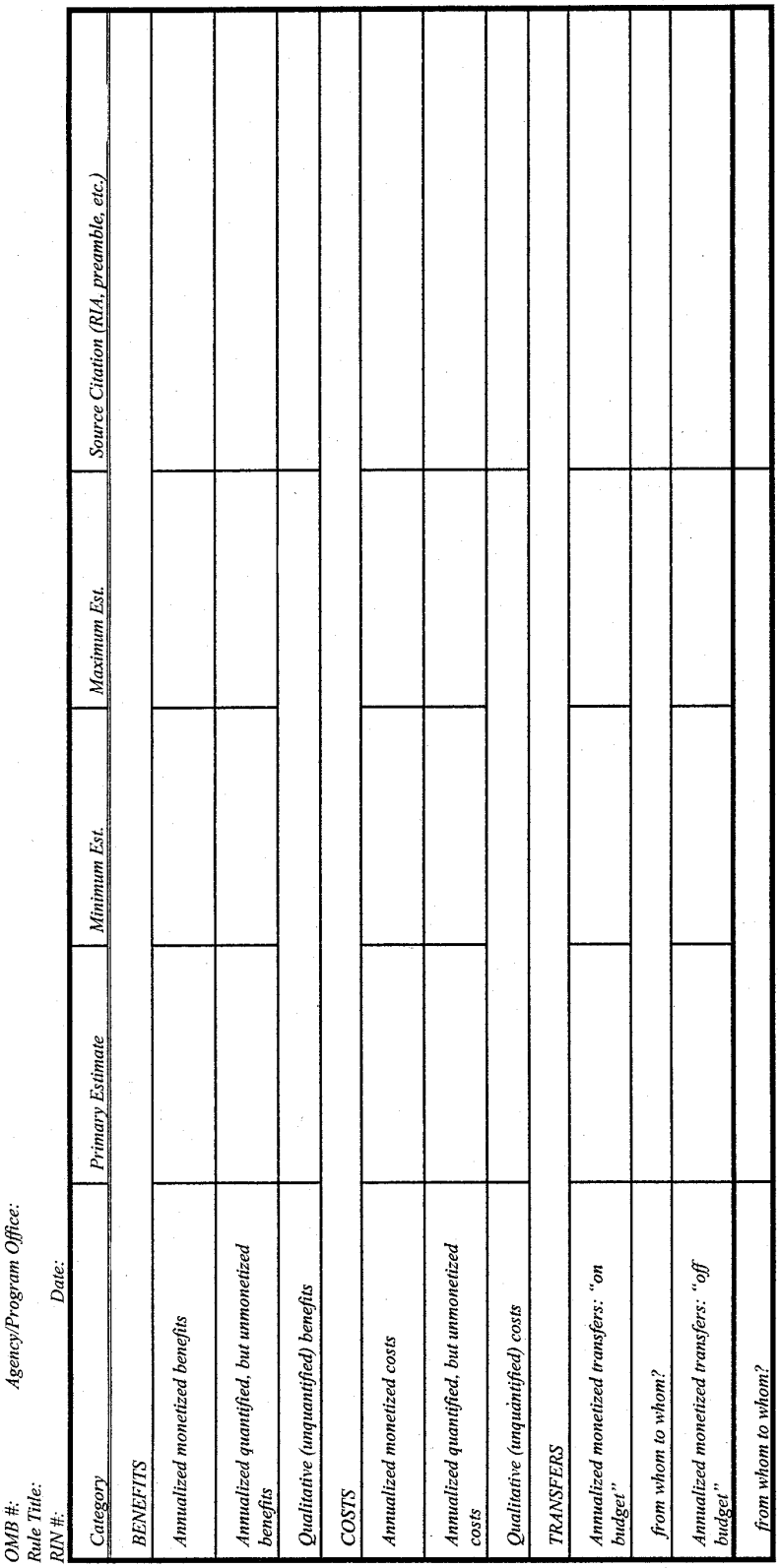
Separate Reporting of Transfers

You should report transfers separately and avoid the misclassification of transfer payments as costs or benefits. Transfers occur when wealth or income is redistributed without any direct change in aggregate social welfare. To the extent that regulatory outputs reflects transfers rather than welfare gains to society, you should identify them as transfers rather than costs or benefits. You should also distinguish transfers caused by Federal budget actions—such as those stemming from a rule affecting Social Security payments—from those that involve transfers between non-governmental parties—such as monopoly rents a rule may confer on a private party. You should use as many categories as necessary to describe the major redistributive effects of a regulatory action. If transfers have significant effects in addition to distributional effects, you should evaluate them also.

Effects on State, Local, and Tribal Governments, Small Business, Wages and Economic Growth

You need to identity the portions of benefits, cost, and transfers received by State, local, and tribal governments. To the extent feasible, you also should identify the effects of the rule or program on small businesses, wages, and economic growth. Note that rules with annual costs that are less than one

billion dollars are likely to have minimal effect on economic growth.



OMB #: *Agency/Program Office:*
Rule Title:
RIN #: *Date:*

Category	*Primary Estimate*	*Minimum Est.*	*Maximum Est.*	*Source Citation (RIA, preamble, etc.)*
BENEFITS				
Annualized monetized benefits				
Annualized quantified, but unmonetized benefits				
Qualitative (unquantified) benefits				
COSTS				
Annualized monetized costs				
Annualized quantified, but unmonetized costs				
Qualitative (unquantified) costs				
TRANSFERS				
Annualized monetized transfers: "on budget"				
from whom to whom?				
Annualized monetized transfers: "off budget"				
from whom to whom?				

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