Cost-Benefit Assessment in Rulemaking:

A Guide for State Agencies

July 2008

STATE OF NEW YORK
Governor David A. Paterson
Governor's Office of Regulatory Reform
Empire State Plaza
Agency Building 1
P.O. Box 2107
Albany, New York 12220-0107
(518) 486-3292

Table of Contents

Introduction

The New York State Administrative Procedure Act (SAPA) requires that when an agency plans to adopt or amend a rule, whether it be a permanent or emergency rule, the agency must issue a Regulatory Impact Statement (RIS) which includes an assessment of the costs and benefits of the proposed action.[1] The Governor's Office of Regulatory Reform (GORR) assists state agencies and the Executive Chamber in the rule making process. GORR has developed this guide to assist agencies in identifying, measuring, and reporting the costs and benefits of regulatory proposals.

Agencies should conduct a cost-benefit assessment not only to evaluate rules that they plan to propose. They should also do cost-benefit assessment to identify existing rules that may need to be rethought.

The nature and complexity of an agency's cost-benefit assessment will vary depending on the specifics of the rule proposal. Rules that may have a significant impact on the economy, public health or the environment warrant a more rigorous analysis than those that are routine in nature. Agencies will use their best judgment to determine the breadth and depth of the analysis they will conduct. Depending on the proposed rule, GORR may at times ask that further steps be taken in conducting the assessment.[2]

In the past, and despite some guidance under SAPA[3], agency drafts analyzing costs and benefits have at times been skimpy, anecdotal and variable in quality and clarity. This guide reflects a decision to remedy that situation by providing fuller, plainer direction.

Cost-Benefit Assessment in Rulemaking

1. Confirm and measure need for rulemaking
2. Identify regulatory options and a base to compare alternatives
3. Select an analytical framework
4. Identify groups affected by rule change
5. Identify and quantify the costs and benefits of each identified regulatory option
6. Monetize costs and benefits of each option
7. Adjust costs and benefits for inflation
8. Discount costs and benefits to present value
9. Calculate net benefits or cost-effectiveness ratios
10. Report analysis and findings in impact statements

[1] SAPA, Section 202-a.

[2] GORR is empowered by Executive Order No. 20 (EO #20), issued by Governor Pataki in November of 1995, to require a formal cost-benefit assessment from agencies subject to EO #20. Governor Spitzer issued Executive Order No. 5 in January 2007 continuing EO #20. Governor Patterson has likewise continued former EO #20.

[3] This document replaces the cost-benefit handbook issued by GORR in 1996, entitled *Cost-Benefit Handbook: A Guide for New York State's Regulatory Agencies*.

GORR will follow the concepts expressed here in reviewing proposed rules. We present general information on how to conduct a cost-benefit assessment using the ten analytical steps listed in the textbox on page 3. Additional technical information is provided in the appendices to this document. We also note resources for additional information throughout the guide.

Step One: Confirm and measure the need for rulemaking

Your cost-benefit assessment should begin with an effort to confirm and measure the need for regulatory action.

1. *Confirm the need*. Is a new rule or a rule change really needed? A new or amended statute may require regulatory action to:
    - Meet a specific statutory requirement that rules be adopted
    - Help regulated parties to understand the requirements of the statute
    - Implement or fulfill the purpose of the statute or its amendments.

    Additionally, agency staff may find it necessary to amend existing rules to:
    - Address problems experienced by regulated parties, or other compliance issues, that are not specifically dealt with in current statutes or rules
    - Incorporate proven practices into program requirements or procedures
    - Update program requirements to reflect findings from new research.

2. *Measure or quantify the need.* How great is the need for a new or changed rule? For example, does the statute not even take effect until a new rule is adopted? Once a need for a rule has been identified, agency staff may want to confer internally and with outside parties to gauge or quantify that need. It may be helpful to identify research that has already been done or to commission new evaluations to provide guidance.

    SAPA has specific requirements on this issue of need. The agency's RIS must describe the necessity for a proposed rule, and include a citation for and summary of each study, report and analysis used to establish that need.[4] Agencies must make available, within 30 days of a request, a copy of each study, report, or analysis, including supporting data, used as the basis for a proposed rule.[5]

3. *Complete a formal risk assessment for rules that significantly affect public health, safety, or the quality of the environment.* Risk assessment is a process used to evaluate the need for and the benefits of regulatory action. It involves organizing and analyzing scientific knowledge and other information to identify the harmful

[4] SAPA, Section 202-a(3)(b)

[5] SAPA, Section 104

effects of an activity or a substance and to estimate the likelihood that a proposed action will reduce or eliminate the harmful effects.

A formal risk assessment is necessary for only a narrow range of proposed actions. *Appendix One: Risk Assessment* presents the four steps to conducting a risk assessment (hazard identification, dose-response assessment, exposure assessment, and risk characterization) and notes sources for more information.

Step Two: Identify several regulatory options and a baseline to compare alternatives

Cost-benefit assessment in rule making compares the net benefits of several rule making choices against the alternative of taking no new regulatory action. This exercise provides decision makers and other interested parties with a detailed picture of the gains, if any, that can be anticipated from each new proposal. Two essential concepts here are:

1. *Identifying other approaches* − SAPA requires agencies to consider using regulatory approaches that avoid adverse economic impacts or overly burdensome impacts on individuals, businesses, the economy and local government agencies. Agencies must also consider using approaches that minimize adverse impacts on small businesses and the public and private sector interests in rural areas.[6] In each situation, agencies should be prepared to document that they did consider such alternatives.

   When identifying alternative regulatory options, agency staff may want to look at possible variations on what they are proposing, such as using different compliance dates, different enforcement methods, phase-in periods, etc. *Appendix Two: Alternative Regulatory Approaches* provides a list of regulatory provisions with alternative approaches for consideration.

   Where several alternatives along a continuum exist, agency staff may want to consider how each will affect the cost-benefit analysis. In many cases, both the costs and benefits from regulatory action increase as the rule is made more stringent. In such cases, it is essential to consider the costs and benefits on the *margin*. For example, suppose that a 50% reduction in waste production costs $100 million and yields $150 million in benefits, and that a 90% reduction costs $250 million and yields $275 million in benefits. The 90% adds $150 million in costs for $125 million in extra benefits, which the agency may determine is not warranted.

[6] See SAPA Sections 201-a, 202-a, 202-b and 202-bb.

2. *Identifying a baseline*[7] – The appropriate baseline for most proposals is maintaining the *status quo,* or taking no new regulatory action. When identifying a baseline and using it in its analysis, your agency should

    - Assume full compliance with existing laws and rules. This will focus the analysis on the incremental effects of the proposed change. Some analyses may warrant assuming not full compliance but "current practice" (*e.g.*, the actual degree of compliance), such as when the proposal is designed to address compliance problems with existing policies.

    - Use the same baseline throughout the analysis

    - State in the RIS where your starting point is, and where each regulatory option diverges from the baseline

    - Explain any uncertainties or assumptions about the baseline conditions (*e.g.*, projections of future economic activity or demographic trends, etc.) in the RIS

Step Three: Select an analytical framework

Cost-benefit analysis and cost-effectiveness analysis are different techniques for identifying and comparing outcomes of possible regulatory actions.[8]

1. *Cost-Benefit Analysis (CBA):* Cost-benefit analysis means identifying, quantifying, and expressing in monetary terms the costs and benefits to society of alternative policy choices. A complete analysis captures all factors – inputs and outputs, tangible and intangible – even if some of them may be difficult to quantify. The findings from a CBA should also be presented as net benefits (total benefits minus total cost).

    An unswerving application of cost-benefit principles would hold that the best course of action to follow is always the one that produces the greatest net benefits to society. Adherence to this principle may in some situations prove impossible or

[7] See *Guidelines for Preparing Economic Analyses*, U.S. Environmental Protection Agency, September 2000, pp. 21-25, available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html

[8] The following books provide detailed information on cost-benefit analysis and cost-effectiveness analysis: *A Primer for Policy Analysis* by Stokey and Zeckhauser (W. W. Norton and Company, Inc., 1978), *Policy Analysis: Concepts and Practice* by Weimer and Vining (Prentice Hall, 1992), and *Cost-Benefit Analysis: Concepts and Practice* by Boardman, Greenberg, Vining and Weimer (Prentice Hall, 2006).

unfeasible, particularly if the calculation of net benefits clashes with values that may be thought absolute or not readily measurable. As a result, the information and findings from agencies' net benefits analyses should inform rule making decisions and should be articulated, but cannot always be used as the only standard for approving proposals.

2. *Cost-Effectiveness Analysis (CEA):* Cost-effectiveness analysis is a simplified CBA in that the outcomes are viewed in natural units (*e.g.*, units of pollution eliminated, lunches provided to children, etc.) without having a dollar figure attached (*i.e.*, having the benefit "monetized"). CEA findings should be presented as a ratio. A cost-effectiveness ratio (cost divided by outcome) is the average cost of per unit outcome (*e.g.*, $2 per additional school lunch). An effectiveness-cost ratio (outcome divided by cost) is the average total units of outcome per unit of cost (*e.g.*, 500 additional school lunches per $1,000 spent).

   CEA is a useful method when the total benefits are the same whichever approach is chosen, so only the costs of each approach need to be compared. CEA is useful too in the reverse situation when the costs of each approach are the same so only the total benefits of each approach need to be compared. CEA may also be used when benefits are difficult or impossible to convert to dollars. When using CEA, the best alternative is typically the one that minimizes costs when outcomes are identical or maximizes outcomes when costs are fixed.

Examples of Completed Analyses

Federal agencies generally complete a cost-benefit analysis and cost-effectiveness analysis for each major proposed rule. They report the details of each assessment, including data, assumptions, limitations and findings, in a Regulatory Impact Analysis (RIA). These impact documents are a good resource for individuals interested in reviewing how analyses are done. Many federal agencies post their impact documents to their websites. Additionally, the federal Office of Management and Budget each year provides a brief summary with hotlinks for the impact analyses for major federal rules (see http://www.whitehouse.gov/omb/inforeg/regpol-reports_congress.html).

The following is an example of the conclusions reached in a regulatory analysis completed by the U.S. Department of Transportation that used both techniques − cost-benefit and cost effectiveness.

Tire Pressure Monitoring Systems (70 FR 18136). Federal statute required the Secretary of Transportation to complete a rulemaking for a regulation mandating a warning system in each new motor vehicle to indicate when a tire is significantly under-inflated. The Department analyzed the impacts of three systems that manufacturers could use to comply with the new system requirement. The benefits analyzed include reductions in crashes, lower fuel consumption, less tread wear, less property damage and less travel delay. The costs were primarily due to vehicle redesign and maintenance, and the opportunity cost of refilling

tires. The findings from the Department's CBA ranged from -$597 million to $655 million in net benefits (assuming a value of $5.5 million per statistical life saved and a 3% discount rate). The findings from the Department's cost-effectiveness analysis ranged from $2.3 million to $8.2 million per equivalent life saved (assuming a 3% discount rate). For more information, see the Department's Regulatory Impact Analysis at http://www.nhtsa.dot.gov/cars/rules/rulings/TPMS-FMVSS-No138-2005/index.html

Step Four: Identify groups affected by the proposed rule change

Regulatory action commonly will have different impacts on different population segments and areas of the state. Agency staff therefore should first identify who will be affected by each of the regulatory actions under consideration. The focus of this analysis should be on costs and benefits to residents of New York.[9] Your agency should look at:

1. *Groups Affected* − Consider and, where feasible, present information or projections on the number and types of entities likely to be directly impacted (including regulated parties as well as those responsible for administering the proposal), grouped as follows or in some other manner you think appropriate:

    - State government, including the agency expected to administer the rule and other state entities whose work may be impacted
    - Local governments
    - All business entities, including small business entities[10]
    - Not-for-profit organizations, where these are differentially affected
    - The public, and particular segments of it, looking at characteristics such as age, income, and household type
    - Other regulated parties

2. *Subgroups Affected* − Consider and present information on the positive and negative impact on important subgroups within the groups above. For example, it may make sense to identify the impact of a proposed rule on different types of local governments, such as counties and villages, as well as school districts and other special purpose entities. The same may be true of different population segments (*e.g.*, children, the elderly, poor households, etc.). An analysis focusing on specific industries, such as farming or insurance, may be appropriate, depending on the proposal. The North American Industry Classification System

[9] A portion of the costs and benefits of certain regulatory proposals may flow to residents of other states (*e.g.*, more stringent emissions standards in New York State may reduce acid rain in neighboring states). Agency staff may want to include these impacts in their analysis, taking care to describe these costs and benefits in impact statements.

[10] SAPA Section 102(8) defines small business as *any business which is resident in this state, independently owned and operated, and employs one hundred or less individuals*.

classifies all economic activity into 20 industry sectors and may help identify industries for consideration. NAICS industry sectors and groups are defined by the Census Bureau at http://www.census.gov/epcd/naics02/naicod02.htm

3. *Geographic Distribution* − Different regions of the state often experience different types or levels of costs and benefits from proposed rules. It is important to look at and report such expected differences in impact statements. You may want to consider the following regional delineations:
    - Statewide
    - New York City
    - Downstate − defined as the Hudson Valley, Long Island and New York City regions which include the following counties: Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester, Nassau, Suffolk, Bronx, Kings, New York, Queens and Richmond
    - Upstate − New York State minus the Hudson Valley, Long Island and New York City regions
    - Other geographic detailing, such as by county, agency or labor market region, rural versus urban (see NYS Department of Labor website at http://www.labor.state.ny.us/workforceindustrydata/apps.asp?reg=nys&app=regions).

Step Five: Identify and quantify the costs and benefits of each proposed regulatory option

Identifying costs and benefits means forecasting inputs (what must be done to implement and administer the proposed regulatory action?) and outputs (what will be realized from the proposed regulatory action?).[11] This analysis is to be presented against the timeline during which you expect all the significant costs and benefits to be realized.

1. *Direct costs* − The direct costs of a rule are the compliance costs for the regulated parties to implement the proposed action and for the oversight bodies (your agency and others) to administer it. These typically include both labor and materials. When any of the costs created by a proposed rule will be imposed on the state or any of its agencies, *e.g.*, for monitoring and enforcement action, these must be analyzed in realistic, granular fashion in order to pass DOB muster.

    - Personnel − Wages for required staff as well as the cost of fringe benefits (*e.g.*, health insurance, retirement benefits, etc.). Potential data sources include:

[11] These inputs and outputs are the differences in costs and benefits when comparing the proposed regulatory actions to the baseline (usually no new regulatory action) noted in Step Two.

- Average wage data by occupation and by industry for each region of New York State, available at http://www.labor.state.ny.us/workforceindustrydata/apps.asp?reg=nys&app=wages#11-0000

- Salary schedules for New York State employees that include hiring rates, salary increments and fringe benefits by grade level.[12]

- Equipment/supplies − Office equipment (*e.g.*, computer and telephone) and supplies that new or existing staff may need to perform the rule's required tasks. The cost of specialized equipment required by a proposed regulation should be included. For example, the assessment for a rule requiring a specific filtration system for waste water should include the total cost for all regulated parties to purchase and operate the system.

- Training − All training necessary to explain, implement and administer the new action. This may include training government employees responsible for administering the rule as well as training costs that are likely to be incurred by regulated parties in complying with the new rule.

- Overhead costs − Expenditures for indirect costs, such as equipment depreciation, office rent, utilities and insurance, that are fairly attributable to the new rule. Such "overhead" costs are often calculated as a percentage of personnel costs of those involved in administering, implementing and complying with the rule. The indirect cost rates for the current year that the state uses to bill non-General Fund programs are available on the State Comptroller website, http://www.osc.state.ny.us/agencies/abulls/a590.htm. Agencies should contact their assigned budget examiner at the Division of the Budget for out-year rates. When agencies have negotiated separate federal indirect cost rates with the federal government, they should continue to use those rates instead of the rates on the State Comptroller's website.

- Impact on federal funding − Where the level of state or local government spending in a particular area is the basis for federal funding, and the state or local spending is to be reduced, it may result in a loss in federal funding. Agency staff should note in their analysis any potential loss in federal funding that may result from the regulatory proposal. Agencies should likewise examine whether a projected increase in state or local government spending related to the rule will result in increases in federal funding.

[12] This salary information is available on the NYS Department of Civil Service website at http://www.cs.state.ny.us/businesssuite/Compensation/Salary-Schedules/. The current year fringe benefit rates for New York State employees are available on the Office of the State Comptroller website at http://www.osc.state.ny.us/agencies/abulls/a590.htm. Agencies should contact their assigned budget examiner at the Division of the Budget for out-year rates.

2. *Direct benefits* − The direct benefits of a proposed rule are the favorable impacts caused by the changes that will be made or required by the rule. Direct benefits may be tangible and fairly easy to quantify, such as budgetary savings or the freeing up of staff where an outmoded procedure is to be eliminated. They may also prove to be difficult to monetize, however, such as the value of cleaner air. They may be intangible, such as where a rule change creates increased flexibility in administering a program. You should take a broad view when identifying direct benefits, and make a concerted attempt to include all favorable impacts, whether direct or indirect, tangible or intangible. The analysis should include a description of how, and how precisely, the benefits can be measured. [13]

3. *Secondary costs and benefits* − You should also identify and account for countervailing risks and ancillary benefits, or second-order costs and benefits, of the rule.

    - A countervailing risk is an adverse impact that occurs because of the rule but was not considered among the rule's direct costs. Such a second-order cost might be an increase in microbial disease from reducing chlorine in drinking water to decrease cancer.

    - An ancillary benefit is one that occurs because of the rule, even though achieving that benefit was not the principal purpose of the rule. Ancillary benefits from increasing wetlands as an alternative to building conventional wastewater treatment facilities might include new wetlands control erosion, additional habitats, and increased opportunities for species research.

    Your analysis should also assess the proposal's effect on markets or economic sectors other than the one being regulated. This is particularly so where the proposal affects the availability or cost of intermediate products (*e.g.*, a specific technology) that are also used in the production of goods by other markets or economic sectors. (*E.g.*, a proposal that the state buy and use only vehicles that rely on certain technologies or fuels might affect the availability or cost of those technologies or fuels in other sectors.)

    You should explain and assess second-order impacts by including and then netting them against the total direct benefits and costs (plus or minus), in a manner that is keyed to your overall analysis. Do not omit analysis of these

[13] Where a formal risk assessment has been completed, agency staff should use information from the risk characterization step of the assessment to inform their estimate of benefits. At a minimum, risk characterization includes a contrast of the health, safety or environmental risk that would occur if there were no rule making with the level of risk that would occur under the proposed rule. The identified reduction in risk should be noted as a benefit. See Appendix One.

impacts simply because they are difficult to monetize or are intangible; rather, explain what can reasonably be projected about them, and what cannot.

Step Six: Monetize costs and benefits for each proposed regulatory option where appropriate

A critical step in cost-benefit and cost-effectiveness analyses is monetizing: expressing the value of costs and benefits in monetary terms. At times, *e.g.*, in the environmental or public health area, insuring that all costs and benefits are not only identified but properly valued is the lynchpin of the analysis.[14]

Here are basic concepts to consider:

Market value

A straightforward method for placing a dollar value on the costs and benefits of a proposal is to use the market price of the inputs it consumes and of the outputs it produces. For example, the salaries and fringe benefits rates of staff necessary to conduct audits may be a good measure of the personnel costs of a proposal that requires such audits. Where a proposal increases the availability of housing units, the benefits may be measured by the long-term value of the stream of rent payments from the new units.

There are difficulties with always relying on the market value approach. Market prices are an appropriate measure only when they originate from an efficient market[15], and therefore reflect the true value of the goods to society. This will not be the case for many of the inputs and outputs that you identify. Additionally, in many instances no market exists to provide data. This is a common difficulty encountered by rules affecting the quality of the environment, as there is no established market for the typical benefits (*e.g.*, cleaner water, reduced risk of illness, etc.) of such proposals.

Willingness-to-pay

Willingness-to-pay measures what an individual is willing to pay or give up for a good or service. It asks: how much would people pay to have a result they regard as desirable, or to avoid a result they regard as undesirable?

---

[14] Revesz, R. and Livermore, M., *Retaking Rationality* (Oxford Press 2008).

[15] An efficient market is one where no other arrangement of goods would result in greater social welfare. *A Primer for Policy Analysis* (Stokey and Zeckhauser), pp. 298-308. provides a detailed description of reasons for market inefficiencies, including 1) the imperfect flow of information, 2) transaction costs, 3) absence of markets for some goods, 4) market power, 5) externalities, and 6) public goods.

Where reliable market data does not exist, stated preference methods such as opinion surveys may be used to estimate willingness-to-pay.[16] This method is subject to the pitfalls of all survey research, where quality depends on well-designed instruments and properly drawn samples. It may also be prohibitively expensive.[17]

Revealed preference methods that rely on market price data for related goods may also be used to estimate willingness-to-pay.[18] For example, studies might examine how changes in property values are associated with changes in the environmental attributes of neighborhoods, which therefore may be useful to estimate the totality of benefits of environmental improvements resulting from regulatory action.

For an agency to do willingness-to-pay studies can be both labor intensive and time consuming. Prior to embarking on such an effort, agency staff should confirm whether similar work by others may provide reliable, relevant data for the agency's analysis. Possible sources include studies by academic research centers, the federal government and private industry.[19]

Opportunity cost

A familiar concept in business, opportunity cost recognizes that resources used to implement and administer a rule may be put to other use if no regulatory action is taken. The opportunity cost of a rule is viewed as the best alternative use of the resources that would be needed to meet the rule's requirements.[20] For example, monies used to pay for

---

[16] For an overview of stated preference methods including contingent valuation, conjoint analysis and contingent ranking, see chapter seven of *Guidelines for Preparing Economic Analyses* (U.S. Environmental Protection Agency, September 2000) available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwSER/DEC917DAEB820A25852569C40078105B?OpenDocument

[17] OMB Circular A-4 includes a discussion of principles that one should consider when either designing or evaluating a stated preference study. See pages 22-24 of OMB Circular A-4 available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf

[18] For a brief overview of revealed preference methods, see chapter seven of *Guidelines for Preparing Economic Analyses* (U.S. Environmental Protection Agency, 2000) available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwSER/DEC917DAEB820A25852569C40078105B?OpenDocument

[19] For a survey of literature and estimates of the cost/value of impacts for a number of policy outcomes, see Chapter 15: *Shadow Prices from Secondary Sources in Cost-Benefit Analysis: Concepts and Practice* by Boardman, Greenberg, Vining and Weimer (Prentice Hall, 2006)

[20] For more information, see pages 263-268 of *Policy Analysis: Concepts and Practices* by Weimer and Vining.

staff time for collecting and reporting program performance data might be devoted to direct service functions that result in significant long-term benefits to clients if the proposed reporting requirement were dropped. Prior to using the market price of a good-to-value cost, you should consider whether the market price is an accurate guide to the true cost of the good, taking into consideration the best alternative use of the resource.

Addressing costs and benefits that are difficult to monetize

For many proposed regulations, there will be some known costs and benefits that are difficult or perhaps even impossible to express in monetary terms or quantify (*e.g.*, increased public anxiety). That does not mean these costs and benefits can be excluded from the analysis, because to do so would make the calculation of net benefits deficient. Accordingly, you should include in the proposed rule's RIS:

- An explanation of costs and benefits that are not monetized or quantified, with an explanation of why it was difficult or not possible to include this calculation in the cost-benefit assessment

- A discussion on how the additional analysis might change the calculated net benefits of the alternative regulatory options considered

- Whatever information is available for costs and benefits that can be quantified but cannot be fully monetized, and that may help to define the size and scope of the missing effects, including information on the timing and likelihood of the costs and benefits being realized (*e.g.*, how a stringent new security measure might increase public anxiety initially but reduce it over time).

Step Seven: Adjust monetized costs and benefits for inflation where appropriate

The expected costs and benefits of proposed rules are often realized during a few years. As a result, agency staff must note whether each data set used in their analysis is in nominal or real dollars:

- Nominal values are economic units measured in terms of purchasing power of the date in question. A nominal value reflects the effects of general price inflation. [21]

- Real values are economic units measured in terms of constant purchasing power. A real value is not affected by general price inflation.[22]

---

[21] See OMB Circular A-94 available at http://www.whitehouse.gov/omb/circulars/a094/a094.html#ap-a

Nominal and real values must not be combined in the same analysis.

The more common approach is to measure all costs and benefits in real dollars (sometimes called constant dollars). To obtain constant dollar data, a base year is selected and all other dollar data for years before that base year are adjusted by a deflator. The base year should be as close to the calendar year of your analysis as possible. The consumer price index (CPI) is the most commonly used constant dollar deflator. CPI data and an inflation calculator are available on the U.S. Department of Labor website at http://www.bls.gov/CPI/#publications. [23]

Step Eight: Discount costs and benefits to present value

Monetary impacts that will be felt in the future over periods of different length and at different speeds must be analyzed uniformly in present-day terms. "Discounting" is the process for doing this. The first step is to figure out when the benefits will be felt and at what rate (*e.g.*, a projected 60% cost saving may take 10 years to be fully realized, at a rate of 10% for years 1 and 2 and 5% for the next 8 years). Then, a discount rate, expressed as a percentage, must be applied to annualized costs and benefits before calculating net benefits.

Most agencies can rely on the discount rates that their counterpart federal agencies use in such analyses. In general, agencies can also use the two real discount rates suggested by federal OMB Circular A-4, subject to the advice given there[24]:

- 7% "is an estimate of the average before-tax rate of return to private capital in the U.S. economy." This is characterized as the "base-case for regulatory analysis."

---

[22] See OMB Circular A-94 available at http://www.whitehouse.gov/omb/circulars/a094/a094.html#ap-a

[23] For more information on the mechanics of using the CPI to convert nominal to real values, see pages 146 – 147of *Cost-Benefit Analysis: Concepts and Practice* by Boardman, Greenberg, Vining and Weimer (Prentice Hall, 2006)

[24] OMB Circular A-4, http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf, pp. 31-37. Circular A-4 provides greater detail and assistance than can be provided here in addressing complex discounting issues. One note of caution: The OMB 3% and 7% discount rates require real (constant) costs and benefits because both rates are inflation-adjusted discount rates.

- 3% is the 30-year average real rate of return on long-term debt. This lower discount rate may be used where a regulation would primarily affect private consumption.[25]

Your reasons for selecting whatever discount rate you choose should be explained. You may want to consider presenting a "no discounting" scenario for analyses of policies that have create costs and benefits for future generations.[26]

Step Nine: Calculate net benefits or cost-effectiveness ratio for each regulatory alternative studied

Your agency's final calculation will be different depending on whether it conducted a cost-benefit or cost-effectiveness analysis.

- Cost-benefit analyses – When conducting a cost-benefit analysis, agency staff should calculate and report the net benefits (total benefits minus total cost) of *each* regulatory option included in the analysis. At a minimum, the agency's RIS should note total net benefits for each option. Agency staff should calculate and report net benefits for significant time periods (*e.g.*, three, seven, and fifteen years after implementation) for those proposals where the impacts will be realized at different rates over a period of time.

- Cost-effectiveness analyses are presented as a ratio of quantitative benefits (which are *not* monetized, for this purpose) to total monetized cost. This provides the average number of benefits per dollar (*e.g.*, a reduction of .01% in incidence of a terminal disease for every $1 spent on public education about a vaccine available for it). The reverse ratio may also be useful (average dollar cost per unit of benefit, or, in this example, $10,000 for each person who avoided the disease by getting vaccinated in response to the public education program).

[25] The document presents the 7% and 3% discount rates as the default positions because data needed for the exact "rate consumers and savers would normally use in discounting future consumption benefits" may not be readily available.

[26] For more information on discounting intra- and inter-generational effects, see pages 33-58 of *Guidelines for Preparing Economic Analyses*, U.S. Department of Environmental Protection Agency, available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html

Step Ten: Report analysis and findings in required impact statements

Detailed information on the agency's cost-benefit assessment must be presented in the proposed rule's RIS. It should be logically organized, of manageable length and presented in language that is widely understandable, as jargon-free and non-technical as is feasible. This is important because the purpose of the presentation is to allow the public, its representatives and policy makers, pro and con, to assess the quality of the agency's analysis and the validity of its conclusions and recommendations. This presentation therefore must include a reasonably detailed description of the agency's

- Methodology
- Data sources
- Assumptions
- Findings

The presentation must also include enough discussion of the limitations, uncertainties and sensitivities of each part of the analysis to permit others to assess the results of the analysis (*e.g.*, if data used is known to be incomplete or dated, or if certain factual estimates, if off by a slight percentage, would drastically alter the conclusions reached). See subsection entitled *Uncertainty and Sensitivity* on page 18.

A final word about the report: The agency's observations can only be as precise and detailed as the proposed rule and the circumstances permit. SAPA's purpose is not to hobble rule making with hyper-technical procedures. Rather, it is to provide decision makers and the interested public with the agency's informed analysis of the foreseeable impacts of the proposed rule, positive and negative, and the relative value of each where measurable. Inherently, agencies will have to make estimates, projections and assumptions. An agency has to engage in this exercise even while recognizing that some people may disagree with its analysis or findings. The agency's conclusions, however, need not approach scientific certainty. They need only be reasonably derived from appropriate methodology in order to strengthen the rule against challenge.

Other Considerations

Peer Review

Peer review is a process by which scientific and technical research and analysis are subject to outside review and comments by experts in the relevant field. It involves the review of a draft document to evaluate "the clarity of the hypothesis, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypothesis being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product."[27] Subjecting a body of work to peer review is a generally accepted control process that typically strengthens the credibility of the analysis and helps build acceptance and consensus around its findings.

Therefore, agencies should not rely, or should rely with caution, on non-peer-reviewed studies, analyses and literature. Similarly, risk and cost-benefit assessments conducted by agencies should themselves be subjected to the discipline of peer review where the proposed regulatory action significantly affects health, safety, environmental protection or an economic sector; where there is or is likely to be substantial disagreement on the methods or data used in or findings from the work; or in other appropriate situations where the analysis supporting an important decision would predictably benefit from independent outside scrutiny.

The specifics of the peer review may vary (*e.g.*, individuals versus panel, timing, scope, public participation, etc.).[28] The type and scope of the peer review should reflect the expected impact of the information presented on the regulatory choices the agency is pursing. Where a rule is largely driven by an internal agency finding, that finding would likely benefit from peer review. GORR is empowered to require a formal, detailed peer review of agency assessments under Executive Order #20.[29]

Uncertainty and Sensitivity

Cost-benefit assessments require fallible analysts to anticipate future circumstances. The probability of realizing the net benefits that are anticipated depends on the strength or certainty of the assumptions used. For example, the projected net

---

[27] *Final Information Quality Bulletin for Peer Review*, OMB, December 15, 2004.

[28] For a detailed description of issues agencies should consider when designing a peer review, see *Final Information Quality Bulletin for Peer Review*, OMB, December 15, 2004, pages 11-21, available at http://cio.energy.gov/documents/OMB_Final_Info_Quality_Bulletin_for_peer_bulletin(2).pdf

[29] Executive Order #20, Section II

benefits of a required immunization program will vary depending on the accuracy of the estimates or values assigned to assumptions about how many people will be vaccinated, how many of them will suffer an adverse reaction, such as contracting the illness itself, how likely the immunization is to work, and so forth.

It is important that those who look over completed agency analyses, including not only decision makers but the general public, be able from the text of the RIS itself to understand the level of uncertainty associated with the agency's findings and assumptions, and how this may impact net benefit calculations and the conclusions drawn from them. Agency staff should at a minimum identify contingencies that could alter the findings of the cost-benefit assessment, and describe their potential impact on the net benefit calculations.

Where the rule making is of great significance, it may warrant a "partial sensitivity analysis," perhaps done with outside assistance where appropriate internal resources are unavailable. This analysis entails looking at how the most important or uncertain assumptions separately impact the projected net benefits. Agencies should also consider worst- and best-case scenario analyses that identify what would happen under the least and most favorable assumptions.

Measuring Health and Environmental Benefits

Quantifying and monetizing the benefits of health and environmental rules are among the most challenging, important tasks in rule analysis. They typically require a mix of scientific analyses and economic principles that are specialized, technical and, at times, disputed or controversial. Even so, you will need to address these impacts, which may well be difficult to measure though important, with the expertise, data and resources at your agency's disposal.

In cost-effectiveness analysis, as noted, outcomes are viewed in natural units. Your measure should reflect the final outcomes (*e.g.*, lives saved) of your proposal whenever possible, rather than its intermediate outputs (*e.g.,* car crashes avoided, tons of pollution reduced).

Health and environmental benefits can be monetized using the willingness-to-pay concept presented previously, where the amount an individual is willing to pay for a specific benefit is determined through either market data or opinion surveys. An example of an accepted measure of human health benefits is the "value of statistical life," which represents what someone is willing to pay to reduce a specific risk to his or her life.

The analyses necessary to monetize health and environmental benefits often require data, technical skills and other resources not readily available to state agencies. The least-cost approach to monetizing these impacts is to use "plug in" estimates taken from completed research. For example, agency staff may want to consider using the U.S. Environmental Protection Agency's $5.8 million estimate of the value of statistical life

rather than commissioning new research to develop an estimate.[30] A good resource for plug-in values is textbooks which typically provide an overview of completed research estimating the value of impacts. For example, Chapter 15 of *Cost-Benefit Analysis: Concepts and Practice* (3rd edition, Prentice Hall) provides plug-in estimates for the value of statistical life; cost of injuries, crime, taxation, noise and pollution; and value of time, recreational benefits, and environmental benefits (including the existence value of species).

In some cases, agencies may propose in the environmental area rules that do not have a clear impact on human health (*e.g.*, to set aside land as a park or for recreational uses). Even where there is no evident risk to human health or the environment to warrant the change, other meaningful benefits are likely to be achieved, such as greater recreation, wildlife observation and biodiversity. In these situations, neither market data nor survey data may be available to quantify such obvious benefits without a complex analytical undertaking. At a minimum, agencies should provide qualitative information in their impact statements for benefits that cannot be monetized, as well as available quantitative information that describes the size and scope of the evident impacts.

Resources

Boardman, A., David Greenberg, Aiden Vining and David Weimer, *Cost Benefit Analysis: Concepts and Practice,* 3rd Edition, Prentice Hall, 2005. See Chapter 15: Shadow Prices from Secondary Sources.

Revesz, Richard and Michael Livermore, *Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health*, Oxford University Press, 2008.

U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, 2000, available at http://yosemite.epa.gov/ee/epa/eerm.nsf/vwSER/DEC917DAEB820A25852569C40078105B?OpenDocument. See Chapter 7: Analyzing Benefits and Chapter 8: Analyzing Social Costs.

[30] The U.S. Environmental Protection Agency's $5.8 million estimate of the value of statistical life is the mean of 26 values of statistical life estimates that range from $0.7 to $16.3 million (in 1997 dollars). For more information, see pages 88-90 of *Guidelines for Preparing Economic Analyses*, U.S. Environmental Protection Agency, available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

APPENDICES

Appendix One: Risk Assessment

First, the agency must assess the risk it is considering for possible rule making. Then, it must explain how and why it proposes to manage that risk.

Risk Assessment[31]

A risk assessment is a systematic approach to organizing and analyzing risk-related information. It identifies possible adverse health or environmental effects which may occur because of an activity or exposure to a hazard or substance. It also estimates the likelihood of the effect occurring under specified conditions.

Before regulatory action is taken, a state agency, using a valid risk assessment strategy, should establish that regulating a substance or an activity can reduce or eliminate an unacceptable health, safety or environmental risk. Unfounded intuition or anecdotal accounts do not provide sufficient analysis.

An agency's risk assessment should optimally reference and rely on scientifically valid, peer-reviewed data and methodologies.[32] If other data or methodologies of similar reliability and quality exist, an agency may choose to use these in addition to peer-reviewed data, but should justify doing so. Peer review should be pursued for any proposed rule that will have a major impact on individuals or businesses.

The widely accepted framework for risk assessment posited by the National Research Council has four components: hazard identification, dose-response assessment, exposure assessment and risk characterization. A full risk assessment is not needed for every regulatory action. A simple screening-level risk assessment can identify minor risks. More stringent, detailed analyses will be expected for proposed regulations that impose significant costs or burdens on affected parties.

Hazard Identification**:** The determination of whether a particular substance or a particular activity is causally linked to particular health, safety, environmental or ecological effects.

The hazard identification portion of a risk assessment identifies the specific effects that may be caused by exposure of people or the environment to a particular substance or activity and the conditions (*e.g.*, route of exposure, amount of exposure, type of habitat, working conditions) under which the effects might occur.

---

[31] For more information on the four components of risk assessment see, *Risk Assessment in the Federal Government: Managing the Process*, National Academies Press, Washington, D.C. (1983).

[32] Peer review is a process by which research and analysis are subject to outside review and comment by experts in a relevant field. For more information, see page 18.

Hazard identification is a qualitative description. It should be as specific as possible, depending on factors such as the kind and quality of available data on humans, laboratory animals or the environment, the availability of ancillary information from other studies and the weight of the evidence from all of these data sources.

Hazard identification in the environmental area, *e.g.*, could include information on the nature of the effect, conditions under which it will occur, how long it could occur, who or what could be affected, how it could change the use of a resource and whether it is reversible.

Dose-Response Assessment: The determination of the quantitative relationship between the exposure to a particular substance or activity and the incidence or severity of the effect.

In many instances, the severity of an effect or the number of people (or plants, animals, etc.) affected varies by dose. Some substances (*e.g.*, aspirin, salt or water) may be safe if used as directed in small or moderate doses, but problematic if given in large doses. Events also can have such a quantitative relationship (*e.g.*, carpal tunnel syndrome may be a function of repetitive action). Providing information on how responses change as the amount of exposure to a substance or activity changes is crucial to determining the benefits of the proposed regulation.

Exposure Assessment: Determination of the amount, duration and frequency of exposure of people, organisms or the environment to a substance or an activity that can affect health, the environment or the ecosystem.

Exposure assessment involves specifying the populations that are or may be exposed to a substance or activity, identifying how each of these populations may be exposed, and estimating the magnitude, duration and frequency of exposure. The populations that may be exposed and all of the factors may vary with different regulatory options. Specifying the population at risk may include describing the number of people, their age, sex, racial distribution, socio-economic status and health status. The ways people can be exposed might include inhalation of a substance, having an x-ray, climbing a ladder and many other common activities. The environment can be exposed as well − to greenhouse gases, polluted water or population crowding.

For example, in assessing the exposure of a person to a chemical in the air, quantitative information or estimates are needed on the amount (concentration) of the chemical in the air, the person's inhalation rate, how long the exposure lasts, and how frequently it is repeated. The exposure assessment is sometimes based on hypotheses or estimates about possible activities. It is essential to provide an explanation of and rationale for all assumptions, uncertainties, and data bases used in the assessment, for existing conditions and under each proposed regulatory option.

In addition to human exposure, agencies may need to assess exposure for risk involving the following: surface water, groundwater, air, plants, vegetation and crops, fish and wildlife habitat, lands and forests, and ecosystem functions.

Risk Characterization: Description of the nature and often the magnitude of the health, safety, or environmental risk.

Risk characterization describes the nature and magnitude of the risk that the agency seeks to mitigate and what is likely to happen to people and the environment if certain measures are or are not taken. At a minimum, the risk characterization should contrast the level of the health, safety or environmental risk that would occur if nothing is done with the level of risk that would occur under alternative regulatory options. If the risks vary by population, geography, or other risk factors, these should be explained. The risk characterization should place the risk the agency seeks to mitigate in the context of what is generally considered as unacceptable risk.

The risk characterization should include a description of uncertainties. The uncertainties in risk assessment derive from uncertainties in three of the four component steps: hazard identification, dose-response assessment, and exposure assessment.

- Uncertainties in hazard identification can arise from a lack of information about the hazards associated with a new substance or activity, from inconsistent or conflicting results of studies and from differences in the types of studies.

- There are also specific uncertainties in establishing dose-response relationships for a substance or activity. Scientists may disagree, *e.g.*, on how the effects of substances given to animals in high doses relate to effects on people ingesting them in low doses. These types of disagreements do not necessarily dictate that nothing be done, but they should be fully disclosed and discussed.

- Exposure assessment, too, often requires the use of assumptions and mathematical models which introduce uncertainty in the estimate of human exposure. Examples are the number of people who will be exposed to a chemical, or how much of a non-food substance a toddler will swallow.

In many cases, a useful way to represent the combined effect of all of these uncertainties on the characterization of risk is to express the various parameters in terms of ranges of probable values, rather than as definite numerical values.

Risk Characterization: More than a Synthesis of Information

Initially, risk characterization was viewed as the final step of risk assessment. This approach at times provided limited opportunity for input from interested parties and oftentimes resulted in risk analyses that failed to address issues of concern when regulating a particular substance or action.

The more recent and assertive definition of risk characterization developed by the National Research Council addresses this shortcoming.

> *Risk Characterization is a synthesis and summary of information about a potentially hazardous situation that addresses the needs and interests of decision makers and of interested and affected parties. Risk characterization is a prelude to decision making and depends on an iterative, analytic-deliberative process.*

The Council presents seven principles for organizing the risk characterization process:[33]

1. *Risk Characterization should be a decision-driven activity, directed toward informing choices and solving problems*. An effective risk characterization accurately translates the best available information about risk into language non-specialists can understand.

2. *Coping with a risk situation requires a broad understanding of the relevant losses, harms, or consequences to the interested and affected parties*. Risk analyses should not be restricted to the examination of a narrow set of outcome conditions related to human health or environmental hazards. Risk characterizations should address social, economic and ethical outcomes as well when it is appropriate. Additionally, analyses should address outcomes for certain specially exposed or vulnerable populations.

3. *Risk characterization is the outcome of an analytic-deliberative process.* The analytic-deliberative process must have an appropriately diverse participation or representation of the spectrum of interested and affected parties, of decision makers, and of specialists in risk analysis, at each step.

4. *Those responsible for a risk characterization should begin by developing a provisional diagnosis of the decision situation so that they can better match the analytic-deliberative process leading to the characterization to the needs of the decision, particularly in terms of level and intensity of effort and representation of parties.* Risk situations vary along many elements and the same analytic-deliberative process is not appropriate for all risk characterizations.

5. *The analytic-deliberative process leading to a risk characterization should include early and explicit attention to problem formulation; representation of the spectrum of interested and affected parties at this early stage is imperative*.

6. *The analytic-deliberative process should be mutual and recursive*. Analysis and deliberation are complementary and must be integrated throughout the process leading to risk characterization: deliberation frames analysis, analysis informs deliberation, and the process benefits from feedback between the two.

---

[33] See *Understanding Risk: Informing Decisions in a Democratic Society, National Academies Press*, Washington, D.C. (1996).

7. *Each organization responsible for making risk decisions should work to build organizational capability to conform to the principles of sound risk characterization.*

Resources

Nation Research Council − http://sites.nationalacademies.org/nrc/index.htm

- *Risk Assessment in the Federal Government: Managing the Process,* (1983)
- *Issues in Risk Assessment,* (1993)
- *Science and Judgment in Risk Assessment,* (1994)
- *Understanding Risk: Informing Decisions in a Democratic Society,* (1996)

The Presidential/Congressional Commission on Risk Assessment and Risk Management − http://www.riskworld.com/riskcommission/Default.html

- *Framework for Environmental Health Risk Management,* (1997)
- *Risk Assessment and Risk Management in Regulatory Decision-Making,* (1997)

Society for Risk Analysis − http://www.sra.org/index.php

Harvard Center for Risk Analysis − http://www.hcra.harvard.edu/

U.S. Environmental Protection Agency

- Risk Assessment Portal − http://www.epa.gov/risk/
- Risk Assessment Forum − http://cfpub.epa.gov/ncea/raf/index.cfm
- Human Health Risk Assessment, NCEA − http://cfpub.epa.gov/ncea/cfm/healthri.cfm
- Ecological Risk Assessment, NCEA − http://cfpub.epa.gov/ncea/cfm/ecologic.cfm?ActType=RiskAssess

U.S. Department of Agriculture

- Office of Risk Assessment and Cost-Benefit Analysis − http://www.usda.gov/oce/risk_assessment/

U.S Office of Management and Budget

- Updated Principles for Risk Analysis − http://www.whitehouse.gov/omb/memoranda/fy2007/m07-24.pdf

Appendix Two: Alternative Regulatory Approaches[34]

Different Choices Defined by Statute

When a statute establishes a regulatory requirement and the agency is considering adopting by rule a supporting or detailed 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. Some of these are discussed below in conceptual terms.

Different Compliance Dates

The timing of a regulation may have an important effect on its net benefits. To illustrate, a delay in implementation of a rule may result in a substantial loss in future benefits (*e.g*., a significant reduction in spawning stock that could jeopardize a fishery). Similarly, the cost of a regulation may vary substantially with different compliance dates (*e.g*., an industry may require a year to plan its production runs). A regulation that provides sufficient lead time to affected parties may achieve its goals at a lower cost and with greater compliance than a regulation that is made effective immediately.

Different Enforcement Methods

Compliance alternatives for enforcement include on-site inspections, periodic reporting, and noncompliance penalties structured to provide the most appropriate incentives to full compliance. When monitoring and reporting methods vary in their benefits and costs, you should identify the most appropriate enforcement framework. For example, in some circumstances random monitoring may be less expensive and yet as effective in bringing about compliance as continuous reporting.

Different Requirements for Different Sized Firms

You should consider setting different requirements for large and small entities, basing the requirements on estimated differences in the expected costs of compliance and/or the expected benefits. Small firms may find it more costly per unit to comply with regulation, especially if there are large fixed costs required for compliance. On the other hand, it is not sound policy to load disproportionate costs on the largest, most productive firms simply by virtue of that fact. Each situation needs to be addressed as distinct.

Different Requirements for Different Geographic Regions

Rarely do all regions of New York State benefit uniformly from government regulation. Where there are significant regional variations in benefits and/or costs, you should consider the possibility of setting different requirements for the different regions, where that does not violate statutory provisions or other stated government priorities.

[34] This appendix was adapted from OMB Circular A-4 available at http://www.whitehouse.gov/omb/circulars/a004/a-4.html#c

Performance Standards Rather than Design Standards

Performance standards express requirements in terms of outcomes, rather than specify the means to those ends. Properly crafted, they give the regulated parties the flexibility to achieve regulatory objectives in what to them is the most cost-effective way. Performance standards therefore may have advantages over inflexible engineering or design standards. In general, you should take into account both the cost savings to the regulated parties of the greater flexibility and the costs of assuring compliance through monitoring or some other means.

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. One example of a market-oriented approach is a cap-and-trade program that allows for auction of credits for greenhouse gas emissions. Such programs can be useful in reducing costs or achieving benefits sooner, particularly when the costs of achieving compliance vary across production lines, facilities or firms.

Informational Measures Rather than Regulation

Sometimes market participants act in certain ways because they have inadequate or one-sided information that leads them to act counter to what the state views as the public interest. Measures to improve the availability of information include government establishment of a standardized testing and rating system (the use of which could be mandatory or 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 public availability of information, particularly about the unfavorable characteristics of certain products or activities, provides consumers some choice, which at times may be a better option than a mandatory standard or ban.