**Guidelines for Preparing Economic Analyses**

[**http://yosemite.epa.gov/ee/epa/eed.nsf/pages/guidelines.html**](http://yosemite.epa.gov/ee/epa/eed.nsf/pages/guidelines.html)

This document extracts some key parts of the EPA Guidelines for Economic Analysis. Even though the guidelines were prepared for economic analysis of environmental projects, many of the elements used here can also be used to analyze projects in other sectors.

**1.1 Background**

While economic analysis can provide valuable insights into the setting of Agency priorities and plans for meeting them, the focus of this document is on the conduct of economic analysis to support policy decisions and meeting the requirements described by related statutes

**Chapter 1 Introduction efficiency and distribution.**

These issues often take the form of three distinct questions:

1. Is it theoretically possible for the “gainers” from the policy to fully compensate the “losers” and still remain better off?

2. Who are the gainers and losers from the policy and associated economic changes?

3. How did a particular group, especially a group considered to be disadvantaged, fare as a result of the policy change?

**Benefit-cost analysis (BCA)**

**Net benefits** are derived by summing all of the benefits that accrue as a result of a policy change (including spillover effects) less costs imposed by the policy on society (including externalities)

Benefit-cost analysis (BCA) evaluates the favorable effects of policy actions and the associated opportunity costs of those actions. The favorable effects are defined as benefits. Opportunities foregone define economic costs.

The assumptions and modeling framework developed for the BCA can describe gains and losses to assess efficiency the problem definition discussion should briefly review the nature of the environmental problem to be addressed.

**Need for policy action analysis**

After defining the problem, the statement of need should examine the reasons why the market and other public and private sector institutions have failed to correct.

The final component of the statement of need for policy action is an analysis of why a federal remedy is preferable to actions by private and other public sector entities, such as the judicial system or state and local governments.

**Economic efficiency** can be defined as the maximization of social welfare. An efficient market is one that allows society to maximize the net present value (NPV) of benefits: the difference between a stream of social benefits and social costs over time.

The efficient level of production is referred to as Pareto optimal because there is no way to rearrange production or reallocate goods in such a way that someone is better off without making someone else worse off in the process.

The efficiency of a policy option differs from its cost-effectiveness. A policy is cost-effective if it meets a given goal at least cost, but cost-effectiveness does not encompass an evaluation of whether that goal has been set appropriately to maximize social welfare. All efficient policies are cost-effective, but it is not necessarily true that all cost-effective policies are efficient

**Market-oriented approaches** (or market-based approaches) create an incentive for the private sector to incorporate pollution abatement into production or consumption decisions and to innovate in such a way as to continually search for the least costly method of abatement.10

**4.5.1 The Type of Market Failure**

There are two main types of market failure that are commonly addressed through the use of market based or hybrid instruments. The first, externality, occurs when firms or consumers fail to integrate into their decision making the impact of their own production or consumption decisions on entities external to themselves. The second type of market failure, asymmetric information, occurs when firms or consumers are unable to make optimal decisions due to lack of information

**4.5.5 Market Competitiveness**

Market power is a type of market failure in and of itself, as it may result in output that is too low and prices that are too high compared to what would occur in a competitive market. Instruments that cause firms to further restrict output may create additional inefficiencies in sectors where firms have some degree of market power.

**4.7 Measuring the Effectiveness of Regulatory or Non-Regulatory Approaches**

Several policy criteria should be considered when evaluating the success of regulatory or nonregulatory approaches. These include environmental effectiveness; economic efficiency; savings in administrative, monitoring and enforcement costs; inducement of innovation; and increased environmental awareness.

**5.1 Baseline Definition**

A baseline is defined as the best assessment of the world absent the proposed regulation or policy action.1 This “no action” baseline is modeled assuming no change in the regulatory program under consideration.

**A general “effect-by-effect” approach to benefits analysis**

This approach consists of separately evaluating the major effects of a given policy, and then summing these individual estimates to arrive at an overall estimate of total benefits. The effect-by-effect approach for benefits analysis requires three fundamental steps:

1. Identify benefit categories potentially affected by the policies under consideration;

Determine which benefit categories to include in the overall benefits analysis

**Table 7.1 – Types of Benefits Associated With Environmental Policies: Categories, Examples, and Commonly Used Valuation Methods**

|  |  |  |
| --- | --- | --- |
| **Benefit Category** | **Examples** | **Commonly Used Valuation Methods** |
| **Human Health Improvements** | | |
| Mortality risk reductions | Reduced Risk of:  Cancer fatality  Acute fatality | Averting behaviors  Hedonics  Stated preference |
| Mortality risk reductions | Reduced Risk of:  Cancer  Asthma  Nausea | Averting behaviors  Cost of illness  Hedonics  Stated preference |
| **Ecological Improvements** | | |
| Market Products | Harvest or extraction of:  Food  Fuel  Fiber  Timber  Fur and Leather | Production function |
| Recreation activities and aesthetics | Wildlife viewing  Fishing  Boating  Swimming  Hiking  Scenic views | Production function  Averting behaviors  Hedonics  Recreation demand  Stated preference |
| Valued ecosystem functions | Climate moderation  Flood moderation  Groundwater recharge  Sediment trapping  Soil retention  Nutrient cycling  Pollination by wild species  Biodiversity, genetic library | Production function  Averting behaviors  Stated preference |
|  | Soil fertilization  Pest control |  |
| Non-use values | Relevant species populations, communities, or ecosystems | Stated preference |
| **Other benefits** | | |
| Aesthetic improvements | Visibility  Taste  Odor | Averting behaviors  Hedonics  Stated preference |
| Reduced materials damages | Reduced soiling  Reduced corrosion | Averting behaviors  Production/ cost functions |

Note: “Stated preference” refers to all valuation studies based on hypothetical choices, as distinguished from “revealed preferences,” which refers to valuation studies based on observations of actual choices.

**2. Quantify significant endpoints** to the extent possible by working with managers, risk assessors, ecologists, physical scientists, and other experts; and

The second step is to quantify the physical endpoints related to each category, focusing on changes attributable to each policy option relative to the baseline. Data are usually needed on the extent, timing, and severity of the endpoints. For example, if the risk of lung cancer is an endpoint of concern, required information will usually include the change in risk associated with each option, the timing of the risk changes, the age distribution of affected populations, and fatality rates.

**3. Estimate the values of these effects** using appropriate valuation methods for new studies or existing value estimates from previous studies that focus on the same or sufficiently similar endpoints.

Estimate willingness to pay (WTP) of all affected individuals for the quantified benefits in each benefit category, and then to aggregate these to estimate the total social benefits of each policy option. Typically, a representative agent approach is used when deriving estimates of benefits. The analyst calculates WTP for an “average” individual in a sample of people from the relevant population and then multiply that average value by the number of individuals in the exposed population to derive an estimate of total benefits.

**8.1 The Economics of Social Cost** The most comprehensive measure of the costs of a regulation — and thus the appropriate measure to use in a BCA — is “social cost.” Social cost represents the total burden a regulation will impose on the economy; it can be defined as the sum of all opportunity costs incurred as a result of the regulation. These opportunity costs consist of the value lost to society of all the goods and services that will not be produced and consumed if firms comply with the regulation and reallocate resources away.

**8.1.3 Dynamics**

In most cases, a regulation will continue to have economic impacts for a number of years after its initial implementation. If these intertemporal impacts are likely to be significant, they should be included in the estimation of social cost.

**8.1.1 Partial Equilibrium Analysis**

When the analyst expects that the effects of a regulation will be confined primarily to a single market or a small number of markets, partial equilibrium analysis is the preferred approach for estimation of social cost. The use of partial equilibrium analysis assumes that the effects of the regulation on all other markets will be minimal and can either be ignored or estimated without employing a model of the entire economy.

**8.1.2 General Equilibrium Analysis**

In some cases, the imposition of an environmental regulation will have significant effects in markets beyond those that are directly subject to the regulation

**8.2.1 Alternative Concepts of Cost**

Three alternative concepts of cost, each of which is composed of two components, are: explicit and implicit costs, direct and indirect costs, and private sector and public sector costs.

**8.2.1.1 Explicit and Implicit Costs**

The total costs of a regulation can include both explicit and implicit costs.19 Explicit costs are those costs for which an explicit monetary payment is made, or for which it is straightforward to infer a value

Implicit costs are costs for which monetary values do not readily exist and are thus likely more difficult to quantify

**8.2.1.2 Direct and Indirect Costs**

Direct costs are those costs that fall directly on regulated entities as the result of the imposition of a regulation. These entities may include firms, households, and government agencies. Indirect costs are the costs incurred in related markets or experienced by consumers or government agencies

**8.2.1.3 Private Sector and Public Sector Costs**

The total costs of a regulation can also be divided between private sector and public sector costs.

Private sector costs include all of the costs of a regulation borne by households and firms

**8.2.2.1 Incremental Costs**

Incremental costs are the additional costs associated with a new environmental regulation or policy.

**8.2.2.2 Compliance Costs**

Compliance costs (also known as abatement costs) are the costs firms incur to reduce or prevent pollution to comply with a regulation. They are usually composed of two main components: capital costs and operating costs.

**8.2.2.3 Capital Costs**

Capital costs include expenditures on installation or retrofit of structures or equipment with the primary purpose of treating, capturing, recycling, disposing, and/or preventing pollutants.

**8.2.2.4 Operating and Maintenance Costs**

Operating and maintenance costs are annual expenditures on salaries and wages, energy inputs, materials and supplies, purchased services, and maintenance of equipment associated with pollution abatement.

**8.2.2.5 Industry Costs**

Industry costs are the costs of a regulation to an industry, including the effects of actual or expected market reactions.

**8.2.2.6 Transactions Costs**

Transactions costs are those costs that are incurred in making an economic exchange beyond the cost of production of a good or service. They may include the costs of searching out a buyer or seller, bargaining, and enforcing contracts

**8.2.2.7 Government Regulatory Costs**

Government regulatory costs are those borne by various government entities in the course of researching, enacting, and enforcing a policy or regulation.21

**8.2.3.1 Transitional Costs**

At some point in time after the imposition of a new environmental regulation, the economy can be expected to adjust to a new equilibrium.

**8.2.3.2 Distributional Costs**

Distributional costs are those costs that relate to how certain entities or societal groups are impacted by the imposition of a policy or regulation

**8.3.2 Other Issues in Estimating Social Cost**

Difficulties in measuring social cost generally fall into two categories: (1) difficulties in developing a numeric value for some social cost categories; and (2) For social cost categories where numeric values have been successfully developed, accounting for uncertainty in these values. Economic Impact Analysis

The detailed study of regulatory consequences allows policy makers to fully understand a regulation’s impacts, and to make an informed decision on its appropriateness. Economic information is necessary for the evaluation of at least two types of consequences of a regulatory policy: the regulation’s efficiency, and its distributional effects. In principle, both could be estimated simultaneously using a general equilibrium model. In practice however, they are usually estimated separately.

The distributional effects of environmental regulations can be examined through an economic impact analysis (EIA). A related analysis, called an equity assessment, addresses the distribution of impacts across individuals and households, with particular attention to economically or historically disadvantaged or vulnerable groups (e.g., low-income households, racial or ethnic minorities, and young children).

Relevant factors for government entities may include:

•Number of people living in the community;

•Property values;

•Household income levels (e.g, median, income range);

•Number of children;

•Number of elderly residents;

•Unemployment rate;

•Revenue amounts by source; and

•Credit or bond rating of the community.

Relevant characteristics of not-for-profit entities include:

•Entity size and size of community served;

•Goods or services provided;

•Operating costs; and

•Amount and sources of revenue.