Chapter 4

Environmental Costs
Chapter-4

ENVIRONMENTAL COSTS

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4.1 WHAT IS AN ENVIRONMENTAL COST?

Most corporate leaders agree that a main objective for the economy is sustainable development. Sustainability requires companies to strive for eco-efficiency, but they can only measure that by producing accurate information on both environmental costs and revenues and environmental performance. Environmental costs are one of the many different types of costs, businesses incur as they provide goods and services to their customers. Environmental performance is one of the many important measures of business success.

Environmental costs and performance deserve management attention for the following reasons:

(1) Many environmental costs can be significantly reduced or eliminated as a result of business decisions, ranging from operational and housekeeping changes, to investment in “greener” process technology, to redesign of process/products. Many environmental costs. (E.g. wasted raw materials) may provide no added value to a process, system, or product.

(2) Many companies have discovered that environmental costs can be offset by generating revenues, for example, through sale of waste by-products or transferable pollution allowances, or licensing of clean technologies.

(3) Environmental costs (and, thus, potential cost savings) may be obscured in overhead accounts or otherwise overlooked.

(4) Understanding the environmental costs and performance of processes and products can promote more accurate costing and pricing of products and can aid companies in the design of more environmentally preferable processes, products, and services for the future.

(5) Better management of environmental costs can result in improved environmental performance and significant benefits to human health as well as business success.

(6) Competitive advantage with customers can result from processes, products, and service that can be demonstrated to be environmentally preferable.
(7) Accounting for environmental costs and performance can support a company's development and operation of an overall environmental management system. Such a system will soon be a necessity for companies engaged in international trade due to international consensus standard ISO 14001, developed by the International Organization for Standardization.

Uncovering and recognizing environmental costs associated with a product, process, system, or facility is important for good management decisions. Attaining such goals as reducing environmental expenses, increasing revenue, and improving environmental performance requires paying attention to current, future, and potential environmental costs. How a company defines an environmental cost depends on how it intends to use the information (e.g. cost allocation, capital budgeting, process/product design, other management decisions) and the scale and scope of the exercise. Moreover, it may not always be clear whether a cost is "environmental" or not, some costs fall into a gray zone or may be classified as partly environmental and partly not. Whether or not a cost is "environmental" is not critical; the goal is to ensure that relevant costs receive appropriate attention.

4.1.1 IDENTIFYING ENVIRONMENTAL COSTS

Environmental accounting terminology uses such words as full, total, true and life cycle to emphasize that traditional approaches were incomplete in scope because they overlooked important environmental costs (and potential cost savings and revenues). In looking for and uncovering relevant environmental costs, managers may want to use one or more organizing frameworks as tools. This chapter presents examples of environmental costs as well as a framework that has been used to identify and classify environmental costs. There are many different ways to categorize costs. Accounting systems typically classify costs as:

(1) Direct materials and labor.
(2) Manufacturing or factory overhead (i.e., operating costs other than direct materials and labor),
(3) Sales,
(4) General and administrative (G&A) overhead, and
(5) Research & development (R&D)
(6) High air pollution
(7) Loss of ozone layer
(8) Destroying water, ponds, sacred rivers and species
(9) Deforestation caused less rainfall
(10) Acid rain
(11) Reduction of limited natural resources,
(12) Soil corrosion and ground water loss,

Costs imposed by the environment are
1) excessive climatic changes
2) floods and droughts
3) cyclone storms, tornado and hurricane
4) earthquakes and tsunami
5) Famine and epidemics etc.

Benefits received from the environment are
1) fresh air
2) water
3) sand and clay
4) imperative source and renewable energy
5) important raw material
6) rain and snowfall

Benefits rendered by organizations are
1) green lawns, gardens and reforestation
2) water and river purification projects
4.2 VARIOUS METHODS OF ENVIRONMENTAL TRANSMUTATION

1) Bidding Games
   In this method, participants are asked to offer proposals for specified environmental resources, either total or marginal and the proposals received indicate the costs.

2) Shadow Pricing
   This is the process of ascertaining the values for natural resources from a group of people by asking some questions – how much do they pay for fresh water and air? The average of sample answers is considered for pricing those particular resources. Here the price is not determined by demand and supply law. To determine the total cost, the quantity used by the organization is multiplied by average price per unit.

3) Travel Cost Method
   This is a type of shadow price method. To visit a forest or a green park what people pay in total cost (i.e. traveling cost and opportunity costs of onsite and travel time) is considered as the shadow pricing. Shadow pricing is very helpful in determining the total cost of environmental resources devoted and exhausted by the organization, it is to be considered in the cost of production.

4) Expert Opinion
   Here, based on the expert opinion and measuring the total value the cost of particular environmental resources is ascertained. For example when packaged mineral drinking water is purchased by a person how much it costs to the person is the price of the fresh natural water for the same quantity polluted by the organization.

5) Costless Choice
   Participants are asked to choose between environmental goods and services and others traded goods and services, options the monetary value of which is not disclosed to the participants through those are known.

6) Trade Off Games
   From a fixed hypothetical total budget, participants are asked to select between various options, out of which some are environmental resources.
7) Priority Evaluation

Here, only qualified individuals are asked to provide valuations and assessment. Through observing the annual reports of various organizations it is evident that broadly, the following types of information are disclosed.

❖ types of devices installed for pollution control
❖ steps taken to conserve raw material and energy
❖ steps taken for waste water and production process waste and
❖ Steps taken for improvement of working environment and quality of product and services, process of production etc.

Environmental expenses may be classified in any or all of these categories in different companies, to focus better attention on environmental costs for management decisions, the authoritative technical pronouncements such as EPA Pollution Prevention Benefits Manual (released by Environmental Protection Agency of US) and the Global Environmental Management Initiatives, (GEMI). Environmental Cost Primer use similar organizing frameworks to distinguish costs that generally receive management attention, termed the “usual” costs or “direct” costs, from costs that may be obscured through treatment as overhead or R&D, distorted through improper allocation to cost centers, or simply overlooked, termed “hidden”, “contingent”, “liability” or “less tangible” costs. Table-4.2.1 lists examples of these costs under the labels “conventional”, “potentially hidden”, “contingent”, and “image/relationship” costs.

4.2.1. CONVENTIONAL COSTS. The costs of using raw materials, utilities, capital goods, and supplies are usually addressed in cost accounting and capital budgeting, but are not usually considered environmental costs. However, decreased use and less waste of raw materials, utilities, capital goods, and supplies are environmentally preferable, reducing both environmental degradation and consumption of nonrenewable resources. It is important to factor these costs into business decisions, whether or not they are viewed as “environmental” costs. The dashed line around these conventional costs in Table 4.2.1 indicates that even these costs (and potential cost savings) may sometimes be overlooked in business decision-making.
4.2.2 POTENTIALLY HIDDEN COSTS. Table 4.2.1 collects several types of environmental costs that may be potentially hidden from managers; first are *upfront environmental costs*, which are incurred prior to the operation of a process, system, or facility. These can include costs related to sitting, design of environmentally preferable products or process, qualifications of suppliers, evaluation of alternative

<table>
<thead>
<tr>
<th>Regulatory Costs</th>
<th>Upfront Costs</th>
<th>Voluntary (Beyond compliance)</th>
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<tbody>
<tr>
<td>Notification</td>
<td>Site studies</td>
<td>Community relations outreach</td>
</tr>
<tr>
<td>Reporting</td>
<td>Site preparation</td>
<td>Monitoring testing</td>
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<tr>
<td>Monitoring/testing</td>
<td>Permitting R&amp;D</td>
<td>Training</td>
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<tr>
<td>Studies/modeling</td>
<td>Engineering and installation</td>
<td>Audits</td>
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<tr>
<td>Remediation</td>
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<tr>
<td>Recordkeeping</td>
<td>Conventional Costs</td>
<td>Reports (e.g. annual environmental reports)</td>
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<tr>
<td>Plans</td>
<td>Capital equipment</td>
<td>Insurance</td>
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<td>Training</td>
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<td>Inspections</td>
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<td>Manifesting</td>
<td>Supplies</td>
<td>Remediation</td>
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<tr>
<td>Labeling</td>
<td>Utilities</td>
<td>Recycling</td>
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<tr>
<td>Preparedness</td>
<td>Structures</td>
<td>Environmental studies</td>
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<td>Protective equipment</td>
<td>Salvage value</td>
<td>R&amp;D</td>
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<td>Medical surveillance</td>
<td>Back-End</td>
<td>Habitat and wetland protection</td>
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<td>Environmental insurance</td>
<td>Closure/ decommissioning</td>
<td>Landsaping</td>
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<tr>
<td>Financial assurance</td>
<td>Disposal of inventory</td>
<td>Other environmental projects</td>
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<tr>
<td>Pollution control</td>
<td>Post-closure care</td>
<td>Financial support to environmental groups and/or researches</td>
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<td>Spill response</td>
<td>Site survey</td>
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<td>Storm water management</td>
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<td>Waste management</td>
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<td>Taxes/fees</td>
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<tr>
<th>Contingent Costs</th>
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<tr>
<td>Future compliance costs</td>
<td>Remediation</td>
<td>Legal expenses</td>
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<tr>
<td>Penalties/fines</td>
<td>Property damage</td>
<td>Natural resource damages</td>
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<tr>
<td>Response to future release</td>
<td>Personal injury damage</td>
<td>Economic loss damages</td>
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<tr>
<th>Image and Relationship Costs</th>
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<tr>
<td>Corporate image</td>
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<tr>
<td>Relationship with customers</td>
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<tr>
<td>Relationship with investors</td>
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<td>Relationship with insures</td>
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Pollution control equipment, and so on. Whether classified as overhead or R&D, these costs can easily be forgotten when managers and analysts focus on operating costs of processes, systems and facilities. Second are regulatory and voluntary environmental costs incurred in operating a process, system, or facility; as many companies traditionally have treated these costs as overhead, they may not receive appropriate attention from managers and analysts responsible for day-to-day operations and business decisions. The magnitude of these costs also may be more difficult to determine as a result of their being pooled in overhead accounts. Third, while upfront and current operating costs may be obscured by management accounting practices, back-end environmental costs may not be entered into management accounting systems at all. These environmental costs of current operations are prospective, meaning they will occur at more or less well defined points in the future. Examples include the future cost of decommissioning a laboratory that uses licensed nuclear materials, closing a landfill cell, replacing a storage tank used to hold petroleum or hazardous substances, and complying with regulations that are not yet in effect but have been promulgated. Such back-end environmental costs may be overlooked if they are not well-documented or accrued in accounting systems.

Table 4.2.1 contains a lengthy lists of "potentially hidden" environmental costs, including examples of the costs of upfront, operational, and back-end activities undertaken to (1) comply with environmental laws (i.e. regulatory costs) or (2) go beyond compliance (i.e. voluntary costs). In bringing these costs to light, it also may be useful to distinguish among costs incurred to respond to past pollution not related to ongoing operations to control, clean up, or prevent pollution from ongoing operations; or to prevent or reduce pollution from future operations.

4.2.3 CONTINGENT COSTS. Cost that may or may not be incurred at some point in the future – here termed “contingent costs” – can best be described in probabilistic terms; their expected value, their range, or the probability of their exceeding some amount. Examples include the costs of remedying and compensating for future accidental release of contaminants into the environment (e.g., oil spills), fines and penalties for future regulatory infractions, and future costs due to unexpected consequences of permitted or international release. These costs may also be termed “contingent liabilities” or “contingent liability costs”. As these costs may not currently need to be recognized for other purposes, they may not receive adequate attention in internal management accounting systems and forward-
looking decisions. **Image and Relationship Costs.** Some environmental costs are called “less tangible” or “intangible” because they are incurred to affect subjective (though measurable) perceptions of management, customers, employees, communities, and regulators. These costs have also been termed “corporate image” and “relationship” costs. This category can include the costs of annual environmental reports and community relations activities, costs incurred voluntarily for environmental activities (e.g., tree planting), and costs incurred for P2 award/recognition programs. The costs themselves are not “intangible”, but the direct benefits that result from relationship/corporate image expenses often are.

**4.2.4 ENVIRONMENTAL COST-EXAMPLES**

Costs incurred to comply with environmental laws are clearly environmental costs. Costs of environmental remediation, pollution control equipment, and noncompliance penalties are all unquestionably environmental costs. Other costs incurred for environmental protection are likewise clearly environmental costs, even if they are not explicitly required by regulations or go beyond regulatory compliance levels. There are other costs, however, that may fall into a gray zone in terms of being considered environmental costs.

For example, should the costs of production equipment be considered “environmental” if it is a “clean technology”? Is an energy-efficient turbine an “environmental” cost? Should efforts to monitor the shelf life of raw materials and supplies in inventory be considered “environmental” costs (if discarded, they become waste and result in environmental costs)? It may also be difficult to distinguish some environmental costs from health and safety costs or from risk management costs.

The success of environmental accounting does not depend on “correctly” classifying all the costs a firm incurs, rather its goal is to ensure that relevant information is made available to those who need or can use it. To handle costs in the gray zone, some firms use the approaches, allowing a cost item to be treated as “environmental” for one purpose but not for another, treating part of the cost of an item or activity as “environmental”, or treating costs as “environmental” for accounting purposes when a firm decides that a cost is more than 50% environmental. There are many options. Companies can define what should constitute an “environmental cost” and how to classify it, based on their goals and intended uses for environmental accounting. For example, if a firm wants to encourage pollution prevention in capital budgeting, it might consider distinguishing environmental costs that can
be avoided by pollution prevention investments, from environmental costs related to remedying contamination that has already occurred. But for product costing purposes, such a distinction might not be necessary because both are costs of producing the good or service.

4.2.5 CLASSIFICATION OF ENVIRONNEMENTAL COST VIS-A-VIS CONVENTIONNEL COST

Environmental cost is a term, new to the accounting system. How a company defines it, depends on how it intends to use the information. It is also a function of scale and scope of the exercise undertaken. Conventionally, cost has been described in a very narrow and traditional way, for which environmental cost was hidden in the background. This conventional cost generally takes into account the traditional costs, (these require little explanation) which is enumerated in the chart 4.2.1.

CHART 4.2.1 Conventional Cost

The traditional approach to cost accounting is narrow in its vision and incomplete in its nature and scope, as the system overlooks other costs which are mostly in the form of environmental costs. Proponents of environmental cost criticize conventional cost by calling it incomplete and typical, as it does not take into account the potential cost saving and revenues, as well as the myriads of environmental costs.
The ramifications of environmental cost are depicted in chart 4.2.2, so as to provide an insight into it at a glance. Environmental expenses may be classified in any or all the subcategories of conventional cost. These costs more often than not, may be obscured through treatment as overhead or R&D, distorted through improper allocation to cost centers or simply overlooked.

These are hidden, contingent liability or less tangible costs. Potential saving of conventional cost through decreased use and less wastage of raw materials, utilities, capital goods and supplies is definitely environmentally preferable, as it attempts to make the best usage of resources, thereby reducing both, the environmental degradation and consumption of non-renewable resources. The total cost can be divided into Societal Cost and Private Cost. Private cost can be grouped as Conventional Cost and Environmental Cost.
Potentially Hidden Costs: These costs are those environmental costs which are potentially hidden from managers. This potentially hidden environment cost can be further subdivided into different sub-categories based on some or other homogeneity.

Potential Saving of Conventional Cost: Conventional costs can be saved potentially through the optimum use of resources and less wastage of various utilities, supplies, and raw materials which will ultimately reduce the environmental degradation and reduction in the consumption of various non-renewable resources.

Upfront Environmental Costs: These costs are incurred prior to the operation of a process, system, or facility. These can include costs related to sitting, designing of environmentally preferable products or processes, qualifications of suppliers, evaluation of alternative pollution control equipment etc. Usually these costs are included in the overhead or R&D, as a result of which these costs are not segregated. A few examples of upfront environmental costs pertain to:

<table>
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<tr>
<th>Site studies</th>
<th>Permitting R&amp;D</th>
<th>Engineering</th>
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<tr>
<td>Site Preparation</td>
<td>Installation</td>
<td>Procurement</td>
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</table>

Regulatory Environmental Costs: Sometimes, the magnitude of these costs is very difficult to determine. These are incurred in operating a process, system, or facility and conventionally this is also included in the overhead pool, thereby leaving little scope for due attention of managers and analysts engaged in the day-to-day operation. Thus, this also escapes the attention of decision makers.

Examples of regulatory environmental costs incurred by firms are:

Voluntary Environmental Cost: These costs are in the same footing as regulatory environmental

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Costs. These are also incurred in operating a process, system or facility. The management of the same may be very difficult to determine. These costs are incurred when organizations go beyond the regulatory compliance stipulations and incur such expenses on their own, so as to go for image building. If the regulatory condition in a process stipulates 5 units of toxic contents, and the organization by adding additional process reduces the content to 2 units, the investment in this case is of a voluntary nature and this is voluntary environmental cost. Examples of voluntary environmental cost are given below:

<table>
<thead>
<tr>
<th>Community Relations</th>
<th>Training</th>
<th>Support to Researchers/Others</th>
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<tbody>
<tr>
<td>Monitoring/Testing</td>
<td>Audits</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>Qualifying Suppliers</td>
<td>Reports</td>
<td>Habitat and Wetland Protection</td>
</tr>
<tr>
<td>Feasibility Studies</td>
<td>Insurance</td>
<td>Other Environmental Projects</td>
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<tr>
<td></td>
<td></td>
<td>Remediation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planning</td>
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<tr>
<td></td>
<td></td>
<td>Landscaping</td>
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<td></td>
<td></td>
<td>R&amp;D</td>
</tr>
</tbody>
</table>

**Back-end Environmental Costs:** While upfront and operating expenses are obscured by accounting practices, these types of costs may not find a place in the accounting system. These are prospective costs which may occur in the well-defined future. These costs may be overlooked if they are not well documented or accrued. Examples of back-end environmental costs are closure/decommissioning, disposal of inventory, post-closure care and site survey etc.

**Contingent Environmental Costs:** Costs that may or may not occur at some point in the future comes under this category. These can be called the contingent liabilities of the firm. More often than not, these cannot be predicted, nor can a true estimation of such a cost be predicted. In view of this, for unforeseen contingencies the company should identify it till the extent possible and it should be taken into account for managerial decisions.

Examples of contingent environmental costs are:

<table>
<thead>
<tr>
<th>Penalties/Fines</th>
<th>Future Compliance Cost</th>
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<tr>
<td>Remediation</td>
<td>Response to Future Releases</td>
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<tr>
<td>Property Damage</td>
<td>Personal Injury Damage</td>
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<td></td>
<td>Legal Expenses</td>
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<td></td>
<td>Natural Resource Damage</td>
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<td></td>
<td>Economic Loss Damage</td>
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</table>
Image and Relationship Environmental Costs: There are some costs which are less tangible or intangible, because they are incurred to affect the subjective perceptions of the management, customers, employees, communities, and regulators etc. These are also called corporate image costs or relationship costs. These costs can include the costs of annual environmental reports, community relations activities, costs incurred voluntarily for environmental activities, and costs incurred for award/recognition programs. Even though these costs are not intangible, the direct benefit which results from such expenses are intangible.

Examples of image and relationship environmental costs are:

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<tr>
<th>Corporate Image</th>
<th>Relationship with Insurance</th>
<th>Relationship with Lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship with Customers</td>
<td>Relationship with Workers</td>
<td>Relationship with Regulators</td>
</tr>
<tr>
<td>Relationship with Investors</td>
<td>Relationship with Supplies</td>
<td>Relationship with Professional Staff</td>
</tr>
</tbody>
</table>

Identification of environmental cost is definitely a rigorous exercise, however, the goal of environmental accounting is to increase the amount of relevant information that is made available to those who need it or can use it. The success of environmental accounting does not depend upon "correctly" classifying all the costs that a firm incurs.

- Costs incurred to comply with the environmental laws are environmental costs.
- Costs of environmental remediation, pollution control equipment etc. are environmental costs.
- Non-compliance penalties levied on the business enterprise is undoubtedly an environmental cost.
- Costs incurred for environmental protection, even if they are not explicitly required by regulations, or go beyond regulatory compliance levels, are definitely, environmental costs.

The classification of environmental cost is very often obscured. The same is acute when a particular cost is in the gray zone. The case of production equipment based on "clean technology" or an energy efficient power generating set raises eyebrows as to whether it is to be included under environmental cost. In a similar footing, it may be a Herculean task to distinguish some environmental costs form health and safety cost or risk management cost. However, these classification hazards will never create a serious problem before the management, if the goal and intended use of environmental accounting is clearly defined.
However, organizations handle the costs in the gray zone by adopting certain principles as to whether a cost is to be considered a total or partial environmental cost.

- Purpose-based classification of cost is called environmental cost. Thus a cost treated as environmental cost for one purpose, may not be treated so for another purpose.
- Treating a part of the cost of an activity as environmental.
- If in the opinion of the organization, the cost of an activity is more than 50% environmental, to treat the same as environmental cost.

4.3 ENVIRONMENTAL ACCOUNTING AS A FLEXIBLE TOOL

Environmental accounting is a flexible tool, as it can be applied to different scales of use and for different scopes of coverage. Scale is not a hindrance for the application of environmental accounting. Whether the organization is small, medium or big, whether it is a single process, system, product, facility, division or the entire company, environmental accounting can be applied. Depending on the scale of application, relevant issues or challenges pertaining to such an application are to be taken care of. Irrespective of scale, there is every scope for environmental accounting. Right from the preliminary stage of starting the unit up to the post closure care, at each step, there is scope for environmental accounting. From regulatory aspects to image and relationship building costs, there is scope for environmental accounting. In a nutshell, the scope of environmental accounting refers to the type of costs included. It is to be noted that with the expansion of the scope of environmental cost, the assessment and measurement of certain environmental costs becomes relatively more difficult. This can be explained by way of a continuum as follows:

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Hidden</th>
<th>Contingent</th>
<th>Relationship/Image Building</th>
<th>Societal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to Measure</td>
<td></td>
<td></td>
<td></td>
<td>Difficult to Measure</td>
</tr>
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</table>

Impact of the company on the environment and society in some form or the other leads to some cost, which is known as the Societal Cost. The company is not financially responsible for this cost. These costs also do not directly affect the bottom line of a business. These are External Costs or Externalities. In contrast to this cost, Private cost is the cost
which a business incurs or for which a business can be held responsible. These costs affect a firm's bottom line. The demarcation between private cost and societal cost depends on the prevailing law, rules and regulations. Even though private costs engulf conventional costs and environmental costs, conventionally while taking managerial decisions only conventional costs are factored into, whereas environmental costs are relegated to the background. Environmental accounting at the outset may entail a new way of looking at a company’s environmental costs, performance and decisions.

The whole-hearted commitment of the top brass can set a positive tone, and articulate incentives for the organization to adopt environmental accounting. There is also a strong need to have a cross-functional team in the organization to implement environmental accounting. The idea has to percolate down the line as well as across, for which the cross section of each cadre, rank and file have to take the responsibility to implement this. It should be noted that environmental accounting is not an accounting issue alone; it calls for information from different groups-individually and collectively, so as to develop a common vision, after which the vision is translated into reality. Companies should institutionalize environmental accounting as it is a logical decision support tool in the decision-making process. Modern business approaches like Activity-Based Management/Costing, TQM, Business Process Re-Engineering, Life Cycle Costing etc. should assign importance to environmental accounting. These concepts provide the platform for integrating environmental information into business decisions.

4.4 APPLICATION OF ENVIRONMENTAL ACCOUNTING

Cost Allocation

Environmental accounting brings environmental costs to the limelight for all concerned, so as to enable and motivate them to identify the wages and means to reduce such costs, and side by side, to improve the environmental quality. Overhead cost is a group cost in which the environmental cost of a particular system/process/product is hidden. By allocating environmental cost to a process or a product that generates them, a company can motivate affected managers and employees to find creative pollution prevention alternatives that lower those costs and improve the bottom line. If this overhead cost is not allocated
correctly in a multi-product company, one product will bear more unwarranted burden in comparison with its contribution, while the other will have less than actual contribution, while a third may bear some load without any such contribution. Under these circumstances, manager cannot perceive the true cost of producing the products.

**Chart 4.4.1**

MISALLOCATIONS OF ENVIRONMENTAL COSTS UNDER TRADITIONAL COST SYSTEM

![Diagram of Chart 4.4.1]

In a multi-product company, let us assume that there are 3 products, A, B and C. A has no toxic waste/non-toxic waste, while B has toxic waste, and C has non-toxic waste. In traditional cost system, as depicted in chart 4.4.1, environmental cost is improperly allocated, whereas in environmental accounting the same are allocated according to their contribution, as a result of which, actual costing of different products are done. Further in the new method, where there is an addition of cost due to identification of environmental cost, the managers explore the possibility of reducing the costs and innovating new processes where the environmental costs are either eliminated or reduced.

Specific environmental cost application in chart 4.4.2, in the case of Product B and C will enable the managers to understand the actual position, and will enthuse them to take steps for cost cutting through the reduction of environmental costs and by improving the process, etc. Similarly, where environmental cost results from several processes through complex analysis and mathematical/statistical methods, proper allocation can be made to individual responsible traits. Some environmental costs which may accrue in future may need to be amortized and allocated to proper cost centers. In a similar fashion, the revenues on account of disposal or sale of bi-products or recyclables should be credited to the relevant product, or cost centers.
4.5 CAPITAL BUDGETING

Capital Budgeting is a vital process of developing the planned capital investment of a firm. It typically entails comparing the predicted cost and revenue streams of current operation and alternative investment projects against financial benchmarks, in light of the costs of capital to the firm.

**Chart 4.4.2**  
Specific Environmental Cost Application

With the integration of environmental cost in capital budgeting, better options have become available before any business entity to recognize the financially attractive investments in pollution prevention and clean technology. Thus, while evaluating a potential capital investment at the grass root level, it is wiser to consider total environmental costs, cost savings and revenues, pollution prevention investments vis-a-vis other alternatives. After identifying the cost and revenues of each investment option, its comparison can be made with the financial viability of a cleaner technology investment. In the process, there are certain data and issues which cannot be quantified, such as potentially less tangible benefits of pollution prevention investments which are to be qualitatively analyzed.

Collection of data can be done directly. Simultaneously, environmental data can be developed from the existing accounting system. In case there is environmental accounting system in vogue in the organization, then the inclusion of environmental cost in the capital budgeting will be a much easier process. The environmental cost and benefits are to be quantified, after which the same are to be allocated and projected. Various parameters like cost savings, potential revenue to the products, processes, systems or facilities, which form
the specific focus of capital budgeting decision, are to be meticulously arrived at. Reasonable time horizon in which environmental benefits will accrue is to be fixed. Easier estimations of cost and revenue are to be attempted first, and thereafter we can proceed to estimate more difficult and complex calculations of environmental costs and benefits, such as contingencies, potential less tangible benefits etc.

The benefit of improved corporate image and relationship due to pollution investments can impact costs and revenues which cannot be quantified in terms of money. The potential less tangible benefits of pollution prevention investment will be manifold.

- Increased sales due to enhanced image of the product or company.
- Better borrowing access and terms.
- Equity become more attractive to investors.
- This may lead to cost saving in the field of health and safety.

4.6 COMMONLY USED TERMS

Following are the main terms which are used in environmental cost accounting. To understand what someone means when using these terms, it is essential to determine whether they are referring to a specific management application of environmental accounting (e.g., cost accounting, capital budgeting, process/product design) and the scope of environmental costs meant to be included (e.g., private costs only, both private and societal costs). Sometimes, the terms are used to refer to a specific application of environmental accounting. As noted below,

**Total cost assessment** is often used to refer to the act of adding environmental costs into capital budgeting, whereas **life-cycle costing** may be most frequently used to refer to incorporating environmental accounting into process and product design. Whether or not one uses these terms to refer to environmental cost allocation, capital budgeting, process/product design, or other applications, there is another key difference in the way the terms are commonly used. Some professionals use the terms to refer to a firm’s private costs only (i.e., those that directly affect the firm’s bottom line), or both private and societal costs, some of which do not show up directly or even indirectly in the firm’s bottom line. For some people, **full cost accounting, full cost environmental accounting, total cost accounting** and the other terms refer only to private costs. Other people may use the terms to refer to both
private and societal costs. Some people use one of the terms for private costs alone and another of the terms for both private and societal costs together. Understanding the basic distinction between private and societal costs makes it possible to clarify the intended meanings of the vocabulary and thereby hold a conversation with anyone interested in environmental accounting.

This difference is at the heart of much of the confusion in environmental accounting terminology. It confuses those items that can be handled more easily incorporation of private costs with those that are more difficult to address societal costs. Clarifying what someone means when using environmental accounting terms is the first step to advance communication and cooperation.

1. **Environmental cost accounting** is a term used to refer to the addition of environmental cost information into existing cost accounting procedures and/or recognizing embedded environmental costs and allocating them to appropriate products or processes.

2. **Full cost accounting** is a term often used to describe desirable environmental accounting practices. In the accounting profession, “full cost accounting” is a concept and term used in various contexts. In management accounting, “full costing” means the allocation of all direct and indirect costs to a product or product line for the purposes of inventory valuation, profitability analysis, and pricing decisions.

3. **Full cost environmental accounting** embodies the same concept as full cost accounting but highlights the environmental elements.

4. **Total cost accounting**, an often used synonym for full cost environmental accounting, is a term that seems to have origins with environmental professionals. It has no particular meaning to accountants.

5. **Total cost assessment** has come to represent the process of integrating environmental costs into a capital budgeting analysis. It has been defined as the long-term, comprehensive financial analysis of the full range of private costs and savings of an investment. Adding to the confusion, the acronym for total cost assessment (TCA) is the same as the acronym for total cost accounting (TCA). For example, as required by GAAP for external financial and income tax reporting, accountants calculate the costs of goods sold and value inventory using **full absorption costing** (also called “absorption costing”) which assigns all types of manufacturing costs (direct material and labour as well as manufacturing overhead) to products. In this context, full costs per unit equals full absorption cost per
unit plus selling, general and administrative, and interest expenses, per unit. See, for example, Stickney, Weil, and Davidson, *Financial Accounting* (6th Ed., 1991). An alternative procedure, known as “variable costing,” is often considered superior for certain internal management purposes. A “full cost method of accounting” is available for oil and gas producing activities that includes the capitalization and amortization of upfront activities (e.g., acquisition, exploration, development), estimated future expenditures of developing proven reserves, and estimated back-end costs of dismantlement and abandonment. See Regulation S-X governing financial statements to be filed with the SEC, Section 50410. Rule 4-10. See Statement on Management Accounting No. 2A (Nov. 30, 1990) issued by the Institute of Management Accountants.

6 **True cost accounting** is a less used synonym for full cost accounting. The EPA Office of Solid Waste in its program to encourage local governments to apply full cost accounting to municipal solid waste management uses the term “true cost accounting” to encompass both private and societal costs while employing the term “full cost accounting” to refer exclusively to costs that affect the bottom line of solid waste management activities.

7 **Life-Cycle Terminology.** Life-cycle terms also are used in connection with environmental accounting. These terms include: lifecycle design, life-cycle assessment, life-cycle analysis, life-cycle cost assessment, life cycle accounting, and life-cycle cost.

8 **Life-cycle design** has been defined as an approach for designing more ecologically and economically sustainable product systems, integrating environmental requirements into the earliest stages of design. In life cycle design, environmental, performance, cost, cultural, and legal requirements are balanced.

9 **Life-cycle assessment** has been described as a holistic approach to identifying the environmental consequences of a product, process, or activity through its entire life cycle and to identifying opportunities for achieving environmental improvements. EPA has specified the four major stages in the life cycle of a product, process, or activity as raw materials acquisition, manufacturing, consumer use/reuse/maintenance, and recycle/waste management. By itself, life-cycle assessment focuses on environmental impacts, not costs.

10 **Life-cycle analysis** is sometimes used as a synonym for life-cycle assessment. The U.S. EPA uses the life-cycle assessment term. Neither term addresses the costs and revenues of environmental consequences and improvements, however.

12 **Life-cycle accounting** is a term used to describe the assignment and analysis of product-specific costs within a life-cycle framework including *usual*, *hidden*, *liability*, and *less tangible* costs.

13 **Life-cycle cost** according to the U.S. Office of Management and Budget, means the sum total of the direct, indirect, recurring, nonrecurring, and other related costs incurred, or estimated to be incurred, in the design, development, production, operation, maintenance, and support of a major system over its anticipated useful life span. More recently, *life-cycle cost* has been defined in an Executive Order as the amortized annual cost of a product, including capital costs, installation costs, operating costs, maintenance costs, and disposal costs discounted over the lifetime of a product. The term may also be used more expansively to include societal costs. These life-cycle terms are also subject to terminological confusion. For example, some people view life-cycle costing as referring only to private costs, while others view it as including both private and societal costs. Some apply a life-cycle perspective to capital budgeting, while others apply life-cycle concepts to process and product design. As previously mentioned, the key to facilitating communication is to recognize the different uses of common terms and to be able to identify underlying concepts. A threshold question is to determine whether someone is using an environmental accounting term to include solely private or both private and societal costs. A related question is to determine what application(s) a person has in mind when using these terms. EPA *Life Cycle Design Guidance Manual: Environmental Requirements and Product System*, EPA-600-R-92-226 (1993), pp. 122-9. OMB Circular No.A-109 (April 5, 1976). “Federal Acquisition, Recycling, and Waste Prevention,” Executive Order 12873, Section 210 (October 20, 1993). **Scope of Costs.** Because people
may use environmental accounting terminology to refer to specific sets of environmental costs, or may be imprecise about what they mean, careful delineation of which types of costs are intended to be within the scope of one term or another can reduce confusion and enhance communication. There is an important distinction between costs for which a firm is accountable and costs resulting from a firm's activities that do not directly affect the firm's bottom line:

14 **Private costs** are the costs a business incurs or for which a business can be held responsible. These are the costs that directly affect a firm's bottom line. Private costs are sometimes termed *internal* costs.

15 **Societal costs** are the costs of a company's impacts on the environment and society for which the business is not financially responsible. These costs do not directly affect a firm's bottom line. Societal costs may also be referred to as *external costs* or *externalities*. These costs may be expressed, qualitatively, in physical terms (e.g., tons of releases, exposed receptors), or in dollars and cents. Societal costs (or externalities) are sometimes subdivided according to whether the impacts are environmental, referred to as *environmental costs* or *environmental externalities*, or social, referred to as *social costs* or *social externalities*.

16 **Internal costs** - a synonym for private costs.

17 **External costs** -- a synonym for societal costs. Also termed *externalities*.

18 **Social costs** can be a synonym for societal costs or can refer to a subset of external costs.

19 **Environmental costs** can refer to a subset of external costs or can be used as a synonym for environmental externalities, societal costs, private costs, or both private and societal costs. Applications. Of the many types of forward-looking business decisions, that can benefit from environmental accounting, this primer focuses on cost accounting, capital budgeting, and process/product design:

20 **Cost allocation** refers to the procedures and systems for identifying, measuring, and allocating or assigning costs for internal management purposes.

21 **Capital budgeting**, also known as *investment analysis* and *financial evaluation*, refers to the process of determining a company's planned capital investments.

22 **Process/product design** refers to the process of developing specifications for products and processes, taking environmental costs and performance, among other factors, into
account. Environmental Costs. Terms used to classify or categorize environmental costs are listed below:

23 **Regulatory costs** are costs incurred to comply with federal, state, or local environmental laws (also termed *compliance costs*).

24 **Voluntary costs** represent costs incurred by a company, which are not required or necessary for compliance with environmental laws but go beyond compliance.

25 “**Gray zone costs**” refers to costs that are not solely or clearly “environmental” in nature but may also be viewed, in whole or part, as health and safety costs, risk management costs, production costs, operational costs, etc.

26 **Upfront costs** include pre-acquisition or preproduction costs incurred for processes, products, systems, or facilities (e.g., R&D costs).

27. **Operational costs** refer to costs incurred during the operating lives of processes, products, systems, and facilities, as opposed to upfront costs and back-end costs.

28 **Back-end costs** include environmental costs that arise following the useful life of processes, products, systems, or facilities. See also *exit costs*.

29 **Conventional costs** include costs typically recognized in capital budgeting exercises such as capital equipment, raw materials, supplies, and equipment. Referred to as *usual costs* in EPA *Pollution Prevention Benefits Manual*.

30 **Direct costs** is an accounting term for costs that are clearly and exclusively associated with a product or service and treated as such in cost accounting systems.

31. **Usual costs** — see conventional costs.

32. **Hidden costs** refer to the results of assigning environmental costs to overhead pools or overlooking future and contingent costs.

33. **Overhead** is often used synonymously with *indirect or hidden* costs as comprising all costs that are not accounted for as the *direct* costs of a particular process, system, product, or facility. The underlying distinction is between (1) costs that are either pooled and allocated on the basis of some formula, or not allocated at all, and (2) costs that an accounting system treats as belonging (directly) to a process, system, product, or facility (i.e., a cost centre in accounting terminology).

34 **Manufacturing or factory overhead** refers to costs that are allocated using more or less sophisticated formulae as contrasted with “*general and administrative (G&A)*” overhead costs that remain in pools and are not allocated.
35. **General and administrative (G&A) costs** are overhead or in direct costs that are not allocated to the costs of goods and services sold.

36. **Research and development (R&D) costs** can include the costs of process and product design. See also *upfront* costs.

37. **Exit costs** are the costs of proper closure, decommissioning, and clean-up at the end of the useful life of a process, system, or facility. See also *back-end costs*.

38. **Contingent costs** refer to environmental costs that are not certain to occur in the future but depend on uncertain future events (e.g., costs of remediating future spills). Sometimes referred to as "environmental liabilities," "liability costs," or "contingent liabilities."

39. **Future (or prospective) costs** refer to environmental costs that are certain to be incurred at a later date, which may or may not be known. Sometimes referred to as "environmental liabilities." *Environmental liabilities* is an umbrella term used to refer to different types of environmental costs including costs for remediation existing contamination, costs of complying with new regulations, future environmental costs of current operations (also known as *back-end or exit costs*), and/or contingent costs.

40. "**Less tangible costs**" refers to expenses incurred for corporate image purposes or for maintaining or enhancing relationships with regulators, customers, suppliers, host communities, investors/lenders, and the general public. Also termed "*relationship costs*" or "*image costs.*" Other Related Terms. Two other terms that are relevant to environmental accounting include the following:

41. **Activity-Based Costing (ABC)** is a means of creating a system that ultimately directs an organization's costs to the products and services that required these costs to be incurred. Using ABC, overhead costs are traced to products and services by identifying the resources, activities, and their costs and quantities to produce output.¹

42. **Materials accounting** or materials balance refers to an organized system of accounting for the flow, generation consumption, and accumulation of materials in a facility or process in order to identify and characterize waste streams. Some view a materials balance as a more rigorous form of materials accounting.
REFERENCE
1. Practices and Techniques: Implementing Activity-Based Costing. Statement on Management Accounting No. 4T (September 30, 1993) Institute of Management Accounting, reproducing the Society of Management Accountants of Canada Management Accounting Guideline 17, Implementing Activity-Based Costing. e.g.,