Identifying Strategic Environmental Opportunities: A Life Cycle Approach

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Leading companies now recognize that commitment to the environment can help them not only avoid costly problems or liabilities, but also identify environmentally based opportunities for competitive advantage. These opportunities take two forms: cost reduction and differentiation of products, processes, or services. For example, Du Pont reports saving $1 million a year in one plant by using less of one raw material, cutting the plant's waste by two-thirds. Similarly 3M's Pollution Prevention Pays (3P) program has saved the company more than $500 million since 1975 through process adjustments to avoid waste. And ICI has recently made a commitment to reducing its waste output by 50 percent by 1995. Meanwhile, manufacturers such as Procter & Gamble and retailers such as Loblaw in Canada and Walmart in the United States have developed product and retailing strategies that build on environmental strengths. Loblaw, for example, has developed a full line of environmentally sound products under the Nature's Choice brand name.

To identify opportunities of this kind – as well as potential competitive vulnerabilities – some companies are using a systematic four-step process that we call the Strategic Environmental Assessment Process. The steps in this process are:

1) Identifying key environmental issues

2) Examining the environmental profiles of products or services

3) Identifying competitive opportunities that fit with company strengths and weaknesses

4) Developing and implementing strategies

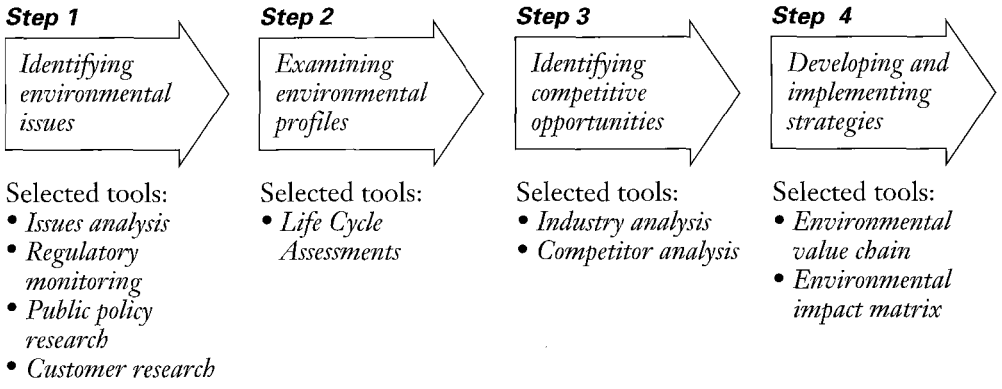
These four steps are outlined in Exhibit 1 and discussed below, together with selected tools available to support the Strategic Environmental Assessment Process and selected examples of leading-edge environmental strategies.

Step 1. Identifying Environmental Issues

Although some environmental issues seem to appear abruptly in the national consciousness, in fact each issue emerges through a development process. Companies that tap into this process improve their ability to judge the potential effects of developing issues well before they reach the general public. For each issue, the development process begins with early awareness, followed by scientific corroboration, developing research and accumulated knowledge, industry participation, opinion leader interest, and sometimes a major event that moves the issue into the public eye.

Exhibit 1

Four-Step Approach to Developing Strategic Environmental Initiatives



Source: Arthur D. Little, Inc.

Companies can monitor the progress of each issue by expanding established company communications and networking mechanisms to include an environmental dimension.

For example, ongoing regulatory monitoring designed to ensure that the company is in compliance with pertinent requirements can be expanded to provide information about future product or packaging environmental issues. Ongoing consumer-research tools used by marketing and sales staff, such as surveys, focus groups, or special product offerings, can include environmental issues as key aspects of consumer opinion. And technology benchmarking methods used by planning and R&D staffs can measure environmental technology developments, technology transfer, and scientific advances. In using these tools, it is important to take a traditional „issues management" approach, identifying which specific issues and subissues are relevant to your company and setting up systems to make sure they are tracked.

Step 2. Examining Environmental Profiles

This is the crux of the analytical process: the overall picture we refer to as an „environmental profile." Among the various tools and methodologies available to help perform this task, one of the most useful is the Product Life Cycle Assessment. In the last year or two, Life Cycle Assessment has received a lot of publicity – good and bad – as a tool to use in „hindsight" to compare one product to another in terms of their respective burdens on the environment. This use alone, however, does not recognize the full potential of Life Cycle Assessment as a diagnostic and planning tool.

A Product Life Cycle Assessment is an objective analytic process whereby companies evaluate the environmental burdens and opportunities associated with a product, process, or activity. The process helps companies quantify the energy and materials used and wastes released into the environment through each life cycle stage: raw materials acquisition; manufacturing, processing, and formulation; distribution and transportation; use, reuse, and maintenance; and waste management. This information, coupled with the issues information gathered in Step 1, identifies opportunities for making environmental improvements.

For example, Arthur D. Little performed a Life Cycle Assessment of beverage containers, comparing steel, aluminum, and glass containers. Our team analyzed each step in the life cycle of the containers, including the mining of materials and beneficiation of upgraded ores/concentrates; extraction or production of materials of interest; manufacture of the beverage containers; distribution of the product, including such considerations as the weight of the containers, shipping distances, and cooling requirements; and the disposition of the used beverage container and the impact of recycling. Interestingly, the team found that the life cycle of a two-way (reusable) glass bottle requires more energy, largely due to washing requirements, than does producing a second one-way (nonreusable) bottle. We also found that more energy is used and more solid wastes created in producing an aluminum can from virgin raw materials than a one-way bottle. However, recycling, melting down, and reusing most of the aluminum from the first can permits the manufacturer to make a second can that uses less than one-fifth the energy of the first can – and is therefore less energy-intensive than the one-way bottle. So, in the long run, if the recycling infrastructure is in place, the energy used for producing recycled aluminum containers can be less than that for one-way glass containers.

Additional examples of Life Cycle Assessments are listed in Exhibit 2.

Companies undertake Life Cycle Assessments for reasons that tend to fall into two broad categories:

• *Response to product attacks.* When either the public or a competitor makes claims against a product's environmental integrity, the attacked company can undertake a Life Cycle Assessment to develop a full understanding of the environmental impacts of the product, in order to counter those claims.

• *Support for an already-strong product position.* If a company recognizes that it has an environmentally strong product, and especially if environmental issues are a growing part of that company's arena, a Life Cycle Assessment will provide factual information and insights to support the product's future position.

There are four separate but interrelated components of a Life Cycle Assessment: Life Cycle Issues Analysis, Life Cycle Inventory, Life Cycle Impact Analysis, and Life Cycle Improvement Analysis.

Life Cycle Issues Analysis. The objective of this first component in the Life Cycle Assessment is to draw on the information gathered in Step 1 of the Strategic Environmental Assessment Process, identify which issues are pertinent to this particular product in each of its life cycle stages, and identify specific environmental vulnerabilities.

Life Cycle Inventory. This component of a Life Cycle Assessment is the most data-intensive and also the most frequently used – and publicized – to date. A Life Cycle Inventory quantifies energy and raw material inputs and air, water, and waste outputs associated with each phase in the product life cycle, from raw materials acquisition to disposal (Exhibit 3).

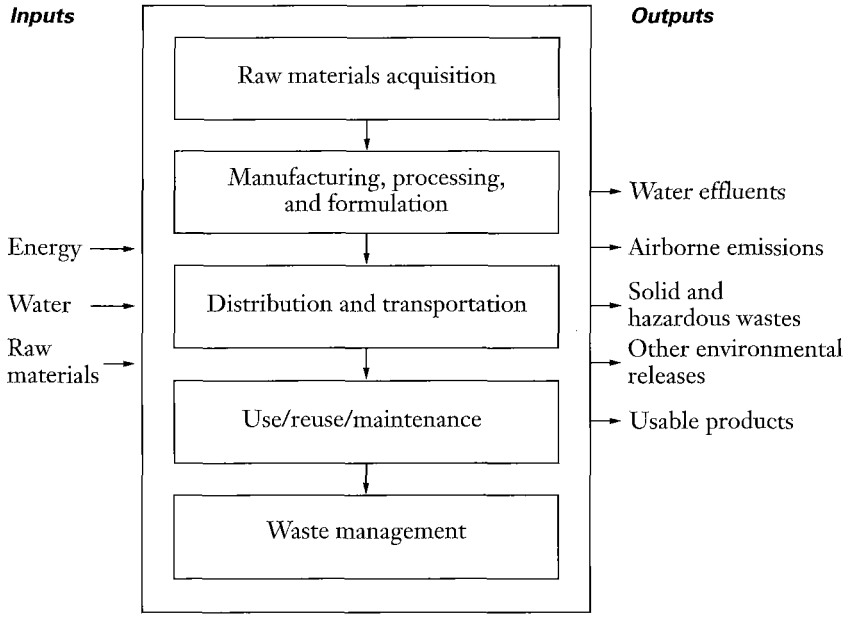
Exhibit 2

Selected Life Cycle Assessment Examples

Products Analyzed	Vulnerabilities	Advantages	Opportunities
Polystyrene clamshell versus coated paper (comparative)			
Clamshell	• *Bulky in landfill* • *Public impression of non-recyclability*	• *Recyclable* • *High-quality package*	• *Educate the public* • *Establish recycling infrastructure* • *Reduce bulk of clamshell*
Coated paper	• *Non-recyclable*	• *Public impression of environmental friendliness* • *Less bulk in landfill*	• *Develop technology to separate coating* • *Develop alternative coating*
Disposable versus reusable diapers (comparative)			
Disposable	• *Greater raw material use* • *More post-consumer solid waste* • *Non-recyclable*	• *Better protection from dermatitis* • *Convenience of use*	• *Develop recycling technology* • *Communicate full environmental impacts to public*
Reusable	• *More process solid waste* • *Consumes more non-renewable energy resources* • *Water pollution from laundering*	• *Can provide economic advantage* • *Public impression of environmental friendliness*	• *Market into public impression* • *Decrease solid waste*

Exhibit 3

Life Cycle Inventory



Life Cycle Impact Analysis. The third element in Life Cycle Assessment consists of characterizing the effects (e.g., ecological, health, economic, esthetic) and significance of the pollutants identified in the Life Cycle Inventory. The Impact Analysis is enhanced by including a cost comparison of either competing products or competing materials and manufacturing processes (including such costs as raw materials, manufacturing, R&D, and process redesign).

Life Cycle Improvement Analysis. The final component of the Life Cycle Assessment is a strategic evaluation of options for reducing the impact of the product or process on the environment – taking into consideration both the product's potential environmental vulnerabilities and its strengths. Here, improvement opportunities can be identified to position a product in terms of design, manufacture, image, and strategy.

Step 3. Identifying Competitive Opportunities

The objective of Step 2 is primarily information gathering. In Step 3, the collected data are used to identify opportunities throughout the product's life cycle to build on the company's environmental strengths and increase its competitive edge. For example, our Life Cycle Assessment of beverage containers points to recycling initiatives and education as major areas of potential opportunity for companies in this market – as do a number of the studies in which we have participated.

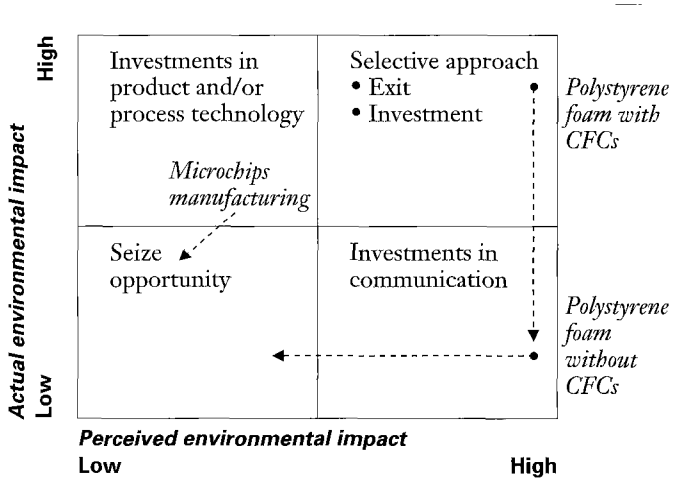
It is important in identifying opportunities to look beyond one product and its current competitive position. At this point in the planning process, the company needs information on competing products and new technologies – both now and in the future. Specifically, what is the competition doing about its products' environmental vulnerabilities? What cooperative efforts – in recycling beverage containers for example – are already in place or developing within the industry? Which approaches make the most sense to meet long-term objectives?

Step 4. Developing and Implementing Strategies

Once a company has completed its product analysis – using the Life Cycle Assessment or other tools as needed – it can use the gathered information to devise and implement traditional strategies, such as those built on cost leadership, product differentiation, or market segmentation. In some situations, work may be required to reduce the actual impact of the product on the environment. In others, the critical task may be to change the public perception about the impact of the product. This distinction between actual and perceived impacts has significant implications for strategy (Exhibit 4). Where the product's actual impact is low, but its perceived impact high, the manufacturer needs to invest in communication. For example, scientific evidence about the effects of chlorofluorocarbons (CFCs) on the atmosphere has had major implications for companies that manufacture polystyrene foam with CFCs. Their first problem was to find CFC substitutes in order to reduce the environmental impact of the manufacturing process. That task has been accomplished. However, a farther challenge now remains: to correct the public misperception about the impact of polystyrene, which still carries the negative image associated with CFCs. The key to success here is educating the public about the „new" product. Polystyrene has been a major issue in North America, while polyvinyl chloride has been embroiled in similar issues in Europe. However, both of these issues are now global.

Exhibit 4

Actual Versus Perceived Environmental Impact



Where the product's actual impact may be higher than the public perceives it to be, the manufacturer should consider investments in product or process technology to reduce the impact. For example, an area that has received relatively little public attention thus far is the environmental impact of microchip manufacture – in particular, of the etchants and other chemicals that are used in the manufacturing process. In order to address the potential concerns of the public, microchip manufacturers should begin now to understand the impact of their processes and materials on the environment and correct for it.

Increasingly, leading companies recognize that in achieving environmental competitive advantage, communication plays a vital role. Constituencies needing frequent communication include employees (probably the single most valuable asset for environmental success), customers, the local community, shareholders, and the general public. There are opportunities throughout the product's life cycle for this kind of communication. For example, a company can establish a forum with the local community to inform people about the company's environmental, health, and safety objectives and progress. It can carefully label products to reflect accurate environmental, health, or safety information. And it can communicate to its suppliers that it expects them to make similar commitments to environmental issues.

Environmental strategies can be built on strengths in each stage of the life cycle, as described below.

Raw Materials Acquisition. Using renewable resources and nonendangered species represent ways to add environmental value in this phase of the life cycle, as does minimizing the impact of raw materials extraction. For example, Norsk Hydro, one of Europe's major aluminum producers, processes its alloys using largely hydroelectric (i.e., renewable) power. Products using recycled materials include 3M „Post-it Notes," which are now available made from recycled paper. Coca-Cola plans to use recycled plastic in drink containers. Newsday (Long Island, New York) recently made a commitment to using recycled newspaper extensively. Du Pont Canada and Procter & Gamble have an arrangement to recycle post-consumer plastic into new bottles for P&G detergent products. The plastic containers will be picked up at the curbside, then sorted, ground into flake, washed, dried, and packaged by Plastic Recycling Alliance, a joint venture of Du Pont and Waste Management formed in 1989. Du Pont will then return the recycled material to P&G's Canadian bottle supplier.

Manufacturing Through Distribution. Energy efficiency, pollution prevention or reduction, and waste minimization are potential ways to gain an economic as well as an environmental edge. Chevron reports that its SMART program (Save Money And Reduce Toxics) yielded $4 million in savings in its first year of operation. Added value can also take the form of having a distribution chain that focuses on protecting the environment. Canon, Inc., the electronic equipment and camera manufacturer, has launched „The Clean Earth Campaign" to collect replaceable toner cartridges from its copiers, laser printers, and facsimile machines for recycling. Each toner cartridge contains a collection kit and postage-paid mailing label. 3M ships its bulk videotape in plastic foam packaging, then collects the used packaging at the customers' plants and reuses it. Valvoline (an Ashland Oil subsidiary) is accepting used motor oil from do-it-yourself oil changers at more than 250 of its oil change centers. Chrysler Corp., in a $2 million venture with Haden Environmental Corp., is converting paint sludge into powder to be used as a filler for pavement cracks and as truck underbody paint.

Product Use and Maintenance. A company may have a competitive advantage if its product has obvious environmental advantages, such as products that use less-harmful additives (e.g., microbial pesticides, water-based paints, or aerosol-free cleaning agents). Competitive advantage can also stem from having an existing base of environmentally sensitive customers. This has been particularly true in Europe, where the „green" movement has had a major effect on products and their manufacture. In response, companies design their brochures and other marketing materials to promote or feature the environmental benefits of their products. The Body Shop's skin- and hair-care business is a good example, as is Smith & Hawken's mail-order catalogue business. And British Telecom recently focused a promotional campaign on the role of telecommunications technology as an environmentally friendly alternative to business travel.

Waste Management. Understanding the disposal profile for a product or material may also lead to a competitive advantage. For example, high-density polyethylene (HDPE) and polyethylene terephthalate (PET) plastics have comparatively well established recycling infrastructures in the United States. For other plastics, however, the recycling infrastructures in most parts of the country are relatively weak. Thus, a company that makes packaging out of PET or HDPE may have an easier time incorporating recycled resin into its raw material mix than a company that uses resins for which there is no recycling infrastructure or good secondary market. One example of an effective disposal effort is General Electric's cooperative venture with Digital Equipment, McDonald's, and Nailite Corp. to reprocess plastic reclaimed from computer housings and turn it into roof panels installed on McDonald's restaurants. Lufthansa Airlines is cutting down on plastic waste by serving food in departure halls rather than in the air for European flights; and the Saunders Hotel Company chain is remaking cafeterias and bathrooms to eliminate certain disposable items.

Other disposal-based examples reflect product-design innovations directed at recyclability or reuse. For example, ease of disassembly is considered at the time the product is designed or manufactured. In the auto industry, companies such as Peugeot and Renault have agreed on a marking system for polymers used in their new models in order to facilitate recycling. In the consumer goods industry, Procter & Gamble sells refillable pouches and cartons for liquid cleaning products that come in large plastic containers.

In terms of waste disposal, smaller usually is better, and a company that makes its products smaller than other companies' similar products is adding value. Leaders in the detergent industry, for example, are making a concerted effort to reduce the volume of their products by concentrating them or by formulating mixes of two or three products to be used together.

Conclusions

The common thread running through this four-step Strategic Environmental Assessment Process is the importance of integration: integrating environmental issues into your overall strategic planning process via Life Cycle Assessment; integrating environmental knowledge and technology into business planning, R&D, manufacturing, marketing, and distribution; and developing effective communication mechanisms to keep the company's various constituencies apprised of goals and progress.

Environmental issues will become increasingly important to corporate strategy and opportunity. Critical to sorting out real opportunities from passing fads is a company's thorough understanding of its products and processes: their relevant environmental issues, their impact on the environment, their potential for improvement, and their opportunities for competitive advantage. Tools such as the Strategic Environmental Assessment Process and Life Cycle Assessment can help a company break new ground in positioning its products for the future.

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