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The ability of financial decision-makers to increase their participation in corporate environmental strategy is dependent on the availability of reliable internal cost information. Environmental full cost accounting is one tool that can be used to support the vision and strategic direction of the CEO. In addition to life cycle costs, full cost accounting includes pollution control and waste management costs.

GREENING THE CFO:

RECENT PRACTICE AND EMERGING TRENDS

Ann Rappaport and Richard MacLean

Positive accounts of corporate environmental performance are reaching the popular press, and companies that signed the International Chamber of Commerce's Business Charter for Sustainable Development are seeking ways to convert ideas into action. CEOs increasingly understand the strategic importance of the environment and are making public commitments to improved performance. But what of the firm's chief financial managers? Can they understand the trend and refine their tools in practice?

High level affirmative attention is gratifying to the many environmental professionals within companies who have, numerous times over the last twenty years, been perceived as the bearers of bad news. Consider the messages that have been delivered since the 1970's: more laws to comply with; more waste sites discovered; more personal liability exposure for top decision makers; more monitoring equipment to purchase; more accountability to the surrounding community; more pollution control equipment to install and maintain; more date to collect and report; more fines for violations of environmental regulations; and more expensive off-site waste treatment.

In the face of this increasing spiral of costly fixes, progressive companies and developed country governments have embraced pollution prevention – in simple terms, not generating waste in the first place – as a preferred approach to environmental challenges. Although this concept has been practiced historically in some industry segments – and an articulate presentation appeared in the pages of the Harvard Business Review as long ago as 1980 (Michael G. Royston, "Making Pollution Prevention Pay"), existing practice of

pollution prevention falls short of what is technically feasible and financially sound.

The 1990 Clean Air Act Amendments embrace a move away from command and control legislation and toward market-based incentives for environmental protection.

One explanation for companies' slow progress may lie in the absence of tools to assist corporate managers in making decisions that are both fiscally and environmentally sound. Financial analyses can be modified to more fully address environmental considerations. Environmental full cost accounting is one tool through which the CFO can become a key environmental decision maker, supporting the strategic direction of the CEO.

Adding Costs, But Not Yet Making Sense

For decades governments have relied on cost-based decisions to set environmental policy. For example, in Europe the "Polluter Pays Principle" assigns costs for environmental degradation to the industries that generate waste. The international agreement to phase out ozone-depleting chlorofluorocarbons (CFCs) balanced the long term costs to switch to safer substitutes against the health risks from increased ultraviolet exposure. Much of the debate over the Clean Air Act Amendments of 1990 was driven by cost/benefit considerations.

The 1990 Clean Air Act Amendments also embrace a move away from command and control legislation and toward market-based incentives for environmental protection. The acid rain program is structured on a SO_2 allowance trading system designed to achieve pollutant reductions with maximum efficiency. Proponents of the scheme produced analyses showing that total costs for compliance are considerably lower under the trading scheme than under the conventional approach of requiring each regulated facility to achieve a percentage reduction in emissions.

At the same time cost considerations are being given increasing weight in national environmental policy, there is recognition that the financial analysis tools available for policymakers fail to integrate the environment adequately into their measures. For example, economists have observed that indicators used for assessing national economic viability; the gross national product or the gross domestic product, have the perverse effect of rising when the environment is damaged. When primary resources are extracted, the country derives income, but there is no offsetting factor for resource loss. The massive oil spill from the Exxon *Valdez* had a positive impact on the gross national product because millions of dollars were spent on clean up. In *Saving the Earth*, Lester Brown, Christopher Flavin and Sandra Postel examine current efforts to develop alternative national accounting systems that do not require exploitation in order to value natural resources.[1]

An effort is also underway in companies to take a comprehensive enterprise-level approach to examining environmental costs, but like countries, companies face some data challenges. Some companies are exploring monetizing external costs, but many are attempting to fully identify and track internal costs. What follows is a discussion of internal costing. For example, in addition to the current cost to dispose of a drum of hazardous waste, there are lost raw materials, waste analysis costs, environmental permit costs, administrative costs; and costs to collect, package, store, manifest

and ship waste. An important, often greater concern, is the potential for regulatory fines, negative publicity and long term liability issues from treatment and disposal.

Called full cost accounting, the systematic analysis of environmental costs offers real advantages for sound business decision making. According to Paul Bailey, senior vice president of the environmental consulting firm, ICF Kaiser, full cost accounting is a modification of life cycle costing. Life cycle costing was developed in the '60s and '70s to reflect rising ownership costs of systems, including labor and energy costs. In addition to life cycle costs, full cost accounting includes pollution control and waste management costs. Bailey described full cost accounting as having four levels of costs:

- Usual capital and operating costs– includes equipment, labor, materials, etc.
- Hidden regulatory costs — includes monitoring, paperwork, testing, training, inspections, etc.
- Contingent liability costs — includes penalties, fines and future liabilities
- Less tangible costs — corporate image, community relations, consumer response, etc.[2]

If a conventional project that produces waste is compared to a project that incorporates pollution prevention technology, the project with pollution prevention will often be financially more attractive when full cost accounting is used. This attempt to factor all environmental costs into enterprise-level decision making is similar in principle to environmental-cost driven decisions emerging at the national level.

In practice, however, the decision making process for a business—at the enterprise level—is different. In the U.S., national-level environmental analyses involve government agencies, elected officials, non-government organizations, academics, industries and the public openly debating issues and assumptions. On the other hand, full cost accounting decisions by businesses are typically made in private. Still, the outcome may impact customers, employees, shareholders, and/or neighbors, people with limited access to the data and/or voice in the outcome. The distinction is crucial and operational.

Selected Environmental Accounting Resources

The U.S. Environmental Protection Agency prepares an "Environmental Accounting Resource Listing," the next version of which should be available through the PPIC (202) 260-1023. Call Holly Elwood at EPA (202) 260-4362 to add material to future listings.

The institute of Management Accountants has prepared several documents on activity-based costing and maintains a list of bibliographies through their library. Call the library at (201) 573-9000.

The Canadian Institute of Chartered Accountings has published relevant research reports and study group reports, including "Environmental Costs and Liabilities: Accounting and Financial Reporting Issues," (1993) and "Environmental Stewardship: Management, Accountability and the Role of Chartered Accountants," (1993). To order call (416) 204-3364.

The United Nations has prepared a guide to literature on corporate environmental accounting called "Environmental Accounting: Current Issues, Abstracts and Bibliographies." Call the United Nations Publications Sales Section (212) 963-8302.

The Business Council for Sustainable Development has a 1994 publication, Internalizing Environmental Costs to Promote Eco-Efficiency, in which a chapter is devoted to Accounting for Environmental Costs. Located in Switzerland, the telephone number is 41 22 839 3100.

Exhibit 1.

What follows explains how financial decision makers can more fully participate in corporate environmental strategy.

Supporting the Existing Environmental Hierarchy

Environmentalists generally agree that there is a hierarchy of product, process and waste disposal options. Products and processes that use the fewest resources, least toxic raw materials, and/or generate the least waste are preferred. If waste is generated, waste management practices that recycle or reclaim the material are better than those that treat it. At the bottom of the hierarchy is landfilling. This hierarchy has been part of federal waste management policy since the Resource Conservation and Recovery Act was amended in 1984.

In principle, full cost accounting drives the decision up this hierarchy towards better choices, at least from an environmental standpoint. The assumption by proponents of full cost accounting is that any decision that moves the current practice up this hierarchy is better for the environment and best for business. However, it may not be better for either. Decision tools are imperfect and should be used with care.

Ideally, a full cost accounting analysis will lead to the selection of a new process involving nontoxic raw materials and zero waste generation. In reality, the selection is rarely this clear-cut. For example, a company may be considering alternatives for an existing waste stream. A full cost accounting analysis may indicate that on-site incineration with energy recovery of a non-hazardous waste is more cost effective than continued off-site disposal at a municipal landfill. The alternative of a process modification that will result in zero waste generation, although technically feasible, may not justify the cost, even after considering indirect costs and long term liabilities.

Bristol-Myers Squibb—
Cost Accounting for Productivity

As their contribution to company-wide productivity efforts, the Environment, Health and Safety group at Bristol-Myers Squibb has launched several operational initiatives, one of which is environmental full cost accounting. Five elements have been identified for implementation over the next four years:

1. **Develop and implement enhanced methodology for capital project evaluation**. By justifying EHS spending on quantifiable financial benefits and compliance, approval and implementation of projects with positive financial returns will be accelerated.
2. **Develop EHS capital project tracking and reporting system**. By coding all significant EHS projects, the company will facilitate analysis and expects economies of scale in executing similar projects across the company.
3. **Track and report priority EHS operating costs**. Activity based costing will help link EHS costs to specific products and businesses and is expected to hold down increases in EHS operating costs by helping decision makers identify the big hits.
4. **Develop electronic systems for managing remediation projects**. Development of software and establishment of cost centers will reduce administrative time for data gathering, analysis and reporting.
5. **Investigate revised treatment of workers' compensation costs**. Just as companies' decisions to push responsibility for waste management costs down to the facility level created an incentive for pollution prevention, Bristol-Myers Squibb is considering allocation of workers' compensation costs down to the department or facility level as an incentive for improved safety performance.[3]

These environmental full cost accounting efforts complement the company's commitment to pollution prevention throughout the produce life cycle, a strategic approach to environment launches in 1992.[4] According to Bristol-Myers Squibb's vice president for Environmental Affairs, Occupational Health and Safety, Dr. Thomas Hellman, the company anticipates significant cost savings and cost avoidance associated with the total package of EHS productivity measures. Implementation of environmental full cost accounting may well result in additional savings beyond those initially anticipated.

Exhibit 2.

The decision to reject the technically feasible process modification in favor of the more cost effective incineration option may some day come under the scrutiny of hindsight. If a thorough analysis was conducted, the merit of the decision will stand. If a superficial analysis was done, problems, possibly more serious than if landfilling had continued, may result. Consider the following scenario:

An attorney files a toxic tort lawsuit on behalf of neighbors claiming that the emissions from the incinerator damaged their health. If the health concerns were not thoroughly evaluated and subsequent analysis confirms their potential existence, the defense is weak. If health issues were identified in the original analysis, not given sufficient weight, no precautions were taken, and alternatives were available but rejected on financial grounds, the company may be subject to substantial punitive damages. In this case, a faulty full cost financial analysis may be worse than no analysis at all.

The Promise in Uncharted Territories

If a faulty analysis can be damaging, then what constitutes a good one? Unfortunately, there is no definitive guidance. The World Resources Institute recognized this shortcoming and undertook a project to develop a revised system for corporate cost accounting; results became available in spring, 1995. In addition, the Institute of Management Accountants has conducted research projects and is in the process of developing a guideline statement. In the interim, the number of published financial analysis models is small; only a handful. Many are several years old and most concentrate on the mechanics of identifying and quantifying costs.

In principle, the mechanics of full cost accounting is identical to any financial analysis that considers readily identifiable costs (*e.g.*, capital, operating expenses, revenues) and displays these in a standard format (*e*.g., financial spread sheet). There are, however, significant differences: first, the time period is considerably longer (*e.g.*, twenty years); second, a more rigorous analysis is conducted of potential future costs; and finally, it includes costs that are often very difficult to quantify.

This analysis might include projected regulatory changes (*e.g.*, land disposal restrictions), indirect compliance costs (*e.g.*, record keeping requirements) and other overlooked or "hidden" regulatory costs associated with waste generation. Potential incentives (*e.g.*, loan guarantees) and disincentives (*e.g.*, waste end taxes) may also be factored in. Less tangible factors, such as potential long-term legal liabilities or the loss of sales revenues due to adverse publicity arising from environmental incidents, can only be estimated from available data or established through some internal company policy mechanism.

While the financial principles are conceptually straightforward, it is extremely difficult to estimate long term liabilities. Case law and remediation cost data have been accumulated only over the past twenty years. Both the technology choices and the legal settlements are in a state of flux. Without a stable platform and historical database, there is no commonly accepted and widely used approach to predicting future costs. This instability is the primary reason why non-sudden, environmental liability insurance is extremely costly and all but impossible to buy.

The bottom line is that environmental financial analysis is in its infancy. Several recent publications have focused on environmental full cost accounting, including work by the U.S. Environmental Protection Agency, the United Nations, the Canadian Institute of Chartered Accountants and the Institute of Management Accountants (U.S.). The best way to accelerate maturity of the

field, however, is for companies to start developing systems and asking hard questions.

The Largest Remaining Questions

1) Is precision necessary? Full cost accounting's advantage is that it provides a persuasive vehicle to communicate to the people who control resource allocation. Environmental managers have traditionally not been skillful in addressing environmental issues in business terms that executives can readily understand. Executives informed of the full range of issues are more likely to seek prudent environmental practices than they would if less quantitative methods were employed. Access to quantitative data is at the core of any informed business decision.

For example, the release of the first SARA 313 (Community Right-to-Know) emission estimates produced a flurry of programs to voluntarily reduce emissions. There is no question that avoiding negative publicity was a major factor. But, many executives learned for the first time of the large volume of wasted raw materials and the potential liabilities created by these emissions. The information, available at a plant level, had never before been consolidated and presented to upper management. In a similar fashion, implementing full cost accounting, even if it is approximate at first, will provide top decision makers with new and useful information.

The inability to precisely estimate long term liabilities and other hard to quantify factors is not a reason to avoid full cost accounting. Companies can use general, published guidelines and modify these to suit their degree of "risk avoidance" – *i.e.*, how much risk the company is willing to accept.

2) What constitutes good full cost accounting? A good full cost analysis—one that will stand the test of time—is determined by the thoroughness by which the alternatives are evaluated by a multifunctional team of professionals. Finance, legal, engineering, environmental, health, safety, R & D and production personnel should be involved, at a minimum.

Full cost accounting's advantage is that it provides a persuasive vehicle to communicate to the people who control resource allocation.

A thorough checklist of costs, a financial model and a software program to process the information facilitate the process, but should not control it. These tools are no substitute for an informed analysis. The surefire way to disaster is to place even the best financial analysis model into the hands of an engineer or finance manager and rely on a single individual's limited perspective.

3) Does good analysis only get you only halfway there? Even if the analysis is technically correct, there are still organizational barriers that may have to be addressed. The ultimate purpose of a full cost accounting analysis is to allocate resources. At some point the information must be reviewed with individuals who have the power and authority to make these decisions. Success at these organizational levels will depend not only on the quality of the analysis, but management's understanding of the issues and ability to thoughtfully deal with the issues.

Unfortunately, even today individuals entering the business world from universities have had little or no exposure to environmental, health and safety issues. While their hearts may be in the right place, their training may be inadequate.

The situation is further compounded by the fact that today's top executives who control resources started their careers at a time when

environmental concerns were not central to business decision making. Old thinking dies slowly. For example, one senior finance executive had a very difficult time grasping that environmental capital projects could have positive returns on investment. His only prior exposure to environmental projects was end-of-the-pipe pollution control facilities with no return. The concept of pollution prevention as a positive business initiative was completely foreign. Senior executives may not be aware of the strategic importance of environment to the company, unless the company has had the misfortune of being associated with a celebrated environmental disaster.

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Business executives make sound decisions every day on incredibly complex issues in meetings that may last a few minutes. They are able to do this because of their specialized training and years of experience dealing with these issues. In contrast, environmental decision making is relatively new and adds a new layer of technical complexity. With little experience and compressed time schedules, executives are forced to rely more on their technical staffs to guide their decisions. The confounding factor is that environment, health and safety issues, by their very nature, involve decisions impacting human health and the environment. As a result, decisions may be dominated by gut level feelings, not sound logic.

Improved analysis will not necessarily correct this dilemma. For example, one executive reviewed accident prevention projects for a large facility producing highly toxic gas. The internationally recognized consultant and the company's technical staff recommended that $6 million out of a possible total of $12 million of accident prevention projects be approved. To illustrate the cost/benefit break points, standard risk curves were used to plot probability of an accident versus number of fatalities. At least to the experts the additional $6 million was a waste of money and was better spent on other environment, health and safety projects. Their recommendation was backed by well-established catastrophic accident estimation procedures that have matured to the point that there are guidelines published by governments on what constitutes acceptable risk.

The executive had never seen a risk plot before. He was so taken aback by the thought of directly dealing for the first time with what he considered life and death decisions that his response was a gut level: "As an officer of this corporation, how can I possibly say no to these other projects? Do them all."

In fact, he was on extremely solid ground to say no, but in a meeting that lasted only minutes it would be impossible to convince him otherwise. The concern on the staff's part was that there were other pressing environment, health and safety issues that had not yet reached the executive's attention.

4) How best can the CFO navigate past institutional barriers? Even if there were no organizational issues, full cost accounting faces institutional issues that, unless addressed, will impede its future use. The most obvious is management's concern over the future use of the records by adversarial parties. The situation is not unlike the sensitivity over facility compliance audits. Management recognizes their need, yet worries over the creation of discoverable records.

Some Advice to Practitioners of Full Cost Accounting

Build Alliances. You are trying to change the way the Accounting/Finance Department has traditionally reported data. It is essential that top management understand and support the need to better identify environmental costs. Without their collaboration you will get nowhere. You should establish a contact within the Accounting/Finance Department that has sufficient stature and knowledge to facilitate this process.

First understand their world. Accounting and budgeting systems were originally structured to answer specific business questions and to satisfy external requirements (*e.g.*, Securities and Exchange Commission). Even in a new company, this framework will dominate how the accounting systems are structured. You will need to work within this structure to identify existing information and mesh new needs conveniently with the existing system.

Some internally or externally imposed accounting systems may prove especially challenging. For example, in the utility industry, much of the accounting practice and culture is centered on reporting according to Federal Energy Regulatory Commission (FERC) accounting practices. In the regulated utility environment, additional cost breakdowns were deemed unnecessary because all costs could be recovered through rates. Currently, accounts are not broken down by specific processes. If they were, costs could be easily categorized for their environmental impact. You will need to understand pre-existing constraints, since these requirements will have to be incorporated into any future system.

Do your homework and network. Ten years ago there was relatively little information available on environmental accounting practices. This is no longer the case, so take advantage of others' wisdom; read the available literature (*see resources sidebar, Exhibit 1).* Equally important is networking among your peers. They can give you useful insights into the do's and don'ts of working with the Accounting/Finance Department and management.

One of the best ways to sell full cost accounting in your company is to explain to your management the progressive steps taken and the benefits gained by other companies (*see sidebar on Bristol-Myers Squibb, Exhibit 2).*

Be strategic in data collection. Determine the questions you need to answer for decision making now and in the future. Differentiate between nice-to-know data and must-know information. You will gain staff and line support if they perceive that the data will influence the outcome of decisions.

It is more than a numerical exercise. Your financial analysis is just one part of the overall analysis. Legal, regulatory and ethical issues, along with company philosophy, must be taken into consideration. Use a team approach to develop a balanced financial analysis.

Timing is everything. Trying to get the Accounting/Finance Department's attention during year-end close is unwise. On the other hand, good opportunities may present themselves; for example, the Finance and Information Systems Departments may be undertaking major overhauls in the way data is gathered and analyzed. Find out if these windows of opportunity are on the immediate horizon, even if you are not very far along in your activities.

This is an emerging field—precision is in the future. You are trying to assist management in making key decisions. These decisions are made by examining the most significant factors. Do not get hung up if the future disposal liability has a sensitivity of plus or minus 50 percent. At this point, it is more important to inform management that there is, in fact, a future liability and that liability may be relatively large compared with other process costs. You are better off having a workable system influencing management today and striving for continuous improvement over time, than waiting five years for a perfect system.

There is growing pressure from environmental groups for governments to require public disclosure of environmental audit results. In the European Community this issue has been resolved for the moment by making the Eco-Audit program voluntary. Despite the concern over environmental compliance audits, they typically use yes/no checklists and rarely create a liability concern if prompt corrective action is taken when problems are identified. In contrast, public disclosure of financial analysis of environmental projects can be very complex and subject to misinterpretation if taken out of context.

Also missing are widely accepted risk management guidelines for full cost accounting. Society, not companies, define acceptable risk. There is a considerable body of literature that defines acceptable risk for catastrophic accident analysis, nuclear plant operation, remediation clean-ups, pesticide use, etc. For full cost accounting the accounting mechanics exist, but not a framework to perform the accompanying risk analysis. Large corporations have the resources to perform custom evaluations and feel relatively secure in their decisions. A concern is that companies with limited resources will perform simplistic evaluations, thus compromising the value of the decision making tool.

Much easier to address is institutional guidance on how the information should be used in a financial context. The Financial Accounting Standards Board (FASB) has provided some guidance on environmental finance issues (*e.g.,* capitalization of costs to remediate environmental contamination). The Securities and Exchange Commission (SEC) has also provided some information on contingent liability disclosure requirements. Specific guidance for performing full cost accounting is still emerging. It is needed for several reasons.

First, there is a grey area between theoretical estimates of liability for planning purposes and actual estimates that must be accrued and/or disclosed. In general, the dividing line is over the certainty of actual funds being expended within a specific time frame. For example, there are sufficient data for many products to estimate and reserve funds to cover product warranties. On the other hand, an environmental accounting model may predict that for each ton of waste generated, $200 in liabilities will be generated. Do you accrue this amount? A project may have an estimated liability (remote, but very large). If you proceed, do you report the information as a contingent liability to the SEC, since environmental liability insurance is unavailable?

With so little data currently available, it seems unreasonable to accrue for these contingent liabilities. But, could accruals be required in the future? Environmentalists might press a case even now that this should be done. Generating full cost evaluations presents a dilemma. The more generally acceptable liability cost factors become, the more useful they are to guide business decisions. At the same time they become a powerful basis to justify subjecting industry to additional financial burdens (*e.g.,* waste or raw material taxes such as those that currently finance Superfund). If long term liability costs became predictable to the extent that industrial accidents are today, environmental liability insurance could become available at “reasonable” rates. Insurance would make it easier to make informed business decisions, since liability uncertainties can be translated into specific business costs.

For example, several years ago the managers of a business were considering starting a new venture to renovate used equipment that contained a hazardous substance. Although the numbers looked promising, management could not reach a decision because of their concern over the waste disposal liability issues. Waste minimization was not an option, since the hazardous substance

already existed and would have to be disposed as a first step in the renovation process. A full cost accounting analysis was used to place the environmental issues in perspective: the liabilities were not significant when compared with the total venture.

Second, buy-in-from the financial community is essential. As discussed previously, business and finance managers do not feel comfortable dealing with environmental risk issues. This underscores the importance of developing environmental accounting procedures; without them, there can be an inclination toward inaction or, even worse, poor decision making. For example, what is the appropriate financial method to deal with long term liabilities extending ten or more years such that their present value in financial terms does not disappear from the decision maker's panorama? Environmental regulators, such as the EPA, cannot address this important aspect of company decision making. Organizations such as the Institute of Management Accountants can have a more direct influence on how businesses manage their accounting procedures and are developing guidelines that address this challenge.

Defining financial procedures, because of their potential significant impact, also raises political issues. For example, the EPA developed an extremely detailed financial model for evaluating the indirect costs of environmental requirements. The model has never been officially approved and released. If it were, it would serve as the standard for the office of Management and Budget to evaluate the costs for EPA regulations.

What the Trend Means to Managers: Full Cost Accounting at Work

Full cost accounting presents a dilemma. On the one hand it can be a powerful tool to systematically analyze environmental issues and convincingly communicate this information to management. On the other hand, it is so powerful that it has the potential to significantly change the products, processes, and organizational structure of its users. For full cost accounting to become a vital part of decision making, the following need to occur:

Define the risk management process appropriate to full cost accounting: Companies need a framework to operate within that will provide institutional approval and foster consistency. With this framework, companies will not be concerned about creating discoverable records or being criticized for the methodology used in their analyses.

Consolidate the model information current into a user friendly package: There is a growing body of information that can be consolidated into a tool that industry can readily use.

Provide financial guidance: Accounting groups can take the lead in providing institutional guidance on procedures and can help with difficult questions, such as those related to liability analysis.

Educate business and finance managers about the environment: Business schools are beginning to address environmental issues in their curriculum. This process needs to be accelerated and expanded to include current managers.

Real environmental decision making: Companies have been making environmental decisions for decades, however, companies have been slow to make environment a core business management issue. Rather, environmental decisions have been handled on the periphery, falling under: government-business relations; ethics; public relations; or social responsibility. Company stakeholders, both internal and external, expect more.

There is an expectation that environmental considerations can and will be woven into companies' decision making fabric, and environmental full cost accounting

represents a powerful tool for achieving this objective. Financial analysis is at the heart of companies' "real" business and when environment is taken into account at this level, companies can legitimately claim to be proactive with respect to the environment. The CFO plays a critical role in the greening process by encouraging the use of decision making tools that convey environmental strategy into action.

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[1] Lester R. Brown, Christopher Flavin and Sandra Postel, *Saving the Planet* (New York: Norton, 1991) pp.121-130.
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