

# Measuring environmental performance: a basic ingredient of environmental management

With the growing interest in environmental issues, it's crucial for organizations to measure their environmental performance through economic and ecological indicators. Norsk Hydro provides a good example of how it can be done

By Jean-François Henri, CMA, and Alexandre Giasson

**O**ver the past 20 years, pressure from stakeholder groups (government, shareholders, employees, NGOs and local communities) has resulted in a number of laws, regulations and incentives that address environmental problems and encourage companies to pay more attention to their environmental costs. Even investors, through so-called "green" investment funds, are applying pressure to get corporations to reduce their environmental contingency risk. This is a trend that is only in its infancy but is bound to grow. Right now, the question is no longer whether companies should take charge of their environmental impacts, but rather how they can do so and still profit. Thus far, the accounting profession has been slow to react.

Although most organizations are aware of environmental issues, it is only recently that new answers have been suggested by Environmental Management Accounting (EMA). How should the impact of environmental issues be measured? How should an organization's environmental performance be measured and its progress in terms of sustainable development be assessed? What systems for measuring environmental performance are currently available? What types of indicators or indices can be applied? These are the problems that will be dealt with in the following pages.

The International Federation of Accountants' 2005 *International guidance document: Environmental management accounting* suggests guidelines for the deployment of EMA. This appears to herald an important new trend in the industry. The management accounting field has successively emphasized the

determination of costs and financial control (pre-1950), the contribution of information to planning and control (around 1965), the reduction of waste in the use of inputs to business processes (around 1985) and, finally, the production and creation of value through effective use of all resources (1995). EMA goes beyond these concepts by extending the definition of resources to all forms thereof (monetary, physical and informational). It basically uses the same tools as traditional accounting, but integrates the recognition of data on water, air, energy and natural resources and identifies the costs associated with inefficiencies in production processes due to pollution and waste. Thus, EMA addresses two major dimensions — cost management (accumulation, allocation, analysis, follow-up, etc.) and ecocontrol (performance measurement systems, budgeting, incentive compensation, strategic planning, etc.).

## Just what is environmental performance?

The concept of sustainable development is based on three major aspects of organizational performance: economic, social and environmental performance. However, defining environmental performance is no easy task. Environmental performance may be defined using a two-way matrix (see Table 1). The vertical axis shows the process and outcome dimensions, while the horizontal axis reflects the internal and external dimensions. The junction of these two axes determines four dimensions of environmental performance: (i) enhanced products and processes — competitive advantages obtained by an organization as a result of its environmental initiatives; (ii) relationships



with interested parties — the interaction between a company and its various outside stakeholders, including shareholders, the local community, government, clients and suppliers; (iii) regulatory compliance and financial impacts — the level of response to environmental standards required by laws and regulations, as well as the economic consequences of

ties involved may be physical quantities of materials used in an industrial process (energy, water, raw materials, etc.) or that result from the process (consumer products, emissions into the environment in the form of air pollution, liquid effluent, etc.). EPIs can also be used to measure the efforts made to reduce impacts — for instance spending on

Standardization (ISO) and the Global Reporting Initiative (GRI). ISO standard 14031, which belongs to the ISO 14000 family of standards, proposes three types of EPI: environmental condition indicators (ECIs), operational performance indicators (OPIs) and management performance indicators (MPIs). ISO standard 14031 also provides a framework for the selection of the most appropriate EPIs, along with tools to identify and integrate the aspirations of interested parties. Several practical examples of its application are included in the various guidelines.

The performance indicators provided by the GRI extend to all dimensions of sustainable development, i.e. economic, environmental and social performance (see *CMA Management*, February 2005) and add a fourth dimension related to integrated performance. Basically, the latter is designed to unify all performance dimensions and support deployment of an organizational strategy. With respect to EPIs, the GRI suggests 35 types of indicators, including 16 core indicators, that can be used to measure all aspects of environmental performance (materials, energy, water, biodiversity, emissions, suppliers, products and services, compliance, transportation and overall performance).

#### Measuring environmental performance through an index

Too many measures can make information unusable. Some indicators are very useful for day-to-day management, but

**Table 1: Corporate environmental performance matrix**

|         | Internal                                    | External                                  |
|---------|---|---|
| Process | Enhanced products and processes             | Relationships with interested parties     |
| Outcome | Regulatory compliance and financial impacts | Environmental impacts and corporate image |

Chart adapted from : Ilinitch, A.Y, N.S. Soderstrom and T.E Thomas (1998). 'Measuring corporate environmental performance'. *Journal of Accounting and Public Policy* (17): 383-408.

environmental initiatives; and (iv) environmental impacts and corporate image — the negative externalities of a company's activities on its environment and its overall reputation.

#### Measuring environmental performance with multiple indicators

An organization's environmental performance can be measured in concrete terms using a variety of indicators. Very generally, environmental performance indicators (EPIs) may be defined as measures that are based on observable or determinable quantities and that reflect in various ways the environmental impacts of a given activity. The quanti-

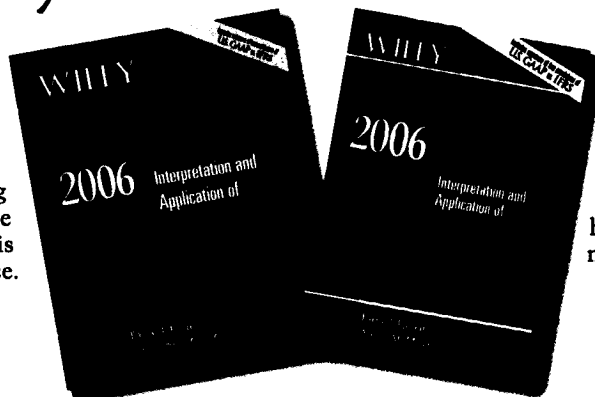
environmental management, or implementing an environmental management system. These indicators may reflect several perspectives: economic vs. ecological, input vs. output, process vs. outcome, internal vs. external, operational vs. managerial, etc. Among other things, they make it possible to identify trends, causal relationships or progress in meeting objectives. They can be useful when responding objectively to enquiries about the status of an organization's environmental performance.

There are a number of different models to guide the development of EPIs. Among the best-known are those of the International Organization for

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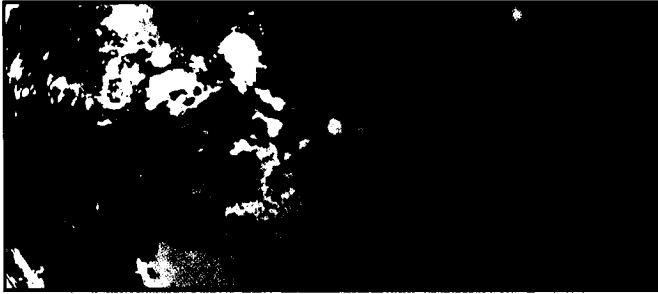
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ineffective for strategic piloting. To simplify the assessment of an organization's overall environmental performance, EPIs can be aggregated into a single index. By allocating different weights to each value in the index, one can derive a score for the organization's overall performance. This makes it possible to identify, at a glance, the direct impact of several series of activities for a given project and to define their volume and importance. Using an index allows current multidimensional measuring systems to be compared by synthesizing the information of each system into a single value or in the form of a diagram. Should it be appropriate to get to the bottom of unex-



pected changes, the index can be examined to ascertain where the largest changes occurred and to make the relevant corrections.

However, aggregating several EPIs into a single index isn't an easy task. Since the main purpose of environmental performance measurement is to convert a large quantity of data into information that is useful for management, it's crucial to weigh the items that make up the index. Positioning targets for a combination of indicators that perfectly reflect a range of objectives is difficult, if not impossible. To even attempt it, one must first perform an integrated systems analysis that will draw out a consensus among the various objectives. However, defining objectives for critical resource indicators is extremely challenging. Indeed, some critical thresholds and limits are regulated for certain emissions, but for most of them, the interconnections of environmental vectors make assessments iffy.

Indices should provide a balanced vision between resource use and the quantity of manufactured goods and services, emissions, effluents and waste of all kinds to assess the effectiveness and ecoefficiency of a business process. However, the development of indices will always involve a measure of subjectivity associated with the values and priorities of the individuals designing them. One way of getting around this problem is to implement an open and transparent process for the development and assessment of EPIs by involving interested parties and the community in the priority assessment process. This is key to promoting corporate responsibility and its continuous improvement. Still, consensus is hard to come by, especially when outside stakeholders are involved.

#### **Norsk Hydro: a case study**

Since 1987, Norsk Hydro Canada has been manufacturing primary magnesium in its facility at Bécancour, Quebec. Along with its ISO 9001 certification, this company has the world's first magnesium plant certified ISO 14001, and the first pro-

duction plant ever to recycle magnesium. This facility is also recognized as a leader in environmental management. In fact, it has received several high profile awards in this field, including the EcoGESTe 2001 award for best performance in reducing greenhouse gas emissions over the past 10 years, and the Énergia 2005 award for sustainable initiatives in the institutional sector, which recognizes excellence and merit in achieving energy efficiency and control.

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R&D program to replace sulfur hexafluoride (SF6) completely before the end of 2005. This program is in full swing, as Norsk Hydro has been using a new gas mixture (CO<sub>2</sub>+R-134a+SF<sub>6</sub>) since the end of 2004. The use of this new gas, HM, has reduced consumption of SF<sub>6</sub> by more than 90%, in addition to generating a 900,000-tonne reduction in carbon dioxide equivalent from 2004 to 2005. We were given an opportunity to meet Jean Laperrière, head of Norsk Hydro Canada Inc.'s Environmental Services, when he visited Laval University and was gracious enough to provide us with information on the company's leading-edge environmental management method.

The firm's environmental management philosophy is based on three corporate commitments: (i) compliance, (ii) risk reduction and (iii) resource conservation. Compliance hinges on the observance of environmental regulations prescribed by various levels of government. The performance indicator used is the number of times that a standard is exceeded during a month. Risk reduction is primarily concerned with preventing and eliminating any environmental accident to protect employees and the general public. Crucial to risk reduction is the response time required in the event of a problem. There exists a direct relationship between response time and the costs generated by an environmental accident. Accordingly, the company has emphasized training employees so that they can detect and react immediately as situations warrant. For instance, plugging a leak at source may cost \$500; however, if a leak reaches the storm drainage system, the cost rises to \$5,000.

The firm's final commitment, prevention, reflects a desire to reduce losses of raw materials and by-products, as well as polluting emissions, at the source. Laperrière stresses that, at Norsk Hydro, pollution is synonymous with loss of resources and money. He also notes that 80% of environmental costs are due to wasted resources, regardless of their form, which is why the company implemented its FEEW environmental performance index, for the loss of raw materials in effluents (F), emis-

sions (E), energy (E) and waste (W). This initiative saved \$4,000 per day in 2003.

The cost of resources purchased or produced was easily identifiable. All that remained was to measure losses, using various techniques. By multiplying the quantity of resources lost in the air, on the ground, in the water and in energy by their cost, Norsk Hydro has managed to quantify the cost of inefficiencies on an annual basis. Thus, the firm is able to assess its environmental and economic performance year after year, in addition to ensuring quality control at the operational end.

The entire process is based on the three Cs — reducing what can be comprehended, calculated and controlled — as

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well as on the services of people who know, want and can (KWC). Those who know — the environmental team — are responsible for establishing priorities and highlighting inefficiencies. They make their decisions on the basis of a "reduce, reuse, recycle and upgrade" mantra.

At the next stage, those who know call on those who want to reduce inputs and improve production processes. As more productivity gains are generated, more executives are willing to invest in making life easier for "those who know and can." Finally, the firm involves "those who can" act directly on processes and the choice of equipment — engineers and operators. The initial focus is on the low-hanging fruit — the quick wins. All stakeholders are motivated by success, and the most significant savings are often apparent early on. Letting the entire organization know about the environmental and economic gains achieved is crucial to keeping everyone focused and motivated. At Norsk Hydro, these results are communicated through a bulletin and monthly reports to people who are directly affected by the results (directors, stewards, executives, etc.).

### Using environmental performance indicators

The Norsk Hydro example demonstrates how EPIs can be used to control costs and production processes, while alleviating environmental pressure and maintaining a motivated staff. But EPIs can also be used for more than that. They are also quite useful in implementing strategy. Without reliable data, even the most well-intentioned executives can't identify zones of excellence and areas for improvement. To be truly meaningful, EPIs must be associated with clear organizational goals and objectives. These indicators track and disseminate specific differences from established objectives, and the resulting trends are then analyzed to promote con-

tinuous improvement. This also fosters organizational communication, since such indicators represent signals that are carried through the organization. Furthermore, because they provide feedback, EPIs also contribute to organizational learning. Disclosure is greatly enhanced through EPIs, as these data can be directly integrated into annual and sustainable development reports. Without them, a quantitative assessment of environmental impact reduction would be impossible.

Beyond external disclosure, an organization can also use the various EPIs to direct its decision making. Making decisions involves choices such as assessing eco-efficient capital projects, selecting vendors who are more respectful of the environment, and planning production based on the environmental impact of the products. At a time when more and more businesses are contemplating environmental information that goes beyond traditional financial and operational efficiency data, very few of them relate this information to the compensation of the people in charge of their implementation. The same goes for using compensation to undertake organizational change. It's recommended that EPIs be tied to financial incentives and used to undertake and assess strategic change. Otherwise, it will be more difficult to integrate EPIs into the organization's guiding and managing processes.

Organizations face environmental issues that require them to take an interest in their environmental performance, a concept that includes four major dimensions: enhancement of products and processes, relationships with the parties involved, regulatory compliance and financial impacts, along with environmental impacts and corporate image. To quantify its environmental performance, an organization may use several financial and non-financial indicators, or an index comprised of several indicators. Environmental performance measures are used for follow-up, internal communications, external disclosure, decision making, continuous improvement, etc. An organization such as Norsk Hydro is an example of a firm that has succeeded in using the potential of EPIs to enhance its environmental performance. ■

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