3. Environmental Management Accounting
Metrics: Procedures and Principles

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3.1. Introduction

This paper aims to define principles and procedures for environmental management accounting (EMA). It focuses on techniques for quantifying environmental expenditures or costs. These EMA metrics can be used by national governments as a starting point for developing EMA guidelines that are adapted to national circumstances and needs, and by companies and other organisations seeking to improve their control and benchmarking systems.

3.2. EMA metrics

Physical and financial

EMA metrics include both physical metrics (materials and energy consumption, flows, and final disposal) and financial metrics (costs, savings, and revenues related to activities with a potential environmental impact).

Conventional corporate monetary accounting comprises:
- financial accounting (bookkeeping, balancing, consolidation, auditing of the financial statement and external reporting);
- management accounting (also called ‘cost accounting’);
- corporate statistics and indicators (past-oriented);
- budgeting (future-oriented);
- investment appraisal (future-oriented).

Conventional accounting systems

Management accounting constitutes the central tool for internal management decisions such as product pricing, and is not regulated by law. This internal information system deals with questions such as ‘what are the costs of production for different products, and what should be their selling prices?’. The main stakeholders in management and cost accounting are members of the managerial staff of the organisation, in various positions (e.g. executive, site, product and production managers).

Unfortunately, many companies do not have a separate cost accounting system, and therefore make calculations on the basis of the financial accounting data from bookkeeping. Financial accounting is designed mainly to satisfy the information needs of

1 This chapter results from research done for the UN. Source: Environmental Management Accounting: Procedures and Principles, United Nations Division for Sustainable Development, Department of Economic and Social Affairs (United Nations publication, Sales No. 01.II.A.3). The website where this publication and others will be available is http://www.un.org/esa/sustdev/estema1.htm.
external shareholders and financial authorities, both of whom have a strong interest in standardised, comparable data and in receiving true and fair information about the actual economic performance of the company. Therefore, financial accounting and reporting are dealt with in national laws and international accounting standards.

**Environmental management information**

The core of environmental information systems consists of materials flow (or mass) balances measured in physical units of material, water and energy flows within the boundaries of a well-defined system. This can be at corporate level, but also at the level of cost centres and production processes or even of individual items of machinery and products. In the latter case, process technicians have to trace the data needed (see Figure 3.1).

<table>
<thead>
<tr>
<th>INPUT</th>
<th>System boundaries</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Nations</td>
<td>Products</td>
</tr>
<tr>
<td>Energy</td>
<td>Regions</td>
<td>Waste</td>
</tr>
<tr>
<td>Water</td>
<td>Corporations</td>
<td>Emissions</td>
</tr>
<tr>
<td></td>
<td>Processes</td>
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</tr>
</tbody>
</table>

Figure 3.1. System boundaries for mass balances.

EMA derives its data from both financial accounting and cost accounting, and is instrumental in increasing materials efficiency, in reducing environmental impact and risk, and in reducing the costs of environmental protection. EMA uses both financial and physical data (see Figure 3.2).

<table>
<thead>
<tr>
<th>Accounting in Monetary Units</th>
<th>Accounting in Physical Units</th>
</tr>
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<tbody>
<tr>
<td>Conventional Accounting</td>
<td>Environmental management accounting</td>
</tr>
<tr>
<td>Financial EMA ('FEMA')</td>
<td>Physical EMA ('PEMA')</td>
</tr>
</tbody>
</table>

Figure 3.2. EMA combines financial and physical data.

**EMA applications**

Key application fields for the use of EMA data are:
- assessment of annual environmental costs/ expenditures;
- product pricing;
- budgeting;
- investment appraisal, calculating investment options;
- calculating costs and savings of environmental projects;
- design and implementation of environmental management systems;