Improving Governments' Role In the Promotion of Environmental Managerial Accounting

An initiative of the United Nations Division for Sustainable Development

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Foreword

In recent years, increasing pressures and incentives for the adoption of cleaner production processes and pollution prevention measures by industry have emerged both inside and outside enterprises. Internally, the adoption of cleaner production systems is driven by pressure to reduce the costs of waste, to reduce the cost of compliance with changing regulations, and to position the enterprise as a "green" enterprise in the local, national, or global marketplace. Externally, corporate environmental performance is increasingly scrutinized by investors, financial analysts, regulatory bodies, host communities, and the public at large.

In response to these pressures, some enterprises are reviewing and changing management procedures in order to measure more accurately the costs of environmental impacts and the benefits of environmental protection. With increasingly stringent environmental protection policies, the costs to enterprises of waste and environmental damage are increasing steadily, but conventional managerial accounting systems do not adequately identify those costs. There is substantial evidence that when businesses can identify and allocate the environmental costs of production, they take action to reduce those costs.

Managerial accounting is a broad term referring to the identification, measurement, organization, analysis, interpretation and communication of financial information for use by management. Environmental managerial accounting covers a variety of techniques for identifying and measuring the full spectrum of environmental costs of production systems and the economic benefits of pollution prevention or cleaner processes. Those costs and benefits can then be integrated into routine business decision-making.

While managerial accounting systems are traditionally viewed as matters internal to a firm, the potential public benefits that can result from their widespread use by corporations provide an incentive for an active government role in promoting such systems. Government programmes and policies can play an important role in encouraging and motivating businesses to adopt environmental managerial accounting systems as an integral part of a their managerial accounting practices.

To assist governments in considering how they might promote environmental managerial accounting, the United Nations Division for Sustainable Development initiated a series of expert meetings of government agencies and other participants on environmental managerial accounting. The objectives of the meetings are: (1) to share information on existing programmes, including their objectives, design, effectiveness and lessons learned; (2) to discuss the role of governments in advancing and promoting corporate EMA; and (3) to establish a mechanism for continuing international exchange of information, discussion and cooperation in EMA programmes. The conclusions and policy recommendations resulting from the meetings will be submitted to the United Nations Commission on Sustainable Development in 2001 when it considers issues related to information for decision making.

ACRONYMS AND ABBREVIATIONS

ABC	Activity Based Costing		
ABM	Activity Based Management		
CER	Corporate Environment Report		
CICA	Canadian Institute of Chartered Accountants		
CSD	Commission on Sustainable Development (United Nations)		
DESA	Department of Economic and Social Affairs (United Nations)		
DfE	Design for Environment		
DG	Directorate-General (European Commission)		
DoD	Department of Defense (United States)		
DSD	Division for Sustainable Development (United Nations)		
EAP	Environmental Accounting Project (USEPA)		
EAS	Environmental Accounting System		
EC DG III	European Commission - Directorate General III (Enterprise)		
ECOMAC	Eco-Management Accounting		
ECs	Environmental Costs		
EHS	Environmental Health & Safety		
EIPs	Environmental Impact Points		
EMA	Environmental Managerial (or Management) Accounting		
EMAN	Eco-Management Accounting Network		
EMAS	Eco-Management and Audit Scheme		
EMS	Environmental Management System		
EPI	Environment Performance Indicator		
ER	Environment Report		
EU	European Union		
Eurostat	European Statistical Office		
FA	Financial Accounting		
FCA	Full Cost Accounting		
GAAP	General Accepted Accounting Principles		
GEMI	Global Environmental Management Initiative		
GGI	Greening of Government Initiative (UK)		
GRI	Global Reporting Initiative		

IASC	International Accounting Standards Committee			
IIIEE	International Institute for Industrial Environmental Economics, Lund University			
ISAR	Intergovernmental Group of Experts on International Standards of Accounting & Reporting			
ISO	International Organization for Standardization			
JEA	Japan Environment Agency			
LCA	Life Cycle Analysis			
LCC	Life Cycle Costing			
LCI	Life Cycle Inventory			
LCIA	Life Cycle Impact Assessment			
MA	Managerial (or Management) Accounting			
MIPS	Material Intensity per unit of Service			
NEA	National Environmental Accounting			
NGO	Non-Governmental Organizations			
OECD	Organization for Economic Co-operation and Development			
R&D	Research and Development			
RCRA	Resource Conservation and Recovery Act (United States)			
REA	Resource-Efficiency Accounting			
SEEA	System for Integrated Environmental and Economic Accounting			
SMEs	Small and Medium-sized Enterprises			
TCA	Total Cost Assessment			
UKEA	United Kingdom Environment Agency			
UN	United Nations			
UNCTAD	United Nations Conference on Trade and Development			
UN-DESA	United Nations Department of Economic and Social Affairs			
UN-DSD	United Nations Division for Sustainable Development			
UNEP	United Nations Environment Programme			
USEPA	United States Environmental Protection Agency			



UNITED NATIONS

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Environmental Accounting Project USEPA



United Nations Environment Programme

Improving

Governments' Role in the Promotion of

Environmental Managerial Accounting

Washington, DC

30-31 August 1999

Report of the Expert Working Group Meeting

INTRODUCTION

The Expert Working Group Meeting on Improving Governments' Role in Promoting Environmental Managerial Accounting was organized for the exchange of information among governments on how they could promote the use of environmental managerial accounting (EMA) by business and industry.

The Expert Working Group was organized as a follow-up to informal discussions on the issue at the 1998 session of the United Nations Commission on Sustainable Development (CSD) in the context of discussions on environmentally sound technologies. Those discussions indicated that a number of governments were involved in, or interested in, promoting EMA, but that there had been little or no communication between the agencies concerned. In particular, the United States Environmental Protection Agency (USEPA), which had an active programme in this area, was interested in exchanging information with agencies in other countries.

The first meeting of the Expert Working Group was organized by the United Nations Division for Sustainable Development (DSD) and the USEPA, and hosted by the USEPA in Washington DC, on 30-31 August 1999.

The participants in the Expert Working Group meeting were from national environment agencies, intergovernmental organizations, industry, accounting firms and academia. The Group included participants from Australia, Austria, Canada, Finland, Germany, Japan, Mexico, Nepal, Norway, the Slovak Republic, United Kingdom and United States, as well as from the United Nations DSD, the European Commission, and the United Nations Environment Programme (UNEP). A written contribution was also received from an expert from China who was unable to attend the meeting.

THE NATURE AND PURPOSE OF EMA

The costs to industry of environmental protection, including pollution reduction, waste management, monitoring, regulatory reporting, legal fees and insurance, have increased rapidly in the past 20 years with increasingly stringent environmental regulations. Conventional management accounting systems attribute many of those environmental costs to general overhead accounts, with the consequence that product and production managers have no incentive to reduce their environmental costs and executives are often unaware of the extent of environmental costs.

There is no consensus on the scope, content or procedures of EMA, and it would probably not be useful to try to reach consensus or promote standardization. EMA systems should be adapted to the management needs and priorities of specific enterprises, economic sectors and national systems for accounting and reporting. To a large extent, EMA procedures that focus management attention on environmental costs are more important than the particular system used or results obtained. While most EMA approaches focus on actual costs to the enterprise (internal costs), EMA can also take into account external environmental costs. Assessment of such external costs is particularly useful for long-term investment planning, considering that current external costs may be internalized through future regulations.

EMA systems that identify external costs can support supply-chain environmental assessment and product life-cycle assessment, and can benefit from recent work in those areas. While the focus of EMA is generally on accounts in monetary terms, accounts in physical terms (natural resource accounts) may also be useful in some situations.

Environmental costs can be categorized as follows:

- Conventional costs:
- Hidden costs:
- Contingent costs (liabilities, risks)
- Relationship/image costs (consumer, community and NGO relations)
- Societal costs (environmental and social externalities).

THE BENEFITS OF EMA

In conventional management accounting, the aggregation of environmental and non-environmental costs in overhead accounts results in their being "hidden" from management. There is substantial evidence that management tends to underestimate the extent and growth of such costs. By identifying, assessing and allocating environmental costs, EMA allows management to identify opportunities for cost savings. Prime examples from the EMA literature are the savings that can result from replacement of toxic organic solvents by non-toxic substitutes, thus eliminating the high and growing costs of regulatory reporting, hazardous waste handling and other costs associated with the use of toxic materials.

A rule of thumb of environmental management is that 20 per cent of production activities are responsible for 80 per cent of environmental costs. When environmental costs are allocated to overhead accounts shared by all product lines, products with low environmental costs subsidize those with high costs. This results in inefficient product pricing which reduces profitability.

A relatively simple application of EMA that may yield large benefits is to waste management, as the costs of handling and disposing of waste are relatively easy to define and to allocate to specific products. Other environmental costs, including costs of regulatory compliance, legal costs, damage to the corporate image, and environmental liabilities and risks, are more difficult to assess. Some enterprises are now using EMA systems, most commonly large enterprises that process natural resources and are subject to extensive environmental regulations. The USEPA Environment Accounting Project had developed forty-five case studies of EMA applications and benefits in various industries. Examples that were presented and discussed in the Working Group meeting included DuPont in the United States and Siemens in Germany.

Environmental regulations, consumer demands and public pressure concerning environmental performance are constantly changing. Companies with EMA systems can quickly determine the costs and implications of responding to such changing regulatory and market conditions and hence can gain a competitive advantage over other enterprises.

OBSTACLES TO EMA

A major obstacle to more widespread use of EMA by enterprises is the cost and difficulty of implementing an EMA system. This is in part due to the inherent complexity and cost of collecting and analyzing more data, and in part due to the lack of established, "off-the-shelf" EMA systems. Each enterprise thus has to define, design and develop its own EMA system, which is a costly process. Even some large organizations, such as AT&T and the United States Department of Defense, have initiated EMA systems and then dropped them. Some accounting and consulting firms that have tried to develop environmental accounting services have abandoned the effort as unprofitable, although others see it as a future growth area.

There is, therefore, a need to assess the costs and benefits of various approaches to EMA for enterprises of various sizes and activities. It may be that detailed EMA systems are not cost-effective for small enterprises with low environmental impacts. There is a need to develop, demonstrate and make easily available a range of EMA systems, including very simple systems for small enterprises.

The accounting profession has been slow to take up environmental issues, perhaps due in part to a certain caution and conservatism in the professional culture. Efforts through professional associations, professional journals and education institutions could help to overcome such obstacles.

ENVIRONMENTAL MANAGEMENT TOOLS RELATED TO EMA

There are important linkages between EMA and other environmental management and accounting systems. EMA systems and those other systems should be designed to be compatible and mutually supportive. An important means for governments and other organizations to promote EMA, for which there are no official standards or regulations, is to develop the standards and regulations for financial accounting and reporting, and environmental management systems, in such a way as to make it advantageous to enterprises to have EMA systems.

ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

Most directly related to EMA are environmental management systems (EMS). International voluntary standards have been established for EMS by the International Organization for Standardization (ISO 14000) and the European Union Eco-Management and Audit Scheme (EMAS). Under each of these systems, enterprises can seek certification that an EMS that meets the established criteria has been established for a particular site (not for the enterprise as a whole). Such certification can be useful for public relations purposes and is required by some organizations, both public and private, of their suppliers. Both ISO 14000 and EMAS set standards for environmental management procedures and institutional structures, rather than for environmental performance.

Neither ISO 14000 nor EMAS includes EMA requirements, but an EMS and an EMA system could be mutually supportive. Both ISO 14000 and EMAS are subject to review and revision, and could be revised to require, or more strongly promote, EMA. The Working Group agreed that a priority for future work would be a study of the actual and potential linkages between EMA and EMS.

EMAS certification requires an environmental policy for a site, a public statement of the environmental policy, an environmental assessment of the site, an action plan, and a management structure and procedures for system. Surveys of enterprises indicate that public image improvement is the primary incentive for EMAS certification, with cost reduction as a secondary incentive. The interest in EMAS certification varies substantially from country to country, with Germany having 1453 certified sites, Austria 141, Sweden 110, Denmark 76 and the United Kingdom 61. Many enterprises with EMAS-certified sites also have ISO 14000 certifications.

In Austria, the cost of establishing an EMAS system and obtaining certification depends on the size of the operation and has been estimated at roughly \$500 per employee. EMAS systems for medium-size sites have generated average cost reductions of about \$170,000, with a payback period of less than one year.

ENVIRONMENTAL REPORTING

Financial accounting for required corporate public reporting is better developed than managerial accounting for internal use. Accounting education focuses largely on financial accounting, as does the accounting literature. In some respects, managerial accounting and financial accounting use the same basic data, but organize, analyze and present them differently.

Financial accounts include most environmental costs, but aggregated in a way that does not identify the specifically environmental costs. There is evidence, however, that some environmental liabilities and risks that are in principle covered by reporting requirements, are often not reported; for example, liabilities for cleaning up contaminated land. A comprehensive EMA system would promote more complete financial accounts in such cases.

While management accounting for internal use, including EMA, is not subject to government requirements or standards, many developed countries have requirements, standards or guidelines for mandatory or voluntary environmental reporting. And an increasing number of corporations are voluntarily publishing annual environmental reports to accompany their annual financial reports. Commonly, such environmental reporting is in physical terms, such as tonnes of pollutants released or waste generated, rather than in the monetary terms normally used in EMA.

Regulatory provisions and requirements provide a major incentive for corporate EMA. Regulations such as toxic release inventories, liability for pollution damage, hazardous waste management and other requirements that increase environmental costs increase the benefits of EMA. EMA systems often focus specifically on the costs arising from regulatory compliance. Increasingly stringent environmental regulations will therefore further increase the benefits of, and incentives for, EMA systems.

Internal corporate EMA systems can support environmental reporting, and reporting requirements or guidelines can encourage the development of internal EMA systems. The International Accounting Standards Committee (IASC), whose members are national professional accounting associations, promotes accounting standards for financial reporting. The Working Group agreed that another priority for future work would be a study of the actual and potential linkages between EMA and corporate environmental reporting.

NATIONAL ENVIRONMENTAL ACCOUNTING (NEA)

There are also linkages between national environmental accounts and EMA. The United Nations Systems of Integrated Environmental and Economic Accounts (SEEA) provides an accounting framework that can be adapted for corporate EMA systems. Corporate EMA can also generate information for use in national environmental accounts through corporate reporting requirements. Natural capital accounting, as promoted by the World Bank, has been a focus of recent work in "green national accounts" and may have interesting linkages with corporate EMA. The Working Group agreed that future work should also consider linkages between NEA and EMA.

GOVERNMENT PROMOTION OF EMA

By promoting wider use of EMA in industry, government environment agencies can achieve pollution reduction at minimal cost to government and with minimal political resistance, in keeping with the current emphasis on voluntary initiatives and use of market forces. Wider use of EMA will tend to increase the effectiveness of new environmental regulations and economic incentives, as enterprises will be able to quickly calculate the costs of such policy measures and to adapt production systems and pricing in accordance with the new conditions at minimum cost. EMA systems will also encourage management to plan new production systems taking into

account prospective new regulations and incentives designed to internalize environmental costs that are now external.

International mechanisms for coordination and standard setting, with the participation of United Nations agencies, exist for corporate reporting, including environmental reporting, and for national environmental accounting, both of which are government responsibilities. Corporate managerial accounting, however, is not subject to government regulation and has therefore not been a subject for inter-governmental discussions. The participants in the Working Group welcomed this first opportunity for international exchange of information.

The Working Group agreed that managerial accounting systems must be adapted to the specific needs of enterprises and the economic and regulatory system in which they operate. It is, therefore, probably not desirable to try to standardize EMA systems, but to offer enterprises a variety of flexible EMA tools and systems. Similarly at the inter-governmental level, there is little need for international harmonization of programmes for promoting EMA, but agencies can gain by sharing experience and undertaking cooperative projects.

There is a need for guidelines and case studies on EMA, explaining concepts and terms, describing a variety of tools and options, and discussing the implementation and benefits of such systems. Such information and publications would be valuable for many potential users of EMA and for government agencies interested in promoting its use. In countries where EMA systems are in use in a significant number of enterprises, this could be done at the national level. For other countries, international guidelines and case studies would be valuable.

Some enterprises in developed countries are now using EMA systems, most commonly large enterprises that process natural resources and are subject to extensive environmental regulations. The experience of those enterprises can be used for the preparation of guidelines on best practices in EMA at the sectoral and national levels.

Use of EMA systems can be promoted by governments through a variety of measures, including dissemination of information, development and dissemination of low-cost, off-the-shelf EMA software, cooperation with industry associations in key sectors, consultant services, seed funding of EMA projects, EMA development for public sector use, and introduction of EMA into accounting education and practices.

EMA systems should complement and be compatible with conventional accounting systems, environmental management systems (EMS), and environmental reporting standards. As noted above, voluntary EMS standards (ISO 14000, EMAS) which do not currently require EMA, could be revised in the future to do so. Environmental reporting requirements could also be revised to encourage EMA, in particular by requiring reporting in monetary terms as well as physical terms. Environmental taxes and incentives, emission trading schemes, and other environmental policies could also be designed to encourage the use of EMA by affected companies. Regulatory procedures and permitting could also be made more flexible, while maintaining overall performance standards, for enterprises with approved EMA systems.

The ECOMAC project (Eco-Management Accounting as a Tool of Environmental Management), sponsored by the European Commission, conducted a survey of 84 enterprises in 4 European countries. The survey indicated that reporting requirements can effectively promote the use of EMA if they require accurate data rather than accepting rough estimates. It also indicated that EMA generated the greatest benefits for large companies with complex production processes, and was often not economic for small companies. EMA was used mostly for capital budgeting, bookkeeping, cost control, and product pricing. Some 26 per cent of the enterprises surveyed were using activity-based costing, providing the data necessary for EMA. The survey revealed some sectoral differences in accounting procedures relating to EMA, indicating for example, that sectors other than utilities usually allocated hazardous waste management to overhead accounts. The survey also indicated that energy costs are more often allocated to production units in Europe than in the United States. (ECOMAC ref. www.eim.nl/uk/nl/ecomac.html.)

To promote voluntary use of EMA by enterprises, governments need a menu of incentives. A Working Group participant from industry noted that the incentives need to be substantial, as corporate managers prefer not to change their procedures and priorities unless there is strong reason for doing so. Incentives should be used not only to induce changes in practices, but also to reward enterprises that have pioneered the development of new practices that go beyond compliance. Possible incentives for the adoption of EMA might include faster review of regulatory applications, simpler procedures for extending permits, regulatory flexibility such as plant-wide emissions limits, self-certification for permits, and reduced inspections for enterprises with approved EMA systems. Favorable tax treatment would be attractive, but would require joint action by environmental and tax authorities, which might be difficult. To be attractive, incentive systems should not involve a burdensome qualification process.

Governments can also encourage insurance companies to assess environment-related liabilities and risks in setting insurance rates. The potential for lower insurance rates would be an incentive for enterprises to use EMA to identify and reduce such liabilities and risks.

Governments can also work with industry associations and non-governmental organizations (NGOs) to support voluntary programmes to promote EMA. While voluntary environmental programmes are often adopted by enterprises primarily for their public relations effect, there is evidence that policies adopted for external public relations purposes gradually become internalized and put into practice.

Education and training in EMA, for accountants and managers as well as students in those fields, is central to promoting use of EMA. Enterprises interested in EMA need accountants trained in EMA techniques, and trained accountants and managers can take the initiative in introducing EMA concepts and systems into corporate management. Educational institutions and professional associations can both play an important role in basic and continuing education.

CURRENT PROGRAMMES RELATING TO EMA

Participants in the Working Group described programmes to promote EMA and related programmes in their countries. The following is a brief summary of the information presented. The Working Group agreed that a more comprehensive and detailed review and assessment of existing programmes for promoting EMA should be prepared.

Norway has instituted a competition and prize for EMA systems, conducted in cooperation with a management school, with the prize awarded in a public ceremony at the stock exchange. This is part of a general effort to improve the environmental performance of small and medium-size enterprises through environmental management systems, product management with respect to environmental impacts, and market-based environmental protection measures. Norway has recently revised its corporate reporting law to clarify the requirements for environmental reporting. The revision does not involve quantitative reporting, but calls for a broad and clear public statement of environmental policy. Norway is also working with the banking industry to increase attention to environmental risk assessment.

Norway, Australia and the United Kingdom are promoting environmental accounting by public authorities, both to improve the environmental performance of the authorities and as an example to private companies. In Norway, a 55-point environmental check-list and an internet networking system have been developed for use by local authorities. Norway also has a "Lighthouse" programme, with consultant assistance, publicity and an eco-logo, that promotes environmental accounting programmes in small businesses.

In Australia, a project to promote the use of EMA by local authorities is working with 178 local governments, using the UN System of Integrated Environmental and Economic Accounting (SEEA) for national accounts, which includes accounts for environmental protection expenditures, depletion of natural resources, and costs of environmental damage. The accounts indicate that local authority spending on environmental protection has amounted to between \$40 and \$250 per capita, depending on the scope of the environmental expenditures covered. The project showed that the SEEA approach was useful for EMA by local authorities, but that it was generally incompatible with existing data management systems. SEEA was considered more useful than the "ecological footprint" or "material flow" approach.

In the United Kingdom, the Environment Agency, which is funded by the national government, by local authorities, and through corporate charges, has undertaken an Environmental Accounting Initiative covering its own activities, including management accounting, financial accounting and environmental planning. Specifying the criteria for inclusion of items in the environmental accounts, defining the items to be included, and setting standards for their assessment have proven difficult. To date, the environmental costs, notably for energy and travel, have been defined, and work is proceeding on environmental assets, savings, liabilities and preventive expenditures.

In the United States, an Environmental Accounting Project was established in 1992 as part of the implementation of the Pollution Prevention Act of 1990, which emphasized voluntary and market-based programmes. The Project has leveraged its limited resources through cooperation with

partner organizations, outreach efforts, and education of other government departments. As part of the Project, EPA has undertaken a variety of activities in cooperation with enterprises or other organizations, with various objectives, including:

- Definition of concepts, terms and the roles of different organizations;
- Development of incentives;
- Education, training, guidance and outreach; and
- Development of analytical tools, methods and systems.

In the E-COST project, the Environmental Accounting Project is working with the Best!Ware computer software company to develop an EMA module for the best-selling "Mind Your Own Business" (M.Y.O.B.) accounting program for small businesses. Information on this and other project activities and reports is available on the USEPA Environmental Accounting Project website: www.epa.gov/opptintr/acctg/.

A number of states in the United States offer tax incentives to encourage enterprises to undertake environmental protection measures beyond those required by regulations. Currently there are no tax incentives for EMA systems, but the existing incentives may encourage analysis of environmental costs and consideration of alternatives. Tax incentives include accelerated depreciation of capital equipment for environmental protection, favorable tax treatment of spending on contamination remediation, corporate income and property tax credits for environmental protection spending, and sales tax waivers for purchases of environmental protection equipment. Other financial incentives include low-interest loans and tax exempt bonds for capital investments.

The Green Ledgers Project of the Washington-based World Resources Institute studied nine United States-based companies, including Amoco Oil, Ciba-Geigy, Dow Chemical, DuPont and S.C. Johnson, showing how those companies used environmental cost information to increase profitability and reduce environmental risk. The publication resulting from the project provides guidelines on practical steps for integrating environmental accounting practices into business systems.

Environment Canada has produced an "Introductory Guide to Environmental Accounting", which covers financial and non-financial data and qualitative information, as well as some external environmental costs. The agency also organizes community-based "Enviro-Clubs" of about 15 small businesses, which are supported for about 6 months with consultant services on EMS, EMA and other aspects of pollution prevention. Mutual support among the members also makes an important contribution to benefits. Participants pay \$5000 to join, and are guaranteed their money back through cost savings. For a typical business, pollution prevention measures undertaken on the basis of work in the Club produce savings of about \$90,000 per year from an investment of about \$100,000.

Canada is introducing requirements for corporate pollution prevention plans, including cost-benefit analysis. The government is also promoting voluntary environmental initiatives such as the Responsible Care Programme initiated by the chemical industry in Canada and subsequently expanded to 42 countries.

The Canadian Institute of Chartered Accountants (CICA) is a quasi-judicial body that sets accounting standards in Canada, undertakes research and disseminates information. EMA related work includes studies on environmental auditing (1992), sustainable development (1993), accounting and reporting of environmental costs and liabilities (1993), environmental performance reporting (1994), waste management guidelines (1995), and full cost accounting (1997). A study is underway on accounting of externalities.

In the province of Ontario, Canada, the provincial Ministry of Environment has undertaken some case studies of corporate EMA, including Husky Injection Molding and the Interface Canada carpet company. The Ministry also works with industry to promote reduction of harmful emissions on a voluntary basis through regulatory incentives including reduced reporting requirements and flexibility on permitting. The Ministry also published sectoral guidelines on eco-efficiency and guidelines on ISO 14000 certification.

In Germany, guidelines have been developed for assessing the cost of air quality protection (VDI RL 3800). Those guidelines, prepared with the participation of industry, industrial associations, government and academia, are currently being revised to cover all environmental protection costs. The revision process is addressing a number of cost assessment questions including recycling, take-back and life-cycle costs, whether costing should be by facility, process or product, and whether it should cover worker safety, noise, product quality and economic factors.

The Japan Environment Agency has produced a Draft Guideline for Evaluating Environmental Costs and Publicly Disclosing Environmental Accounting Information. The Guideline specifies in detail how environmental costs are defined and calculated, and provides forms for both internal cost accounting and public reporting.

In Sweden, most enterprises now include environmental issues in their annual reports, and more and more companies are establishing environmental management systems. The 1999 Annual Accounts Act requires annual environmental reports, including information on regulatory compliance. More extensive information is required from enterprises with major environmental impacts due to emissions, noise or waste, and enterprises which require environmental permits. Sweden does not yet have a programme to promote corporate EMA, but is interested in the question.

In Finland, a working group on environmental accounting has been established with the participation of industry. In 1999, Finland published Guidelines for Environmental Reporting, including EMA, and organized a competition for corporate environmental reports. Finland also carried out a study of the external environmental costs of the forest industry, concluding that, in the case of paper, external environmental costs amounted to about 3-5 per cent of the price of the

product, with the largest cost attributed to climate change resulting from energy consumption and greenhouse gas emissions.

In Europe, an Eco-Management Accounting Network (EMAN) has been established with the participation of researchers, consultants, business people and policy advisors. The purpose of the Network is to promote the understanding and use of EMA by businesses, to stimulate research in the field, to promote education in EMA, and to identify opportunities for government support for EMA. Areas of research that have been identified as promising include cost-benefit analysis of cleaner production, accounting and the internalization of external costs, tools for supply-chain analysis, and EMA for public sector organizations. The Network organizes periodic conferences on EMA, with the next conference to be held at the Wuppertal Institute in December 1999 on "EMA: The role of information systems".

In the Slovak Republic, the government and the National Cleaner Production Centre are promoting environmental reporting and accounting. The government, however, has very limited resources and little leverage for enforcing or promoting environmental protection measures. Environmental regulations exist, but if strictly enforced, they would close a large portion of Slovak industry, which is politically and economically unacceptable.

The Mexican economy has a large informal sector, and economic development takes priority over environmental protection. As a result, government agencies are not very effective in promoting environmental protection and have little leverage for directly promoting EMA. Under such conditions, an effective approach might be to train accountants and consultants, who would have greater credibility in persuading businesses of the productivity increases and cost savings to be achieved from cleaner production. Simple accounting software could also be useful.

In Nepal, industry contributes about 10% to GDP and is estimated to contribute about 8% of pollution. The major environmental problems are dust and other air pollution from brick and cement plants, and water pollution from iron and steel mills, carpet making and sewage. There are few environmental standards, and those that do exist are not enforced.

FUTURE WORK AND PRIORITIES FOR THE WORKING GROUP

Among members of the Working Group, the most common EMA-related activity has been learning about EMA, disseminating information by writing and teaching, and trying to build support for EMA within their own organizations. The Group agreed that priority work for the near future was information, education and training, including preparation of case studies, guidelines and tool kits for using EMA. The Working Group agreed that particular efforts should be made to disseminate information on EMA through internet web-sites.

The Working Group agreed that it should coordinate its work with groups working on related issues, including the Eco-Management Accounting Network (EMAN), the Greening of Industry Network, the Global Environmental Management Initiative (GEMI), the Global Reporting Initiative

(GRI), the UNCTAD Intergovernmental Group of Experts on International Standards of Accounting and Reporting (ISAR), and the Financial and Management Accounting Committee of the International Federation of Accountants.

The Working Group agreed that it should continue to meet periodically for exchange of information, coordination, and development of cooperative activities, with the United Nations Division for Sustainable Development as the secretariat. While the primary function of the Group would be to bring together people from government agencies and international organizations concerned with EMA, it was agreed that participants from industry, the accounting profession, and academia should also be invited to bring their perspectives and expertise to the Group.

The Group agreed that a priority for future work should be studies of linkages between EMA and the related issues of financial and environmental reporting, environmental management systems (EMS) and national environmental accounts (NEA). Studies were also needed of the feasibility and effectiveness of various incentives for promoting EMA. A number of national agencies indicated willingness to prepare studies on such issues for consideration at the next meeting. They will consult with the secretariat to coordinate the studies.

The Working Group agreed that one of its goals should be to produce a report on EMA for broad international distribution and submission to the Commission on Sustainable Development at its 2001 session under the theme "Information for Decision-Making". The report could include a description of EMA and its benefits for business and society, consideration of the role of governments in promoting EMA, a review of national and international activities for promoting EMA, and recommendations or guidelines for government efforts to promote EMA.

The next meeting of the group will be hosted by Austria in May 2000. A planned meeting on environmental management tools organized by the European Commission in Lisbon in March 2000 provided an interim opportunity for exchange of information and review of preparations for the next meeting.

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Improving Governments' Role in the Promotion of Environmental Managerial Accounting

Meeting Document for the First Expert Working Group Meeting Washington DC, 30-31 August 1999

> Division for Sustainable Development Department of Social and Economic Affairs

Preface

This report was commissioned by the United Nations Division for Sustainable Development (UN DSD) for the First Expert Working Group Meeting on Improving Governments' Role in the Promotion of Environmental Managerial Accounting, Washington DC, 30-31August 1999. The meeting was initiated by the UN DSD, and was hosted by the United States Environmental Protection Agency (USEPA). Co-organizers included the United Nations Environment Programme (UNEP), the European Commission Directorate General III - Enterprise (EC DG III) and the International Institute for Industrial Environmental Economics (IIIEE), Lund University.

Following the meeting, the report was revised to include information from the presentations and discussions in Washington by representatives from governments, business, academia and other non-governmental organizations. Recognition should be given to all those who shared their knowledge: Martin Bennett (Cheltenham and Gloucester College, United Kingdom) Jan Jaap Bouma (Erasmus University, The Netherlands) Thomas Brennan (State Department, United States) Daniel Cayen (Ministry of Environment, Ontario, Canada) Lucie Desforges (Environment Canada) Daryl Ditz (Environmental Law Institute, United States) Viera Feckova (Slovak Cleaner Production Center) Will Gibson (McNamee Industrial Services, United States) Charlotte af-Hallstrom (Swedish Environmental Protection Agency) Pedro Henriques (European Commission DG III, Belgium) Antero Honkasalo (Ministry of Environment, Finland) Tsuyoshi Kawakami (Environment Agency, Japan) Edwin Mongan (DuPont, United States) Richard Osborn (University of Canberra, Australia) Howard Pearce (Environment Agency, United Kingdom) Kristin Pierre (Environmental Protection Agency, United States) Kalyan B. Pradhan (Ministry of Industry, Nepal) Ernie Rosenberg (Occidental International, United States) William Russell (PriceWaterhouseCoopers LLP, United States) Hans-Guenther Schwarz (Austrian Federal Ministry for Science and Transport) Eberhard K. Seifert (Wuppertal Institute for Climate, Environment and Energy, Germany) Victor Shantora (Environment Canada) Martin Standley (GRIP Foundation for Sustainable Production & Consumption, Norway) Ralph Thurm (Siemens AG, Germany) Carlos Munoz Villarreal (National Institute of Ecology, Mexico) Faith Ward (Environment Agency, United Kingdom) Ulrika Wennberg (International Institute for Industrial Environmental Economics, Lund University, Sweden), Allen White (Tellus Institute, United States) Alan Willis (Canadian Institute of Chartered Accountants) and other participants of the meeting for all the information and help they provided.

Thanks also to Jonathan Hanks (IIIEE, Lund University, Sweden) who provided comments on the draft of the report.

This report was prepared by Lin Li (International Institute for Industrial Environmental Economics, Lund University, Sweden) and Tarcisio Alvarez-Rivero (Division for Sustainable Development, United Nations) with the guidance of Ralph Chipman (Division for Sustainable Development, United Nations).

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INTRODUCTION

The growing concerns over companies' environmental impacts create a demand for measuring, monitoring, assessing, comparing and benchmarking companies' environmental performance. Many companies have begun to review and modify managerial processes and internal decision-making processes to develop or improve managerial accounting systems to cope with increasing environmental concerns. The potential economic, social and environmental benefits of widespread use of environmental managerial accounting (EMA) tools call for active governmental programmes for promoting such systems.

The Commission on Sustainable Development (CSD), within its mandate as specified in General Assembly resolution 47/191, focuses on issues that are crucial to sustainable development. It policies that integrate economic, social and environmental promotes dimensions of sustainability and considers linkages between sectoral and cross-sectoral aspects of Agenda 21. In 1998, the CSD in decision 6/3 identified 8 areas for action, with progress to be reported to the 10th session of the CSD in 2002. One of the action points is to study factors that hfluence company decision-making, such as economic competitiveness and environmental management, including the adoption of best practices in environmental management. To assist governments in considering how they might promote corporate EMA, the United Nations Division for Sustainable Development (UN DSD) initiated a series of meetings on environmental managerial accounting. The policy recommendations resulting from the meetings will be submitted to the 9th session of the Commission in 2001 when it considers issues related to information for decision making.

The First Expert Working Group Meeting on Improving Governments' Role in the Promotion of Environmental Managerial Accounting was held from 30-31 August 1999 in Washington DC. The objective of the meeting was to bring together experts in the field from various countries to share information on existing programmes, discuss the role that government can play to promote corporate EMA, and create a mechanism for continuing international cooperation in promoting EMA (UN-DSD et al. 1999). This meeting was hosted by the United States Environmental Protection Agency (USEPA) and was organized in cooperation with the United Nations Environment Programme (UNEP), the European Commission Directorate General III - Enterprise (EC DG III) and the International Institute for Industrial Environmental Economics (IIIEE) at Lund University.

The participants in the first meeting included experts representing governmental EMA programmes, private sector collaborative programmes, international organizations, professional organizations, and academic and research institutions. They brought their expertise and experience in the implementation of EMA related initiatives as well as a large number of questions to the meeting. The participants were selected on the basis of their expertise in the field. Information from the participants was the primary basis for the review of the current status of EMA and the assessment of government's role presented in this report.

Integrating environmental factors into a company's management information systems to help management make better business decisions is an emerging practice. Governments, with the

goal of improving environmental quality and ensuring sustainable development, have started to examine companies' management accounting practices. Several governments have carried out programmes and initiatives to promote EMA in companies.

The purpose of the United Nations EMA initiative is first to survey and assess the current status of EMA and government involvement in promoting EMA. Based on that assessment, this report will then make recommendations on policy instruments and present a proposed action plan for governments to promote corporate EMA.

The report includes definitions of basic EMA concepts, identification of tools for EMA, an assessment of EMA programmes in various countries, assessment of the effectiveness of various policy instruments, and a proposed action plan for governments to promote corporate EMA. The report considers questions such as:

- (1) What is environmental managerial accounting?
- (2) Why companies¹ should use EMA and why governments should promote corporate EMA?
- (3) Which players should government involve in the promotion of corporate EMA?
- (4) When is the proper time for government to intervene?
- (5) How should governments promote EMA?

The report is based primarily on experiences in corporate and governmental EMA practice and experiences with policy instruments, although theoretical development of EMA concepts, tools and implementation have also been studied. Two questionnaires were designed to gather information from meeting participants. Of the 44 participants in the meeting, 16 were from government and inter-governmental organizations; 11 from the private sector, 5 from academic institutions, and 2 from other international organizations. The information from the questionnaires, together with discussions at the meeting, were used in the assessment of the status of EMA, the effectiveness of policy instruments, and the future development of government involvement, and in the formulation of recommendations and the proposed action plan for governments.

The questionnaires requested information for the participants' countries or sectors, including questions on:

- (1) Understanding and application of EMA concepts and tools,
- (2) Level of EMA use,
- (3) Incentives and barriers to EMA integration into corporate decision-making,

¹ Company, firm and corporation are used interchangeably throughout this report.

- (4) Perceived importance of environmental costs,
- (5) Government programmes and approaches for promoting EMA,
- (6) Objective of EMA programmes,
- (7) Intended benefits to government, industry and society,
- (8) Key players in EMA programmes,
- (9) Policy instruments available to governments, and
- (10) Priorities for future government efforts.

RESEARCH QUESTIONS AND THEORETICAL FRAMEWORK

In the following sections, the questions addressed in this report are presented and the theoretical background is considered as a basis for the further analysis and discussion in this report.

WHY SHOULD COMPANIES IMPLEMENT EMA AND

WHY SHOULD GOVERNMENTS PROMOTE CORPORATE EMA?

The need for corporate environment managerial accounting

Companies are facing increasing concerns from various groups over their environmental impacts, and different stakeholders are asking for different types of information. Company management needs information on costs, revenues and profits. Environmental protection agencies, environmental organizations and community residents want information on environmental impacts, while tax authorities, shareholders and investors are concerned with environmental assets and liabilities. Environmental managerial accounting can provide information to meet these requirements. (See next section for a detailed description of EMA systems.)

To identify problems and possible improvements in a company's performance, including its environmental performance, accurate measurement is essential. As a management dictum says, "What gets measured gets managed". The process of evaluating corporate environmental performance should proceed from measurement to assessment to communication. In developing an environmental management system (EMS) for a company, initial efforts should focus on environmental accounting techniques for measuring performance, followed by the development of an auditing system, and then by the publication of environmental reports to

communicate with stakeholders. Identification, measurement and allocation of environmentrelated costs can help companies to identify opportunities for savings and the potential of cost avoidance, thereby increasing profits, while improving relationships with the community and other groups. In practice, companies have tended to start with auditing, followed by reporting, and lastly by introducing environmental accounting. This "backward" approach, as shown in Table 1, reduces the effectiveness of measuring, assessing, communicating and improving corporate environmental performance.

To satisfy growing stakeholder pressures concerning corporate environmental performance, some corporations have taken steps to manage their environmental impacts. They are reviewing and modifying managerial accounting practices and internal decision-making processes to address the increasing environmental and social concerns for sustainable development.

Ideal	Common practice
↓ Environmental / Full Cost Accounting	↓ Environmental Auditing
↓ Environmental Indicators	↓ Environmental Reporting
↓ Environmental Management System (EMS)	↓ Environmental Management System
↓ Environmental Auditing	↓ Verification
↓ Environmental Reporting	↓ Environmental Benchmarking
↓ Verification	↓ Environmental Indicators
↓ Environmental Benchmarking	↓ Environmental / Full Cost Accounting

 Table 1. Environmental management processes

Source: UNEP/SustainAbility, 1996. Engaging Stakeholders 1. The Benchmark Survey, p. 8.

Firms need to account for environmental costs for the same reason they account for other costs: environmental costs affect the bottom line. Environmental costs may be a substantial portion of a firm's total costs, although many companies are not aware of it. The implementation of cleaner technology and pollution prevention approaches may improve a company's bottom line and bring long-term benefits to the company, as increased production efficiency reduces the use of resources and generation of wastes.

In conventional accounting, most environmental costs are combined with non-environmental costs and allocated to overheads. Such cost aggregation and allocation cannot provide the environmental cost data needed for formulating corporate environmental policy. The full costs

and benefits of existing and alternative production systems are thus obscured by conventional accounting practice. Managers will not invest resources in cleaner production if they cannot see the environmental costs of existing systems and the economic benefits of cleaner production.

Environmental costs are often under-estimated. Table 2 displays some examples of environmental costs identified in company case studies. A notable case study is the Amoco Yorktown Refinery case, in which estimated environmental costs were only 3 percent of noncrude operating costs, while actual environmental costs were 22 percent, more than seven times the estimated share (Ditz, et al. 1995). In the S.C. Johnson Wax case, when only waste processing costs were considered, as is the practice in most companies, environmental costs were identified as 0.25 per cent of manufacturing costs. However, when marketing expenditures and personnel costs were included, the waste related costs were much higher. Even the higher figures don't include the costs of raw materials not converted into product but turned into waste. Thus, different methods of calculating and allocating costs can produce widely different results. Whichever method is used, the process itself, as well as the results, may open managers' eyes to the costs of current systems and the benefits of alternative processes.

Corporation	Identified ECs (%)	Remarks
Amoco Yorktown Refinery	22	Of operating costs excluding the costs of crude oil. Environmental costs were initially estimated at 3 percent of total costs.
Dow Chemical	3.2	Of total manufacturing costs. Only waste disposal and treatment costs were considered as environmental costs. Other environment related costs such as labor, manager's salary, and planning, were not included as environmental.
Du Pont	19	Of manufacturing costs. 15% as fixed costs plus 4% as variable costs.
S.C. Johnson Wax	0.25 17 21	Waste processing cost/manufacturing cost. Environment related marketing expenditures/total expenditures. Environmental personnel expenses/total expenditures.

 Table 2.
 Environmental costs as a proportion of total corporate costs

In addition to helping management reduce waste and improve productivity, EMA can also help companies build a better image and enhance competitiveness in more environmentally concerned markets.

The need for government to get involved

Market processes cannot be relied upon to look after the environment, since many environmental costs and benefits are public goods (Turner et al. 1994). The demands of the marketplace cannot adequately account for externalities such as air and water pollution and resource depletion. Small companies that accept responsibility for externalities may be uncompetitive. Large companies may be able to afford such considerations, but most have historically preferred not to. Government must therefore intervene on behalf of the public interest.

Agenda 21 has defined the role of government as integrating economic, social and environmental dimensions into policy design and decision-making processes to achieve sustainable development. Industry's behavior is a major factor in society's production and consumption patterns. Many countries have started to promote pollution prevention, cleaner production and cleaner technologies in industry as part of their strategies for sustainability. Some countries are introducing eco-labeling and product take-back schemes to reduce waste generation and encourage "design for environment" (DfE). Many national and local government programmes are encouraging implementation of environmental management systems (EMS) including a commitment to continual improvement of a company's environmental performance. Efforts are also being made to promote public reporting through regular corporate environmental reports (CER), which provide information on the company's environmental behaviour to its various stakeholder groups. However, there is a lack of technical tools to fully identify and analyze the economic impacts of corporate production and service activities.

Governments have generally responded to environmental problems by elaborating increasingly stringent laws to reduce land, water and air pollution, with penalties for non-compliance. The penalties include fines and even prison terms in some countries. Compliance with these stringent regulations leads to significant costs to the companies. In the absence of a full analysis of environmental costs and benefits, companies have tended to focus on "end-of-pipe" technologies to reduce emissions to the required level. EMA allows more comprehensive analysis of the costs and savings of alternative approaches, in particular of cleaner production processes, and therefore, allow comparison of different solutions.

The ultimate goal of promoting corporate EMA would be not only to increase its use for environmental compliance, but to see it integrated into routine decision-making on investment and operational management, which could substantially reduce the costs of compliance with future regulations as well as the enforcement costs for government.

Another benefit for government of integrated corporate EMA is the facilitation of data collection, especially on environmental expenditures. Chapter 8 of Agenda 21, "Integrating environment and development in decision-making", notes the need to establish systems for integrated environmental and economic accounting at the national level. "Government should encourage corporations: (a) to provide relevant environmental information through transparent reporting to

shareholders, creditors, employees, government authorities, consumers and the public; (b) to develop and implement methods and rules for accounting for sustainable development" (United Nations, 1994, p73). By promoting corporate EMA, government can facilitate the collection of good data on environment-related expenditures. This will also help governments obtain information for developing and testing indicators for sustainable development such as those being developed as part of the CSD indicators programme. (United Nations, 1996)

Policies for promoting EMA can be an important element in a policy package that governments can use to promote environmentally friendly corporate management. The promotion of corporate EMA will contribute to government efforts to achieve sustainable development.

Managerial accounting practices are traditionally viewed as internal corporate matters. However, the potential social benefits resulting from taking environmental issues into consideration in business decision-making gives government an interest in promoting EMA. Government's role in this area is therefore to motivate and encourage corporate management, rather than to require EMA procedures. EMA systems, if they are to be used as part of routing business decision-making, must be adapted to the specific needs of each company.

Some companies are now making efforts to identify their environmental costs and have started to work to reduce them, both out of concern for their environmental impacts and for the business advantages that cost-reduction can bring. Yet lack of knowledge of EMA, lack of qualified personnel, and lack of available tools, have hindered progress in EMA implementation. Because the EMA concept is relatively new, it is often not cost-effective for companies to work individually to develop EMA techniques. Sources are needed for knowledge, techniques and practical expertise to support the efforts of interested companies in using EMA. Some standardization may be necessary for the wider dissemination of EMA systems and exchange of experience on EMA implementation.

Governments can play a role by promoting the development of broadly applicable EMA tools, disseminating information, and designing economic incentives and regulatory procedures to encourage the use of EMA.

WHAT DO WE MEAN BY EMA?

Promotion of corporate EMA will be facilitated by clear and generally accepted standards as to what elements should (and should not) be included in corporate environmental accounts, and how these elements should be categorized and presented (Tuppen, 1996). The standards, however, should be adaptable to the specific needs of each company and hence should not be rigidly defined.

To understand what environmental managerial accounting is, one should first be familiar with the basic accounting and environmental concepts that are components of EMA. A group of related concepts and the tools for conducting EMA are presented in the following sections.

Management accounting and financial accounting²

The basic purpose of accounting is to help decision-makers make more informed and better decisions. The users of accounting information can be both internal and external to the company.

Internally, managers use accounting information for:

- Short-term planning and management of routine operations;
- Non-routine decisions such as investing in assets, pricing of products and services, and choosing products to emphasize and de-emphasize in marketing;
- Formulating strategic policies and long-range plans.

Accounting information serves three functions in helping an organization achieve its objectives:

- Score-keeping functions to answer questions such as "Are we doing well or poorly?"
- Attention-directing functions to answer questions such as "Which problem should we look into?"
- Problem-solving functions to answer questions such as "Of the several ways of doing the job, which is the best?"

External users, such as investors, banks, stockholders, suppliers and government authorities, can use accounting information for making their decisions relating to the company.

Because internal and external users have different requirements for accounting information, there are two main accounting fields – management accounting and financial accounting.

Management accounting is the process of identifying, measuring, accumulating, analyzing, preparing, interpreting, and communicating information that helps managers fulfill organizational objectives (Horngren, et al. 1999). Management uses it for planning, evaluation, and control within an organization.

Financial accounting develops information for external decision-makers such as stockholders, suppliers, bankers, and government regulatory agencies (Horngren, et al. 1999), although internal managers may also use the information.

The major differences between management accounting and financial accounting are listed below in Table 3. However, considering the costs of establishing two different accounting

² Much of this section is based on Introduction to Management Accounting (11th edition.), by C.T. Horngren, G.L. Sundem and W.O. Stratton (1999, New Jersey: Prentice Hall International, Inc.)

systems, despite the differences of MA and FA, most organizations prefer a general-purpose accounting system to provide information for all users.

	Managerial Accounting	Financial Accounting	
Primary users	Organization managers at various levels	Outside parties such as investors and government agencies, but also organization's managers	
Freedom of choice	No constraints other than costs of information collection relative to benefits of improved management decisions	Constrained by generally accepted accounting principles (GAAP)	
Behavioral implications	Measurements and reports influence managers' daily behavior	Behavioral considerations are secondary, although executive compensation based on reported results may have behavioral impacts	
Time focus	Future planning and budgeting; comparing budgets with performance	Evaluation of past performance	
Time span	Flexible, from hourly to 10 to 15 years	Less flexible, usually one quarter or year	
Reports	Detailed reports on units of the company, products, regions, etc.	Summary reports, primarily on the company as a whole	
Disciplines	Flexible use of economics, decision sciences, and behavioral sciences	More formally defined, less use of related disciplines	

 Table 3.
 Distinctions between Managerial and Financial Accounting

Source: Horngren, C. T., Sundem, G. L. and Stratton, W. O., 1999. *Introduction to Management Accounting (11th edition)*. New Jersey: Prentice Hall International, Inc. p.6.

The role of managerial accountants is changing dramatically. Their previous role was basically that of clerical workers who would analyze monthly cost variances. Now managerial accountants work closely with operating and sales managers and, in some leading companies, with environmental managers, to provide information in a format that is most useful to management. Managerial accounting produces estimates of present and future costs. The first step is to measure current costs, and the second is to use current costs to estimate future costs at expected future levels of cost-driver activity. The resulting information is used by management for strategic and operational decision-making.

It is widely felt that traditional managerial accounting practice has become too inward-looking and has not evolved to match the changing business environment. It has become subordinate to financial accounting and thus emphasizes data collection and score keeping rather than analysis for decision-making. Intangible costs are not adequately recognized in most managerial accounting systems. The limitations of managerial accounting practices also constrain the use of EMA.

Environmental costs

A cost is a sacrifice or use of resources for a particular purpose, frequently measured by the monetary units that must be paid for goods and services (Horngren, et al. 1999). There are many ways to classify costs. Costs can be classified into fixed, variable, step and mixed costs³, or into direct and indirect costs. Costs can also be categorized as:

- (a) direct materials and labor,
- (b) factory overhead,
- (c) marketing and sales,
- (d) general and administrative overhead, and
- (e) research and development.

These various systems of cost classification lead to difficulties in defining environmental costs.

Although environmental costs are the elements of EMA, there is no standardized definition of environmental costs. Environmental expenditures may be included in all of the above-mentioned cost categories. Table 4 gives examples of environmental costs, as defined by the United States EPA's Environmental Accounting Project.

Potentially Hidden Costs			
Regulatory	<u>Upfront</u>	Voluntary (Beyond Compliance)	
Notification	Site studies	Community relations/outreach	
Reporting	Site preparation	Monitoring/testing	
Monitoring/testing	Permitting	Training	
Studies/modeling	R&D	Audits	
Remediation	Engineering and procurement	Qualifying suppliers	
Record-keeping	Installation	Environmental Reports	
Plans	Conventional Costs	Insurance	

Table 4. Examples of Environmental Costs Incurred by Companies

 $^{^3}$ Fixed cost is a cost that is not immediately affected by changes in the cost driver. Variable cost is a cost that changes in direct proportion to changes in the cost driver. Step costs are costs that change abruptly at intervals of activity because the resources and their costs come in indivisible chunks. Mixed costs are costs that contain elements of both fixed- and variable- cost behavior.

Training Inspections Manifesting Labeling Preparedness Protective equipment Medical surveillance Environmental insurance Financial assurance Pollution control Spill response Storm water management Waste management Taxes/fees	Capital equipment Materials Labor Suppliers Utilities Structures Salvage value <u>Back-End</u> Closure/decommissioning Disposal of inventory Post-closure care Site survey	Planning Feasibility studies Remediation Recycling Environmental studies R&D Habitat and wetland protection Landscaping Other environmental projects Financial support to environmental groups and/or researchers	
Contingent Costs			
Future compliance costs Penalties/fines Response to future releases	Remediation Property damage Personal injury/damage	Legal expenses Natural resource damage Economic loss damages	
Image and Relationship Costs			
Corporate image Relationship with customers Relationship with investors Relationship with insurers	Relationship with professional staff Relationship with workers Relationship with suppliers	Relationship with lenders Relationship with host communities Relationship with regulators	

Source: USEPA, 1995a. An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms. Washington, D.C., USEPA <u>http://www.epa.gov/opptintr/acctg/earesources.htm</u> (July 27, 1999).

In some countries, companies are required to submit expenditure data, including environmental expenditures, for tax and/or statistical purposes. The definitions for this purpose are usually quite narrow and specific, and sometimes with restrictions, to allow easy data categorization. The definitions of environmental costs used for statistical purposes also vary from country to country.

The Netherlands Bureau of Statistics, for example, defines environmental costs as the costs of activities undertaken to avoid negative effects of a facility on the environment, with the condition that the primary purpose of the activities must not be labor safety or other safety reasons (Bennett and James, 1998). Environmental activities that are profitable are not considered in many cases. The European Statistical Office (Eurostat) defines environmental costs as expenditures that are deliberately and mainly undertaken for environmental reasons.

Companies tend to use different concepts of environmental cost according to purpose for which the data is collected. One pragmatic definition of environmental costs adopted by the AT&T

"Green Accounting Team"⁴ is costs for which the expertise of environmental professionals is important in their identification and management (Bennett and James, 1998). They consider the two generic categories of environmental costs as:

- Internal environmental costs expenses that are wholly or partially driven by environmental considerations, including environmental opportunity costs, and
- External environmental costs financial costs or other quantifiable disbenefits that are incurred outside the organization and not internalized within its accounts.

In general, definitions of environmental costs tend to focus on defensive expenditures, such as pollution control equipment, rather than more proactive expenditures, such as investments in cleaner production.

The gap between what could be included in a broad definition of environmental costs and what are commonly considered as important environmental costs is substantial. The responses to the questionnaire developed in the project reflect this. When asked, "which costs should be included within the definition of environmental costs?", most respondents chose investment costs, production/service costs, waste management costs, liabilities, contingent costs, voluntary costs, and regulatory/legal costs.⁵ However, when asked, "which are important/significant environmental costs sector?" most respondents chose investment costs, to your production/service costs, and waste management costs. This reflects the reality that most environmental costs that influence business decision-making are internal and tangible environmental costs and those measured by normal data collection, thus understating other less obvious environmental costs.

Environmental accounting

The broad term "environmental accounting" covers national and company level accounting, both financial and non-financial information, and both internal and monetized external damage costs. Table 5 explains the focus, usage and content of different types of environmental accounting at different levels.

Table 5. Different Types of Environmental Accounting

⁴ AT&T established a DfE initiative in the mid-1990s, aimed at identifying whole-life environmental impacts and costs of computing and telecommunications equipment in order to make environmental considerations a priority during the design stage. There were six cross-functional teams formed, including a "Green Accounting Team". The Green Accounting Team consisted of staff from accounting, operations, environmental management and other business functions, from both the corporate center and business units.

⁵ Contingent costs are those costs that may or may not be incurred at some point in the future. Voluntary costs are the costs incurred because a company takes action beyond the requirement of law or regulation. Regulatory costs are those costs incurred when a company complies with the laws or regulations. (USEPA, 1995a)

Level	Types	Focus	Audience	Content and Usage
National Level	National Income Accounting	Nation	External	 National environmental accounting uses monetary or physical units to measure consumption of natural resources. Also called "natural resource accounting"
				Macro-economic measure
Firm Level	Financial Accounting	Firm	External	 Environmental liabilities and financially material environmental costs
				 Financial reports for use by investors, lenders and others
	Managerial Accounting	Firm, division, facility, or product line	Internal	 Data on costs, production levels, inventories and other aspects of a business
				 To support management decisions for planning, evaluation and control
				 Answering scorecard, attention- directing and problem-solving questions of concern to the management of the firm

Source: USEPA, 1995. An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms. Washington, D.C., USEPA <u>http://www.epa.gov/opptintr/acctg/earesources.htm</u> (July 27, 1999)

Environmental managerial accounting

Environmental managerial accounting (EMA) is defined as the generation, analysis and use of financial and related non-financial information in order to integrate corporate environmental and economic policies and build a sustainable business (ECOMAC, 1996). EMA serves business managers in making capital investment decisions, costing determinations, process/product design decisions, performance evaluations and a host of other forward-looking business decisions. It can be seen as a decision-making support tool. It is an information instrument that can be used by company management to integrate life-cycle environmental and economic data in order to make better-informed business and environmental decisions. The understanding and interpretation of EMA varies form country to country and from sector to sector.

EMA tools

EMA can make use of a number of general advanced managerial accounting tools, as well as tools specially designed for EMA. There are two categories of EMA tools: cost management instruments, and resource management instruments. The first category includes Activity Based
Costing (ABC); Activity Based Management (ABM); Total Cost Assessment (TCA); Full Cost Accounting (FCA); and Life Cycle Analysis (LCA), which includes Life Cycle Inventory (LCI), Life Cycle Impact Assessment (LCIA) and Life Cycle Costing (LCC). The second category includes Resource Efficiency Accounting (REA) and input/output analysis.

<u>Activity Based Costing (ABC)</u>, which emerged in the 1980s, is a system that aggregates various overhead costs for the activities of an organization, and then allocates those costs to the products and services that caused those activities (Horngren, et al. 1999) (see Figure 1). ABC systems can convert many indirect manufacturing overhead costs into direct costs. Appropriate selection of activities and cost drivers allows managers to trace many overhead costs to specific products, which can give management a better understanding of costs.

However, ABC systems are more complicated and costly than traditional accounting systems and very few companies use them fully. Nonetheless, more and more organizations have started to adopt activity-based systems for different reasons, such as competitive pressure, business complexity, new technologies that result in greater indirect costs, and information technologies that reduce the costs of accounting systems that track many activities.

<u>Activity Based Management (ABM)</u> is a management practice that uses an activity based costing system to improve the operations of an organization (Horngren, et al. 1999). ABM's aim is to improve the value received by customers and improve profits by providing this value. The primary concern of ABM is to distinguish between value-added costs⁶ and non-value-added costs⁷. Value-added costs are necessary as long as the activity that drives them is efficiently performed. Non-value-added costs should be minimized on the condition of not affecting customer's value.

⁶ Value-added cost: The necessary cost of an activity that cannot be eliminated without affecting a product's value to the customer.

⁷/ Non-value-added cost: Costs that can be eliminated without affecting a product's value to the customer.



Figure 1. Traditional and Activity-Based Cost System

Source: Horngren, C. T., Sundem, G. L. and Stratton, W. O., 1999. *Introduction to Management Accounting (11th edition)*. New Jersey: Prentice Hall International, Inc. p. 138.

<u>Total Cost Assessment (TCA)</u> is a generic term for the long-term, comprehensive analysis of the internal costs and savings of programmes for cleaner production, energy efficiency and other environmental projects (USEPA, 1995a). It is a process of integrating environmental costs into a capital budgeting analysis.⁸ In other words, it is an applied ABC methodology to properly allocate environmental costs and evaluate the advantages of pollution prevention alternatives over end-of-pipe approaches. The purpose of TCA is to reveal the total "four-tier" costs that occur in a firm (White A., Savage D. and Becker M., 1993).

Four-tier costs refer to:

- 1. Direct costs associated with capital expenditures, raw materials, and other operating and maintenance costs, etc.
- 2. Regulatory costs from activities such as monitoring and reporting, etc.

⁸ Capital budget is the long-term planning for making and financing investments that affect financial results over more than just the next year. Capital budgeting has three phases: (i) identifying potential investments, (ii) choosing which investments to make (which include generating data to support the decision), and (iii) follow-up monitoring of the investments. For more details on the subjects, see Horngren, C. T., Sundem, G. L. and Stratton, W. O., Introduction to Management Accounting (11th edition), New Jersey: Prentice Hall International, Inc., 1999.

- 3. Contingent liabilities arising from remediation of contaminated sites, fines and penalties for non-compliance, etc.
- 4. Less tangible costs and benefits due to consumer perceptions, employee and community relations, etc.

Figure 2 shows a traditional cost accounting system and a TCA system that allocates waste management costs (waste B) directly to the product responsible for their generation (product B) rather than to overhead. The TCA approach is suitable for financial analysis of any type of decision on investment, expansion of production, product pricing, product quality improvement, efficiency enhancement, waste management, occupational health & safety, and regulatory compliance issues. TCA is particularly useful for projects with substantial environmental costs or savings.



Figure 2. Traditional and total cost accounting

Like conventional accounting, TCA does not include externalities. External impacts are only included to the extent that they have economic effects on the firm in terms of marketing and sales. Life cycle costs such as product disposal costs, for example, are not included in a TCA, unless they actually affect the firm.

<u>Full Cost Accounting (FCA)</u> is a system of accounts based on society's costs and benefits, including externalities, rather than only that of the company (Rubenstein and Blake, 1994). However, there is not a common understanding of this concept. In traditional business education, full cost accounting refers only to full private costs incurred within the company. More recently, many people have used this term to refer to both private and societal costs. For this report, FCA will be taken to include social costs, i.e. externalities.

The full costs of activities to society are increasingly relevant to the firm, since the society is increasingly asking firms to pay the social costs through "cost internalization" in the form of

taxes, fines and penalties. If societal costs are likely to become a firm's private costs sooner or later, it may be better for industry to take account of these costs now in long-term planning and investments. Figure 3 depicts the conceptual relationship of a firm's private cost to the social cost and full cost in terms of time scale and product quantity. It indicates that the earlier the firm starts to reduce social costs through its planning and decision-making, the more cost-efficient its investment will be in the future.





Life Cycle Analysis, including Life Cycle Inventory, Life Cycle Impact Assessment, and Life Cycle Costing, is a group of concepts that take into consideration a product's environmental impacts throughout its life cycle. Within the broad Life Cycle Analysis, there are three subsidiary steps, each with a different focus. These are Life Cycle Inventory (LCI), Life Cycle Impact Assessment (LCIA) and Life Cycle Costing (LCC). LCI produces an inventory of environmental impacts, LCIA weights and aggregates the impacts, and LCC converts the impacts into monetary terms. Thus, LCI and LCIA focus on environmental impacts and not on costs. LCC aggregates the direct, indirect, recurring, nonrecurring, and other related costs incurred in the design, development, production, operation, maintenance and support of a major system over its anticipated useful life span (USEPA 1995a). Because of the complexity of Life Cycle Analysis, many companies stop at the LCI stage and do not go on to the subsequent steps.

<u>Resource Efficiency Accounting (REA)</u> was developed as part of the Sustainable Enterprise Programme of the Wuppertal Institute, Germany (Orbach and Liedtke, 1998). REA provides a simple and flexible information tool oriented to decision-making, combining an ecological sustainability indicator (material intensity) with decision-making oriented economic indicators (e.g. costs, contribution margin, profit) within resource-efficiency portfolios. The objective of REA is to reveal saving potentials throughout a product life cycle and to assess economic and ecological aspects of company activities at different company levels. In this concept, both materials and money are considered as resources: both have to be used efficiently in order to guarantee the sustainable success of a company. Only if economic and ecological aspects are considered simultaneously and life-cycle-wide, can all cost reduction potentials of a company be explored. Material Intensity per unit of Service (MIPS) is the accompanying ecological indicator developed by the Wuppertal Institute. MIPS records the whole material input into a system. MIPS can be used independently or as a tool in EMA. MIPS is the basis for the ecological dimension of Resource Efficiency Accounting (REA).

<u>Input/Output Analysis</u>, originally developed for national economic analysis, provides a tool to assess the environmental impacts of products, processes, services and infrastructures by analyzing the inputs and outputs to the system concerned (Orbach and Liedtke, 1998). Input/output analysis provides management (strategic or operative) with information on direct and indirect resource utilization. Input/output analysis, measuring resources in physical units rather than financial terms, can be used to set environmental management targets or strategies for action.

WHO SHOULD GET INVOLVED IN PROMOTING CORPORATE EMA?

A considerable amount of work has been carried out in academia and by leading companies, professional associations, non-governmental organizations (NGOs), governments and international organizations to develop methodologies for environmental managerial accounting.⁹ Practical applications of these methodologies have, however, not been widespread. Thus, most of the work has been on the supply side of "environmental accounting" tools.

Dissemination and use of EMA can be done most effectively and efficiently through collaboration among the interested organizations. Government's role is to mobilize as many stakeholders as possible to work together to spread EMA knowledge, information, tools and experiences and to provide business with incentives to use EMA. Industry has the main role to play in developing and testing cost-effective ways EMA practices meeting management needs in various sectors and countries. Academia and research and development institutes can develop new EMA techniques, disseminate technical information, and train accountants and other professionals in EMA. Industrial and professional associations can disseminate information and promote exchange of information among actual and potential EMA users. Environmental and other nongovernmental organizations can bring public pressure to bear on companies to improve their environmental performance, including through use of EMA. International organizations can promote international exchange of information and experience, and assist developing

⁹ See, for example, Report on Invitational Expert Seminar (France); the Ecomac project (EIM, The Netherlands); Environmental Management Project (USEPA); the first EMAN conference (Milan); and Gray, R., 1993; M. Bennet and P. James, 1998; Orbach, T. and Liedtke C., 1998; Parker, T., 1996; Rubenstein and Daniel Blake, 1994 ; and Stone, D., 1994.

countries in obtaining and using new techniques for integrating economic development and environmental protection.

WHEN IS THE PROPER TIME TO PROMOTE CORPORATE EMA?

Concern over the state of the natural environment is increasing throughout the world, and voices calling on companies to improve their environmental performance are getting stronger. Effective environmental management in industry and other organizations is seen as part of the solution. Companies in various countries and sectors are implementing environmental management systems (EMS) and reporting on their environmental performance to stakeholders in the form of corporate environmental reports (CER). Eco-labeling schemes are starting to spread, as well as product take-back schemes. Environmental performance indicators (EPI) are being developed to help audiences both inside and outside companies get a clearer picture of company activities and to compare companies. All these changes will have an impact on management practices. How to measure the costs and benefits of changing business practices and improving the environment is the task facing both governments and companies.

EMA is one of the most effective instruments to support the implementation of environmental management systems (EMS), preparation of corporate environmental reports, assessing the gains of eco-labeling and development of environmental indicators. The sooner governments and companies start to develop and disseminate corporate EMA, the more effective EMA will be in supporting environmental management at both the corporate and national levels.

EMA is becoming cost-effective for an increasing number of companies. Costs of compliance with environmental regulations were small for most manufacturing firms in the 1970s, while the costs of data collection and analysis were high. With higher standards and stricter enforcement of environmental regulations, today's environment-related and compliance costs are much larger and steadily growing.¹⁰ Fines for environmental non-compliance are much higher than they have ever been before. Meanwhile, information systems for tracking environmental costs have become less expensive due to rapid advances in both hardware and software.

How should EMA be promoted?

By understanding the driving forces and barriers for EMA, effective and feasible policy instruments can be identified to enhance driving forces and overcome barriers.

¹⁰ Examples can be seen in several large Japanese companies' estimated or actual environment expenditures. NEC estimated that it would spend 24 billion yen (\$209 million) on environment-related activities in fiscal year 1999-2000. Toyota's environment-related outlays, consisting mainly of spending on development of greener cars and engines and capital expenditure, totaled 100 billion yen in fiscal year 1998, up from 90 billion yen the previous year (Environmental Accounting & Auditing Reporter, 1999).

Incentives and barriers for corporate EMA

Incentives for corporations to use EMA come both from the increasing pressures that companies are facing, such as more stringent regulatory pressure and growing market competition, as well as from the benefits of implementing EMA. The gains EMA systems offer to companies include:

- (a) Identify impacts of environment related activities on the corporate bottom line, and identify hidden environmental costs in overhead accounts,
- (b) Identify cost reduction and other opportunities to improve performance and offset environmental costs by generating revenues,
- (c) Demonstrate the cost savings to be gained from good environmental management, and reduce or eliminate non-value-added costs, offsetting environmental costs by generating revenues,
- (d) Raise management commitment and awareness, and assist decision-making on cost allocation, capital budgeting, product pricing, product mix, investment and development, and increase competitive advantages and market expansion opportunities to environmentally aware consumers,
- (e) Support development and operation of an overall environmental management system, provide assurance to stakeholders of improvements in environmental performance,
- (f) Reduce environmental liabilities and risks, and enhance compliance with environment related laws and regulations,
- (g) Enhance customer values, thereby increasing competitive advantage,
- (h) Improve environmental performance and protection of human health, establishing a green corporate image,
- (i) Provide improved environmental, financial and other data for reporting to external stakeholders, and
- (j) Supporting long-term sustainability of the business, taking into account economic, environmental and social factors.

It would appear that many companies that could gain from EMA are not implementing such systems. The barriers that block this implementation are lack of information on EMA systems and the benefits they can generate. For many companies, the process is considered too costly relative to the benefits. Lack of knowledge and qualified personnel and lack of available tools are other barriers. For more detailed analysis on this issue, see the analysis of the surveys in the next section.

Policy instruments

Governments, including local authorities, can promote corporate EMA through a variety of policy instruments that increase incentives and reduce barriers to the use of EMA. The policy instruments available can be categorized as information, incentives, voluntary programmes and regulations. There is no clear boundary between the categories and they may overlap. Following is a grouping of policy instruments.

<u>Information-based instruments</u> include awards, education and training, public reporting, information networks, software development, and demonstration projects.

<u>Incentive-based instruments</u> include tax reductions, subsidies, fines, penalties, government contracts, government procurement, favorable depreciation, and interest deduction.

<u>Regulatory instruments</u> could include regulations requiring EMA, either independently or as a component of other regulations, standardization of EMA systems, and regulatory flexibility conditional upon approved EMA systems.

<u>Voluntary programmes</u> include sectoral voluntary initiatives and negotiated agreements, possibly based on national or international guidelines or standards.

The analysis of the strengths and weaknesses of different policy instruments is presented in the next section.

Having provided a theoretical framework and brought up questions to answer, it is time to take a look on what has happened and is happening regarding programmes and projects for promoting EMA. The understanding of EMA in practice will provide further insight on the questions discussed in this section.

Promotion and Implementation of corporate EMA

There are currently a small number of initiatives and projects in various countries for promoting EMA. In addition, some programmes that promote other environmental activities or objectives also encourage the adoption of EMA. Some examples of programmes and projects for promoting EMA are given in this section, as well as results from the survey undertaken for the meeting in Washington, to demonstrate the current situation of EMA understanding, promotion and implementation. This report will not cover all the initiatives or programmes that have been implemented or planned, but will present representative cases that illustrate the current stage of EMA development and implementation.

GOVERNMENT PROGRAMMES TO PROMOTE EMA

This section presents programmes that directly promote corporate EMA, programmes for the integration of EMA into government activities, and an international EMA promotion programme.

Direct EMA promotion programmes

Environmental Accounting Project, United States:

The United States Environmental Protection Agency (USEPA), in 1992, initiated the Environmental Accounting Project as a catalyst for the adoption of environmental accounting and to identify the incentives for investing in prevention-oriented technologies and practices. The objective of the programme is to promote understanding and integration of environmental costs through the development and use of improved cost accounting and capital budgeting, and to encourage and motivate businesses to understand the full spectrum of their environmental costs and integrate these costs in decision making. It is a voluntary programme with only two full-time USEPA staff.

Partner organizations participating in the project include government agencies, businesses, trade associations and non-profit organizations. The USEPA's role in this programme is that of a facilitator and supporter for partners interested in developing, promoting and using EMA.

Since its inception in 1992, EAP has funded, developed or actively participated in almost 100 activities, including original research, case studies, tool development, benchmarking and guidance. The focus of the project is to mobilize the expertise of the accounting, business, academic, and environmental communities and government agencies to integrate environmental costs more explicitly into managerial accounting and capital budgeting practices. A "Stakeholders' Action Agenda", produced in 1993 (USEPA, 1994), identified four major areas requiring attention to advance environmental accounting. These are: (1) better understanding of terms, concepts and roles of government; (2) internal and external incentives for management; (3) education, guidance, and outreach for development and dissemination of information; and (4) development and dissemination of analytical tools, methods and systems.

USEPA has produced a number of publications and other products to address issues raised by the "Stakeholders' Action Agenda". A handbook entitled "An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms" was published in 1995 to improve understanding of terms and concepts. P2/Finance software (USEPA, 1992b), a capital budgeting tool for the inclusion of environmental costs, was developed and made available to interested parties free of charge. Forty-five case studies documenting the benefits of environmental accounting were developed, among them "Environmental Accounting Case Studies: Green Accounting at AT&T" (USEPA, 1995b).¹¹ EAP has also established an Environmental

¹¹ More case studies are available, such as "Searching for the Profit in Pollution Prevention: Case Studies in the Corporate Evaluation of Environmental Opportunities", 1998; Applying Environmental Accounting to

Accounting Network for Managerial Accounting and Capital Budgeting with a directory of over 800 members from all over the world. The individuals in the directory are either active or interested in environmental accounting activities. They are categorized into academia, industry, consulting, government, etc., with information on what they do and what services they can offer to others. The directory is freely accessible and can be used as a phone or skills directory.

The EPA Environmental Accounting Project web site contains the publications and information mentioned above. This allows free access and timely assistance to companies, agencies and others who are interested in the issue.

Current EAP activities include the development of a Materials Management Guidebook, Materials Management Case Studies, small business software to support environmental accounting (see below), an Environmental Activities-Based Accounting Guidance Manual, and an evaluation of the Environmental Accounting Project. The EAP evaluation will be completed at the end of 1999.

Since 1997, EAP has been working on environmental accounting support for small businesses. With limited budgets and expertise, and intense competition, the first concern of small businesses is usually not environmental costs. When small businesses need assistance, local governments are usually their choice for support if they turn to government at all. Even when they are interested in addressing environmental issues, the good intentions are usually constrained by lack of expertise. Furthermore, for small businesses, the benefits of environment accounting might not offset the costs of implementing a brand new system.

To address these problems, EAP initiated the E-COST project especially for small businesses. The project is developing commercial accounting software to introduce environmental accounting concepts to small business. EAP worked closely together with Best! Ware Inc. (a major commercial accounting software provider), Trade Associations, Small Business Development Centers, Technology Assistance Providers and Experts in pollution prevention and environmental accounting. The software works with conventional small business accounting software (e.g. the Best!Ware accounting program) used by many businesses.

The E-COST project helps small businesses invest in cost-effective pollution prevention and cleaner production. It combines business performance and environmental performance by associating environmental costs with specific production activities, indicating which activities are both profitable and environmentally preferable. E-COST is free and downloadable from many Internet sites. EAP co-sponsors training with commercial partners and provides on-line support through EPA's web-sites.

Important insights have been gained through the EAP. The success factors of the project include partnership with government agencies, businesses and accounting experts, leveraging of government and business resources, educating other government programmes and staff on the

Electroplating Operations: An In-Depth Analysis", 1997; Environmental Cost Accounting for Capital Budgeting: A Benchmark Survey for Management Accounting", 1995. They can be downloaded from the USEPA's Environmental Accounting Project homepage - <u>http://www.epa.gov/opptintr/acctg/earesources</u> (July 27, 1999).

benefits of environmental accounting to their goals, and building outreach and education channels. The project has developed strong collaborative relations with its partners and advanced the implementation of environmental accounting in the United States with a small staff and budget.

The USEPA hosted the First Expert Working Group Meeting on "Improving Government's Role in the Promotion of Environmental Managerial Accounting", 30-31August 1999, in Washington DC, in order to exchange information on governmental EMA initiatives with agencies in other countries (see international initiatives in the next section).

Ecomac Project, Europe

The European Ecomac project (Eco-management Accounting as a Tool of Environmental Management) is sponsored by the European Commission (DG XII, Environment and Climate Programme, Human Dimensions of Environmental Change) (ECOMAC, 1996). The Ecomac project has studied the development of eco-management accounting in the European Union, in particular Germany, Italy, the Netherlands and the United Kingdom. The Ecomac project has explored the accounting aspects of environmental management, concluding that conventional accounting practices do not include adequate information to support progressive environmental policies. The empirical relationship between environmental management and management accounting was explored though a survey of 84 companies in the four countries, including both It focused on industries for which environment is an important large and small companies. issue, including chemicals, pharmaceuticals, energy and printing. In almost all cases, both environmental and financial specialists were interviewed in each company, providing a comprehensive understanding of environment accounting in the companies. It also investigated how a number of companies have made notable steps in developing ecomanagement accounting. These best practices are expected to be relevant to many other companies who sooner or later will confront the same issues.

The Ecomac project has concluded that as pollution prevention and reuse/recycling requirements are steadily strengthened, environmental costs will increase and management accounting will increasingly be recognized as an important tool of environmental management (Bartolomeo et. al., 1999). Along with an expansion of traditional management accounting tools, the development of new techniques and systems for eco-management accounting is a promising new field of research. Eco-management accounting projects or research could provide guidelines for improving existing accounting systems and developing new ones. The assessment of the benefits and costs of eco-management accounting systems and techniques is important for promoting their use. Additional empirical research on the application of eco-management accounting is required.

As follow-up to the Ecomac project, the Environmental Management Accounting Network (EMAN) was established to promote the dissemination and exchange of EMA information and techniques. EMAN is a network of researchers, consultants, business people and policy advisors interested in environmental management accounting as a tool for corporate environmental management. It

holds regular meetings of network members to exchange recent experience in the field. The first EMAN conference was held in Milan in 1997 with the theme of "Researching and Implementing The conference linked environmental management Environmental Management Accounting". with management accounting and other disciplines such as financial accounting, strategic management and resource economics. The scope of environmental management accounting and differences and linkages with social accounting and financial accounting were also discussed. The second conference coincided with the Greening of Industry Network Conference in Rome in 1998. EMAN's third conference was held in Germany in December 1999 with the theme of "Environmental Management Accounting: the Role of Information Systems". The purpose of the conferences is to discuss further development and the role that different stakeholders can play in EMA implementation in business and industry. The establishment of the EMAN network has effectively fostered information exchange and promoted the development of EMA theory and practice.

Japan's Guidelines for Grasping Environmental Cost Accounting

Japan's guidelines on environmental cost accounting are the first governmental guidelines providing guidance to companies on understanding and controlling environmental costs. The guidelines, issued in draft form in April 1999, were entitled "Grasping Environmental Cost Accounting: Draft Guidelines for Evaluating Environmental Costs and Publicly Disclosing Environmental Accounting Information" (JEA, 1999). The Discussion Committee on Grasping of Environmental Costs of the Japan Environment Agency (JEA) has published the Guidelines on the Internet. Industries are encouraged to apply the principles for assessing and reporting their environmental costs, and to give feedback to JEA based on their experiences with the Draft Guidelines. The Guidelines are to be issued in final form by the end of March 2000.

The Guidelines define environmental costs as environmental investments plus environmental expenses in a given time period. Six categories of environmental cost are defined:

- (a) Direct costs for reducing the company's environmental impacts;
- (b) Administrative costs for reducing the company's environmental impacts;
- (c) Product design costs for reducing the environmental impacts of product use and associated wastes;
- (d) Research and development costs for environmental protection;
- (e) Costs for external environmental projects beyond the company's direct environmental impacts; and
- (f) Other costs for environmental protection.

The Guidelines also give concrete examples for each environmental cost category. Table 6 lists the content of each environmental cost category given by the Guidelines.

Table 6. Categorization of Environmental Costs¹²

Cost Category	Examples
Direct	 Costs to prevent pollution and environmental damage from manufacturing processes
Costs	a. Costs to prevent air pollution (including acid rain prevention)
	b. Costs to prevent water pollution
	c. Costs to prevent land pollution
	d. Costs to prevent noise
	e. Costs to prevent vibration
	f. Costs to prevent odor
	g. Costs to prevent ground subsidence
	h. Other costs to prevent pollution
	2. Global environmental protection and resource conservation costs
	a. Climate change prevention costs
	b. Ozone layer protection costs
	c. Energy conservation costs
	d. Water conservation and storm water usage costs
	e. Other global environmental conservation costs
	 Costs to reduce, recycle, incinerate and treat industrial hazardous waste and solid non-hazardous waste
	a. Costs for the reduction of industrial hazardous waste
	 b. Costs of treatment, incineration and landfill of industrial hazardous waste
	c. Costs to recycle industrial hazardous waste
	d. Costs for the reduction of solid, non-hazardous waste
	 e. Costs of treatment, incineration and landfill of solid non-hazardous waste
	f. Costs to recycle solid non-hazardous waste
	1. Costs of environmental education for employees
Administrative	2. Costs of establishing and implementing an environmental management
Costs	system, including costs of external certification of the management system
	3. Costs of monitoring and measuring environmental loads and discharges
	4. Additional costs for purchasing environmentally sound products
	environmentally harmful fuels or raw materials
	6 Labor costs associated with the above 5 items

¹² Compiled from Grasping Environmental Cost Accounting: Draft Guidelines for Evaluating Environmental Cost and Publicly Disclosing Environmental Accounting Information (Tentative Translation) published by Study Group for Grasping Environmental Cost Accounting, Environment Agency, Japan, March 1999. The material was distributed during the EMA Meeting in Washington, D.C. August 1999.

Cost Category	Examples	
	Costs to gather and recycle or reprocess products	
Product	Costs to gather and recycle or reprocess containers and	d packaging
Design	Costs of changing product design to reduce environmer	ntal impacts
Costs	Costs of making packaging and containers more enviror	mentally friendly
	Other costs connected to the above 4 items, such as tr fees.	ade association
	Labor costs associated with the above 5 items	
	R&D costs to design more environmentally friendly proc	lucts
Research and Development	R&D costs and design/planning costs for process change environmental performance	es that improve
Costs	R&D costs for improving the environmental friendliness	of company's
	distribution and sales systems	
	Labor costs for the above activities	
Costs for External	Costs for afforestation, beautification, environmentally s and other improvements in and beyond the company's	ound landscaping, property
Environmental Projects	Costs for support of local community environmental act providing funds, seminars and information	vities, such as
	Contributions and support to environmental groups	
	Costs for preparing public environmental report	
	Costs for environmental advertisements	
	Labor costs associated with the above 5 items	
	Costs for remediating soil contamination and damages t	o the environment
Others	Costs related to environmental settlements, compensa	tion and penalties
	Costs related to environmental trials	
	Environmentally related donations or surcharges/asses	sments
	Other environmental costs not previously accounted for	

The Guidelines also suggest steps for implementing a system of environmental cost accounting and guidelines for public reporting of environmental accounting information.

Japan's Guidelines cover the most important environmental cost categories. Not covered are some intangible, and hard to evaluate, environmental costs for such things as corporate image and relationships to communities. Since the Guidelines have been available to industry in Japan for less than a year, it is too early to evaluate the effectiveness of the Guidelines in helping industry to address their environmental costs.

Integration of EMA into government activities

Besides the direct promotion of corporate environmental managerial accounting, some governmental agencies have adopted EMA for their own activities.

United Kingdom Environmental Accounting Project¹³

Governments can promote EMA by applying it in their own operations, thus setting an example to the private sector and assisting in the practical development of EMA systems. This is the purpose of the Greening of Government Initiative (GGI) in the United Kingdom. GGI has set the agenda for government departments and their agencies to "practice what they preach". The United Kingdom Environmental Agency (UKEA), the environmental regulator for England and Wales, is at the forefront of "the Greening of Government", and was the first government body to publish an environmental report. In terms of staffing, annual turnover and capitalization, UKEA is a large "business" with significant environmental impacts of its own. The Environmental Accounting Project, an initiative to "green" UKEA's financial accounting system, was initiated in 1997. With the objective of reducing both environmental impacts and costs and increasing both environmental performance and cost-effectiveness, UKEA developed and integrated an Environmental Accounting System (EAS) into the Agency's financial processes. The Agency produced a Corporate Environmental Plan, Annual Environmental Accounts, and Environmental Reports, as examples of good practice in environmental accounting and reporting. With an integrated EAS, the information on resource use can be steadily improved, leading to better resource management. As resource consumption is reduced, the costs to the organization will be reduced, as will the organization's impact on the environment. The business process, including corporate planning (budgets), management accounting (monitoring) and financial accounting (disclosure), was used by UKEA to address its own environmental issues. The key environmental expenditures were tracked, including operational costs, administrative support A financial infrastructure was developed to support costs and capital expenditures. environmental managerial accounting, including new accounting codes and reporting mechanisms, increasing environmental and financial awareness throughout the agency. Assets and liabilities were reviewed, cost savings were identified and monitored, and financial information and performance measures were linked. Based in part on this experience, UKEA is cooperating with expert groups to promote environmental accounting techniques, provide guidance and develop standards of disclosure.

Several important issues were identified in the process of developing and implementing the UKEA Environmental Accounting System. Integrating environmental accounting into existing core financial systems requires widespread "culture change" and business acceptance. Gaining consensus on "business needs" between environmental and financial groups is essential but difficult. Limited environmental awareness on the part of financial representatives, and financial awareness on the part of environmental representatives, sometimes act as constraints, reflected in conflicts between what is financially and environmentally important. Environmental and financial awareness training is important. Because of the lack of incentives, clear standards and guidance for EMA implementation, consensus on terminology, and a specific EMA framework,

¹³ Presentation at the First Expert Working Group Meeting in Washington DC, 30-31 August 1999, by Mr. Howard Pearce, Head of Corporate Planning, Environmental Accounting Project Executive, and Ms. Faith Ward, Corporate Business Analyst, Environmental Accounting Project Manager, Environment Agency, United Kingdom.

integrating environmental accounting into core financial systems is a difficult process. Advice from external specialists was sought, but inconsistent opinions from different experts, reflecting the lack of agreed standards in the field, sometimes made the advice difficult to use. Confusion arose at times as a result of terminology that had precise technical meaning, at times with legal or regulatory implications, in either the financial or environmental field.

The project showed that although the integration of EMA into core financial systems is slow, it has an important effect in building environmental thinking into the day-to-day operation of the business. Effective use of cross-functional expertise within the organization was a key issue that requires further attention. The project team and board should include representatives from environmental management, financial management, financial accounting, procurement, auditing and operations.

The Dutch approach

The Dutch government agency responsible for the design, construction and maintenance of governmental buildings (Rijksgebouwendienst - Rgd) carried out a research project to attach a monetary value to the environmental impacts of the construction materials used in those buildings. Each construction material was given "Environmental Impact Points (EIPs)" based on a life-cycle analysis of pollution prevention and compensation costs (Bennett and James, 1998). Each point had a value of 110 Dutch Guilders. The environmental impact of a unit of concrete was evaluated at 4.9 EIP, while a unit of aluminum was 1248.5 EIP. The total environmental impact of the materials in a building can then be evaluated as the product of the total EIP of the materials times 110 Guilders. This monetarized environmental impact of materials can be used, in conjunction with other financial and environmental considerations, for planning purposes and to explain construction decisions to the public. As in other applications of environmental accounting techniques in public activities, the project was also intended as an example to the private sector.

An international initiative

The Expert Working Group Meeting on Improving Government's Role in the Promotion of Environmental Managerial Accounting, which held in first meeting in Washington DC, 30-31 August 1999, is the first broad international effort to consider how governments can promote EMA. Experts, in particular from government agencies, were brought together to share information, discuss the role of public sector organizations, and build a framework for further cooperation. The main objective of the initiative is to create a mechanism for continuous international cooperation among governments and other stakeholders to increase the use of EMA and to improve policies and programmes available to governments to motivate businesses to adopt EMA. The participants in the meeting were from Australia, Austria, Canada, Finland, Germany, Japan, Mexico, Nepal, Norway, the Slovak Republic, the United Kingdom, and the United States, as well as from the European Commission and the United Nations system.

The meeting was organized to:

- (a) Discuss the need for and potential benefits of government programmes for promoting EMA, including the potential benefits and the role of government relative to industry, academia and research institutes;
- (b) Review existing programmes for promoting EMA by governments, academic and research institutions, and business, including their objectives, activities, effectiveness, problems and lessons learned;
- (c) Examine policy instruments, approaches and mechanisms available to government for promoting EMA;
- (d) Discuss design and management issues regarding the development and operation of governmental programmes to promote EMA, including company information needs and information availability, support by government in bridging this information gap, engaging other stakeholders, and identifying and overcoming obstacles;
- (e) Examine the role of international cooperation, including organizational mechanisms and resources, types and mechanisms of information exchange, and participation of governments, industries, academics, researchers, and professional and trade associations; and
- (f) Exchange views on institutional mechanisms and procedures for future work of the Expert Working Group.

During the meeting, almost all governmental programmes around the world that promote EMA were presented. In addition to presentations on the programmes described above, the meeting also included the following presentations on government programmes:

- Using Environmental Accounting Practices in Australia, on efforts to promote and support local government efforts to estimate their environmental expenses and incomes using guidelines based on the United Nations System for Integrated Environmental and Economic Accounting (SEEA);
- The Austrian Eco-management Programme, on implementation of the EMAS scheme;
- Ontario Ministry of the Environment, Canada, on EMA as a possible component of future environmental management programmes being considered for the Province;
- Environmental Accounting from Theory to Practice, Province of Quebec, Canada (see next section);
- Environmental Managerial Accounting in China, on promotion of cleaner production and EMS (submitted in writing);
- Environmental Managerial Accounting in Finland (see next section);

- Industrial pollution management strategy for Nepal, on the possibility of introducing EMA to Nepal;
- Trends in environmental policy in Norway, including a handbook on environmental reporting and a prize for the best report; a new accounting law in 1999; environmental indicator development; and a contest for local environmental authorities on activitybased environmental accounting systems;
- Promotion of Environmental Managerial Accounting: Actual status in Slovakia, on activities of the Ministry of Environment of the Slovak Republic including support for the Slovak Cleaner Production Center and plans to improve the role of government in the promotion of environmental accounting among enterprises; and
- Environmental Inspection and Enforcement in Sweden (see next section).

The presentations and discussions at the meeting showed that there is no common understanding of what EMA is, and there are many different approaches to the promotion of EMA. Nonetheless, the participants agreed that the meeting was very useful for raising the issue for international discussion, and providing a forum for discussion of problems, exchange of experiences and sharing of information. Suggested issues for future work by the group included:

- Dissemination of information on EMA
- Research and education.
- Case studies/Training tool kits
- Review and classification of incentives
- Exploration of the linkages between EMA and other environmental management tools
- Multi-stakeholder engagement
- International cooperation for developing common principles, concepts and definitions of EMA.

While the primary purpose of the meeting was to bring government agencies together, it also included participants from the private sector. Among the contributions of those participants were their views on incentives that are likely to influence industry behavior, and what support business needs from government in developing and using EMA.

Other types of programmes

Many governments do not directly promote EMA, but promote environmental management programmes related to EMA. Such programmes promote environmental cost analysis, corporate environmental reporting, environmental management systems, and other pollution

prevention and cleaner production principles. The programmes in Quebec (Canada), Finland and Sweden are representative of this type of government programme related to EMA.

At the federal level in Canada, there are currently no government incentives for the adoption of EMA by industry. However, such programmes exist at the provincial level. Environment Canada's Environmental Protection Branch for the Quebec Region has published *Introduction Guide to Environmental Accounting* for private businesses, which identifies the economic benefits of pollution prevention. The Guide was developed jointly with the Quebec Charted Accountants Association, with the goal of familiarizing administrators and professionals in the environmental field with the concepts and benefits of environmental accounting. Its goal is to promote the idea that every business decision must take environmental issues into account. The proposed environmental accounting model in Quebec is presented in Table 7.

The Ministry of Environment of Finland published Guidelines for Environmental Reporting in April 1999.¹⁴ According to the Guidelines, environmental reports should include a description of the company or other organization, environmental issues and impacts, environmental performance, and the environmental management system. In addition, the organization should report on the social effects of its economic and environmental decisions, and how the problems are managed. Economic data should be presented in a manner that is accessible and credible to the public. The data should include environmental investments, costs of research and development, administrative and management costs, and environmental taxes. The Ministry of Environment of Finland has also funded a national environmental reporting competition, which has gained wide publicity and proven to be an interesting and promising instrument for promoting quality environmental reports by industry.

Focus	Content	Examples
Identification of measurable objectives and targets	You manage what you measureLinkage to EMS	 Environmental effectiveness Compliance Reliability of management reports

Table 7. Proposed environmental accounting model for Quebec¹⁵

¹⁴ Presentation at the First Expert Working Group Meeting in Washington DC, 30-31 August 1999, by Mr. Antero Honkasalo, Director, Environmental Protection in Trade and Industry, Ministry of Environment, Finland.

¹⁵ Compiled from the presentation at the First Expert Working Group Meeting in Washington DC, 30-31 August 1999, by Ms. Lucie Desforges, Environment Canada, Environmental Protection Branch, Quebec Region.

Gathering and analysis of decision support data	 All stages of the product/service life-cycle Externalities covered briefly Data needed to carry out management activities (decision-making, performance assessment, accountability, etc.) 	 Quantitative financial data Quantitative non- financial data Qualitative data
Accountability	 Disclosure of environmental performance Internal reports External reports 	 Internal Decision supporting reports Performance assessment reports External Financial statements Environmental performance reports

An Environmental Code came into force in 1999 in Sweden. The Code requires companies with environmentally hazardous activities to conduct internal monitoring of those activities. Companies with activities requiring a permit are required to submit an annual environmental report on their environmental impacts to the supervisory authority. The report should include:

- Information on measures taken to fulfill the Environmental Protection Act;
- The conditions of a permit under the Act and the result of measures taken; and
- Information on discharges to air, water and soil, generation of waste, consumption of raw materials and energy, and use of chemicals.

Sweden is one of the first countries in Europe to require companies to report environmental elements in the financial accounts.¹⁶ This requirement was introduced through a change in the Annual Accounts Act, which was put into force on 1 January 1999, so it is too early to draw any conclusions about the effect of the change. However, since the new law requires companies to examine their environmentally harmful activities and to consider their economic impact, this may influence the company's management accounting practices. The Swedish environment protection agency is also implementing an environmental management system for its own activities.

In the United States, in addition to the efforts of the USEPA, some state authorities are requiring firms to demonstrate that they have investigated less-polluting alternatives to their current processes. One example is "Accounting for Pollution Prevention in Washington State".¹⁷ The

¹⁶ Presentation at the First Expert Working Group Meeting in Washington DC, 30-31 August 1999, by Ms. Charlotte af-Hallstrom, Environmental Economist, Swedish Environmental Protection Agency.

¹⁷ S.H. Stinson, "Accounting for Pollution Prevention in Washington State", in Green Ledgers: Case Studies in Corporate Eenvironmenta Aaccounting. Edited by Daryl Ditz, et al.

State of Washington requires companies to tabulate environmental costs as they prepare Pollution Prevention Plans. Firms are required to identify sources of hazardous waste at a detailed level of specific processes and to compare the costs (including regulatory compliance costs) of current processes and cleaner alternatives. The Pollution Prevention Plan must include:

- Description of each process that generates hazardous wastes;
- Comparison of the costs of current processes and cleaner technologies;
- Description of the environmental accounting system used; and,
- Specific performance goals for reducing hazardous substance use and hazardous wastes and for recycling materials.

The Washington State Department of Ecology reviews the plan and can reject it if it is incomplete. If a company fails to file the required Pollution Prevention Plan, it faces a fine of \$1000 or three times the firm's annual hazardous waste disposal fee, whichever is greater. The plan's executive summary is accessible to the public. Case studies show that in quantifying the environmental savings, companies often identify cost-effective projects that might otherwise have been overlooked (Ditz et al. 1995).

Conclusions

As indicated by the variety of programmes described above, the design of a programme for promoting EMA depends on the country's legal and regulatory frameworks, technological development, public and industrial environmental awareness, and general business culture. The choice of whether to directly promote EMA or to promote it in the context of other environmental management schemes lies with each government. No one approach fits all.

It is difficult to judge the effectiveness of different approaches for a number of reasons. First, the diversity of programmes, definitions and approaches to EMA, and the different national contexts, makes comparison difficult. Second, most of these programmes are quite new, and it is too early to measure their results. Introducing a full EMA system is a substantial change in business practice and a substantial commitment of resources, so companies are likely to approach such a change carefully, particularly when few other companies have made the change.

INDUSTRY AND OTHER EMA SYSTEMS

A number of leading companies in different sectors in various countries have developed and adopted environmental managerial accounting systems for management decision-making. Worldwide information on which industries and sectors have been involved in EMA activities is not available, but the case studies collected by the USEPA Environmental Accounting Project offer some examples.¹⁸

- Automobile manufacturing: Chrysler Corporation
- Chemical Processing/manufacturing: DuPont, Polaroid Corporation, S.C. Johnson Wax.
- Electric Utilities: Southwest Hydro, Inc.
- Electronics: Precision Circuits, Inc.
- Forest Products: A paper coating mill
- Health Care Products: Baxter International
- Metal Finishing/Fabrication/Use: An aluminum processing company
- Oil/Petroleum: Amoco Oil Company
- Pharmaceuticals: Sandoz Pharmaceuticals
- Printing: Quebecor Printing Mount Morris, Inc.
- Others: a jewelry company, a resins manufacturer, and Tiz's Door Sales, Inc.

Industry EMA initiatives, like those of government, are highly diversified. The following table contains examples of industry EMA initiatives from North America and Europe. The industrial sectors represented by these case studies covers chemicals, pharmaceuticals, telecommunications and energy. The case studies reflect the fact that environmental regulation has had substantial impacts on these sectors, increasing the incentives for and value of EMA.

The case studies indicate that companies generally examine environmental expenditures in order to reduce environmental costs and gain market competitiveness. Many companies have realized substantial economic benefits through EMA. The role of government can be to help companies be aware of the benefits of integrating EMA into day-to-day decision-making. Incentives and information may need to be sector specific to be effective.

¹⁸ Compiled from the USEPA Environmental Management Accounting Project - Case Studies. For detailed Environmental Accounting Snapshots, see USEPA, <u>http://www.epa.gov/opptintr/acctg/</u> (May 12, 1999).

Project	Focus	Outcomes/Findings			
CASES FROM NORTH AMERICA					
Full cost accounting at DOW	Eco-efficiency Full Cost Accounting *	Closer control of landfill sites and reduced need for incineration. *Due to the difficulties of calculating externalities and the possible competitive disadvantages resulting from spending to reduce external costs, internal costs were prioritized in the identification of full costs.			
Accounting for environmental externalities at Ontario Hydro	Full cost to society	In the extreme case, external environmental costs are 42.5% of internal environmental costs. On average, external costs are from 2.5% (nuclear) ²⁰ to 12.5% (fossil fuel) of internal. Potential application: capital budgeting. Although the externalities have been calculated, they have not been reduced or internalized into product pricing because this would put Ontario Hydro at a competitive disadvantage. The evaluation of external costs could enable government and regulators to require appropriate pricing by all producers.			
Environmenta I-accounting linkages at Pacific Bell	Understanding and adapting the company's accounting systems	Greater awareness of environment, health and safety costs. Data for business decision-making, for example early replacement of fuel tanks. Pacific Bell's General Ledger now has a number of account codes grouped under Hazardous Materials/Hazardous Waste management, which is the main area of environmental expenditure. Individual entries to the ledger can be tracked to particular projects and the full costs of a project can be calculated.			
CASES FROM NORTH AMERICA					

Table 8. Some industry EMA systems¹⁹

¹⁹ Compiled from Martin Bennett and Peter James, "Environmental-related managerial accounting in North America", in Environmental Accounting in Industry: A practical review, edited by Chris Tuppen (Tuppen, 1996), and USEPA Environmental Accounting Project, Case Studies (USEPA 1992a).

²⁰ The low external cost of nuclear generating capacity is due to the internalization of external costs through high regulatory standards. But the costs included for a possible nuclear accident are limited to impacts on the heath of the local population, and do not extend to long-term economic consequences, or to accidents associated with nuclear wastes in long-term storage.

Project	Focus	Outcomes/Findings
Identifying material and waste costs, and allocating waste costs at Pacific Gas and Electric	Examining various service areas Identification of "best practice" center with regard to materials and waste, and spreading their methods to other centers	A material flow map has been developed for identifying material and waste costs. Waste management costs which were hidden in corporate overheads were allocated to the business centers generating the wastes. Outcomes were used to identify activities creating the most waste and offering the greatest potential for waste reduction. The project is still in the early stage, and the accounting has been in physical terms only. For example only the volume of wastes have been determined, not the associated costs or environmental impacts.
Environment and Activity Based Costing at Bristol Myers Squibb	Potential of environmental accounting in pharmaceutical manufacturing Identification of environment-related costs in the new drug development process Encouraging a holistic life-cycle perspective	An environmental accounting system that integrated into the company's ABC system would be more effective. The head of the task force reported jointly to corporate vice-president for environment, health and safety and the chief financial officers of the division involved. The process provided a common language with considerably improved communication.
An environmental profit center at Nynex	In-house recycling operation and "chopping line" to strip coatings from copper cable	A greater yield of resalable materials; a higher market price for the output; better vendor relationships; improved cash flow and less non-payment due to selling to commodities dealers rather than scrap metal merchants. Evaluation showed that the net financial result is significantly better than if the operation were contracted outside the company.

Project	Focus	Outcomes/Findings		
Classifying environmental expenditures at Monsanto	Classifying environment related expenditures that are both required by external stakeholders and significant to internal decision- makers Calculating environment related costs of new products or existing products with significant environmental impacts Assessing competing pollution prevention projects	Clear definition of environmental expenditures, including operating costs, capital investment, staff costs, land remediation, environmental R&D, and income such as recoveries. Benchmarking activities in this area against other companies. Developing guidance for sales and other staff to use with customers on issues such as transport, packaging, customer cost reduction, end user issues, and product/service features, to reduce waste management costs. Developed guidelines on how to calculate and report environmental costs and benefits. Designed a Potential Environmental Effects Model to rank all the releases made by the company. The tools are used to inform decisions rather than substitute for the judgment and responsibility of business managers. The final decision on any project will always be judgmental. Other environmental or business factors that are not captured in these models should also be taken into account, such as pressures from local communities on particular impacts.		
CASE		S FROM NORTH AMERICA	ł	
A diversified chemical company	Converting byproduct into usable raw material and reducing landfill waste	Using Total Cost Analysis method. Reduced landfill wastes by 3.8 million pounds per year. For a capital investment of \$4.96 million, annual operating costs are expected to decrease by \$2.29 million.		
		Year (One Savings	
		Recovered byproduct	\$2,470,000	
		Waste Management	\$44,100	
		Total Savings	\$2,514,100	
		Year One Costs		
		Additional Labor	\$220,500	
		Total Costs	\$220,500	

Project		Focus		Outcomes/Findings
Green accounting a AT&T	Exter	nsion of ABC	 Developed: A glossary of environmental accounting to reduct internal and external misunderstanding; A checklist to assist sites in identifying areas of oweakness; Green Activity Matrix that lists environmental contwo dimensions: The first dimension is categorized by the type of cost incurred: labor, materials and supplies, services and consulting fees, depreciation of equipment, energy a utilities. The second dimension lists 30-40 types of environmentations: The second dimension lists 30-40 types of environmentations. The second dimension lists 30-40 types of environmentations. The cells in the matrix are the costs. This provides a between the General Ledger system, which collects by the types of resources, and the business activitied drive the amounts of costs incurred. This can be used identify which activities are the most significant in directs. 	
British Telecom- munication s (BT)	CASES FROM Understanding current status of financial reporting in industry Exploring options for developing a framework to collect and report environment related financial data in BT Studying practical opportunities and constraints of collecting and reporting this data using BT's existing accounting and management information systems		CASES FROM status of lustry veloping a d report ancial data in rtunities and and g BT's management	EUROPE Identified two main themes that UK companies should follow in producing aggregated information on environmental costs in order to improve identification and allocation of environment-related costs, such as waste disposal, to selected business processes, products or sites, possibly in line with developing work in ABC schemes.
		C	ASES FROM	EUROPE
Dutch computer software consultanc y, BSO/Orign	"Costing "Enviror stateme convent in value quantifi environ	"Costing environmental externalities" "Environmental value added" statement which re-states conventional profit and loss account in value added form, and bring in quantified values of the business's environmental impacts		Identified environmental impacts, collected data, and converted them into financial terms to represent the imputed costs of those impacts. The data was based on the calculation of long-term costs of control in the Dutch National Environmental Protection Plan.

The case studies also reveal that many projects are short term. Once the project is finished, managerial accounting practices return to their original form. How to motivate a company to permanently change its managerial accounting to EMA and integrate EMA information into its management activities remains an important issue. This task requires close cooperation between government and industry, and the cooperation of all stakeholders.

PERCEPTIONS OF EMA AND POLICY INSTRUMENTS — SURVEY RESULTS

Two questionnaires were developed as part of the United Nations EMA initiative to survey the status of EMA development and identify useful policy instruments. The second questionnaire was a supplement to the first. The two questionnaires are contained in the Appendix. The analysis of the results is presented in this section.

The first questionnaire was sent to participants in the Washington meeting prior to the meeting. There were 22 replies, including 10 (45%) from government, 5 (23%) from academia, 4 (18%) from the private sector and 3 (14%) from international organizations and NGOs.

The second questionnaire was completed by 9 participants at the end of the meeting. It served to clarify some issues raised by the first questionnaire. It was also developed with the intention to collect information when opinions on certain questions may have changed after the presentations given at the meeting. It was complementary to the first one, but also focused more on the acceptance of policy instruments and the issues that are important to the future role that government can play to advance EMA.

A large majority of respondents (about 80%) felt that understanding of EMA concepts and tools was rather confused in both industry and government, that development of EMA tools was limited, and that EMA was not well integrated into decision-making.

Regarding EMA tools that were considered valuable, most respondents chose Total Cost Assessment (68%), physical environmental accounting (59%), Resource Efficiency Accounting (59%) and input/output analysis (41%). Only a few respondents (18%) chose Life Cycle Costing. This would suggest that external costs, which are important in Life Cycle Costing but not in the others, are not seen as a useful focus for EMA.

Concerning the incentives or motivations for businesses to adopt EMA, cost savings and profit generation was the overwhelming favourite, chosen by 91% of the respondents. Other important factors were market competition (55%), liability and risk avoidance (41%), regulatory compliance (36%), and corporate group requirements (36%). Public and consumer pressure was chosen by only 23%.

Concerning barriers to the use of EMA, respondent identified lack of information on EMA and lack of appreciation of the benefits of EMA as the most important factors. Also considered important were lack of available tools and excessive costs of implementation. Lack of qualified personnel was seen as less of a problem.

Almost all respondents (91%) agreed that government should be involved in the promotion of corporate EMA. The two negative responses cited the undesirability of government regulation of EMA and the confusion that might arise from different national standards as the reason.

Regarding instruments that government could use to promote EMA, the favorites were support for pilot or demonstration projects (82%) and information dissemination (77%). Regulatory approaches were also mentioned by many (73%), although there was no agreement on what kind of regulatory instruments governments should use. Other policy instruments favored were integration of EMA into education curricula (50%) and support for R&D on EMA (41%). There was less interest in implementing EMA in government activities to set an example (32%), and government-sponsored voluntary programmes (27%).

Concerning what should be included in the definition of environmental costs, most respondents agreed that environment-related investment costs (82%), production/service costs (77%), waste-management costs (73%), contingent costs (future penalties, remediation and compliance costs) (59%) and regulatory/legal expenses (59%) should be considered environmental costs. Fewer respondents agreed that liabilities (45%), voluntary costs (45%), external environmental costs (36%) or intangible costs such as corporate image and community relations. To clarify the views concerning inclusion of contingent costs, liabilities, legal fees and intangible costs, specific questions on those issues were included in questionnaire 2, which was completed at the end of the Washington meeting, resulting in greater agreement that those costs should be included in environmental costs. Whether this was due to the rephrasing of the question or a change in views as a result of the meeting is not clear. In either case, there does not seem to be clear agreement as to whether contingent costs, liabilities, legal expenses and intangible costs should be included as environmental costs in EMA.

When asked about EMA activities in their organizations, most participants mentioned environmental reporting, cleaner production, natural resource accounting, and environmental management systems. Few were directly involved in EMA activities.

When asked about the relationship of EMA to environmental reporting and environmental management systems, half answered that EMA is a basic tool for measuring corporate environmental performance for both activities.

GOVERNMENT'S ROLE IN PROMOTING EMA

There is general agreement among people involved in EMA that governments have a useful role to play in promoting corporate EMA. Yet there are many questions as to what instruments governments should use and what incentives they can offer.

ANALYSIS OF GOVERNMENT INVOLVEMENT

Government promotion of EMA for corporate decision-making has multiple benefits. Businesses benefit by reducing costs and increasing productivity, the government benefits by achieving environmental protection at lower cost and less political resistance, and the public benefits from the cleaner environment. Government's role in the promotion of corporate EMA should be that of

a catalyst, encouraging, facilitating and promoting, as well as mandating change when necessary.

Policy instruments for promoting EMA

There are various approaches that governments can take to promote corporate EMA. The instruments taken by governments in different countries vary according to the legal, economic and cultural factors in their countries.

In the past, efforts to control industrial pollution centered on regulating emissions and disposal of pollutants. More recently, attention has been shifting to efforts to reduce the generation of pollutants through cleaner production systems, eco-efficiency and environmental management systems. In some countries, companies are required by law to identify their environmental costs, investigate less polluting alternatives, or utilize the best available technologies for their production systems. These requirements come from both local and national governmental authorities.

Federal authorities in the United States have imposed a wide range of requirements on firms through environmental regulations, but none required accounting systems for environmental costs. A proposal to introduce such a requirement was contained in draft guidelines under the Resource Conservation and Recovery Act (RCRA) (Ditz, et al. 1995, p159):

Characterization of Waste Generation and Waste Management Costs:

Maintain a waste accounting system to track the types and amounts of wastes as well as the types and amounts of the hazardous constituents in waste... Additionally, a waste generator should determine the true costs associated with waste management and clean-up, including the costs of regulatory oversight compliance, paperwork and reporting requirements, loss of production potential, costs of materials found in the waste stream, (perhaps based on the purchase price of these materials), transpiration/treatment/storage/disposal cost, employee exposure and health care, liability insurance, and possible future RCRA or Superfund corrective action costs... Substantial uncertainty in calculating many of these costs, especially future liabilities, may exist. Therefore, each organization should find the best method to account for the true costs of waste management and cleanup.

A Cost Allocation System:

Where practical and implementable, organizations should appropriately allocate the true costs of waste management to the activities responsible for generating the waste in the first place (e.g. identifying specific operations that generate the waste, rather than charging the waste management cost to "overhead"). Cost allocation can properly highlight the parts of the organization where the greatest opportunities for waste minimization exist; without allocating costs, waste minimization opportunities can be obscured by accounting practices that do not clearly identify the activities generating the hazardous wastes.

In general, regulatory approaches are generally not considered appropriate for management accounting systems, which are used for internal decision-making and should therefore be adapted to the specific needs of each company. An accounting system that was felt to be inappropriately imposed would probably not be used for decision-making.

However, regulatory requirements that do not directly require environmental accounting systems may nonetheless encourage the adoption of EMA by a company. When a company is asked to provide financial data for environmental items in its annual and environmental reports, the requirement encourages the company to use EMA to gather information needed for the reports. Currently Sweden, Finland and Japan require companies to report environmental items in financial accounts or encourage them to assess and report their environmental costs.

In general, any regulation that increases environmental costs will also provide an incentive for EMA to manage such costs. This would such regulations as emissions standards for air and water pollutants, permit requirements for activities with environmental impacts, reporting requirements for the use of toxic materials, and liability for pollution damage or improper waste disposal. As the incentive for EMA depends on the total environmental costs, these different regulations are cumulative in their effect.

For directly promoting EMA, voluntary approaches are generally favored. Governmental authorities at different levels have applied a variety of voluntary approaches, including:

- Requiring companies to collect data on environmental expenditures for the purpose of statistical review, as done in the Netherlands;
- Providing funding for empirical research to evaluate the status and potential for EMA. One example is European Union funding of the Ecomac project. The project conducted European-wide studies on eco-managerial accounting practice, including interviews with 84 companies, and detailed studies of 15 companies in Germany, Italy, the Netherlands and the United Kingdom;
- Organizing conferences, workshops and working groups, bringing together experts from business, professional groups, government, NGOs and academia to exchange knowledge and experience. This approach has been used by USEPA, the Ecomac project and the United Nations EMA initiative;

- Establishing national prizes and competitions financed by governmental authorities. This approach has been used for promoting corporate environmental reports. Examples are the National Environmental Reporting Competitions in Finland and the Prize for Environmental Reporting in Norway; and
- Disseminating information through websites and electronic newsletters, an approach that has been used by the USEPA's Environmental Accounting Project, the Ecomac project, and for Japan's Guidelines for collecting, allocating and publicizing corporate environmental accounting information.

Public concern over environmental issues also provides an incentive for EMA as a tool for assessing the cost of voluntary environmental protection measures designed to give a company a "green" image. While governments do not directly control such public concerns, an active government environmental protection programme and information dissemination on environmental issues can certainly promote and support public concern. Requirements or encouragement for corporate environmental reports will both encourage environmental awareness generally and provide the public with information on corporate environmental performance.

On the other hand, government policies that reduce environmental costs also reduce the incentives for EMA. If prices for natural resources, water, energy and other inputs are kept low through explicit or implicit government subsidies, and if environmental regulations are poorly enforced, environmental costs will be low as will the potential benefits of EMA.

Policy instruments that governments can use to promote EMA can be categorized into four major groups: information, incentives, voluntary programmes and regulatory instruments. Different measures are grouped into these four categories, although there are no strict dividing lines between them. Each of the instruments has it strengths and weaknesses. The analysis of the strengths and weaknesses of different instruments are listed in the following table.

Category	Example of Instruments	Strengths	Weaknesses
Information instruments	Competition and awards schemes	 Open to many companies, nationally or sectorally Promotes public or customer pressure for other companies to improve environmental performance 	Difficulty in assessing internal management system

Table	10.	Strenath	and	weakness	analysi	is of	different	policy	instruments
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Category	Example of Instruments	Strengths	Weaknesses
	Promoting public information disclosure or environmental reports	 Enhancing environmental awareness Improving public access to information Creating peer pressure Raising public concern over environmental impacts 	Environmental reporting does not require EMA
	Supporting demonstration or pilot projects and exchange of experience	 Recognized benefits form pilot project can convince other companies to take a similar approach Can build on experience of companies that have successfully adopted EMA on their own Widely accepted approach 	Difficulty in evaluating improvements, especially in a short period
Information instruments (continued)	EMA networking, conferences, workshops, training courses Websites, newsletters, publications	 Promote wide exchange of successful and beneficial experiences Meets needs for information in a quick and effective way Provides contacts for practical assistance in adopting EMA 	Difficult to assess results
	Software development and distribution	Provides substantive support to many small businesses	Difficult to adapt to different requirements
	Integration of EMA principles into education curricula	Prepares future managers and accountants for EMA	Slow impact
	Training kit development	 Can reach many students and employees in a short time Easy accessibility and applicability 	Difficulty in adapting to specific requirements
	Government demonstration of EMA in public decision-making	 Demonstrates the benefits of EMA implementation through experience Can help to develop EMA systems 	Requires substantial human resources and organization-wide commitment
Incentives	Taxes, subsidies	 Provide incentives to profit motive Well accepted instruments Encourage environmentally friendly behaviour by changing prices of resources, goods and services to reflect full social costs of production and consumption 	 Difficulty in targeting EMA May be costly to monitor, evaluate and control

Category	Example of Instruments	Strengths Weaknesse	
	Financial support for EMA R&D and pilot initiatives	Well accepted instruments	May be costly
Voluntary programmes	Promoting voluntary initiatives or negotiated agreements, such as EMS including EMA, and voluntary environmental performance and reporting standards	 Uses private sector peer pressure Low cost to government Uses measures most cost-effective to business 	 Results uncertain due to lack of external incentive Businesses may try to maximize public impact with minimum real commitment Difficult to target EMA used for real decision- making
Regulatory instruments	Requirements for EMA either independently or as part of other requirements (permits, bans, product take backs, etc.) Regulations on accounting principles	 Regulatory approach has been widely used Can require EMA 	 EMA not adequately defined and standardized EMA may not be used for real decision- making Regulatory approach may be unacceptable for management accounting
	Flexible regulation for companies with approved EMA system	Benefits to participants; no costs to non-participants	Difficulty in verifying use of EMA for decision- making

Factors for successful government promotion of corporate EMA

Government efforts to promote corporate EMA can benefit from coordination among governmental agencies, including environmental protection agencies, other regulatory agencies, tax authorities, local authorities and others. Design and coordination of corporate reporting

requirements to promote the use of EMA for reporting will also promote its use for internal management purposes. On the other hand, burdensome reporting requirements due to lack of coordination among different agencies may produce an adversarial attitude from firms regarding environmental data collection and disclosure.

An example of governmental reporting requirements providing a disincentive to a change in accounting systems is described in the case studies in "Accounting for Pollution Prevention in Washington State".²¹ Contractors for the United States Department of Defense (DoD) are required to report costs according to DoD Accounting Standards, for payments under the contract. If a change is made in accounting methods, any cost reduction results in lower payments, while cost increases do not result in payment increases. An introduction of EMA will reallocate costs among different activities, probably resulting in some reduction in contract payments.

Within companies, cooperation among executives, accountants, environmental offices, and production managers is essential to the acceptance and success of EMA. Broad familiarity with EMA in the business community is therefore an important condition for the effective implementation of EMA systems. Government can promote widespread acceptance of EMA by encouraging integration of EMA concepts and methodology into business and accounting education curricula, although it would take time for the effects to be felt in business. Corporate training programmes might be more effective on a shorter time scale.

The effectiveness of government efforts to promote EMA will also depend on the receptiveness of business. Some large companies in developed countries are now developing and implementing EMS and reporting environmental factors to the public, through both mandatory and voluntary environmental reports. Governmental agencies providing information and guidelines to companies on how environmental costs should be identified and allocated would advance the process. It is generally not feasible to substantially change existing accounting systems or develop a totally new system. Government intervention is best if, during the formulation of the new accounting and reporting regulations, it encourages companies to consider EMA. However, because EMA is quite new and not standardized, regulatory bodies may not have the knowledge and expertise necessary to formulate policies to effectively promote EMA.

Organizing pilot or demonstration projects, supporting national reward schemes or competitions, and disseminating experience and information through a variety of media will help more companies realize the benefits of EMA. An effective information dissemination system can accelerate the pace of industry learning. When companies need information and help, they will know where to go.

It is a substantial burden for individual companies to use financial and human resources to develop systems for environmental cost identification and allocation. Government agencies

²¹ Refer to section on "Other Programmes" for general introduction to the case studies in "Accounting for Pollution Prevention in Washington State".

should work with specialists from the environmental, accounting and information technology fields to encourage and assist the development of widely applicable and flexible EMA systems. Special attention should be paid to developing EMA systems adapted to the need of small and medium-sized enterprises, which in some countries account for 99% of all enterprises.

Conclusions and Recommendations

CONCLUSIONS

The analysis in this report has shown that governments do have a role in the promotion of corporate EMA. Yet how government can most effectively promote corporate EMA depends on the specific economic, environmental and social contexts in each country.

EMA is an internal management supporting process for a company and is not specifically designed to reduce environmental impacts or improve the environmental performance of a company. Yet the adoption of EMA practice will generally open management's eyes to the benefits to the company of pollution prevention and waste minimization. Realization of those internal benefits will generally be accompanied by external benefits to society at large.

EMA is still in the development stage, and EMA concepts, tools, processes and the potential benefits of EMA to both industry and government are not clearly recognized. Adoption of EMA is limited by the lack of commonly accepted definitions, on what should be included in environmental accounts, and on how these figures should be categorized and presented.

For companies that have implemented EMA, such as Siemens and DuPont, the primary motivation has been to save money. However, the benefits that EMA can offer are not generally perceived by industry as justifying the costs of changing accounting systems to identify and allocate environmental coats. Indeed, for many companies, particularly small companies, the costs may well be greater than the benefits. In some companies, EMA has been introduced as a short-term project, and when the project was completed, EMA stopped. Once the successful experiences of companies with permanent EMA systems are established and publicized, and the costs of EMA are reduced through the efforts of the pioneers, other firms will also introduce EMA.

It is possible for a large corporation that is environmentally aware and willing to invest in environmental performance and social responsibility to develop its own customized EMA system. For SMEs, it is more suitable to integrate simple EMA elements into existing accounting systems.

There are a number of government initiatives for promoting EMA, including the United States EPA's Environmental Accounting Project, United Kingdom's Greening of Government Initiative, and Japan's Guidelines on Grasping Environmental Cost Accounting. However, it is still too early

to draw conclusions as to what instruments and mechanisms are most effective. Current governmental activities for promoting EMA are mainly attempts to define EMA and limited efforts to promote EMA implementation. Issues such as the relative role of purely voluntary initiatives, economic incentives, and regulations are still under discussion. At the current, preliminary, stage of EMA development, dissemination of information on EMA should be a primary element of any government programme.

In the development of EMA, more work is needed to clarify the scope of environmental costs and develop convenient accounting tools for analyzing those costs. EMA principles should be integrated into business and accounting education curricula so that future accountants and managers will be prepared to work with EMA systems. Educational institutions, professional associations, government agencies and international organizations can support information networks to spread EMA knowledge, expertise and experience, both nationally and internationally.

The trends in environmental policy-making from traditional regulations towards market mechanisms, voluntary agreements and public-private partnerships will be reflected in the role of governments in promoting corporate EMA. To the extent that regulations are used, EMA will probably be integrated into regulations on such things as financial reporting, corporate environmental reporting, environmental management systems, product responsibility, and licensing and permitting.

Finally, cooperation with academia, research institutions, environmental organizations, and government agencies will be an important factor in EMA development and implementation. International organizations such as the United Nations and the European Union are playing an increasingly important role in international exchange of information and experience and establishment of guidelines and standards.

RECOMMENDATIONS

The recommendations presented here are intended as suggestions to governments interested in promoting corporate EMA. Not all the suggestions are applicable to all countries, but should be selected and adapted to the specific conditions of each country. Governments may choose one or a combination of the following instruments.

Short-term approaches could include the following:

- Sponsoring research on EMA concepts, tools and methodologies, with the results to be shared with government and industry.
- Sponsoring case studies or demonstration projects and encouraging companies to undertake pilot EMA projects, again with the results to be shared with government and industry.
- Working with educational institutions and professional associations to develop training courses on EMA or to integrate EMA into and training in environmental management or accounting courses.
- Cooperating with educational institutions and professional associations to give awards and other public recognition to companies with the best EMA systems.
- Developing information-sharing mechanisms, including publications, websites, conferences, workshops and information networks. These would not only disseminate information but also promote contacts between workers in the field.
- Supporting the development of accounting software that includes EMA.
- Developing national guidelines for EMA.
- Focus on large corporations in industries with substantial environmental impacts and subject to environmental regulations.
- Exchange information with other countries on the design and effectiveness of policies for promoting EMA.

Longer-term approaches could include:

- Working with universities to integrate EMA principles into accounting and management curricula.
- Developing financial and environmental reporting standards and guidelines that encourage EMA.
- Designing regulatory and economic incentives for the use of EMA, such as regulatory flexibility for companies with recognized EMA systems.
- Assess the costs and benefits of various elements of EMA systems for various industries, and assess the effectiveness of government policies for promoting EMA.
- Coordinating the work of government agencies responsible for environment, finance and industry to promote EMA consistently.
- Working with industrial associations to develop voluntary cooperative EMA schemes.
- Promoting the inclusion of EMA in standards and guidelines for environmental management systems, including future revisions of ISO 14000 and EMAS.
- Supporting research on the linkages between EMA and corporate financial and environmental reporting, environmental management systems, and national environmental accounting, and on how to make them mutually supportive.
- Focus on developing EMA systems suitable for small and medium-sized companies.

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Appendix

QUESTIONNAIRE 1

Name:	Title:				
Address:	Tel:				
Name of Organization:					
EMA programme(s) involved:					
Group to which your organization belongs:					
Public/Civic Sector: P	Private Sector:				
 Governmental organization International organization Research/Academic Institution NGO Other (please specify) 	Industry Business Professional Association Other (please specify)				

Basic information

Questions

Please answer the following questions with regard to your country.

1. How clear is the common understanding of the EMA concept, tools and benefits?									
In industr	ry:		1	2	3	4	5	(1-very confused / 5-very clear)	
In government: 1 2 3 4 5 (1-very confused /						(1-very confused / 5-very clear)			
2. To what extent have EMA tools been developed?									
	1	2	3	4	5	(1-ve	(1-very limited / 5-fully developed)		
3. How integrated is EMA into company's decision-making processes?									
	1	2	3	4	5	(1-no	(1-not at all / 5-fully integrated)		

4. Which are the most useful and valuable tools within EMA?

- □ Physical Environmental Accounting (energy & water, etc.)
- □ Total Cost Assessment (internal costs)
- Life Cycle Costing (converting LCA to monetary terms)
- **D** Resource Efficiency Accounting (material Intensity and economic indicators)
- □ Input/Output analysis
- □ Others (please specify)

5. What are the incentives and barriers for integrating EMA into company's decision-making processes?

Incentives:

- Regulatory compliance
- □ Market/Competition pressure
- Group requirement (International corporate)
- □ Public/Consumer pressure
- □ Cost saving/profit generating
- □ Liability/Risk avoidance
- □ Others (please specify)

Yes

Barriers:

- □ Too costly
- □ Lack of regulatory requirement
- Lack of information
- □ Lack of qualified personnel
- Lack of available tools
- □ Others (please specify)

6. Should government be involved in promoting EMA in industry/business?

ê

No

ê

7. If yes, what are the most effective instruments, approaches and mechanisms that government can use to promote the use of EMA?

- □ Voluntary agreement
- □ Information dissemination (e.g. software development, information sharing)
- □ Integrating EMA into education curriculum
- □ Supporting R&D on EMA methodology and application
- □ Setting examples (e.g. use of EMA by government)
- D Pilot/demonstration projects (e.g. supporting industry using EMA)
- Governmental procurement policy
- □ Regulatory approaches
 - Integrating into existing regulations
 - **D** Economic instrument(s) (e.g. subsidies, taxes)
 - **D** Policy differentiation
 - **D** Regulations on accounting principles
 - □ Others(please specify)
- □ Others(please specify)

8. Which costs should be included within the definition of environmental costs?

- □ a. Investment costs (environmental activities related)
- **b**. Production/Service costs (environment issues related)
- \Box c. Waste management costs
- d. Liabilities
- □ e. Contingent costs (penalties, remediation, future compliance)
- □ f. Intangible costs (image & relationship)
- □ g. Voluntary costs (beyond compliance)
- □ h. Regulatory/Legal costs
- □ i. External costs (environmental and social costs)
- □ j. Others (please specify)

9. From the above list, which are important/significant environmental costs to your sector?

a b c d e f g h i

Others:

10. What EMA programmes/projects have been completed or are underway	v in your organization?		
Programme/Project name(s):	* Government involvement		
	Yes		
Organization(c) in volved:	No		
	* Current status of Programme:		
	Completed		
Contact person:	On-going		
Address:	Under planning Other (please specify)		
Tel:			
Fax:			
E-mail:			
11. What motivates your organization to undertake the EMA programme/pr	oject?		
12. If government organizations were involved, what instruments or approach the use of EMA by industry?	ches were used to promote		
13. What success factors have contributed most to the success of the progr	ramme/project?		
14. What are the intended benefits of the EMA project to: (please specify)			

a. **Government:** (e.g. regulation compliance, regulatory cost reduction...)

b. **Industry:** (e.g. cost reduction, profit generation, image improvement...)

c. Society: (e.g. economy, environment, public health & safety...)

15. If you were to design a government programme to promote EMA in industry,

- a. Who should take part?
 - □ Individual industrial company
 - □ Industrial associations
 - Professional associations
 - □ Accounting firms
 - □ International organizations
 - Academia
 - □ NGOs
 - □ Others (please specify)

b. Which EMA elements and approaches should the programme focus on?

QUESTIONNAIRE 2: We would like to have your opinions on the following issues:

QUESTION 1. What should be included in the definition of environmental costs?

A. Should Liability Costs (costs incurred to protect against liabilities) be considered environmental costs?

Yes

If answer is No, please give the reason(s)

B. Should Contingency Costs (such as those incurred in future penalties, remediation expenditures and future compliance costs) be considered environmental costs?

Yes

If answer is No, please give the reason(s)

C. Should Legal Fees (incurred due to lawsuits, failure to comply and compensation for accidents) be considered environmental costs?

Yes

If answer is No, please give the reason(s)

D. Should Intangible Costs (such as demagnification of corporate image and relationship to stakeholders due to unfavorable environmental behaviour and performance) be considered environmental costs?

Yes

No

If answer is No, please give the reason(s)

No

No

No

QUESTION 2. How do you perceive the relationship of EMA to Environmental Management Systems (EMS) and Environmental Reporting (ER)?

- A. EMA is the basic tool to measure corporate environmental performance for EMS/ER
- B. EMA is part of EMS/ER
- **C.** EMA is complementary to EMS/ER
- D. EMA is in practice, independent of EMS/ER

QUESTION 3. Please rank the following barriers to starting an EMA programme in your country from 1-5 (1 representing most common and 5 least common).

- ____ Benefits of EMA implementation not perceived
- ____ Too costly
- Lack of information
- ____ Lack of available tools
- ____ Lack of Qualified Personnel
- ____ Lack of regulatory requirements

QUESTION 4. Governmental policy instruments could mainly be categorized into informational instruments, economic incentive instruments, self-regulatory instruments, regulatory instruments and cooperative instruments, although there is no absolute distinction between and among them.

A. Please check 1-3 instruments from each category that you think are most feasible and effective according to the current EMA development stage.

Informational instruments

- ____ Competition and Award scheme
- _____ Public release / Information disclosure / Environment reporting (ER)
- _____ Supporting demonstration or pilot projects and sharing the experience

____ Government setting examples by implementing EMA in its own decision-making process

- ____ Networking
- ____ Conferences/Forums
- _____ Software development and distribution

- ____ Homepage build up
- ____ News letter and publications
- ____ EMA principle integrated into education curricula
- ____ Training kit development

Economic incentive instruments

- ____ Taxes / Subsidies
- ____ Fine / Penalties
- ____ Financially support EMA R&D and pilot initiatives
- ____ Governmental procurement policy
- ____ Governmental contract project

Self-regulatory instruments

- _____ Voluntary environmental reporting
- ____ EMS implementation
- ____ Voluntary corporate EMA initiative

Regulatory instruments

- _____ Promoting/regulating EMA together with EMS and ER
- ____ Integrating into existing regulations (permits, bans etc.)
- ____ Regulating on accounting principles

Cooperative instruments

- ____ Cooperate with profession association
- ____ Cooperation among different governmental departments
- ____ International cooperation

B. Please rank the following categories from 1 to 5, (1 representing most feasible at present or in the near future in countries like yours and 5 representing not very feasible).

	Informational instruments	Economic incentive instruments	Self- regulatory instruments	Regulatory Instrument s	Cooperati ve instrumen ts
Rank					

1. QUESTION 5. Please check the 5 programmes and mediums that best disseminate EMA information.

- ____ Competition and Award scheme
- ____ Public release /Information disclosure /Environment report (ER)
- ____ Supporting demonstration or pilot projects and sharing the experience
- ____ Specialist/Experts Networking
- ____ Conferences/Forums
- ____ Software development and distribution
- ____ Internet publication
- ____ News letter and Publication
- ____ EMA principle integrated into professional education curricula
- ____ (International/National/Sectoral) Training programme

QUESTION 6. What are the important issues to focus on in the next meeting?