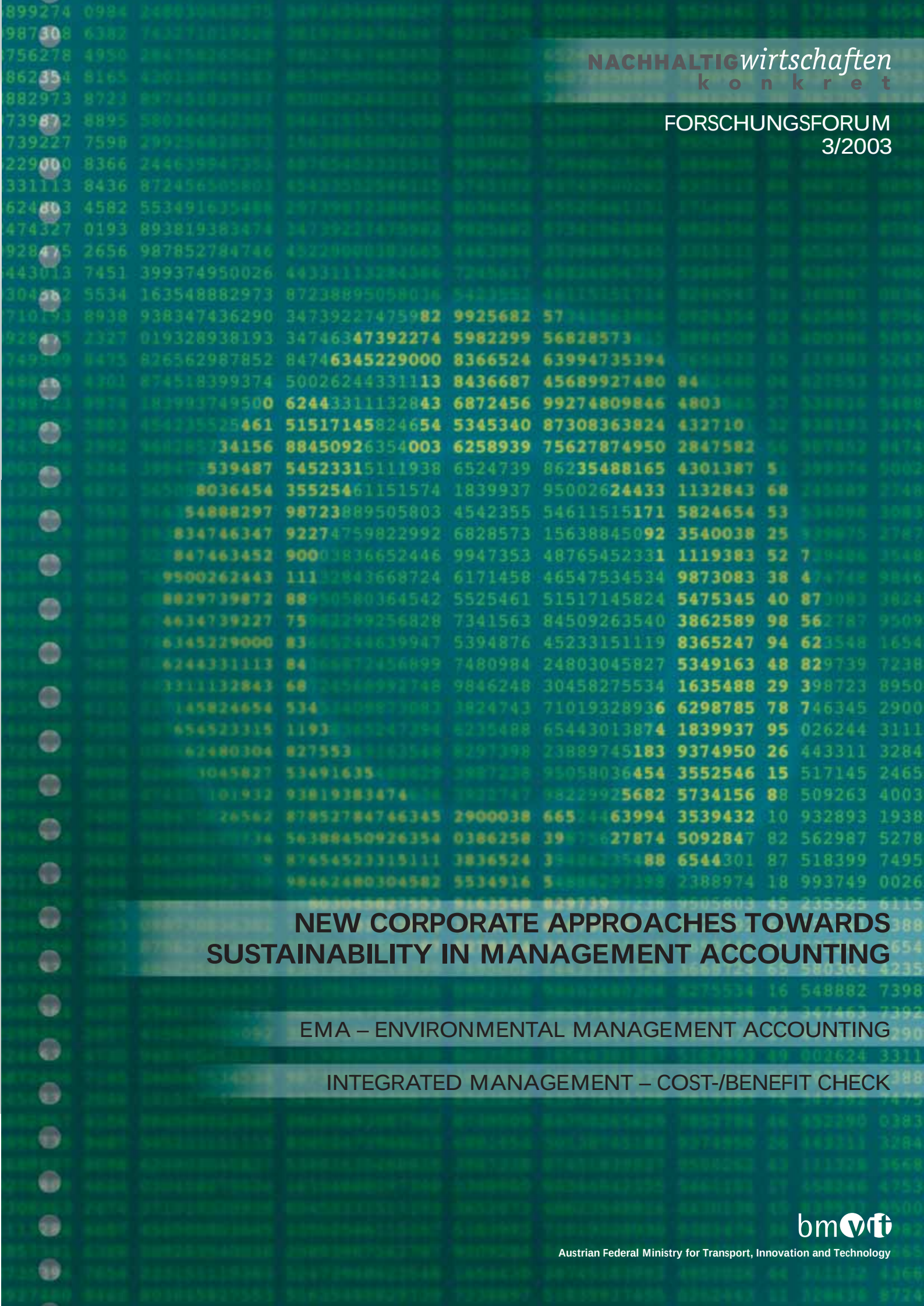

NACHHALTIG*wirtschaften*
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FORSCHUNGSFORUM
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# NEW CORPORATE APPROACHES TOWARDS SUSTAINABILITY IN MANAGEMENT ACCOUNTING

## EMA – ENVIRONMENTAL MANAGEMENT ACCOUNTING

## INTEGRATED MANAGEMENT – COST-/BENEFIT CHECK

bmvit
Austrian Federal Ministry for Transport, Innovation and Technology

# RESEARCH ON ENVIRONMENTAL MANAGEMENT ACCOUNTING WITHIN THE "FABRIK DER ZUKUNFT" SUBPROGRAM

*In order to promote the restructuring process towards sustainable development, the Austrian Ministry of Transport, Innovation and Technology (bmvit) initiated, in 1999, the research and technology program "Nachhaltig Wirtschaften". It has since supported numerous research and development projects as well as demonstration and diffusion measures implemented within the scope of several subprograms, which provide significant innovative impetus for Austria's economy. The subprogram "Fabrik der Zukunft" ("Factory of Tomorrow") aims to initiate and realize innovative technology development in Austria, which should demonstrate, by means of concrete examples, the feasibility of a sustainable economy. Therefore, the program focuses especially on projects that, using a comprehensive strategy can be further developed to result in demonstration and model projects or to contribute to such a development. Suitable examples could be innovative manufacturing processes, trend-setting products, or model enterprises. The necessary innovative development should be achieved in the fields "sustainable technologies and innovation in production processes", "use of renewable raw materials", and "products and services".*



A great number of successful developments in this field have shown that the objectives of sustainability and the economic success of an enterprise do not contradict each other. Eco-efficiency is an important entrepreneurial concern that also benefits the enterprise and, in the long run, increases its value.

The concept of sustainable development requires managerial strategies that also take account of economic, social, and ecological aspects. For this purpose, an organization will need environmental management and environmental accounting systems that provide an integrated perspective of the monetary and material aspects of all environment-relevant activities of the organization. Conventional accounting and cost accounting systems do not yield a comprehensive picture of the performance of or the environmental costs accruing for an enterprise in the fields of health/safety. Today´s decision makers are rarely able to link environmental data and economic variables and therefore urgently need information on real safety and environmental costs attributable to the activities of an enterprise. The economic value of existing human or environmental resources and assets as well as the economic benefits of a first-rate safety and environmental performance for the enterprise have not yet been sufficiently understood in many organizations and, consequently, have not been integrated in the decision making process. For this reason, existing potentials for greater efficiency are not being sufficiently used. The projects below were supported by the bmvit and were concerned with "Environmental Accounting Systems" and "Integrated Management"; they may be considered models for the development of specifications used in tender documents within the scope of the "Fabrik der Zukunft" subprogram.

## 1 Workbook on Environmental Mangement Accounting

Metrics, Procedures and Principles
Christine Jasch, IÖW Institut für ökologische Wirtschaftsforschung, Wien 2001

This study was conducted by a working group on EMA-Environmental Management Accounting within the UN Commission for Sustainable Development (UN CSD). The study´s aim was to establish globally applicable definitions and principles as well as methods and approaches in the field of environmental cost accounting systems, in particular with a view to establishing annual environmental costs and expenditures.

## 2 EMA – Environmental Management Accounting

Pilottesting
Christine Jasch, IÖW und Hans Schnitzer, Institut für Verfahrenstechnik, TU Graz, Wien 2002

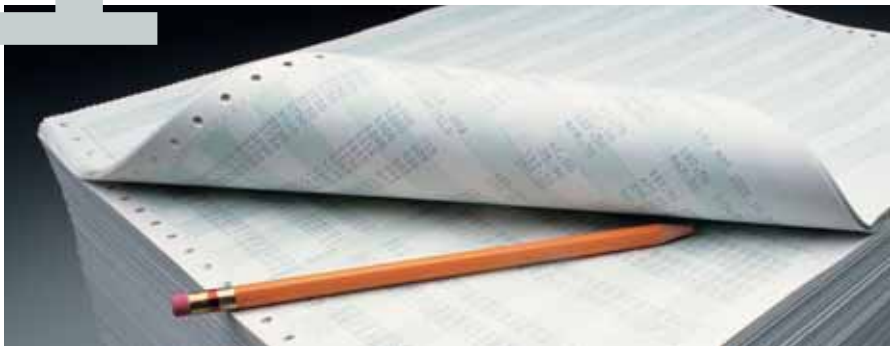
A number of case studies conducted within the scope of the bmvit "Fabrik der Zukunft" subprogram were to supplement the abovementioned international research project. These pilot projects did not aim to ascertain environmental costs in detail, but rather to critically analyze the need for development in existing information systems with the objective to provide an improved basis for decision making in material flow management.

## 3 Integriertes Management – Kosten-/Nutzencheck

eco4ward, H. Dimitroff-Regatschnig; Denkstatt, C. Plas; ÖAF/WIPÄD-KFU, D. Mandl, M. Trummer, Graz 2002

This project aimed to develop a tool (especially for small and medium-sized enterprises – SMEs) permitting to quickly ascertain costs, benefits, and saving potentials in the fields of safety/health, environment, and quality assurance. Researchers participating in the project used a holistic approach linked the managerial activities performed in these three fields to form one comprehensive system of integrated management.

# 1 ENVIRONMENTAL MANAGEMENT ACCOUNTING – PRINCIPLES AND PROCEDURES



In 1999, the UN Commission for Sustainable Development established a special Environmental Management Accounting (EMA) expert working group. The Austrian Institute for Environmental Economics and Management (Dr. Christine Jasch), on commission of the bmvit drew up a strategy paper for this working group describing principles and procedures in environmental and material flow cost accounting.

One problem in environmental management accounting arises from the fact that there is no uniform definition of the term "environmental costs". Various cost items such as disposal costs, investment costs, sometimes also external costs are being subsumed under this category. What is more, many of these cost items have not been systematically identified and linked to the processes and products causing these costs, but allocated to overhead accounts. This causes distorted calculations and incorrect assessments with a view to possible improvements. As a result, the economic and ecological benefits of preventive environmental protection projects are not being recognized and, to the detriment of the enterprise are not being used.

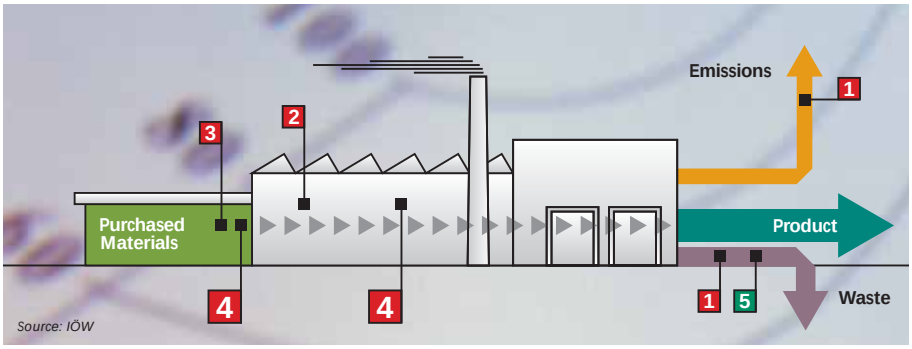
EMA provides a basis for decision-making in corporate environmental protection and comprises:

- data and parameters to identify material and energy input, material flows, waste, and emissions
- monetary data on costs, savings, and earnings from environmental measures

EMA improves materials efficiency, mitigates environmental risks and environmental impacts, and reduces the costs of environmental management in enterprises. The approach developed for the UN CSD is based on the fact that all purchased materials will leave the enterprise either as product or as "non-product output" (NPO = waste, effluent or emission into the atmosphere). Emissions are thus are a sign of inefficient use of raw materials in the manufacturing process. In calculating environmental costs this approach takes into account not only charges for disposal but also calculates the material purchase value "wasted" as well as the proportionate share of manufacturing costs for waste and emissions.

In this context it has been shown that the biggest share of environmental costs is attributable to the material purchase value of the NPO. The purchase price of materials contained in waste may amount to 40 to 70 % of the overall costs, depending on the industrial sector, and exceeds disposal costs by a factor of 10 to 100. Environmental costs accrue at various stages of the production process. The study addressed ***5 environmental cost blocks.*** Environmental costs form part of an integrated system of material and monetary flows, they are not a separate cost factor. The objective of environmental management accounting is to ensure that all significant costs are taken into account in the corporate decision making process.

Meanwhile, the study on environmental management accounting has become an international success and has been translated into twelve languages. It addresses both, enterprises and accounting professionals (tax accountants etc.) and can be used in practice as a concrete guideline for establishing the real costs of material flows and environmental expenditures. The study is to serve as a basis for the development of national guidelines and frameworks in countries all over the world.
www.ioew.at




### Categories of Environmental Costs

1 *Conventional waste disposal and emission treatment costs, including requisite plants and equipment, operating materials and personnel*
2 *Expenditure for process-integrated prevention of environmental impacts and costs of corporate environmental management*
3 *Calculation of wasted material purchase value*
4 *Evaluation of non-product output (waste, effluent, air pollutants) including proportionate share of manufacturing costs*
5 *Environmental revenue from sale of by-products and waste material*

# 2 CASE STUDIES ON ENVIRONMENTAL COST ACCOUNTING AND INVESTMENT APPRAISAL

In addition to the international investigations, Austrian researchers performed and documented a number of case studies within the scope of the subprogram "Fabrik der Zukunft". This compilation of practical examples (in combination with the UN EMA Workbook) could be used as a starting point for the further development of environmental management accounting systems resulting in a demonstration project within the "Fabrik der Zukunft" subprogram. The illustrative examples are to enhance the dissemination and acceptance of the concept with enterprises and consultants and can be used for training purposes.

The case studies were conducted in workshops held in participating companies. Key points of the studies included a description of plant and equipment with potential environmental impact, an estimate of environmental costs for the year 2001, a review of the material flow balance as well as a recalculation of an example of the investment appraisal. A discussion of existing information systems, weak points, and potential for improvement concluded the process.

The studies investigated ***12 examples of companies*** with rather dissimilar structures, in order to be able to represent the different aspects and (great variety of) specific problems encountered in environmental management accounting. Companies with relatively simple production processes (e.g. breweries) are particularly suitable for a comprehensive documentation of the introduction of EMA in the enterprise. In some other companies investigations concentrated on individual aspects: For the ski manufacturer "Fischer Ski" the study identified the largest proportion of environmental costs in the material purchase value and the manufacturing costs of the NPO. Concerning the service sector the studies have shown that a disproportionately large part of (otherwise relatively low) environmental costs is attributable to energy costs.

**A simplified documentation was developed for each of the pilot projects, which covers the following points:**

- Description of the company and its products
- Rough outline of the process and production technologies
- Description of waste and emissions generated
- Description of cost accounting system including list of accounts, specific accounts and, if necessary, further data (e.g. from stock management, production planning, analysis of cost centers, product pricing, investment appraisal)
- Task list
- Approach to solutions including explanatory comments

Collected company data were made anonymous and served as a basis for the representation of the cost structures typical of the different trades. Companies were analyzed separately by production and service sectors. Varying expenditure for materials and personnel in these two sectors (e.g. material in the service sector only 1 – 5%, personnel 40%) also has a bearing on the structure of environmental costs. Thus, in the manufacturing sector the largest share is found in the cost block "material purchase value of the NPO" (45-85%). Expenditure for the treatment of waste and emissions ranks second at 15-52%.

Despite lower expenditures for materials in service enterprises the block "material purchase value of the NPO" often is a dominating factor: The reason for this lies in the high energy costs, also belonging to this block, which account for a considerable part of environmental costs in service companies.

**Distribution of Cost Items by Cost Blocks**

| | Minimum | Average | Maximum |
|---|---|---|---|
| 1. Waste and Emission Treatment | 13% | 29% | 52% |
| 2. Prevention and Environmental Management | 1% | 6% | 14% |
| 3. Material Purchase Value of NPO | 39% | 64% | 85% |
| 4. Manufacturing Costs of NPO | 0% | 5% | 17% |
| 5. Environmental Revenues | 0% | –3% | –9% |

*Source: IÖW*

***12 examples of companies:***

*SW Umwelttechnik*
*Puntigam Brewery*
*Murau Brewery*
*Roto Frank*
*eloxal Heuberger*
*SCA Laakirchen*
*Fischer Ski*
*Austrian National Bank*
*Raiffeisen-Holding NÖ-Wien*
*3 business segments of the Verbundkonzern (Austrian Association of Power Industries)*

The pilot projects have shown that the new method meets with great interest and that the analysis can be completed in one to two days. Analyses yielded proposals for the improvement of cost accounting and for the reduction of material and energy losses. Real environmental costs exceeded estimates made by the individual companies by a factor of ten to thirty. All participating enterprises intend to further develop the tool and use it as a basis for managerial decision making processes.

3

P R O J E C T

# INTEGRATED MANAGEMENT – COST-/BENEFIT CHECK

■ A great number of enterprises worldwide have recognized and implemented management systems as an important tool for corporate organization and compliance with standards in quality assurance, environmental protection, and occupational safety. In practice it has been shown, however, that parallel working with different systems and applying them in an isolated manner causes inefficient operation of an enterprise. The example of EMA has also shown that only a comprehensive approach will be able to identify costs "hidden" in overheads. For this reason, efforts have been intensified to develop integrated approaches that join the manifold objectives in one single system.

Integrated management systems (IMS) afford increased efficiency, flexibility, and transparency of the various activities of an enterprise in the fields of safety/health (S/H), environment (E), and quality (Q). Within a project on IMS for SMEs completed in 2001, researchers developed a method that permits to harmonize these activities and to benefit from synergies and field-tested the method in several enterprises. (www.iman.at)

The follow-up project **"Integriertes Mananegment – Kosten-/Nutzencheck"** (Integrated Management – Cost-/Benefit Check) extended the method to include a tool permitting to perform a cost/benefit assessment and to identify savings and improvement potentials. Both studies were commissioned by the bmvit, the bmlfuw, , WIFI Austria and AUVA and realized by eco4award, AG Denkstatt, and ÖAF/WIPÄD-KFU (Project Leader: Hermine Dimitroff-Regatschnig).

The systematic approach to a cost/benefit analysis in Integrated Management covers all managerial categories and, at the same time, gives enterprises sufficient leeway for individual adaptation. In addition to a conventional definition of costs, this approach also identifies hidden costs incurring to the enterprise on account of measures that have not been realized. The method thus highlights potentials for concrete improvement. Checklists for various fields of activity, tried and tested worksheets, and examples of corporate activities for each cost and benefit category facilitate assessment in the enterprise.

Experts in the fields of safety/health, environment, and quality assurance as well as specialists coming from the commissioning institutions were involved throughout the duration of the project. Critical analysis from various perspectives focused in particular on the practice-oriented work papers. This continual process of discussion contributed to a high degree of support and acceptance.

The first phase of the project (July 2001 through February 2002) served to develop the theoretical principles and training materials for the subsequent pilot phase (March through October 2002). During the pilot phase, which involved ***11 enterprises*** and 13 consulting firms, the method was field-tested at all levels of the companies´ activities. Accompanying workshops provided consultants and representatives from the companies with the requisite know-how for the implementation process.

***The following enterprises participated in the pilot phase of the project "Integriertes Management – Kosten/Nutzencheck":***

*ALU SOMMER, GmbH / metal working*
*Gfrerer Isolierwerk GmbH & CoKG / supplier for building industry, insulation*
*Hans Schwarz Metallgießerei GesmbH&Co KG / light metal foundry*
*HOERBIGER-ORIGA PNEUMATIK GmbH / manufacturer, compressed air*
*Josef Manner & Comp AG / food processing*
*Killer GmbH & CoKG / waste disposal*
*Kruschitz GmbH / plastics recycling*
*Leinen-Weberei Vieböck / weaving mill*
*LKH Mürzzuschlag / hospital*
*Rappold Winterthur / stone and ceramics industry*
*ROTOFORM Druckformen GMBH / graphic trade*