

MINISTRY OF THE ENVIRONMENT OF THE CZECH REPUBLIC  
MENDEL UNIVERSITY AGRICULTURE AND FORESTRY BRNO  
UNIVERSITY OF PARDUBICE  
BRNO UNIVERSITY OF TECHNOLOGY

PROCEEDINGS FROM  
INTERNATIONAL SCIENTIFIC CONFERENCE

**“ECONOMIC ASPECTS  
OF ENVIRONMENTAL PROTECTION”**

**Brno, October 7 - 9, 2003**

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# TRAINING OF MANAGERS FOR ENVIRONMENTAL PROTECTION

**Marie Bednařiková**

Our society entered the new millennium as a society of institutions – we have a system of private companies, financial institutions, business companies, institutions concerned with the social sphere, sphere of health care, sports and education, as well as associations concentrating on environmental protection. It is clear that our current society could not do without institutions of various types; nobody can be self-sufficient and nobody can provide all services to other people. However, our attention is concerned with the latter sphere – protection of the environmental. Why has importance of environmental protection increased so much in the recent period, why is it necessary for environmental protection associations to intervene as much as they do? Would it be possible to ensure that all the above institutions approach environmental issues in a manner so that they would themselves provide for environmental protection as matter of priority? How should managers and other senior officers be trained for environmental protection?

The modern concept of a manager – entrepreneur is based on ideas of economist J. Schumpeter who conceives an entrepreneur as a person seeking changes and considering changes to be a chance for his future business activities.

According to Peter F. Drucker, it is generally not true that every manager is an entrepreneur (this is connected with managerial functions, i.e. planning, organizing, decision-making, directing people and control, and their various means of application at individual levels of management) but rather that every entrepreneur is also a manager, even though he is not automatically born as such. Entrepreneurs have to be trained for managerial functions.

Managers require a lot of knowledge – in economy, legal fields, psychology, sociology, human resources, marketing, finance, trade ... as well as knowledge in the area of the environment. All the above knowledge can be acquired only through studies. The same is true for environmental knowledge; however, this field requires not only knowledge, but also certain consciousness, senses, requirements ... The issue is to harmonize these requirements with the basic rule of business: “If I want to survive, I must create profit, if I want to create profit, I must concentrate mainly on my business activities and on my own economy, effectiveness and profitability” – unfortunately, in some cases, these rules are in direct contradiction with environmental protection and are thus achieved at its expense.

It must be remembered that we manage scarce and limited resources and that resources that have recently been “free” are now becoming relatively expensive and it is not certain for how long they will be available. Therefore, a forward-looking entrepreneur should come to the conclusion, that the antagonism between economy and ecology is misleading. The ever growing demand for environmentally friendly products and technology is an excellent business prospect and opportunity.

Environmental protection should not be a duty of companies, but rather their voluntary activity, based primarily on responsibility and prevention – i.e. active searching for social issues and their resolving. These issues undoubtedly include environmental needs. Respect for the environment should become one of the basic factors of corporate culture and philosophy. Education and motivation of employees and management must ensure achievement of a higher level of willingness to accept the principles of environmental protection. This idea is

not new, but it remains topical. Ethics in business cannot be considered to be a kind of an “antidote” that balances adverse consequences of business and managerial practice.

Companies are already familiar with concepts such as eco-audit (i.e. evaluation of the correct functioning of the environmental management system and its components) or eco-controlling (i.e. assessment of the overall development during a certain period of time on the basis of comparison of planned and actual situations). Crisis management must also include the component of environmental risk and, in particular, management procedures in emergency situations.

The trends in opinions concerned with social responsibility of the business sphere indicate that there is a tendency to extend the obligations towards the neighborhood and environment and to provide for voluntary limitations in the use of some means in connection with environmental protection and quality of life. However, not even the best efforts of corporate management and a comprehensive approach to management and organization of environmental care will not be successful without “working willingness” of employees. For employees, it is necessary to stipulate the relevant duties and responsibilities in the description of working activities, connected with environmental protection. It is also necessary to prepare and implement diverse programs of increasing environmental qualification of employees (i.e. knowledge of the corporate environmental policies and their environmental goals, knowledge of general principles of environmental conduct, such as the risks connected with individual activities and knowledge of regulations pertaining to their work). All requirements should be stipulated in the relevant guidelines with which the employees will be acquainted upon employment by the company or transfer to a new workplace and whose compliance should be stipulated in employment contracts and required also from employees of subcontractors working on behalf of the enterprise.

Standard tools that can be utilized in enforcement of goals and objectives of environmental policies of the company can be classified as direct and indirect. Direct tools are considered to include all legislative instruments, i.e. regulations, orders and prohibitions imposed by the top-management that unambiguously determine how the employees should act in certain situations and how non-compliance will be punished. Indirect tools consist in management acts performed with a greater degree of independence and responsibility in relation to the selection of procedures and means intended for fulfillment of the set goals (e.g. contribution to the savings achieved). Of course, all employees should be informed of the results achieved in the area of environmental care, as well as of issues that have to be resolved. In contrast with some other corporate activities in the area of ecology, it is recommended to maintain full openness towards both the employees and the public. This information must be in accord with the principles of truthfulness, transparency and comprehensibility. There are a number of ways how a company can present this information – e.g. in corporate promotional materials, advertising in newspapers, information boards within the company and outside of the premises of the company, presentation activities of the company and fairs.

Acknowledgement of the need for environmental care must be included in strategic plans of the company. In practice, this need is usually satisfied by training and education.

Environmental education includes:

- teaching special professional knowledge in natural sciences in relation to economic and environmental issues.
- training in ethically responsible behavior and conduct in relation to their consequences, in particular, with respect to negative externalities.

Establishment of a good relationship to the environment and its protection requires both knowledge of legal regulations on environmental protection and, in particular, penalties and sanctions for non-compliance, and recognition of the consequences of such non-compliance in practice – directly in nature and also from literature and the media. Future managers must see the potential consequences of any lack of respect to the nature and the effects of such lack of respect not only on nature, but also on health of human beings and their children, and also that this approach could cause shortening of life of people and distress for people both at the present time and in the future. Every future manager must be responsible to himself, his children and family – as well as to his employees, colleagues and the company itself.

As mentioned above, education cannot be ensured without adequate motivation. Balance must be maintained between the necessary degree of control over subordinates and colleagues on the basis of formal authority and motivated interest in environmentally sound behavior and conduct. Training in environmentally responsible conduct is a long-term educational process ensured by special institutions. In Czech Republic, this is ensured by the Czech Environmental Management Center.

Environmental education must be commenced in schools. It must be noted that the current state of the environment is not a result of action of uneducated and unconscious people. In contrast, it is a result of activities of people who were brought up with conviction that they were predestined to control the nature. Today, students should be prepared for resolving issues that have not been addressed by any generation before and - to be completely honest – no generation has ever attempted to do so. It is very appropriate to involve students in various projects in the area of environmental protection, because one's own experience and successful results of one's own work in practice are the best motivation.

Training of managers in environmental protection must be based both on knowledge and understanding of business activities of companies and damage caused by such conduct, and on acceptance of the principles of environmental conduct and their comprehensive implementation in practice. Managers should not only comply with certain environmental principles, but also consistently provide for improving the current state of affairs and also endeavor to adopt suitable measures in the area of environmental protection.

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# IMPLEMENTATION OF EMAS IN THE SLOVAK REPUBLIC

**Emília Bod'ová**

The Slovak Republic, within the accession steps into the EU, in compliance with the EU legal regulation and requirements given in EU Directives No. 761/2001, has created the legal frame through issue the Act No. 468/2002 Coll. on system of environmental oriented management and audit, and the institutional framework with aim to assure the legal security and transparent-ability to satisfy the requirements of the whole process. At this state, the generally binding legal regulation for execution of the objective Act is being prepared for issue.

In compliance with the law on system of environmentally oriented management and audit, **the central body of state administration should be the Department of the Environment**, which shall complete the function of competent body and it is responsible for observance of tasks appointed in the regulation including the registration and accreditation process.

**Technical activities** connected with registration process through providing the support to the institutions being incorporated into the system and with activities linked with information process, shall be provided by the **Slovak Environmental Agency, Centre for Waste Administration and Environmental management**. **The accreditation of environmental verifiers** shall be performed by the **Slovak National Accreditation Service**, whose any accreditation activities realized up to now passed through the evaluation process, which has been performed by the authorities of the European accreditation. It shall participate in meetings of the Forum of Accreditation Bodies (FAB) on accreditation of environmental verifiers and it has prepared the respective documentation (Methodical Directives for Accreditation of Environmental Verifiers) and the procedures upon warranty of the Department of the Environment.

**The Slovak Inspection for Environment (SIE)** shall perform the activities connected with execution of state surveillance and with issuing the statements on fulfilment of terms stated in generally binding legal regulations in the area of environmental maintenance by an institution. The SIE, after entry of the SR in the EU, shall perform the inspection of EMAS' logo application and it shall be authorized to impose penalties for the incorrect or unauthorized application of logo.

The basic processes of the EMAS system are specified in the enclosure to this report.

## **Implementation Steps**

The preparation of legal standard with aim to harmonize the EU Directive No. 761/2001 and further coherent regulations has been realized through the project TWINNING PHARE No. SR/IB/EN/01, within the framework of which the foreign development partners were the PROVINCE TURIN, The National Environmental Agency ANPA ROME and the Regional Environmental Agency ARPA TURIN.

On behalf of the Slovak partner, the representatives of the Department of the Environment of the SR, The Slovak Environmental Agency, The Slovak National

Accreditation Service as the accreditation institution in preparation and the selected legal experts participated directly in the project.

The principal project activities have been oriented to:

- Creation of suitable structure and content of legal regulations,
- Requirements for accreditation process,
- Preparation and quantitative requirements of environmental verifiers, internal auditors, managers of institutions and other subjects interested in, or implementing into the EMAS system, including the requirements for environmental management system implementation in compliance with the regulation and the requirements for preparation of environmental statement,
- Environmental verification process,
- Registration process,
- Task and functional arrangement of institutional scheme links,
- and finally also on possibilities by the state support in integration of institutions into the system of environmentally oriented management and audit, as well as the EMAS integration with other legal standards and processes in the care about environment.

The Slovak development team gained precious knowledge through presentation of practical skills directly

- In the Committee for EMAS and ECO-label with presence of the Mr. president Giuseppe Bianchi,
- In ANPA, where it has been acquainted in details with administrative, professional activities and documentation in connection with the accreditation and registration,
- In the Province Turin with the organizational links concerning the regional operation of EMAS, support and preparation of institutions (preferably with help of industrial unions and extra-governmental environmental institutions), as well as with the activities of the environmental activities' inspection, which shall surveillance the fulfilment of legal standards by the registered institutions, and its total incorporation in the EMAS scheme,
- In registered enterprises dealing with wastes' maintenance and in companies with production feature.

### **Act on Environmentally Oriented Control and Audit System**

Act No. 468/2002 deals with conditions and procedure for application of voluntary environmentally oriented control and audit system in compliance with entire provisions and requirements of EU Directives No. 761/2001. It was approved by the National Council of the Slovak Republic on 25<sup>th</sup> June, 2002 and came into efficiency on 1<sup>st</sup> December 2002. It contains six parts and three enclosures. The particular parts are as follows:

**The first part** → Created by the principal provisions including the main meanings.

**The second part** → Contains the conditions for participation in the environmentally oriented control and audit system with requirements for initial environmental review, for environmental management system, for internal environmental audit and for environmental statement.

**The third part** → It presents the accreditation of environmental verifiers and it contains the conditions and requirements concerning the environmental verifiers (EV) and their activities,

the granting of accreditation, the accreditation proceeding, the certification on accreditation and the list of accredited EV, suspension and extinction of accreditation and surveillance of EV activity.

**The fourth part** → It applies the incorporation of institutions into the environmentally oriented control and audit system with requirements for registration of institutions, conditions for registration maintaining and the application of logo and the reference for registration. The paragraph 22 deals with state support conditions for participation of institutions in the EMAS system.

**The fifth part** → It is devoted to the state administrative bodies, including provisions for proceedings and penalisation.

**The sixth part** → It contains the common, transient and conclusive provisions, relating to the authorisation for performing the professional preparation and the efficiency of the law.

**Enclosure 1** → It contains the requirements for the environmental management system and like the part of the environmentally oriented control and audit system.

**Enclosure 2** → Consisting of particulars and criteria to the environmental statement.

**Enclosure 3** → There is the diagram of EMAS logo and reference for registration in this Enclosure.

### **The Present Status of EMAS Implementation in the SR.**

The Ministry of Environment, in co-operation with the SAŽP (Slovak Environmental Agency - SEA) realized in course of last two years some significant activities, through which it has been provided especially:

- Informing of target groups, which are the industrial enterprises, institutions of various type, public utility and business and trade companies,
- Professional preparation of selected specialists from the part of
  - National certification bodies
  - Consultation companies
  - Enterprises of small and middle-size type
  - Selected schools

with target to start up the accreditation, registration and educational process.

The professional preparation has been realized by the accredited environmental verifiers and consultants from Italy and Germany.

At present period, 118 (one hundred and eighteens) institutions has implemented and certified the environmental management system according to ISO 14001. One institution has been registered since 2001 in the EMAS system. In connection with realized supporting steps, about four institutions among enterprises directly supported by the state are expected to be prepared for registration process till the end of the year. It is being expected, that in connection with the accreditation after issuing of executive regulation to the Act No. 468, which - besides other processes - shall contain also the examinational rules for tests on verification of professional ability for the accreditation of environmental verifiers, in a very

short time the accreditation process for 2-3 national applicants to be accredited as the environmental verifiers shall commence, who are virtually prepared for such an process.

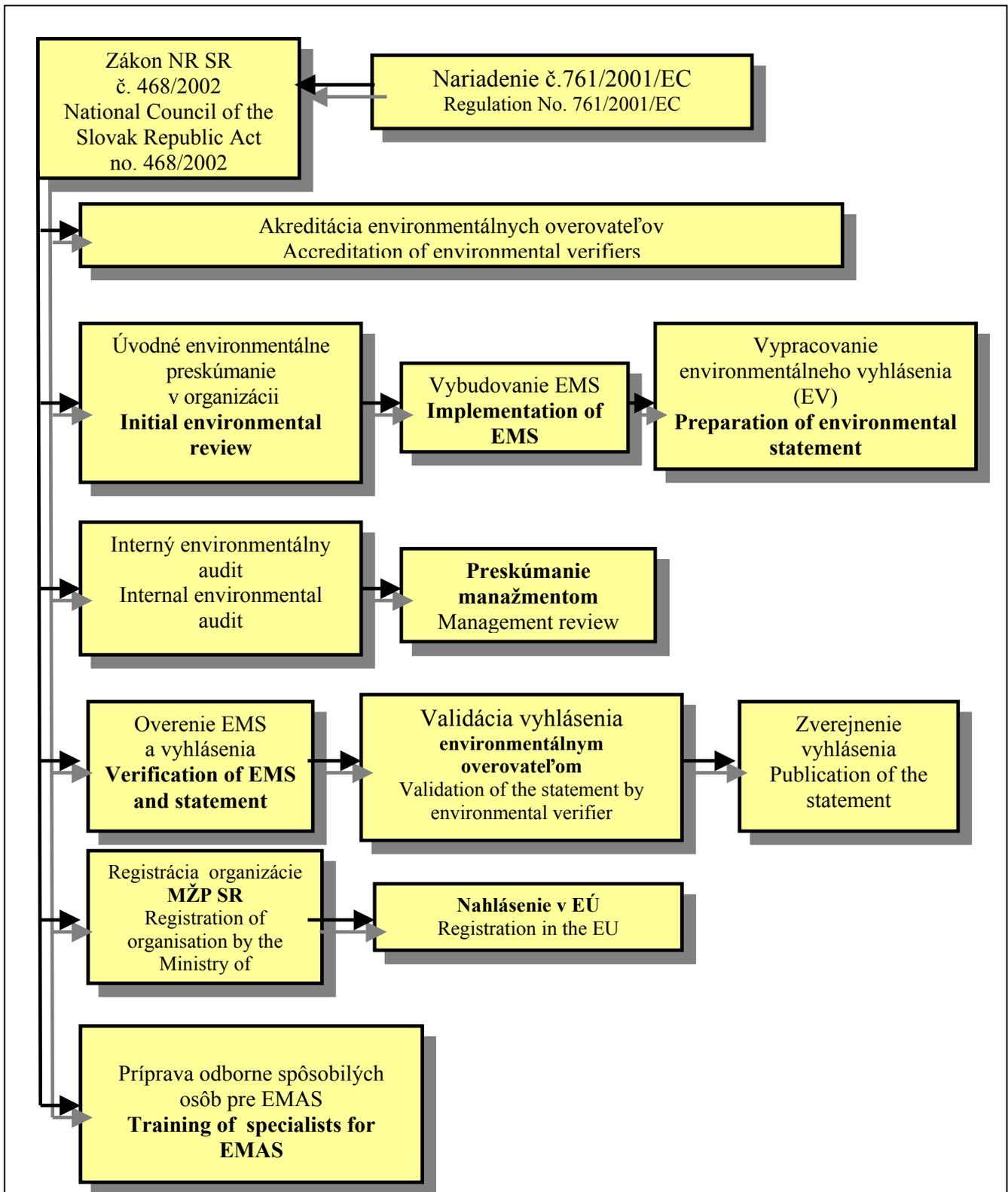
## **Conclusion**

In connection to the abovementioned principal implementation steps can be noted, that the Slovak Republic has created the institutional and technical environment for realization of the voluntary institutional incorporation process enabled in compliance with the EU Directives No.761/2001 within the conditions of the SR. Within the framework of preferred activities of the Department of Environment of the SR are at the same time realized further steps of support defined into the prepared Program. The SEA has outlined the implementation and certification of the Quality Management System according to ISO 9001 into its strategic targets, also in connection with improvement of technical works for EMAS and Eco-label.

As to the institutions, they are expected to be willing to present the level of their environmental behaviour also in spite of high requirements given by the implementation process into the EMAS system when compared with standard EMS certification.

Emília Boďová,  
Slovak Environmental Agency, Centre for Waste Administration and Environmental Management

## Enclosure No. 1 Scheme of EMAS Basic Processes



# EXPERIENCES WITH IMPLEMENTATION OF INTEGRATED RESOURCE (ENERGY) PLANNING IN POLISH CITIES

Dominik Drzazga

## Introduction – the main challenges facing the Polish energy sector

The Polish energy sector depends for a great part on the resources of fossil fuels that can be found in Poland (mainly brown coal and pit-coal). However, too great a proportion of energetic requirements, which is provided for by coal is both uneconomical and inconvenient as far as the environment protection is concerned. In 1995 coal was used to produce 75% of energy in Poland, while the OECD countries obtained only 20% of their energy from coal [Szargut, Ziębik, 2000]. The fuel-types used for energy production in Poland cause great pollution of the atmosphere, while the energy sector is one of the leading producers of green-house gasses and other types of atmospheric pollution (SO<sub>2</sub>, NO<sub>x</sub>, CO, dust).

The Polish energy sector is peculiar in a sense that the solid fuels take up a large proportion of used primary energy. This is one of the reasons for a high level of energy consumption, which is distinctive for the Polish national product. Unfavorable structure of available resources causes an unwanted structure of primary energy sources. The coal monoculture has been dominating for many years now (coal provided around 78% of energy in the 80s). The hydrocarbon fuels accounted for about 20% of energy even in the late 80s [Szargut, Ziębik, 2000]. The existing approach to creating primary energy in Poland has been shaped by a view, which was obeyed for over 40 years and according to which an energetic safety of a country requires that the country is self-sufficient in terms of energy.

However, a new tendency is being observed in Poland – the liquid and gas fuels as well as unconventional (including renewable) sources of energy make up for a growing share of all primary energy carriers (at the expense of solid fuels). Despite that pit-coal still remains the dominant source of energy (table 1).

**Table 1. The structure of primary energy consumption in Poland between 1990 and 1998**

An energy carrier	1990	1992	1994	1996	1998
Pit-coal	62,25	62,27	58,33	57,80	50,64
Brown coal	13,59	14,03	13,65	12,19	13,99
Oil	13,98	14,30	15,48	16,85	20,20
Earth gas	9,00	8,10	8,58	8,72	10,19
Geothermal and wind energy, etc.	1,18	1,30	3,96	4,44	4,98

From: [„Założenia polityki energetycznej...”, 2000].

The primary energy consumption per capita in Poland is similar to the consumption levels observed in Western Europe (about 5 tones conventional fuel / Man·a). However, the level of GNP per capita in Poland is several times smaller than in the Western economies. This means that in the terms of GDP Polish economy is more energy-absorbent than the developed European economies. This results from high rates of heat consumption by the communal and welfare sectors as well as from an excessive energy and material absorptiveness of Polish industrial production, which is characterised by a low level of transformation. This phenomenon is further encouraged by too small a share of energy costs in the final production cost – the prices of energy carriers do not reflect all their social and environmental costs, nor

do they reflect the prices offered on foreign markets. *“It is estimated that around 40% of the increased energy absorptiveness of the GNP is caused by the coal monoculture”* [Szargut, Ziębik, 2000].

The communal and welfare sectors use around 50% of all direct energy consumed in Poland. Such a level of consumption is relatively high, especially when comparing to the developed European economies, where it is on average around 32%. The largest Polish cities obtain their usable energy from large energetistic companies. Some of them are owned by the state, some have already been privatised. These companies were created (or enlarged) after World War 2. They supply energy to the main residential areas, which were created during the same period of time, but also to some pre-war residential areas. Most of them are monopolies on their local energy market. The individual sources of heat (local boiler rooms, which supply individual buildings – the so-called “low emission” sources) are more significant in the old city-centers as well as in small towns and villages. The most common energy carriers in those cases are coal and coke. The individual sources of heat are gradually removed (the buildings are connected to the centralised heating network) or modernised (coal and coke are replaced by earth gas or petroleum).

It is estimated that the harmful effects of the energy sector on the natural environment have caused losses, which are equivalent to 11% of Polish GNP.

### **The reasons for public authority intervention on the local energy market**

Among the three main resources of urban environment (space, matter and energy), only spatial economy has been so far covered by special, largely formalised, planning procedures regulated by the law (the Physical Planning and Spatial Economy Act and the Land Use Act). The public opinion as well as the academic circles and authorities of various levels – both local and central ones – are currently becoming more interested in the problems of energy management in all spheres of human activities. *“The system reform, which is currently being implemented in Poland, brings many changes to managing the energy sector. These changes lead to the privatisation, decentralisation and growth of effectiveness in this sector [...]. The new ideas for optimal planning and management in the energy sector, which have already been verified in many countries, are vital for the development of this sector”* [Zabawski, Zatorska – Sytyk, 2001]. It is believed that rationalising the energy management processes in the communities (the regulation concerning the local energy sector) can significantly stimulate local development [“Planowanie działań...”, 2001]. *“The communal energy sector is an important part of state and regional energetistic policies. Furthermore it provides a significant sphere for economic and social development on the local (communal) level [...]. The communal energy sector should be considered when creating the rules of managing the state. This is more so, since the developing societies strongly integrate economy, ecology (environmental protection) and society. This is expressed by the theme of sustainable development”*. [Hille, Niedziela, Pasierb, 1997]. The sozological (environmental) aspects are also pointed to, because *“proper development of particular communities requires not only an implementation of spatial order and exposing the architectural and landscape qualities of the community, but also a proper state of technical infrastructure, possibilities for supplying the citizens with high-quality water, collecting and purifying sewage as well as the **accessibility to ecologically clean energetistic media**”* [Ebelt, 1999]<sup>1</sup>.

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<sup>1</sup> All undertakings aiming to reduce the consumption of energy have serious consequences. They are strongly correlated with protecting the climate from the negative, anthropogenic influence like the emissions of greenhouse gasses into the atmosphere. The community is the subject of such activities. There are special projects

There are social, economic as well as environmental (sozological) reasons for undertaking actions, which shape the local energy market according to the paradigm of sustainable development. Robakiewicz states that “developing and rationalising the energy market requires a preparation of an appropriate plan and its co-ordinated implementation. These steps may be effectively taken only by the local authorities in particular cities and communities. There are several reasons for this:

1. All economic activities, just like the living conditions of the citizens, depend on stable and constant energy supplies.
2. The state and local authorities have to intervene in the energy market due to the existence of natural monopolies in the sphere of production and delivery of this strategically important resource. Leaving the energy sector for the “blind hand of the market” is impossible.
3. The prices of energy are a never-ending source of conflicts. The producers and suppliers aim at setting the prices at the levels, which would compensate for the costs of production, while the consumers are strongly against any increases of the share that the cost of energy has in their budgets. The only way of solving those conflicts lies in rational usage of energy. Such policy would be impossible to implement on a city-wide scale without the local authorities getting involved.

*The energy market can significantly influence the natural environment. Boiler rooms and heating plants are the most notable polluters of the atmosphere. Caring for the natural environment is one of the primary obligations that the community has. Therefore, preparing a plan for increasing an efficiency of the energy market should be a significant sphere of local government activity” [“Jak zmniejszyć...”, 1994].*

Hille, Niedziela and Pasierb [1997] point to several criteria for specifying the tasks and the role of the communal energy market. They include legal, economic, energetic, ecological, social and financial criteria. Only the ecological criteria will be dealt with in detail in this study (box 1). This is due to the limited space of the study and its overall theme – those who are interested in the remaining criteria should familiarise themselves with the study by Hille, Niedziela and Pasierb.

**Box 1. Ecological (environmental) criteria for specifying the tasks and the role of the communal (municipal) energy market**

1. “Gathering, distributing and usage of energy carriers are the main sources of pollution in a community (i.e. atmospheric pollution caused by the sources of high and low emissions). The living conditions in a community may be drastically improved by choosing environmental-friendly systems of production as well as by effective usage of the energy carriers.
2. A community may go beyond the legal requirements and standards for pollution emissions and choose such economic and social development priorities, which would direct investments into improving the state of the environment. It is possible for a community to have its own ecological policy.
3. The community is the right place in the administration for carrying out sustainable development of the energy market. This is to say that the community ought to balance the social costs of investing directly in reducing the emissions (reducing the “end-pipe emissions”) and removing the effects of inefficient usage of energy”.

Source: Hille, Niedziela and Pasierb [1997].

confirm the involvement of local authorities in protecting the climate, such as “Our community protects the climate”. There are also publications on this topic. These undertakings are organised by the NGO: the Institute for Sustainable Development and the EkoFundusz Foundation. [“Nasza gmina...”, 2000], [“Mniej...”, 2000].

The definition of sustainable development may be applied to managing the energy within a city – *“the communal energy market should strive to fully and reliably provide for all demand by the consumers. At the same time, sustainable development of energetistic sector should take into consideration the current as well as the future needs of the local society, local economy and the issues of environment protection”* [“Planowanie działań...”, 2000].

### **Formal and legal conditions for energetistic planning in communities**

A rational organisation of energy management may require implementing the **energetistic planning** procedures in communities. Dobroczyńska gives the following definition of a planning process: planning concentrates *“on choosing the goal and guaranteeing that the goal is reached. Any given sphere of activity requires such an approach. However, the economy is where planning is most useful. The modern economic planning is firstly a procedure of conscious and systematic processing of economic and technical information in order to create cohesive strategies (which cover the existing conditions and limitations) – the best ways of reaching the objectives – and secondly a complex social process, which resolves into a peculiar conflict of what is required and what is possible. This ‘game’ requires on one hand a detailed knowledge of the object (including its environment), which is being planned for, and certain methodological abilities (planning methods and techniques) on the other. Even when these conditions are met the results often fail to meet the expectations”* [Dobroczyńska, 2000].

While “The Energy Law” was not yet in force, that is before 1997, the energetistic planning meant planning for the development of energy systems, including the usage of specified energy sources. This approach concentrated on planning among the suppliers – on energy production, transmission and distribution systems. When “The Energy Law” came into force, the energetistic planning gained a new, additional dimension. This Act puts a lot more emphasis on planning the demand on the energy market (planning applies to the consumers, reflecting the modern macroeconomic trend, which sees the demand as the main factor steering the economy). At the same time the planning tasks are shifted from the central and regional levels to the local one (a community or a city) on one hand, and from the energy sector to the communal sector on the other. Energetistic planning has been thus applied to the usage of energy carriers on lower levels, with the emphasis on the communal and welfare sectors.

Dobroczyńska [2000] states that *“the primary goal of The Energy Law, passed on April 10<sup>th</sup>, 1997 (Dz. U. Nr 54 / 1997, position 348 with later changes), was to create the conditions ensuring the energetistic safety of the country and reasonable prices for the population. The rules of conducting the energetistic policy of the state as well as supplying and using various fuels and energy sources, which were specified in the Act, are the means to achieve national safety and acceptable prices. The specific tasks have to be divided between the central government and the local governments in order to implement those rules. The Economy Minister is the superior central government body, responsible for the issues of energetistic policy. Bearing that in mind, the Act gives a specific role to the local governments, which are obliged to fill the energetistic policy with detailed aims and strive to achieve them, through planning and organising heat, electric energy and gas fuels supplies within the boundaries of a community (article 18). This regulation has shed more light on the earlier regulation, which had been formulated in the Local Government Act passed on March 8<sup>th</sup>, 1990 (Dz. U. Nr 13 / 1996, position 74 with later changes). The earlier Act had provided that supplying the society with energetistic media is one of the obligatory communal tasks, which should be carried out by the local administration under a supervision of the local government. The same fact has*

*been supported by the changes of several Acts, which determine the competences of public administration. These changes may be found in an Act passed on July 24<sup>th</sup>, 1998 (Dz. U. Nr 106, position 668)”.*

Formally, the public authorities may intervene on the local energy markets under the provisions of the Communal Local Government Act passed on March 8<sup>th</sup>, 1990 (the original text may be found in Dz. U. Nr 16 / 1990, position 95; the updated version may be found in Dz. U. Nr 13 / 1996, position 74)<sup>2</sup> and “The Energy Law” passed on April 10<sup>th</sup>, 1997 (Dz. U. Nr 54 / 1997, position 348 with later changes). “The Energy Law” provides (articles 18 to 20) an extensive and detailed range of regulations concerning the duty of a community to supply energy (they are dealt with in more detail further down in this study). Finally, such intervention is possible under the provisions of an Act passed on July 24<sup>th</sup>, 1998, which has changed several Acts determining the competences of public administration due to the system reform (Dz. U. Nr 106 / 1998, position 668). The aforementioned **energetic planning**<sup>3</sup> is a peculiar instrument, which may be used for intervention purposes. Using energetic planning is both formal and obligatory. It should allow the communal authorities to shape the local energy market. *“Generally, the communal competences in this sphere come down to the obligatory co-ordination of energetic planning activities. The community ought to initiate the creation of energetic infrastructure within its boundaries, despite the fact that the community rarely owns such an infrastructure (although there are still many communal - municipal energetic enterprises). Involving the community in this process aims at eliminating accidental or uncoordinated activities of various enterprises. Some of them, the so-called network enterprises, have been obliged by the law to prepare development plans striving to satisfy the current as well as the future demand for gas fuels, electric energy or heat. They have to take into consideration the local physical plans or the directions of communal development, which are described in the study of spatial development directions (article 16). All plans concerning electric energy and gas have to be agreed upon by the Chairperson of The Energy Regulatory Authority of Poland because they must be prepared in accordance with the law and the energetic policy of the state and, what is more, they must carry into effect the requirement of balancing the interests of energetic enterprises and the consumers of energy (article 23, passage 1). Since heat is not covered by those regulations, the community has a greater responsibility for this sphere of energetic planning”* [Dobroczyńska, 2000].

The energetic planning mechanism, which has been introduced in the communities by articles 18 to 20 of “The Energy Law”, includes all the ideas that are the essence of **Integrated Resource Planning** – an instrument used by the developed countries (in Poland it is known as “**integrated energetic planning**”). According to Żmijewski [1998] “The Energy Law” introduces the IRP to the Polish energy management practice, even though the term ‘IRP’ does not appear anywhere in the text. Therefore, whenever the term ‘energetic planning’ is used in relation to the communities, we have the IRP procedure in mind.

According to the provisions of “The Energy Law”, the energetic planning (IRP) should cover energy management in a community (*planning and organising the heat, electric energy and gas fuels supplies within the boundaries of a community*) – article 18, passage 1, point 1). The energetic enterprises and the communities (local authorities, which represent the

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<sup>2</sup> Article 7.1 of the Act states that it is the duty of the community to provide for the collective needs of the society. The communal duties cover in particular: the issues of spatial order, land management and environment protection [...], electricity energy, heat and gas supplies.

<sup>3</sup> Article 18. 1 of the Act provides that as far as electric energy, heat and gas supplies are concerned it is the duty of the community to plan and organise these supplies within the boundaries of the community in question.

interests and requirements of local society and act – by making decisions – in accordance with the rules of constant and sustainable development) are the subjects of energetistic planning (IRP)<sup>4</sup>.

The contents of local physical plans, the study of spatial development directions<sup>5</sup> and the development plans of energetistic enterprises, which operate in a given community need to be taken into consideration and integrated during the energetistic planning (IRP) process. Energetistic planning (IRP) ought to be a continuous procedure (i.e. it should be repeated periodically). Formally, there are two types of planning documents that the communal council should agree upon under the provisions of “The Energy Law”:

1. The assumptions of the heat, electric energy and gas fuels supply plan (article 19).
2. The heat, electric energy and gas fuels supply plan (article 20).

Should the first of the two lie in line with the plans prepared by the energetistic enterprises, there is no need of creating the second one. It ought to be emphasised however, that *“the Act is very vague when formulating the demands concerning the object of planning procedures (i.e. the analysis of current and future demand for energy and comparing it to the capacity for meeting it), forms of public discussion, acquiring the opinions of the voivodship local authorities (including the voivode) [...], as well as co-operation with energetistic enterprises. The last of these spheres is the toughest one – there is a real danger that the community’s interests will become dominated by the aims of the energetistic monopolies”* [Dobroczyńska, 2000].

The local authorities ought to formulate the energetistic policy of the community prior to preparing the aforementioned documents. This policy may be formally included in the *assumptions of the heat, electric energy and gas fuels supply plan*. In that case *the heat, electric energy and gas fuels supply plan* would become a tool for implementing the energetistic policy of the community.

The assumptions to the heat, electric energy and gas fuels supply plan and the heat, electric energy and gas fuels supply plan<sup>6</sup> should be prepared in accordance with the social and economic development strategy of the community<sup>7</sup> as well as with the provisions of the energetistic policy of the state (the document entitled “The provisions of Polish energetistic policy until 2020” is currently binding – it has been agreed upon by the Cabinet on February 22<sup>nd</sup>, 2000). Furthermore, they should also take into consideration the energetics and heating industry development prognoses as well as the other concepts that the appropriate (regional or national) authorities may have for the development of the energetics sector.

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<sup>4</sup> Not only local authorities and energetistic enterprises may become involved in the IRP processes. It is also possible to include the other local or regional institutions dealing with the energetic sector (representatives of the housing communities, energy conservation agencies, etc.). *“The energetistic planning process is restricted to only two subjects – the energetistic enterprises and the community. The remaining parties have limited competences. They may issue opinions concerning the plan, suggest their proposals, etc. They do not have any powers to make decisions”* [Dobroczyńska, 2000].

<sup>5</sup> They have to be prepared according to the provisions of the Physical Planning Act passed on July 7th, 1994 (the updated text: Dz. U. Nr 15 / 1999, position 139).

<sup>6</sup> These documents are often called the **energetistic strategy of a community**, because they contain a detailed and complex analysis of the communal energy market. [Cena, Żurawski, 2000], [“Oszczędzanie...”, 2000].

<sup>7</sup> *„It is important whether the community decides to develop through farming, tourism or industry. These various fields of economic development imply a different strategy of energetistic development. Hence, determining the nature of a given community will greatly affect its energetistic sector”* [Cena, Żurawski, 2000].

*“The heat, electric energy and gas fuels supply plan should be based on the assumptions of social and economic development of a city. These assumptions determine the needs of developing the specific types of energetistic infrastructure. They are also a determinant of the physical plan prepared as a part of the study of spatial development directions and the local spatial plan”* [Zabawski, Zatorka-Sytyk, 2000].

Dobroczyńska points out the main functions that the communal planning documents have in terms of managing energy. *“The assumptions of the energy carriers supply plan should serve as a base for comparing the demand for the particular carriers with the development plans of energetistic enterprises”* [Dobroczyńska, 2000]. *“The heat, electric energy and gas fuels supply plan on the other hand is the tool for attaining energetistic order in the best interest of local society and economy. The energetistic order means:*

- *that the communal social and economic development goals lie in line with the development plans of energetistic enterprises;*
- *a harmonious co-operation with all subjects on the local energy market in order to ensure the supplies of heat, electric energy and gas fuels;*
- *that there are conditions for a competitive energy market to appear;*
- *that there are external investors interested in developing the energetistic infrastructure according to the community’s requirements”* [Dobroczyńska, 2000].

The box below (box 2) presents an example of methodology used by the Łódź local authorities in creating the “Assumptions” and the “Plan”.

**Box 2. Basic methodology of preparing the “Assumptions” and the “Plan”**

Zabawski and Zatorska-Sytyk [2000] propose the following stages:

**Stage I.** Formulating the assumptions – a general strategy of the city [...] for creating the so-called “energetistic order”, which satisfies the social and economic goals of the city.

**Stage II.** Preparing an introductory outline of how the goals should be reached within the general strategy.

**Stage III.** Adding detail to the introductory outline and preparing the basic variants of achieving the goals.

**Stage IV.** Analysing the basic variants using benefit-loss tests for all subjects on the local energy market.

**Stage V.** An assessment and choice of the best variant; choosing the instruments.

As far as the *Energy Law* is concerned:

- Preparing the assumptions to the plan is carried out during stage I.
- Preparing the plan itself is carried out in stages III, IV and V.
- Stage II links the preparation of assumptions to the preparation of the plan.

An integrated resource planning is a meritorical link between the above method and the procedures. IRP links manufacturing, transmitting and distributing the energy to its consumption in order to meet the demand for energy at the lowest possible cost.

Dobroczyńska [2000] states that *“The Energy Law does not specify when the planning documents should be prepared and passed, but it is not wise to put it off for too long because possessing them offers many potential advantages. These advantages include:*

- *the community may implement its own energetistic and ecological policy, which ensures the safety of energy and gas fuel supplies, the reduction of energy services’ costs and the improvement of the state of the natural environment;*
- *the energy consumers may expect better accessibility to energetistic services and a better price for them;*
- *the energetistic enterprises may expect a better definition of the future local energy market and a more reliable prognosis of demand, which may allow them to avoid unnecessary investments concerning the systems of manufacturing, transmitting and distributing energy”.*

**The environmental aspects of integrated resource planning (IRP)**

The integrity of local energetistic planning means an integration and cohesion between the goals of the energy market and the goals of environment protection. IRP should thus take into consideration the widely defined environmental aspects of the local energy market apart from caring about its economic aspects (reducing the cost of energy).

The local programmes of reducing the pollution emitted by the energetics industry (if there are any) have the same goals as the energy, electric energy and gas fuels supply plans. This becomes obvious when the total external cost of environmental protection is calculated into the cost of manufacturing, transmitting and distributing energy. Hille, Niedziela and Pasierb [1997] state that the external costs of environmental protection are still gravely underestimated. This is why the heat, electric energy and gas fuels supply plans ought to strive to reduce the pollution emissions (i.e. the low emissions) of the energetics industry. Integrated resource planning should be the base for all heat, electric energy and gas fuels supply plans in order to provide a more objective tool for choosing environmental priorities.

*“An assessment of the energetics’ impact on the environment is a vital part of energetistic planning in a community”* [“Planowanie energetyczne...”, 2000] because *“it is impossible to plan for the energetistic development of a community without knowledge concerning the impact that the particular variants have on the environment”* [“Planowanie energetyczne...”, 2000]. What is more, all considered variants of supplying the community with energy need to be assessed from the environmental point of view. This analysis has to lead to the best solutions in terms of environmental and climate protection. *“It is necessary to prepare energetistic plans for those communities, which see the need to reduce the emission of greenhouse gases”* [“Planowanie energetyczne...”, 2000] because protecting the climate is a top priority in integrated resource planning. An aforementioned analysis should concentrate on identifying the sources, the levels and the causes of polluting emissions. The recommended energetistic solutions need to take the increasing importance of atmospheric protection into consideration. Atmospheric protection becomes particularly important since Poland is aspiring for a European Union membership, which will pose new demands concerning environmental protection. All solutions that are planned for have to meet Polish as well as European Union standards.

These conditions are particularly important for sustaining the development of energetistic market and should be carefully considered when the energetistic strategy of a community is being prepared:

1. The protection of natural environment, mainly through atmospheric protection (reducing the polluting gas emissions).
2. The available energetistic resources: local, regional, national as well as global.
3. The diagnosed changes of energy carriers’ prices.
4. The possibilities of reduced energy consumption (energy-saving and more effective usage of energy).
5. The possibilities of using the renewable energy sources.

A multidimensional approach to finding possible reductions in energy consumption should be one of the key assumptions of an energetistic strategy (an energy supply plan) of a community. Cena and Żurawski [2000] state that *“energy-saving ought to be the main postulate of the energetistic strategy of every community”*. The reductions are possible through<sup>8</sup>:

1. A more rational consumption of energy in buildings.
2. Increasing the energetistic effectiveness of manufacturing, transmitting, distributing and regulation of energy – energy conservation.
3. Using the renewable sources of energy to a greater extent.

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<sup>8</sup> A more detailed information concerning specific actions aiming at reducing the consumption of energy may be found in [Oszczędzanie...”, 2000].

4. Promoting modern, energy-saving types of construction for newly constructed housing and commercial buildings.
5. Educating the local society.

Dobroczyńska [2000] analyses the required contents of the document entitled ‘Assumptions of the heat, electric energy and gas fuels supply plan’ and states that “*a more rational consumption of energy needs to be classified as one of the needs that the communities have in regards to the energy management. Supplying heat and the accompanying emissions of pollution are the most significant part of energetic planning for most communities. Hence there should be a theoretical programme of modernising the heat manufacturing plants in order to increase their effectiveness and reduce the pollution levels, including the so-called low emissions. Increasing the role played by the associated economies in manufacturing of heat and electric energy should also be considered (as long as it would be economically viable). The assumptions should also include the local sources of energy (wood, straw or peat) as well as the possibilities of using unconventional and renewable sources of energy such as wind, solar, water or geothermal energy. The cost of manufacturing energy from these sources is still higher than the cost of using conventional sources. However, the future technological advancement and more suitable legal and financial regulations have to be kept in mind*”.

The IRP mechanism allows a complex, holistic approach to the energy management in a community. This means that all stages of energy management (from manufacturing to consumption) are considered. Hence the rationalisation – savings, increasing the effectiveness as well as reducing the direct negative influence on the environment (atmospheric emissions) – may be carried out in the most sensitive parts of the energetic system and in the most effective way. This implies that all actors on the local energy market (the suppliers, the consumers and the public authorities) may become involved in the process of rationalisation.

### **Reducing the consumption of energy in large cities – conclusions**

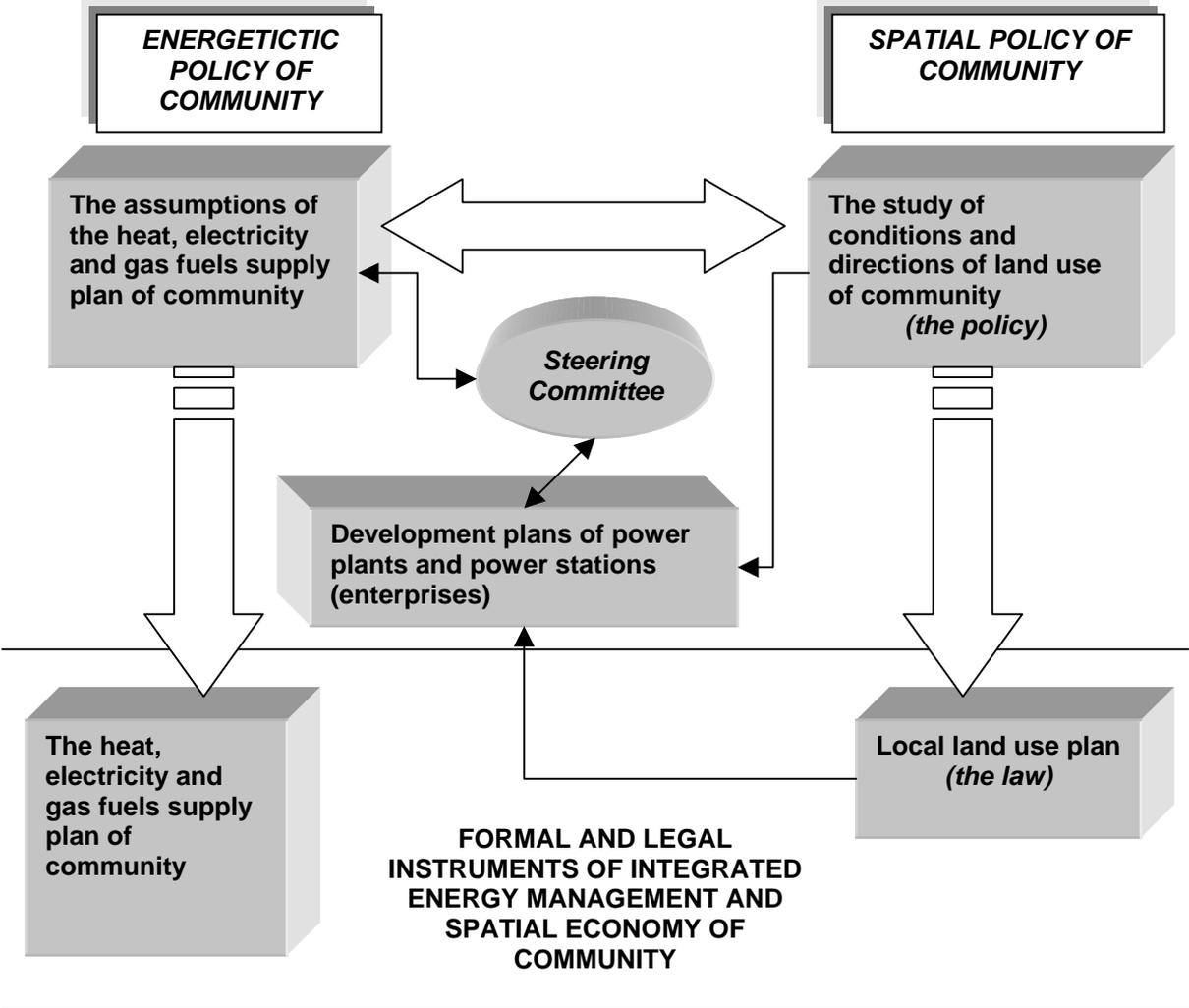
Integrated resource planning requires state interventionism on the market in order to work well. The local public authorities have such competences under the provisions of “The Communal Local Government Act” and “The Energy Law”.

Integrated resource planning may be used by the authorities as a tool for managing the sustainable development of the urban energy market. It is believed that despite current changes in the energetic sector, “*the Energy Law and an increasing involvement of local governments in improving the quality of city air, will be the main forces causing an implementation of integrated resource planning*” [Hille, Niedziela, Pasierb, 1997].

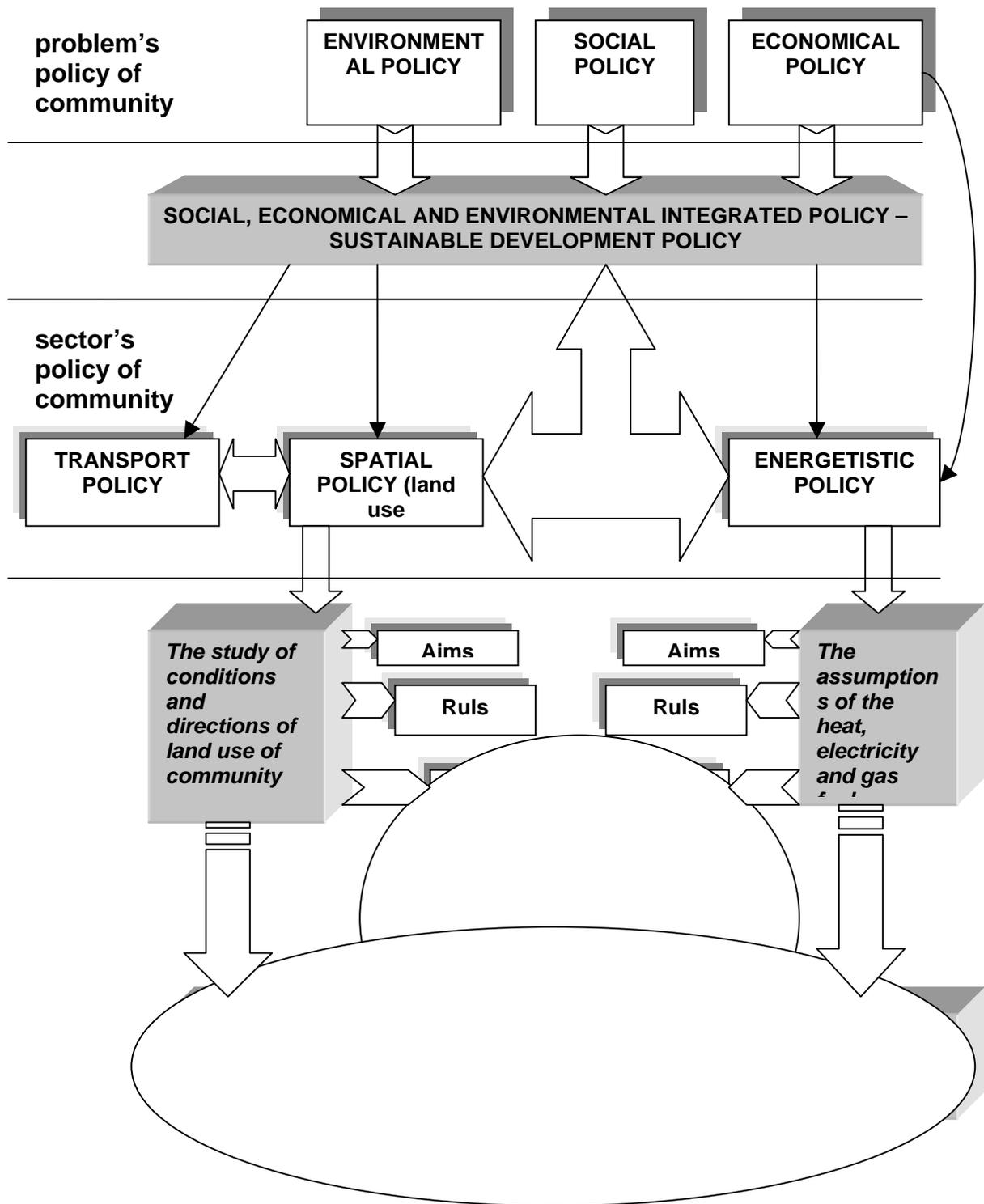
In conclusion it ought to be said that the IRP process, which was characterised above, is but an instrument for a more rational supply of heat, electric energy and gas fuels. That is why using IRP does not solve all the complex problems, which are to do with energy consumption. It should be a part of a wider system striving to rationalise the energy consumption and to protect the climate. A system, which would cover transportation, industry (including the energetic industry) and the communal and welfare sectors (construction, housing, services, households). Therefore, the energetic strategies of a community must not be restricted solely to the energetic industry and the receivers of energetic media, but also to reducing the consumption of energy in the transportation sector for example. The problematic energetic relationships within cities show that there is a need to deeply integrate the spheres of energy management and, for example, spatial management.

Problems related to energy management as a whole go beyond the problems of managing the so-called energetistic sector. A broad, complex approach, which is not restricted to the energy supply plan for a community, is necessary to solve these problems. Such a plan is needed, but it is only one of many instruments, a part of a greater energetistic strategy, which strives to reduce the energy consumption in all urban subsystems. Integration of all activities, which strive to rationalise energy consumption, is made possible only by a complex, multidimensional approach to the urban sustainable development, such as AGENDA 21.

Picture 1 and 2 shows the further, possible and highly recommended position of Integrated Resources Planning as a part of local sustainable development's strategy. Current situation of IRP implementation in Polish cities indicates that the process of integration between energy management, spatial planning and environmental protection is still on the very early stage.



**Picture 1. The scheme of integration between energy policy and spatial policy of community, and instruments of integrated energy management of community.**  
 Source: personal compilation.



Picture 2. Integrated energy management of community, with its formal and legal instruments, as a part of the local sustainable development's strategy.

Source: personal compilation.

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# SYSTEMATIC DEFINITION OF LCA METHOD

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In the frame of EURO WASTE, the statistic base is compiled by a system including LCA. This report deals with the systematic definition of this method.

## **1. Introduction**

The LCA /Life Cycle Assessment/ Method is the most extended method of assessment of human impact on the environment.

This method is specific in dealing with the whole life cycle of a product, including raw materials extraction, the production process, the product usage and its disposal.

## **2. LCA Method Description**

This method has four main parts :

### **A/ Goal Definition and Scoping**

At this stage, the purpose of the analysis has to be stated clearly and there has to be also specified what the results of the analysis will be used for. It should be specified whether the analysis is intended for internal usage /e.g. when choosing new, environmentally friendly production method/, or for decisions and strategic choice on the national level. It is also necessary to specify geographical /regional, national.../ and time validity. The scope is often additionally adjusted according to the obtained data.

Next, it is necessary to set so called functional unit. This unit must be easily measurable and in compliance with the aim of the analysis and the input and output data. It could be for example the amount of fuel burnt to produce one production unit etc.

Finally, the requested quality of data must be specified. The final quality of the analysis depends substantially on the initial data quality. Generally, we distinguish primary data gained through measurement/ compiled, if possible, by the author/, and secondary data, obtained from the statistical yearbooks, specialized literature etc. The quantity of data and their completeness are also taken into consideration.

Inventory analysis is an essential part of Life Cycle Assessment Method. The method study energetic and raw materials flows as a part of the life cycle of the investigated product or service. The initial data are raw materials, fuels and materials used in the individual stages of the life cycle. The output data are products, secondary product, waste, emission of pollutants and energetic emissions /noise, radiation, heat etc./

With LCA Method being most widely used for the assessment of the life cycles of the mass production results, the assessment takes the life cycle of a product or service as a system with further inputs and outputs. The system borderlines must be precisely determined and what is behind these borders is defined as system background.

The investigated system is then divided into separate processes. It must be taken as a kind of simplification with detailed analysis of other individual systems, often in the form of graphs describing the production process stages. The division into separate processes enables enhanced inputs and outputs identification.

It is very important to take into consideration all the processes of the product or service life cycle. This is the reason why the electric energy life cycle includes primary raw materials extraction. Similarly, plastic products assessment must deal with petroleum

extraction and transport etc. We cannot neglect processes related to raw materials and materials transport involving frequent consumption of energy and fuel.

## **B/ Impact Assessment**

At this stage of LCA, the data received through inventory analysis are assessed from the environmental point of view. Generally approved unified methodology for the impact assessment has not been developed yet. However, the assessment process includes the following steps:

**Classification** - the data received through inventory analysis are classified into groups and further impact categories. These categories include three main environmental impacts - resources exhaustion, impact on human health and impact on so called ecological health.

**Characterization** - it is a quantitative analysis of the impact. An equivalent unit is set up to convert individual partial impacts to a common base. Next, so called optimization follows, the aim of which is to display relative area related harmfulness of individual impacts and to take various regional preferences into account.

The final assessment states the importance of individual results in relation to the aim of the whole analysis. In case that we compare two or more systems, the main area of interest should be which of them shows lower or higher values in comparison to the other systems. If it is not a comparative study, we should find out which parts of the product life cycle are the most environmentally unfriendly and thus we have to pay special attention to.

## **C/ Enhancement Proposal**

The aim of this final stage is to find and assess ways of possible enhancements or improvements of faults revealed in the previous stages. For processes with negative impact on the environment, we try to find an alternative. In case we assessed more than one alternative, we should choose the process with the lowest bad impact etc. Designing new technological or construction changes of products and services is not included in LCA, but the results of the analysis could consequently be used for their development and application.

## **3. Conclusion**

LCA Method is not the only method available to assess the human impact on the environment. It researches the whole life cycle of products or services including the final stage of waste disposal. When being implemented to the company decision making process /e.g. the introduction of environmental management/, LCA method can bring reasonable improvements regarding waste and environmental policy in general, not to mention potential economic advantages such as fuel and energy cost decrease.

Thus, application of this method should not be seen as obstruction and useless restriction, but as a competitive advantage. Besides the above mentioned cost-saving, companies should consider the role which this could play in the company image making.

Together with continuous unification and enhancement of this method, we could see growing demand for this system. A wide range of software applications are available, with help of which LCA studies could be simulated on computers and which automatize and simplify calculations.

There also exist different methods for rating the impact of human activities on the environment, for example SEA /Strategic Environmental Assessment/ or EIA /Environmental Impact Assessment/.

SEA could be defined as a kind of strategy or an attitude to plans and projects assessment from the environmental point of view. It is a kind of environmental policy, specified in EU guidelines /2001/. The aim of this policy is to ensure that some investments and projects are environmentally assessed before being implemented or realized. Following the official approval, the public is informed about the results of the decision process. In general, the aim of SEA is to participate in the continuous development policy implementation.

EIA then represents a practical method applied in the decision process concerning particular projects in compliance with environmental policy set by SEA. SEA as well as EIA is embodied in the European Union legal system in the form of guidelines.

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# TRANSPORT FLOW DURING LIQUIDATION OF USED PRODUCTS

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An optimal model of transport flow during liquidation of used products is an important part of the research. This article deals with possible system modelling using neural network.

## **1. Introduction**

For this academic research, it was necessary to define a fundamental system in the frame of which we will consider the production technology of given groups of products and their life cycles including their liquidation, which should be optimal from different points of view.

## **2. Modelling the investigated system**

Model could generally be represented with the help of Artificial Intelligence. This perspective field development is closely related to the development of computers and with sociotechnical devices recognizing scenes and surroundings. There exist a number of artificial intelligence technologies. These are represented by applications drawing upon biology - for example neural networks and genetic algorithms, physics, mathematics and logics - for example technologies modelling and identifying chaos and technologies exploiting fuzzy groups. These technologies form groups based on computer models of solving problems with a source of expert information / expert systems/, groups based on inductive theory and others. The artificial intelligence main strengths are expert tasks /financial analyses, engineering,.../, formal tasks /games and simulating exercises/, other tasks with e.g. natural language recognition, perception processes etc.

*The most widely used artificial intelligence technologies are now as follows:*

- **neural networks.** Artificial neural networks try to exploit the principles of human brain - neural networks. There exist various neural networks representations and their interpretations - for economic tasks, the multilayer neural networks will be suitable as it enables clearer identification of nonlinear relations,
- **genetic algorithms.** There are chromosomes /like in biology/ in genetic algorithms, such as chains of bits, fields, trees lists and other objects. The chromosomes carry important information concerning the system item. The information could be encoded in binary format / it is possible to encode more pieces of information/, or in other formats. The chromosomes in the first generation are generated accidentally - their value for the following generations is set-up with the help of special function. This is then followed by reproduction - selection, crossover and mutation. Genetic algorithms could be used for example when assessing the neural networks outputs. In economics, they are used e.g. in optimization tasks of assets allocations,...
- **fuzzy logic technologies**
- **systems identifying and modelling chaos**

## **3. Transport flow modelling by neural networks**

The neural networks copy the biological model of neural structure of human brain. The cortex contains about 15 milliards neurons, each of which could be linked to up to 5000 other neurons. Every neuron consists of body, dendrites and axons. Various kinds of synapses then transmit the information [1]

This theory is fundamental for the mathematic neuron model. If  $x_1, x_2, \dots, x_n$  are real neuron inputs and  $w_1, w_2, \dots, w_n$  synaptic line on these inputs, then

$$\zeta = \sum w_i \cdot x_i \text{ pro } i = 1, \dots, n$$

defines the internal potential of the neuron. The neuron then activates the potential in the output:

$$y = \sigma(\zeta).$$

The most important quality of neural networks is that we could teach them. We enter individual training models, always inputs and requested outputs. The neural network replies accidentally at first, but it gradually adapts its synaptic lines to the given algorithms, as there is a discrepancy between the calculated and requested values. Finally it understands the relationship between the quantities and is then able to provide appropriate outputs to entered inputs. Whether the input values were included in the training group or not is irrelevant. The aim of the proposed model will be to minimize used products storage costs on one side and liquidation costs on the other. The transfer model consists of:

- a part representing afferent neural network studying up-to-now development and estimating the transport claims
- a part that could follow the previous one and could be formed by genetic algorithm. The gene is then the number of used products of certain sort, the chromosome the state of supplies of all investigated products. When setting-up the generation we always consider several alternatives of possible supply structure. The generation is then accidentally chosen group of these alternatives. One person can for example represent maximal supply, other person minimum supply, other some middle value etc. The number of investigated alternatives and thus the number of people in the generation is defined by the user. Crossover is defined as a combination chosen from two chromosomes, it means from two possible states of supplies of stored used products. A group of products from both alternatives is always chosen. Mutation is random change in the number of liquidated products in one of the possible alternatives.

#### 4. Conclusion

Artificial Intelligence is a modern and rapidly developing discipline, which is now used in various fields and branches. It could be widely used in economic informatics too. Compared to classic models these systems provide the following advantages:

- Classic program requires precise algorithm of calculation, which does not usually exist for present economic processes. Systems exploiting the methods of artificial intelligence could work with approximate information, in a atmosphere of uncertainty and risks
- a change of conditions in which classic program works, requires also change of the program including possible subsequent faults, while in case of artificial intelligence based systems such a change represents registration of new rules for productive systems at the most. Neural Networks and genetic algorithms adapt to new conditions automatically.

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# ASSESSMENT OF EFFECTIVENESS OF ENVIRONMENTAL INVESTMENTS

Miroslav Hájek

The aspect of implementation of environmental investments is often addressed in corporate decision-making. On the one hand, such investments are required due to administrative instruments, voluntary standards (ecolabelling), increasing demands on products and ever more expensive environmental measures. On the other hand, there is usually inadequate information on cost-effective solutions. This often leads to implementing of an environmental investment that is not the best amongst the possible options, both from the viewpoint of management of the company and from the viewpoint of environmental protection.

A fundamental aspect in assessing environmental investments is related to the fact that individual investors use different approaches. In principle, a number of generally known methods can be used in a certain case, usually including monitoring of the magnitude of costs.

A cost effectiveness analysis is the best known analysis used with various modifications, as specified below. The analysis consists in assessment of costs required for implementing an environmental protection measure from various points of view.

## Assessment of investment costs

The most simple example consists in assessment of investment costs required for resolving a single issue. Comparison is carried out between the magnitude of investment costs required for various solutions. Subject to satisfaction of the requirements following from the terms of reference of the given project, the solution encompassing the least investment cost is selected. This procedure is usually followed in resolving individual issues connected with environmental protection where a tender procedure is announced for resolving of these issues and the above mentioned criteria are used, i.e. the solution entailing the least investment costs is selected as the most suitable (of course, subject to complying with the set parameters of the solution).

## Assessment of investment cost of various projects

A common issue is connected with limited financial resources on the one hand and an almost unlimited number of projects concerned with environmental protection on the other hand. In this case, evaluation is concerned particularly with specific investment requirements, e.g. for removal of a unit of pollution, and priority is given to projects with the lowest specific requirements.

$$S = \frac{IN}{Q}$$

S ... specific requirements

IN ... investment costs

Q ... magnitude of pollution

This procedure is based on the theoretical relationship between the magnitude of pollution and the costs of its removal from which it clear follows that the lower is pollution the higher are the costs of its removal and the amount of pollution removed per unit cost gradually decreases.

## Evaluation of investment and operational costs and the time factor

In addition to investment costs, operational (current) costs that constitute another viewpoint in project evaluation are fundamental for decision-making on project implementation. Operational costs must be comprehensively assessed in cases where evaluated projects have an identical solution and entail the same investment costs. Costs can be recalculated to the Present Discounted Value of Costs (PVC) for the purposes of evaluation in an adequate term.

$$PVC = \sum_{n=1}^n C_n \left( \frac{1}{1+r_n} \right)^n$$

or

$$PVC = \sum_{n=1}^n K_n \left( \frac{1}{1+r_n} \right)^{n-1} + \sum_{n=1}^n C_n \left( \frac{1}{1+r_n} \right)^n$$

where costs of acquisition of an investment (K) are expended in a lump sum in the first year and operational costs (C) are the same each year, the calculation can be simplified as follows:

$$PVC = K_1 + C \sum_{n=1}^n \left( \frac{1}{1+r} \right)^n$$

The Annual Average Present Value of Cost (APVC) is used for comparison of a number of projects (with various life terms).

$$APVC = \frac{PVC}{n}$$

Another option consists in transferring investment costs to yearly flow values

$$TC = C + K \cdot A(r)$$

where  $A(r)$  is the investment renewal factor (the annuity factor) which ensures conversion of K to the flow of annual payments. Annualization is considered to be a payment at the end of the year in real monetary units cleared from the effect of inflation. (Sejak 1997)

### Evaluation of the magnitude of avoided damage

A better indicator of specific costs can be obtained by relating the eliminated pollution to avoided damage (rather than the construction costs). The risks following from eliminated pollution expressed through the amount of damage are thus reflected in this indicator. However, this indicator cannot be accurately expressed in money which is a fundamental shortcoming. Nevertheless, in considering implementation of an environmental investment, the magnitude of costs can be expressed using other known methodologies.

Importance of this method is clearly demonstrated e.g. by data stated in the materials prepared at the Luzern Conference of the Ministers of the Environment (April 28-30, 1993). It follows from the conclusions of assessment of introduction of gas in Poland that a ton of SO<sub>2</sub> and NO<sub>x</sub> emissions from low chimneys causes 2.5 times the damage caused when high chimneys are used and for fly ash emissions this ratio is 12:1. Recalculation for the conditions in the Czech Republic indicates that households and small plants burn 8 – 10% of the overall amount of coal burnt, but their contribution to the overall environmental damage equals one third (Sejak 1994).

### Cost effectiveness analysis and reduction of risk

Application of a method based on comparison of the amount of costs and the health risks consists of the following steps<sup>9</sup>.

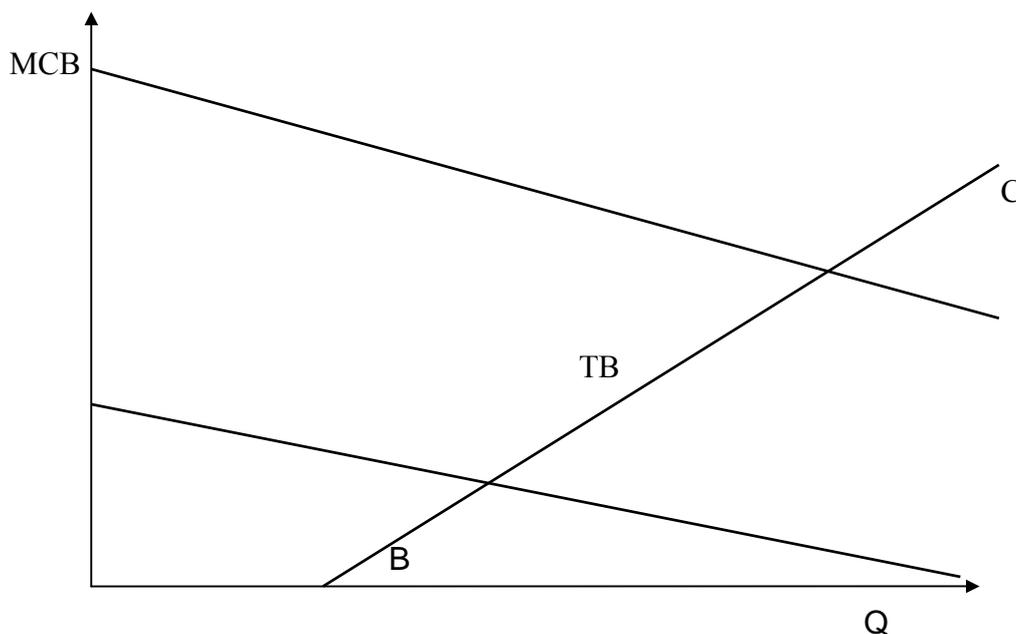
- identification of health risk
- proposal for appropriate measures
- calculation of the amount of costs entailed in each measure
- determining of the change in the health risk for each draft measure
- setting the priorities of individual measures on the basis of the amount of costs in relation to the change in risks.

The time factor is also important for calculation of the amount of costs for each measure. It is therefore assumed that the present cost value method will be used. However, this method cannot be used at an enterprise level. The risk degree is usually used indirectly in relation to the enterprise on the basis of emission limit values, fees for pollution, etc.

### Cost-benefit analysis

The most comprehensive, but often the most complex method is the cost-benefit analysis which can be used in decision-making on implementation of an investment. Relationship of costs and benefits can be characterized by the following graph. This is also applicable to subsequent consideration of investments for environmental protection<sup>10</sup>.

Costs and benefits of the state environmental policy:



- MCB marginal costs and benefits  
C costs  
TB total benefits  
B benefits without the viewpoint of nature protection  
Q quality of the environment

<sup>9</sup> Applying Cost Effectiveness Analysis to Risk Management in Russia: A Case Study of Air Pollution Health Risks in Volgograd. International Environmental Program, Harvard University, 1997.

<sup>10</sup> World Development Report 1992. Development and the Environment. Oxford University Press, New York, 1992, p. 66.

The graph can be divided into three zones. The first zone is located to the left of the point of intersection of the horizontal axis and the line illustrating costs. In this zone, the relevant business entity enjoys economic benefits and simultaneously there are benefits for environmental protection.

The second part of the graph (to the point of intersection of benefits with costs) is characterized by supremacy of benefits that do not include environmental aspects. This area includes benefits at the enterprise level that are calculated during decision-making on implementation of the relevant investment.

The third zone shows overall benefits exceeding the relevant costs. A governmental intervention is required in this case as a market failure occurs. Public budgets that provide for implementation of environmental protection projects in public interest intervene in the third zone with their subsidies.

### **Cost-benefit analysis structure**

A cost-benefit analysis consists of the following steps: project definition, establishment of economically important and physical impacts of the project, discounting (Hanley 1993).

1. Project definition consists in delimitation of the area covered by the project, including e.g. specification of the scope of inhabitants affected by the project.
2. Identification of impacts of the project (both positive and negative). This may include establishment of net impacts concerning only the given locality or a transfer from or to some other locality.
3. Identification of important economic impacts.
4. Physical impacts of project implementation.
5. Monetary evaluation of important effects. The basic unit of the cost-benefit method consists in money. In prediction of their amount, increased attention must be paid to prices. Account must be taken of the effect on prices caused by imperfect competition, governmental interventions or absence of market.
6. Discounting of the cost and benefit flow. An important contribution following from the cost-benefit analysis is the aspect of time (Pearce, 1993). This analysis allows for calculation of benefits for the environment also in a long term and an economically comprehensive picture of implementation of the measures can thus be obtained. Thus, long-term effects that are an important feature of investments for environmental protection can thus be assessed.
7. Use of the method of net present value is important from the viewpoint of temporal distribution of the compared costs (which are usually greatest at the beginning of the period of implementation) and expected yields that are likely to be obtained even in a long term, i.e. 10, 20 or more years. This is also connected with the accuracy of calculations. In the initial years of implementation, the values of costs and benefits will be relatively accurate while at the end of the evaluated period these will be mere estimates. The net present value represents the difference between the current value of expected benefits and the current value of costs including costs of acquisition of investments and operational costs.

8.

$$NPV = \sum_{n=1}^N B_n \frac{1}{(1+r)^n} - \sum_{n=1}^N C_n \frac{1}{(1+r)^n}$$

In addition to the method of evaluating effectiveness on the basis of the net present value, another suitable method consists in calculation of the internal revenue percentage.

$$\sum_{n=1}^N B_n \frac{1}{(1+r)^n} - \sum_{n=1}^N C_n \frac{1}{(1+r)^n} = 0$$

A third option consist in evaluation on the basis of the ratio of benefits and costs.

$$BCR = \frac{\sum_{n=1}^N B_n \frac{1}{(1+r)^n}}{\sum_{n=1}^N C_n \frac{1}{(1+r)^n}}$$

9. sensitivity analysis follows from the fact that input data change during the preparatory phase as the estimate of the required data is gradually specified for the lifetime of the project. Therefore, the analysis must be recalculated upon a change in the following parameters:

- the discount rate,
- a change in the quality and number of inputs,
- shadow prices of these inputs,
- a change in the quality and number of outputs,
- shadow prices of outputs,
- time period of the project.

The objective is to determine which parameter is the most sensitive in relation to the results of the analysis.

#### **Survey of the main issues connected with application of the cost-benefit analysis**

Success of practical application of the cost-benefit analysis depends on resolving the most substantial issues connected with the analysis.

- Appreciation of non-market goods (nature, landscape).
- Complexity of the ecosystem (aspect of accuracy of prediction of the future trends in the ecosystem).
- The manner of determining the discount rate.<sup>11</sup>
- It should be reconsidered whether the analysis can actually be used in practice. It could only contribute to increased bureaucracy without the desired effect.

Cost-benefit analysis is not yet generally used for evaluating effectiveness of costs, both in public and private sectors. In addition to the general framework, assessment of effectiveness of investments for environmental protection that are financed from public budgets entails specific approaches that could be briefly characterized by their substantial

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<sup>11</sup> Discounting is a fundamental part of analysis. Selection of the discount rate has a fundamental impact on choice of projects. Two types of discount rate are proposed in literature. These include the Social Rate of Time Preference and the Social Opportunity Cost of Capital. The Social Rate of Time Preference is difficult to express as it contains a subjective component (Pure Rate of Time Preference). Within the analysis, it is necessary to use a single discount rate. Several various discount rates can be used within sensitivity analysis. It is not possible to evaluate various parts of a project or the assessed activities on the basis of various discount rates (Dixon, 1993).

social benefit and long-term return. Assessment of the amount and allocation of this type of public expenditures is becoming ever more important as, at the present time, public expenditures for environmental protection have reached their peak and the upcoming period will be characterized by their stagnation or decrease, and it is thus necessary to concentrate on more economic use of these funds.

The current public environmental expenditures are characterized by inadequate specification of priorities which leads to high financial requirements, in particular, on the State Environmental Fund, and by insufficient economic analyses taking account of both the time factor and determinable society-wide effects. Determination of priorities must be based on evaluation of the degree of risk according to the approved state environmental policy.

The danger of ineffective expenditures from public budgets should be reduced to minimum by means of more detailed economic calculations that would form a basis for decision-making on allocation of funds. The most important aspect will probably consist in improving the method of minimizing costs and implementation of cost analysis in assessment investments for environmental protection.

### **Decision-making with the use of the cost-benefit analysis**

The cost-benefit analysis should be used for all projects that are based on governmental plans or intentions of politics and political parties, and also projects of private and public enterprises that require state assistance. In all these cases, it is necessary that the assessor of the project (the state) take account not only of the implementation costs, but also of the overall benefits for the society that follow from implementation of the project. Preparation of projects is usually divided into several stages entailing individual assessment and subsequent decision-making on further procedure. These include:

- the initial idea and definition,
- feasibility studies (quantification of demand for goods and services, input parameters and cost estimate, labour, financing (costs and revenues), economic evaluation (costs and revenues), social benefits (who will use the goods or services, who will pay for them, and also appreciation of benefits, if appropriate)),
- a detailed proposal.

For comparison of the determined benefits with costs, it is necessary to collect the relevant data covering the entire lifetime of the investment. The established “cash flow” is generally the same in all cases, i.e. negative in the initial stages of implementation of the investment and later changing to positive. Therefore, in drawing up an investment plan, it is particularly required to express the costs connected both with the actual acquisition and with operation of the given facility, according to the individual years during the entire term of the investment, which should also include payments to the state (taxes, fees, etc.), as well as “negative costs” in the form of state assistance. The investment plan should also include the manner of financing.

Evaluation of a project encompasses, amongst other things, financial analysis which includes actual prices. In contrast, economic analysis (comprehensive economic assessment) uses modified prices, following e.g. from appreciation of natural resources or calculated benefits for society. Distribution analysis entails division of benefits to areas covered by the given project. The last analysis, analysis of the needs of society, follows, in addition to the basic needs, also from externalities affecting positively or negatively society in implementation of the project. (Jenkins, 1995)

An important aspect for assessing investment projects consists in evaluation from the viewpoint of various entities participating in implementation and subsequent use of the project (Jenkins, 1995). These include, in particular, banks, owners, the government and state as a whole.

Decision-making on investments according to the types of entities (Hanley, 1993)

Entity	Type of analysis			
	Financial	Economic	Distribution	Basic needs
Bank	A	n	E	n
Enterprise	B	n	E	n
State budget	C	n	E	n
State	D	D	E	F

n - inapplicable

The above scheme can be briefly described in the sense that while decision-making at the level of enterprises and banks is based on financial analysis, decision-making by the state (society) follows from economic analysis, distribution analysis and analysis of basic needs.

Interest of the banks is concerned especially with assessment of the degree of risk connected with the provided loan and evaluation is concentrated on real tangible financial sources and benefits [A]. Thus, banks evaluate primarily financial feasibility of the given project, credit needs and likelihood of repayment.

Considerations of corporate managers [B] are similar to decision-making by bank managers; however, their financial analysis also takes account of the financial benefit (costs) obtained if the relevant project is not implemented. Furthermore, the owner considers credit to be an income and, on the other hand, deducts the principal amount and interest.

From the viewpoint of the state budget [C] participation in the project is an expenditure (subsidy, transfer) or revenue (tax, fee). In this case, financial analysis evaluates the benefits of the project as a balance of income and all expenditures from the budget in relation to implementation of the project.

economic analysis from the viewpoint of the state [D] also includes expenditures and revenues of the state budget in the prices used. In particular, the analysis must include calculation of externalities generated by implementation of the project. The costs must also include activities preceding implementation of the project. In contrast with financial analysis carried out by bank managers and owners, economic analysis performed by the state includes revenues and expenditures of the state budget and neglects credit. It can thus be expressed as a balance of overall benefits and costs assessed under the above conditions.

Distribution analysis [E] follows from financial and economic analysis. In relation to financial analysis of basic needs [F] it must be noted that it also includes benefits following from externalities, such as education, health, nutrition, etc.

Evaluation carried out according to the individual entities demonstrates how important it is to provide for maximum internalization of externalities and thus ensure implementation of projects that are beneficial both from financial viewpoint and from the viewpoint of whole

society. Projects that are beneficial only from a narrow financial viewpoint without taking account of environmental aspects could ultimately lead to negative effects on economic development.

The values of costs and benefits change in time. Investments in the area of environmental protection are characterized, in particular, by their lifetime and by the fact that benefits are usually obtained only in a long term. Therefore, it is important to make calculations on the basis of the net present value, as described in the previous chapter. Of course, in addition to the best possible calculation of benefits and costs, it is also important to lay down the correct discount rate.

In calculation of the net present value, it is assumed that the discount value is the same during the entire lifetime of the investment, which is disputable especially in case of a long lifetime of the investment. The net present value can then be calculated as follows:

$$npv = P_0 - N_0 + \frac{P_1 - N_1}{(1 + r_1)} + \frac{P_2 - N_2}{(1 + r_2)} + \frac{P_3 - N_3}{(1 + r_3)} + \dots$$

where  $r_n$  are values of the discount rate for various periods of time.

After calculating the net present value, a decision is made on the basis of the following criteria:

1. Projects with a positive net present value are selected. Implementation of projects with a negative net present value would lead to deterioration of economy.
2. If there are several variants for the solution, the project with the highest net present value is selected.
3. Taking account of the fact that it is not always possible to financially appreciate all benefits of investments for environmental protection, a project with a negative net present value can be selected; in other words, projects with the highest value, not only positive, are selected. However, at a corporate level, this decision depends on consideration of sanctions that would be imposed on the enterprise in case of non-implementation of the investment.

**From the viewpoint of the time criterion, it is necessary to implement the investment so that a maximum net present value is achieved. This includes, in particular, the following cases:**

- benefits from implementation of a project are illustrated by a gradually growing function,
- benefits from the project are determined by “calendar time” rather than by the lifetime of the investment,
- costs of the investment depend on calendar time,
- postponement of implementation would lead to an increase in costs.

In decision-making on investments for environmental protection it must be noted that the environment is being damaged in real time and thus the damage to the environment continuously increases which is reflected in both economic activities and human health and biodiversity, etc. From the viewpoint of timing these investments, it is therefore essential to implement them as soon as possible so that damage to the environment is limited, in particular if such damage could lead to endangering of human lives, loss of natural resources,

irreversible changes or extinction of plant and animal species<sup>12</sup>. However, all these investment projects cannot be implemented at once and thus the Government adopts a system of priorities and instruments contained in the environmental policy.

## Conclusion

A number of enterprises encounter problems in quantifying cost savings associated with implementation of environmental investments. In order to optimize decision-making on this type of investment, it is therefore important to introduce environmental accounting. Then it will be clear, for example, what costs will be incurred in case of non-implementation of the investment.

Experience obtained to date in relation to the use of environmental accounting in decision-making on environmental investments shows that it is necessary to improve information within material and monetary data and within various departments at the corporate level, to improve information on material flows as a basis for as comprehensive monetary expression as possible, and to consider future costs connected with implementation of environmental investments.

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# FINANCIAL AND ENVIRONMENTAL AUDIT AND ADMISSION OF THE CZECH REPUBLIC TO EU

Jiří Hřebíček, Jana Soukopová

## INTRODUCTION

The contribution paper briefly describes the financial (accounting) and environmental audit one of connecting elements of which is the environmental accounting [1], [3]. This issue is very topical at the time being with regard to the admission of the Czech Republic (hereinafter referred to as the “CR”) to the European Union (hereinafter referred to as the “EU”). Moreover, it has a connection to the implementation of the national programme EMAS II based on the Council Ordinance (ES) 761/2001 and the implementation of the standard EN ISO 190 11 that is a follow up to the standards ISO 10011-1, ISO 10011-2 and ISO 10011-3 from the set of standards ISO 9000 and standards ISO 14010, ISO 14011 a ISO 14012 from the set of standards ISO 14000.

Both the financial and environmental audit will be closely interlinked after the admission of the CR in connection with the implementation of the integrated management, development and manufacture of environment-friendly products and the integrated prevention of pollution resulting into an always more comprehensive protection of the environment and sustainable development so highly emphasised by the EU.

## 1. FINANCIAL AUDIT AND ADMISSION OF THE CR TO THE EU

The essential aspect of the processing of the accounting (financial) audit is the verification of financial statements consolidated financial statements and annual reports or consolidated annual reports (hereinafter referred to as the “audit”), verification of other facts subject to special legal regulations and verification of other economic information within a scope as specified in the contract.

The mission and sense of the audit is to express the opinion of an independent qualified person to the credibility of accounting statements published by the management of an accounting unit. The audit verifies whether the data contained in the accounting statements depict truly the status of assets and liabilities, financial standing and profit/loss of a company in compliance with rules prescribed by Czech or other accounting regulations, **often with international accounting standards**. The opinion of the auditor has a sufficient information value only in combination with specific completed financial statements as subject-matter of the comments by the auditor. An opinion of an auditor separated from its relation to financial statements is confused.

To be able to get a thorough understanding of this, we will give a brief explanation of the terminology and duties of the auditor in the financial audit.

- *Audit is a systematic process* of an objective collection and analysing of evidence on economic activities and events in order to ascertain the scope of compliance of such information on the set out criteria and communicate the results to the interested recipients.  
Source: US Accounting Association Committee

- *Auditor's report* is the expression of the opinion of an independent, competent person based on persuasive evidence and concerning all materials related to the accounting information communicated by a juridical person (an individual company or governmental agency) and the compliance of such information with the set out criteria.

Source: US Accounting Association Committee

- In the *execution of an audit* the audit has to verify whether the information given in the financial statements or consolidated financial statements depict truly and honestly the subject-matter of the accounting and the financial standing of the concerned accounting unit and the annual report is in compliance with the financial statements or the consolidated annual report is in compliance with the financial statements.

Source: Act No. 254/2000 Coll. on Auditors

- *The objective of the audit of the financial statements* is to enable the auditor to express his/her opinion on whether the financial statements contain all relevant aspects and completed in compliance with used accounting principles.

Source: Auditors's Directive No. 1, Chamber of Auditors of the CR, 1998

- *The audit is a review* of accounting statements, the accounting system itself and accounting records by an authorised auditor in a scope sufficient to formulate an opinion whether the submitted accounting statements are true and correct and whether they comply with the relevant regulations.

Source: Economic Dictionary, Collins

- *The audit is a method* one persons uses to assure another person on the quality, terms of condition of a concerned object the other person has examined. The need of such an audit arises because the first person has some doubts or is not sure about the quality, terms or condition of the concerned object and it is not able to eliminate such doubts or uncertainty on its own.

Source: Lee T.A., The Nature , Scope and Qualities of Auditing

- *The audit is an independent verification* and expression of the opinion about accounting statements of a company by an appointed auditor based on such an appointment and in compliance with respective legal regulations.

Source: Auditing Practice Committee, UK

- *The role of the audit* is to enhance the credibility of accounting statements published by the management of a company.

Source: Auditing, ACCA

- Act No. 563/1991 Coll., on Accounting in the wording of later regulations

- Act No. 337/1992 Coll., on the Administration of Taxes and Charges in the wording of later amendments and all tax laws
- Commercial Code
- Labour Code and related legal regulations.

This evaluation of the accounting audit make sit possible to assess the economic and financial situation of an organisation (company) or to prevent an adverse trend in such a financial situation . It is a significant tool in the sale or privatisation of company.

The auditor has to be independent and be bound only by legal regulations. He/she is obliged to adhere to the auditing directives and professional regulations issued by the Chamber of Auditors of the CR. The auditor may provide the auditing services in his own name or as a partner in or employee of an auditing company in its name and, in the provision of auditing services, he/she has to use the identification “auditor”. A single auditor must not work for more than one auditing company.

**For the sake of the development of the internal market of the EU and strengthening of the benefits and limitation of possible disadvantages, the EU regulates the business environment.**

In the field of the right of trading companies as such, the community right therefore regulates for instance the protection of consumers and minority shareholders, business representation, winding up and liquidation of companies etc.

The most significant EU directive in this field have already been incorporated to the Business Code of the Czech Republic. In addition to the above, the were used as a basis for a exacter formulation of provisions for mergers and division of companies, exacter rules for the entry of companies to the trade register or a regulation of comparison advertising.

**As well, the EU regulates European trading companies that will facilitate economic activities of such companies throughout the territory of the EU.**

**A necessary condition for the incorporation of the internal EU market is the harmonisation of the accounting (financial) systems with the system as in effect in the EU member countries.**

For this purpose, in the framework of the harmonisation of the Czech legislation with the EU legislation, the CR incorporated respective EU directives to the Czech laws in order to make the auditing system operable and simplify the communication of enterprises. It should provide support to entrepreneurs and facilitate the function of the internal market by the comparability of the financial statements among individual EU member countries.

## **2. ENVIIRONMENTAL MANAGEMENT AUDIT AND ADMISSION OF THE CR TO THE EU**

With regard to the condition of the environment in global terms and in the CR, manufacturers implement new procedures that take into consideration the impacts of the process and every single product upon individual components of the environment, but, at the same time, they have a beneficial impact upon the economy of the enterprise.

The environment-friendly processes are an extraordinary opportunity for the Czech industry in the framework of the single European market. Those prospective industries involve in particular waste recycling, clean technologies and pollution prevention, energy efficiency or alternative and renewable energy sources. Estimates made by European trade unions envisage that such industries will show a 8 % year-to-year growth at least by 2010. Data published by the European Commission indicate that the business in such fields might generate an turn-over worth up to 4 billion EUR and employ up to 25 000 people.

The environment-friendly business in the EU has a connection with the implementation of the integrated pollution prevention based on the Council Directive No. 96/61/EC as of September 24, 1996 on the Integrated Pollution Prevention and Control referred to as the "IPPC" which among other involves the preference of so called Best Available Techniques (BAT). The obligatory implementation requires the endorsement of a new act (the Act No. 76/2002 Coll. on the Integrated Pollution Prevention and Control). The BATs are not implemented only in the industry but in farming, too.

Since the 80s, the advanced European countries have used so called voluntary preventive tools the manufacturers wish to use to contribute to an improvement of the quality of the environment. Such procedures have become on of the most important preconditions of the competitiveness of companies in major markets in Europe and world-wide.

Currently, the following preventive voluntary tools have been implemented:

- Marking of environment-friendly products
- Environment management systems
- Cleaner manufacture
- Voluntary agreements

## **2.1. Environmental Management Systems and Their Implementation in the CR**

The implementation of the management of companies that takes into consideration the environment is a new progressive approach that may be used to achieve the compliance of the management of manufacturing activities with the elimination of their adverse impacts upon the environment. As early as now, it has been confirmed that the implementation of this system of the environmental management leads to company prosperity as the adherence to measures results into savings of material and energy and lower environment pollution taxes, it minimises penalties and improves the quality of the products.

Currently two most common methods of the implementation of the environment management systems (EMS) apply:

- Implementation of the EMS subject to the standards ISO series 14000 that includes first of all the core standard ČSN EN ISO 14001 Environmental Management Systems - Specification and Implementation Instructions.
- Implementation of EMS in the framework of the Programme EMAS II ("Eco-Management and Audit Scheme") i.e. based on the Council Ordinance (ES) No. 761/2001 (EMAS II). The programme EMAS II was approved by the Resolution of the Government of the CR as of July 19, 2002 No. 651 as an update to the National Programme of the Implementation of the Company Management System and Audit from the Point of View of the Protection of the Environment (Updated EMAS Programme) and it followed up the

Resolution of the Government of the CR No. 466 as of July 1, 1998 that implemented the “National Programme of the Implementation of the System of the Management of Companies and Audit from the Point of View of the Protection of the Environment - EMAS”.

The above methods of the implementation of EMS subject to ISO 14000 or the EMAS Programme II differ in factual terms by the fact that meanwhile a specific procedure requires some of them, another procedure only recommends them. For details see the web portal of the EMAS agency at <http://www.ceu.cz/emas>.

In the implementation of the EMS subject to the Programme EMAS II, the difference resides in the verification of the system and, in particular, in the obligation of the company concerned to inform the members of public on its environmental objectives. It is a new approach that is legalised by out Act on the Free Approach of the Public to Information on the Environment (the Act No. 123/1998 Coll.) in compliance with global trends (to manage and influence the quality of the environment by the involvement of the public to the decision making process). It based on the presumption that a sufficiently informed and, therefore, motivated public has a positive impact upon the implementation of the EMS by companies. An analysis completed at Czech companies who have implemented the EMS indicates that the central point of the measure resides in particular in the reduction of waste and raw materials savings – see [8].

The funding of the EMS subject to ISO 14000 of the EMAS II Programme is not a subject to any legal obligation by the state, however, the state supports the implementation of both systems from support programmes and funds, foreign projects funded for instance by EU or resulting from bilateral contracts with EU member countries. As per September 8. 2003, there were 506 ISO 14000 or EMAS II certified/validated companies in the CR.

## **2.2 Environmental Management System Auditing to ISO 19011**

In the implementation of efficient system of the environmental management to ISO 14000 and EMAS II Programme and their operation, every such system contains as an integral part the process of its verification by external and internal audits subject to the important new standard ISO 19011 (see <http://www.ceu.cz/emas>). This standard contains a guidance for the execution of an internal and external audit of quality assurance systems and/or EMS as well as a guidance for the management of the audit programmes. The anticipated users of this international standard will be auditors, organisations who implemented both management systems and organisation interested in the certification of auditors or their training, the certification of management systems and accreditation or standardisation in the field of the assessment of the conformity.

As to external audits, the standard will provide for a uniform approach of certification authorities and facilitate the combined external assessment of the management systems. Thus, it serves the actual needs of the market from the point of view of a better harmonisation of methods in the field of quality and environment.

An important improvement of the new standard relates to the qualification of auditors. Much more clearly than the previous auditing standard, the new one acknowledges that the qualification of an auditing team and individual auditors differs depending on the type of audit, subject-matter of the audit and its complexity and that it is not possible to set out uniform criteria of such qualification that could be applied to all situations. Therefore, the

standard EN ISO 19011 provides a specific framework that enables organisations to set their own requirements for the qualification and the processes of the assessment of auditors are relate to this.

Another improvement of the same importance is a combination of the description of the management of audit programmes and the execution of separate audit in a single directive. Such a combination emphasises the relation between these two systems and explains that the quality of individual audits depends among other on the quality of the audit support programme.

The original understanding of an EMS audit as a mere tool for the detection and elimination of discrepancies and problems concerning the environment (i.e. a kind of a duplication of the control) shows significant changes in the standard ISO 19011. It shifts the audit to the area of the prevention and provides an efficient and effective tool that will make it possible to improve the executed activities and minimise the impacts upon the environment. No matter that every organisation will have its set of reasons to execute an audit with different priorities, the prevention and elimination of the causes of the lack of conformity will always be a priority. According to [3], another important aspect of the standard 9iso 19011 is that it is a transition from a random based verification of individual persons, their instant incompetence or indisposition and from the detection of achieved or not achieved parameters of a product or a service to an assessment of the condition and level of the conformity of defined requirements and principles with the reality realised. The main objective of such finding must not be any sanctions nor penalties imposed to individual persons but they have to be used as a starting point for initiatives and action plans to analyse, set out and eliminate causes of problems and a systematic improvement of the system operated.

## CONCLUSION

An inevitable precondition for the incorporation of the CR to the operation of the internal market in the framework of the EUU is the harmonisation of the accounting system with the system as in effect in the EU member countries. For that, the CR has incorporated respective directives to the Czech legal system in order to keep the system operable and to simplify the communication of enterprises. It should support enterprise and the comparability of statements among EU member countries and, thus, to facilitate the operation of the internal market.

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# **THE STATE OF PREPAREDNESS OF CZECH ENTERPRISES FOR ENVIRONMENTAL ACCOUNTING SYSTEM IMPLEMENTATION IN THE FRAMEWORK OF EMAS II**

**Jaroslava Hyršlová**

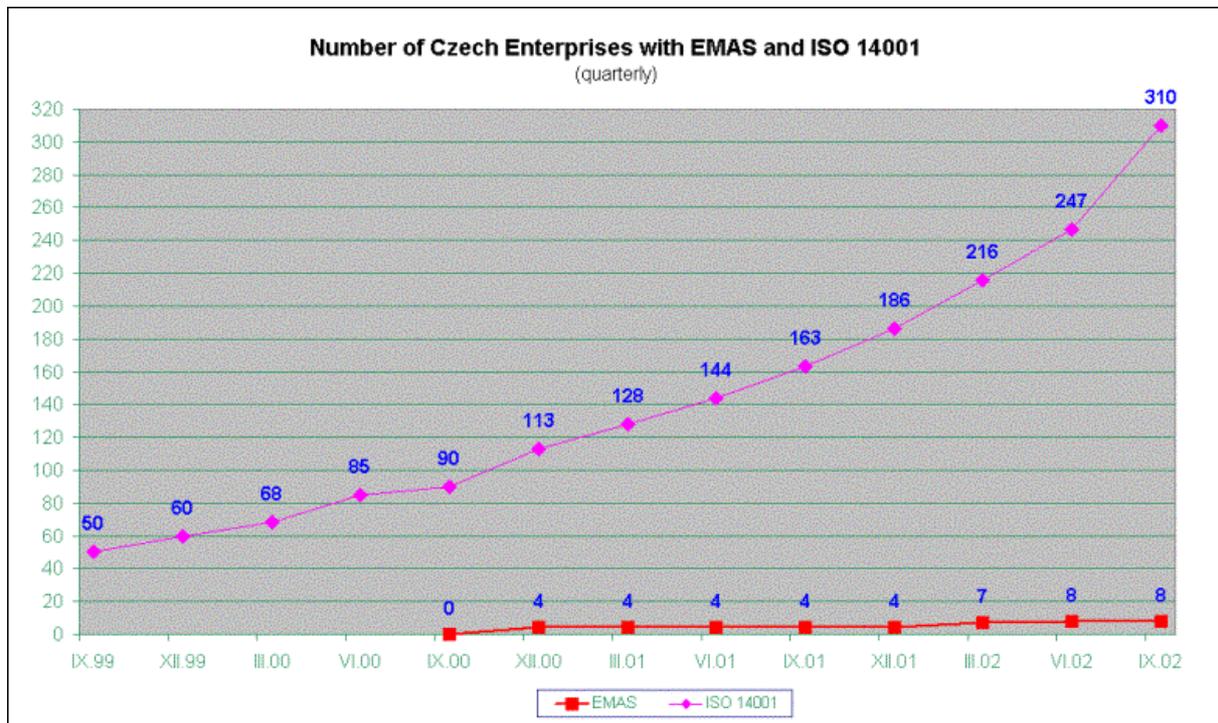
## **Introduction**

Environmental management systems are broadly implemented in enterprises in the Czech Republic. A total of 471 organisations had implemented a system of environmental management by June 30, 2003. The main reasons that led enterprises to establish these systems encompassed continuing interest in protecting the environment and attempts to maintain or improve their position in the market. Enterprises are aware of the ever-increasing pressure of interested parties (especially the state authorities, the public and business partners) towards a responsible attitude to the environment, particularly in the sense of transition from a passive approach (end-of-the-pipe technology) to an active approach (cleaner production). The laws related to environmental protection are becoming increasingly stringent and demand on the part of customers is changing in that they are willing to pay more for environmentally sound products and/or do not wish to bear the environmental responsibility of their suppliers. It is being verified in practice that one of the great advantages of these systems is "better order" in the enterprise. Activities with a detrimental impact on the environment are identified and important environmental aspects and environmental impacts of the activities, products and services of the enterprise are revealed. The greatest attention is concentrated on ensuring accordance with the valid laws and standards. Environmental policy and environmental objectives and targets are set. One of the main objective of the system - a continual improvement - leads to an improvement in the environmental performance of the enterprise in accord with its environmental policy. Thus, the enterprise is "prepared" for increasingly strict environmental laws in the future and is able to rapidly adapt to them. In addition to these benefits, establishment of these systems contributes to continuing economic growth and prosperity in the enterprise. Implementation of these systems can also lead to an increase in competitive advantage. The factors increasing competitive advantage include especially an improvement in management in the entire enterprise, a cost reduction (savings in materials and energy; decreased fees for environmental protection; improved waste management, etc.), an improvement in supplier-consumer relations and an improved position for negotiations with banks, insurance companies, the state authorities (e.g. easier access to credit, public contracts, etc.) and the public.

## **1. Eco-Management and Audit Scheme - EMAS**

The Eco-Management and Audit Scheme (EMAS) consists in voluntary activity of the enterprise, intended to improve the environmental impact of enterprise activities and to provide the relevant information to the general public and other interested parties. EMAS came into effect in April 1995 on the basis of Council regulation (EEC) No. 1836/93. In 2001, the system was revised in Regulation (EC) No 761/2001 of the European parliament and of the Council (EMAS II). Council regulation (EEC) No. 1836/93 was adopted in the Czech Republic through Resolution of the Government of CR No. 466/1998 of July 1, 1998. The EMAS Programme was updated on the basis of Regulation (EC) No 761/2001 of the European parliament and of the Council through Resolution of the Government of CR No. 651 of June 19, 2002 (the Updated EMAS Programme).

EMAS is implemented primarily in the countries of the European Union and in countries preparing for accession to EU. In the Czech Republic, EMAS has not been adopted as broadly as the environmental management systems established according to ISO 14001 international standard (see Graph 1). Nonetheless, the number of enterprises with validated EMAS in this country is the highest of all countries preparing for accession to EU.



Graph 1 Numbers of Enterprises with ISO 14001 and EMAS in CR (source: [www.ceu.cz](http://www.ceu.cz))

## 2. Environmental Accounting in the Framework of EMAS II

The Czech Republic is the only country that has included requirements on tracing and tracking of economic impacts, caused by the environmental impacts of the enterprise activities, in EMAS II. If an enterprise is attempting to implement EMAS II, then an essential part of the system consists in the obligation to "establish and maintain procedures for monitoring of environmental financial flows in order to implement environmental management accounting" [1]. In this, the enterprise must proceed according to the methodology published by the Ministry of the Environment. This method came into effect on January 1, 2003 under the title "Environmental Management Accounting Implementation Guideline" (hereafter "Guideline") [5].

The concept of environmental management accounting (hereafter EMA) is based on interconnecting information on material and energy flows with monetary information. Emphasis is placed on the importance of knowledge of the material and energy flow values (material and energy flows are money flows). Let's consider the example of the application of EMA in a production enterprise. The consumption of basic material (raw materials) is a very important element of cost. The basic materials enter the enterprise (purchased from an external supplier and priced at the purchase value) and are consumed in the enterprise in the production of products that are intended to satisfy the needs of customers. The EMA system not only provides information on the material value on entering the enterprise, but is also a source of information on the costs of processing this material in the individual stages of production. Thus, a gradual

increase can be seen in the value of the material that, through work in process and semi-product is becoming a finished product intended for the customers. During this process, material is lost (wasted) or degraded, and non-product outputs can be created. The EMA system provides the users with information, not only on costs expended to produce products intended for customers, but also on the material purchase value of non-product outputs and processing costs of non-product outputs. It is possible to trace and track activities and places where losses and wastes occur and non-product outputs are created. On the basis of this information, measures can be proposed that lead to an increase in the efficiency of the use of materials and energy, a reduction in the environmental impacts of the activities, products and services of the enterprise, a reduction in environmental risks and, in the final stage, an improvement in the economic results of the enterprise.

The initial step for implementation of EMA is preparation of a material, water and energy flow balances. As the Guideline enables implementation of EMA on the corporate level as well as on the process, cost centre and product level it is quite within the competence of the enterprise to choose the variant that is significant for the needs of management. The boundaries for the balance can thus be the entire enterprise, or the individual workplaces, facilities, centres, processes, outputs, etc. It is useful to select the boundaries for implementation of EMA so that the information obtained can be used to support the decision-making process in the enterprise (i.e., e.g., to select plants with significant environmental aspects). Simultaneously, it is useful to also take into consideration the existing system of management accounting, in order to be able to obtain the relevant monetary information. The Guideline enables preparation of a material and energy flow balances for only several selected important materials and kinds of energy or for all the material and energy used in the enterprise (in the system). It is always necessary to take into account that the objective of the balancing process is to trace and track how the materials and energy pass through the enterprise (system).

Consequently, in the framework of EMA implementation, it is necessary to analyse the individual activities and processes that proceed in the enterprise (system), to prepare a balances of material and energy flows, to consider waste flows and their impact on the environment and to obtain the waste, waste water and air emission disposal. The material and energy flows are then expressed in monetary units.

Especially information on costs expended for environmental protection and costs related to environmental damage (i.e. information on environmental costs) is very important for determining the economic effects of the environmental behaviour of the enterprise. Identification of environmental costs is based on the balances of material and energy flows.

Requirements on monitoring and reporting environmental costs and revenues are specified in the framework of the Guideline. The concept of environmental costs is based on separate monitoring of the environmental protection costs and costs associated with damage to the environment. An attempt is thus made to obtain information, not only on all expenditure for measures for environmental protection of an enterprise or on its behalf to prevent, reduce, control and document environmental aspects, impacts and hazards, as well as disposal, treatment, sanitation and clean up expenditure, but also on the costs associated with non-product outputs (wastes). Waste is ineffective not only because the enterprise must deal with the waste in a suitable manner (dispose of it), but primarily because each waste has its "value". This "value" includes the costs of wasted material (i.e. the purchase value, for which the wasted material was acquired) and the costs of processing this material, which has not become a product for the market but constitutes an "undesirable" output. The Guideline is thus based on the concept of environmental costs, which was conceived by a group of experts working in the framework of the UN Division for Sustainable Development [3]. We are of the opinion that this definition of environmental costs is of great importance for needs of environmentally oriented management. It permits separate evaluation of the environmental protection costs, how much the enterprise

expends to waste disposal (either through operation of its own environmental facilities or through payments to external companies) and separate reporting of the value of non-product outputs (i.e. what the enterprise loses through the wastes). The utilization of this approach in the framework of the decision-making process in the enterprise assists significantly in accepting measures that are not only friendly to the environment and constitute a very significant step towards sustainability, but also are, in the final analysis, economically advantageous to the enterprise. For correct evaluation of the economic effects of the attitude of the enterprise towards the environment, it is also necessary to concentrate on environmental revenues. Environmental revenues include, e.g. revenues from recycling of materials, sale of wastes, subsidies and awards. They also include other elements of revenues, related to elements of environmental costs. The Guideline is again limited to certain recommendations in relation to environmental costs and revenues. There is no attempt to identify all environmental costs and revenues, but rather it is necessary to concentrate on important elements.

According to the Guideline, environmental costs and revenues should be assigned to the individual environmental media. This allocation enables a further view of environmental costs and revenues. It is important for evaluating the impacts of enterprise activities on the individual environmental media and demonstrates their economic effects. Reporting for the impacts of enterprise activities on the individual environmental media is fully in accord with external reporting in the area of the environment in the framework of European Union.

It is apparent from the above text that the EMA system provides users with very important and valuable information that is not available in the framework of the existing systems of management accounting. Management accounting systems in most enterprises are concerned primarily with information that is of importance for management along the levels of centres and outputs (products). However, it is useful to support the decision-making process in the enterprise by information on flows of materials and energy and the value of these flows.

### **3. Implementation of Environmental Accounting in Enterprises in the Framework of EMAS II**

As incorporation of EMA into the environmental management system constitutes a quite new obligation, in the first half of 2003, the University of Pardubice carried out a qualitative study of the state of preparedness of enterprises, registered in the EMAS Programme, to implement EMA. The main objective of the study was to determine the existing state of EMA implementation in selected enterprises and to identify problems that could arise in the enterprises in connection with requirements following from the Guideline. The study was carried out through personal interview in selected enterprises that were registered in the EMAS Register as of December 31, 2002. Of the total number of registered organisations (9 companies were registered in the EMAS Programme as of December 31, 2002), 4 agreed to participate in the study (Peguform Bohemia k.s., Liberec - Liberec and Libáň plants; Frantschach Pulp & Paper Czech a.s., Štětí and AQ-test spol. s r.o., Ostrava). Personal questions were posed in the framework of interviews with representatives of top management, with employees responsible for the area of environmental protection and with employees of financial divisions and controlling divisions.

The study yielded the following results:

- The enterprises are acquainted with the Updated EMAS Programme and are of the opinion that it will not be difficult to comply with the newly established requirements. They are aware of the obligation to monitor financial flows related to the environment, as newly imposed by the Updated EMAS Programme. However, we are of the opinion that the concept of EMA is not entirely clear to them. Environmental management accounting is conceived in a very narrow sense - as monitoring and reporting environmental costs.

- They consider information following from EMA to be beneficial especially to employees responsible for environmental protection in the enterprise; this information enables assessment of the efficiency of the environmental management system.
- Representatives of the studied enterprises stated that they will manage to implement EMA through their own resources and that they will thus not require the services of external consulting companies. Employees of the sections concerned with environmental protection in the enterprise and employees of the controlling sections will participate in implementing the system.
- The enterprises are not aware of the possibility of selecting boundaries for the EMA system; they assume that the boundaries will consist in the entire enterprise.
- Requirements on preparing material and energy balances following from the Guideline can be met. In all the studied enterprises, the balances of raw materials and energy have already been completed and are used in management of the enterprise. Utilisation of material and energy balances has brought the enterprise a number of significant savings in the past. The enterprises do not expect that it will be necessary to establish new records of materials, energy or waste substances to meet the requirements of the Guideline.
- At the present time, none of the studied enterprises has created a system of tracing and tracking environmental costs and revenues. They consider the definitions of the individual categories of environmental costs and revenues in the Guideline to be comprehensible. In identifying environmental costs and revenues, they will proceed as follows:
  - the starting point for identification will consist in the material and energy balances from which the waste streams unambiguously follow,
  - in the next step, important elements of costs and revenues related to these waste streams will be pinpointed,
  - following identification of important elements, their amount will be determined; in relation to some elements, a modification in the accounting system will be necessary to ensure that their amounts can be determined directly from the accounting system.
- The enterprises consider the classification of environmental costs in the Guideline to be useful; it corresponds with classification of the costs of quality, with which they have experience. The enterprises consider that "costs related to non-product outputs" to be a problematic element, both from the standpoint of inclusion in environmental costs and from the standpoint of determining their amount.
- The enterprises do not expect that monitoring of environmental costs and revenues will be incorporated into their accounting system (because of the amount of work involved in restructuring the already functioning information system). It is thus apparent that statements of environmental costs and revenues will contain estimated information; employees of the divisions concerned with environmental protection and with controlling will participate in these estimates.
- The enterprises do not expect problems in allocating environmental costs and revenues to the individual environmental media. This considered useful especially by employees responsible for environmental protection in the enterprise.

The study confirmed that implementation of EMA does not constitute a major problem for the enterprises. However, the attitudes of some employees (especially employees of controlling divisions) indicate a lack of willingness to introduce any (even partial) changes in the already functioning information systems. These employees argue that the information systems used in the enterprise do not permit incorporation of monitoring of economic impacts caused by

the environmental impacts of enterprise activities into the accounting system. However, we are of the opinion that these arguments are not substantiated.

## Conclusions

As far as we are aware, only the Czech Republic has included the requirement to implement an EMA system in EMAS II. The EMA concept is fully in accord with the information obtained from foreign experts, especially with the concept of the Expert Working Group on "Improving the Role of Government in the Promotion of Environmental Management Accounting" [3]. Only the future will show whether the EMA system will assist enterprises in achieving sustainability or whether this requirement will complicate the implementation of environmental management systems according to EMAS II. Only in the future will it become possible to evaluate whether the implementation of EMA will become only a formal matter or whether enterprises will value the importance of information that can be obtained in the framework of the system, and this information will be employed to support the decision-making processes in the enterprise.

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# COST FLOW ACCOUNTING - EXTENDED CONCEPT OF ENVIRONMENTAL ACCOUNTING

Jaroslav Klusák

Cost Flow Accounting is the basic tool in the new managerial approach known as Flow Control and it goes beyond the Environmental Cost Appraisal. The Flow Control aim is to organise production from its start to its end in terms of Material and Information Flows – all structured in an effective way oriented in accordance with the objective. The Start-to-End Analysis based on the Flow Control principle includes not only Material Flows within the Company, but also organisation adjustments (i.e. structural organisation, organisation of processes within the Company) and the configuration of its various integrated Information Systems (i.e. Material Management, Production Planning and Production Control, Financial Accounting and Financial Control).

Flow Control deals in particular with Material Flow in its central phase between various organisation functions of the Company and a Company can be defined as a Material Flow System. This means – on one hand – the classic Material Flows along the Added Value Chain from incoming goods through various processing phases to distribution to the Customer. On the other hand, it also includes all Material Losses that occurred in the various phases along the Logistic Chain (e.g. rejected products, scrap, chippings, disposal of outdated items and damaged goods), which then leave the Company as from the economic and environmental viewpoints unwanted residues.

Picture 1: Company as a (Simplified) Material Flow System



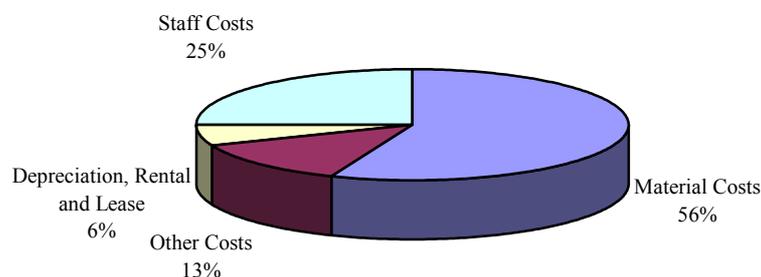
Source: Jasch, Ch. (2001)

Cost Flow Accounting quantifies the elements in the Material Flow System and enhances the Internal Information Flow and also localises the points for input of economically and environmentally oriented modifications into the Material Flows. When quantifying the Material Flow System, the Company builds up a database, which states the quantities, values and costs in an internally consistent way. The database states these quantities in physical units (pcs, kg, etc.), values (physical quantity x entry price) and costs related to the Material Flows (e.g. Material Costs, Inventory Price and Waste Volume) and to all other costs that the Company had with the maintenance of the Material Flow System (e.g. Staff Costs, Depreciation).

The purpose of Cost Flow Accounting is not to assess the share of the overall Environmental Costs, but to deal with Material Flows for the purpose of evaluation of the Overall Production Costs. Therefore, Cost Flow Accounting is an enhancement of the present accounting methods and that in two aspects:

1. Economic – if we look at Cost Flow Accounting from the economic point of view, it works on the Real Material Costs, which often comprise by far the largest part of the Overall Costs within manufacturing plants (see Picture 2)

Picture 2: Typical Cost Shares within the Manufacturing Sector



Source: Statistisches Bundesamt, Stat. Jahrbuch 1999 – Federal Bureau of Statistics, Annual Abstract of Statistics 1999

This average Cost Structure within the German manufacturing plants corresponds to the results of an American study carried out by the Business Week magazine (on March 22, 1993), which lays the Material Cost Share in American enterprises to 50 through 80 %.

Conventional accounting methods are unable to provide sufficiently accurate data on Material Costs and the Company is, therefore, unable to track down the point of internal consumption of the material and to show the exact flows and points, through which each individual material passes within the Material Flow System.

Cost Flow Accounting adjusts this information gap by interconnecting the quantitative physical and financial data with the Material Flows. The Material Progression through the Company becomes transparent and information decisions can be taken on, which material and in which value enters the Product as added value and which material and in which value will leave the Company unproductively as waste. In the Companies that took part in the test projects, this transparency concerning flows often leads to new ways, how to design Products with reduced material consumption and to new measures to increase the overall effectiveness (by reducing the quantity of Rejected Products, scrap, Damaged Products etc.)

2. If we view the Material Flow Accounting from the environmental point of view, it deals with systematic cost reduction when trying to reduce the quantity of used material and energy, which leads to positive environmental effects (decrease of waste, waste water and emissions). That is why Cost Flow Accounting is an important tool for implementation of Integrated Environmental Care and Care for Environmental Effectiveness Increase Management System.

## From the Conventional Environmental Cost Accounting to the Material Flow Accounting

The Conventional Accounting and its use in various Companies are most often criticised for two reasons. The first reason is the economic one, as neither the largest cost volume, which are the Material Costs (see Picture 2), nor the increasing overhead costs are monitored with sufficient transparency. The second reason is the environmental one, where the Conventional Accounting is reproved that it provides neither the substantial information concerning environmental damage, nor measures concerning environmental profile.

In the recent year, in quest of elimination of the problems concerning in particular the environmentally oriented criticism, a number of approaches of environmentally oriented Cost Calculations have been developed, in particular:

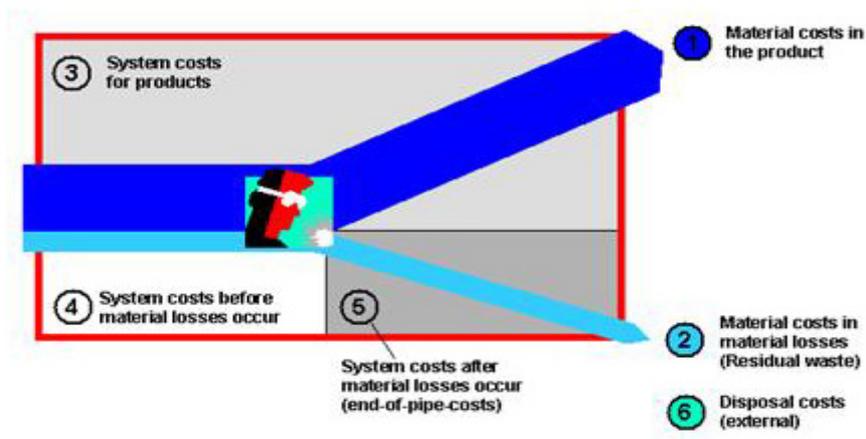
- Conventional Environmental Cost Calculation;
- Calculation of Costs Related to Waste;
- Cost Flow Accounting.

For more detailed specification of these different approaches, it is appropriate to divide the Company Costs based on Material Flows to six basic parts.

Material Costs are split into two sections, specifically: the Material Costs that physically convert into the Product, including Packaging (Segment 1), and those that are physically included in the Material Losses (Segment 2).

The System Costs are split into three groups. According to the definition, the System Costs are the costs, which arise during dealing with Material Flows within the Company. The first group contains such System Costs that arise within the Company during manufacturing the Product (Segment 3). The second group incorporates the costs handling Material Losses even before these Losses occur (Segment 4) and the third group contains System Costs handling Material Losses after these Losses occur that is so-called “End-of-Pipe Costs” (Segment 5). Disposal Costs concerning waste represent a separate group (Segment 6).

Picture 3: Dividing Costs into Groups based on Material Flows



Source: IMU Augsburg

Conventional Environmental Cost Calculation (US EPA 1995, BMU / UBA 1996) is used for reporting on detailed costs of environmental protection (Water Treatment, Waste Segregation etc.) and on costs resulting from harming the environment (Waste Deposition and Air Pollution Charges etc.), either within the existing Cost Accounting, or in separate calculations. Such reporting remains substantially limited to so-called „End-of-Pipe Costs“ (Segment 5) and Disposal Costs concerning Waste (Segment 6). In some cases, the attention is focused on estimating costs related to the measures of the Integrated Environmental Prevention (additional costs for increasing the efficiency of the technologies in question).

In reality, this conventional approach to the Environmental Cost Calculation does not too much support or improve the development of integrated measures aimed at reducing the environmental burden. On one hand the Environmental Costs calculated in this way seem relatively insignificant due to the overall aggregate value, on the other hand they represent only a fraction of the real potential that the system of integrated environmental measures can offer. Much larger potential is comprised in the Material Cost savings, however, this potential is often neglected by the traditional Environmental Cost Calculations. Upon closer examination of the effects of the traditional calculations of the Environmental Costs, it is clear that this system is hardly able to show the potential measures for improvement of the environment.

**Calculation of Costs related to Waste** (Fischer / Blasius 1995, Fischer 1997) is a more advanced approach in comparison with the previous one. It namely takes into account not only the so-called „End-of-Pipe Costs“ and the Disposal Costs concerning Waste, but also the Material Costs concerning Material Losses and part of the System Costs related to the Material Losses (Segments 2, 4, 5 and 6). In this way, this approach brings the Material Effectiveness more to the fore when compared with the traditional approach to the Environmental Costs. These calculations are thus expected to bring a real contribution to the improvement of environment quality by means of Material Loss Reduction. In this way, they encourage the activities aimed at Material Loss Reduction and - as a result – they decrease the waste quantity.

However, these calculations push aside the Product, including Packaging (and so the by far the largest material quantity and thereby the largest part of the costs).

**Cost Flow Accounting** (Strobel 2001, Wagner, B. / Strobel 1999, Hessisches Ministerium für Wirtschaft 1999) tries to identify and analyse the complete Material Flow System as the prime mover of all costs. Not only the Material Costs, but also the System Costs are incorporated into the Material Flows (Segments 1-6). Thus, the Cost Flow Accounting can be viewed as the approach of „Overall Cost Accounting“. In this way it shows, which costs can be decreased by virtue of lower - or more effective - material and energy consumption. Quantities, values and costs are more transparent and, therefore, the Material Flow Accounting leads to measures such as development of products and packaging with lower material intensity, decrease of Material Losses and – as a result – Waste Reduction.

The following table compares the traditional Environmental Cost Calculations, Calculation of Costs Related to Waste and Cost Flow Accounting from the viewpoint of the extent of cost items taken into account.

Table 1: The Share of Overall Production Costs Attributed to each Approach.

	%	Tradicional Environ. Cost Calculation	Calculation of Costs Related to Waste	Cost Flow Accounting
1)Material Costs in the Product (the Product +the Packaging)	57			
2) Material Costs in Material Losses	6			
3) System Costs included in the Product	28			
4) Systémové Costs before Mat. Losses occur	6			
5) Systémové Costs after Mat. Losses occur	2			
6) Disposal Costs	1			
<b>Cost Percent taken into account</b>		<b>3 %</b>	<b>15 %</b>	<b>100 %</b>

### The Principle of Cost Flow Accounting

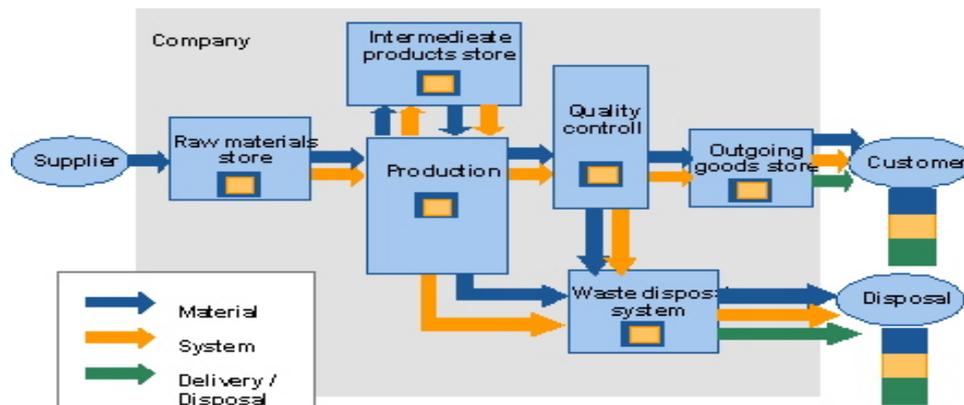
The Cost Flow Accounting tool transfers the Internal Material Flows in the Company to the focus of the Cost Analysis and tries to change these flows, expressed by means of their impact, to transparent ones from start to finish.

So that the impact of the planned measures on costs can be comprehensively evaluated and the potential savings find out, the impact of each measure must be calculated and evaluated. Previously, the evaluation of the individual measures was often inadequate. This leads – on one hand – to the performance of measures, which are uneconomical and harm the environment and – on the other hand – to many measures positive for the environment being rejected or overlooked, as their contributions are underestimated under to the previous conventional evaluations.

To achieve the above transparency, the values and Material Flow Costs in Cost Flow Accounting are split into the following categories:

- Material
- System
- Delivery & Disposal

Picture 4: The Principle of Cost Flow Accounting



Source: Jasch, Ch. (2001)

### Material Values and Costs

For the purpose of Material Values and Costs calculation, the physical quantities of materials contained in the various flows and stocks must be known in detail. The existing Material Management and Production Planning Systems usually provide extensive databases.

If we start from these flows and stocks, we can move forward and perform evaluation based on prices and so achieve important values of these flows and stocks. Then the Material Costs can be determined by determination, which Material Flows are important from the cost viewpoint. The focus on Material Value is the core of Cost Flow Accounting. The transparency of the known values and costs for materials already brings - at reasonable price and effort - a new approach to the largest part of the costs.

### System Values and Costs

For the purpose of assigning System Values and Costs, the Material Movements must be handled as cost sources. By definition, the System Costs are such costs that occur during dealing with Material Flows within the Company (e.g. Staff Costs, Depreciation). A Company incurs System Costs in its effort to ensure that the Material Movements can be performed in the required form. The System Costs assigned to the Material Flows are defined as "System Values". Whether these flows are Raw Material, Intermediate Product or Semi-finished Product Flows or Material Losses, each of the Material Flows within the Company can be viewed as a cost carrier for systematic assignment of System Costs according to the cause.

System Costs are assigned to the Product Output Flows and then passed as System Values to the subsequent flows and stocks.

### Delivery & Disposal Costs

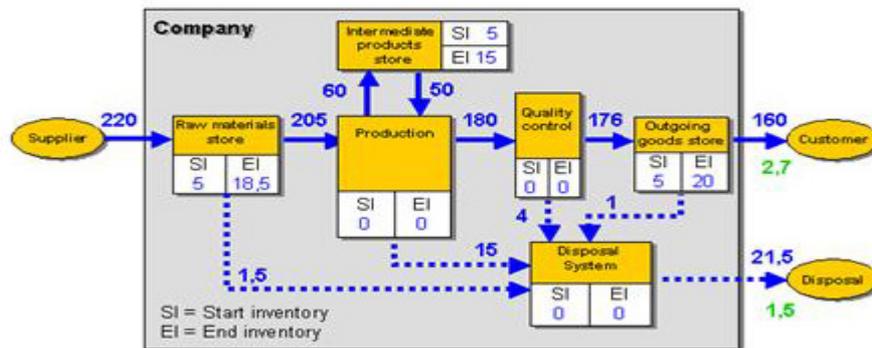
Specific Delivery & Disposal Costs must be assigned to such flows that leave the Company. These outgoing Delivery & Disposal Costs include payments to the external third parties and, therefore, are not a part of the System Costs by definition. Delivery & Disposal Costs include all costs, which occur to ensure that the material leaves the Company, i.e. not only Product Transport Costs, but first of all the External Waste Disposal Costs and charges for Waste Water Control.

## Results and Forms of the Material Flow Report

Material Flow Model with Data, where the Material and System Costs data are compressed within one time period into the Material Flow Model, was designed for better visual representation. The Material Flow Model with Data has much higher information capability compared with the previous accounting approaches.

Material Flow Model with Data referring to the Stocked Material Values and to the Material Flow Values usually enables formation of highly useful opinions. To give you a better idea of this, a real Material Flow Model with Data follows.

**Picture 5: Material Flow Model with Material Flow Values and Delivery & Disposal Costs**



Source: IMU Augsburg

Cost Flow Matrix represents the outgoing Material Flows, e.g. Products and Packaging, and assigns Material Losses to the following categories: Material Costs, System Costs and Delivery & Disposal Costs. Cost Flow Matrix represents Cost Flow Accounting in tabular, simplified and standardised form.

The Matrix Structure does not change, even if the Material Flow Structure does, which makes it an exceptionally useful and significant form of result presentation and reporting. The Material Flow Matrix can be used to show the development of a certain workplace within the Company during several years, or to compare performance of different workplaces within the Company. It can also be used to compare different Companies within one branch concerning their Cost Flow Structure.

**Picture 6: Cost Flow Matrix (simplified)**

**Typical flow costs structure** (example: pharmaceuticals industry)

Production costs (in US \$ m.)	Material costs	System costs	Delivery / Disposal costs	Total
Product	120	25	0.2	145.2
Packaging	40	25	2.5	67.5
Material losses	21.5	6.4	1.5	29.4
<b>Total</b>	<b>181.5</b>	56.9	3.9	242.3

**Material costs account for a considerable percentage!**  
(here: 75 % of production costs)

**A considerable share of costs is caused by material losses!**  
(here: > 10 % of production costs)

Source: IMU Augsburg

Cost Flow Report provides the possibility to choose specific extracts and to arrange them in a form defined by the user for the purpose of more profound Material Flow Analysis.

**References:**

Jasch, Ch. (2001) Workbook 1, Environmental Management Accounting Metrics, Procedures and Principles. UN Division for Sustainable Development, Expert Working Group on „Improving the role of Government in the Promotion of Environmental Managerial Accounting“

Wagner, B. (2003) „Development of Material Flow Cost Accounting in Germany“ presented at International Symposium on Environmental Accounting in Japan 2003

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# **MAY THE INVESTMENT INTO EMS IMPLEMENTATION BE RETURNABLE?**

**Miroslav Krčma**

## **Evaluation of Environmental Investment Efficiency – EMS**

The decision about implementation and certification of environmental management system according to ISO 14001 Standard possibly verify according to EMAS Programme requirements, should be evaluated from the efficiency point of view as other environmental investments. Most of the companies evaluates only costs of EMS implementation, but do not evaluate benefits, or revenues, which can originate in EMS implementation. The companies usually consider only theoretical benefits relating to successful certification of implemented EMS, like improved image of the company, higher chance succeed in competitive tendering, higher customers loyalty etc. Only few companies specify objectives and assess implemented EMS from the point of view of penalties savings and chargers for pollution releases, or even from the higher production process efficiency point of view.

## **The EN ISO 14001 Standard**

The company management and possibly EMS consultancy company decides about EMS orientation towards return on investment. The economical orientation of EMS depends on task definition by the company top management and determination of priorities, which should be generally indicated in environmental policy. The ISO 14001 standard gives a range of possibilities how to take into consideration the economical questions. The Standard includes for example:

- the Standards intended to assist organizations to achieve environmental and economic goals
- the overall aim of this International Standard is to support environmental protection and prevention of pollution in balance with socio-economic needs
- when establishing and reviewing its objectives, an organization shall consider the legal and other requirements, its significant environmental aspects, its technological options and its financial, operational and business requirements, and the views of interested parties
- in order to achieve environmental objectives, the environmental management system should encourage organizations to consider implementation of the best available technology, where appropriate and where economically viable; in addition, the cost effectiveness of such technology should be fully taken into account
- management shall provide resources essential to the implementation and control of the environmental management system; resources include human resources and specialized skills, technology and financial resources

Most of the Standard requirements may be implemented in company management system taking into consideration the economy. Some of the examples are shown in the following table:

<b>The Standard Requirement</b>	<b>Possible relation to the economy of EMS</b>
4.2 Environmental policy	public document, besides showing to customers, that EMS helps to establish framework conditions for effective spending of cost and to reduce costs and with it reduce selling prices
4.3.1 Environmental aspects	economical losses related to the environmental aspect should be one of criteria for environmental aspects significance
4.3.2 Legal and other requirements	updated and accessible list of legal and other requirements makes lower the risk of penalties for failure to comply with legal requirement, beside that allows systematic solution of legal and other requirements in advance and monitoring of new legislation development and thus lower costs of future legal requirements changes and tightening of requirements up
4.3.3 Objectives and targets	the objectives can be focused on lowering environmental costs; the objectives should be preferentially focused on preventative measures, which are cheaper than corrective measures; the EM programmes are one of the tools for preventative measures enforcement, e.g. by utilisation of the Cleaner Production Assessment methodology; if the result of EM programmes are investment measures the criterion like return of investment should be taken into consideration; the variant options preferring investments into production process
4.3.4 Environmental management programmes	
4.4.1-2 Structure and responsibility, training, awareness and competence	functional management of organisational structure deals not only with authorities but also with responsibility, which can be implemented to a certain extend as a responsibility of individual workers for damages possible material responsibility; some responsibilities can relate to prevention assertion and economically most advantageous measures; the management have to give resources necessary for EMS implementation and operation which should lead to planning and monitoring of financial, personal and technological resources utilisation
4.4.3 Communication	the procedures for communication unify fragmented communication, defines information flows and their recording in the way that information is available to the authorised persons and also the uniform information outputs from company are available so it is not necessary each time individually collect the information resources
4.4.4-5 Environmental management system documentation, document control	most of measures which increase EMS economical effectiveness have to be determined and approved by management in writing even it is not the Standard requirement (see e.g. 4.2, 4.3.2-4, 4.4.3-5, etc.), the management has a tool to enforce economical criteria into daily company operation
4.4.6-7 Operational control, emergency preparedness and response	some problems has been evaluated as significant in environmental aspects registry taking economical criteria into consideration (see 4.3.1) e.g. the engine fuel and oils consumption. For these “economical” aspects working procedures should be specified with methods of lowering environmental and economical impact; also the purchasing allows optimisation of economical and environmental criteria (purchase in returnable/recyclable packaging decrease the

	amount of waste production and the costs connected with the waste management; restriction on dangerous chemical purchase helps to cut down costs for health and safety measures and monitoring); the operational control should ensure the minimum losses in the emergency situations (fire, floods, accidents, electricity blackouts etc.)
4.5 Checking and corrective action	checking and corrective measures should also evaluate economical impacts and determine appropriate preventative measures
4.6 Management review	it is opportunity for periodical checking and decision by company management about economy of the whole management system

### The EMS Implementation Costs and Environmental Costs

On one hand the problem can be seen from accounting and taxation point of view, if it is an investment (from accounting standards point of view) and if the costs of EMS implementation, certification and operation are tax-deductible costs.

On the other hand the problem, as it is analysed by this text, can be seen from point of view of total costs or expenditures of EMS implementation, certification and operation. These costs can be in a simplified way divided into following categories:

- personal costs caused by EMS implementation and operation
- cost of external consultancy
- cost of certification
- costs caused by EMS implementation: e.g. new equipment investment, monitoring, communication with public, etc.

From the perspective of time scale the costs can be split up to two phases: till the certification audit (inclusive) and after certification audit. The costs for the first phase (implementation and certification) are usually much higher than costs of implemented EMS operation. With respect to the period of certificate validity the costs should be divided into respective taxation years.

The total costs of EMS implementation are almost in all cases at least in hundreds of thousands Czech crowns (CZK). Even for very small companies the costs of EMS implementation and certification usually overstep 100 thousands CZK. According to State Environmental Fund (SEF) data was in the period from 2000 to the middle of year 2003 approved 28 applications for financial support for EMS. Except one case all successful applications were supported by 50% of costs and the average subsidy was approx. 260 thous. CZK. From these data it follows that average cost of external consultancy and certification per one company is about 520 thous. CZK. Till the end of year 2002 SEF did not subsidy own personal costs of the company staff implementing EMS.

In the wider context the environmental costs and revenues are elaborated by environmental accounting (e.g. described in Methodical instruction on implementation of environmental managerial accounting, Czech Ministry of Environment, 2002). This instruction divide environmental costs into many categories, in a simplified way can be divided as follows:

- pollution management (waste, waste water, air pollution, remediation etc.)
- attention to the environment and pollution prevention
- the value (price) of material and its processing into non-product output

As it is mentioned below, effectively implemented EMS decreases by way of preventative measures particularly the last category of costs.

## Revenues

Except revenues for sold wastes etc. the decreased costs should be significant category of revenues. Because it is decrease of costs, it cannot be evaluated like revenue, but anyway it significantly influences the pay back period of EMS investment.

Appropriate preventive measures brings not only lower costs of own waste management, but especially lower cost of purchased materials. The savings on materials are higher than waste management saving in the ration 60/40 up to 80/20.

If the investment in EMS implementation should be returnable (reasonable return on investment indicator), the EMS have to ensure effective problems solution. For example in the case of exceeding emission limits for waste water in the process of nickel electroplating, the variant of bigger or new waste water treatment is not effective solution. More effective is the cause analysis of the pollution formation. Well implemented EMS, including economical indicators, in accordance with the Standard, offers sufficient data for evaluation, which shows how much the “production” of 1 m<sup>3</sup> waste water costs.

<b>Input/operation - waste water</b>	<b>Price</b>
Waste water rate	15,- CZK/m <sup>3</sup>
Water rate (purchasing price)	25,- CZK /m <sup>3</sup>
Precipitation sludge (material, chemicals, fees)	12,60 CZK /m <sup>3</sup>
Energy (temperature rise of waste water by 5 °C)	10,20 CZK /m <sup>3</sup>
Personal and operational costs...	x CZK /m <sup>3</sup>
<b>The waste water price</b>	<b>min. 62,80 CZK/m<sup>3</sup> (waste water rate is about 24 %)</b>

By the waste water price the potential for preventive measures can be evaluated with benchmarking method. One of preventive measure can be insertion of one more stage of rinsing or measures lowering the amount of electrolytical solution taken away.

The different subsidies are included in revenues as well. For example the EMAS Programme of SEF or “TRH” program of Ministry of Industry. The subsidy is 50% (ISO 14001) or even 60% (EMAS) of the costs.

## Payback Period

Simple payback period is the time (number of years) of investment refund, which is calculated as a proportion of investment expenses of the measure (IN) and annual benefits of the measure (CF), it means the change of the cash flow after measure implementation:

If we would take a simplified example into consideration, based on real data, we can show, that payback period of EMS investment can be easily about 2 years.

Implementation in medium sized company operating nickel electroplating:

- the total EMS implementation costs: 500 thous. CZK
- caused investment into preventative measure (installation of the third economical rinsing stage): approx. 250 thous.CZK
- the annual consumption of water: 16 thous. m<sup>3</sup>, the prices shown in the table above and realistic waste water reduction by 25% (theoretically 33%)

- the waste water rate (charge) saving: 60 thous.CZK, savings in connected processes and material costs: 190 thous.CZK, total annual savings: 250 thous.CZK
- the simple payback period of the investment in preventative measure is about 1 year, as the lifetime of the used technology is 5 years, in following two years this only one measure can pay off the costs of EMS implementation

This simplified example does not take into the consideration many effects (lower risks, electrolysis of nickel from waste water, operational costs).The EMS implementation should bring higher number of such measures, under the condition that the EMS is implemented and operated effectively.

Miroslav Krčma, Czech Cleaner Production Centre

## SEF CR

**Pavel Nejedlý**

The State Environmental Fund of the Czech Republic (hereinafter the “Fund”) is one of the basic economic instruments for performance of obligations following from international conventions on environmental protection and from the Implementation Plan for the Area of Environment, and for implementation of the State Environmental Policy.

The Fund was established and its activities regulated by Act No. 388/1991 Coll. which was followed by the related implementing regulations – the Statute of the Fund, Rules of Procedure of the Council of the Fund, Directive of the Ministry of the Environment on provision of financial means from the Fund and Annex to the Directive stipulating the conditions for provision of support for the relevant period.

Income of the Fund consists, in particular, of payments for pollution or damaging of individual components of the environment, repayment of the provided loans and interest thereon, and revenues from available funds in time deposits. According to law, decisions on use of financial means from the Fund are made by the Minister of the Environment on the basis of recommendations of an advisory body – Council of the Fund.

Support from the Fund is allocated in accord with the National Program of Preparation of the Czech Republic for Accession to the EU, obligations following from international conventions and the State Environmental Policy, in particular into the areas of water protection, waste management, and nature conservation and care for the landscape. The form and purpose of subsidies are stipulated according to external and internal environmental and economic conditions laid down in the Annex. Support cannot be provided for completed projects.

The Office of the Fund provides for the entire agenda connected with activities of the Fund. This includes, in particular, consulting and advisory activities (an open-door day is organized each Tuesday from 8:00 A.M. to 4:30 P.M.), acceptance of applications for support, evaluation thereof, preparation of proposals for meetings of the Council of the Fund and Decisions of the Minister, subsequent contractual agenda related to the provision of support, the agenda of contractual guarantees for provided loans, provision of funds to the beneficiaries including continual monitoring of the purpose of use of the funds, final evaluation of use of the provided funds and of the environmental effects achieved, monitoring of returning of loans until full settlement of obligations, and imposing and exacting penalties in case of non-compliance with the terms and conditions for provision of support or breach of budgetary rules.

Thus, the Fund specifically provides direct and indirect financial support in the sense of § 3 and § 4 of Act No. 388/1991 coll., on the State Environmental Fund of the Czech Republic, in the form of:

- subsidies
- loans
- contributions for partial payment of interest.

The subject of support consists in measures implemented on the basis of programs announced by the Ministry of the Environment, in the areas of:

- water protection
- air protection
- conservation of nature and the landscape, protection of soil, utilization of natural resources
- waste management
- technologies and products
- use of renewable energy sources
- EU ISPA programs.

According to law, decisions on use of financial means from the Fund are made by the Minister of the Environment. Pursuant to the Act on the Fund, the Council of the Fund is an advisory body for the Minister. Decisions of the Minister on provision of support from the Fund are issued to support financing of individual projects. The Office of the Fund provides for implementation of supports as they follow from the Decisions of the Minister of the Environment.

By establishing seven regional workplaces in the framework of its regional policy in 1999, the Fund brought some activities nearer to the clients, e.g. provision of consultancy and advisory activities and control activities; regional acceptance of applications is also under preparation. In 2000, the Fund provided personnel for five additional workplaces on the basis of tender procedures; these workplaces commenced their activities on January 1, 2001. Subsequently, the network of regional workplaces of the Fund was supplemented so that it would correspond to the division of the country into 14 regions and regional workplaces of the Fund were located in the seats of Regional Authorities.

The Fund continues to cooperate with various entities in the framework of implementation of the EU ISPA program and continues to prepare support for the area of the environment. The Fund is the implementation agency for the ISPA program and the ISPA flood program and will also perform the duties of the implementation agency for the Cohesion Fund and the Infrastructure Operational Program. Within its activities, the Fund is fully prepared to gradually commence funding of environmental protection on the basis of subsidies from the Cohesion Fund and the Infrastructure Operational Program.

**Revenues of the Fund**  
**in 2002            CZK 3.41 billion**  
**in 1992-2002 CZK 42.93 billion**

**Expenditures of the Fund**  
  
**in 2002            CZK 4.23 billion**  
(subsidies equaled CZK 3.34 billion, loans CZK 0.78 billion,  
costs of the Office CZK 110 million)  
  
**in 1992-2002 CZK 36.75 billion**  
(does not include receivables in the amount of CZK 0.6 billion)

The balance of revenues and expenditures in the 1992 – 2002 period equaling CZK 5.58 billion, including an assigned receivable in the amount of CZK 0.6 billion, covers the existing financial obligations of the Fund which equaled CZK 7.39 billion as of January 1, 2003.

### **Results of Activities of the State Environmental Fund of the Czech Republic**

Revenues of the State Environmental Fund of the Czech Republic equaled CZK 3.4 billion in 2002 and CZK 42.9 billion in 1992-2002. Overall expenditures in 2002 equaled CZK 4.1 billion (excluding expenditures of the Office of the Fund), of which CZK 3.3 billion were subsidies and CZK 0.8 billion loans; in 1992-2002, expenditure equaled CZK 36.0 billion (the time series was recalculated retrospectively and cleared from all expenditures of the Office of the Fund).

Implementation of the following projects was financially supported from the means of SEF in 1992-2002:

- 1 115 waste water treatment plants and sewerages,
- 177 projects to remove flood damage,
- 3 636 extensive introduction of gas in municipalities and introduction of gas in boiler houses including other technologies,
- 1 295 projects to reduce burdening of nature and the landscape, including waste management projects
- 3 196 projects to use renewable energy sources.

Pavel Nejedlý, Ministry of the Environment, Czech Republic

# USAGE OF EMS IN THE IPPC PROCESS

Pavel Růžička

## 1. Introduction

In recent years, an increasing number of new instruments have appeared in connection with implementation of the targets of environmental policy. Where only a vague connection with environmental protection was apparent a few years ago, instruments are now available that have an effective and demonstrable impact on the environment and that can significantly affect it.

Similarly as substantial changes are occurring in the number of instrumental policies, there important changes are also taking place in attitudes on how these instruments should function. The international conference on the environment in 1992 in Rio de Janeiro was an significant turning point in this area; for the first time, the importance of the **strategy of prevention** was publicly emphasized. This strategy states, in simplified terms, that it is *better (more effective, simpler and cheaper) to prevent environmental damage than to face the necessity of later remedying it.*

Trends in prevention strategy at the beginning of the 90's began to be reflected both by major international industrial enterprises and by the governments of the individual countries, as well as supranational authorities. As a consequence, new standards and regulations were created for the introduction of **environmental management systems** (EMS) and also Council Directive 96/61/EC of September 24, 1996 on **integrated pollution prevention and control** (IPPC) was adopted.

This manual is intended to demonstrate the connections between environmental management systems (as voluntary instruments introduced in enterprises) on the one hand and the Directive on integrated pollution prevention and control (as a legal instrument utilized by the state for enforcing the targets of environmental policy) on the other hand.

## 2. Environmental Management Systems

Two standardized methods are employed to **introduce EMS** at the present time:

1. According to international standards of the ISO 14 000 series, represented in the Czech Republic particularly by basic standard *CSN EN ISO 14 001 Environmental management systems - Specifications with instructions for use.*
2. According to *Regulation (EC) No. 761/2001 of the European Parliament and Council of 19 March, 2001 allowing voluntary participation of organizations in a Community eco-management and audit scheme (EMAS)* (i.e. EMAS II). Regulation No. 761/2001 replaced original Council Regulation (EEC) No. 1836/93 of 29 June, 1993 for voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (i.e. EMAS I).

The EMAS Programme has been introduced in the Czech Republic since 1998, on the basis of *Resolution of the Government of the Czech Republic No. 466/1998, approving the National Programme of introducing the environmental management and audit scheme - the EMAS Programme and the Rules for introducing the environmental management and*

*audit scheme.* On June 19, 2002, a new Resolution of the Government of CR No. 651/2002 was approved, up-dating the Czech EMAS Programme. On this basis, the updated rules for introducing EMAS were adopted, reflecting the requirements of Regulation No. 761/2001

Consequently, in introducing EMS, organizations in CR may utilize either Czech standard CSN EN ISO 14 001 or the National EMAS Programme or the *Updated EMAS Programme*. Both of these approaches (the ISO 14001 standard and the regulations on EMAS) reflect identical principles; however, there are certain differences - things required under EMAS are either not specified at all in ISO 14001 or are only recommended. (For example, assessment of indirect environmental aspects, preparation of an environmental statement, employee participation in introducing EMS, etc.).

As of September 15, 2003, a total of 506 organizations with certified EMS according to ISO 14001 were registered and at least 12 enterprises were registered with a verified EMAS system, of which 9 enterprises were registered in the national EMAS Register.

The subsequent text will be concerned primarily with the EMAS system, as it serves as a better example of the connections and potential for use in the area of IPPC than ISO 14001.

An enterprise must undertake the following steps for **registration in the EMAS Programme**:

1. Carry out an environmental review.
2. Introduce an environmental management system (EMS).
3. Carry out or arrange for an environmental audit.
4. Prepare an environmental statement.
5. Arrange for verification of whether the environmental review, management system, audit procedures and environmental statement comply with all the requirements of Regulation No. 761/2001, and arrange for validation of the statement by a certified environmental verifier.
6. Deliver an application, which shall include the validated statement, to the relevant entity (in CR, the EMAS Agency at the Czech Environmental Institute).
7. Make the statement available to the public following registration.

Amongst other things, the **environmental statement** should also include the following information:

- a description of the organization and a summary of its activities, products and services, any relationship to a parent company
- the environmental policy and brief description of the EMS of the organization
- a description of all the direct and indirect environmental aspects and explanation of their environmental impacts (e.g. emissions into the air, discharge of waste waters, waste management, soil use and decontamination, use of natural resources, raw materials and energy, local problems - noise, vibrations, smells, dust, visual impacts, risks of accidents and their environmental impacts, impacts on biological diversity etc.)
- description of general and specific environmental targets
- summary of available information on the environmental impacts of the activities of the enterprise (e.g. pollutant emissions, waste production, consumption of raw materials, energy and water and other aspects mentioned above)

- other factors related to the environmental impacts of the activities of the enterprise (e.g. compliance with the legislation).

### 3. IPPC

The Directive on integrated pollution prevention and control and Czech Act No. 76/2002 Coll., on integrated pollution prevention and control, on the integrated pollution register and amending some laws (Act on integrated prevention), which came into force on January 1, 2003, impose on the operators of selected installations the obligation to obtain an integrated permit for operation of these installations.

According to information from the Information Center of the Agency for Integrated Prevention at the Czech Environmental Institute, a total of 1314 installations in 733 enterprises were registered by the September 15, 2003.

Amongst other things, the Act on integrated prevention also outlines the procedure that must be followed for issuing of an integrated permit. This **procedure** consists in the following steps:

1. Submitting an application for an integrated permit.
2. Sending the application to all participants in the procedure on the integrated permit, the relevant administrative authorities, professional qualified persons and the affected state(s) (the state(s) whose environment could be significantly detrimentally affected by operation of the installation).
3. Statements from the relevant administrative authorities, participants in the procedure, professionally qualified persons and the affected state.
4. Oral deliberation of the application.
5. Issuing of a decision on approving or rejecting an application for an integrated permit.

Amongst other things, the operator of the installation is obliged to include the following in the **application for the integrated permit**:

- a description of the installation and the activities connected therewith
- identification information on the location of the installation
- the category of installation (according to Annex No. 1 of the Act)
- a description of raw materials and auxiliary materials, other substances and energy used in the installation or produced thereby
- a list and description of sources of emissions and a description of other impacts of the installation
- the character and amount of expected emissions from the installation into the individual components of the environment
- important environmental impacts of these emissions
- the character of the state of the territory where the installation is to be located (especially pollution levels)
- a description of the technology and other techniques intended to prevent the generation or decrease emissions
- a description of measures to prevent waste generation, waste treatment and use
- a description of measures for measuring and monitoring emissions discharged into the environment

- comparison of the existing or planned installation with BAT
- a description of further measures planned for compliance with the general preventative obligations of the operator (e.g. economical use of energy, preparation for emergencies, manner of returning the place of operation to the original state after termination of operations, exclusion of the risk of any pollution of the environment and risk for human health, etc.)
- a proposal for binding conditions for operation of the installation
- decisions, standpoints, statements and consents issued pursuant to the special regulations, especially those that are to be replaced by the integrated permit
- a concluding summary of the previous information without technical details and professional jargon.

In addition to the obligation to obtain an integrated permit, further **obligations** arise by law for the operators of the relevant installations:

- To operate the installation in accord with the issued integrated permit.
- To announce any planned change in the installation to the authority.
- To cooperate with the relevant administrative authorities in controlling compliance with the conditions of the integrated permit.
- To notify the authority without delay of all unusual situations, break-downs in the installation and accidental escapes of pollutants into the environment.
- To keep records of information on compliance with the binding conditions for operation in the integrated permit.

#### **4. Basic connections between EMS/EMAS and IPPC**

The identical characteristics of EMS/EMAS and IPPC can be perceived on two basic levels:

1. Both are based on the described strategy of prevention and are thus based on identical principles. Similarly, they both have similar benefits, both for the enterprise and of a general social character.
2. The data stated in the environmental statement and the other data on EMS are, to a considerable degree, identical with the data required for formulating the application for issuing of an integrated permit.

##### **4.1 Prevention of Pollution**

As mentioned above, both instruments - EMS/EMAS and IPPC - are based on the strategy of prevention, and thus identical **principles**, on which they are based, can be identified. These consist particularly in:

- the principle of prevention of pollution (including constant improvement)
- the principle of high level of environmental protection
- the principle of integration and a complex approach to dealing with aspects of environmental protection
- a team approach in the enterprise
- the principle of openness and public access to information.

A further important connection between EMS/EMAS and IPPC lies in the similar **benefits** provided by introduction of EMS/EMAS or IPPC **in a company**. These consist primarily in

- a decrease in operating costs (savings of raw materials, materials and energy, lower fees for environmental pollution)
- increased competitiveness of the enterprise
- gaining access to new markets
- improved communication with affected parties.

In addition, it is important to bear in mind the **general social benefits**, of which the more important consist in

- an improvement in the quality of the environment (a decrease in the amount and hazardousness of emissions and wastes, a decrease in the risk of occurrence of an accident, pressure on development and introduction of new, environmentally sounder technologies)
- increased competitiveness of the economy
- improved communication amongst the affected parties.

*Thus, it can be justifiably expected that, in an enterprise with introduced EMS/EMAS, the potential for preventing environmental damage is greater than in an enterprise where EMS/EMAS has not been introduced and similar principles are not implemented.*

#### **4.2 EMS/EMAS as information support for IPPC**

The very significant connection between EMS/EMAS and IPPC permits utilization of data from EMS (or the environmental statement) in formulating the application for issuing an integrated permit. This potential is explicated in the following table:

*The table is divided into six parts (blocks) for easier orientation:*

- 1. Basic information on the enterprise and the operated installation; basic information on production, raw materials, technology, energy, wastes, etc.; general description of the environmental impacts of the enterprise/installation*
- 2. More detailed information on the environmental impact of the enterprise/installation (mostly specific numerical values)*
- 3. Measures to decrease the detrimental environmental impact of the enterprise/installation (especially of a preventative character)*
- 4. Detailed technical data on the operated installation*
- 5. Documentation*
- 6. Brief summary of the previous parts.*

Part	Application for an integrated permit	Environmental statement
1.	<ul style="list-style-type: none"> <li>• Description of the installation and the activities connected therewith</li> <li>• Identification information on the location of the installation</li> <li>• Description of raw materials and auxiliary materials, other substances and energy used or produced in the installation</li> <li>• List and description of sources of emissions and description of other impacts of the installation</li> <li>• Important environmental impacts of emissions from the installation</li> <li>• Character of the state of the territory where the installation is to be located (especially pollution levels)*)</li> <li>• Description of technology and other techniques intended to prevent the formation of emissions or to decrease emissions*)</li> <li>• Description of measures to prevent waste generation and for waste treatment and use</li> <li>• Description of measures for monitoring and measuring emissions discharged into the environment*)</li> </ul>	<ul style="list-style-type: none"> <li>• Description of the organization and a summary of its activities, products and services, any relationship to a parent company</li> <li>• Description of all direct and indirect environmental aspects and explanation of their environmental impacts</li> </ul>
2.	<ul style="list-style-type: none"> <li>• Character and amount of expected emissions from the installation into the individual components of the environment</li> <li>• Character of the state of the territory where the installation is to be located (especially pollution levels)*)+)</li> </ul>	<ul style="list-style-type: none"> <li>• Summary of available information on the environmental impacts of the activities of the enterprise (preferably numerical with the possibility of international comparison)</li> </ul>
3.	<ul style="list-style-type: none"> <li>• Description of other measures planned for compliance with the general preventative obligations of the operator*)</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental policy and a brief description of the EMS of the organization</li> <li>• Description of general and specific environmental targets</li> <li>• Further factors related to the environmental impact of the activities of the company (e.g. compliance with the legislation)</li> </ul>
4.	<ul style="list-style-type: none"> <li>• Category of installation</li> <li>• Comparison of the existing or planned installation with BAT</li> <li>• Proposal for binding conditions for operation of the installation</li> </ul>	<p>This information is not included directly in the environmental statement; however, specific target values, set by the enterprise in the framework of their environmental protection programmes, should approach these parameters</p>

5.	<ul style="list-style-type: none"> <li>• Decisions, standpoints, viewpoints and consents issued pursuant to the special regulations, especially those to be replaced by the integrated permit</li> </ul>	It is obligatory to collect this information in carrying out the introductory environmental review (see Annex VII, subparagraph 7.2, (a) of Regulation No. 761/2001)
6.	<ul style="list-style-type: none"> <li>• Final summary of the previous information without technical details and professional jargon</li> </ul>	As the environmental statement is intended for the general (lay) public, it should not contain too many technical details and professional jargon. Consequently, the concluding summary in the application for issuing of an integrated permit can be considered to be a brief form of this application.

*\*) This data need not be included in the statement on the state of the environment or need not be included in the extent and depth required for the application for an integrated permit*

*+) This point is included in two parts of the table (1 and 2) as it can include both a general description and detailed information on the impact of the organization/installation on the environment or its immediate vicinity.*

It can be seen that a great deal of the information that constitutes a compulsory part of the application for issuing an integrated permit can be found directly in the environmental statement, in either partial or completely satisfactory extent. If EMS has been introduced and maintained at a sufficiently high level, a great deal of the information that is not included in the statement can be readily obtained. This can consist, e.g., in

- a description of the existing technical installation (for comparison with BAT)
- a description of measures and equipment for measuring and monitoring the environmental impact of the enterprise
- a description of all preventative measures
- documents of decisions, standpoints, viewpoints and consents from the bodies of the state administration
- etc. ...

It is apparent at first glance from the above text that the information stated in the application for issuing of an integrated permit encompasses far more particulars and technical details than the environmental statement. However, this difference is quite logical in relation to the purpose of these two documents - the application for an integrated permit is intended for the responsible authority for professional assessment of the operated or introduced installation, while the environmental statement is intended as information for the general lay public on the environmental impact of the enterprise and its activities in this area. Consequently, in principle, the statement cannot include "boring" technical details - the public is primarily interested in how the enterprise affects the environment and not in the parameters of the operated installation.

However, the statement is only one part of EMS. Consequently, it is necessary to again emphasize that a great deal of information that is not included in the statement, or is not included in the required extent and depth of detail, can be found in other documents in the framework of EMS.

*Thus, it can be unambiguously stated that introduced and functioning EMS/EMAS may act as significant information support for an enterprise coming under the IPPC regime, as it significantly facilitates obtaining information required for formulation of the application for issuing an integrated permit. In practice, the application for issuing of an integrated permit can thus be considered to a major degree to constitute a detailed, technically oriented output of EMS.*

## 5. Conclusions

Two important conclusions were drawn in part 4:

1. An enterprise with introduced EMS/EMAS has a greater potential for preventing environmental damage than an enterprise where EMS/EMAS has not been introduced and similar principles are not implemented.
2. Introduced and functioning EMS/EMAS may act as significant information support for an enterprise coming under the IPPC regime, as it significantly facilitates the obtaining of information required for formulation of the application for issuing an integrated permit.

*In conclusion, we can state unambiguously that an introduced and functioning EMS/EMAS system in the enterprise substantially facilitates compliance with the conditions following from the Act on integrated prevention.*

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# FROM FUTURISTIC MARKETING TO THE MONITORING OF ENVIRONMENTAL COSTS

Adrián Podskřan, Peter Sakál

## 1. INTRODUCTION

Marketing became in the last 30 years the prosperity prodigy in development of companies, which understood its meaning and purpose in identification of market.

It is evident, providing that the marketer identifies the needs of customer correctly and he creates the good products with optimum prices, distribution and effective advertisement, that it will be readily marketable goods. Of course, but today the advanced marketing should be based from pragmatic view to the given reality. When adapting to the new era of business he must not forget on environmental protection.

In the 21<sup>st</sup> century, the managers of large companies are not necessary to be explained, that thinking for future actually means the protection of environment (E). These managers start to aware the negative impacts of their companies' behaviour to the environment, whereby they start to consider the nature to be the necessary condition for their existence.

Exploitation of market occasions oriented to environment and the simultaneous paying an attention to the eventual environmental risks constitutes one of the most important challenges of the market-oriented company.

For the companies were able to pay attention to the environmental risk and challenges, they need the advanced marketing, which requires a little bit more than only production of environmental friendly products with the attractive price. They know, that the product is necessary to be made accessible to the potential customers without contamination of environment. The futuristic marketing deals with such an issue in full range using the monitoring of environmental costs. This article, which creates a part of scientific project VEGA No. 1/9099/02: “**Environmental Marketing upon Conditions of the Slovak Republic**” also deals with it.

## 2. FUTURISTIC PHILOSOPHY OF MARKETING BUSINESS

The merits of the futuristic philosophy of marketing business is according to our opinion the strategy of permanent maintenance with the market control, where the environmental marketing means the key for success of this strategy.

**The basis for environmental marketing is the development of ecologically more safe products, recyclable and biodegradable packages and further coherent marketing activities, more effective inspection of contamination and the operations with less demands of power [3, 4].**

Environmental marketing goes from the basic idea of *social marketing philosophy*, which is characterized by P. Kotler [3, 4] like *determination of needs, wishes and interest of target markets and their satisfaction in a more actively and effective way than the competition in the way, which shall maintain or increase the welfare of consumers and society.*

The futuristic philosophy of marketing business expects, in our opinion, the reaching of the balance in company profit, of the requirement for client's satisfaction, permanent maintenance and public interest in determination of the company marketing policy. At present, the permanent maintenance begins to become the integral part of realization of company decisions. When as **the permanent maintenance we understand such a development, which enables to satisfy the needs of present generations without risk for the future generations' possibilities to realize their own needs**, so we in our opinion can speak about **the enforcement of futuristic philosophy of marketing business**.

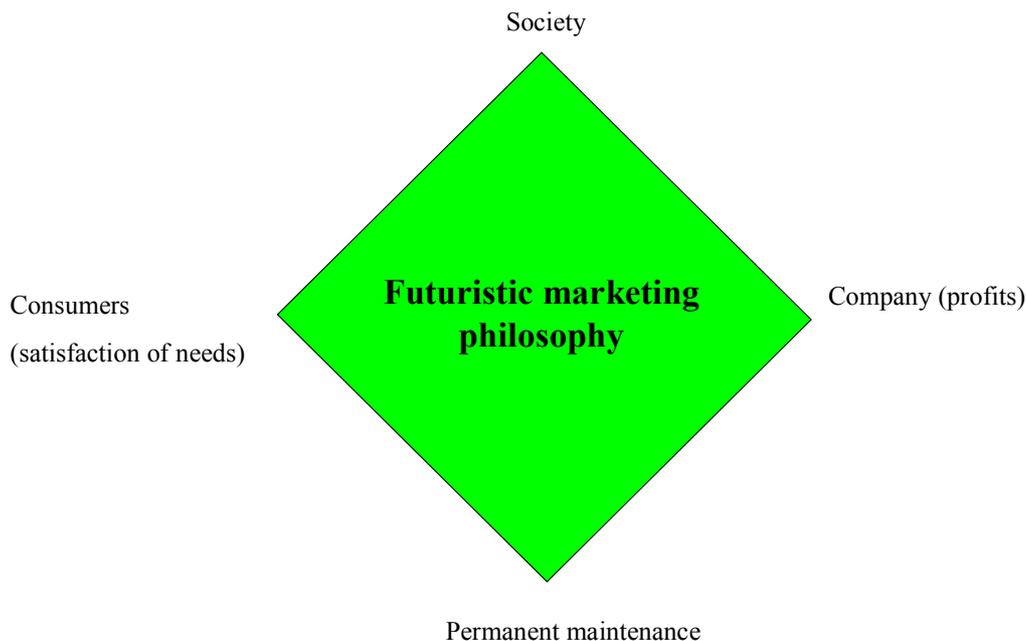


Figure No. 1: Four aspects of futuristic marketing philosophy [4]

**As the environmental marketing we can understand such marketing activities, which take into account the environmental aspects and those become a part of responsible approach of a company to the entrepreneurial activity and simultaneously the opportunity for business growth.** Therefore the initiatives of the company environmental marketing are obviously accompanied, if not even controlled, by the gradual change of company culture and of the company business activity's realization process, through movement from regression-oriented environmental management to the proactive oriented management and marketing planning [4].

The environmental marketing is not only result of such changes, but also a new perspective, from which the companies proceed towards everyday marketing planning and realization of business decisions. When realizing the marketing decisions, the company must appreciate the importance of long-term satisfaction of consumers' needs and wishes, which can be in contrary with the effort to reach the short-time profit [4].

Influenced by various networks and legislative regulations relating to the consideration of environmental aspects in company decision-making, some entrepreneurial subject deal in compliance with legal regulations, but they proceed regressively as to the strategic point of

view. Managers, who are thinking in a long-term periods, they identify and utilize the new business opportunities connected with the environment starting with prevention of contamination and using of more effective technologies up to the environmental education of consumers and promotion of environmental oriented products [4].

**The task of environmental marketing is as follows [3, 4]:**

- to create and support the sale of products, which comply with needs and wishes of consumer and at the same time they have a minimum influence to the environment,
- to draught and to created the picture of environmental responsible company.

If we have a look to the product in a more detailed way, we can find, that the environmental influences are evident in each stage from research and development up to the sale and consumption. All of these processes incident to the material flow from the nature to the nature are described in the Figure No. 2.

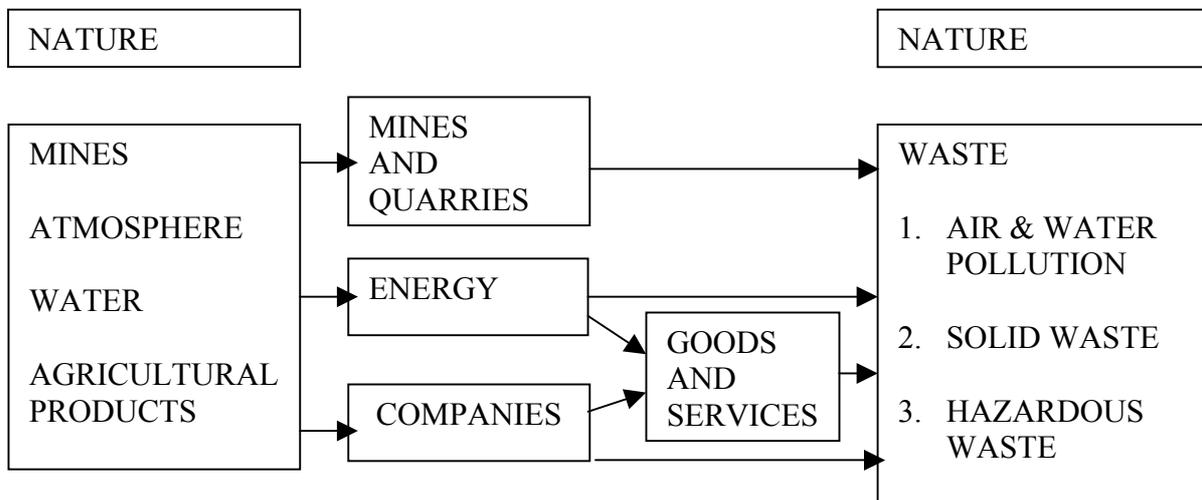


Figure No. 2: From the nature to the nature – material flow [3]

This is the universal material flow. It means, that if the company management must take into account, when creating the environmental oriented company marketing strategy, besides the quality of procedures and products, the costs and risks connected with using the sources and the production of wastes. The management must realize, that when decreasing the quantity of sources used and in management of minimization of wastes, some occasions for higher profits and higher competitiveness can be find. The right decision can recover essential secondary sources of profit.

Consideration of environmental aspects with creating the environmental marketing strategy requires the application of new procedures for the strategy implementation, the result of which is the substantial change in the way of business making. The importance of the environmental marketing for survival, success and growth of any company, which already today thinks for the future with the aim to integrate the company into the business, commerce and environment, and vice versa, to integrate the client into the company market development, is undisputed [3].

We can say, that the environmental marketing continues in environmental management of the company. To tell it otherwise, the company responsibility to the total high-quality environmental management must be followed by environmental marketing program,

otherwise the environmental program shall neither be reliable nor supported. Not each procedure and product shall reflect the highest level of environmental sensitivity. But prior accepting the environmental marketing program, the company must start the procedure of environmental aspects' implementation into its management actions, whereby it is necessary to harmonize the internal company management activities with the environmental marketing requirements of consumers.

### **3. MONITORING OF ENVIRONMENTAL COSTS**

The futuristic marketing philosophy is closely connected also with the monitoring of environmental costs. According to the team Hyršlová, J. – Sakál, P. – Podskľan, A [2] the information about environmental costs represent the initial documentation not only for the permanent evaluation of efficiency of products, production procedures and measurements, but they are also very important for responsible planning of products and activities in compliance the Environmental Management System.

In the strategic and tactic level, the information about environmental costs are used preferably in connection with the research and development of new technologies and products and decision-making on investments. It is going about information, which are oriented for the longer period of time and which are processed mostly with alternatives [2].

### **4. CONCLUSION**

This report deals with analysis of the nature of the futuristic marketing philosophy. The futuristic marketing philosophy has and shall have the value for industrial companies, where the management still today think fast forward and it means to be ahead the competition, to foresee and to be able to react in the right time.

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# VOLUNTARY INSTRUMENTS INCREASING THE COMPETITIVENESS OF ENTERPRISES

**Dagmar Sucharovová**

Attempts to introduce the principles of sustainable development and specifically introduction of changes in patterns of consumption and production do not constitute an attempt to suppress all forms of human activity and are certainly not directed against human enterprise. There is no a priori resistance to technology. To the contrary, there is an attempt to overcome contemporary imperfections in modern means of utilizing (and abusing) technology. It is thus desirable to strengthen these potentials for rationality and humanity, which were not used, suppressed or deformed for various reasons in developments to date for various reasons and that lead or contribute to a more sustainable life style, more sustainable social and economic relations and a more sustainable overall concept of the world in an environmental, social and economic context.

The Czech Republic has actively joined those countries of the world that, in their everyday lives, attempt to implement, not only classical legislation, also new approaches, taking into account the environmental impacts of production and products and simultaneously improve the economics of the enterprise and especially its competitiveness in developed international markets. These consist in new preventative instruments supporting a change in the behaviour of producers and consumers towards sustainable consumption and production. In this connection, we can state that, e.g., CR has a well-functioning set of instruments, such as labeling of environmentally sound products - ecolabeling, the use of voluntary agreements between the state administration and associations of manufacturers, introduction of environmental systems of management, introduction of the principles of cleaner production. We are developing the implementation of other instruments supporting changes in patterns of consumption and production, such as LCA (life-cycle assessment of products), ecodesign, reporting, greener purchasing, retailing (utilizing the retail network offering environmentally sound products and services), public procurement (implementation of environmental criteria in public tenders), etc.

Let's take a closer look at some of the voluntary instruments employed in CR, that decrease the detrimental impact on the environment and simultaneously increase the competitiveness of products on the markets.

## ECOLABELING

The ecolabeling system was introduced and adopted in CR through Government Resolution No. 159/1993 in accord with the approaches in EU and OECD, with the target of:

- providing the consumer with a state-guaranteed assurance that, on the basis of environmental evaluation of the properties of products (in accord with the current state and level of knowledge), detrimental impacts on the environment and natural resources are minimized for labeled products.
- ensuring safe orientation of environmentally aware consumers in the wide choice of almost equivalent products,
- increase sales of these products and thus create one of the basic mechanisms of a market economy, i.e. consumer demand, and thus create competition amongst producers.

## **Principles of the Program**

In accordance with the declaration of the International Chamber of Commerce, the following principles are involved:

1. the principle of orientation towards products of a consumer nature,
2. the principle of favorable effect and soundness of products in relation to all the components of the environment,
3. the principle of voluntariness,
4. the principle of comprehensibility,
5. the principle of reliability,
6. the principle of application of the methods of LCA, i.e. life-cycle assessment of the product,
7. the principle of exclusion of products subject to other specific regulations (*foodstuffs, beverages, pharmaceuticals, arms, explosives, etc.*),
8. the principle of a time limit for holding the Environmentally Friendly Product Ecolabel,
9. the principle of finality of the product - *where the ecolabel is awarded to the product as a whole and not some part of it,*
10. the principle of openness, allowing *any company, both domestic and foreign, to apply,*
11. the principle of controls,
12. the principle of international harmonization.

## **Managing the Program**

The National Ecolabeling Program for environmentally friendly products (hereinafter EFP) in this country is managed by the Ministry of the Environment of CR. In addition to the relevant department of the Ministry, the Council for Environmentally Friendly Products and the Agency for Environmentally Friendly Products assist the Minister.

In addition to these main components, the EFP Program also encompasses selected authorized and certified laboratories and testing units, which test the submitted products on the basis of criteria established for the relevant product categories, and confirm compliance with the relevant criteria, specified in the product categories for the given product.

**The detailed procedure followed by an enterprise that wishes to submit an application for awarding of an ecolabel can be found at the web site of the EFP Agency:**

[www.ceu.cz/EŠV](http://www.ceu.cz/EŠV)

Information on products that have been awarded the right to use the ecolabel can be found at the web sites: [www.env.cebin.cz](http://www.env.cebin.cz) and [www.ceu.cz/ES](http://www.ceu.cz/ES). The information also includes contact information for the EFP Agency, which provides for the entire process of awarding the ecolabel. This also includes information related to fees for awarding the ecolabel, payments for testing the product and preparing documents required for the application, rules for using the ecolabel and other details. It is perhaps important to point out that, in the interests of encouraging manufacturers to produce environmentally friendly products, access to the Czech Program is the cheapest, and requires of manufacturers only a single registration fee of 20 000 CZK, and does not require payment of a percentage on product turnovers or other types of payments.

### **Current conditions:**

**32 product categories have been approved in the Czech Republic, in the framework of which more than 280 products hold the ecolabel.**

### **GREEN PURCHASING**

How can sustainable consumption be achieved? One of the positive steps is to prefer environmentally friendly products in one's purchases and in production. The Czech National Ecolabeling Program permits such a choice on the domestic market. 56 manufacturers are currently producing environmentally friendly products in CR. These consist, for example, of water-based coating materials, various types of hot-water boilers, liquid cleaning agents, recycled hygienic paper, recycled graph paper, wood-based agglomerated materials, waste-wood briquettes, tenside cleansing cosmetic preparations, paper shopping bags, interior mirrors, pipes, polyolefin shaped pieces and pipelines, abrasive scattering materials, furniture, and a number of other products. There are more than 280 such products.

The conscientious consumer who wishes to have a sound approach to the environment attempts to purchase these products. Obviously, ME itself purchases these products preferentially. This corresponds to implementation of the first steps in green purchasing.

As assistance cannot be provided to the manufacturers of environmentally friendly products, ME attempts to assist manufacturers in increasing the turnover of sales of their environmentally friendly products, in that it has prepared the basic documents for the Government and the Government adopted **Resolution No. 720 of July 19, 2000**. In this Resolution, it is recommended that all members of the Government, heads of other central bodies of the state administration and heads of the regional authorities ensure, in the organizations that they control, that:

1. in calling for tenders for public contracts pursuant to Act No. 199/1994 Coll., on tenders for public contracts, as amended, that may be concerned with the supply, installation and use of a product, one of the criteria for evaluating the tender for the public contract should be the environmental soundness of the product (e.g. through labeling with the "Environmentally Friendly Product" ecolabel),
2. they prefer direct purchase of these ecolabelled goods and products (e.g. for repairs to exteriors and interiors of buildings and their equipment - furniture, copying machines, lighting, office paper, hygienic requirements, etc.).

The first summary report following from this Resolution, for 2001 and 2002, indicated that the individual sectors have begun to purchase environmentally friendly products; however, the extent of use or installation of environmentally friendly products, rather than commonly employed "classical" products, varies considerably. The overall evaluation for this initial period was basically favorable.

In Resolution No. 720/2000, the Czech Government took a basic step, in which it initiated an important process - an increase in the contribution of the state administration in implementing new procedures directed towards sustainable development in society. It was thus amongst the first to accept its responsibility to create a demand for environmentally friendly products. The greater the demand, the faster and more extensive will be the shift towards sustainable development.

VOLUNTARY AGREEMENTS can, in general, be characterized as activities of enterprises and other entities (public bodies, NGO's, etc.) that:

- exceed the framework of the valid legislation on the environment or take the place of nonexistent legal regulations;
- are employed to deal with traditional environmental problems or are employed to deal with "new" environmental problems;
- may be employed to alleviate the economic impact of new legislation in sectors that were seriously affected;
- are based on increased activity of the polluter;
- in some cases this is connected with a search, which can lead to greater variability of the solution;
- in addition to an improved state of the environment, this can ensure economic and other favorable benefits (support the process of innovation, disseminate information, etc.) for the participating entities;
- in combination with economic instruments, it can assist in the search for and finding of socially less expensive approaches to environmental problems.

At the present time, there are several signed voluntary agreements between manufacturers and the Ministry of the Environment. These include, e.g.:

- An agreement on a gradual decrease in the detrimental impact of detergents on the environment, signed on March 22, 1995 between the Ministry of the Environment and the Czech Federation of Manufacturers of Soaps, Cleaning Agents and Detergents, with the chief benefit that the Federation will place only phosphate-free detergents on the market after 2005.
- An agreement on cooperation between ME, the Federation of Industry and Transport of CR and the Czech Business Council, of 1999. A current and permanent priority of this agreement continues to be transposition and implementation of EU environmental legislation into conditions in the Czech Republic, with emphasis on creation of conditions for compliance with the conditions of the Act on integrated pollution prevention and control and the integrated pollution register, the Act on protection of the air and the ozone layer of the Earth, the Act on packages, the Act on chemical substances and chemical preparation and the Act on wastes in practice, and the introduction of new instruments of environmental protection in industrial enterprises (EFP, cleaner production, EMS/EMAS, LCA, etc.).
- An agreement on cooperation between the Ministry of the Environment, the Federation of Entrepreneurs in the Construction Industry and the Let's Build Environmentally Federation (signed in April 2000). Some of the specific targets of cooperation between ME, the Federation of Entrepreneurs in the Construction Industry and the Let's Build Environmentally Federation can be listed here:
  - the introduction of environmental management systems in the construction industry,
  - preferential purchasing and use of environmentally friendly product and the products of companies that have implemented environmental approaches in their production processes (greener purchasing), implementation of the principles of cleaner production in the work of construction companies, gradual implementation of LCA and ecodesign (evaluation of the life cycles of products), reporting - submitting reports on the activities of the construction industry from the standpoint of the environment;
  - implementation of environmental criteria under the conditions of calls for tenders for subcontractors (public procurement);
- competition for environmentally sound construction; the first annual competition was held in 2003;
- in the area of education, guiding cooperation towards preparation of project plans in post-graduate study concerned with the environmental aspects of the construction industry, intended for middle-level management employees, etc.
- and a number of other activities.

Voluntary agreements are an instrument that will be increasingly employed, especially at a regional level, e.g. in that the regional authorities will be able to deal with some regional environmental problems through implementation of such agreements (see the publication

"Voluntary Agreements in the Environment", published by the University of Economics and the Ministry of the Environment, Prague 2000).

## **ENVIRONMENTAL MANAGEMENT SYSTEMS**

In CR these systems have been introduced both on the basis of ISO 14001 international standards and as EMAS on the basis of the EU Directive. The state administration supports primarily the introduction of environmental management systems based on the EMAS program, in accordance with the approach in the EU, particularly in order to create conditions so that Czech manufacturers will be competitive in the Uniform Internal Market in EU.

### **THE EMAS PROGRAM IN THE CZECH REPUBLIC**

The EMAS program was introduced in CR on the basis of *Resolution of the Government of the Czech Republic No. 466/1998* on approval of the National Program of introduction of the eco-management and audit scheme.

Updated versions of these documents are currently valid. These were created on the basis of *Regulation of the European Parliament and Council (EC) No. 761/2001* on voluntary participation of organizations in the eco-management and audit scheme (termed EMAS II) and the subsequent *Resolution of the Government of the Czech Republic No. 651/2002* on updating of the National Program of introduction of the eco-management and audit scheme (updated EMAS program).

### **Legislation**

The following basic documents were approved on in the sense of **Resolution of the Government of the Czech Republic No. 466/1998**:

- the Statute of the Council of the EMAS Program as the body responsible for EMAS in CR;
- the Rules of Procedure of the Council of the EMAS Program as the body responsible for EMAS in CR;
- the Statute of the EMAS Agency;
- The National Program of introduction of the eco-management and audit scheme (Updated EMAS Program) (abbrev. "**National EMAS Program**")
- The Rules for introduction of the eco-management and audit scheme (Updated Rules) (abbrev. "**Rules for Introduction of EMAS** ")
- Methodical Instruction MPA 90-01002 "Certification of environmental verifiers"
- Methodical Instruction MPA 90-02-02 "Supervision over foreign certified environmental verifiers".

### **Financial support for introduction of EMS/EMAS**

In the framework of support for introduction of environmental management systems (ISO 14001 a EMAS), Czech enterprises may obtain subsidies from three potential sources:

- the TRH Program of support for small and medium-sized entrepreneurs;
- a contribution from the State Environmental Fund (SEF);
- regional support

## **The current state of introduction of EMAS according to ISO 14001 or EMAS**

**CR was the first of the candidate countries to introduce a fully functioning EMAS system; the current register of enterprises contains 510 industrial enterprises, of which 10 have registered EMAS systems.**

**Further information on the EMAS Program in CR, including registration of enterprises, auditors and verifiers can be found at the web sites: [www.env.cz](http://www.env.cz) and [www.ceu.cz/EMAS](http://www.ceu.cz/EMAS).**

## **CLEANER PRODUCTION**

The basic reason for the great importance of cleaner production is the fact that cleaner production is a universally applicable and integrally conceived preventative strategy that does not deal with environmental problems by transferring the burden from one component of the environment to other components, but rather by first searching for the cause of occurrence of the given burden and attempting to eliminate it. This is the only approach that can lead to a permanent decrease in detrimental impacts on the environment and to an overall improvement in its condition. The strategy of cleaner production is thus fully in accordance with the concept of sustainable development.

To support the implementation of the principles of cleaner production, in 2000 the Czech Government adopted the National Cleaner Production Program in Resolution No. 165, in which the Government recommended the application of these principles in all areas of the economy of CR.

The Czech Cleaner Production Program is based on:

- i) the principle of prevention, i.e. prevention of the generation of wastes is cheaper than subsequent waste disposal from the standpoint of costs for society as a whole;
- ii) the precautionary principle - it is necessary to prevent the generation not only of hazardous wastes, but of all wastes in general, as all the mechanisms of conversion of substances in the environment are not yet well understood;
- iii) the principle of integration, on the basis of which it is necessary to employ measures to reduce waste generation so as not to decrease wastes in one component of the environment and simultaneously increase the amount of wastes in some other component of the environment;

It is necessary to further state that the National Program was one of the first steps taken by CR in implementation of the principles of the International Declaration on Cleaner Production, declared by UNEP in 1998, to which CR acceded through its signature in 1999. Through its signature of the Declaration, CR pledged to create capacities for promulgation of information, educational and training programs for cleaner production, to support its integration into practice and to provide information to all interested persons.

## **LIFE-CYCLE ASSESSMENT (LCA)**

The importance of the LCA method is also documented by standardization of its procedure as contained in international standards of the ISO 14000 series. The following have already been issued in CR:

ČSN EN ISO 14040 - Environmental management - Life-cycle assessment - Principles and contents;

ČSN EN ISO 14041 - Environmental management - Life-cycle assessment - Establishing targets and extent and inventory analysis;

ČSN EN ISO 14042 - Environmental management - Life-cycle assessment - Evaluation of impacts;

ČSN EN ISO 14043 - Environmental management - Life-cycle assessment - Life-cycle evaluation.

### **Use of LCA**

The basic concept of the LCA method, i.e. to assess a product, activity or some system from its creation to its expiry from the point of view of its environmental impact or from some other point of view (impact on human health, on safety, on the occurrence of risks), is very useful in practice. It permits a choice, amongst alternative products, of the product whose life cycle will cause the least damage to the environment, or to suitably combine the individual phases of life cycles.

The LCA method constitutes an irreplaceable analytically oriented information instrument that can be employed in practice primarily for:

- a) decision-making related to the development of products and processes in the company;
- b) decision-making on the purchase of goods (public contracts, supplying the state administration, etc.);
- g) eco-labeling (labeling environmentally friendly products);
- h) decision-making related to legal regulations;
- i) support for legislative decisions.

Last but not least, the LCA method is an important source of information, which is essential for further scientific and technical development concerned, not only with decreasing detrimental environmental impacts, but also with achieving sustainable development.

**We consider it essential to inform the Czech business and consumer public of the potential for utilizing the above instruments and thus we have prepared a brief manual on the subject of LCA and the potential for its use in practice in CR.**

### **ECODESIGN**

The purpose of ecodesign, as conceived in CR, is to create a high-quality product for an acceptable cost with the smallest possible detrimental impact on the environment. It follows from practice that these are not contradictory requirements, as savings in materials, raw materials, water and energy and reduction of wastes to a minimum are requirements that contribute both towards reducing the negative environmental impact and towards increasing economic effectiveness.

#### **Manner of use:**

- a) The preventative intention of ecodesign is based on the fact that a decrease in the negative environmental impact of the product is incorporated right from the beginning of considerations related to the product and thus this is the most preventative and, as has been demonstrated in practice, the most economical approach to decreasing the negative environmental impacts of the product.
- b) It depends only on the enterprise itself whether or not it decides to employ ecodesign in developing its new products. In accordance with the right of citizens to a healthy

environment, it is basically not possible to design products without an attempt to reduce their negative environmental impact.

- c) Promotion of ecodesign and its use thus not only constitute a very important task, from the standpoint of protection of the environment, but this is also very useful as a marketing instrument.

### **Ecodesign - a marketing instrument**

Preparation of the market for the introduction of a new product is a very important process, which must be carried out for every new product. However, in relation to ecodesign, the fact that requirements on protection of the environment were incorporated into the development and construction of the product can be very advantageous. This information can become a decisive element in selection of goods by the conscientious consumer.

From the standpoint of the state administration, it is important that, in addition to direct regulatory action, ecodesign can also have a regulative effect through market mechanisms, similar to ecolabeling. Simultaneously, ecodesign has the advantage that its market success not only depends on decreasing the negative environmental impact of the product, but can also be supported by choice of a modern appearance of the product, increased efficiency, etc., so that there is a greater range of ways in which consumer interest can be aroused. This is not only an instrument for achieving sustainable production, but also an instrument leading to sustainable consumption. From this point of view, ecodesign is also an important means for increasing the competitiveness of the enterprise.

**The Ministry of the Environment of CR has prepared a brief, simple brochure for manufacturers and consumers, explaining this concept and proposing ways in which this instrument can be employed in both the consumer and the business sphere.**

### **GREENING OF Public Procurement**

It is assumed that, with increased awareness of the necessity to improve the quality of the environment, consumers will gradually demand greener products and greening of production processes from their suppliers. This will progressively create a considerable potential for influencing the market in greener products, for example through the requirement of a validated system of environmental management according to EMAS, preferential purchase of environmentally friendly products, etc. Greening of public procurement is an important instrument that should support this process.

In this area, we consider that an important step lies in the incorporation of environmental requirements into basic criteria in the Act on public procurement in CR, which is currently being amended. This is a joint initiative of ME and a number of Members of Parliament. It is expected that the new Act will be approved by the Parliament of CR in this wording.

Only a small amount of information has been provided here on procedures that will define Integrated Production Policy in greater detail. We are aware of the importance of preparation of such a policy in CR, which will probably lead to greater greening of the market and the creation of competitive products and services, and thus we have decided to define such a policy.

### **INTEGRATED PRODUCTION POLICY (IPP)**

Accession to CR to EU is approaching and one of the basic conditions for acceptance is harmonization of the legislation and policies with EU; consequently, we consider it useful to inform you of new trends in developments in the area of products and services in CR. This consists in preparation of an Integrated Production Policy, which EU is formulating and

which was published in July 2003 as a Communication of the European Parliament and of the European Council; it specifies the main directions and instruments for defining new trends in developments in products and services. Following approval, these procedures should be progressively implemented in CR.

In the framework of IPP, it is necessary to find a mutually beneficial situation (win-win strategy), where an improvement from the standpoint of the environment is accompanied by improved properties of the products and where an improvement in relation to the environment also improves the long-term competitiveness of the industry - this is the target of IPP. Another challenge of IPP is to create an improvement in market conditions for greener products on the European market, and thus to increase the competitiveness of European sectors manufacturing "greener products". Through the creation of these conditions, IPP can unambiguously contribute to sustainable development.

**General trends in measures for products:**

- To date, environmental measures related to products have attempted to concentrate on major point sources of pollution. Measures related to industrial emissions and waste management must be extended to include measures that would take into account the entire life cycle of the product, including the phase of use, in order not to simply shift the detrimental impacts from one part of the life cycle to some other.
- Environmental impacts will be dealt with in the part of the life cycle where the detrimental environmental impacts and consumption of resources can be best and most cost-effectively decreased.

**In this procedure, the following characteristics of products also be taken into account:**

- the total amount of products is increasing;
- the range of products and services is being extended;
- new types of products are constantly being created through innovation;
- products are traded on a global scale;
- products are becoming more complex;
- emphasis is placed on the consumer in relation to proper use of these products and on disposal of products after the end of their lifetimes;
- it is necessary to contribute to the flow of information along the supply chain.

**Basic approaches and principles in implementation of IPP:**

- *life-cycle-thinking*;
- *work with the market*;
- *participation by the affected parties* (the business sphere, consumers, government);
- *constant improvement* - where the companies can define their own speed and concentrate on those improvements that are most cost-effective for them;
- *a variety of instruments of the policy* - in addition to compulsory legislative instruments, *also work with voluntary instruments*.

**The instruments recommended for use in the framework of IPP can include:**

1. Instruments for creation of the proper economic and legal framework, e.g.

- taxes and subsidies, which EU will support and will favor the use of fiscal measures, such as taxes and stimuli, related to the environment, at a suitable local and national level;
- voluntary agreements and standardization;
- legislation on public contracts;
- other legislation dealing with measures related to products.

2. Instruments supporting decision-making in the dimensions of the life cycle of the products;
  - provision of information and explanation instruments on the life cycle;
  - environmental management systems
  - obligations related to the design of products.
3. Provision of information for decision-making by consumers
  - a) greener public contracts,
  - b) greener public procurement,
  - c) environmental labeling.

We have described only a small amount of information on procedures that will define Integrated Production Policy in detail and simultaneously specify the main principles of IPP as they are being newly formulated in CR. We are also making these efforts because we are aware that IPP is an integral part of the strategy of sustainable development. Its primary target is to decrease the detrimental environmental impacts of products during their entire life cycles, where possible employing a market-supported procedure that includes aspects of competitiveness. The competitiveness of business will understandably be increased by greater cohesiveness of the policy, which will facilitate IPP both in the framework of the life cycle and also amongst various instruments of the policy. Experience gained with some instruments of environmental management indicate that increasing environmental consciousness in companies may be accompanied by a decrease in costs. In an increasingly competitive world, the approach to the environment may also be a factor that provides companies and their products with a competitive advantage and can be increasingly employed as a marketing instrument, which can draw attention to the company on the one hand and will simultaneously ensure improved product quality with fewer detrimental impacts on the environment, on the other hand. This is also a challenge for consumers to focus their attention on these products and services, and for the state administration to create a suitable framework for such a healthy environment.

### **Conclusions:**

As the gradual introduction of changes in patterns of consumption and production also entails a change in the thinking of consumers and producers, which cannot be regulated by directives in a market environment, we consider it important to support further education and provision of information on new voluntary instruments. This process can also be supported by participation of all the affected groups in promulgation of information and exchange of experience, utilization of the newest discoveries of science and research, and search for financial resources to support greater use of these procedures in both small and medium-sized companies. It is also certainly necessary that application of new procedures in environmental protection not be seen as extravagant approaches that are connected with excessive economic expenditures.

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Ministry of the Environment of CR

# VOLUNTARY CO-OPERATION BETWEEN INDUSTRY AND GOVERNMENT EXEMPLIFIED BY THE ENVIRONMENTAL ALLIANCE OF SAXONY

Maria Urbaniec

## 1. Basic conditions for voluntary self-commitments in the field of the environment

Voluntary agreements between industry and politics have gained more and more significance in the recent years. Except environmental protection charge, environmental taxes, environmental adhesion (liability), voluntary environmental self-commitments play a steadily increasing role, which - since 1996 - the European Commission has also attached high relevance. The Commission has compiled guidelines, which guarantee the transparency and effectiveness of such agreements.<sup>13</sup>

In practice there is a multiplicity of terms for the relatively new, but increasingly more strongly used environmental policy instrument in Germany and Europe. Voluntary agreements and self-commitments in the field of the environment, voluntary co-operation solutions (industry agreements), voluntary consents, self-commitment statements, voluntary agreements, negotiated agreements or moral suasion are some usual terms.<sup>14</sup>

All in all, it is about cooperative instruments such as arrangements and negotiations, in particular industry agreements and association (federation) solutions, informal administrative acting (e.g. negotiations in the forefront of project approval procedure), in addition mediation procedure (mainly in the USA and Japan so far).<sup>15</sup>

Because this article concerns an example of a regionally aligned (oriented) voluntary agreement, the foundation for this instrument will be only represented here, i.e. just those intersectoral (interbranch) voluntary agreements, which are valid within a federal state (e.g. Environmental Pact of Bavaria, Environmental Partnership of Brandenburg, etc.) and not throughout Germany (e.g. within the range of old car-utilisation or climate protection).

Consents of the industry for the realisation of environmental policy goals in the context of an agreement with national participants are designated voluntary agreements of the economy. As return (consideration) for the consents the state waives certain environmental policy actions. Such agreements are usually contracted between state and trade associations concerning overall environmental policy questions (problems).

Such environmental policy co-operation solutions can be fundamentally derived from the co-operation principle, which is applied in environmental policy together with the polluter pays principle and the precautionary principle.<sup>16</sup> It is regarded as an example for the arrangement of decision-making and sense-making processes, which state and society should take part in.<sup>17</sup>

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<sup>13</sup> See: KOM (96) 561, KOM (2002) 278, p. 12 and KOM (2002) 412, p. 3.

<sup>14</sup> See: FABER (2001, p. 207).

<sup>15</sup> See: SIMONIS (2001, p. 8 f.).

<sup>16</sup> The environmental policy in Germany is based since the 70's on a "triple-principle", within their frameworks the environmental policy goals are realized. These are precautionary principle, polluter pays principle and co-operation principle. See: BURSCHEL (1996, p. 20).

<sup>17</sup> See: GELDSETZER (1997, p. 1), SCHMELZER (1999, p. 39).

In Germany self-commitments have proved to be the effective and efficient means (instruments) in over 70 cases for reaching environmental policy goals.<sup>18</sup>

With regard to the discussion about sustainable development in particular voluntary agreements have a central role as alternatives to legal and fiscal instruments, which are characterized by steadily increasing acceptance in policy.<sup>19</sup>

Mainly the overlapping aspects of sustainable development, like the necessary integration of social, ecological and economical questions (problems), depend on the participants' cooperativeness and ability to cooperate. Such an approach is only sustainable, if beyond the existing, traditional political departments (environment, economics and technology promotion, urban development, regional planning) new political instruments and co-operation forms are developed, which help overcome in particular the segmentation of the sub-areas environmental protection/ecology, labour market and economic development.

Co-operations between industrial and environmental federations (associations) as well as between industry and the state sector offer numerous (strategic) chances. It must be obvious, that environmental protection does not just mean renouncement and self-restraint, but that the ecological modernization opens chances for new techniques, processes, services and occupation fields. Voluntary agreements prove to be conditions for a long-term restructuring towards environmentally sound production processes and products. Beyond <sup>that</sup> the advantages also refer to faster negotiability (practicability), less bureaucracy and to an intensified self-responsibility of the enterprises and thus to the goal-oriented solution of environmental problems.

Apart from these advantages, monitoring seems to be problematic most of all, since it has to clarify, whether the enterprises actually keep to their self-imposed commitments. Furthermore the scope of action for such co-operation solutions is regarded as reduced due to the danger of competition-restraining and/or impairing arrangements.<sup>20</sup>

Such agreements require most of all dialogues between public authorities and enterprises as well as the allocation (creation) of incentives to environment-oriented voluntary measures (actions). A key element of such voluntary agreements is the determination of quantified objectives and the formulation of concrete action steps. The precondition for a successful application of self-commitments however is, that the ecological goals are set correctly and within reach.<sup>21</sup>

That means, it is crucial for the application of self-commitments as instruments of environmental policy that:<sup>22</sup>

- an environmental policy goal is predetermined from the national side after consultations with the economy <sup>sector</sup>,
- a branch concerned can ensure the compliance and
- an effective monitoring is stipulated and conducted.

In this context, it is necessary to determine appropriate criteria for the transparency, credibility and responsibility of measures (arrangements) that guarantee a demanding general form as well as pretentious characteristics of such commitments. Referring to this, the European Commission has been given a framework (general guidelines) presenting important demands on the effective use of Environmental Agreements (self-commitments).<sup>23</sup>

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<sup>18</sup> See: BDI (Hrsg.) (2001, p. 2).

<sup>19</sup> See: BDI (Hrsg.) (1999, p. 13).

<sup>20</sup> See: BARTMANN (1999, p. 8 f.) and GELDSETZER (1997, p. 18 and 21).

<sup>21</sup> See: SRU (Hrsg.) (1996, p. 98).

<sup>22</sup> See: BMBF (Hrsg.) (1997, p. 142).

<sup>23</sup> See: KOM (96) 561 (1996, p. 12 ff.).

- **Content elements of the self-commitments** – e.g.: indication of the parties (associations and/or individual firms) of the environmental self-commitment, content of the declaration (kind and extent), quantified objectives, subject of the agreements, public (government) participation, bulletin, monitoring/measurement of results, geographical expansion, validity period and public information (transparency);<sup>24</sup>
- **Composition of the negotiation process** – the goals of the self-commitment are partially specified by the economy and partially they are the result of negotiation processes between state and industry;
- **Objective of the self-commitments** – clear and checkable formulation of the kind and the extent of the self-commitments with exact definition of the goals and the reference quantity (including appropriate computation/measuring procedures), with factually and chronologically exact definition of the goal (no „up to“ - formulations, possibly however restriction to the definition of minimum goals) and with the objective determination in absolute sizes (containing at least the estimation of the attainable absolute environmental discharge in case of fulfilment (completion) of the self-commitment);
- **Implementation of the self-commitments** – the way to realize a voluntary commitment, including the information of the association members about the voluntary commitments, the form of the federation-internal realisation of the voluntary commitment and the representation of the provided technical or organizational measures necessary for the implementation;
- **Monitoring system of results** – an effective check-up of the adherence to the obligations entered by the economy considering the following elements: Collecting of results of the measures introduced for fulfilling the voluntary commitments as well as of successes obtained, transmission of the results collected to a neutral inspection office, publication of the results;<sup>25</sup>
- **sanction mechanisms** – e.g.: federation-internal sanctions against members of the association, who do not sufficiently fulfil voluntary commitments as well as state sanctions for the default of goals in form of enforcing environmental measures threatened and/or cancelling supporting measures.

In summary it must be emphasized that clearly defined goals, the presence of sanction mechanisms, an effective monitoring and control system represent a minimum of requirements, which cannot be ignored. The requirements of the organization (composition) of self-commitments specified in this chapter, are frequently regarded as fundamental conditions for success too, whose consideration and fulfilment (completion) in every respect contributes to the effectiveness of voluntary agreements and whose analysis and/or representation (description) will be presented in the next part of this article. Here it will be shown exemplified by the Environmental Alliance of Saxony - which effects can be achieved by applying this instrument in practice.

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<sup>24</sup> See: SCHENDEL (2000, p. 99).

<sup>25</sup> See: TROGE (1997, p. 150).

## 2. "Best Practice" – the Environmental Alliance of Saxony as an example of a successful voluntary agreement

The Free State of Saxony was the first East German Federal State and the second in Germany, in which a cooperative environmental agreement was concluded. Meanwhile other federal states have also followed. Altogether 12 federal states of Germany take part in the concept "regionally-oriented voluntary agreements".

The Environmental Alliance of Saxony is a form of environment-oriented co-operation, which - since 1998 as Environmental Alliance of Economics and since 1999 also as Environmental Alliance of Agriculture and Forestry – has been orientated on a resource-preserving and sustainable development policy aiming at continuous improvement of environmental protection.<sup>26</sup> So far over 350 agricultural, forestry and fishery enterprises have taken part in the Environmental Alliance of Agriculture and Forestry and over 200 enterprises and/or other institutions of the industry sector in the Environmental Alliance of Economics.<sup>27</sup>

The Environmental Alliance of Economics is a voluntary agreement between the Federal State of Saxony and the industry sector, represented by its chambers and federations. In the Environmental Alliance of Saxony can take part private firms, federations and other institutions with a location in Saxony.<sup>28</sup> In that both partners commit themselves to the discharge (relief) of the environment by voluntary achievements in environmental protection beyond legally prescribed measures aiming at more self-responsibility of enterprises and discharge (relief) of official report and documentation obligations in favour of a more efficient and trend-setting environmental protection in enterprises.<sup>29</sup> In the context of the Environmental Alliance the enterprises commit themselves e.g. to the decrease of fuel consumption, to the reduction of noise pollution, air emissions, water and energy consumption as well as waste and also to the intensified usage of environmentally friendly (environmentally acceptable) supplies (utilities).<sup>30</sup> Thereupon the state commits to voluntary supporting (promotion) arrangements and to the discharge of the enterprises from redundant (dispensable) regulations.

With this goal (more environmental protection in enterprises – less official bureaucracy) the Environmental Alliance of Saxony makes an important contribution to the stabilization of the economic situation of Saxony. Altogether, the point is to improve the basic conditions for an ecologically harmless economic development, the promotion of business self-responsibility, the mobilization of business ideas and initiatives for an effective protection of the environment as well as less bureaucracy in environmental protection through administrative simplifications.<sup>31</sup>

It is the main goal of this agreement to perform additional environmental protection services in the areas of environmental management, waste and energy management, renewable primary products, traffic, supporting (promotion) measures and deregulation.<sup>32</sup> It is of special importance that the consents are both interbranch and multidisciplinary and that both sides have complied with commitments.

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<sup>26</sup> See: [www.umwelt.sachsen.de](http://www.umwelt.sachsen.de) (Date: 12.05.2003)

<sup>27</sup> See: [www.smul.sachsen.de](http://www.smul.sachsen.de) (Date: 29.04.03)

<sup>28</sup> See: [http://www.dresden.ihk.de/inet2000/leistungen/id\\_985/id\\_985\\_ww4.htm](http://www.dresden.ihk.de/inet2000/leistungen/id_985/id_985_ww4.htm) (Date: 03.07.01).

<sup>29</sup> See: SÄCHSISCHES STAATSMINISTERIUM FÜR UMWELT UND LANDESENTWICKLUNG (1998, p. 3).

<sup>30</sup> See: RKW (Hrsg.) (2000, p. 2).

<sup>31</sup> See: KREUTEL (1998, p. 7).

<sup>32</sup> See: CHRIST (2000, p. 10).

The participation spectrum at the Environmental Alliance of Saxony reaches from small handicraft enterprises, service providers, hospitals, transporting enterprises, federations, enterprises of chemical industry, microelectronics and food industry, up to industrial large-scale enterprises.

The participants make different voluntary contributions to environmental protection and so far have gained a lot of experience during this process. Some examples of voluntary achievements of the enterprises and national (state) decision makers are given here as follow:<sup>33</sup>

Effects on the part of enterprises	Effects on the part of the Federal State of Saxony
<ul style="list-style-type: none"> <li>• participation in the EEC-Eco-Audit (implementation of an EEC-Eco-Audit at 138 institutional locations – date: December 31, 2002),</li> <li>• implementation of environmental management system according to ISO 14.000 ff.,</li> <li>• implementation of an environmental management system in handicraft enterprises according to the criteria for the assignment (allocation) of the environmental seal "environmental standard handicraft of Saxony",</li> <li>• substantial voluntary contribution to the <u>enforcement</u> of the <u>recycling management</u> principle,</li> <li>• reduction of the produced quantity of waste or the pollutant content in the context of waste-economical model project for waste avoidance or waste recycling (utilisation),</li> <li>• voluntary measures (actions) for energy conservation, in particular for <u>power-heat coupling</u> and the use of renewable energies,</li> <li>• reduction of the input of particularly <u>environmentally hazardous substances</u> by the voluntary introduction of substitutes,</li> <li>• active cooperation in waste-economical industry working groups and during the implementation of a waste-economical industry concept,</li> <li>• voluntary contributions to integrated environmental protection and to the preservation of resources,</li> <li>• voluntary contributions to the improvement of the immission control, water protection, nature protection and soil protection,</li> <li>• voluntary measures for using of <u>renewable primary products</u>.</li> </ul>	<ul style="list-style-type: none"> <li>• implementation of administrative easements (<u>facilities</u>) for eco-audited enterprises (catalogue "administrative easements (forms of relief) in favour of eco-audited enterprises in the Federal State of Saxony" with at present over 60 measures),</li> <li>• numerous easements (forms of relief) regarding report and documentation obligations</li> <li>• reduction of the monitoring frequency according to the cycle economic and waste law, <u>recycling management</u> and waste act</li> <li>• deregulation by amending the plant regulation of Saxony</li> <li>• execution of practice seminars about the topics "Eco-audit", "Environmental Alliance of Saxony" etc. and about partnership administrative acting; presentation of the Environmental Alliance at important trade fairs (e.g. on the TerraTec); execution of environmental <u>regulars' tables</u> and publication of public-effective press reports,</li> <li>• possibility of <u>employee</u> exchange between industry and public authorities</li> <li>• establishment six topic-referred working groups (WG) in February 2002: WG of handicraft, WG of administrative simplification, WG of environmental management, WG of energy/climatic protection, WG of communication, WG of industry and topic-referred agreements, whose results are the central basis for the operational and thematic implementation of the Environmental Alliance of Saxony.</li> </ul>

These effects clearly show that an environment-friendly economic development of the enterprises in the sense of sustainable development is possible. In particular this must be promoted by the state and by the public authorities.<sup>34</sup>

In spite of numerous positive effects further facilitation measures are still needed, e.g. referring to environmental-legal licensing procedures (approval procedure) as well as the active participation of all members of the Environmental Alliance of Saxony and as a result the increase of their effectiveness and efficiency. This will be well to the fore concerning the continuation phase of the Environmental Alliance of Saxony from the middle of 2003 to about

<sup>33</sup> See: [www.ik-sachsen.de](http://www.ik-sachsen.de) (Date: 10.05.2003), [www.sachsen.de](http://www.sachsen.de) (Date: 20.06.2003)

<sup>34</sup> See: [www.ik-sachsen.de](http://www.ik-sachsen.de) (Date: 12.05.2003)

2008. In this regard both the continuous enhancement and the border-crossing activities with the future European Community members (Poland and the Czech Republic).

### **3. Demand for voluntary environmental agreements in Poland and the Czech Republic**

Border-crossing activities have just marginally been dealt with by the Environmental Alliance of Saxony so far. The first starting points however were introduced by establishing the working group "European Union Enlargement" of the Environmental Alliance of Economics.

The additional concretisation and also the first-implementation of exemplary environmental alliance activities in Poland and the Czech Republic is the object of the project granted by the DBU and accomplished by the IHI Zittau now. It is the main goal of this project to work out the basic conditions for voluntary agreements in Poland and the Czech Republic by including interdisciplinary co-operation partners in order to ensure their successful implementation on this basis. The need (demand) of environmental policy co-operation solutions and/or voluntary agreements can generally be derived from the implementation of environmental management standards in these countries. As already shown with the Saxony example, the implementation of an environmental management system is particular promoted in the context of the Environmental Alliances, because it contributes to the realisation of the environmental goals in enterprises, to significant environment discharge and to economic improvement.

So the implementation of the environmental management systems (ISO 14001 and EMAS) leads to different results compared with Germany. According to the data of the Federal Environmental Agency the number of enterprises certified according to ISO 14001 enterprises was 3,700 in Germany in December 2002, 434 in Poland and 366 in the Czech Republic.<sup>35</sup> The little importance of environmental management systems is caused by the larger popularity of Cleaner Production as an environmental management strategy, which is regarded as a kind of one-sided self-commitment of the economy sector and can be a basis for the implementation of a voluntary agreement in Poland and the Czech Republic.

Altogether it can be stated that the environmental management systems of Poland and the Czech Republic still have backlog demands, if implementation intensities comparable with Germany should be achieved. The concept of the environmental alliances could positively affect this process, because it is possible to realise numerous environmental measures in enterprises. Furthermore, the environmental alliance represents a suitable aid to create environmentally compatible structures and is available as voluntary instrument of environmental policy for the international transfer of technology and of know-how.

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# COMMUNICATION ON THE ENVIRONMENT AND ENVIRONMENTAL REPORTING BASED ON THE ORÉE METHOD

Vojtěch Vaněček

## INTRODUCTION

The communication of an enterprise on the environment with external entities and company employees

- complies with the right of the public to information
- cultivates mutual understanding and belief between the enterprise and members of public, it improves the awareness of the public of plans and objectives of the enterprise and facilitate their acceptance and
- the same applies to own employees of the enterprise and, moreover, it converts the employees into well informed “corporate envoys” in the community and among members of public.

This communication has to be bilateral and systematic.

The communications of the enterprise directed to own employees is referred to as environmental reporting (for various definitions and other details see also my previous communication [1]). The entities using the environmental management system subject to the standards series ISO 14000 will have a corresponding standard ISO for their communication, soon, that is now subjected to the comments proceeding [2]. The reporting is on a good level in many Czech companies and it is systematic, too (annual reports,...). There is a well developed guidance for the environmental reporting for instance the chemical industry uses an excellent manual CEFIC [3]. All the way round, the opinion of the public is examined only exceptionally and there is a lack of any systematic approach. Also such an activity is subject to guidance as in hand: an older manual CEFIC [4] and now a Czech adaptation of a communication manual of the French company Orée [4] based on which the Czech Environment Management Centre (CEMC) executed the bellow described Czech-French project.

The corporate communications in the field of the environmental reporting are usually expressed in the for of environmental indexes (for detail see for instance [1]). Their implementation is envisaged by the environmental management system subject to the standard ČSN EN ISO 14031. Orée has compiled an inspiration catalogue of corporate environmental indexes that was completed at CEMC by the inclusion of a series of other proposals [6]. The reporting of Czech enterprises contains an abundance of data of the nature of environmental indexes but in most case such are required by the legislation (the volume of waste, BOD, ...) whose response to the needs and concerns of the public is low or improper.

## JOINT PROJECT ORÉE – CEMC

I presented a preliminary information on the project at the meeting of the task group [1] and the seminar ENVIREP held at the Ministry of Environment a Prague on December 20, 2001. The joint project Orée – CEMC was executed at eight Czech companies since June to

October 2001 with later additions and adaptations of reports and used manuals [5] and [6]. One company was large, other medium and small-sized ones in the field of industry, farming and forest husbandry. The French partner proposed to enrich both manuals by the end of 2003 with their further experience.

With the help of CEMC consultants, the companies more or less perfectly implemented the following procedure subject to the Communication Manual by Orée [5]:

### **PHASE 1: Starting Condition**

#### *1.1 Identification of Environmental Impacts*

- Objective description (management and experts)
- Assessment (order of priority, priority programmes ...)

#### *1.2 Identification of Environmental Objectives*

- Identification of stakeholders (internal, external)
- Database of own target values and their priority
- Lay-out of reports for the stakeholders – identification of the main orientation of the reports

#### *1.3 Perception of Environmental Impacts*

- Observed environmental impacts
- Questionnaire to chosen officials
- Processing of results (to derive environmental programmes)
- Knowledge of target intentions

#### *1.4 Perception of Environmental Events and Programmes*

- Questionnaire on the attitudes of stakeholders
- Analysis of results of the investigation and formulation of conclusions

### **PHASE 2: Definition of the Communication Tactics**

#### *2.1 Definition of the Environment Communication Policies*

- Anticipated questions
- Objectives
- Policies

#### *2.2 Template and Nature of Communication*

- Template
- Nature of the communication
- Communication means
- Communication methods

### **PHASE 3: Assessment**

- To assess the new perception of environmental impacts by the concerned entities
- To implement a regular assessment

The Communication Manual [5] contains a detail description of the procedure including practical instructions and warnings and specimen form for the public opinion research and to process the collected findings and to communicate the results to the partner organisations etc. All the above make it apparent that the procedure is well prepared and proved by its practical implementation. The items 1.3 and 1.4 envisage a research of the opinion of the stakeholders (authorities, shareholders, employees, trade unions, neighbours, clients, public,...). The implementation of the project will be concluded by the Phase 3 – Implementation, however, the communication will continue as it is to be repeated periodically.

The manual ESAP [6] could be used for the environmental assessment itself (Phase 1).

## CONCLUSIONS AND ASSESSMENT

I submit the conclusion and assessment only as one of several consultants of CEMC and they relate to the applicability and suitability of the Orée methodology as it is described in the manual adopted by ourselves [5] a [6].

1. **I have found the Communication Manual [5] a good, inspiration and quite unique guidance for the bilateral communication.** The method as according to the manual seemed work consuming but simple to trivial after the first reading of the paper. When working with four parties involved in the project – the four companies – I changed my opinion. The implementation is not only very work consuming but it requires a creative approach and it is not simple at all. My doubts arose from the fact that a small or medium size company for whom the methodology was designed would master the rational application of the methodology without the help of an experienced consultant. Company ecologists who are in charge other duties are at a loss – they are not sure what to do and to do it (how many and which indexes from the manual of indexes are to be used, how a research should be provided for, how to process heterogeneous answers of respondents etc.). The manual rather represents a maximum scope that has to be adapted in an adequate way without deviating from the principles of the bilateral and permanent communication.
2. **A research of the opinion of external entities and own employees** - this is what I have found the most important innovation in this agenda. Small and medium-sized companies really did it – for the first time in their history - with the help of students etc. with several tens to hundreds of respondents and they found the outcome very useful in terms of the information contained in particular in confrontation with their own assessment.
3. **Medium companies** mastered the procedure quite well and they incorporated the findings from the communication in their practical activities. For example, they informed their employees with the results of the project, they introduced the environmental reporting to the annual report, they took the requirements expressed by the employees in their annual plan, created specific corporate environmental indexes for the external communication etc.
4. The method was not meant for **major companies** and it is likely not be an adequate one for them. I judge that the manual CEFIC [3] describing adequate more general methods of the bilateral communication is more proper to such a company. The major company involved in the project faced so many various complaints to its environmental behaviour that it would not be wise to provoke the public by such a questionnaire event.

5. **The small company** apparently has to reduce quite a lot the scope of works recommended by the Communication manual Orée [5]. Surprisingly, a company with 20 employees regarded the project interesting and a contribution.
6. **The Index Manual** [6] is a catalogue of indexes from various areas that fit to almost every company. Companies work with tens of such indexes (without referring to them as such) but they do not develop their own specific indexes for the presentation of their environmental care to their clients and public. We tried to do so in several cases. For instance a company providing forest husbandry services and selling wood faces objections raised by the members of public that by cutting the woods they participate in the destruction of the nature. Therefore, we created a specific corporate indicator for the communication with the public called “number of planted/cut trees” that showed the company in a very positive light (no matter that from the expert point of view the index is said not to be correct). The same company has to face the question asked by foreign customer whether the wood was not imported from rainforests. This is to be addressed by means of a specific indicator “share of wood with the logo of PEFC” i.e. from forests certified according to the pan-European system of forest certification. The co-operative manufacturing chemical products faces objections that it supports the entrainment of hazardous chemical substances to the environment. It will fight such objections by the publication of the values of their newly introduced specific indexes “number of excesses of the environmental standards”, “share of aromatic substances in products”, “number of audits executed by customers” and, all the way round “number of audit executed by the co-operative at the suppliers”, “number of accidents”, “share of wastes supplied for external re-use” etc. The company dealing with surface finish faces similar objections by the implementation and publication of the environmental index “share of painting materials showing very low or zero emissions of volatile organic substances”. The Environmental Index Manual [6] brings 112 generally applicable indexes for the communication, however, specific corporate indexes for the communication are to be developed as late as based on an analysis of opinion and concerns of the stakeholders.

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