

**SUSTAINABILITY**  
**ACCOUNTING AND REPORTING**  
**(at macroeconomic and microeconomic level)**

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# UPDATE OF THE STRATEGY OF SUSTAINABLE DEVELOPMENT OF THE CZECH REPUBLIC

Alena Marková, Jaroslav Blažek

The current Strategy of Sustainable Development of the Czech Republic (hereinafter the SSD CR) was approved by Resolution of the Government No. 1242 of December 8, 2004. Its basic objective was to point out in due time the existing and potential issues that could endanger the transition of the Czech Republic to sustainable development and to initiate measures to prevent or at least alleviate these dangers. The Strategy aimed at creating a consensual framework for drawing up further materials of a strategic nature (sectoral policies or action programs) and thus establishing an important background for strategic decision-making in the framework of the individual sectors as well as for inter-sectoral cooperation with special-interest groups.

The renewed EU Sustainable Development Strategy was adopted in June 2006. In its introduction, it defines the term “sustainable development” in the framework of the EU<sup>1</sup> and also identifies persisting unsustainable trends in relation to climate change and energy use, threats to public health, poverty and social exclusion, demographic pressure and ageing, management of natural resources, biodiversity loss, land use and transport.

The global objective of the renewed strategy is to improve the quality of life both for current and for future generations, through the creation of sustainable communities able to manage and use resources efficiently and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion: The following global objectives are derived from this strategic vision:

- a) environmental protection (ecosystems, biological diversity, management of natural resources, sustainable production and consumption)
- b) social equity and cohesion (social cohesion, health, safety, rights, equal opportunities for all and cultural diversity)
- c) economic prosperity (welfare, living standards and employment, innovations, knowledge and eco-efficiency)
- d) international responsibility (stable democratic institutions, peace, security, freedom, global sustainability and international commitments).

On the basis of the aforementioned objectives, the EU SDS specifies the following 7 priority areas:

1. Climate change and clean energy (limitation of economic and social effects of climate change)
2. Sustainable transport (transport systems meeting society’s social, economic and environmental needs whilst minimizing their undesirable impacts on the economy, society and the environment)

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<sup>1</sup> Par. 1 of the text: “Sustainable development means that the needs of the present generation should be met without compromising the ability of future generations to meet their own needs. It is an overarching objective of the European Union set out in the Treaty, governing all the Union’s policies and activities. It is about safeguarding the earth’s capacity to support life in all its diversity and is based on the principles of democracy, gender equality, solidarity, the rule of law and respect for fundamental rights, including freedom and equal opportunities for all. It aims at the continuous improvement of the quality of life and well-being on Earth for present and future generations. To that end it promotes a dynamic economy with full employment and a high level of education, health protection, social and territorial cohesion and environmental protection in a peaceful and secure world, respecting cultural diversity.” (Text the EU SDS is available at [www.europa.eu](http://www.europa.eu)).

3. Sustainable production and consumption (promotion of sustainable consumption and production patterns)
4. Conservation and management of natural resources (improved management of natural resources and avoidance of their overexploitation)
5. Public health (provision of conditions for good public health, equal conditions and improvement of protection against health threats)
6. Social inclusion, demography and migration
7. Global poverty and sustainable development challenges (EU's internal and external policies consistent with global sustainable development and responsible fulfillment of international commitments).

The key areas are followed by cross cutting policies and approaches concentrating on education and training, research and development and financing, economic and communication tools. The Strategy also contains a requirement for reviewing and updating national strategies from the viewpoint of the renewed EU SDS, in the interest of greater integration and effectiveness of measures adopted at the level of the EU.

The process of updating the Strategy of Sustainable Development of the Czech Republic has been underway since 2007. The objective of preparation of the document is to set the priorities of the Czech Republic and, simultaneously, reflect the renewed EU Sustainable Development Strategy (EU SDS). The update is based on the assumption that the Strategy of Sustainable Development of the Czech Republic must express a broad social and political consensus on the given topics, priorities and objectives that are contained in the update.

The update certainly does not aim at replacing the individual sectoral concepts, strategies and policies, but rather at defining the key topics and issues (social, economic and environmental) of sustainable development of the Czech Republic and at finding appropriate measures to resolve them. These measures may be encompassed in already existing and approved strategic documents. The update should thus facilitate mutual interconnection of the measures that are contained in various strategic sectoral documents, or indicate issues for which there are currently no appropriate policies and measures.

Consequently, it was necessary to respect the following principles in the preparation of the Strategy of Sustainable Development:

- Equilibrium of three pillars of sustainable development (economic, environmental and social), elimination of internal conflicts (individual sources of imbalance, stabilizing elements, etc.);
- Comprehensiveness, representativeness (the Strategy encompasses key topics of development and their basic characteristics) and comprehensibility;
- Solutions for sustainable development in the specific context of the Czech Republic;
- Practicability and feasibility;
- The target state selected for the relevant deadline allows for further sustainable development (i.e. goes beyond the deadline);
- The selected deadline of 2030 exceeds the electoral term (however, the SSD should not change according to political wishes);
- Broad political consensus.

Three versions of the material were prepared in the period from January to October 2007; these versions were both subject to commentary procedures within the sectors and the Government Council for Sustainable Development and subject to public consultations. The document, which was created in the given period, was recommended as the background

material for further work on updating the SSD CR and was provided to the Government for its information as the “Principles, Instruments and Draft Priorities for Finalization of the Updated Strategy of Sustainable Development of the Czech Republic”.

The “Update to the SSD CR – General Introduction” was drawn up in May 2008 as a further step in the process of updating the Strategy; the mentioned document briefly defined the key principles of the update and the EU strategic framework for sustainable development, and also provided a reference overview of sustainable development strategies of some European countries. The document also encompassed the first proposal for the strategic visions and key topics of sustainable development in the Czech Republic as an initial basis for discussion on the contents of the update. The document was opened to comments; the results of the public discussion were published after end of the discussion, and the comments and ideas were used in the preparation of further documents.

The basic documents (strategic and conceptual documents of the Czech Republic) were analyzed in the period from July to September 2008 with the aim to identify and describe the principal trends and issues related to the subject of sustainable development. Given the great many basic documents involved, the method of mathematic clustering was used to determine the structure of the report and the result of this method formed the basic structure of the analysis. This was further modified on the basis of a discussion within the author’s team<sup>2</sup> and a working group composed of representatives of the individual sectors. The outputs of this phase consist in an analysis of the basic documents and a TOWS analysis. Both documents were published and opened to comments, which were later used in the preparation of the present text.

The strategic part of the SSD was drafted on the basis of the conclusions of the analysis. The draft strategy is structured into five priority axes, where each axis is divided into priorities encompassing the individual objectives. The strategy responds to problems that were determined within the analysis as key issues; the individual objectives are proposed preferentially in relation to the existing approved strategic documents.

The priority axes of the updated Strategy are as follows:

- Population, human beings and health (living conditions, health and life style, demographic aspects and family)
- Economy and innovations (competitiveness of the Czech economy, energy production, human resources, science and research)
- Spatial development (territorial cohesion, conditions for the quality of life in the territory, coordination of development)
- Landscape, ecosystems and biological diversity (state of the landscape and biodiversity, agriculture and forestry, effects of climate change)
- Stable and safe society (migration and security risks, public finances and government, international relations and commitments).

Each subchapter within the given priority axis contains description of the main issues in the given area and draft priorities and objectives. When seeking the optimum structure and the scheme of axes, it was the aim to reflect the mutual links (whether synergic or conflicting) existing amongst the individual areas.

The last chapter of the document provides a set of the currently proposed indicators that are relevant for the individual objectives of the SSD; however, the mentioned set will be gradually elaborated concurrently with finalization of the strategic part – i.e. the individual

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<sup>2</sup> Integra Consulting Services Ltd.

indicators will be modified so as to enable monitoring of fulfillment of the proposed objectives. Certain indicators may relate to several objectives (internal links), while different suitable strategic indicators that are already being monitored in the long term may replace others.

A public discussion on the draft document will take place in the period from April to May 2009. The second version of the update will be drawn up on the basis of the comments raised in the discussion; this version will be discussed in the intersectoral working group, in working bodies of the Government Council for Sustainable Development and, subsequently, within the intersectoral commentary procedure so that it can be submitted to the Government for approval within the set deadline, i.e. by November 30, 2009.

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# **METHODOLOGY CONCEPT OF EX-POST ENVIRONMENTAL POLICY ASSESSMENT**

**Petr Šauer, Jaroslav Kreuz, Antonín Dvořák**

## **1. Introduction**

In the practice of environmental policy, we experience frequent attempts at ex-ante and ex-post assessment of its effectiveness. While those preparing Regulatory Impact Assessment (RIA) follow a methodology developed for that purpose, for ex-post assessments of the policies such methodology has not existed yet. The aim is to prepare such methodology in the form directly applicable in practice.

The methods of work involved extensive retrieval of information from domestic and foreign literature, qualitative research among potential users of the methodology and deductions from more general theories and concepts. The draft of the methodology under preparation is step by step tested for particular IPPC application.

The paper briefly presents the prepared concept and the basic elements of the methodology in progress. The concept builds on several basic criteria of effectiveness: level of achievement of environmental objectives, policy cost effectiveness, including transaction costs, overall economic effectiveness of the policy implementation. It includes the assessment of a number of other economic, social and political factors. The concepts of economic analysis, economic policy and administration and policy analysis as such meet here.

In the paper, findings from the Czech and foreign literature dealing with the methodologies of assessment of environmental policies are briefly summarized. This is followed by a brief description of the basic characteristics concerning the methodology of assessing the effectiveness of implementation of environmental policies, prepared by the authors. The process of assessment is described in the final chapter.

## **2. Methodological approaches to assessment of environmental policies in the literature**

As regards the Czech sources, they focus on environmental policy rather as an economic and fiscal phenomenon. The selected tools of environmental policy and their economic effectiveness are dealt with in the papers by EUROLEX (2006) and Jílková et al (2004). Moravec (2005) developed structured criteria for assessment and a draft of complementing the economic tools which would be applicable for the area of nature conservation and landscape protection. For the assessment, he used factor analysis. Factor analysis and time series analysis were used by Pavel (2006) in the paper dealing with aspects of impacts of environmental policy measures on national economy.

As regards foreign sources, EEA (2008) and OECD (2004) publications should be mentioned. They bring two different concepts for assessing the effectiveness of environmental policy. EEA (2008) defines in more detail what is understood to be the effectiveness of implementation of environmental policy, nevertheless, it fails to provide high-quality grounds for practical application. OECD (2004) presents a listing of a large number of criteria for assessment. They include traditional criteria as well as criteria involving a broader social view of the issues concerned. Nevertheless, for the purpose of practical application it also fails to provide applicable guidance how to work with the criteria.

### **3. Brief characterization of the methodology**

The assessment output should support decision-making in the political process. It provides the information to what extent the environmental and other objectives of implemented policy have been achieved, at what costs, and with what economic and other impacts on all important subjects concerned. It should assist to explicit identification of the main reasons for success and drawbacks. The methodology application results include, among others, also proposals for the next stage of the policy cycle – it may be proposed and justified to continue in the given policy, modify it or back out of the policy.

The assessment is divided into two main levels – basic assessment and in-depth assessment. Basic assessment is carried out in all cases and is of complex character. Basic assessment proceeds in three modules which reflect the basic cornerstones of sustainable development – environment, economy and social policy. In-depth assessment is carried out only if required by conclusion of basic assessment. In this point, the methodology is to a certain extent analogical to „small“ and „extended“ RIA assessment. However, as regards the RIA, decisive for the carrying out of in-depth assessment are not arbitrarily pre-defined criteria (amount of costs), but the result of basic assessment (see below).

The methodology is intended to bring outputs which are intelligible to policy-makers, experts in various disciplines and the public. In principle, the methodology uses structured and easy-to-survey tables, which are, step by step, to be filled in. This system enabled to incorporate in assessment standard classifications and procedures facilitating the assessment. In this way, all assessment steps are also transparently documented.

The methodology regulates the definite determination of competence in the assessment process – clear definition of the roles of the manager, executor, subjects concerned and expert reviewers (opponents). A thorough opponency of the assessment documentation represents a significant attribute of the methodology.

As regards the methods used for the assessment itself of the policy implementation effectiveness, both the qualitative and quantitative methods are applied. The qualitative methods include, for example, the document analyses, identification of the relevant factors for multicriterial assessment, consultation and in-depth discussions with experts and subjects concerned, etc. The quantitative methods include, in particular, conversions to comparable units used in assessment tables, and also multicriterial assessment techniques. In preparing the assessment, the quality of the data is observed. The use of the qualitative assessment of the data validity according to EMEP-CORINAIR (1998) is envisaged.

### **4. The assessment process**

As mentioned above, the assessment may proceed in two levels following one after another. The basic assessment consists of four phases:

- preparatory phase,
- the gathering of the data and assessment in the particular modules,
- overall assessment of the policy,
- opponency and final assessment of the policy.

The preparatory phase begins through raising the requirement to assess the effectiveness of the policy implementation. Such requirement may ensue from the policy itself and may be forwarded to the Ministry of the Environment from another organization at governmental level (the ministries, the parliament), from non-governmental organizations, political parties, industrial associations, etc. The requirement is then reviewed from the viewpoint of necessity to perform actual assessment of effectiveness of the relevant policy implementation.

The reason for rejection may be, for example, the fact that the required assessment already proceeds within the reporting to the EU, the requirement does not aim at the assessment of effectiveness of the policy implementation, but at public resources management control. Another reason may be, for example, the fact that the policy concerned does not fall within the competence of the Ministry of the Environment, or the fact of inappropriate timing leading to the funds wastage, etc. Should a decision on carrying out the assessment of effectiveness of the policy implementation be made, the assessment manager and executor are appointed.

This is followed by the gathering of the information in the particular modules and their transformation to the form needed for partial assessment. The executor works with the criteria ensuing from the policy wording, with the criteria provided by the methodology, and with the criteria which are in a creative way derived from the analyses performed within the framework of assessment. For all of the criteria, the methodology has the rankings prepared.

The overall assessment consists of the criteria ranking in each module according to their significance and of standardized weights assigning to each criterion in each module. Based on the results, easy-to-survey tables showing overall assessment are compiled. The first table, in the methodology called „policy performance review“, contains a listing of the significant criteria with explicit inclusion into the positive or negative group from the viewpoint of impact on effectiveness, a listing of the criteria recommended for in-depth assessment, and overall verbal and quantitative assessment of the policy. The next overall assessment tables include (i) the identification of the reasons for the positive and negative results of the assessed policy and (ii) the table of specific well-founded proposals for the following phase of the policy cycle.

The resulting documentation of the basic assessment is distributed to expert opponents. It is also placed on the Internet and so the public and representatives of the subjects concerned are given an opportunity to raise comments. Through raising comments they become participants in opponency.

The opponency may result in:

- approval of the resulting assessment and process and the contents of the basic assessment;
- raising a request for final elaboration of the basic assessment and new opponency;
- raising a request for and specification of in-depth assessment.

In-depth assessment which follows up with the basic assessment need not be of a complex character. There may be recommended to focus, for example, on deeper economic analysis using CBA, there may be recommended to make, in more detail, calculations of inter-compartmental effects of the policy assessment, a deeper analysis of macroeconomic impacts of the policy, for example, using a general equilibrium model, using methods of qualitative analysis, etc. In-depth assessment may deal with a request for preparing detailed proposals for the policy improvements for the future, which may include, in more detail, international comparison of assessments of the innovative technologies and cycles, etc.

## **5. Conclusion**

The assessment which the present Methodology is intended for, serves primarily for getting to know whether and how the given policy affected the quality of the environment, how it impacted on other aspects of quality of human life, how high were the costs of the policy, and also for the identification of its other economic and social context.

The methodology should help implement the „philosophy“ of regulation improvements. In the future, it may be used to enrich the methodology of the RIA preparation. In particular, its outputs may serve to improve proposals of newly prepared regulations in the existing environmental

areas. The significance of the proposed methodology in connection with the drafts of new policies consists primarily in accentuating the necessity to formulate verifiable targets.

The aim of the assessment is not to give rise to and possibly back up the existing disputes between different subjects. The aim is to identify major problems in the given environmental areas (compartments) and assist in resolving them. The problem solving instead of „stirring up disputes“ requires and at the same time generates space for the analytical capabilities and creativeness of all participants in assessment.

## References

1. EEA, (2008), Effectiveness of Environmental Taxes and Charges for Managing Sand, Gravel and Rock Extraction in Selected EU Countries, European Environment Agency, Copenhagen, ISBN 978-92-9167-267-7.
2. EMEP-CORINAIR (1998): "Atmospheric Emission Inventory Guidebook", Second Edition.
3. EUROLEX (2006): Poplatky k ochraně životního prostředí a jejich efektivnost EUROLEX BOHEMIA, Praha. ISBN 80-7379-002-5.
4. Jílková et al. (2004): Efektivnost veřejných výdajů na ochranu životního prostředí. Project Report. IEEP. Praha.
5. Moravec, J. et al. (2005): Vyhodnocení ekonomické efektivity péče o českou krajinu a návrhy změn pro transformaci stávajících programů péče o krajinu v souvislosti s Evropskou úmluvou o krajině a dalšími mezinárodními závazky. Project Report. IREAS - Institut pro strukturální politiku, o.p.s. Praha.
6. OECD (2004) Tradable Permits – Policy Evaluation, Design and Reform, Organisation For Economic Co-operation And Development, Complete Edition - ISBN 9264015027.
7. Pavel, J. (2006): Národospodářské modely dopadů opatření politiky životního prostředí na makroekonomické agregáty v České republice, IEEP, Praha.
8. Šauer, P. (ed., 2008): Rozvoj metod ex-post analýz kauzálních vztahů mezi ekonomicko-politickými institucionálními změnami a kvalitou životního prostředí III. SeptimTISK, Píbram. ISBN 978-80-904032-1-5.

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# USING IPPC PROCESS TOOLS TO PROMOTE BATs/BEPs RELATED TO POPs

Blanka Kapustová

## 1. Background

Under the Stockholm Convention on Persistent Organic Pollutants, the promotion of best available techniques (BATs) and promotion of application of best environmental practices (BEPs) became appropriate. When applying BATs and BEPs for pollution sources, guidelines on BATs and BEPs should be adopted. The Conference of the Parties to the Stockholm Convention, at its 3rd meeting held in 2007, adopted draft of guidelines on BATs and provisional guidance on BEPs.

Since the application of BATs is relevant to many other environment protection themes and areas, there is a lot of mutual relationships to other environmental conventions and directives, principles or approaches, like Basel Convention, sustainable development, IPPC, cleaner production, life cycle management etc.

## 2. IPPC process in Slovak Republic and its relation to POPs issues

IPPC process and POPs issues are closely related, since significant amount of emissions generated in IPPC installations belongs to POPs chemicals.

In most cases, industries / installations producing POPs fall under IPPC Directive, so they should be operated according to the integrated permit.

Process of integrated permitting in Slovak Republic is managed by the Ministry of Environment of Slovak Republic (MoE SR), which is the central state administration body in the matters of integrated pollution prevention and control, and Slovak Environment Inspection, which is permitting, as well as inspecting body. The number of IPPC installations in Slovakia is about 542, the number of integrated permits issued is 1 241, including changes of permits issued (status to January 2009).

In IPPC process, there are also acting Slovak Hydrometeorological Institute (SHMI) and Slovak Environmental Agency (SEA). SHMI is the body responsible for the collection, processing and validation of data on emissions of IPPC installations, while SEA was authorized by Ministry to co-ordinate IPPC reporting obligations fulfilling.

Operators obviously try to find appropriate BAT in concrete Best Available Technique Reference Document (BREF) relevant to industry branch within they operate their installations.

## 3. IPPC Information System

Information System on IPPC, which has been building and operating at SEA (<http://ipkz.enviroportal.sk/informacny-system.php>), is focused on providing of complex system of collection and processing of information and data to inform European communities, as well as public.

The IPPC Information System (IPPC IS) is a subsystem of the Information System of Environment Departments at SEA, a part of the Information System of Public Administration; IPPC IS building started in 2003.

Main objectives of IPPC Information System are:

- provides information about the IPPC permitting process and related activities,
- supports the execution of the Act on IPPC in Slovakia,
- creates conditions for meeting reporting requirements of the Slovak Republic.

Structure of the IPPC IS is formed by six registries, namely: 1. Registry of Operators and Installations/Facilities under IPPC, 2. Integrated Registry of Information System, 3. Registry of BATs and BREFs, 4. Registry of Environmental Quality Standards, 5. Registry of Authorised Persons, 6. Registry of Integrated Permits Issued.

Users of IPPC Information System are state/local/regional authorities, bodies, local municipalities, IPPC operators, non-IPPC operators, industrial associations, university students, public.

Actually, in this context, the focus is given to the Registry of BATs and BREFs.

#### **4. Registry of BATs and BREFs – extension by Guidelines on BATs/BEP relevant to POPs**

Primarily, Registry of BATs and BREFs is a part of IPPC Information System. The Registry is one of the outputs of Slovak roadmap within Environmental Technologies Action Plan (ETAP). Nevertheless, it is a part of the initial phase of BAT and BEP Action Plan (a part of the National Realization Plan on Stockholm Convention), since Registry is going to be extended about relevant information, documents and guidelines on POPs' BATs and BEPs.

The result of such inclusion through the extension of the Registry of BATs and BREFs might lead into following:

- the basis for more effective permitting process and environment protection will be established;
- information basis for industrial ecology issues which will provide support through connection of specialized information systems, such as IPPC IS, EIA/SEA IS, Environment Loads IS, Major Accidents Prevention IS, Environment Damages IS, as they are going to be mutually connected in the future. Registry of BATs and BREFs, extended by POPs' BATs/BEP guidelines might be the common element among connected information systems;
- POPs issues will be turned into such system without useless duplicities;
- support working tool for National Contact Point of Stockholm Convention creation.

#### **5. Better dissemination, demonstration and understanding**

To enforce the meaning and significance of POPs' BATs and BEPs guidelines and guidance, it is necessary:

- to provide inclusion of guidelines into existing BREFs during their revision process,  
or
- to accept guidelines and guidance as BREFs-like, provisionally,
- to build the co-operation with European IPPC Bureau in Sevilla, which might be valuable not only for EU Member States, but for all countries within Stockholm Convention interest region.

## 6. Conclusion

What is really important and can make an effort, is integration of existing approaches, systems and initiatives, which might create integrated system in which it would be possible to find what we look for, without duplicities. Inclusion of BAT/BEP guidelines and guidance into the BATs and BREFs listed in Registry of BATs and BREFs might help to improve dissemination of such information, since only few operators have information about existence of BATs and BEPs related to POPs.

## References

1. SECRETARIAT OF THE STOCKHOLM CONVENTION, 2007: Guidelines on best available techniques and provisional guidance on best environmental practices. UNEP, Geneva, Switzerland.
2. KAPUSTOVA, B., 2009: Using IPPC process tools to promote BATs/BEPs on POPs. Presentation at Regional BAT and PEP Forum for CEECCA – 2nd consultation meeting, 27th – 28th January 2009. UNEP, Bucharest, Romania.

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## ENVIRONMENTAL SERVICES SURVEY

Študent Jiří

In the previous two years, I have informed you about the ongoing project focused on readiness of environmental services operating on the Czech territory on liberalization of the full opening the market.

This year the project ends with the publishing of a monograph on environmental services. This monograph will be presented at a seminar organized in November. At this moment I can inform you only about the results we achieved in the previous two years. Since my remarks are based on a PowerPoint presentation, I focus only on a brief recapitulation of the achieved results.

CEMC for the solving the project we accepted assumptions and procedures, which I have previously mentioned, but I consider it necessary to reiterate here:

1. Environmental services and products are especially part of the services as such. Thus, we assume that they have affected by economic, political and others connected with the development of society. Environmental services are specific that their development is influenced by environmental legislation.
2. The term environmental services we understood in the broad sense. We include not only services but also the manufacturer of products, which contributes to prevent, reduce, eliminate and correct the negative impacts on the environment (more definition (OECD and Eurostat: The environmental goods and services industry - manual for data collection and analysis)
3. Analysis of the impact of liberalization on environmental services is ensured by evaluating the competitiveness of selected operators in the Czech market through the internal potential. We assume if this potential is high the company can successfully resist the competition from both the domestic market and foreign market.
4. Compared to the statistical survey (RU VL 1 -01 and 1 - 01) we focused on the supply side of environmental services.
5. CEMC isn't satisfied with a one-off survey, and so the project has created a publicly accessible database of environmental services ([www.envisluzby.cz](http://www.envisluzby.cz), [www.enviservices.eu](http://www.enviservices.eu)). The database serves respondents to facilitate their cooperation by its presentation on European area, and allows them to be able to compare with others by benchmarking.
6. Thanks to the evaluation of the internal potential to the investigator offered a unique opportunity, on the basis of data collection with a three-year periodicity, continuously observe the development process of environmental services, replacing the needs for further surveys in this area. The organization pays by its data for participation in this database!

During the solution has been asked about 6 000 subjects with effect responses below 5%, even though the database has become a PR tool and incentive subjects to fill in a questionnaire by promises:

- The organization will become part of publicly accessible databases.
- Part of the presentation and organization logo will be a brief description in Czech and English.
- The organization itself will be able to define your own keywords describing the company's operations.

- For each activity the organization will be able to specify their products and services.
- Organizations will be preferred compared to other searches, as far as fill in required data.
- Organization banner will be placed directly on the home page database.

A secondary outcome of the project was the creation of a universal nomenclature of environmental services, which allows a uniform way to characterize the service area regardless of their orientation.

The nomenclature consists of the following fundamental further disintegrating layers:

- Exploratory and design work
- Authorized measurement
- Operation of technology and services
- Production and delivery of technological units and accessories
- Construction, reconstruction, servicing and repairs
- Other services

It shows that the term “environmental services” involves relatively wider range of activities timely excess of the OECD and Eurostat selected categories, which according to them, represent the services (production and distribution of water, processing of secondary raw materials, waste water treatment, waste, retreading of tires, clean-up).

In the course of 2008 the description of environmental services was specified, which enable the characterization of environmental services, also were considered obstacles to foreign trade and, finally, was considered the competitiveness of environmental services by NACE.

### **Description of environmental services**

Survey represent 198 organizations providing in 2006 the total turnover of nearly 52 mld.CZK, with its total export volume of 5.2 mld.CZK, providing added-value of 7.1 mld.CZK and assets created in volume 39.2 mld.CZK at 17 471 employees.

According to the typical example of the environmental services organization is operating on the market 14 years, with three branches operating throughout the Czech Republic and one branch abroad, employing 14 staff, is owned primarily domestic business, entity achieves an annual turnover of 15 mil CZK, with zero export, value added in volume of 1.6 mil CZK and the permanent assets of about 10 mil CZK(all those values are as median).

Among the positive findings are that:

- Organization believes in more competitive than if the contrary
- Main users of the services are industry
- Good language skills

and on contrary negative facts:

- Low number of graduates in strategic positions of management
- Assumptions for future developments do not match the strategy of the program activities services
- Low priority given to new areas and challenges.

More detailed information characterizing the environmental services are provided in the presentation.

### **Barriers on foreign markets**

All the organization's comments about the barriers on foreign markets can be summarized into five relatively independent groups, which characterize the quality of business environment in which the destination:

- Financing
- Local Culture
- Legal barriers
- Quality of market
- Workforce

The result of the investigation indicates a difference between developed and developing markets. While in developed markets company faces a lack of confidence in the Czech production to developing markets company faces with many dangers, which if not treated, can have a fatal impact on the organization. It is interesting that the bureaucratic obstacles encountered in both markets.

The survey was motivated investigators attempt to assess what options the government if it wanted to encourage environmental services' activities on foreign markets. Analysis of the information obtained, we concluded that the state affects the environmental services (ESV) commitment in the field:

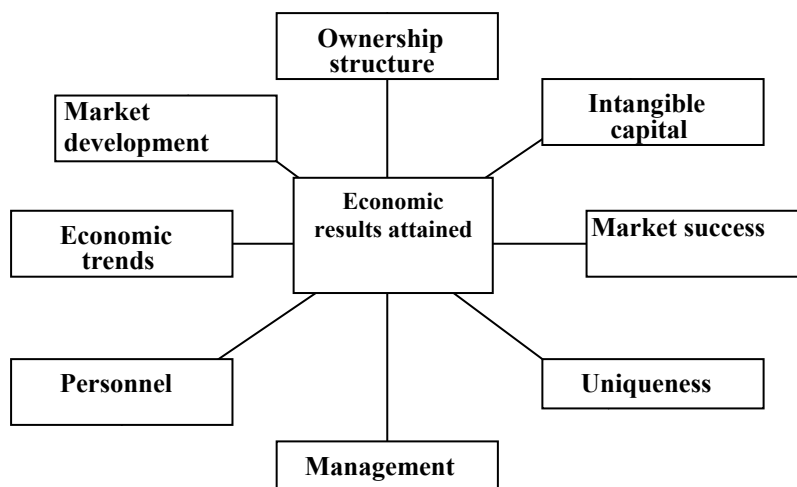
- stabilizing exchange rate of the koruna
- support and export credit insurance policy,
- legal help and diplomatic support in the target countries,
- information support entrepreneurs in developing regions.

More information on barriers to foreign markets is on the presentation.

### **Analysis of internal capabilities and assess the competitiveness**

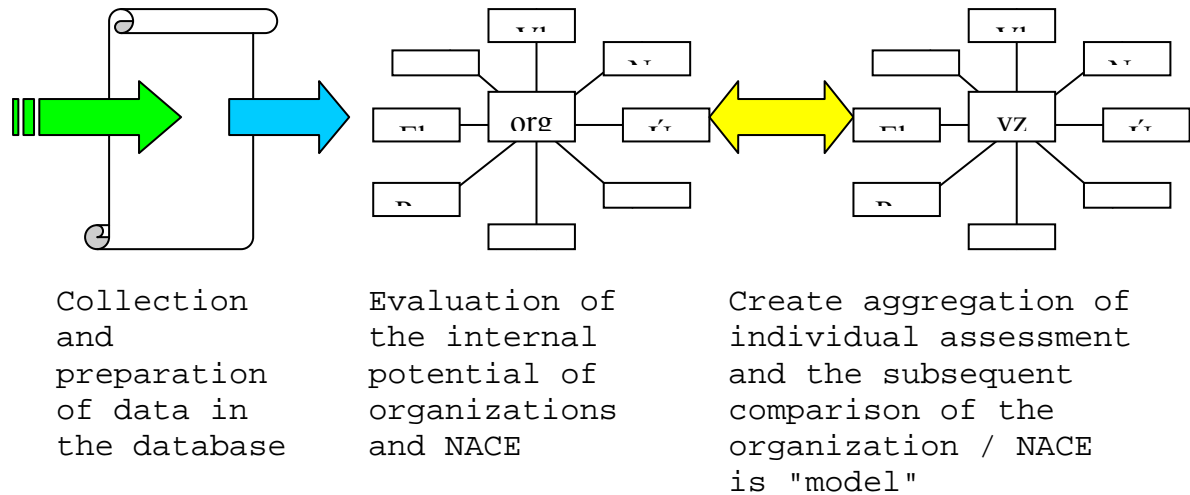
The evaluation is to assess the eight segments:

**Fig. 1 – methodology for evaluating competitiveness**



Evaluation of internal potential require the calculation of the internal potential for each organization separately, and then determining the average of the various organizations under the NACE and the average of the whole.

Evaluation of competitiveness based on the evaluation of the internal potential, which is the result of the process:



Rating of the internal potential and competitiveness environmental services can be carried out within the different groups' models' (type of product or activity; industry, the environment in which the organizations involved, the region where the organization operates, etc.).

Sample internal assessment of the potential and competitiveness, see. presentation.

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# WASTE STATISTICS IN THE CZECH REP. AND EUROPE

Lucie Šimonová

## 1. Statistical surveys of waste in the Czech Rep.

### 1.1. History

The Czech Statistical Office (ČSÚ) has been doing statistical surveys in the sphere of waste production and handling since late 1980s. Since 1992 ČSÚ has been organizing annual waste surveys regularly. Besides, for more than 10 years ČSÚ has been sending obtained data on waste to Eurostat (European Statistical Office). In 1995-2004 national data on waste were reported through the Eurostat/OECD Joint Questionnaire on Waste. A change in the structure of reporting data on waste to Eurostat occurred in 2006, when the Department of Environmental Statistics first sent data on waste in accordance with the Directive of the European Parliament and Council no. 2150/2002 on Waste Statistics. This Directive became effective for all the EC Member States at the end of 2002 and it is the Czech Statistical Office that ensures its administration in the Czech Republic.

### 1.2. Legislation

Statistical surveying in the sphere of waste management is annually part of the *Statistical Surveying Programme* for the particular year. In accordance with the Act no. 89/1995 Coll. on the State Statistical Service a reporting unit is obliged to fill in all the required data in the *Odp5-01 report - Annual Waste Report*. So on one hand reporting units are subject to the lawful duty to provide the Czech Statistical Office with data, but on the other hand ČSÚ guarantees that individual data of these entities will be protected. In practice this means that any data on waste production, the way of its handling, etc. may only be provided to another entity in the aggregated form only, i.e. in such a form that prevents identification of a particular reporting unit.

Waste statistics processed by ČSÚ complies both with valid Czech legislation - the Act no. 185/2001 Coll. on Waste - and the Directive of the European Parliament and Council no. 2150/2002 on Waste Statistics.

### 1.3. Methodology and processing

The source of data for waste statistics is the report no. *Odp5-01- Annual Waste Report*, which is annually sent to approximately 18,000 respondents. The set of respondents consists of selected economic entities (enterprises) and selected municipalities. Surveys of economic entities provide data on industrial and other corporate waste while municipalities provide data on waste of households and small trades.

To reduce administrative load of small enterprises companies with fewer than 20 employees are not included in the survey of economic entities. If some enterprises with fewer than 20 employees considerably contribute to generation of waste or are significant in the sphere of waste handling, they are included in the statistical survey and sent the report. For a selected set of approx. 400 enterprises the *Odp5-01* report comprises an appendix focusing on consumption of waste as secondary raw materials for the production of selected products.

Production of municipal waste is monitored by means of reports received from a selected set of municipalities from the Czech Republic. Similarly to enterprises in this case ČSÚ also endeavours to reduce the administrative load of municipalities and therefore the production of municipal waste is established with the use of a selective method (approx. 1000 municipalities) with subsequent calculation.

The entire technical processing of filled-in report forms is performed in accordance with an approved technical project. Among other things the correctness of data provided by the respondents is verified with the use of more than 50 software check links (from the basic check of the respondent's ID to comparison of the filled-in quantity of produced waste and waste handling method to the quantity and handling method declared by the reporting unit in the previous years).

#### 1.4. Survey results

Results of the statistical surveying are regularly published in the following publications:

- Statistical Yearbook of the Czech Rep.
- Environmental Yearbook of the Czech Rep.
- Production, Use and Removal of Waste
- Information on the website of ČSÚ: [www.czso.cz](http://www.czso.cz)

## 2. Comments on waste data for 2007

### 2.1. Waste production

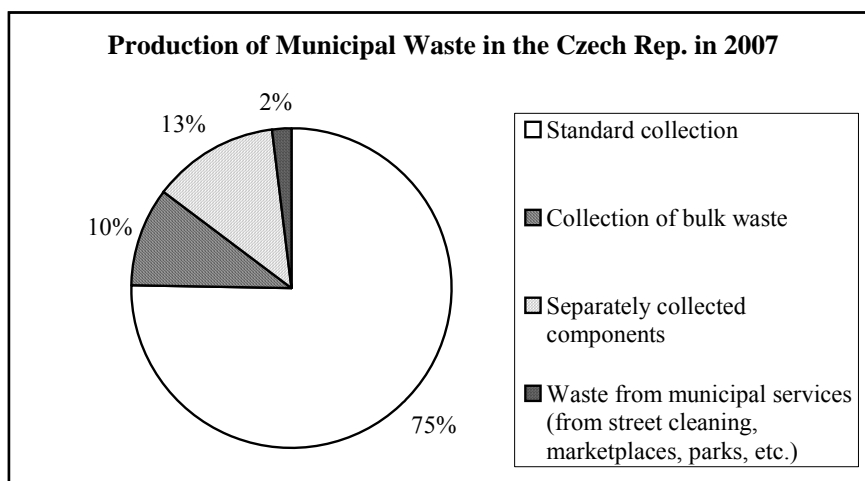
Statistical surveying has shown that in 2007 the overall production of waste in the Czech Rep. achieved 25.1 mil. tons. As compared to 2006 the overall production of waste did not manifest any significant change. Production of dangerous waster in 2007 amounted to 1.3 mil. tons (5.2% of the total production) and in comparison to 2006 its level also remained the same.



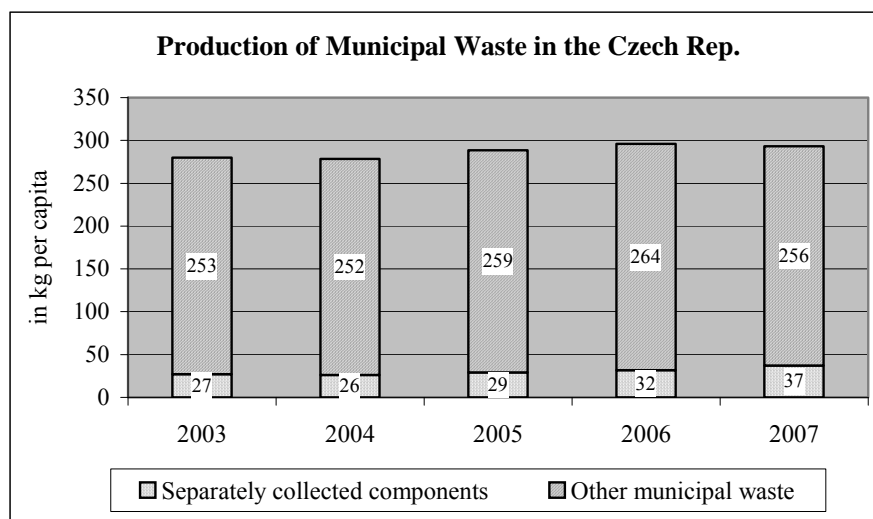
Data source: ČSÚ

Activities of economic entities (enterprises) generated 21.7 mil. tons of waste (in 2006 21.3 mil. tons). The long-term trend shows that approx. 75% of waste produced by enterprises in the Czech Rep. are generated by the activities of 300 enterprises.

The production of municipal waste dropped in the annual comparison to 3 million tons, i.e. 293 kg per inhabitant (in 2006 296 kg per inhabitant). Especially the increase of the share of sorted waste achieved in 2007 can be considered as a positive signal. In comparison to 2003 the quantity of sorted waste per inhabitant increased from 27 kg to 37 kg in 2007.



Data source: ČSÚ



Data source: ČSÚ

## 2.2. Waste handling

According to the statistical surveying in 2007 28.5 mil. tons of waste were handled. Out of this figure 8 mil. tons of waste (28.1% of all waste, i.e. from enterprises as well as municipalities) were utilized (R-codes only) and 6 mil. tons (21.3% of all waste) were removed (D-codes). The other ways of handling (N-codes) cover almost 50% of all waste that was handled in 2007.

Within the handling of municipal waste the amount of waste deposited in dumping sites decreased as compared to 2006, namely from 89.8% of the total production in 2006 to 82.6% in 2007. This means that in 2006 266 kg of municipal waste per inhabitant were deposited in dumping sites while in 2007 the figure was 242 kg.

## 2.3. Consumption of waste as secondary raw material

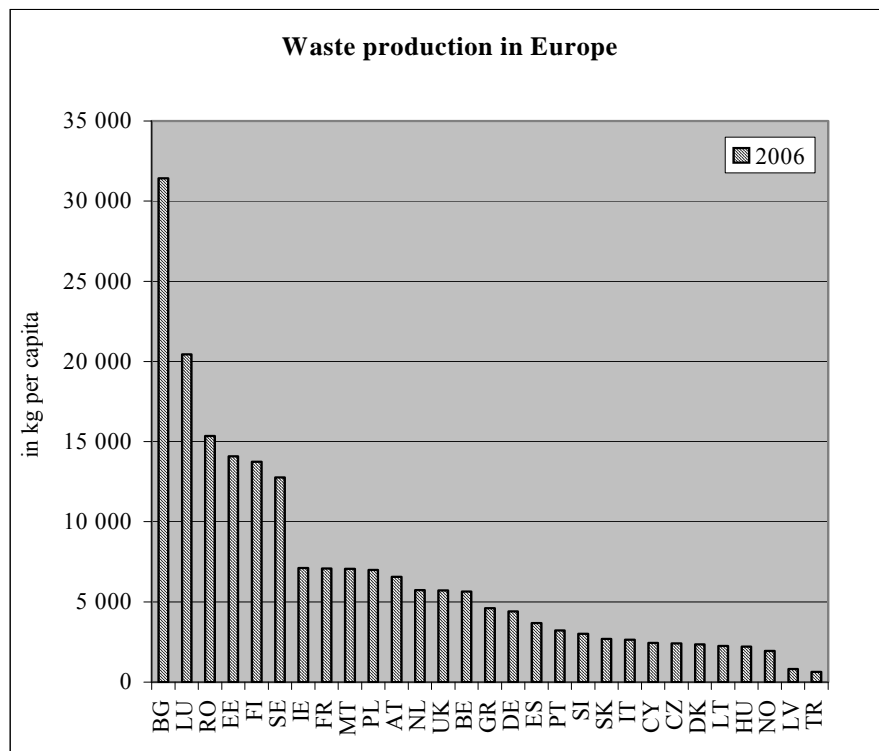
The established production of selected waste as secondary raw material for the production of selected products in monitored enterprises (glassworks, metallurgical plants, construction companies, etc., since 2004 also paper mills, cement works and textile companies) amounted to 3.3 mil. tons, which is 1.2 mil. tons less than in 2006.

### 3. Waste statistics in Europe in accordance with the Directive of the European Parliament and Council no. 2002/2150/EC on Waste Statistics

The aim of the Directive of the European Parliament and Council (EC) no. 2150/2002 on Waste Statistics is to provide a framework for the European waste statistics. The Directive, which became effective in December 2002, regularly requires the EC Member States to report data on their production, use and removal of waste. Among other things it contains objectives, basic definitions, methodological instructions for data collection and the data framework for the implementation of the Directive.

The Member States have the obligation to send data about the production, use and removal of waste every two years from 2004 on. The results must be delivered within 18 months from the end of the reference year. The format of transmission of waste data is defined by the Commission Directive no. 2005/782/EC.

Together with the data the Member States submit the *Quality Report* in accordance with the Commission Directive (EC) no. 1445/2005, which documents the required quality and exactness rate of the provided data. Besides, it also describes the methodology of statistical surveying (respondent selection method, data collection method, verification, used mathematical-statistical methods, etc.).



Data source: Eurostat

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# SELECTED INSTRUMENTS FOR PACKAGING WASTE MANAGEMENT REGULATION AND COMPARISON OF THEIR EFFECTIVENESS

Jan Slavík, Jana Matějovská

In 2005 the Czech government passed Resolution no. 1621 of 14<sup>th</sup> December 2005 “on Measures to Implementation of Government Order no. 197/2003 Coll., on Waste Management Plan of the Czech Republic and on Participation of the Ministries in their Fulfillment (stage II)“ where requirement to prepare proposal of measures leading to improvement of refillable beverages packaging system with objective to prevent waste production is formulated in Measure 7.7.

As a result of this measure the deposits on one-way beverages packaging (PET bottles and cans) started to be discussed. However, deposits represent only one from many discussed regulation instruments, whose main objective should be: (a) advantage refillable beverage packaging against one-way beverage packaging, (b) increase recycling of packaging waste (or more precisely beverages packagings) and (c) reduce littering. In order to achieve these objectives, operative politics uses the broad range of instruments which differentiate by the extent to which they accept market economy conditions and to which extent they rely on direct state regulation.

Instruments with regulation character are e.g. selective prohibitions of one-way packagings, quotas for refillable beverage packaging, obligation of return acceptance, obligation of unifying of refillable packagings, obligation of deposit collection etc. On the other hand market-based instruments, more respect individual cost functions, are represented by packaging tax or license on packaging (Baum-Cantner-Michaelis, 2000; 67).

Experiences with implementation of mentioned instruments to use have nowadays a lot of EU countries. Deposits for one-way beverage packaging have been introduced in Sweden, Finland, Norway, Denmark, Estonia and last but not least also in Germany. Experiences with packaging tax have e. g. Finland or Estonia. Licenses on packagings are discussed as one of potentially useful instruments, but practical experiences with their functioning have so far only England.

But how should we identify which of these instruments implement to existing instrumental mix? Naturally one of chosen criterions should be environmental efficiency of the instrument. From relation between instruments and policy objectives results that the instrument could be considered as effective only if contributes to achieving the objective. As Rutkowsky (1998; 212) or Baum-Cantner-Michaelis (2000; 24) add this criterion is not the only one useful for evaluation of relation between instruments and objectives. Other criterions of evaluation are:

- **static effectiveness** – a policy instrument could be considered static effective, if respective objective is achieved with minimal costs (to prevention);
- **dynamic effectiveness** – a policy instrument is dynamically effective if new technologies and mechanisms are initiated in order to achieve objectives (e. g. new and from costs point of view effective methods of waste production and prevention or in the field of waste use).

Besides these criterions we could identify also a lot of others (additional) criterions, which could provide significant information about the instrument and his position in environmental protection policy. As Bartmann (1996, 118) mentions e. g.:

- **enforceability** – in this sense we do not consider only political enforceability of an instrument to use, but also the fact if there is available sufficient information to evaluate efficiency and if control mechanism is necessary (or possible);

- **system conformity** – which way an instrument takes into account market function and subsidiarity;
- **social capacity**;
- **obstructions in working** etc.

Significant entry into discussion about ex post evaluation of environmental protection policy instruments brings also OECD (1996, 29) with its methodology so-called 3E<sup>1</sup> – Efficiency<sup>2</sup>, Economy<sup>3</sup>, Effectiveness<sup>4</sup>. This methodology was originally developed for evaluation of expenditure programs effectiveness, but its universality affords to apply it also in case of instruments.

### Packaging tax

The main aim of packaging tax is substitution of one-way beverage packaging with refillable packaging. For this purpose taxation of beverages packagings happens; it should contribute to internalization of extern costs caused by these packagings to the environment. However Baum-Cantner-Michaelis (2000; 82) emphasize that from organizational point of view taxation of one-way beverage packaging is not **the only** possibility. We could also imagine a situation when this packaging tax is imposed on one-way as well as on refillable beverages packagings and the tax effect will remain the same. Reason is obvious - refillable packaging pass through more cycles in consumption then tax burden on one filling of these beverage packagings will be lower in comparison with one-way ones (Feess-Dörr-Steger-Weihrauch, 1991; 177). As Baum-Cantner-Michaelis (2000; 83) add in this case the taxation has its foundation, because during life cycle of both types beverages packagings the quality of the environment is influenced by both of them.

From theoretical point of view packing tax has nature of Pigovian tax. Its purpose is internalization of externalities caused (mainly) by one-way beverages packagings. How to figure out her range? Ewringmann (1986; 114) assumes that packing tax should be prohibitively heavy, because if it is not it would not have sufficient effect on change of packaging mix on behalf of refillable beverage packagings. Nevertheless as the author adds in this case the packaging tax would not differentiate from absolute prohibition of one-way beverage packagings (ibid). Groth (2007, 162) on the other hand mentions that the tax range does not have to be prohibitive. It is sufficient if it has motivation effect. On the base of calculation in German conditions he indicates that taxation in range 0,20 EUR would be sufficient motivation.

In the frame of discussion about range of packaging tax some authors recommend to use recommendations formulated by Baumol and Oates (1979) who proposed to resolve the problem with setting the tax range through gradual adjustment of the tax range to predefined standard (Baum-Cantner-Michaelis, 2000; 83)<sup>5</sup>. As the authors confess in another part this solution is hardly to put into practice. Method of “trial and error” would lead not only to: *“risk of bad investments from bottlers of packagings and producers, but this attempt would also fail when economic conditions would change faster because of technological development and economic growth than the tax range will adjust”* (ibid; 86).

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<sup>1</sup> This methodology was also used in the frame of project „Analysis of effectiveness of economic instruments“ which was solved by IEEP, Institute for Economic and Environmental Policy at the Faculty of Economics And Public Administration, University of Economics, Prague in 2008. The author of this paper participated on its solving.

<sup>2</sup> Key question: „Does the instrument contribute to achieve policy objective?“

<sup>3</sup> Key question: „Was the instrument implemented with minimal possible costs?“

<sup>4</sup> Key question: „Was maximum benefits achieved with minimum invested means?“

<sup>5</sup> The same solution proposes also Linscheidt (1998; 148).

Other authors recommend using conclusions of products life cycle evaluation (LCA). This approach also refers to a problem consisting in relative equality of both types of packagings in their impact on the environment (Feess-Dörr-Steger-Weihrach, 1991; 182-183). Capacity to define optimal tax range and question if it is necessary to define this is impeached by Ewringmann (1986; 114) who declares: *“impact on consumer depends on the fact how the costs will be really transferred on consumer (in other words on price strategy of a store)”*.

One of crucial issues related to practical implementation of packaging tax is: **what** should be base for tax calculation? Groth (2007; 161) and Baum-Cantner-Michaelis (2000; 83) propose two possible options:

- **volume tax** (in this case the tax is based on volume of beverage packaging and particular capacity categories are defined);
- **price tax** (in this case the tax is calculated as fixed percentage of the beverage price).

Baum-Cantner-Michaelis (2000; 83) add that we could imagine a situation when the range of packaging tax reflects character of the material from which a beverage packaging is produced and its impact on the environment. The authors consider this measure: *“from internalization of externalities point of view to be theoretically justified”* (ibid), but from practical point of view it would be difficult viable. Groth (2007; 161) explains that impossibility of such a measure results from the fact that a number of beverages packagings is composed from more materials therefore their taxation would be very complicated.

The next question which should be cleared before real implementation of this instrument is: who should be taxpayer of this tax? Considering subjects disposing of beverages packagings the taxpayer could be producer, bottler or store. The level of distribution where the packaging tax will be collected will have fundamental impact on efficiency of this instrument. Groth (2007; 162) assumes that higher efficiency (therefore substitution of one-way beverages packagings by refillables) could be expected in particular on higher levels of distribution. Baum-Cantner-Michaelis (2000; 83) add to this that levying the tax on the highest level of distribution is advantageous because of lower number of taxpayers. On the other hand as Groth (2007; 162) declares there is a risk that relatively long distance from the highest level of distribution to consumers could initiate undesirable customizing processes and in the same time cut the tax efficiency, because higher burden will be distributed to particular subjects of distribution chain.

Providing that the taxpayer of packaging tax will be producer of beverages packagings, then according to Baum-Cantner-Michaelis (2000; 84) we could expect 4 different strategies how the producers will react on increasing of the costs:

- *“internal absorption of packaging tax through optimization measures*
- *dislocation on other products*
- *switch-over to refillable beverages packagings*
- *direct dislocation on bottlers”*

Regarding the original objective of packaging tax – substitution of one-way beverages packagings by refillables – the third listed strategy is desired. Ewringmann (1986; 118) mentions that packaging tax need not to cause substitution of one-way beverages packagings by refillables used in any case, if a producer has enough possibilities to optimize production costs. Nevertheless as the author adds in conditions of competition market we cannot expect that a producer dispose of possibilities to cut production costs (more than he already did in past).

Baum-Cantner-Michaelis (2000; 84) add that allocation of costs on other products is also very controversial, because packaging industry is characterized by high specialization. For the same reasons the switch-over on repeatedly used beverages packagings is hardly likely, be-

cause we cannot expect that majority of producers disposes by technologies producing both types of beverages packagings. Ewringmann (1986; 118) states: “*packaging tax does not have substitution effects in favor of refillable beverages packagings.*”

The likeliest strategy of producers is then dislocation of burden on lower level of distribution – on bottlers. They dispose of the same strategies how to resolve increased production cost as beverages packagings producers. Their reaction will depend to a great extent of the fact how the cost ratios between use of one-way and refillable beverage packaging will change, on expected reactions of stores on packagings change and also on relation between revenues and costs in case of particular beverages (Ewringmann, 1986; 118). By this chain link we could also expect that the likeliest option will be dislocation of the costs on lower link in the distribution, on the store (Baum-Cantner-Michaelis, 2000; 85).

What reaction on increasing burden in consequence of packaging tax could we expect in case of store?

- *“elimination of beverages in one-way packagings from assortment and their substitution by beverages in refillable beverages packagings;*
- *shift of costs to prices of beverages in one-way beverages packagings;*
- *shift of increased costs to prices of other goods, not only to beverages, but to whole assortment”.*

Baum-Cantner-Michaelis (2000; 85) add that in case of shift of increased costs to prices of the other goods the environmental efficiency of packagings cost absolutely disappears.<sup>6</sup> In case of shifting costs only to beverages segment then the repeatedly used beverages packagings would be paradoxally handicapped. We could find similar conclusions also by Groth (2007; 162) or Ewringmann (1986; 118).

Feess-Dörr-Steger-Weihrach (1991; 165) emphasized that **consumer** will finally decide about success of packaging tax, because by his decisions he provides the crucial information to producers or stores what they should produce (or sell). Ewringmann (1986; 119) adds that shifting of increased cost is in connection with packaging tax on consumer more likely in case of medium and more expansive beverages, because the supply elasticity is quite low in this beverages segment. Whereas the supply elasticity is higher by beverages with low price and possibility to allocate costs on consumer is therefore lower too.

Until now we did not answer one very significant question – cui bono will be used levied packaging tax? Feess-Dörr-Steger-Weihrach (1991; 177) states that it depends to a large extent on the fact if it is specific tax (for specific purposes – e.g. environmental, generation of other LCA etc.) or general tax without any exact destination. Groth (2007; 164) adds that packaging tax could be better politically enforced thanks environmental purposes of levied tax.

The packaging tax has number of opponents and advocates as well. While the supporters emphasize mainly the fact that it is market-conform instrument, hence the taxpayers can look for the most effective solution from the point of view of costs, the opponents emphasize above all that the packaging tax is finally shifted on consumer. The packaging tax is often compared with deposits. In case of deposits one-way beverages packagings are recycled to a large extent, in case of packaging tax they could land on landfills because the consumers buy right to pollute the environment by paying the packaging tax. External costs are hidden in the packaging tax and they are internalized through the tax. Nevertheless Feess-Dörr-Steger-Weihrach (1991; 181) emphasize that this argument is not consistent to a large extent.

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<sup>6</sup> The authors emphasized in this respect one fundamental fact: „*beverages supply restructuring will cause additional, but significant, demands on salesroom... repeatedly used beverage packagings need 50 – 200% more salesroom than one-way beverages packagings*“ (Baum-Cantner-Michaelis, 2000; 86).

In conclusion we should define to which extent the packaging tax satisfies effectiveness criteria. It is obvious from previous text that **environmental efficiency** of the packaging tax is very low, because it is impossible to warrant that this instrument will contribute to defined objective, in other words to substitution of one-way beverage packaging with refillables. Final effect will to a large extent depend on decisions of particular links of distribution chain and especially of consumers. The risk of decreased efficiency consists chiefly in company optimization strategies, which absorb cost increase in consequence of packaging tax as well as in possible shift of burden to other links of distribution chain. In case of consumers the decisive factor will be: to which extent potential price increase of one-way beverages packagings could influence price elasticity of supply (Pladerer-Gupfinger, 2002; 20).

In case of **static effectiveness** the situation is more complicated. Baum-Cantner-Michaelis (2000; 37) present relatively high static effectiveness of this instrument. Groth (2007; 163) add that high static effectiveness of packaging tax results from the fact that possible substitution of one-way beverages packagings with refillables is rewarded by lower tax. Particular subjects search for optimized solution from cost point of view in frame of their cost functions and they are not forced to substitution. This type of behavior is typical also for consumers – he could pay lower price for beverage in refillable packaging (but it was already mentioned we could probably expect antipode).

Baum-Cantner-Michaelis (2000; 37,127) and also Groth (2007; 163) speaks about **high dynamic effectiveness** originating in instrument's motivation for innovation activity by producer (switch-over to production refillable beverages packagings is rewarded by lower tax). As it was already mentioned in the text the effect of high specialization of production is lower probability of switch-over to new technology. Possibility of producer's switch-over to technology producing refillable beverages packagings on cost optimized conditions is emphasized also by Pladerer-Gupfinger (2002; 20).

### **Packaging license**

Licenses on packaging group to economic instruments whose functioning is based on price mechanism when achieving environmental objectives. Nevertheless Jílková (2003; 38) points out that price mechanism could be applied in two ways:

- **price** is defined by state and quality (quantity) of the environment is result of market operation (e. g. packaging tax, fees etc.)
- **quantity**, or quality of the environment is defined by state and the price is generated by market.

Packaging licence belongs to economic instruments by which state defines required quality of the environment and price for achieving of this quality is generated by market. Discussion about practical application of this instrument take place from the end of the 70's, but decisive interest in this instrument is obvious only in the 90's (Pladedder-Gupfinger, 2002; 21)<sup>7</sup>. This instrument was used in field of climate and water protection, agriculture or fishery in past (Jílková, 2003; 97). During last years the possibility of its use in waste management is discussed (including beverages packagings treatment).

Fundamental principle of packaging licenses is definition of total quantity of one-way beverages packagings in the market and of quantity of these packagings which are accepted by the

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<sup>7</sup> This instrument is also often called tradable permits, right to pollute, tradable certificates etc.

state<sup>8</sup>. The state distributes permits for this quantity to market participants so that there will not be introduced more one-way beverage packagings than state accepts. The owner of the license obtains right to “pollute” the environment to an extent which is accepted by state. This right is traded in the market among the owners of licenses on the base of ratio between marginal costs on prevention ( $MC_P$ ) and price of the license. In case that marginal costs on prevention (in other words costs on substitution one-way beverage packagings by refillables) are higher than license price than subject authorized to trading buys licenses from subjects whose costs prevention are contrariwise lower than license price.

The crucial questions in application packaging license in practice according to Baum-Cantner-Michaelis (2000; 88) are first of all:

- definition of subjects authorized to trade with licenses (producers of packagings, bottlers or store);
- base for assessment of distributed license number;
- period and area validity (limited or unlimited period);
- method for license distribution (free, auction).

Who will be authorized to trade with licenses? In principle they are 3 subjects: (a) producers of beverage packagings, (b) bottlers, (c) stores. According to Groth (2007; 164) or Baum-Cantner-Michaelis (2000; 88) we should take into the charge two fundamental facts when choosing the subjects. Primarily the number of subjects should not allow any trade participant to gain market power enabling him to influence market price of licenses. On the other hand number of authorized subjects should not be too high, because in this case transactional costs related to market participants control grow<sup>9</sup>. Hence the mentioned authors recommend to **authorized subjects to trade** should be **bottlers of beverage packagings**, because in case of producers there is threat of oligopoly structures (Baum-Cantner-Michaelis, 2000; 88); in case of stores the transactional costs would grow disproportionate.

Next issue is decision about base of assessment of distributed license number. It could be set by capacity of one-way beverage packagings, by their weight or type of packaging material. As Groth (2007; 165) mentions assessment by type of packaging material is almost impossible, because packagings materials often consist from more materials thus differentiation of license number by particular materials would be very difficult. Baum-Cantner-Michaelis (2000; 89) add that in spite of this fact, assessment license number by weight or type of packaging material would be justified in the light of different environmental impacts of different materials. However feasibility is also in this case difficult<sup>10</sup> because of high transaction costs for particular market participants and for monitoring on the one hand and efficiency decreasing of this instrument in consequence of diversification of market with licenses by packaging materials to small number of participants<sup>11</sup>. It is obvious that **capacity** of one-way beverage packagings is considered to be the right base for assessment of license number.

Significant role for rules formulation in field of packaging licenses has also license period of validity. From theoretical point of view we could differentiate limited and unlimited validity,

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<sup>8</sup> According to Feess-Dörr-Steger-Weihrauch (1991; 186) political decision making about „accepted“ quantity of one-way beverage packagings is problematical, because they think that political objective should be complete substitution of one-way beverage packagings with refillables and not only defining of accepted quantity.

<sup>9</sup> The advantage of high number of market participants is higher competition in the market. It has positive impact on effectiveness (cost optimization, stress on innovations etc.

<sup>10</sup> Feess-Dörr-Steger-Weihrauch (1991; 189) add that license administration of all one-way beverage packagings (with corresponding price increase) is not desired from the environmental point of view, because impact on the environment depends on material type.

<sup>11</sup> Pladeder-Gupfinger (2002; 21) also agree with these arguments.

whereas each of these configurations has its pros and cons. Groth (2007; 165) assumes that the main advantage of limited validity is the fact that their issue in short periods enables regulations of licenses number in the market and thus influence of their price. Nevertheless limited period of validity does not meet the requirements of trade authorized subjects, because it disables long term investments planning and therefore restrict innovation activities (including potential substitution of one-way beverages packagings by refillables). The author thus recommends restriction of license period of validity only in case of insufficient experiences with this instrument, because issue of license for short period enables to react on possible problems (ibid)<sup>12</sup>.

Baum-Cantner-Michaelis (2000; 90) points out to packaging license concept adopted by the Federal Environment Ministry in Germany. This concept assumes 95% of licenses with unlimited validity and only 5% of license would have limited validity. This principle would significantly cut the costs related to monitoring of subjects and number of authorized licenses.

The last issue of packaging licenses application is method of licenses distribution to applicants. There are two basic possibilities: (a) free distribution to applicants (so-called grandfathering), (b) auction. Free distribution of licenses to applicants is based on historic principle – licenses number is derived from average quantity of one-way beverages packagings produced in the past. As Groth (2007; 167) emphasizes this principle becomes controversial in case of new applicants which are obliged to buy licenses from subjects already existing in the market. Free license distribution could impose entrance barriers to sector and thus create artificially “status quo” in the market (Baum-Cantner-Michaelis, 2000; 91).

License auction is state organized auction the subject offering the highest price becomes the acquirer. This principle takes into account to a larger extent marginal costs on prevention of the subject – the applicant with the highest offer gains the license (in other words the subject whose costs on prevention are the highest) (Groth, 2007; 166). This fact is potentially increases static effectiveness of this instrument, because measures on reducing of negative impact on the environment are realized by subjects with lower costs on prevention. Groth (ibid) mentions in this respect one very fundamental fact: “*auction price is the first parameter in case of licenses with unlimited validity. The market price is constituted secondary. In case with limited validity we could expect after auction just slight differences in prices, because during license validity changes in producing structures and changes of costs on prevention are impossible*”.

How does efficiency of packaging licenses look like from point of view of chosen criterions? This instrument is connected to the highest **environmental efficiency** from all evaluated instruments. The main reason is the fact that quality of the environment is set by state and only price for achieving of this quality is result of market operation. Groth (2007; 167), Baum-Cantner-Michaelis (2000; 37) or Pladedder-Gupfinger (2002; 22) as well as Wollny (2003-2004; 185) agree on this conclusion. The latter of them researches efficiency of this instrument in the case of England.

On the other hand Goth (2007; 167) points out that licenses on packagings have positive impact only on reducing of share of one-way beverages packagings in the market, but not on e.g. increasing recycling or reducing of littering which are other significant objectives of beverages packagings treatment policy. “*Licenses do not contain any other incentives to collect used packagings and not to throw them in public places*” (ibid). On this account Feess-Dörr-

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<sup>12</sup> The example of such kind of problem could be e. g. license market over allocation as it happened in case of emission permits. Limited validity of licenses would enable looking for prompt solutions.

Steger-Weihrauch (1991; 189) recommend together with licenses on packagings implementation of deposits on one-way beverages packagings which should resolve these problems.

With respect to **static effectiveness** all mentioned authors state that licenses on packagings from their definition really enable searching for cost effective solution from. Nevertheless also in this case as Groth (2007; 168) points out the static effectiveness of licenses on packagings could be limited in case that the license price in the market fluctuate in the long term therefore market participants could not adopt long term strategic decisions and as well it increases the risk of wrong investment decision.

In case of **dynamic effectiveness** all the authors also agree on the fact that this instrument in comparison with others is the most motivating to switch-over to environmental friendly technology. However under condition that in the market there is all the time demand is in excess of supply of licenses and license price motivate to investments to new technologies (Groth, 2007; 168).

In this moment it is necessary to add that theoretical implications about efficiency of this instrument do not always correspond to experiences with its real application. Wollny (2003-2004) analysed experiences with applications of licenses on packagings in England, so called Packaging Recovery Notes (PRN), and concludes his analysis by list of empirical observations. The most significant conclusion is the fact that licenses on packagings did not meet criterion of static effectiveness, did not provoke innovations and thus dynamic effectiveness. They require considerable state control and they are not suitable for achieving of recycling objectives. It is necessary to add that this instrument was not focused on one-way beverages packagings, but on all packagings (every producer producing more the 50 tons of packagings during year and achieve turnover higher than 2 mil. £ becomes part of the system (ibid, 186)). The conclusions should be thus evaluated in dependence on defined objective.

### Deposits

As well as packaging tax or licenses on packagings the deposits on one-way beverages packagings could be evaluate from the point of view of environmental efficiency, static and dynamic effectiveness. What are the conclusions in case of **environmental efficiency**? Deposits on one-way beverages packagings should be considered as environmental efficient only in case they would imply achieving objectives defined in previous chapters – increasing of share of refillable beverages packagings, increasing packaging waste recycling and last but not least to reducing of littering. As it results from research paper of the Ministry of Environment *Economic analysis of intended deposit system for beverages packagings in the Czech Republic*, **the environmental efficiency of deposits is very controversial**. Deposits do not increase the share of refillable beverages packagings in the market. It is conclusion not only of the theoretical analysis but also experiences with deposit implementation in Germany.

In case of expectation concerning increased recycling of packaging waste and reducing of littering situation is complicated, but still even in this case deposits cannot be considered as environmental efficient. Deposits on one-way beverages packagings indeed result in expected increase of recycling of packaging waste, but only to an extent which influence the final rate of recycling only unremarkable (in conditions of the Czech republic we could expect increase of recycling about 1,3%). In case of influence of deposits on littering we can confirm that deposits result in reducing of littering, but only beverages packagings share of thrown waste. The share of deposited beverages packagings on thrown waste is estimated from 6% (research of Vienna university), or 17% (research of Basel university) quantified by number of pieces, to 75% (research of SPF Group) quantified by capacity. Deposits in any case represent only a contribution to decrease of littering and not its solution. Limited environmental efficiency is

confirmed also by other authors who dealt with evaluation of efficiency of instruments for beverages packagings regulation (e.g. Baum-Cantner-Michaelis, 2000; Pladerer-Gupfinger, 2002; Groth, 2007).

In case of deposits on one-way beverages packagings similarly controversial is also **static effectiveness** or ability of the instrument to achieve objective with minimal costs. Deposit system imposes costs on the side of beverages packagings producers (importers) as well as on the side of beverages packagings bottlers and stores. The costs are increased also in case of consumers. Consumer who decides not to return the beverage packaging to store voluntarily runs the risk of higher price of beverage. This price increase has character of internalized externality caused by beverage packaging thrown in public places or to container for mixed municipal waste. Consumer buys beverages and in the same time by its non-returning he “buys” the right to degradation of the environment.

Evaluation of static effectiveness of deposits is justified only in case that the predefined objective is at least partially achieved. Deposits on one-way beverages packagings cause increasing of packaging waste recycling about 1,3 % (in total amounts it is increasing about 23.569 t). The IREAS paper *Proposal of measures to improvement beverages packagings deposit system with objective of waste prevention* from 2006 results that costs on 1 ton of recycling in consequence of deposit system reach 2.483 €/t, it means approximately 65.000. CZK/t (Slavík, 2006). These costs significantly exceed costs of recycling in frame of existing system of sorted waste; in 2007 these costs were about 7.560 CZK/t<sup>13</sup>. From this point of view we could evaluate deposits as statistical inefficient instrument.

Static effectiveness of deposits in the field of littering refers to problem of ambiguous effect on total amount of thrown waste quantified by share of beverages packagings on littering. Evaluation based on this criterion could represents costs on reducing of littering about 1% (costs on implementation of deposits are in frame of the generated model estimated to 3 CZK bill.). Since the share of beverages packagings on littering differentiated significantly in cited papers and costs on other measures for reducing of littering about 1% are unknown then it is impossible to conclude unambiguously about static effectiveness of this instrument.

In case of deposit evaluation based on static effectiveness criterion we have to emphasize one more crucial fact which was not discussed in the text sufficiently yet. Deposits on one-way beverages packagings will cause **depreciation on investments** to existing system of sorted waste whose financing to a large extent depends on sale of sorted plastics (above all PET). Implementation of parallel system will cause loss of economies of scale because of expanding of collection places and capacities of equipment for packaging waste use. If these costs will be taken into account by evaluation of static effectiveness of deposits then using the paper from 2006 we can conclude that social costs on recycling of packaging waste from deposit system are 5.935 €/t, it means approximately 155.000 CZK/t (Slavík, 2006).

The last monitored criterion is dynamic effectiveness of deposits or ability of deposits to support innovations. Deposits on one-way beverages packagings should support substitution of these packaging with refillables by consumer as well as by producer. In reality (it is obvious in case of Germany) packaging mix is changed, but not in favor of refillable glass. Clear winners of deposit systems are producers of one-way PET packagings. Producers switch-over to different technologies depends to a large extent on their market power and size. Local producers with one production line for one type of beverages packaging we could not expect switch-over to another technology. Regional and international producers have more possibilities to

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<sup>13</sup> Data are provided by authorized packaging company EKO-KOM, Inc.

switch-over to beverages packagings preferred by consumers. What is more in many cases they dispose by production lines for different types of beverages packagings.

Innovations in consequence of deposits happen undesired – some producers or bottlers of beverage packagings in effort to avoid costs related to participation on deposit system switch to non-standard beverages packagings. This process is again obvious at experiences from Germany where some bottlers switch to non-deposited beverages packagings (see chapter 6.1).

On the base of this criterion we can also consider deposits as ineffective. Nevertheless deposits on one-way beverages packagings are only one of instruments from state instrumental mix whose objective is regulation beverages packaging treatment, then in following table they are compared all the discussed instruments (packaging tax, packaging licenses, deposits) from point of view of environmental efficiency, static effectiveness and dynamic effectiveness.

**Tab. 1. Comparison of different instruments for beverages packagings treatment regulation**

	<b>Environmental efficiency</b>	<b>Static effectiveness</b>	<b>Dynamic effectiveness</b>	<b>General evaluation</b>
Packaging tax	-	+	-	Controversial setting of range
Packaging licenses	+	++	+	Controversial practical implementation
Deposits	+/-	-	-	Controversial relation between costs and benefits of the system

Source: Baum-Cantner-Michaelis (2000; 37), modified by the author

### **Conclusion**

From comparison of potentially utilizable instruments for beverages packagings treatment regulation result that the most effective instrument from point of view of all chosen criterions are licenses on packagings. This instrument embodies the highest static effectiveness because measures on improvement of the environment quality implement the subject with lowest costs on prevention. With regard to the fact that socially optimal quality of the environment is object of politic decision, then this instrument embodies also high environmental efficiency. In contrary the least effective instrument from point of view of all criterions is deposits. The main reason is first of all absence of influence on decision making of consumers and other market participants (in particular beverages packagings producers and bottlers). State set the range of deposit, but final quality of the environment is out of state's influence. Higher deposit could theoretically increase number of returned beverages packagings, but the higher is deposit the more it is similar to packaging tax.

### **References**

1. BARTMANN, H. (1996): *Umweltökonomie – ökologische Ökonomie*, Berlin; Köln: Kohlhammer, ISBN: 3-17-013765-4
2. BAUM, H.G.- CANTNER, J.- MICHAELIS, P. (2000): *Pfandpflicht für Einweggetränkeverpackungen? : Eine Analyse marktwirtschaftlicher Instrumente in der Abfall-*

*wirtschaft insbesondere zur Stützung der Mehrwegsysteme*, 1. ed., Berlin: Analytica Verlag, ISBN 3-929342-62-6

3. BAUMOL, W.J.- OATES, W.E. (1979): *Economics, Environmental Policy and Quality of Life*, Prentice-Hall, N.J.
4. EWRINGMANN, D. (1986): *Zur Effizienz eines Zwangspfandes auf ausgewählte Einweggetränkeverpackungen*, Finanzwissenschaftliches Forschungsinstitut, Köln: Carl Heymanns Verlag KG, ISBN 3-452-20610-6
5. FEESS-DÖRR, E.- STEGER, U.- WEIHRAUCH, P. (1991): *Muß Verpackung Abfall sein?: Strategie zur Reduktion der Umweltbelastung durch Einwegverpackungen*, Wiesbaden: Gabler, ISBN 3-409-13939-7
6. GROTH, M. (2007): *Verpackungsabgaben und Verpackungslizenzen als Alternativen zur Pfandpflicht für ökologisch nachteilige Einweggetränkeverpackungen?*, Zeitschrift für angewandte Umweltforschung, Jg.18 (2007), H.2, S. 157-171
7. JÍLKOVÁ, J. (2003): *Daně, dotace a obchodovatelná povolení - nástroje ochrany ovzduší a klimatu*, Praha: IREAS, ISBN 80-86684-04-0
8. LINSCHIEDT, B. (1998): *Ökonomische Anreizinstrumente in der Abfallpolitik*, 1. ed., Berlin: Analytica, ISBN 3-929342-42-1
9. OECD (1996): *Evaluating the Efficiency and Effectiveness of Economic Instruments in Environmental Policy*, ENV/EPOC/GEEI(96)6
10. PLADERER, CH.- GUPFINGER, H. (2002): *Bundesweite Instrumente zur Stützung von Mehrwegsystemen für Getränkeverpackungen und deren Auswirkungen auf die Stadt Wien*, Österreichisches Ökologie-Institut für Angewandte Umweltforschung, Wien, přístup z WWW: <http://www.kulttypen.at/ecology/files/berichte/E10.765-2.pdf>, citing: 9.1.2009
11. RUTKOWSKY, S. (1998): *Abfallpolitik in der Kreislaufwirtschaft*, Berlin: Erich Schmidt Verlag, ISBN 3-503-04399-3
12. SLAVÍK, J. (2006): *Návrh opatření ke zkvalitnění systému vratných nápojových obalů s cílem prevence vzniku odpadů*, Praha: IREAS, research report, for the Ministry of Environment
13. SPF (2007): *Analýza volně pohozených odpadů v ČR*, Praha: SPF GROUP v. o. s., December 2007
14. WOLLNY, V. (2003/2004): *Verpackungsabfallverwertung in Großbritannien – Praktische Erfahrungen mit einer Zertifikatslösung in der Verpackungsverwertung*, Zeitschrift für angewandte Umweltforschung, Jg. 15/16 (2003/2004), H. 2, S. 185-197

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# THE PROBLEM OF SOCIAL ACCEPTABILITY OF WATER AND SEWAGE TARRIFS IN THE CZECH REPUBLIC

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There are three main reasons, why the problem of social acceptability is currently an important issue within the public water supply and sewage sector in the Czech Republic:

- a) the climate change impacts (especially decrease in water availability) will have to be solved also via economic policy instruments,
- b) in 2010, there is a dead line to meet urban waste water directive requirements (directive No. 91/271/EEC) – lot of investment is needed,
- c) total household costs (energy, rent, etc.) are increasing, so households have limited ability to absorb abrupt increase in water and sewage tariffs.

First two factors influences the supply side of water markets, the third one touches the problem on the demand side. The total situation will be further influenced by expected economic recession which will endanger total extent of public expenditures. The problem of social acceptability of water tariffs versus environmental sustainability of water uses is accentuated in the Water Framework Directive (No. 2000/60/EC, further marked as WFD). From this directive, the conflict between full cost recovery of water services and the mitigation of negative social impacts as its consequence is very well stressed. However, it is obvious that higher water and sewage tariffs will lead to higher sustainability of water uses and vice versa.

We think that the discussion about this problem within the Czech Republic is currently starting and there are many relevant points to be stressed. The goal of this paper is, therefore to show how is the social acceptability defined and which administrative and economic instruments might help to solve the described dilemma.

## Current state of the discussion

There are several papers dealing with social acceptability of water and sewage tariffs in the Czech context up to now (see e.g. Young, Válek, 2006; Vykydal, 2006, 2008).

Young and Válek (2006) states that by past increases in tariffs the full cost pricing principle has not been reached, yet (i.e. the tariffs still do not cover most of recovery investments and all operational costs). The main reason for this is high portion of fixed cost related to running public pipelines and sewage systems. As withdrawals are constantly decreasing, the cost per m<sup>3</sup> and increasing. According to authors, due to this situation we have already reached the social acceptability frontier for some low-income households and further rapid tariff increases must be compensated by public subsidies. If this problem will not be solved systematically, water service providers are afraid of disconnecting of people in rural areas where the self-supply via individual wells is possible. Vykydal (2006) stresses similar arguments as authors within previous article. His argument in favor of public expenditures in the water and sewage sector touches the problem of the public interest and the context of the “water right” declaration.

Current state of the problem of social acceptability can be summarized as follows:

- the share of water and sewage expenditures in the total household income is significant,
- these expenditures currently do not decrease the standard of living of low-income households, but in the near future this might happen,

- according to Ministry of the Environment methodology, the frontier for the social acceptability of water and sewage expenditures is 2 % of these expenditures in total net households incomes (if we accept this criteria, there is a room for a potential increase of tariffs of 10-30 % in some regions),
- the requirement of continuous public subsidies of the sector is clearly articulated.

### **Subsidies and regulations and potential for changes**

In the Czech Republic, there is still not unified method to count cost recovery of water services. The applied procedure developed for the purpose of WFD implementation deducts total subsidies from total revenues and divide it by total costs. However, following this formula, it is very difficult to set up the % of which current water and sewage tariffs should increase (or decrease) to reach full cost recovery. Due to these methodological problems, there are only preliminary data setting up the need for future water and sewage tariff increases as required by WFD. In general, the current cost recovery is considered around 75 %. The important political and instructional question, therefore, is, if the state or the private sector should cover missing 25 % to reach full cost recovery. In the following discussion it is important do distinguish investment to the infrastructure (capital costs) and operational costs.

### **Infrastructural investments**

Investment costs are financed mostly from public sources (municipal, national or European). This can be done only where the infrastructure (pipelines and sewerages) are owned by the municipality.

Considering short-term consequences of subsidizing of investments, their impact on tariffs is rather low. Most of the municipalities hire the infrastructure to a service provider, so the only influence of investment costs on tariffs is through rent. Long-term impacts are more important. If an investment is effectively designed, it should have positive impacts, such as better usage of the infrastructure, lower overheads, etc. However, most of investments into pipelines are motivated by social goals (e.g. to connect distant areas) and that is why they mostly increases cost of services. Regarding sewerages, new investments into wastewater treatment plans are required by EU legislation from environmental reasons.

The impact of new investments to social acceptability of water and sewage tariffs is not often taken into account. The conclusion is not that their effect on tariffs is always negative. In case of particular subsidy we must take into account the mutual relationship between the infrastructure owner and service provider, the balance between ecological and economic limits and the impact on fixed but also variable operational costs. The more public interests are introduced, the less effective investments are and therefore, there is more pressure on the tariff increase. In case of meeting of stricter environmental goals, the higher tariffs are “compensated” with higher environmental quality.

### **Operational costs**

Operational costs of the sector are mostly covered by current water and sewage tariffs. Solutions to the problem of their social acceptability are, therefore, often searched within barriers of the current regulation.

Firstly, the water tariff includes a component of fee for raw water (surface water or groundwater). In the sewage tariff, fees for wastewater releases are contained. The extend of these payments represents the preference of the regulator (the state) towards the use of the public good. The diversification of fees shows politically prioritized users (e.g. the use of groundwater for the drinking water production or free water for agricultural uses). In future

according to WFD requirements, there fees should also reflect so-called environmental and resource costs, not just political priorities. The level of these costs should be objectively set up. So the pressure on the increase of these fees (and subsequently water and sewage tariffs) is expected. However, from the environmental perspective, the problem of social acceptability should not be solved at the expense of sustainability of water uses. So different mechanisms must be found to keep tariffs on “acceptable” lever, rather than trying to ignore introduced idea of environmental and resource costs.

Water and sewage tariffs are also regulated – the type of the regulation can be called “factual rectification”. In practice, this means that service providers are allowed to include only truth costs and appropriate profit into tariffs. The calculations must be published and they might be a subject of the financial control. The goal of the regulation is to protect an end user from overpricing from the side of natural monopolist. So far, the problem of social acceptability of prices (especially from the side of low-income households) has not been reflected, although we are persuaded that this could be done only via minor modification of the current regulation.

One solution is to use increasing block tariffs, where the “basic” block is the cheapest. This use of water is characterized by inelastic demand and its physical amount is often determined by the social context and the scarcity of the resource. It usually includes water for drinking, cooking and personal hygiene, nevertheless its understanding varies a lot among particular countries (see e.g. Merrett, 2007). In the Czech Republic, the “basic” block is determined as 100 l/person/day (SOVAK, 2007). The main advantages of increasing block tariffs are the absence of subsidies for low-income households and the allocation efficiency of prices which is not harmed.

Another option is to identify specific groups of users (according to their income) which may be the most endangered by tariff increases. As we already mentioned, the social acceptability of tariffs would be specified as their share on total net income of a household in a region – in the Czech Republic the level is 2 % (MŽP, 2007). Identified users are subsequently subsidized.

### **Concluding thoughts**

Due to many listed reasons, the future increase of water and sewage tariffs in the Czech Republic is very probable scenario. Since it is emphasized that current level of tariffs is about to touch the frontier of social acceptability (as defined above), this problem will have to be solved in the near future. Drinking water and sewerage provision are considered as public interests.

We came into conclusion that the problem cannot be solved by square subsidizing of water and sewage tariffs – e.g. by the providing all infrastructure investments from public resources as required by service providers (furthermore we argued that public investments may significantly increase operational costs), or by neglecting the EU requirements regarding stricter environmental goals. Instead of debate on how much public subsidies in the water supply and sewage sector is needed, the effort should be devoted to methodological and technical problems to set up “basic” block of water consumption and the options for its reimbursement (as a “social” block). Also, the suggested frontier to define “water poverty” should be carefully investigated, tested and consensually agreed before it will become a benchmark for the political action.

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## References

1. Merrett, S. (2007): The Price of Water. IWA, Publishing, 2007.
2. MVA Consultancy, Setting Strategic Direction, Competition Research with Business Customers, Report for Consumer Council for Water and Ofwat, In Association With WRc, June 2007.
3. Ministerstvo zemědělství ČR (2008): Návrh plánu jednotlivých oblastí povodí, červen 2008.
4. Ministerstvo zemědělství ČR (2003-2005): Přehled o vývoji vodného a stočného a rozbor nákladů a zisku na základě kalkulací provozních společností za rok 2003 – 2005, přičemž pro rok 2005 byl použit plán, nikoliv skutečnost, (materiál pokrývá cca 90% trhu VaK)
5. METODICKÝ POKYN PRO ZPRACOVÁNÍ FINANČNÍ A EKONOMICKÉ ANALÝZY VODOHOSPODÁŘSKÝCH PROJEKTŮ V RÁMCI FONDU SOUDRŽNOSTI, MŽP, březen 2005.
6. Podmínky přijatelnosti vodohospodářských projektů pro Operační program Životní prostředí v programovacím období 2007 – 2013, MŽP, srpen 2007.
7. Ofwat's future strategy for customer charges for water and sewerage services: consultation conclusions, Ofwat, srpen 2008.
8. Rámcová směrnice pro vodní politiku ES 2000/60/ES.
9. Směrnice č. 91/271/ EHS, o čištění městských odpadních vod.
10. SOVAK, (ing. M. Melounová) In: Češi snížili za 20 let denní spotřebu vody ze 150 litrů o třetinu, květen 2007 (ČTK) - (Zdroj: www.ekolist.cz)
11. Vykydal, M. (2006): Financování vodovodů a kanalizací. Vodní hospodářství 3/2006, s. 68 – 71.
12. Vykydal, M. (2008): Obnova vodovodů a kanalizací – (ne)udržitelný proces, Vodní hospodářství 10/2008, s.
13. Young – Válek (2006): Sociální únosnost vodného a stočného v podmínkách ČR, Vodní hospodářství 3/2006.

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# MATERIAL FLOWS AND THE CZECH REPUBLIC

Světlana Svitáková

In 2008 the OECD Council approved the Recommendation of the Council on Resource Productivity – C(2008)40), which is aimed at increasing the interest in and responsibility for sustainable use of natural resources.

The Recommendation promotes the efforts of the OECD Member States to improve the use of resources within their entire cycle, with a view to reducing negative effects on the environment and preventing natural resource degradation. The Recommendation focuses primarily on the following areas:

- How to improve knowledge (scientific knowledge, information) and analytical capacity concerning the material flows and resource productivity at national, international and global levels, including their economic and environmental implications, and how to disseminate knowledge by means of information.
- How to reduce, in a cost-efficient manner, the negative environmental impacts associated with the use of natural resources and materials, and to avoid waste of resources, at all stages of their life cycle (extraction, processing, use and eventual disposal, including re-use, recovery, recycling, re-manufacturing and end of life management), taking into account the diversity of countries as regards their geographical and socio-economic context and their endowment in natural resources.
- How to effectively and efficiently integrate measures concerning natural resource and materials management, such as the 3Rs (reduce, reuse, and recycle), sustainable materials management, circular economy programmes.

The mentioned Recommendation followed up on the Recommendation of the Council on Material Flows and Resource Productivity”.<sup>1</sup> From the outset, the Ministry of the Environment paid increased attention to material flows and resource productivity, particularly due to the fact that, based on the available data, material effectiveness in the Czech Republic was substantially lagging behind the developed EU-15 countries.

Activities in the given area also continued within the Czech Statistical Office. The CSO issued another yearbook “Accounts of Material Flows in the Czech Republic in the Period from 2002 to 2007 (selected indicators)”,<sup>2</sup> which is available at <http://www.czso.cz/csu/2008edicniplan.nsf/p/2008-08>. The yearbook includes:

- selected accounts (used domestic extraction, imports and exports);
- selected indicators (physical balance of foreign trade, direct material input, domestic material consumption);
- time series, tables, graphs and commentaries.

The table below outlines the current values of the following indicators of material flows:

- **Direct material input (DMI)** = measures the input of materials which are directly used in the economy, i.e. all materials that have an economic value and are used for

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<sup>1</sup> Recommendation of the Council on Material Flows and Resource Productivity – C(2004)79

<sup>2</sup> Accounts of Material Flows in the Czech Republic in the Period from 2002 to 2008 (selected indicators), the Czech Statistical Office, Prague 2008.

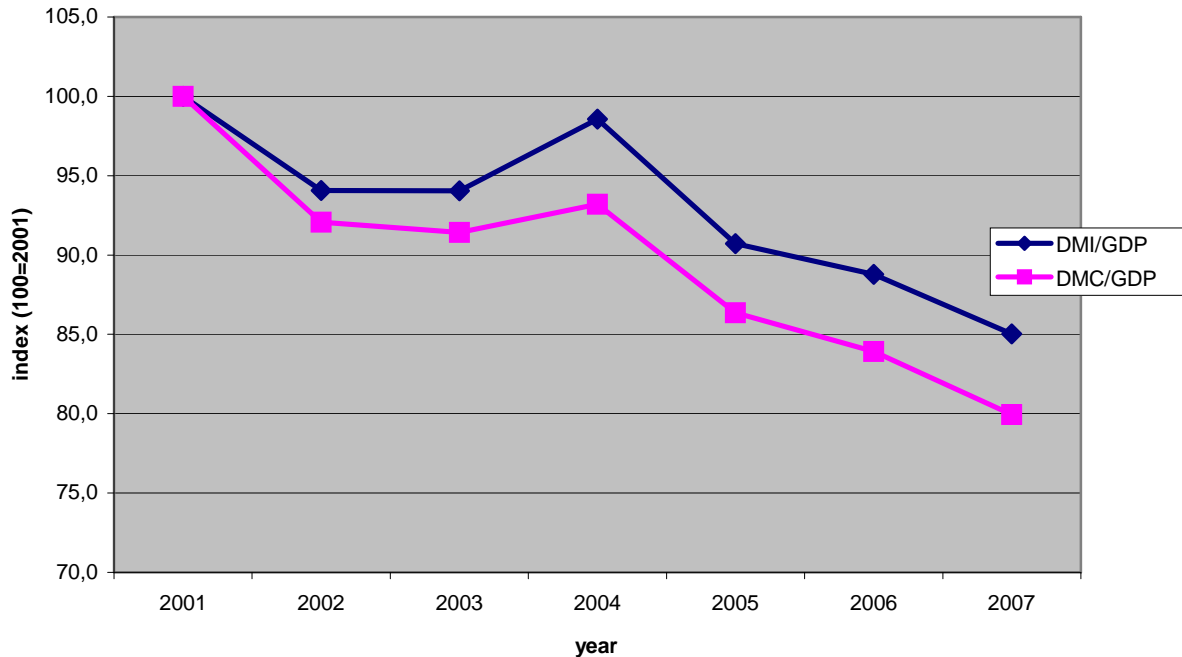
production and consumption. DMI is domestic used extraction (extracted and auxiliary raw materials, grown biomass) plus import;

- Domestic material consumption (**DMC**) – measures the total amount of materials directly used in the economy, without hidden flows (unused domestic extraction, indirect export and import flows, i.e. raw materials required for production of import/export in the country of their origin (e.g. raw materials required for the production of exported products and stripping of soil connected with extraction of these raw materials)). DMC is calculated as DMI minus export;
- Physical trade balance (**PTB**) = measures the surplus or deficit of the physical foreign trade of the economy. It is calculated as imports minus exports.

Selected indicators of material flows in the Czech Republic in the 2001-2006 period							
		2002	2003	2004	2005	2006	2007
<b>DMI Indicator</b>	<b>Unit</b>						
DMI	1 t	220 307 363	228 208 631	249 209 003	245 127 838	255 246 711	260 864 161
DMI	t/person	21.60	22.37	24.42	23.95	24.86	25.27
DMI/GDP	kg/CZK 1000	96.39	96.38	101.01	92.96	90.99	87.15
GDP/DMI	CZK/kg	10.37	10.38	9.90	10.76	10.99	11.47
DMI/GDP	kg/USD	1.43	1.44	1.51	1.43	1.43	1.25
GDP/DMI	USD/1000kg	698.87	695.68	661.96	701.29	701.15	801.66
<b>DMC Indicator</b>							
DMC	1 t	175 867 468	180 922 409	192 149 088	190 330 441	196 734 744	200 011 090
DMC	t/person	17.24	17.73	18.83	18.60	19.16	19.38
DMC/GDP	kg/CZK 1000	76.95	76.41	77.89	72.18	70.13	66.82
GDP/DMC	CZK/kg	13.00	13.09	12.84	13.85	14.26	14.97
DMC/GDP	kg/USD	1.14	1.14	1.16	1.11	1.10	0.96
GDP/DMC	USD/1000kg	875.47	877.50	858.54	903.20	909.68	1 045.56
<b>PTB account</b>							
PTB	1 t	4 914 249	5 607 321	7 241 844	5 346 683	7 646 703	5 842 548

Data source: CZSO, GDP – purchase prices, constant prices in 2000.

**Material Intensity in the Czech Republic in 2002-2007 (GDP, in constant prices of 2000).**



Data source: CZSO

The positive trend of decreasing material intensity has been maintained in the period from 2002. This decrease has been caused by the significant economic growth, which has exceeded the increase in material consumption. The curves were relatively substantially decoupled in the Czech Republic in the 2002-2007 period; however, this was solely relative decoupling – the GDP grew at a faster rate than the indicators of material flows (CSO, Accounts of Material Flows in the Czech Republic in the Period from 2002 to 2007 (selected indicators)). The trend allowing for not increasing or further decreasing the consumption of materials, while simultaneously increasing the performance of the economy, should be maintained in the coming years. An important factor will lie in promotion of research and development in the area of modern technologies that entail lesser requirements on material inputs and are more environmentally sound.

The consumption of materials could also be related to the territory required for their production, which allows for identification of the intensity of land use. This subject, which has been elaborated particularly for renewable resources, is dealt with, e.g., by the ecological footprint concept (Wackernagel et al., 1996). An important feature related to cities and towns consists in the fact that the territory required for production of the consumed materials is greater than the area of the city or town, which is naturally caused by the high density of the population in cities and towns and the low ratio of productive area. On the other hand, the situation of regions and countries can be markedly different.

The value of the material consumption indicator has been updated and the changes in the material intensity of the Czech Republic in time series from 1990 have been evaluated in

relation to evaluation of the Strategy of Sustainable Development of the Czech Republic<sup>3</sup> within the Situation Report on the Strategy of Sustainable Development this year.<sup>4</sup>

Work is underway in the Czech Republic in 2008 and 2009 within the preparation of the updated Strategy of Sustainable Development of the Czech Republic. The proposed objectives of the updated SSD CR also include an area concerned with material intensity.

The project of research and development entitled “Monitoring and Evaluation of the Links Amongst the Environment, Economy and Society through the Situation Report” is now in its third year. The project is concerned, amongst other things, with material consumption indicators. The financial support for the project from the budget of the Ministry of the Environment equals CZK 5,754 thousand over the period of its implementation – 2007-2010. The specific objectives stipulated within implementation of the project and concerning the area of material flows are as follows:

- Regular updating of the DMC indicator (Domestic Material Consumption) for the needs of the Situation Report (in cooperation with the Czech Statistical Office).
- Compilation of time series for RME (Raw Material Equivalents), or the modified DMC indicator including imports and exports of products in the form of raw materials required for their production.
- Comparison of material consumption expressed through DMC and modified DMC and interpretation of the ascertained differences.

“Monitoring and Evaluation of the Links Amongst the Environment, Economy and Society through Indicators of Material and Energy Flows” is another important project in research and development, concentrating exclusively on the aspect of flows of material and energy resources. The financial support for the project from the budget of the Ministry of the Environment equals CZK 4,142 thousand over the period of its implementation – 2008-2010. The main tasks of the project are as follows:

- Updating the time series of indicators of material and energy flows.
- Calculation of indicators of material and energy flows for economic sectors.
- Structural decomposition analysis of indicators of material and energy flows.
- Quantification of physical stocks and prediction of future waste material flows for the urban level.
- Analysis of the trends in indicators of material and energy flows.
- Monitoring of the international trends and reporting duties in the area of indicators of material and energy flows.

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<sup>3</sup> Approved by Resolution of the Government of the Czech Republic No. 1242 of December 8, 2004.

<sup>4</sup> Situation Report on the Strategy of Sustainable Development of the Czech Republic, Government Council For Sustainable Development, Ministry of the Environment, 2009.

## References

1. Český statistický úřad (2008 Praha) *Účty materiálových toků v České republice v letech 2002 – 2008 (vybrané indikátory)*. – *Czech Statistical Office (Prague 2008) Accounts of Material Flows in the Czech Republic in the Period from 2002 to 2008 (selected indicators)*.
2. Wackernagel, M. et. Rees, W. (1996) *Our Ecological Footprint. Reducing Human Impact on the Earth*.
3. MOLDAN, Bedřich (1983 Praha Academia) *Koloběh hmoty v přírodě (Circulation of Matter in Nature)*.
4. OECD (C(2008)40) *Recommendation of the Council on Resource Productivity*.

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# MATERIAL FLOWS MONITORING IN THE REGION

Robert Baťa, Ilona Obršálová, Ticiano Costa Jordão

## 1 Introduction

The production of municipal waste (in kg) per capita in the Czech Republic is, compared internationally, relatively low, in 2005 it was 55% of the level in the EU 25. The proportion between landfilled and incinerated municipal waste is different from the EU average, landfilled waste is two thirds above the EU average while incinerated waste is below average. The effort to reduce the amount of biodegradable constituent of municipal waste has been recently driven not only legislation, conceptions and plans in waste management, economic tools of environmental policy but also by initiatives from below, on regional level.

The region of Pardubice in the Czech Republic was chosen as a case study with the focus on biodegradable part of municipal waste. The amount of produced municipal waste in the Pardubice region between 2003 and 2005 was growing slowly; the growth in 2007 was more significant up to 283 kg per capita. This amount was as well as in previous years below the average in the Czech Republic (293.0 kg per capita in 2007) [8, 13, 17]. There are not available long-term data for valuation and predictions.

The amount of bio waste from households oscillates depending mostly on life style fluctuates, according to analyses, between 30 and 60 kg per capita and year. Various estimations state [7, 8, 12, 25, 27] that 30-60% weight of municipal waste is formed by BDMW.

The proportion of separated constituents of municipal waste in the Czech Republic in recent years has grown to 10.8%, in the Pardubice region 12.2%. However, the time line is not informing enough about the trend on regional level [21, 28]. Quantification and evaluation of time lines on this level is very complicated due to the changes in methods of their reporting. The information on material and energy flows and their environmental impacts are very important for sustainable management of the region, including information on costs and benefits for management of municipalities and waste disposal firms.

Material and energy flows are analyzed within the framework of Life Cycle Assessment (LCA) on different levels (Material Flow Analysis – MFA; Substance Flow Analysis – SFA) by various indicators such as Direct Material Input (DMI), Domestic Material Consumption (DMC), Domestic Energy Input (DEI), Domestic Energy Consumption (DEC) and others.

There are keeping tracks of environmental impacts of bio waste disposal in the Pardubice region in the contribution.

## 2 Problem formulation

There were determined important incorporation with the duties to work out Conceptions and Plans of the waste management on the regional level. As every such document the quality depends on the available information. The main source was information's system on waste management (ISOH), own calculation and analysis, material flows according to landfills' evidence. In the Conception of Waste Management states the view of minimization of costs by waste flows are used. Optimization study was not carried out. Balances are in physical units derivate from the normative values.

Judging impact of waste composting on environment is a task for management of material and energy flows observed according to the principles of LCA because only by quoting of all the material and energy flows from creation of compostable material in a biomass form via all the

relevant steps of its processing to its conversion into final product, in this case compost. If any important data is omitted, mainly on material flow, the results may be significantly distorted, hence providing wrong conclusions.

This risk can be characterised by an example from information sources for LCA [19, 22], where only gas outputs during composting process are considered.

Involving these regularities via modelling means is quite difficult; models of CPM (Critical Path Method) type are not suitable, because they are unable to sufficiently represent circulation of some components during these processes. Modelling means that are not capable of involving dynamics of these processes, like UML, does not offer sufficiently representative results. Petri Nets is regarded as a convenient tool for creating such models.

Fulfilling strategic objectives in the area of BDMW disposal is a considerable problem and that is why this issue was chosen for the analysis of possible solution approaches.

The aim of the paper is the evaluation of the development of BDMW generation in the region, analysis and presentation of one modelling possibility from the perspective of desired product output as well as evaluation of undesired impacts from the perspective of the LCA conception. Data was processed with respect to the type and size of a settlement (urban settlement, suburban town or village) and the average weight of bio waste for potential material utilization were estimated. The utilization of bio waste for composting or thermal utilization is assumed. The first option has been used until now, the others only marginally.

The Pardubice region has 511 400 inhabitants. It covers 4 518 km<sup>2</sup> and its population density is 113 inhabitants per km<sup>2</sup>. The Pardubice region has 451 municipalities, which were sorted by size and residential pattern. BDMW proportions in among the total municipal waste generated were estimated from average values. Collection logistics was evaluated and entry data for modelling processed.

There is one composting plant in the region with the capacity of 9 000 t of waste per year where the waste is brought by trucks and other facilities (pellet pressing, biogas station).

Various scenarios of solution based on the hierarchy of the most suitable methods (from waste handling to prevention strategy) were formulated. Apart from the basic solution strategy, composting in a high-capacity facility, it has been also counted on composting at the waste production premises (within possibilities own composting machines or communal composting). The paper will summarize the result of evaluation of one of these options.

### 3 Problem solution

As a suitable instrument for the modelling of material flows was chosen Petri Nets [23], defined as follow:

A Petri net (PN) is a kind of directed graph. An ordinary Petri net could be defined for example like 6-tuple  $N = (P, T, F, W, K, M_0)$

where:

1)  $(P, T, F)$  is a finite net, where

**P** is a set of all places (for example a net with 3 places  $P = \{p_1, p_2, p_3\}$ );

**T** is a set of all transitions (for example a net with 3 transitions  $T = \{t_1, t_2, t_3\}$ );

**F**  $\subseteq (P \times T) \cup (T \times P)$  is the union of two binary relations;

- 2)  $W : F \rightarrow N \setminus \{0\}$  determinate a weight of each arc;
- 3)  $K : P \rightarrow N \cup \{\omega\}$  determinate the capacity of each place;
- 4)  $M_0: P \rightarrow N \cup \{\omega\}$  is the initial marking of  $N$ .

For modelling of biodegradation of part of municipal waste purposes there are tools allowing analysing relevant processes in light of its inputs, outputs and even related energetic and material flows based on the conception of Petri Nets [6, 16]. The Umberto programme shows quite significant anomalies compared to common approaches to Petri Nets defined above. That results from the fact that the programme is based on high-level Petri Nets, considers usage of colored Petri Nets, works with constant, but user defined edges set usually within parameters of particular transitions either by user or from module library, allows even construction of hierarchic nets and of all combinations mentioned. The environment is oriented on support of evidence and optimalization of material and energy flows related to environmental accounting [18], [19], [20], [21], which gave rise to the need of significant modifications of the very conception of simulated net function.

A model based on Petri Nets implemented in the Umberto environment was carried out for modelling of material flow and quantification of negative impacts caused by handling of BDMW. Therefore, the conceived model enabled us to calculate alternative solutions in terms of the LCA approach.

So conceived a model enabled us to calculate solution options in terms of the LCA approach. Sorted and pre-processed data was submitted for calculation with the support of the Umberto software [26], which apart from flow variables modelling allows modelling and monitoring of e.g. material and power flow in a region, financial flow or information flow etc.

In this case it was necessary to define inputs, places of transformation, material outputs; the starting situation in a simplified way. The model is described including both material transport for composting and the composting process itself. The places represents material brought to the composting plant, auxiliary substances necessary for composting, produced compost and emissions created at composting, the entry of organic material to composting, the entry of fuel for the transporting process, emissions produced by material transport for composting. Transition presents the material transport process to the composting plant.

With respect to the character of used Petri Nets in the environment of the Umberto program, this net was not analysed from the perspective of properties as the particular environment already determines these properties and these are identical for all created models.

With entered parameters of transport to the facility the most important non-desired outputs in material balance were calculated and described in Tab. 1. The table shows a simulated model output calculated for the maximal capacity of the composting plant, which is 9000 t of material per year. The results shows that for a total amount of 9000 t of material processed there will be 3,790,550 Kg of compost and other related substances created.

**Tab. 1 The calculated material outputs**

Material	Output (kg)
AOX	0,06
BOD	123,64
COD	639,63
NMVOC (hydrocarbons)	0,17
NMVOC from diesel emission	68,49
NMVOC, unspec.	128,86
NOx	2373,02
PAH not B(a)P, unspec.	2,35
PCB	2,97
PCB	2,94
TOC)	10596,08
VOC, unspec.	213,77
amonia	26256,04
ammonium	91,07
ashes and slags	175,25
benzene	4,80
carbohydrates, unspec.	10,67
carbon dioxide, fossil	238080,11
carbon dioxide, renewable	1936360,55
carbon monoxide	865,40
carbon, organic	286,88
compost	3 790 550
dinitrogen monoxide	717,69
flue gas	3,74
gypsum (flue gas clean)	111,51
hydrogen chloride	4,80
hydrogen sulfide	4,64
landfill gas, diffuse	42145,15 m3
landfill volume	451,23 m3
methane	77,27
methane, renewable	37749,70
methylene oxide	18,74
nitrate	41,84
nitrogen	450,42
nitrogen compounds as N	35,06
Particles	194,61

#### 4 Conclusion

The use of Petri Nets with the aforementioned software enables very fast variant calculations and the possibility to monitor the whole variety of impacts according to the LCA concept. The domain of biodegradable waste decreasing in municipal waste is a matter of integrated strategy of prevention, separation and collection as well as of the end technology for processing. The effort to quantify the impacts on the environment is very important as it is revealed that recycling at any price is not always the optimal solution. A problem of LCA concept was also identified in the area of system boundaries. Processes based on LCA allow the decision-making sphere on regional level to decide the alternative with respect not only to economic result but also to other significant context which might not be evident in a short run. The particular problem has, of course, also economic (financial flows are favourable to model similarly like material flows) and social bearability dimensions, which must be resolved concurrently.

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## References

1. Act No. 185/2001 Coll., on waste [http://www.env.cz/ris/vis-legcz-en.nsf/0/3AF3925653DDDC52C125735C0043814E/\\$file/20010185Sb\\_kv.pdf](http://www.env.cz/ris/vis-legcz-en.nsf/0/3AF3925653DDDC52C125735C0043814E/$file/20010185Sb_kv.pdf) [cit. 2008-07-15].
2. Act No. 477/2001 Coll., on packaging [http://www.env.cz/ris/vis-legcz-en.nsf/0/37A3BDF546537587C125735C0043813F/\\$file/Z%C3%A1kon\\_o\\_obalech\\_4772001angl.pdf](http://www.env.cz/ris/vis-legcz-en.nsf/0/37A3BDF546537587C125735C0043813F/$file/Z%C3%A1kon_o_obalech_4772001angl.pdf) [cit. 2008-07-15].
3. Act No. 76/2002 Coll., on integrated pollution prevention and control [http://www.env.cz/ris/vis-legcz-en.nsf/0/1B1407ADB185A15DC125735C00438147/\\$file/20020076Sb.pdf](http://www.env.cz/ris/vis-legcz-en.nsf/0/1B1407ADB185A15DC125735C00438147/$file/20020076Sb.pdf) [cit. 2008-07-15].
4. Dumitrascu D.D., Pascu R. V., Dumitrascu C. L.: *Justifying Data about the Need and Feasibility of Waste Management Projects in Romania*. WSEAS TRANSACTIONS on ENVIRONMENT and DEVELOPMENT Issue 11, Volume 2, November 2006 pp.1411-1416 ISSN 1790-5079
5. Changes proposal of the Act no.185/2001 Coll. [cit. 2008-07-25] [http://www.env.cz/\\_C1256D3D006B1934.nsf/\\$pid/MZPKPFOH6B4L](http://www.env.cz/_C1256D3D006B1934.nsf/$pid/MZPKPFOH6B4L) in Czech
6. Češka, M. *Petri Nets, Introduction Theory and Instruments for Application of Petri Nets*. Brno: Akademické nakladatelství Cerm, 1994. 94s. ISBN 80-85867-35-4. in Czech
7. EKO KOM a.s. database, unpublished material, 2008
8. Generation, Recovery and Disposal of Waste in the CR in 2006 [cit. 2008 -08-25] <http://www.czso.cz/eng/edicniplan.nsf/aktual/ep-2>
9. [http://ceho.vuv.cz/CeHO/CeHO/Bloodpad/BRO\\_Prehled\\_zarizeni/Bro\\_CR.htm](http://ceho.vuv.cz/CeHO/CeHO/Bloodpad/BRO_Prehled_zarizeni/Bro_CR.htm) [cit. 2008-07-15].
10. Janoušek, V. *Objects Modelling by Petri Nets*. Brno: Vysoké učení technické. Fakulta elektrotechniky a informatiky. Ústav informatiky a výpočetní techniky, 1998. 121 s. in czech
11. Kikuchi R., Sato H., Yamamoto T.& R. Gerardo: *Economic comparison of competitive waste treatments: case studies of municipal waste, sewage sludge and automobile shredder residue* 4th IASME/WSEAS International Conference on ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT (EEESD'08) Algarve, Portugal, June 11-13, 2008 pp. 285-290 ISSN: 1790-5095
12. Kotoulová Z.,Váňa J.: Handbook of municipal waste disposal. MŽP, ČEÚ Praha 2001, ISBN80-7212-20 in Czech
13. Krajský úřad Pardubického kraje: Conception of waste management in Pardubice Region. Pardubice 2002. in Czech
14. Kralj D., Markič M.: Processes Innovation and Sustainable Development. WSEAS TRANSACTIONS on ENVIRONMENT and DEVELOPMENT Issue 2, Volume 4, February 2008 pp.99-108, ISSN: 1790-5079
15. Kralj D., Markič M.: Sustainable Development Strategy and Product Responsibility.WSEAS TRANSACTIONS on ENVIRONMENT and DEVELOPMENT. 12 Issue 1, Volume 4, January 2008. pp. 12-23, ISSN: 1790-5079

16. Marsan, M. A. et. al. *Modelling with Generalised Stochastic Petri Nets*. 1. vyd. John Wiley and Sons, 1994. ISBN: 0-471-93059-8.
17. *Municipal waste generated in selected countries*. [http://www.czso.cz/csu/2008edicniplan.nsf/engt/D4003CDB26/\\$File/20010819.pdf](http://www.czso.cz/csu/2008edicniplan.nsf/engt/D4003CDB26/$File/20010819.pdf) [cit. 2008 – 09 -20]
18. Obršálová, I., Baťa, R. Environmental Accounting at the Corporate-Level. In *Environmental management accounting and cleaner production. Environmental Management Accounting Network, 9th Annual Conference*. Graz: Graz university of Technology, 2006. Poster Session. p. 66. ISBN 3-902465-36-0.
19. Obršálová, I., Kožená, M., Baťa, R. *Research Report II - Environmental accounting on the micro-level*. Pardubice: Univerzita Pardubice, 2006. 39 s. ISBN 80-7194850-0.
20. Obršálová, I., Munzarová, S., Kožená, M., Baťa, R., Převrátíl, B. Contribution to the Topic of Environmental Accounting in Czech Companies. In *Proceedings of Environmental Accounting Sustainable Development Indicators*. Ústí nad Labem: Univerzita Jana Evangelisty Purkyně, 2005. Str. 331. ISBN 80-7044-676-5.
21. Obršálová I., Kožená M., Baťa R., Jordao Costa T.: *Environmental Management Accounting for Municipal Waste Reduction with Utilization of Clean Production(Consumption) Principles* SDI-EA Praha, 2007. ISSN pp.258-264 ISSN 978-80-87076-03-3
22. Petre E., Bobasu E.: *A new adaptive control strategy for a class of anaerobic wastewater treatment bioprocesses*. 4th IASME/WSEAS International Conference on ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT (EEESD'08) Algarve, Portugal, June 11-13, 2008, pp. 303-309 ISSN: 1790-5095
23. Riera, D., Narciso, M., Benqlilou, CH.: A Petri Nets-Based Scheduling Methodology for Multipurpose Batch Plants. *SIMULATION*, 2005, Vol. 81, No. 9, pp. 614 -623.
24. Rimaitytė I., Denafas G., Račys V.: Implementation of Life Cycle Assessment Tools for Evaluation of Municipal Waste Management Scenarios. *Environmental research, engineering and management*, 2006.No. 2 (36), pp.68-76
25. Tichá M., Černík B.: LCA of mixed municipal waste landfill and incineration. *Environmentální aspekty podnikání*. CEMC Praha, 2003 (5), no.1, p.2 in czech
26. UMBERTO ifu Institut für Umweltinformatik Hamburg GmbH, Hamburg Germany <http://www.umberto.de/en/> [cit. 2008 - 07-20]
27. Waste management plan - Czech Rep. [cit. 2008 - 07-20] [http://www.env.cz/AIS/web-pub.nsf/\\$pid/MZPJZFGV0QT2/\\$FILE/POH%20CR\\_kompletni%20dokument.pdf](http://www.env.cz/AIS/web-pub.nsf/$pid/MZPJZFGV0QT2/$FILE/POH%20CR_kompletni%20dokument.pdf) in czech
28. Waste management plan - Pardubice region. [cit. 2008 -07-20], <http://www.pardubickykraj.cz/article.asp?thema=3036> in Czech [cit. 2008 -10-28],
29. <http://eurlex.europa.eu/LexUriServ/LexUri.Serv.do?uri=COM:2008:0811:FIN:CS:PDF> [cit. 2009-03-20]

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# ENVIRONMENTAL FEES IN THE CZECH REPUBLIC: APPROACH TO STIMULATING EFFECT ASSESSMENT<sup>1</sup>

Iva Ritschelová, Egor Sidorov, Eva Tosovska

## Introduction

Environmental fees have traditionally been taken as an important economic tool supporting environmental protection policy of the Czech government. According to environmental economic theory fees enable regulating the environmental behaviour of producers by introducing “polluter pays principle”, internalizing negative externalities.

Ideally the fee level should be equal to the external costs caused by the action of pollutants. Nevertheless, determination of externalities in the actual economy is a controversial and data-intensive process. Therefore, rates and amounts of fees set and used in practice are rather the result of various approximations and consensual agreements often influenced by a political context.

The contemporary system of environmental fees in the Czech Republic comprises of dozens of different types of fees. One can distinct between fees for groundwater withdrawal, registration of new mining areas, payment to the state for extracted mineral raw materials, for removing land from the agricultural land register, for exemptions according to the Forest Management Act, etc. Among the most significant fees one can name a) air pollution fees, b) polluted water discharge fees, and c) landfill disposal fees.

Revenues from fees are either the income of the State Environmental Fund of the Czech Republic or of the corresponding municipal budgets. The payment of fees does not relieve the polluter from compensating environmental damages: e.g. those caused by accidents, exceeded emission limits or violation of landfill rules and conditions are penalised.

The following text presents results of analyzing the impact of fees on costs of an extensive set of Czech enterprises. Based on this information the environmental fees system is consequently assessed with a view to its stimulating effect.

## 1 Methodology

In 2008, the Jan Evangelista Purkyne University in cooperation with the Czech Statistical Office prepared a pilot analytical study for the Ministry of the Environment of the Czech Republic (see Ritschelova et al., 2008). The aim of the study was to support decision making while updating fees in the sphere of waste generation, and release of pollutants into air and water.

The analytical work, among others, consisted in formulating a methodology for identifying impact of current environmental fees on the enterprises and consequent quantification of the fees' influence on their economic indicators. For these purposes the year 2006 was chosen as reference one since not all necessary indicators for 2007 were available at the time of analysis.

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Fees are paid in accordance with legislative regulations where respective fee rates can be found. The following table presents them.

**Table 1 Environmental fee rates**

	<b>2006</b>
<b>Waste production fees (EUR*/t)</b>	
Municipal waste and other waste	14.11
Hazardous waste	165.84
<b>Air pollution waste (EUR*/t)</b>	
Solid pollutants	105.86
SO <sub>2</sub>	35.29
NO <sub>x</sub>	28.23
<b>Polluted water discharge fees (EUR*/t)</b>	
COD - rate a	0.64
COD - rate b	0.32
COD - rate c	0.12
Insoluble substances	0.08
P total	2.82
N inorganic	1.20
Absorbable organic halides (AOX)	12.14
Hg	808.44
Soluble organic compounds	0.02
Cd	161.68

Note: Fee rates were recalculated at the average 2006 exchange rate of 28.34 CZK/EUR.

It was initially intended to carry out the study based on selective questionnaire investigation. However, due to the limited time-frame, and negative experience with the measure of response in case of electronic surveying, the new approach based on available statistics has been developed.

Initial data on environmental fees was acquired from several disposable data sources, namely from the Czech Statistical Office, the Czech Hydrometeorological Institute, and the Czech Environmental Inspection. Indicators of production consumption<sup>2</sup> were acquired from the Czech Statistical Office based on statement P 3-04 (*Quarterly statement for economic subjects of selected production sectors*)<sup>3</sup>.

## 2 Results of analysis

In 2006 only 259 enterprises of 8,911 (which is approx. 3 % of the analysed population) covered 80 % of collected fees. From the economic activities point of view, the structure of these enterprises is as follows (see Table 2).

<sup>2</sup> Production consumption is the sum of costs spent on consumed purchases of materials, energy, and other non-storable supplies.

<sup>3</sup> For more details about the Statement see: [http://www.czso.cz/csu/klasifik.nsf/i/p\\_3\\_04\\_\(psz\\_2008\)](http://www.czso.cz/csu/klasifik.nsf/i/p_3_04_(psz_2008)).

**Table 2 Share of the main important sectors according to NACE in total environmental fees**

<b>NACE</b>	<b>Name</b>	<b>2006</b>
<b>45</b>	Building industry	22.81
<b>40</b>	Manufacture and distribution of electricity, gas and thermal energy	16.01
<b>27</b>	Manufacture of basic metals and metallurgical products	10.31
<b>41</b>	Water collection, treatment and distribution	4.98
<b>37</b>	Recycling of secondary raw materials	3.08
<b>24</b>	Manufacture of chemical substances, preparations, pharmaceuticals, and chemical fibres	5.81
<b>10</b>	Coal, lignite and peat extraction	2.09

As one can see the most significant agents paying majority of landfill disposal, air pollution, and polluted water discharge fees (either single or their combinations) were concentrated in the following sectors:

- construction,
- energy generation and distribution, and
- metal manufacturing.

Based on data about production consumption of single companies, as well as indicators of their total fee payments the ratio of total environmental fees to production consumption has been calculated for each agent. The distribution of the frequency of individual share indicators is presented in the following table.

**Table 3 Distribution of the frequency of individual share indicators (%)**

<b>Ratio level</b>	<b>(Fee) / (Production consumption)</b>
<b>≤0.5</b>	95.77
<b>0.5-1</b>	1.95
<b>1-5</b>	2.06
<b>5-10</b>	0.12
<b>10-50</b>	0.09
<b>&gt;50</b>	0.00

As one can see, in case the cumulative impact is concerned (i.e. impact of all the three types of fees), the share of fees in production consumption amounts to maximum 0.5 percent in case of 95.77 percent of population. Furthermore almost 98 percent of analysed economic agents indicate this share less or equal to 1 percent.

However, 0.09 percent of analysed companies indicate the ratio from 10 to 50 percent. With a view to prevailing majority of companies showing very low levels of fees to costs ratio, one can state that such deviations rather reflect critical business situation of these agents. This enables one to make a conclusion that the cumulative landfill disposal, air pollution, and polluted water discharge fees have a low impact on production costs.

## **Conclusion**

In theory environmental fees are supposed to motivate companies towards environmentally friendly behaviour. On the basis of partial results of carried out analyses presented in this paper, one can say that in practice this is not the case. The low weight of cumulative environmental fees in companies' costs directly corresponds to their low motivation role.

Though the transformation processes in the Czech economy created the necessary space for more effective action of economic tools of the environmental policy in general; in particular, environmental fees are too low to stimulate environmental protection more effectively. In this respect, environmental fees are only a supplement to other economic and normative tools of environmental protection.

In order to improve their motivation effect the Ministry of the Environment of the Czech Republic would have to dramatically increase the fee rates. However, with a view to the current economic crisis the government quite naturally develops measures aimed stimulating economic activity by catalyzing either aggregate supply or aggregate demand. In this respect any significant increase (if any at all) of environmental fees doesn't seem to be politically acceptable solution at present.

## References

1. ČERNÁ A., LAMSER Z., TOŠOVSKÁ E.: *Co stojí péče o životní prostředí*. Edice Ekonomie a společnost. Praha. Svoboda 1987.
2. ČERNÁ. A., RITSCHELOVÁ. I., TOŠOVSKÁ. E.: *Dopad emisních poplatků na ekonomiku podniků*. VaV ústav stavební Praha. MŽP ČR 1991. 1995.
3. JÍLKOVÁ J. a kol.: Výzkumný projekt GAČR „Ex-post analýza poplatkových nástrojů v ochraně životního prostředí v ČR“ (No. 402/05/0360).
4. MOLDAN B. a kol.: *Ekonomické aspekty ochrany životního prostředí*. Praha. Karolinum 1997.
5. RITSCHELOVÁ, I. a kol. *Dopad poplatků za znečišťování životního prostředí na konkurenceschopnost podniků*. Praha: CENIA, česká informační agentura životního prostředí, 2008. 115 str. ISBN 978-80-85087-68-0

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# RESPECTING ENVIRONMENT IN THE BUDGETARY LEGAL ACTS OF THE CZECH REPUBLIC

Jitka Bělohradová, Libor Kyncl, Marie Poláčková, Ivana Pařízková

## 1. Introduction

The aim of this paper will be to analyze current status of the budgetary legal acts of the Czech Republic from the perspective of impact on environment. Besides the current legal regulation we will take into account possible suggestions for future amendments in this area because we believe that environment may be respected much more while creating public budgets and state budget particularly. Environment is taken into account mainly while approving specific building sites and projects that are partly or completely financed by the state budget and the state budget itself is not yet validated from the view of impact on environment and nature in a complex way. The exception is ecological agriculture and subsidies for it from state budget and public funds that are observed more from environmental view. The role of the Ministry of Environment in this area will be taken account, too.

## 2. Budgetary policy of the state in general (Ivana Pařízková)

The increased significance of the state budget as the main instrument of national revenue's centralized redistribution caused growing importance of the budgetary policy that is continually becoming the most powerful part of the complex state's economic policy. Budgetary policy consists of purposeful influence on economic processes by creating, redistribution and using of budgetary fund.

In the market economy economic processes' affecting by the budgetary policy has its boundaries that are given by reasonable limits of centralized way of national revenue redistribution. If this redistribution exceeds certain limit mainly when the redistribution is aimed at company sector it may work against the functions of free market, so called system of market auto-regulation.<sup>1</sup>

In the theory of public finance presented in the European Union the prevailing opinion is that the function of advanced market economy is possible only under the condition of market self-regulatory system legitimately combined with efficient system of state's regulatory interventions.

With respect to big efficiency of the budgetary policy the concept of financial policy is often understood only as the budgetary policy and this constricted view of the financial policy is put alongside monetary and foreign exchange policy. From the view of complex economic policy the individual policies – budgetary, monetary and foreign exchange policy – are very directly connected and penetrated among themselves so heavily that it seems theoretically better and practically more useful to understand them as a divisions of the same process of financial policy.<sup>2</sup>

## 3. Environmental protection by state through grants and subsidies (Marie Poláčková, Jitka Bělohradová)

Environmental protection is financially supported both by state budget and by specially established Environment State Fund. Subsidies are given on the basis of published national programs. Programs financed from state budget are mostly administrated by Ministry of the

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<sup>1</sup> See Mrkývka, P. Finanční správa. Brno: Masarykova univerzita, 1997.

<sup>2</sup> See Mrkývka, P. Finanční správa. Brno: Masarykova univerzita, 1997.

Environment (thereinafter “MŽP”) or Ministry of the Agriculture (thereinafter “MZe”). On the next pages we try to summarize relevant national programs with their short characterization. We can divide these programs into three groups. Criterion is financial resource.

1) Programs financed from public budgets of the Czech Republic (thereinafter CR)

▪ **Countryside care program (Program péče o krajinu);** for period 2009-2011

Program is elaborated as MŽP directive no. 3/2009. It is financed from state budget. Program is divided into three subprograms which deal with e.g. protected territory protection or care for endangered species. Financial subsidies could be awarded up to 100% relevant costs.

▪ **Subprogram Imprescriptible National Property Administration in specially protected areas (Podprogram Správa nezcizitelného státního majetku ve zvláště chráněných územích)**

Subprogram is worked out for Agency for Nature Conservation and Landscape Protection of the CR (thereinafter „AOPK“), Cave Administration and National Park Administration which can ask for financing of the projects realized in specially protected areas on state lands. They can also ask for financing of arrangements realized on the basis of plans of care for specially protected areas. Conceptual tools processing produced for areas administrated by aforesaid organizations could also be financed by this subprogram.<sup>3</sup>

▪ **Operational and national programs in forest, water and ponds area**

MZe gives support in water area as subsidy from state budget according to current state budget law.<sup>4</sup> Program pays attention to prevention from floods and dryness through pond restoration and reconstruction and water schemes building. Amount of subsidy depends on relevant costs up to 100%.

MZe offers nonproduction pond functions support according to law no. 252/1997 Sb., about agriculture, in actual version. We can give our requests to AOPK. Recipient of subsidy for ponds over 5 ha could be subject who is self-employed in agriculture and fulfils decisions of water right authorities or landscape protection authorities or ensures public interest. Height of subsidies depends on pond extent, max. 1000 CZE/ha.<sup>5</sup>

Allowances in forest protection area are offered by MŽP, Ministry of Defence or MZe. Their height depends upon forest location and it calculated either from technical unit rate or from real costs.<sup>6</sup> Benefit is given for forest management and also for keeping and training of national races and hunting-dogs and bird of prey.

▪ **Subsidies for nonprofit organizations**

MŽP publish public selection procedures every year. These procedures should support activities of nonprofit organizations in environmental protection and sustainable development area. Subsidy tends especially to climate protection, nature protection, biodiversity protection, human health protection, waste and sustainable development projects. Limit for one project

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<sup>3</sup> AOPK spends about 20 mil. CZE a year.

<sup>4</sup> Confront law no. 475/2008 Sb., about state budget, in actual version, in supplement no. 10.

<sup>5</sup> Supposed costs are 40 mil. CZE in this area for year 2009. Source: Vorlíček, P. Poslanci potvrdili více než miliardu na dotační programy v zemědělství [cited 20. 3. 2009]. Available from: <http://www.mze.cz/Index.aspx?ch=270&typ=1&val=42844&ids=2515>.

<sup>6</sup> Height is calculated percently, confront rules for allowance offering for year 2009 in law no. 475/2008 Sb., about state budget, in actual version, in supplement no. 9.

is 250 000 CZE. Yearly rate of dividing sum is 20-30 mil CZE. In 2009 nonprofit organization obtain 29,8 mil CZE.<sup>7</sup>

- **Program of damage removing from Soviet army (Program odstraňování škod po Sovětské armádě);** from 1991

Objective of this program is the sanitation of former Soviet army platforms. 190 CZE has been already spent. Sanitations are financed from MŽP budget according to actual needs. It is supposed that cca 300 mil. CZE would be spent until 2012.<sup>8</sup> Most of sanitations have been already done.

## 2) Programs financed both from public budget of the CR and from public budget of the EU:

- **Rural Development Program (Program rozvoje venkova – thereafter „PRV“);** for period 2007-2013

Finances are offered both from public resources of the CR and from public resources of the EU. This program would be described in detail in the chapter which concerns ecological agriculture (thereinafter EZ).

- **Regional Operation Program (Regionální operační programy NUTS II<sup>9</sup>);** for period 2007-2013

These programs are operation programs oriented to particular regions of cohesion. Programs are specialized on traffic accessibility, territory development, tourism and regional business development support – always according to needs of particular region. Ministry of Regional Development is central coordinator for finance spending from EU Funds.<sup>10</sup>

- **Operation Fishing Program (Operační program rybářství);** for period 2007-2013

Program is worked out on the basis on Council Regulation no. 198/2006, about European Fishing Found (thereinafter „EFF“). Benefit is offered on investment to aquaculture in order to increase production, to water protection and in water animals and plant health protection. Program is financed in 75% by EFF. The CR refunds rest from public resources.<sup>11</sup>

## 3) Programs financed only from EU public resources:

We can include many programs of the EU to this group. We are not able to deal with this area because of the extent of this contribution.

## 4. **Environmental protection in public projects (IPPC, EIA, SEA) (Marie Poláčková, Jitka Bělohřadová)**

Environmental protection is also ensured through prevention tools which should assess what impact will particular activity have on the environment before the activity itself will be done. We include also environmental impact assessment process (thereinafter EIA), strategic environmental assessment (thereinafter SEA) and integrated pollution prevention and control (thereinafter IPPC) to these tools.

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<sup>7</sup> The whole sum for projects in years 1997-2007 is 207 881 mil CZE. Confront: Ministerstvo životního prostředí. Roky 1997-2007 [cited 21. 3. 2009]. Available from: <http://www.env.cz/projekty.2008/vse.html>

<sup>8</sup> Ministerstvo životního prostředí. Odstraňování starých ekologických zátěží způsobených Sovětskou armádou [cited 18. 3. 2009]. Available from: [http://www.env.cz/AIS/web-pub.nsf/\\$pid/MZPJGFJDL0L9](http://www.env.cz/AIS/web-pub.nsf/$pid/MZPJGFJDL0L9).

<sup>9</sup> Nomenclature of territorial statistical units.

<sup>10</sup> Ministerstvo pro místní rozvoj. Regionální politika EU [cited 20. 3. 2009]. Available from: <http://www.strukturalni-fondy.cz/regionalni-politika>.

<sup>11</sup> Ministerstvo zemědělství. Operační program rybářství 2007-2013 [cited 14. 3. 2009]. Available from: [http://www.mze.cz/attachments/OP\\_R\\_191\\_11\\_07\\_msc\\_CZ.pdf](http://www.mze.cz/attachments/OP_R_191_11_07_msc_CZ.pdf).

Intention, conception or project have to pass through above mentioned processes if they fulfil marks given in laws.<sup>12</sup> It does not depend whether it is financed by state or private subject. Stat, as applicant for EIA, SEA or IPPC, conducts as any other artificial person.

Announcer (a man who intends to make an intention) refunds costs connected to environmental impact assessments. However, costs connected to public discussion and publishing refunds appropriate authority in whose territorial administrative district the intention is proposed, eventually MŽP. Costs connected with SEA are refunded by submitter. Publishing is one exception when the authority for whose territorial administrative district the conception is worked out refunds costs, eventually MŽP. IPPC costs refunds applicant for IPPC.

## **5. Ecological Agriculture state support (Marie Poláčková, Jitka Bělohradová)**

Rural Development Program will be fundamental for this chapter.<sup>13</sup> This conceptual tool is worked out in compliance with Council Regulation no. 1698/2005, on Support for Rural Development by the European Agricultural Fund for Rural Development (EAFRD) and Council Regulation no. 1290/2005, on the Financing of the Common Agricultural Policy.

According to above mentioned Council Regulations particular measures with specific goals are divided in to coherent groups named as AXES: AXIS I – Improving the Competitiveness of the Agricultural and Forestry Sector, AXIS II – Improving the Environment and Countryside, AXIS III – The Quality of Life in Rural Areas and Diversification of the Rural Economy, AXIS IV – Leader.<sup>14</sup>

PRV determines particular measures in axis area. Agro-environment measures (thereinafter AEO) included in axes II will be object of our analysis. One of AEO are procedures regardful of environment. Ecological agriculture is included to this AEO.<sup>15</sup>

### **1) Axis II (Improving the Environment and Countryside), agro-environment measure – endowment item II. 1.3.1.1. Ecological Agriculture.**

Subsidies are offered on area (hectares) of ecologically managed land. Government Regulation no. 79/2007 provides concrete process how to gain support. In order to gain the subsidy a subject has to fulfill particular conditions. Above all it is necessary to ask for engaging in AEO (item EZ). Request is given for period 5 years a it is delivered to State Agricultural Intervention Fund (thereinafter „SZIF“). The second step is request offering to SZIF for annual subsidy in AEO area. Concrete rates are stated so: arable land: 155 EUR/ha, grass growth: 71 EUR/ha, permanent cultures: 849 EUR/ha, vegetables and special herbs on arable land: 564 EUR/ha.<sup>16</sup>

Ecologic farmer can use also other items than item EZ in PRV area.

### **2) Axis I (Improving the Competitiveness of the Agricultural and Forestry Sector)**

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<sup>12</sup> Law no. 100/2001 Sb., about environmental impact assessment, in actual version and law no. 76/2002 Sb., about integrated prevention and pollution restriction, about integrated pollution register, in actual version.

<sup>13</sup> Rural Development Program for period 2007 – 2013, document publishing by Ministry of Agriculture.

<sup>14</sup> Connection of axis IV with ecological agriculture is low that is why we will not deal with this axis in this chapter.

<sup>15</sup> Government Regulation no. 79/2007 Sb., which concretes conditions for AEO application.

<sup>16</sup> For example: in 2008 it was asked for almost 618 mil CZE compensatory subsidies on area of ecologically managed land. Recourse: Ministerstvo zemědělství. Základní statistické údaje ekologického zemědělství k 31.12.2008 [cited 21. 3. 2009]. Available from: <http://www.mze.cz/Index.aspx?ch=73&typ=1&val=43614&ids=0&katId=3343>.

### **I.1.1 Modernization of Agricultural Holdings**

The aim of this measure is to improve competitive strength of agricultural. Maximum amount of benefits is from 40% to 60% relevant costs. The CR participates in offered subsidy 25% from public resources. The rest is refunded from EU public resources.

### **I.1.3 Adding Value to Agricultural and Food Products**

This measure targets not only the agriculture but also the food sector. Maximum amount of benefits is from 25% to 50% relevant costs. The CR participates in offered subsidy 25% from public resources. The rest is refunded from EU public resources.

### **I. 3.2 Initial Establishment of young Farmers**

The aim of this measure is stimulation of initial setting up in ecological agriculture. Benefit will be granted up to 40 000 € for period 2007 – 2013. The CR participates in offered subsidy 25% from public resources. The rest is refunded from EU public resources.

## **3) Axis III (The Quality of Life in Rural Areas and Diversification of the Rural Economy)<sup>17</sup>**

### **III.1.1. Diversification into non-agricultural activities – intention a)**

The aim of this measure is keeping and setting up of working station in countryside to non-agricultural activities area. Maximum amount of benefits is given percently according to enterprise extent and regions. The CR participates in offered subsidy 25% from public resources. The rest is refunded from EU public resources.<sup>18</sup>

## **6. Complex assessment of environmental aspects of state budget de lege ferenda (Libor Kyncl)**

The aim of this chapter of paper is on the contrary to other chapters that analyze current legal regulation to analyze and simply make a suggestion for modification of legal regulation de lege ferenda as potentially in the future the complex assessment of state budget from the view of impact on environment. Essential question regarding the process is whether something like that is required. According to my opinion this process is not completely necessary for preserving constitutional rights stipulated in the Czech Constitution regarding environment in the present. Environmental conformity of projects and strategies is already supervised by the state administration bodies in the section of the Ministry of Environment and state affects environment using energy taxes, excise taxes and local or other charges. Nevertheless current way of environment consideration in budgetary law is not complex and therefore it begs a question of further expansion.

The outcome of any economic activity may be divided into:

- intended product (effect, impact) and
- externality<sup>19</sup> (unintended impact of the activity on rights of the third persons, no matter whether they are property rights or rights in re aliena).

Externalities may further be divided to negative ones and positive ones.<sup>20</sup>

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<sup>17</sup>We do not deal with tourism support because connection with environment is rather indirect.

<sup>18</sup> Supposed amount of investment for period 2007-2013 in this area is 290 mil EUR. Source: Ministerstvo zemědělství. Program rozvoje venkova 2007-2013, s. 125 [cited 17. 3. 2009]. Available from: [http://www.szif.cz/irj/go/km/docs/apa\\_anon/cs/dokumenty\\_ke\\_stazeni/eafrd/1180428724933.pdf](http://www.szif.cz/irj/go/km/docs/apa_anon/cs/dokumenty_ke_stazeni/eafrd/1180428724933.pdf).

<sup>19</sup> Compare Learning materials of course Environment, Faculty of Civil Engineering, Czech Technical University, course code 143ZIPR, semester Spring 2008/2009.

<sup>20</sup> Vide Johnson, P. M. Externality: A Glossary of Political Economy Terms - Dr. Paul M. Johnson [cited 20. 3. 2009]. Available from: <http://www.auburn.edu/~johnspm/gloss/externality>.

In the area of environment and its legal regulation negative externalities are usually limited or sanctioned. Or alternatively the environment protection prevent high amount of negative externalities. Obviously there is no need to fight with positive externalities – on the contrary their asset to the environment is positive.

State in its production of public property<sup>21</sup> is one of the biggest producers of property in general. In many cases state producing intended product also manages to produce externality, usually unintended one. Statistically we can simplify this situation to the conclusion that the status of the biggest property producer also implies the status of the biggest externalities producer. Knowingly I commit a simplification and only presume this relationship, but its verification would require separate paper from the field of economy. Mentioned externalities produced by state may be of several different types. Type that is connected to this area is represented by externalities harmful against environment, there may exist also externalities regarding only property of third persons and having no impact on environment.

The Constitution of the Czech Republic as a basic document of the Czech legal system stipulates to the state the duty to care about provident usage of natural sources and protection of biological wealth.<sup>22</sup> The Charter of Fundamental Rights and Freedoms further expands this regulation by granting one of basic economic, social and cultural rights – right to favorable environment. There are connections between this right and at the same place set down right to timely and complete information on environment and natural resources status. Contradictious prohibition corresponds with this right – nobody may threaten or damage the environment, natural resources, species wealth of the nature and cultural monuments over the limit set by the act.<sup>23</sup>

Existing instruments that execute mentioned constitutional law enactment may be determined as instruments specific for certain area. However there is no general instrument allowing prevention against excessive externalities production by state.

Complex assessment of public budgets impact on environment may be interpreted as the method aimed at evaluating the impact of certain state budget's chapter from perspective of both incomes and expenses. For static view it would evaluate whether there is any impact expected and for dynamic view it would evaluate whether there will be change from previous period. Complex assessment also determines whether execution of projects that are planned will or will not mean significant impairing of environment against current status and on the contrary whether projects that would slightly improve environment are not postponed to later period. This assessment should be divided according to state budget's chapters and should be pursued across all chapters. Obviously it would be necessary to maintain relative independence of certain chapters in order to carry on existing guarantees of certain institutions' independence.<sup>24</sup>

Assessment would therefore offer the state an option how to consider all steps that will be taken by the state from the environmental perspective. It may be executed in practice by the

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21 Vide Mrkývka, P. Veřejné statky. In Mrkývka, P. et al. Finanční právo a finanční správa, 1. díl. Brno: Masarykova univerzita, 2004. ISBN 80-210-3578-1. p. 9.

22 Compare art. 7 Constitutional Act No. 1/1993 Sb., Constitution of the Czech Republic, as amended.

23 Vide art. 35 Decree of the Presidium of the Czech National Council No. 2/1993 Sb., on declaration of The Charter of Fundamental Rights and Freedoms as part of the constitutional order of the Czech Republic, as amended.

24 These are the chapters Chamber of Deputies, Senate, Office of the President of Republic, Constitutional Court, Supreme Audit Office and Office of the Public Defender of Rights. Compare § 8 section 3 Act No. 218/2000 Sb., on Budgetary Rules and on the change of certain connected acts (Budgetary Rules), as amended.

separated division of the Ministry of Environment that would prepare the material analyzing the impact of individual budget chapters on the environment posted along with the draft Act on State Budget for specific year to the Parliament of the Czech Republic's Chamber of Deputies and at the same time it would offer the Ministry of Finance the assistance for preparing draft Act on State Budget itself.<sup>25</sup> It would also determine if it is possible to improve the impact of the budget on environment in any way and which modifications are to be recommended for discussion in the Chamber of Deputies from the environmental view.

New process of assessment would therefore mean the modification of current budgetary process. The aforementioned implies that it would be necessary to change the budgetary process in its phases of budget compilation and budget approval.<sup>26</sup> Further there would also be an option to change the passing of moderate-term outlook and moderate-term expenditures framework.<sup>27</sup> The arguable question remains whether it is possible to effectively and in complex way assess state budget during budgetary year or alternatively assess state closing account in complex way. I leave these questions open for further research.

## 7. Conclusion

In this paper we conducted the analysis of existing ways of particular adjudication of the state budget according to its environmental aspects in the Czech Republic. We started our analysis by the state budget as an instrument of the budget policy of the state that also affects the environment. After the analysis of the theoretical background of state budget we continued by ways how the state takes environment into account in providing grants or subsidies. Then we dedicated next part to environmental prevention in public projects where we subsumed processes of projects and concepts impact assessment and also a process of integrated approval. The overview of current legal regulation was ended by support of ecological agriculture by the state. Our paper then resumed by suggestions how to change the legal regulation *de lege ferenda* – by introducing complex assessment of the state budget from environmental view that would be able to strengthen the consideration of the state for environment.

## References

1. Johnson, P. M. Externality: A Glossary of Political Economy Terms - Dr. Paul M. Johnson [cited 20. 3. 2009]. Available from: <http://www.auburn.edu/~johnspm/gloss/externality>.
2. Ministerstvo pro místní rozvoj. Regionální politika EU [cited 20. 3. 2009]. Available from: <http://www.strukturalni-fondy.cz/regionalni-politika>.
3. Ministerstvo zemědělství. Operační program rybníkářství 2007-2013 [cited 14. 3. 2009]. Available from: [http://www.mze.cz/attachments/OP\\_R\\_191\\_11\\_07\\_msc\\_CZ.pdf](http://www.mze.cz/attachments/OP_R_191_11_07_msc_CZ.pdf).
4. Ministerstvo zemědělství. Program rozvoje venkova 2007-2013, [cited 17. března 2009]. Available from: [http://www.szif.cz/irj/go/km/docs/apa\\_anon/cs/dokumenty\\_ke\\_stazeni/eafrd/1180428724933.pdf](http://www.szif.cz/irj/go/km/docs/apa_anon/cs/dokumenty_ke_stazeni/eafrd/1180428724933.pdf).

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<sup>25</sup> Vide § 8 section. 1 Act No. 218/2000 Sb., on Budgetary Rules and on the change of certain connected acts (Budgetary Rules), as amended.

<sup>26</sup> Compare Pařízková, I. Rozpočtové právo. In Mrkývka, P. et al. Finanční právo a finanční správa, 1. díl. Brno: Masarykova univerzita, 2004. ISBN 80-210-3578-1. s. 322 - 326.

<sup>27</sup> Vide Pařízková, I. Rozpočtové právo. In Mrkývka, P. et al. Finanční právo a finanční správa, 1. díl. Brno: Masarykova univerzita, 2004. ISBN 80-210-3578-1. s. 299 - 302.

5. Ministerstvo zemědělství. Základní statistické údaje ekologického zemědělství k 31.12.2008 [cited 21. 3. 2009]. Available from: <http://www.mze.cz/Index.aspx?ch=73&typ=1&val=43614&ids=0&katId=3343>.
6. Ministerstvo životního prostředí. Roky 1997-2007 [cited 21. 3. 2009]. Available from: <http://www.env.cz/projekty.2008/vse.html>
7. Ministerstvo životního prostředí. Odstraňování starých ekologických zátěží způsobených Sovětskou armádou [cited 18. 3. 2009]. Available from: [http://www.env.cz/AIS/web-pub.nsf/\\$pid/MZPJGFJDLOL9](http://www.env.cz/AIS/web-pub.nsf/$pid/MZPJGFJDLOL9).
8. Mrkývka, P. et al. Finanční právo a finanční správa, 1. díl. Brno: Masarykova univerzita, 2004. 404 p.
9. Mrkývka, P. Finanční správa. Brno: Masarykova univerzita, 1997.
10. Learning materials of course Environment, Faculty of Civil Engineering, Czech Technical University, course code 143ZIPR, semester Spring 2008/2009.
11. Vorlíček, P. Poslanci potvrdili více než miliardu na dotační programy v zemědělství [cited 20. 3. 2009]. Available from: <http://www.mze.cz/Index.aspx?ch=270&typ=1&val=42844&ids=>

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# QUANTITATIVE METHODS AND THEIR UTILISATION IN EFFECTIVITY ASSESMENT OF LOCAL BUDGETS ENVIRONMENTAL EXPENDITURES

Jana Soukopová

## 1. Introduction

In the recent years, of increasing importance is a question of relation between economic growth and environmental protection. Discussed as well are impacts of environmental policy and of environmental public expenditures as an economic tool of environmental policy on economic growth and other basic economic indicators, such as unemployment, inflation, trade, etc. The measurement of impacts of the particular expenditures and of their effectiveness is difficult for all public expenditures, but especially problematic it is in the area of environmental protection. This is given by the fact that the measurement of improved environmental quality in particular areas has its specificities and, furthermore, it cannot be said that there would exist definite direct proportion between the amount of expenditures on particular environmental areas and environmental quality improvements. Environmental quality is influenced by a number of factors and financial expenditures are only one of the tools of how to influence the environmental quality. In addition, for each of environmental protection areas, irrespective of whether water, air, soil, nature and landscape is concerned, there exist a large number of indicators for the measurements of quality, and these indicators cannot always be applied to the effectiveness of expenditures in the given area of environmental protection. It is therefore necessary to model possible methods to measure the effectiveness of public expenditures, and include into such methods possible environmental indicators to measure this effectiveness and their input in the analysis of this effectiveness.

## 2. Public budget expenditures in the area of environmental protection

Public budget expenditures in the area of environmental protection form significant part of the total public expenditures (see Figure 1), and it is probable that despite the current financial crisis their amount, thanks to active environmental policy of the European Union and expenditures from the structural funds, will not experience significant reductions.

**Figure 1 Trend of volumes of public budget expenditures on particular areas of environmental protection (in 1000 CZK)**

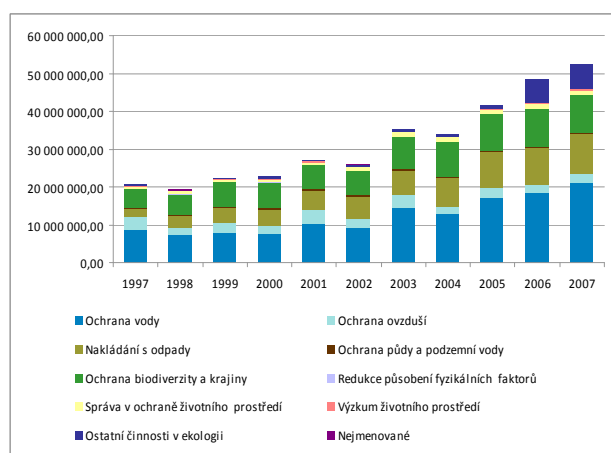
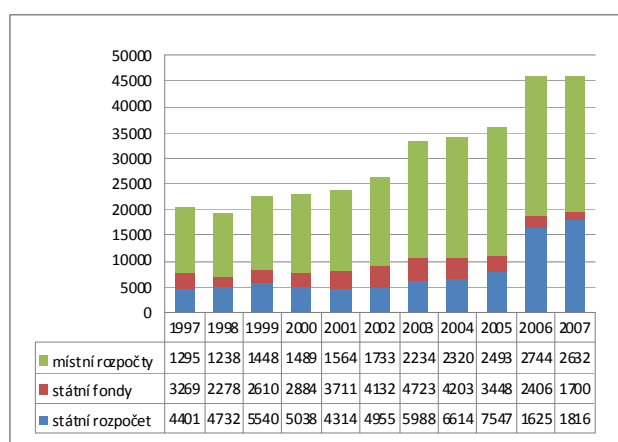


Figure 2 Trend of volumes of expenditures from particular levels of public budgets on environmental protection (in mil. CZK)



Source: Information from ARIS, modified by author

Within the analysis of the amounts of public budget expenditures in the particular areas of environmental protection, there were analyzed public budget data available from ARIS system, according to budget composition break-down, as demonstrated in table 1 for the period 1997-2007.

Table 1 Public budget expenditures according to budget composition break-down

Environmental protection area	Description of activity	Paragraph
Water pollution control	Waste water collection and treatment, sludges	2321
	Water pollution prevention	2322
	Waste water collection and treatment not elsewhere included	2329
	Artificial channelling of minor watercourses	2333
Air pollution control	Thermal insulation and energy savings programmes	2115
	Removal of solid emissions	3711
	Removal of gaseous emissions	3712
	Changes in heating technologies	3713
	Measures to reduce greenhouse gas production	3714
	Changes in manufacturing technologies aimed at removal of emissions	3715
	Monitoring of air pollution control	3716
	Other air pollution control activities not elsewhere included	3719
Waste management	Secondary materials collection and processing	2122
	Hazardous waste collection and pick-up	3721
	Municipal waste collection and pick-up	3722
	Other waste collection and pick-up	3723
	Hazardous waste utilization and disposal	3724
	Municipal waste utilization and disposal	3725
	Other waste utilization and disposal	3726
	Waste production prevention	3727
Monitoring of waste management	3728	

	Other methods of waste management not elsewhere included	3729
Soil and groundwater protection	Anti-erosion protection	2342
	Soil and groundwater protection against infiltration pollution	3731
	Soil decontamination and groundwater treatment	3732
	Soil and groundwater monitoring	3733
	Soil salinization prevention and remediation	3734
	Other methods of soil and groundwater protection not elsewhere included	3739
Biodiversity and landscape protection	Social forest functions	1037
	Revitalization of river systems	2334
	Protection of species and habitats	3741
	Protected parts of nature	3742
	Land rehabilitation due to mining and quarrying operations	3743
	Erosion and avalanche control measures, fire protection measures	3744
	Care for municipal appearance and green areas	3745
	Other nature and landscape protection activities not elsewhere included	3749
Reduction of physical factor action	Construction and application of noise prevention barriers	3751
	Radon prevention measures	3752
	Monitoring to control physical factor levels	3753
	Other operations to reduce physical effects	3759
Administration in environmental protection	Central state administration in environmental protection	3761
	Other state administration bodies in environmental protection	3762
	Other administration in ecology	3769
Environmental research		3780
Other activities in ecology	International environmental cooperation	3791
	Environmental education, training and awareness raising	3792
	Environmental programmes in transport	3793
	Environmental matters and programmes not elsewhere included	3799

Source: Final Report on the project „Analysis of Local Budget Expenditures and of Their Effectiveness“ for 2008

The areas which to the most extent are financed from public budgets standardly include the following (see Figure 1):

- *water protection,*
- *nature and landscape protection,*
- *waste management and*
- *air pollution control,*

*with expenditures on other environmental activities having increased in the recent two years.*

As regards the amounts of public expenditures allocated to the area of environmental protection from the central level, of special significance is the state budget, primarily chapter 315 – Ministry of the Environment (MoE) and of course local budgets (see Figure 2).

In addition to the Ministry of the Environment, public environmental expenditures also come from the chapters of the Ministry of Transport, Ministry of Agriculture, Ministry for Regional Development, Ministry of Industry and Trade, Ministry of Defence and Ministry of Finance of the Czech Republic.

### **3. Effectiveness of environmental public expenditures and methods for its measurement**

As it was already mentioned, to measure the effectiveness of public expenditures, various quantitative and qualitative methods of economic analysis can be used, nevertheless, results of the qualitative analyses such as SWOT analysis, etc. in the case of public expenditures are contradictory, therefore, we will further deal with the quantitative methods only.

The quantitative methods of economic analysis can be divided to single-criterial and multi-criterial methods. Single-criterial methods in assessment assume the existence of one dominant criterion, which the other criteria are transferred to. Such a criterion in private sector would be profit or some of ratio financial indicators. Nevertheless, in assessing the environmental public expenditures, such a criterion is most often the level of costs (expenditures) or of some of ratio expenditure indicators. The majority of single-criterial methods so is based on an assumption that outputs can be related to the costs (expenditures) which were expended on their getting, and that the effects or impacts of the given measure are directly proportional to the amount of expenditures allocated to the given measure. However, such an assumption in the case of environmental public expenditures is partly questionable, as within the framework of environmental protection it is not possible to exactly separate expenditures on a certain area of environmental protection and then examine only their effectiveness without taking into account the effect of expenditures on other environmental compartments.

#### **3.1 Single-criterial method potentials for assessment of environmental public expenditures**

In practice, most often used single-criterial methods to assess environmental investments include cost minimization analysis, cost-effectiveness analysis, and cost-benefit analysis. These methods belong to so-called cost-output methods and are appropriate for assessing the effectiveness of public expenditures on environmental protection. The only exception is cost minimization analysis, which only compares the amount of costs (expenditures) on certain investment, therefore, this method will not further be considered for assessment of the effectiveness of environmental expenditures from public budgets.

##### ***Cost-benefit Analysis (CBA)***

Cost-benefit analysis is one of the most frequently used methods of economic analysis for public projects. Its methodology is shown in the following text:

- Step 1 Identification of the essence of the project<sup>1</sup>.
- Step 2 Identification of the project impacts (positive and negative).
- Step 3 Identification of significant economic impacts.
- Step 4 Identification of physical impacts of the project realization.
- Step 5 Monetary valuation of significant benefits (basic unit of measure are **monetary units**<sup>2</sup>).

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<sup>1</sup> This means the determination of an area influenced by the project, including, for example, the determination of population group influenced by the project.

- Step 6 Cost and benefit flow discounting.
- Step 7 Assessment using the criteria which most often include net present value, internal rate of return, repayment time or B/C indicator. In practice, one of the criteria or several criteria together are used.

Should we examine whether CBA is appropriate for assessing the effectiveness of local budget expenditures, we have to state that, on the one hand, CBA is the most complex single-criterial method, but, on the other hand, it is also a method which is most difficult to apply in making decision on the realization of environmental investment. Its significant benefit is taking into account the time aspect<sup>3</sup>. In assessing the effectiveness of the projects, there can be applied also a long-term character of the effects, which is a significant aspect of environmental protection investments.

The main weakness of this method from the viewpoint of assessing the environmental public expenditures is difficult valuation of environmental benefits in monetary units. On the one hand, such valuation is possible through shadow prices, substitute markets, technical methods or off-market valuation methods which are numerous in the area of environmental valuation (in more detail, for example, Tošovská 1997, Soukopová 2005), but, on the other hand, this valuation is very costly and, furthermore, it often fails to lead to the requested results which would give a real illustration of investment effectiveness. This problem then can be solved with the use of the third of the above mentioned single-criterial methods which is cost-effectiveness analysis (CEA).

#### ***Cost-effectiveness Analysis (CEA)***

The next single-criterial method used to assess the effectiveness of public expenditures is cost-effectiveness analysis. CEA is used if valuation of project benefits in monetary units using CBA is complicated. In this type of analysis, the effectiveness is not expressed in monetary units but outputs are measured through appropriate natural or physical units.

The effectiveness of investment is then given by ratio indicator of specific investment intensity, for example, in relation to pollution unit removal, where of higher effectiveness is expenditure showing the lowest possible specific investment intensity<sup>4</sup>.

$$S = \frac{\sum_{t=1}^n \frac{C_t}{(1+r)^t}}{E} \rightarrow \min, \quad (3.1)$$

where  $C$  means total discounted costs,

$S$  means specific investment intensity

$E$  means output unit (for example, amount of pollution)

$R$  means discount rate

For assessment of environmental public expenditures, this method appears to be appropriate, because as  $E$  there can be used some of environmental indicators, such as produced waste quantity, amount of discharged CO<sub>2</sub>, environmental impact determined in point scale, etc.

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<sup>2</sup> For environmental public projects, the valuation of benefits in monetary units is performed using off-market methods of valuation, shadow prices or substitute markets (in more detail, see Soukopová 2006, Tošovská 1997).

<sup>3</sup> This analysis allows to calculate environmental benefits also in a long-term time horizon and provides so economically integrated view of the realization of measures.

<sup>4</sup> This approach is based on theoretical relation between the amount of pollution and costs of its removal, from which it is evident that the lower pollution is, the higher are the costs of its removal.

The assessment using CEA method seems to be very simple from this viewpoint, but it is also connected with a number of problems relating especially with the selection of output indicator. Most marked it is in the case of existence of more types of benefits or if the particular benefits cannot be compared with one another (in more detail, see, for example, Soukopová 2005). Therefore, there arises a question whether it is possible at all to mutually compare the particular benefits in the area of environmental protection. For environmental public expenditures this appears possible, especially if two municipalities or two regions are to be compared.

### 3.2 Multi-criterial method potentials for assessment of environmental public expenditures

The preceding two single-criterial methods assessed the environmental public expenditures on the basis of one assessment criterion. Nevertheless, in the majority of decision-making situations we decide on the basis of more than one criterion, therefore, it is important to point out the significance of multi-criterial methods.

The formulation of a problem of multi-criterial assessment of public expenditure effectiveness then will be as follows: Given is public expenditure  $v_1$ , and a listing of assessment criteria  $K = \{k_1, k_2, \dots, k_k\}$ . Each expenditure (in our case item of budget composition break-down)  $v$  according to these criteria is described by vector of criterial values  $(y_1, y_2, \dots, y_k)$ . Then it will be possible to transform mathematical model after Fiala, Jablonský and Mañas (1994) into the following criterial matrix:

$$Y = (Y_j) \quad (3.2)$$

The assessment of the given expenditure according to the particular criteria may be in different units and different scales. Important then is the transformation of input information to comparable units, allowing aggregation according to all criteria. This is allowed by scales which belong to the simplest methods of multi-criterial assessment.

#### Scales

The best-known scales include:

- *Nominal (binary) scale*, based on operation of equality or variance (difference), which is determined by binary logical value 1 (equality), or 0 (variance). From the viewpoint of the assessed criterion, the assessed variants are indifferent. The weakness of assessment using binary scale is the fact that preference of the particular criteria is not measured and also weights of the particular criteria are not taken into consideration although these weights cannot be assumed to be identical.
- *Ordinal scale*, which is used as classification scale, where the particular criteria are scored (for example, 1 through 5, with 1 = the best value and 5 = the worst value) or as scoring scale which values the particular criteria within the given scale (for example, 1 through 10, where 1 = the worst value, 10 = the best value). Ordinal scale so overcomes the main weakness of binary scale, as it classifies the criteria from the least important to the most important one.
- *Cardinal numerical scale*, which is used as interval scale and as ratio scale.
- For assessments of environmental public projects, scales are most often used within expert assessments, with ordinal scoring scale being used most frequently. The main advantage of scales is, without question, a relative simplicity in assessing the alternatives. On the other hand, the disadvantage is that these methods do not

discriminate between the importance of the particular criteria. Such a weakness is resolved by methods using in assessment the weights of the criteria.

For multi-criterial assessment of the variants therefore the knowledge of weights of the criteria is required by the majority of multi-criterial methods. Perhaps most frequently used multi-criterial method in assessing the environmental expenditures is the scoring method.

### Scoring method

This method belongs to those based on partial assessment of variants, where the particular variants (expenditures) are assessed independently from one another. In this method, particular variant is assigned a certain score from the selected scale (see above) with regard to the given criteria and, the better is valued the given variant, the higher is its score with regard to the criterion concerned. The scale score range depends on valuator's resolution which may not be identical for all criteria. Nevertheless, the maximal (or minimal) score assigned to the best (or worst) criterion value has to be identical for all criteria. We cannot exclude a case, where in partial valuation according to a certain criterion none of the variants reaches this extreme score (a hypothetically defined number may be concerned). In this method, valuation of the variants is calculated as follows:

$$h_i = \sum_{j=1}^k v_j y_{ij} , \quad (3.3)$$

where  $h_i$  means valuation of  $i$ -th variant,  $i = 1, 2, \dots, n$ ,

$y_{ij}$  means values of criterial matrix  $Y$ ,

$v_j$  means standardized weight of  $j$ -th criterion,  $j = 1, 2, \dots, k$

and variants  $a_i$  are ranked as follows: the higher is the value  $h_i$ , the more is  $i$ -th variant preferred.

In my opinion, scoring method is inappropriate for assessment of environmental expenditures from local budgets within one municipality. The result is a figure which is not comparable with another municipality. I would recommend the use of scoring method for assessment of environmental public expenditures at a higher level of local administration, at a level of districts, regions or in assessing the effectiveness within the whole of the Czech Republic.

## 4. Draft of the method

From the viewpoint of assessing the effectiveness of environmental expenditures from local budgets, thanks to the above mentioned conclusions, most appropriate seems to be multi-criterial assessment with the dominant criterion of the CEA method, where the Effect will be several appropriately selected environmental indicators and the subsequent multi-criterial assessment of the CEA results.

As an example, assessment of the effectiveness of expenditures for budget item 3722 – municipal waste collection and pick-up is shown. To compare the effectiveness of expenditures expended in the area of waste management, I have proposed the following indicators and applied them to three groups of type III municipalities. The following table shows the proposed indicators and their application to CEA.

**Table 2 The proposed indicators**

Indicators		CEA as criterion	
Municipal waste (MW) production	t	Expenditures on MW/MW production	§ 37/ MW
MW production per head	Kg/head	Expenditures on MW collection and utilization/MW production	(§ 3722 + 3725) / MW
Separated waste production proportion in municipal waste production		Expenditures on MW collection and pick-up/ MW production	§ 3722/MW
		Expenditures on waste collection and pick-up (MW)	(§ 3721 +3722 +3723)/ MW

**Table 3 Application of the proposed indicators in practice for a selected sample of municipalities**

Indicators	group 1		group 2		group 3	
	Žamberk	Kostelec	Rychnov	Lanškroun	Hradec	Pardubice
Municipal waste production	17 684,26	7 358,84	23473,44	14098,11	57694,07	47786,61
MW production per head	2,93	1,18	2,025843	1,386791	0,612106	0,539602
Separated waste production proportion in MW	5,59	13,02	5,86	18,66	13,17	12,85
CEA						
Expenditures on MW/ MW production	0,90	0,58	0,374456	0,482281	1,060225	1,361675
Expenditures on MW collection and utilization/MW production	0,90	0,57	0,370195	0,482281	0,954236	0,816534
Expenditures on MW collection and pick-up/MW production	0,24	0,57	0,370195	0,482281	0,954236	1,024062

Source: ISOH, CSI, ARIS, author

Despite efforts to reach maximal similarity of the municipalities in particular groups, big differences can be seen there. Therefore, the next step towards assessment of results and towards certain generalization of the groups is valuation of the particular criteria according to scoring method with scoring scale between 1 and 100 with identical weights.

**Table 4 Transformation of indicators using scoring method for a selected sample of municipalities**

Indicators	group 1		group 2		group 3	
	Žamberk	Kostelec	Rychnov	Lanškroun	Hradec	Pardubice
Municipal waste production	41,61	100,00	31,35	52,20	12,75	15,40
MW production per head	18,42	45,73	26,64	38,91	88,15	100,00
Separated waste production proportion in MW	29,96	69,77	31,40	100,00	70,58	68,86
Expenditures on MW/MW production	41,61	64,56	100,00	77,64	35,32	27,50
Expenditures on MW collection and utilization/MW production	41,13	64,95	100,00	76,76	38,79	45,34
Expenditures on MW collection and pick-up/MW production	100,00	42,11	64,83	49,76	25,15	23,44
$\Sigma$	272,72	387,12	354,22	395,27	270,75	280,54
Ranking of the municipalities	5.	2.	3.	1.	6.	4.

Source: author

From the viewpoint of the performed analysis, the best in the area of municipal waste management appears to be the municipality of Lanškroun.

## 5. Conclusion

The assessment of public expenditures in the area of environmental protection and creation shows a number of specificities. There exist numerous methods of economic analysis to assess public projects, but not all can be used to assess expenditures from local budgets on a certain area of environmental protection. The core of economic approach to the analysis and assessment of public projects is to use the criterion of rationality of behaviour of the participating subjects in accordance with an idea, that rational behaviour consists in effective use of limited resources in order to achieve, to the maximal extent, the goals or desirable benefits. In this paper, I tried to analyze advantages and weaknesses of single-criterial and multi-criterial methods for assessment of expenditures from local budgets. The result of this analysis is a draft of assessment method with the application of multi-criterial assessment using scoring method with the dominant CEA criterion.

## References

1. Fiala, P., Jablonský, J. a Maňas, M. 1994, *Vícekritériální rozhodování*, VŠE, Praha, ISBN 80-70709-748-7
2. Soukopová, J. 2005, *Metody hodnocení veřejných projektů*, Brno, Disertační práce, Provozně ekonomická fakulta, Mendelova zemědělská a lesnická univerzita v Brně, Brno
3. Soukopová, J. 2006, *Metody mimotržního oceňování a jejich využití pro hodnocení environmentálních veřejných projektů*. In *Systém účetnictví a reportingu udržitelného*

*rozvoje na mikroekonomické a makroekonomické úrovni*. 2006. vyd. Brno: Univerzita Pardubice, 2006, ISBN 80-7194-866-7. od s. 209-216, 8 s.

4. Tošovská, E. 1997, 'Techniky mimotržního oceňování'. In Moldan, B. aj. 1997. *Ekonomické aspekty ochrany životního prostředí*. 1. vyd. Praha, Univerzita Karlova, Vydavatelství Karolinum, s. 138–151, ISBN 80-7184-311-3
5. Valach, J. 2006, *Investiční rozhodování a dlouhodobé financování*, Ekopress, II. přepracované vydání, Praha, ISBN 80-86929-01-9
6. Soukopová, J., et al. *SP/4i1/54/08 Analýza místních rozpočtů a jejich efektivnosti ve vztahu k ochraně životního prostředí : Závěrečná zpráva o řešení projektu*. [online]. [cit. 2009-03-07]. Dostupný z WWW: <[http://files.amr.webnode.cz/200000035-549ed55988/zaverecna\\_zprava\\_2008-opravena.pdf](http://files.amr.webnode.cz/200000035-549ed55988/zaverecna_zprava_2008-opravena.pdf)>.

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# LOCAL AGENDA 21 IN THE DEPARTMENT OF HOME AFFAIRS AWARDS FOR QUALITY AND INNOVATION IN PUBLIC ADMINISTRATION IN THE YEARS 2005-2008

Jarmila Neshybová

## Introduction

The Earth Summit also known as UNCED, a UN conference about the environment and future development took place in Rio de Janeiro in 1992. Representatives from over 170 countries agreed on accepting several important documents. One of them was Agenda 21 – a program for the 21<sup>st</sup> century, which should help the human society in the transfer to sustainable growth<sup>1</sup>, whose goal is to maintain the environment for future generations in an unchanged state.

Agenda 21 is a document that became the strategic plan for the development of society. The document listed the main restrictions of the negative effects of our civilization in different areas (such as social differences between rich and poor countries, healthcare deficiency, global threat to the environment, expansion of human establishments and so on).

Local Agenda 21 is a strategic and action plan of the development of a municipality or region that brings the principles of sustainable growth into practice. Hence, it is a plan that combines economic and social aspects of the environment and that is created in co-operation with the public. Its definition can be broken down according to the words in the title [2]:

- local – refers to the effected area, domicile, municipality or region
- agenda – Latin word meaning a program or a list of things, that need to be done, in order for the set goals to be reached
- 21 – means it is about what we need to do for (in) the 21<sup>st</sup> century, it calls for consideration of long-term horizons

Local Agenda 21 is a process that via

- higher quality administration of public affairs,
- strategic planning (managing),
- public participation and
- the use of all obtained knowledge about sustainable growth

raises the standard of living in all of its aspects.

Chapter 28 of the Agenda 21 [4] document is dedicated to the activities of local administrations, it states, among other things, the stance of administrations towards Local Agenda 21: “based on counseling and creating of a consensus, the local authorities should seek information and obtain the necessary data for creating the best strategies from citizens and local, civic, community, business and industrial organizations.”

Local Agenda 21 is not a law or a government regulation, it is not compulsory, there are no standardized procedures of implementing, however, we know the key steps of how to do it.

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<sup>1</sup> Sustainable growth is such a method of economic growth that brings together economic and social progress with adequate conservation of the environment

(Wikipedia definition [http://cs.wikipedia.org/wiki/Trvale\\_udr%C5%BEditeln%C3%BD\\_rozvoj](http://cs.wikipedia.org/wiki/Trvale_udr%C5%BEditeln%C3%BD_rozvoj)). According to the CENIA definition it is such a method of growth that satisfies the needs of the present generation without lowering the potential of satisfying the needs for future generations.

([http://www.cenia.cz/\\_C12571B20041E945.nsf/\\$pid/MZPMSFHV0HSB](http://www.cenia.cz/_C12571B20041E945.nsf/$pid/MZPMSFHV0HSB))

The implementation of Local Agenda 21 in the Czech Republic started around 1997, substantially later compared to other European countries. [5] Local Agenda 21 can be initiated by a local administrative authority, non-government organization, private sector organization, group of people or an individual citizen. An irreplaceable role in the Local Agenda 21 process is played by the local administrative authority, which has to cover and support it.

### **The Local Agenda 21 process**

Local Agenda 21 should have the following components [6]:

- Organizational background – the process must be coordinated, usually the local administration provides the background or it has to be officially connected with it.
- Community co-operation (partnership) – the local administration should co-operate with local organizations and the public at the highest possible level during the preparations and realization of local activities, individual aims of development of the municipality/region
- Capacity for obtaining resources – Local Agenda 21 leads to a higher capacity for obtaining resources mainly due to the implementation of the UR principle under local conditions.
- Formalization of the process, political support – local representatives must accept Local Agenda 21 as an official part of the development and operation of the municipality/region.
- Sustainable growth strategies with public participation – every municipality/region that wants to initiate Local Agenda 21 should prepare a long-term UR strategy, as a covering document for partial strategies, plans and politics. Every local citizen should have the right to participate on its creation and realization. An action plan, that defines exactly who does what and when, should be part of the strategic plan.
- Upbringing, education, enlightenment and awareness – the citizens themselves have to understand the fundamental questions of UR and also must be aware of the fact that they themselves are the co-creators of the future of the municipality/region. They have to be motivated to actively take part in Local Agenda 21.
- Management of quality – preservation should be taken as part of the operation of the local authority.
- External relations and bonds – UR is not a municipal/regional matter, it has wide connections, therefore the municipality/region should build external relations, informational channel and partnerships with other municipalities/regions, within the national and international project network.
- Micro-projects – partial projects which serve as example projects that contribute to UR. The local administration should take part in them financially.

Within the process a plan with the following components is created, worked with and defined:

- Basic values – that the participants believe in and due to which they participate
- Vision – what we want to achieve, what will the municipality/region look like in 15, 20 years
- Purpose – who are we, why do we want to start and realize the process
- Determining high priority regions – key part in the realization of Local Agenda 21
- Aims and specific goals – aims basically state what we intend to do in each of the chosen regions. Specific goals then specify these aims; however, they are not tasks or precise actions.
- Action – an action plan is set for every chosen region – a list of particular activities (projects), that have to be done, in order for the set goals, in the regions, to be reached.

It is these components that build the Local Agenda 21 foundation for administrative control, the control and administration of public matters including public resources. It is especially because of these components that Local Agenda 21 is ranked as a quality tool for public administration and as was mentioned before – quality management of the given authority is an integral part of Local Agenda 21. Quality tools are very popular at the moment, they are taken over from the private sector (e.g. EFQM excellence model, Balanced Scoreboard, benchmarking, benchlearning, ISO norms and so on), or quality tools that were specially designed for the needs of public administration organizations are implemented (CAF model, Local Agenda 21, community planning and so on).

The Local Agenda 21 process can contain for example; care of historical monuments, care of the countryside, elder citizens care, conservation of traditional customs and crafts, sustainable tourism, school programs specialized on UR questions.<sup>2</sup>

### **Public involvement within Local Agenda 21**

Public involvement is very important for the Local Agenda 21 process, not only into the creation of plans but also in their realization. A helpful tool for this integration can be the aforementioned community planning. The more people are involved in the Local Agenda 21 process, the better the process is. Possible tools for public involvement are questionnaires, flyers, public meetings, round-table meetings, exhibitions, individual discussions, virtual discussions, case studies and so on.

The advantages of public involvement:

- The foregoing of conflicts, conflict solution acceptable by both parties, help with incomprehension and misunderstanding
- The co-operating parties mutually learn and inspire each other, thus increasing creativity
- Everybody brings their local knowledge and experience as well as their expertise
- People can relate to the intention, take it for their own and will care about the outcome
- Strengthens cohesiveness with municipality, feeling of ownership and motivates to act
- Helps to reach UR goals
- Enhances process dynamics

### **Measuring the quality of Local Agenda 21 in the Czech Republic**

The official tools, allowing all active local administrations to show whether they are using Local Agenda 21 and on what level, according to specific parameters, are the Local Agenda 21 Criteria. The criteria are registered in the Local Agenda 21 internet database – official Local Agenda 21 registration in the Czech Republic.

A set of twenty-one Local Agenda 21 Criteria is split into four categories “A” to “D”, the starting “Applicants” category is a part as well. Each of these categories represents a certain level of quality of the realized Local Agenda 21. Each Local Agenda 21 Criteria has given indicators including activities/operations whose realization leads to its completion. An integral part of the indicators are their limits – a specific value that has to be fulfilled and provided by every municipality according to specific documentation. It is an official set of criteria covered by the Government Board of Sustainable Growth. The characteristics of each category can be found for example on the website of the National network of Healthy Cities<sup>3</sup>.

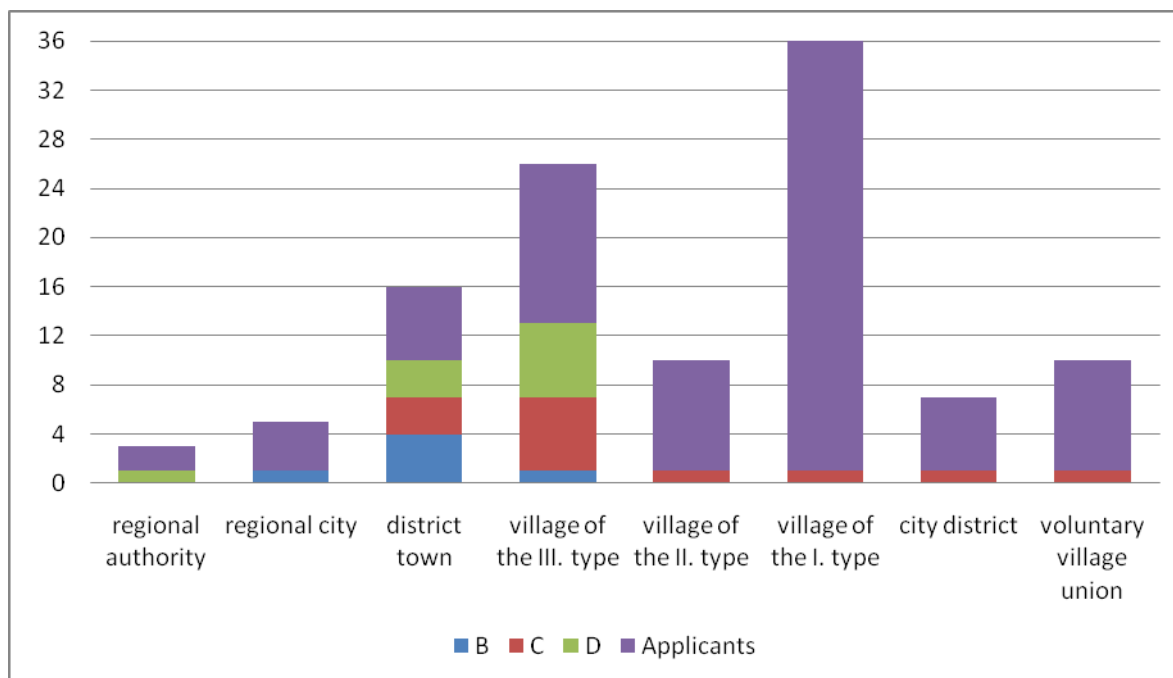
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<sup>2</sup> Other cases of Local Agenda 21 can be found on: <http://obcan.ecn.cz/index.shtml?w=u&x=1923253>

<sup>3</sup> Particularly available on: <http://www.nszm.cz/cb21/asp/ibrana.asp?id=11695>

Most municipalities can be found in the “Applicants” category, category “A” has not yet been reached by any municipal organization (see picture). Local Agenda 21 is implemented in a total of 113 municipalities, from which 84 are in the “Applicants” category (status on 27.2.2009).

**Picture 1 Number of municipal subjects in the LA 21 categories**



Data source: View of LA 21 in the Czech Republic in 2009. Status on 27. 2. 2009). Available at: <http://ma21.cenia.cz/prehled>. Worked by authoress.

### **Local Agenda 21 support**

Local Agenda 21 is currently supported by some official document, such as the Strategy of sustainable growth of the Czech Republic, Environmental state policy, State program of environmental education, upbringing and enlightenment. The start of the Government Boards of Sustainable Growth, or its Local Agenda 21 work group to be more precise, contributed to the institutional consolidation of Local Agenda 21. Its goal is to assist so that Local Agenda 21 will become a frequent instrument for planning in the public administration of the Czech Republic. In the year 2005, the work group compiled and started testing Local Agenda 21 Criteria in practice; these should allow the comparison between the quality of individual Local Agendas 21 and their categorization into a database based on objective indicators.

The Local Agenda 21 coordinator in the Czech Republic is CENIA, a Czech environmental information agency that provides basic and fundamental information, provides contacts and information sources inside and outside the Czech Republic. It keeps a database of all current Local Agendas 21 within the Czech Republic on its website. Two networks of cities and villages that support Local Agenda 21 are of national significance – the National network of Healthy Cities of the Czech Republic and the TIMUR association aimed at watching the indicators of sustainable growth on a local level.

### **Local Agenda 21 awarded with the Department of Home Affairs Award for quality and innovation in public administration**

Local Agenda 21 belongs to a group of instruments controlling and increasing the quality within public administration, whose implementation is awarded with the Department of Home

Affairs Award for quality and innovation. These are awards given out every year since 2005 by the Department of Home Affairs on the National conference of quality in public administration. The Department of Home Affairs tries to support the implementation of quality instruments into public administration organizations with a number of motivational ways<sup>4</sup>, one of them are the mentioned Department of Home Affairs Awards for quality and innovation. The aim of these awards is to support those public administration organizations that look for and find ways to improve their quality or the quality of their services. According to Ing. Pavel Kajml, from the Division of reform regulation and quality in public administration, the aim of the Department of Home Affairs Awards is to support those organizations that are not only aware of the importance of quality but are also looking and finding ways of reaching it. [1] The awards are a tool for popularization and the spreading of modern instruments of control in public administration in the Czech Republic. Awards are awarded in two categories:

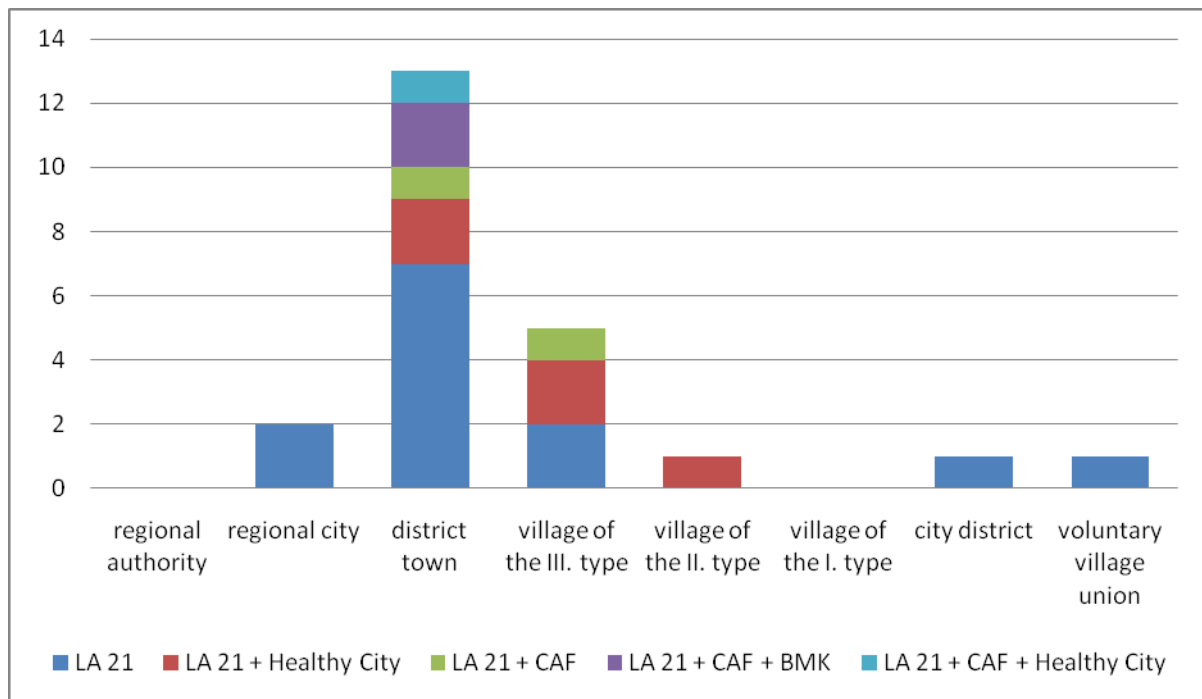
- bronze – “Organization raising the quality of public services” for first results in the raising of quality of provided services,
- silver – “Organization of good public services” for excellent and demonstrable organizational achievements in the given year.

The expansion of Local Agenda 21 was mentioned before, now is a good time to look at how many municipalities were awarded a certain type of the Department of Home Affairs Award for quality and innovation for their implementation of Local Agenda 21 – see picture 2. It is necessary to mention that picture 2 shows the total number of awards obtained between years 2005 and 2008 and not the number of subject of the given municipality. The same municipalities can be awarded more than once for the same instrument of quality, mostly there is a difference in the award category (bronze x silver). More than one award for the same subject can be found in the category of regional and district towns. The awards in the picture are divided according to the type of municipal subject: regional authority (total of 13 in the Czech Republic), regional city (total of 13 regional cities), district town (total of 61 district towns), village with an expanded sphere of operation (village of the III. type, total of 205 villages), village with a municipal office (village of the II. type, total of 188 villages), other village (village of I. type, total of 5855 villages), city district (in the capital city Prague, or possibly in other cities) and Voluntary Village Unions (VVU).

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<sup>4</sup> Department of Home Affairs professionals in co-operation with external experts provide e.g. methodical supervision and coordination of activities linked with the implementation and use of tools for quality measurement in public administration organizations, the Department of Home Affairs provides a number of projects and conferences about quality in public administration.

**Picture 2 Number of the Department of Home Affairs Awards for implementation of LA 21 (of years 2005–2008)**



Data source: information from Reform governing and quality in public administrative Department (the Department of Home Affairs). Worked by authoress.

Both awards for regional cities went to one - to Ústí nad Labem (for years 2006 and 2008). The following cities were also awarded more than once:

- Vsetín (2006 and 2008) for Local Agenda 21
- Chrudim for Local Agenda 21 (2006) and for Local Agenda 21 + CAF + Healthy City (2007)
- Prostějov for Local Agenda 21 + CAF (2006), for Local Agenda 21 + Healthy City (2007) and for Local Agenda 21 (2008)
- Litoměřice for Local Agenda 21 + Healthy City (2007) and for Local Agenda 21 (2008).

Municipalities were awarded for the sole implementation of Local Agenda 21 on one hand and for a combination of several methods of quality improvement, mostly with the CAF<sup>5</sup> model and the Healthy City<sup>6</sup> project, on the other.

<sup>5</sup> CAF = Common Assessment Framework, a self-evaluation framework developed especially for the needs of public administration organizations, based on the EFQM excellence model.

<sup>6</sup> Initiated by the UN in 1988, and implicated in the Czech Republic after the year 1989. Based on two documents: Health 21 (a document of the World health organization WHO – UN) and NEHAP (National environmental and health action plan of the Czech Republic from 1998)

**Chart 1 The number of municipalities using LA 21 and municipalities awarded for using LA 21 comparison (of years 2005–2008)**

<b>Municipal type</b>	<b>Well-established LA 21 (1)</b>	<b>Well-established LA 21 without „Applicants“<sup>7</sup> (2)</b>	<b>Number of Awards (3)</b>	<b>Number of awarded subjects (4)</b>	<b>(4)/(2) (in %)</b>
<b>Regional authority</b>	3	1	0	0	0
<b>Regional city</b>	5	1	2	1	100
<b>Distrikt town</b>	16	10	13	8	80
<b>Village of the III. type</b>	26	13	5	5	38,5
<b>Village of the II. type</b>	10	1	1	1	100
<b>Village of the I. type</b>	36	1	0	0	0
<b>City district</b>	7	1	1	1	100
<b>Voluntary village union</b>	10	1	1	1	100
<b>Total</b>	<b>113</b>	<b>29</b>	<b>23</b>	<b>17</b>	<b>58,6</b>

Data source: CENIA and Reform governing and quality in public administrative Department (the Department of Home Affairs). Worked by authoress.

From the total number of 113 municipalities in all categories of Local Agenda 21, already 15% of them received a Department of Home Affairs award for their implementation. The Department of Home Affairs Awards for quality and innovation are not intended for the “Applicants” category. As table 1 clearly shows, it is very probable, that if a municipality that is in a higher category signs up for the Department of Home Affairs Awards it will be awarded with some kind of this prize. We can also see from the table, that it is possible to obtain a prize for implementing Local Agenda 21 and its quality improvement impact more than once (however, only once per year). Local Agenda 21 is mostly spread in district towns (13.1% from the total of 61 district towns in the Czech Republic), and these have received more than half of the Local Agenda 21 prizes awarded. It is on this level that Local Agenda 21 is very often complemented with another instrument for improving quality.

## **Conclusion**

I suppose that for municipalities, Local Agenda 21 is an understandable and an easy to grasp tool for practical following of the principles of sustainable growth. Only a small number of self-administrative municipalities use Local Agenda 21, if we take into account the total number of municipalities - 6248. Even so we can say that the use of this tool is very positive, at least because the use of Local Agenda 21 demonstrates the effort of authorities to tackle the problems of environmental protection and sustainable growth. Thanks to the motivation of the Ministry of Home Affairs and its awards for quality and innovation, or thanks to rewarding these efforts leading to higher quality services and overall higher quality of life of the citizens

<sup>7</sup> Only category A, B, C and D.

in the municipality, the expansion of Local Agenda 21 and other managing and innovative tools for public administration will help raise the standard of living.

## References

1. KAJML. P. *Ceny MV ČR za kvalitu a inovaci v územní veřejné správě za rok 2006. Aktuální stav.* [on-line] [cit. září 2008]. Dostupné na: <http://www.mepco.cz/data/Ceny%20MV%202006.ppt>
2. *O místní Agendě 21.* [on-line] [cit. únor 2009]. Dostupné na: [http://www.cenia.cz/web/www/web-pub2.nsf/\\$pid/MZPMSFGSI0KM](http://www.cenia.cz/web/www/web-pub2.nsf/$pid/MZPMSFGSI0KM)
3. MV ČR. Informace o udělení cen MV za kvalitu a inovaci v jednotlivých letech ve formátu MS Excel
4. *Agenda 21.* MŽP 2005. [on-line] [cit. únor 2009]. Dostupné na: <http://www.env.cz/osv/edice.nsf/e26dd68a7c931e61c1256fbe0033a4ee/b56f757c1507c286c12570500034ba62?OpenDocument>
5. *Místní Agenda 21 v ČR a v Praze.* ENVIS – Informační servis. [on-line] [cit. únor 2009]. Dostupné na: [http://envis.praha-mesto.cz/\(4hmrnn55hjxwi555pkwzsq45\)/default.aspx?ido=5323&sh=-473550853](http://envis.praha-mesto.cz/(4hmrnn55hjxwi555pkwzsq45)/default.aspx?ido=5323&sh=-473550853)
6. *Místní Agenda 21 – Jak na to.* [on-line] [cit. únor 2009]. Dostupné na: <http://obcan.ecn.cz/index.shtml?w=u&x=1923253>
7. CENIA. *Přehled MA 21 v ČR v roce 2009.* Stav ke konci února 2009. [on-line] [cit. únor 2009]. Dostupné na: <http://ma21.cenia.cz/prehled>.

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# COMPARISON OF PRESENTED ENVIRONMENTAL DATE WITH A VIEW TO MUNICIPALITY

Eduard Bakoš, Barbora Kaplanová, Jana Soukopová

## Introduction

It is known there are two ways to observe expenditures for environmental protection in the Czech Republic:

- via sample survey by Czech Statistical Office
- via the Ministry of Finance's information system ARIS<sup>1</sup>.

Expenditures for environmental protection obtained from those two main sources are also used by CENIA Agency which displays the data on its own website, as analyzed later.

In both cases expenditures are observed by the international classification CEPA 2000 which divides environmental protection expenditures into 9 areas:

1. Protection of ambient air and climate
2. Waste water management
3. Waste management
4. Protection and maintenance of soil, underground and ground water
5. Noise and vibration abatement (except for protection of work places)
6. Biodiversity and landscape protection
7. Protection against radiation (except for external protection)
8. Research and development
9. Other environmental protection activities

Budget composition does not exactly follow these areas. Field classification of budget composition for 2009 divides section 37- environmental protection into the following subsections:

- 371 – Protection of ambient air and climate
- 372 – Waste management
- 373 – Protection and maintenance of soil and underground water
- 374 – Protection of nature and landscape
- 375 – Noise and vibration abatement
- 376 – Environmental protection administration
- 377 – Protection against radiation
- 378 – Environmental research
- 379 – Other environmental activities

The differences in the methodology of data classification are shown in the chart below.

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<sup>1</sup> ARIS stands for Automated Budgeting Information System.

**Chart 1 Municipality budgets expenditures according to the functional classification of budget composition and Czech Statistical Office**

Czech Statistical Office	Ministry of Finance (budget composition)
Protection of ambient air and climate	Air protection
Waste water management	Water protection
Waste management	Waste management
Protection and maintenance of soil, underground and ground water	Protection of soil and underground water
Noise and vibration abatement (except for protection of work places)	Reduction of physical factors effects (noise and vibration abatement and protection against radiation)
Protection against radiation	
Landscape and biodiversity protection	Biodiversity and landscape protection
Research and development	Environmental research
Other activities	Other ecological activities
	Environmental protection administration

As seen from the chart, there are some small differences in the application of CEPA 2000 methodology in the Czech Republic according to Czech Statistical Office<sup>2</sup> and the Ministry of Finance. In OECD and Eurostat methodology these differences in particular items are emphasized as well as other differences when observing data according to CEPA 2000 in various countries. The most concerned item is the “other” item where some countries include other areas and therefore there are less than 9 areas observed. Some areas may not be observed at all.<sup>3</sup>

It is important to add that besides the section 37 there are also sections 10 and 23, e.g. 1037 and mainly paragraphs 2321, 2322, and 2324. These paragraphs have an impact on the amount of ecological expenditures and it is necessary to include them into municipality budgets expenditures which are spent on environmental protection activities. According to the authors Paroubek and Kinšt<sup>4</sup> these paragraphs are preferred to those in the section 37.

Czech Statistical Office observes investments to environmental protection, non-investment expenditures for environmental protection and economic benefits from activities regarding environmental protection.

These data are observed with the help of sample surveys done by Czech Statistical Office in “Annual statement about environmental protection expenditures”. According to the information from CSU, they chose mostly agricultural and industrial economic subjects, subjects that deal with waste water and waste removal, public cleaning (OKEC 90), communities having a population of more than 500, budget organizations, state organizations, state funds, National Property Fund, Land Fund, Support and Guarantee Agricultural and Forestry Fund, Railway Infrastructure Administration.<sup>5</sup>

<sup>2</sup> The classification of areas according to Czech Statistical Office corresponds to the classification according Eurostat

<sup>3</sup> OECD/Eurostat: Environmental Protection Expenditure and Revenue Joint Questionnaire/

<sup>4</sup> Kinšt, Paroubek: Rozpočtová skladba v roce 2009, p. 138

<sup>5</sup> Annual statement about environmental protection expenditures.

It is obvious that the sample survey of CSU does not involve small towns (with a population of less than 500) and it is hard to determine whether the expenditures were funded by public or private sector.

Public sector expenditures and mostly those from public budgets are observed by the Ministry of Finance independently. Using its statistics and the information system ARIS, the Ministry assigns environmental protection expenditures from central sources (state budget, state funds) and municipality budgets. The differences in data from MF and CSU are shown in the following (detailed) chart 2.

Based on an elaborated analysis, data from the Ministry of Finance and its system ARIS are more relevant. They are complete because they contain data about budget plan as well as its execution in every municipality. For the further analysis it is necessary to discuss the CEPA methodology and the budget composition paragraphs which can be included into particular areas of environmental protection within municipality budgets analysis.

The presented data are taken up and used in other official documents which could be confusing sometime. CSU posts several publications that refer to investment and non-investment expenditures for environmental protection. The first document is “Statistical yearbook 2007” with published investment and non-investment expenses classified, among others, by regions. The data are published with delay – we can find only expenditures from 2005 in the updated yearbook. Similar data can be found in two other documents; Regional yearbooks and a publication called “Environmental protection expenditures in the Czech republic”. It is a paradox that the most updated documents contain data from 2007, too.

There are two more publications that contain data from both sources. It is “Statistical yearbook of environment 2008” and “Report on environment in the Czech Republic 2008”. Although both publications cite the sources, less informed individuals can make errors when applying the data.

**Chart 2 Comparison of data from MF CR and CSU in chosen environment protection area by regions in 2007**

	Source	Capital						Non-capital (current)						TOTAL
		Air protection	Waste water management	Waste management	Protection and maintenance of soil, underground and ground water	Others	Total	Air protection	Waste water management	Waste management	Protection and maintenance of soil, underground and ground water	Others	Total	
Prague City	MF	19 310	263 824	6 955	920	754 887	1 045 896	12 871	129 329	1 209 499	14	1 045 148	2 396 862	3 442 758
	CSU	596 509	277 801	914 885	334 959	1 401 061	3 525 215	784 832	1 238 213	9 880 238	644 295	323 860	12 871 438	16 396 653
Central Bohemia Region	MF	24 493	1 847 776	15 385	0	95 800	1 983 454	6 104	196 938	843 080	777	514 834	1 561 732	3 545 186
	CSU	490 685	874 598	173 671	965 718	73 787	2 578 459	363 565	933 412	2 178 433	141 308	88 651	3 705 369	6 283 828
South Bohemian Region	MF	11 062	476 357	33 195	-	93 981	614 595	3 249	98 634	438 259	52	310 469	850 663	1 465 258
	CSU	182 264	223 386	167 669	36 312	20 203	629 834	72 375	572 536	1 335 821	50 100	49 128	2 079 960	2 709 794
Pilsen Region	MF	5 334	1 631 534	60 374	106	44 149	1 741 498	127	76 805	292 186	473	274 780	644 371	2 385 869
	CSU	328 771	1 163 576	245 171	10 439	34 231	1 782 188	59 627	437 039	1 240 358	6 172	59 676	1 802 872	3 585 060
Karlovy Vary Region	MF	44	146 570	2 099	0	26 113	174 825	965	17 040	188 585	5	165 652	372 247	547 072
	CSU	97 384	145 255	49 631	i.d.	i.d.	316 418	48 216	298 816	387 162	1 257	22 714	758 165	1 074 583
Usti Region	MF	19 281	308 081	12 432	1 753	138 788	480 335	3 040	29 694	530 057	538	432 902	996 230	1 476 565
	CSU	874 755	476 919	474 636	391 293	299 277	2 516 880	652 060	644 469	4 758 477	44 580	468 195	6 567 781	9 084 661
Liberec Region	MF	381	119 736	9 129	0	29 979	159 226	1 116	16 338	327 797	17 846	202 473	565 571	724 797
	CSU	203 307	70 860	46 885	173 644	15 046	509 742	20 865	177 883	793 977	1 136 731	337 008	2 466 464	2 976 206
Hradec Králové Region	MF	301	321 338	69 785	0	59 995	451 419	79	62 768	298 996	838	325 762	688 443	1 139 861
	CSU	86 584	259 874	308 287	52 391	30 775	737 911	41 067	341 948	1 341 968	52 887	44 672	1 822 542	2 560 453
Pardubice Region	MF	5 880	365 582	87 720	54 411	47 786	561 379	3 849	58 499	314 231	12 915	182 195	571 690	1 133 069
	CSU	139 317	303 365	124 111	-	-	599 590	194 827	765 146	2 300 575	105 500	92 258	3 458 306	4 057 896
Vysocina Region	MF	9 714	635 675	95 006	-	59 111	799 506	5 353	58 799	339 042	912	189 852	593 958	1 393 465
	CSU	402 500	132 061	86 980	25 102	14 851	661 494	53 539	165 023	570 724	12 513	28 669	830 468	1 491 962
South Moravian Region	MF	1 575	1 466 220	228 107	15 843	148 967	1 860 711	4 795	334 763	850 953	5 412	518 856	1 714 779	3 575 490
	CSU	238 077	575 618	317 856	77 852	98 987	1 308 390	103 998	788 646	3 462 039	139 204	292 799	4 786 686	6 095 076
Olomouc Region	MF	1 513	1 187 050	4 809	2 038	69 141	1 264 551	1 001	84 206	430 788	409	326 445	842 849	2 107 400
	CSU	241 346	540 875	86 983	20 385	68 500	958 089	216 989	308 478	1 050 598	176 015	57 578	1 809 658	2 767 747
Zlín Region	MF	7 042	433 866	89 775	809	74 947	606 438	4 852	60 204	406 552	863	272 201	744 673	1 351 112
	CSU	279 966	375 476	234 426	26 844	7 269	923 981	117 011	516 163	1 426 501	17 543	55 956	2 133 174	3 057 155
Moravian-Silesian Region	MF	6 588	415 167	17 789	1 567	121 241	562 351	4 175	90 456	834 788	1 480	547 164	1 478 062	2 040 413
	CSU	1 744 467	633 637	141 353	94 826	237 067	2 851 350	422 958	901 388	3 049 835	82 930	143 391	4 600 502	7 451 852
Czech Republic Total	MF	93 208	9 354 951	725 604	76 526	1 009 998	11 260 288	38 704	1 185 144	6 095 314	42 521	4 263 585	11 625 267	22 885 555
	CSU	5 905 932	6 053 301	3 372 544	2 209 765	2 301 054	19 899 541	3 151 929	8 089 160	33 776 706	2 611 035	2 064 555	49 693 385	69 592 926

Source: CSU and MF

Environmental protection expenditures are recorded also by the Ministry of the Environment's allowance organization CENIA. At the present, the Agency summarizes and posts all the data (from CSU and MF CR) on its website. Even though the Agency declares that some data are taken over from the Ministry of the Environment, after a closer examination, it can be supposed the data are originally from the MF CR. The agency does not explain its CEPA 2000 methodology either and it is impossible to determine the differences in the application of the methodology according to CSU and MF CR as was done earlier in the text. The data published by CENIA are completed and cover both observed categories. The data are also used in other published documents.

When focused on the comparison of environment protection expenditures observed by CSU and MF CR, the numbers reported by MF CR are lower than those reported by CSU. It should be logical since CSU includes private investments as well. Interesting situation occurs in the item "others" where numbers from MF CR are higher than those from CSU. It is probably due to the different application of CEPA methodology by both institutions. MF CR includes expenditures concerning environmental protection administration into "others" while CSU does not. There is one more value that is higher according to the MF CR and that is "investment expenditures" in the area of "Waste water management". It may be caused by building sewage disposal systems in towns with a population of less than 500 because CSU does not observe data in such small communities.

As mentioned earlier, MF CR observes data by municipal budgets as well. For the purpose of this project these data are crucial, especially for researching the data in particular regions and municipalities. Although there is an obligation to post the data in the information system, some data in ARIS cannot be found. It is caused by many factors. At the present, it is impossible to obtain such data or it would be extremely hard to interpret them based on reports from CSU's sample surveys. It would not cover all data anyway. For those reasons, the authors of the project focus only on the analysis of the data from MF CR.

## **Conclusion**

Environmental protection expenditures in the Czech Republic are closely observed in two ways – via sample survey of CSU and via the Ministry of Finance's information system ARIS. It looks like for purposes of detailed analysis of environmental protection expenditures from municipality budgets it is better to analyze only data from the MF CR. Those data provide more detailed and more complex view on the given issue.

## **References**

1. SOUKOPOVÁ, J., NESHYBOVÁ, J. KAPLANOVÁ, B., BAKOŠ, E. Analýza místních rozpočtů a jejich efektivnosti ve vztahu k ochraně životního prostředí. Závěrečná zpráva o řešení projektu SP/4I1/54/08 2008. 51 s.
2. OECD/Eurostat: Environmental Protection Expenditure and Revenue Joint Questionnaire/SERIEE Environmental Protection Expenditure Account, Conversion Guidelines, 2005.
3. PAROUBEK, J., KINŠT J. Rozpočtová skladba v roce 2009. Praha: ANAG, 2008. ISBN 978-80-7263-486-6.

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# THE DEVELOPMENT OF DISPARITIES IN LIFE QUALITY IN SOUTH MORAVIA REGION

Iva Živělová, Jaroslav Jánský

## Abstract

The aim of the paper is the disparity analysis of life quality among the townships of South-Moravian region, and that the townships: Blansko, Brno-město, Brno-venkov, Břeclav, Hodonín, Vyškov and Znojmo. The duality of life is possible to evaluate with respect to three basic sources of regional sustainable development, namely economical, environmental and social sources. The paper is especially focused on environmental sources related to environment protection and to the outgoings spent on this protection in relevant regions in 2002 – 2006.

**Key words:** quality of life, regions' disparity, environmental protection

## References

1. Živělová, I., Jánský, J. Metodologické přístupy k hodnocení ekonomické výkonnosti regionu. Sborník z mezinárodní vědecké konference „Účetnictví a reporting udržitelného rozvoje na mikroekonomické a makroekonomické úrovni“. Brno 2007. ISBN 978-80-7194-970-1
2. Český statistický úřad, 2009 [on-line]. [cit. 2008-12-15] <http://www.czso.cz/xb/edicniplan.nsf/tab/13002E297D>
3. Zpráva o stavu životního prostředí. Ministerstvo životního prostředí ČR [on-line]. [cit. 2009-02-11] [http://mzp.cz/cz/zpravy\\_o\\_stavu\\_zivotniho\\_prostredi](http://mzp.cz/cz/zpravy_o_stavu_zivotniho_prostredi)

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# ANALYSIS OF MODEL PROJECTS OF SUSTAINABLE DEVELOPMENT IN HOSTĚTÍN

Jana Tesařová

Since the nineties of the 20<sup>th</sup> century, model projects of sustainable development have been arising in Hostětín, a small village located in the White Carpathians, on the border between Czech Republic and Slovakia. The cooperation of the municipality, non-profit organization ZO ČSOP Veronica and other partners had started on designing the reed-bed sewage treatment plant and continued during other projects, mainly from the area of sustainable energy and fruit-growing and processing. Nowadays, following projects are situated in Hostětín (the year of launching indicated in the brackets):

1. Reed-bed sewage treatment plant (1997)
2. Traditional fruit drying kiln (reconstruction 1998)
3. Apple juice plant with organic production (2000)
4. Solar collectors for heating water (nineties of the 20<sup>th</sup> century)
5. Biomass heating plant (2000)
6. Saving public lighting (2006)
7. Passive house – educational Centre Veronica Hostětín (2006)
8. Photovoltaic solar collectors (2008)

The uniqueness of Hostětín in the scale of Czech Republic lies in complexity and concentration of the model projects, their mutual cohesion and utility in the life of the real village. The experience from regularly monitored projects is widely disseminated via excursions and educational modules. In 2008, an analysis of model projects named „What the Hostětín projects brought?“ was elaborated. The analysis is a subject of this conference entry, which does not aim at bringing detailed information about the analysis' findings, but rather wishes to present goals, methodology and selected interesting points, and motivate to reading the whole analysis.

## Goals of the analysis

The notion of sustainable development goes through visions and policies, but only rarely it finds concrete shape in everyday practice. The goal of the analysis of the model projects of sustainable development is to describe their benefits and difficulties in environmental, economic and social area and so to bring argumentation and a concrete example of application of the sustainable development concept.

The analysis is a source of information for research, counselling and educational institutions and public authorities, which deal with sustainable development. Especially, it serves as a basis for decision-making of Hostětín visitors (expert as well as lay public), who need detailed data for realization of similar projects. (After building of the educational centre, designed in the standard of passive houses, and also in association with growing public interest in solving environmental problems, the number of people interested in good practice examples in Hostětín has grown – nowadays, the projects are visited by more than 5000 people a year.)

## **Methodology**

Analysis of the model projects of sustainable development was elaborated by the Czech independent think tank Economy and Society Trust; using literature search, personal interviews and data of Hostětín municipality, ZO ČSOP Veronica and other partners.

With regard to the absence of unified, complex and comprehensible methodology, own methodology was designed. It had been inspired by the Moldan's publication „Sustainable Development Indicators“ (1996). The Hostětín analysis works with so-called aspects of sustainability, which are not so exactly formulated, measurable, and verifiable as the sustainable development indicators. However, they are more concrete and they can be applied on the micro-level. As well as the indicators, the aspects are formulated as simply and comprehensibly as possible. They are divided into three basic pillars of sustainable development – economic, social and environmental (not seldom they diffuse). The aspects of sustainability are designed in a way to reflex strong and weak points of individual projects and at the same time to be pursuable at all projects, or at least at several projects.

The aspects involve for example jobs creation in the social aspect, local financial flow in the economic aspect (it was quantified by the instrument called local multiplier, developed for measuring financial contribution of institutions or companies to communities). In the environmental pillar, the aspects comprise use of local resources, energy savings, carbon dioxide emissions savings and others. Some of the aspects can be quantified, some are subject of qualitative evaluation with the risk of certain subjectivity.

Since the study aspired to cover not only economical, but also other viewpoints, the cost-benefit analysis was not used. Also, the SWOT analysis did not serve as a tool, as the aim was to follow mainly the projects' common effects, and mainly from the angle of sustainability.

## **Content of the analysis**

The analysis of Hostětín model projects counts 86 pages and is divided into six chapters. The preface, methodology description, localization and brief introduction to the theory of sustainable development concept are followed by analyses of the individual projects. Readers can learn about goals, history and technical parameters of the projects, as well as about their benefits and pitfalls divided into the aspects of sustainability. Consequently, the individual projects' analyses are summarized for the complex of model projects as a whole. The analysis contains a four-page summary in English.

## **Conclusions**

The conclusion chapter presents the overall effects of the complex of the model projects of sustainable development in Hostětín. It brings the aspects of sustainable development which are common for all, or most of the projects:

<i>Economic aspects</i>	<i>Social aspects</i>	<i>Environmental aspects</i>
<ul style="list-style-type: none"> <li>▪ financial flow in the region – generated purchases</li> <li>▪ incomes from individual and company taxes for the municipality and the state – not very important compared to other factors</li> <li>▪ efficient use of local and natural resources – fruit, wood, solar energy, rainwater etc.</li> <li>▪ electricity and energy savings</li> <li>▪ change of consumer patterns (organic juice, solar and biomass energy use, insulation etc.); development of the market with local products (regional mark Traditions of the White Carpathians®)</li> </ul>	<ul style="list-style-type: none"> <li>▪ education – more than 5000 visitors of Centre Veronica Hostětín a year</li> <li>▪ creating jobs – 8-10 local jobs, placement for highly educated and disadvantaged people</li> <li>▪ promotion of the region and municipality – pilot example for other regions</li> <li>▪ participation of the civil society – local events, cooperation of local associations</li> <li>▪ self-help /voluntary work</li> <li>▪ growth of the village inhabitants number</li> <li>▪ public health protection – air quality improvement etc.</li> <li>▪ contentment with the projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ biodiversity protection – old fruit varieties conservation, biotope around the reed-bed sewage treatment plant etc.</li> <li>▪ climate protection – see the table below</li> <li>▪ efficient use of energy and substitution of fossil energy by the renewable energy resources</li> <li>▪ environment protection (air, soils, water)</li> </ul>

From the narratives, we present a few commenting data. Among others, it deals with connection to local economy. The tool called local multiplier shows that the apple juice plant generates 63 additional halers from each Czech crown (CZK) received, and the biomass heating plant even 1.30 cents (out of maximum two CZK which can be generated – for more see Kutáček, 2007).

In the environmental pillar, the intentional concept and goal of all model projects in Hostětín is emphasized - the way towards energy self-sufficiency and maximal use of renewable resources.

It is useful to point out at the global climate connections, among others the carbon dioxide savings calculations. Such tools should be common not only for the state and higher levels, but also for the lower levels – regions, municipalities, institutions and individuals. In the case of Hostětín the carbon dioxide savings are as follows:

<i>Project</i>	<i>Approx. savings of the carbon dioxide emissions in tons</i>
Reed-bed sewage treatment plant	20
Solar systems for heating water	80
Biomass heating plant	1500
Saving public lighting	6
Total	1606

The author of the analysis finds a proportioned representation of the economic, social and environmental aspects in the Hostětín model projects. She points out at the significant role of initiating and leasing personalities and multilateral cooperation in the present rural development.

### **A source of inspiration?**

The analysis presents concrete experience with model projects of sustainable development in Hostětín – their benefits and pitfalls.

Its other goal, with no less importance, is to show what standpoint could or should the individuals, institutions and communities take as for evaluating intents and projects. Not only from the view of the economic short-term profit, but mainly from the long-term view with all parameters – economic, social and environmental. Solutions which fulfil all three pillars of sustainable development can be sought.

The analysis also points at the concept of local economy, which has not so far received much attention in the Czech Republic; even though it carries potential to strengthen the stability and independence of outward resources, to generate additional finances, create local jobs and respect local traditions.

### **Acknowledgements and supplemental information**

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The analysis of model projects of sustainable development „What the Hostětín projects brought?“ is disposable at the following web page or address. Centre Veronica Hostětín issued also its short version called „The Hostětín way“.

### **References**

1. Stanislav Kutáček (ed.), *Peněžům na stopě* (Brno, 2007)
2. Bedřich Moldan, *Indikátory udržitelného rozvoje* (Praha, 1996)
3. Jitka Uhlířová, *Co přinesly projekty v Hostětíně? Analýza modelových projektů udržitelného rozvoje.* (Brno, 2008)
4. *Hostětínská cesta* (Hostětín, 2008)

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# THE AIR QUALITY MONITORING IN AUTOMATIC SYSTEM IN BAI A MARE CITY

Ana-Irina Smical, Vasile Hotea, Dan Constantinescu, Jozsef Juhasz, Elena Pop

## 1. Introduction

Air represents one of the most important environmental constituent since the life development strongly depends of its quality. In order to insure the air quality a series of legislative provisions and measures have been issued and implemented.

The responsibility concerning the air quality monitoring in Romania belongs to the environmental protection authorities [1].

The monitored pollutant categories, the measurement methods, the alert and informative thresholds as well as the monitoring point emplacements are established by national legislative provisions in accordance with the European Regulations requirements.

Baia Mare city is one of the 11 agglomerations in Romania that are part of a special regime of air quality assessment and management [2].

## 2. The automatic air quality monitoring network

In Romania there are 117 equipments for continuously air quality monitoring. They have been endowed with automatic systems for measuring the concentrations of the most important atmospheric pollutants. This national network includes 38 local centers which have the role to collect and send the received data from the monitoring stations to the public informative panels.

After their primary validation by the local centers these data are sent to the National Reference Laboratory in Bucharest in the view of their certification.

The monitored pollutant categories are: sulphide dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), suspension powders (PM<sub>10</sub> and PM<sub>2,5</sub>), benzene (C<sub>6</sub>H<sub>6</sub>), lead and other toxic metals (Pb, Cd, As and Hg) and aromatic polycycle hydrocarbons (PAHs). Based on these pollutants concentration the air quality is expressed using specific quality index.

**Fig.2 Quality index for the air pollutants concentrations measured by the continuous monitoring stations. (source: [www.calitateaer.ro](http://www.calitateaer.ro))**



1 – Excellent; 2 - very good; 3 - good; 4 – medium; 5 – bad; 6 – very bad

The specific index correspondent to sulphide dioxide is established by the medium hour value included in one of the concentration domains presented in the table below:

**Table 1 Specific index of concentrations domain for sulphide dioxide**

Concentrations domain for sulphide dioxide (ug/m3)	Specific index
0-49,(9)	1
50-74,(9)	2
75-124,(9)	3
125-349,(9)	4
350-499,(9)	5
>500	6

The specific index correspondent to nitrogen dioxide is established by the medium hour value inclusion in one of the concentration domains presented in the table below:

**Table 2 Specific index of concentrations domain for nitrogen dioxide**

Concentrations domain for nitrogen dioxide (ug/m3)	Specific index
0-49,(9)	1
50-99,(9)	2
100-139,(9)	3
140-199,(9)	4
200-399,(9)	5
>400	6

The specific index correspondent to ozone is established by the medium hour value inclusion in one of the concentration domains presented in the table below:

**Table 3 Specific index of concentrations domain for ozone**

Concentrations domain for ozone (ug/m3)	Specific index
0-39,(9)	1
40-79,(9)	2
80-119,(9)	3
120-179,(9)	4
180-239,(9)	5
>240	6

The specific index correspondent to the carbon monoxide is established by including the arithmetic average of the hour values, registered in the last 8 hours in one of the concentrations domains in the table below:

**Table 4 Specific index of concentrations domain for carbon monoxide**

Concentrations domains for carbon monoxide (mg/m3)	Specific index
0-2,(9)	1
3-4,(9)	2
5-6,(9)	3
7-9,(9)	4
10-14,(9)	5
>15	6

The specific index correspondent to the suspension powders is established by including the arithmetic average of the hour values, registered in the last 24 hours in one of the concentrations domains in the table below:

**Table 5 Specific index of concentrations domain for suspension powders**

Concentrations domains for suspension powders (ug/m <sup>3</sup> )	Specific index
0-19,(9)	1
20-29,(9)	2
30-49,(9)	3
50-79,(9)	4
80-99,(9)	5
>100	6

In the National Network for the Air Quality Monitoring, 5 stations for the air quality monitoring have been installed in Baia Mare City. They were inaugurated in December 2007. These are emplaced as follows:

- a) **MM1 – Traffic Station (28, Bucharest Street)** – assesses the traffic influence upon the air quality having a representative range between 10-100 m;
- b) **MM2 – Urban Background (9-11, Unirii Street in Mara Park)** – assesses the influence of “human settlements” upon air quality. It covers an area of 1-5 km. It shows both the atmospheric pollutant and the meteorological parameters;

**Fig. 3 (1) Urban Background Station - MM2; (2) informational panel** (source [www.apmmm.ro](http://www.apmmm.ro))



- c) **MM3 – Suburb Background (65, Firiza Street)** – it is similar with the urban station but it has a representative range of 1-5 km;
- d) **MM4 – Industrial Station (Colonia Topitorilor Street)** – shows the industry influence upon the air quality. It has a covering ability of 100 m – 1 km. Besides the atmospheric pollutant concentrations it shows the meteorological parameters as well;
- e) **MM5 – Industrial Station (Secondary School no.9, Ferneziu)** – shows the industry influence upon the air quality. It has a covering ability of 100 m – 1 km. Besides the atmospheric pollutant concentrations it also shows the meteorological parameters.

#### **Atmospheric pollutants – norms and measurement methods**

- **Sulphide dioxide.** Its presence in atmosphere gives its acidification, acid rains with undesired effects upon the environment.

The reference method for SO<sub>2</sub> analysis is provided by ISO/FDIS 10498 (standard project) “Surrounding air – the sulphide dioxide assay” – fluorescence in ultraviolet method [3].

- **Nitrogen oxides.** They take part at acid rains formation and facility the nitrates accumulation at soil level having negative effects upon fauna and vegetation.

The reference method for NO<sub>2</sub> analysis is provided by ISO 7996/1985 “Surrounding air – the nitrogen oxides massic concentration assay” – chemiluminescence method [3].

- **Ozone.** It damages vegetation through atrophycation of several tree species. The reference methods for ozone assay and for instruments calibration for ozone are [3]:
  - The assay method: UV photometric method (ISO 13964)
  - Calibration method: reference UV photometer (ISO 13964, VDI 2468, B1.6)
- **Carbon monoxide.** The most known effects are upon health and less upon environment.

The reference method for the carbon monoxide assay is the dispersiveless infrared spectrometry method (NDIR): ISO 4224 [3].

- **Benzene.** It has effects upon health and less upon the environment. The benzene assay reference method is the sampling method by aspiration through an absorbent cartridge followed by gas-cromatographic method standardized at the moment by the European Committee for Standardization (CEN) [3].
- **Suspension powders PM10 and PM 2.5.** They have significant negative impact upon the people health due to the particle small diameter. Their inhalation conducts to various respiratory system damages.

The reference method for PM10 sampling and assay is that one presented in EN 12341 “Air quality – outside testing procedure in order to demonstrate the reference equivalence of PM10 fraction sampling from the suspension powders method”. The assay principle is based on the collection of PM10 fractions from the suspension powders on filters and their mass assay by gravimetric method. The reference method for PM2.5 sampling and assay will be established in accordance with the normative [3].

The statistic data concerning the automatic air quality monitoring in Baia Mare area during December 2008.

▪ Automatic monitoring of SO<sub>2</sub>

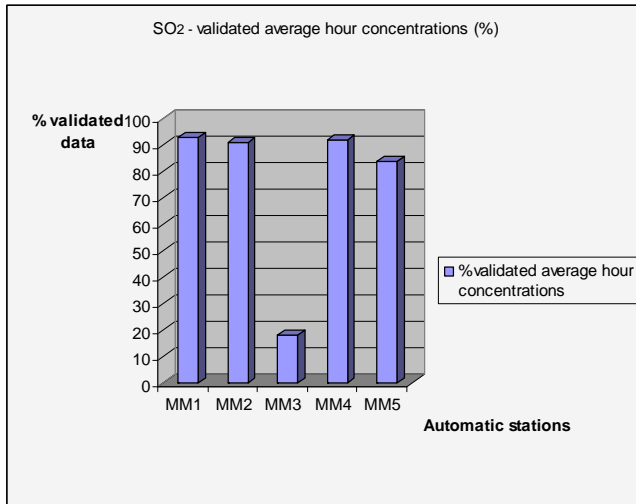


Fig. 4 Amount of validated average hour concentrations of SO<sub>2</sub> in December 2008

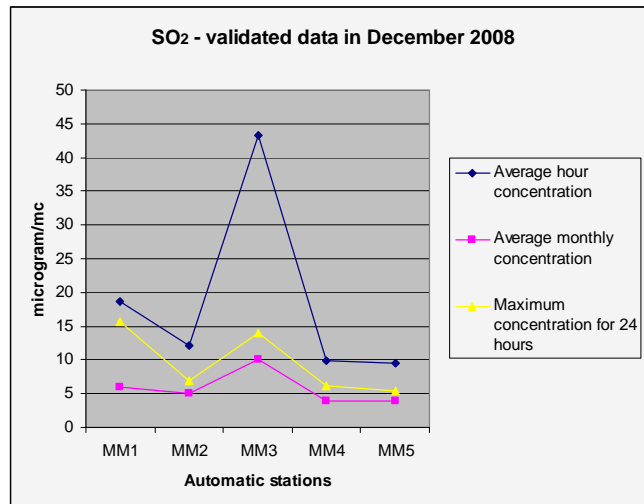


Fig.5 Validated data for SO<sub>2</sub> in December 2008

▪ Automatic monitoring of NO<sub>2</sub>

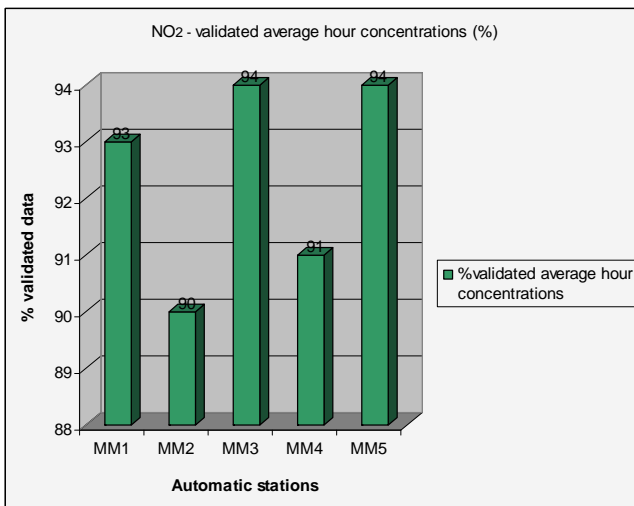


Fig. 6 Amount of validated average hour concentrations of NO<sub>2</sub> in December 2008

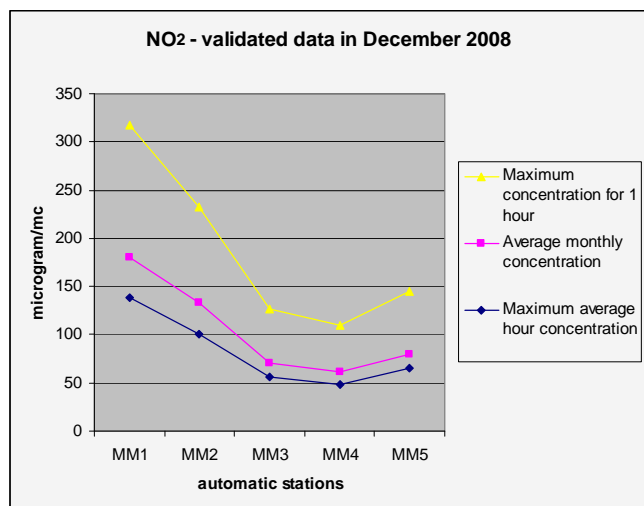


Fig.7 Validated data for NO<sub>2</sub> in December 2008

▪ **Automatic monitoring of CO**

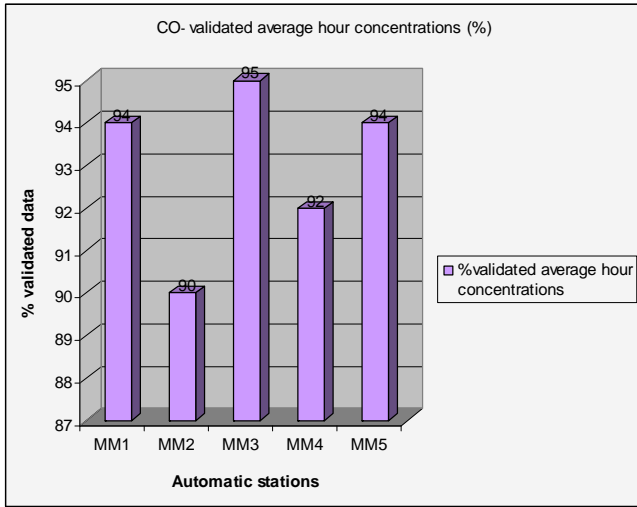


Fig. 8 Amount of validated average hour concentrations of CO in December 2008

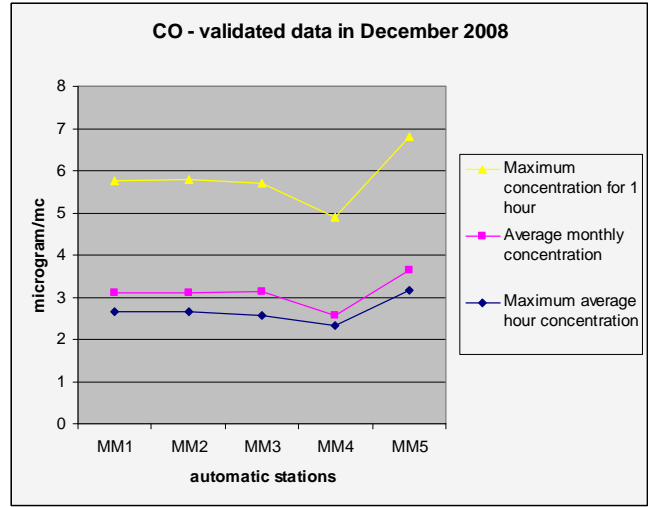


Fig.9 Validated data for CO in December 2008

▪ **Automatic monitoring of O<sub>3</sub>**

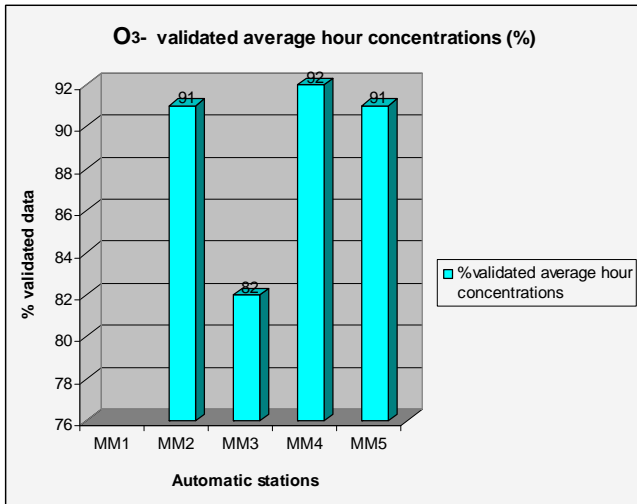


Fig. 10 Amount of validated average hour concentrations of O<sub>3</sub> in December 2008

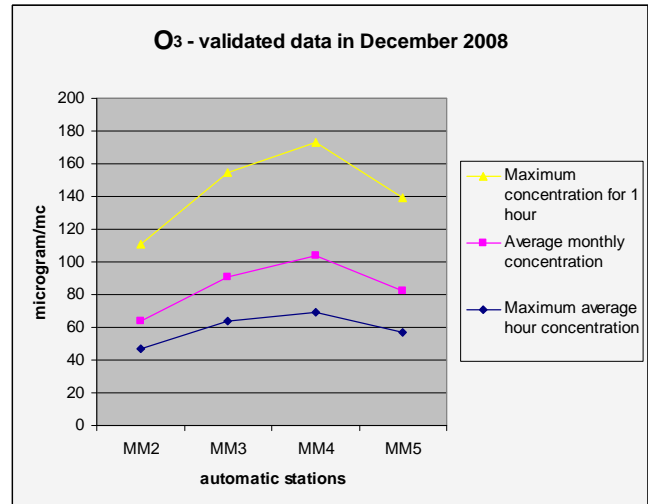


Fig.11 Validated data for O<sub>3</sub> in December 2008

▪ **Automatic monitoring of PM10**

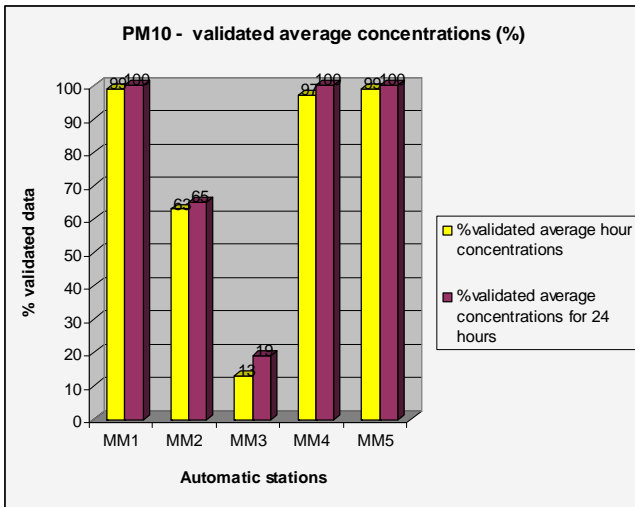


Fig. 12 Amount of validated average hour concentrations of PM10 in December 2008

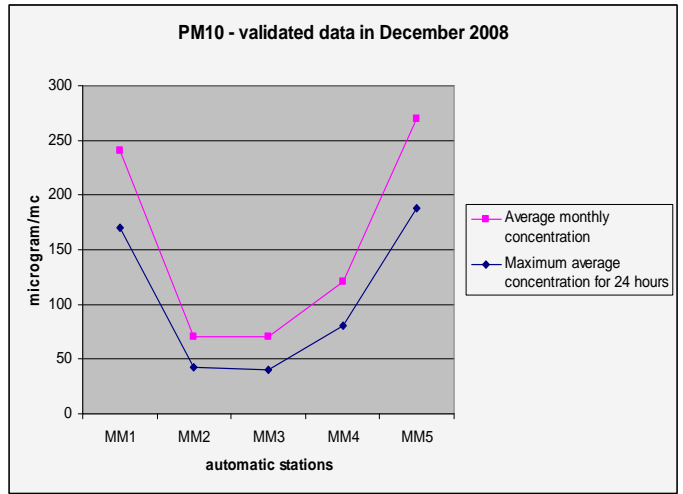


Fig.13 Validated data for PM10 in December 2008

▪ **Automatic monitoring of benzene**

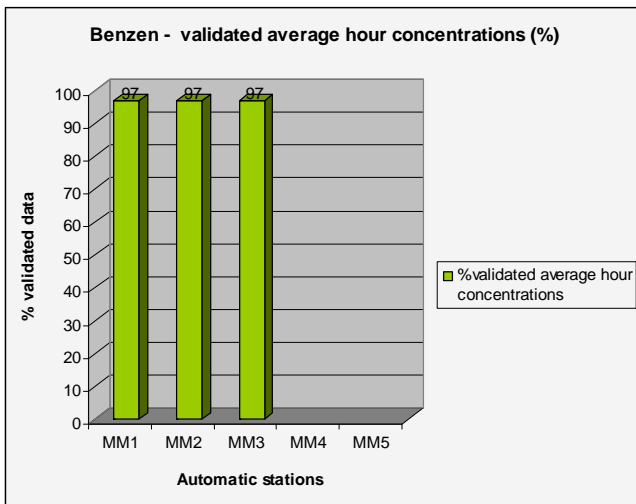


Fig.14 Amount of validated average hour concentrations of benzene in December 2008

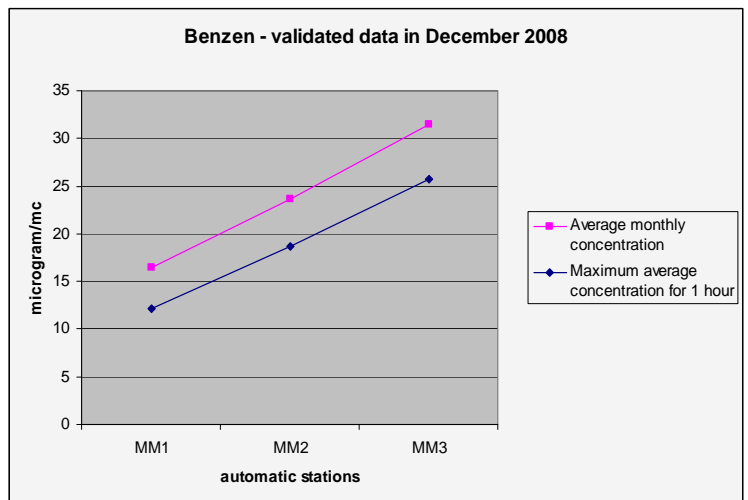


Fig.5 Validated data for benzene in December 2008

## **Conclusions**

During 2007, the 5 automatic stations for air quality monitoring in Baia Mare agglomeration have been endowed with specific monitoring equipment. They were inaugurated in 7<sup>th</sup> December 2007. The stations have been functioning in testing regime during December so that in 2007 no validated data had been measured in this automatic network.

The statistic data presented for December 2008, concerning the automatic air quality monitoring in Baia Mare City have referred to several indicators as: SO<sub>2</sub>, NO<sub>2</sub>, CO, O<sub>3</sub>, PM10 and benzene. They have showed the average hour concentrations, average monthly concentrations and maximum concentration for 24 hours.

At the moment the information concerning the air quality in Baia Mare area is offered to the people and others interested factors through those informative panels and mass media.

## **References**

1. Law no. 265/2006 for Emergency Decree no 195/2005 concerning the environmental protection approval
2. MAPM Minister Order no. 745/2002 concerning the agglomerations establishment and agglomerations and zones classification in order to assess the air quality in Romania
3. Atmospheric pollutants - <http://www.calitateaer.ro/parametri.php>
4. MAPM Minister Order 592/2002 for the Normative approval concerning the establishment of the limit values, the threshold values and the methods and criteria for assessment of sulphide dioxide, nitrogen dioxide and nitrogen oxides, suspension powders (PM10 and PM2.5), lead, benzene, carbon monoxide and ozone in the surrounding air, modified with MMGA Minister Order no. 27/2007 for modifying and complement of several orders that transpose the environmental acquis communitair.

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# EXPERIENCES OF MUNICIPALITIES WITH BDMW COLLECTION

Jitka Vlčková

## Introduction

IREAS, the Institute for Structural Policy, together with Institute of environmental engineering at VŠB - Technical University of Ostrava resolve project „Proposal of integrated system for bio-waste treatment in Moravian – Silesian region” for the Ministry of Environment in frame of Science and Research program between September 2008 and December 2009. The project objective is to propose a system for bio-waste treatment in Moravian – Silesian region and eventually to propose recommendations for other regions in the Czech Republic.

One of the first phases of project solving was summary of results and experiences of BDCW collection in municipalities in the Czech Republic. We addressed to 30 municipalities whereas half of them agreed with directed interview. The following article is summary of these experiences.

## Basic ground for collection and treatment of BDMW

One of the main objectives of Waste management plan of the Czech Republic 197/2003 Coll., based on European legislation is decreasing of maximal amount of biologically degradable municipal wastes deposited in landfills so that the fraction of these components equals maximum of 75% wt. in 2010 and 50% wt. in 2013 and, in the future, in 2020, a maximum of 35% wt. of the total amount of BDMW produced in 1995.

Ordinance 341/2008 Coll. on particulars of biologically degradable waste treatment was passed in the end of the last year. This ordinance involves list of biologically degradable wastes and requirement on their quality when entering to technological processing – technical and technological requirements for compost units and biogas stations, requirements on quality of outcomes from these installations and possibilities of their further use. The new Guideline about particulars of biological degradable wastes treatment was also published in December 2008.

Proposal of a new law about wastes assumes introducing of duty for all municipalities to assure separated collection of wastes for four commodities – paper, glass, plastic, beverage cartons and from 2010 also collection of biologically degradable municipal wastes (the duty will not refer to community composting).

If the Czech Republic wants to achieve the targets imposed by European legislation, it should assure collection and use for approximately 270.000 tons of biologically degradable wastes which are thrown into landfills /1/.

## Prevention principle

As in other fields of the environment the prevention principle is considered to be the most efficient, it means to prevent waste producing and in case of their production to support municipal composting. City or municipality should strive first of all to support home composting. In case that it is not possible for any reasons, they should introduce collection and transport of BDMW. Community composting is suitable chiefly for small municipalities up to 2.000 inhabitants, but it could be use in bigger cities as well as support of the whole system.

In last years the share of home composting is decreasing, because of increasing popularity of ornamental gardens. Illegal dumping places with garden compost appear around some municipalities since inhabitants prefer BDMW collection than its home composting. It makes support of home composting in cities and municipalities more complicated. Some non-profit organizations support community composting in the Czech Republic (e. g. EKODOMOV etc.).

### **What are the experiences of municipalities with BDMW collection?**

Municipalities and cities start to resolve what to do with BDMW because of legislation becoming gradually more restrictive and requirements of waste managements plan. Several pilot projects took place in the Czech Republic; their aim was to size up the possibilities of BDMW collection. The first pilot projects were implemented already in the begging of the 90's – e. g. Nová Paka, Jindřichův Hradec – their main objective was to support sustainable approach to the environment. Nevertheless majority of pilot projects were implemented after 2000 with effort to achieve targets defined in WMP, but they often also strived to reduce illegal dumping places. A city or municipality which decided to implement pilot project examining possibilities of BDMW collection and treatment, generally carried on BDMW collection and treatment even after official termination of pilot project (in frame of sample it was 90 % of municipalities).

### Location of BDMW collection

BDMW collection usually starts in localities with family houses where collection is in general less complicated and less problematic and it is extended to blocks. They were, of course, municipalities where it was conversely e. g. Písek town.

### What is collected?

Collection is concentrated (with some exceptions) on biologically degradable waste from households and wastes from gardens. Possibility of BDMW disposal to collection units remains (used for large quantities of BDMW disposal) together with regularly BDMW disposal or the regularly disposal is completed with special mobile disposal when it is necessary.

### Information campaigns

Important and essential part of BDMW collection is information campaigns. In addition to basic leaflets, interview surveys, guidelines, campaign in media, lectures at schools, it proved good also personal communication with citizens, namely visits in all the households and explaining basic particulars and the whole collection concept. Direct communication with citizens increases credibility of the BDMW collection. Disposal calendars for households are also welcomed. Other possibilities are free telephone lines for citizens questions, information labels with description what can / cannot be thrown into the container, discussions in radios, TV, excursions etc. Real experiences of cities and municipalities show up that if information campaign is underestimated from very beginning, it results negatively in success of BDMW collection. During the project implementing is also necessary to regularly update and provide information to citizens.

### Disposal frequency

BDMW disposal frequency is the most often 1x or 2x a 2 weeks independent on containers capacity. It depends on place of containers, season and willingness to separate.

### BDMW containers and their placing

Density of particular containers placing depends on building density, container capacity and disposal frequency. In case of BDMW placing to each family house containers have capacity

of 120 liters, eventually if required 140 liters. In case of BDMW container placing together with classic separate collection containers it should have bigger capacity – 240 liters. It is possible to place several larger containers to a street. If every family house has its own container then it is easier e. g. to monitor quality of collected BDMW and to point out on eventual mistakes. In the case of blocks the risk of undesired substances in bio-waste is higher. Containers are also placed with regard to optimized and economic effective disposals. It is recommended to use special containers for BDMW collection.

#### Quality and quantity of collected BDMW

Quality of collected BDMW is directly proportional to information campaigns intensity, but unfortunately it depends also on composition of the population in concrete locality and often also on concrete type of building. Quality of collected BDMW is lower in the blocks than in family houses, but not always. Waste from blocks seems to be of poor quality on the first sight, but it is mainly caused by lower content of garden waste. There are no problems with BDMW quality in localities where educated people with lower average age live, but in some specific localities despite of more intensive information campaigns the BDMW collection is destined for failure. In this case we do not recommend introducing collection without quality school education and long-term intensive campaigns.

Faction of BDMW in MW is around 40% in the long term. However quantity of collected BDMW depends on many factors. Amount of collected BDMW from blocks is usually approximately 10 – to maximum 40 t per citizen / year, whereas from family houses 50 / 180 t / citizen / year.

From the point of view of comparison of share of MW and BDMW there is no decrease of production MW in case of introducing BDMW collection system. Nevertheless decreasing of production of MW can happen as a result of introducing BDMW collection. Thus costs to MW treatment decrease and there is better finance perspective for BDMW collection. Introduction of BDMW collection also contributes to reduce costs for removal of illegal dumping places.

#### Collected BDMW treatment

In frame of our survey the majority of interviewees (90%) stated that BDMW is composted in a composting unit. Use of compost is very similar: for recultivations, ground and terrain shaping, landfills recultivations, post-mining recultivation, addition to urban vegetation. None of interviewed municipalities use the compost in agriculture. In some cases the compost is offered for domestic use. Part of BDMW is deposited in landfills; in one case (Zlín city) the final product is energetically used. Biogas stations can be also recommended.

#### Financing of BDMW collection

BDMW collection is in majority cases financed from municipality's other budget items, because total amount of collected fees does not cover all parts of municipality waste management. It is possible to find examples where there is no loss in frame of waste management budget item. One of them is Prague: citizens who want to be involved do BDMW disposal, have to pay for this service separately. Disposal of MW and BDMW take place once per 2 weeks in turns. If the system is well prepared municipalities can achieve economies from cut of the fees for waste depositing in landfills or waste incineration plant, other revenues can be money from compost sale and also economies on transport when using municipality compost unit.

It also results from executed interviews that majority of municipalities use for waste management financing capitation fee. In Jindřichův Hradec there was introduced fee

depending on produced waste amount, but the experience with this type of fee was negative: municipal BDMW collection system collapsed after fee introduction.

In last years, many projects are financed from different types of subsidies – from state budget or European means. Subsidies are used for particular activities – e. g. construction of composting unit or for whole pilot project including BDMW collection. Risk of these projects often lies in unsustainability of system financing after the project finishes. Although financial sustainability of the project is more emphasized at present, in some cases we can still rather doubt of their future sustainability

Average range of costs per 1 ton of BDMW moves between 1500 – 2400 CZK, significant part of these costs represent transport costs, hence new projects should take into account distance to composting unit.

We can conclude that BDMW in some municipalities in the Czech Republic is collected successfully, but a lot of cities and municipalities still face many problems and difficulties which complicate effective implementation of the whole system of BDMW collection and achieving of national objectives.

## References

1. HEJÁTKOVÁ, K.: Pomůže změna zákona o hnojivech vyřešit problém s odbytem kompostu?, *Odpadové fórum* 3/2009.
2. SLEJŠKA, Antonín: Sběr a komunitní kompostování domovních bioodpadů v ČR. *Biom.cz* [online]. 2002-02-25 [cit. 2009-03-27]. Available on WWW: <<http://biom.cz/cz/odborne-clanky/sber-a-komunitni-kompostovani-domovnich-bioodpadu-v-cr>>. ISSN: 1801-2655.
3. Own interview survey in cities: Děčín, Plzeň 1, Plzeň 2, Bílina (2 projects), Chrudim, Praha – Dolní Chabry and other city districts, Uherské Hradiště, Vysoké Mýto, Nová Paka, Písek (2 projekty), Zlín, Strážnice, Jindřichův Hradec (2 projects).

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# **STATE ENVIRONMENTAL FUND OF THE CZECH REPUBLIC – NATIONAL SUPPORT PROGRAMMES AND “GREEN INVESTMENT SCHEME”**

**Radka Pokorná, Adam Helebrant**

State Environmental Fund of the Czech Republic (SEF) was established by the Act No. 388/1991 Coll., and its activities are further managed by extending legal regulations, e.g. Status of SEF, Ministry Guidelines on distribution of funds from SEF and Annexes to Guidelines. SEF is by law administered by Ministry of the Environment (MoE). The provision of financial funds is determined by the Minister. He can consult his decisions with the Fund Council. Report of the SEF activities in previous year is annually presented to the government.

At the moment, SEF is providing both the administration of supporting programmes of European funds (ISPA/Cohesion Fund, Operational Programmes Infrastructure and Environment), including their co-financing from the state budget and financial resources of SEF, and performs also within the frame of so-called national programmes. These are financed from SEF own budget. In 2009, a new programme under Green Investment Scheme was added to these programmes.

State Environmental Fund is in that way among the most important extra budgetary sources of financing of environmental investments and provides support to municipalities, regional self-government authorities, to non-profitable legal bodies, firms and entrepreneurs and also citizens. Support is provided in form of loans and non-returnable subsidies.

The income of SEF consists in major of fees for pollution or for damage of the environment and other penalties for breaking the environmental law. The other sources are instalments for given loans including their interests and yields from bank deposits. The brand new sources of income are financial resources from purchasing the surplus of Assigned Amount Units under Green Investment Scheme of Kyoto Protocol. This is in accordance with the Act No 695/2004 Coll., on purchasing GHG emissions allowances, as amended by the Act No 315/2008 Coll.

Expenditures of SEF are aimed to co-financing of projects supported from EU funds and to so-called national programs. Financial resources obtained from purchasing the surplus of Assigned Amount Units under Green Investment Scheme of Kyoto Protocol are earmarked to those actions and projects only, which will lead to further decreasing of greenhouse gas emissions. For that purpose the new SEF programme was announced, Green Investment Scheme (GIS). Goal of this program is to back insulation of residential houses, new construction in passive energy standard and the use of renewable energy sources.

In 2007 – 2013, main stress is put on raising enough money for national co-financing of European funds (approx. 1.3 billion CZK annually). Together with consideration of the decreasing income of SEF caused by lower pollution of the environment, this means that financing of national programmes will be reduced during this period.

The administration of programmes consists of receiving the applications, their formal and technical evaluation, verification of criteria fulfilment and then preparation of Support Approval. After determination of the Minister, the payment to the applicant will be realised. Evidence of paid support and checking and controlling process is a part of administration as well.

## **ISPA/Cohesion Fund (CF)**

SEF takes part in implementation of pre-accession projects (ISPA), which have not been completed to the date of access of the Czech Republic to the European Union. These projects were transformed into Cohesion Fund projects. The aim is to support fulfilling of Acquis Communautaire conditions. In 2008, the total amount of 590 million CZK for subsidies and 95 million CZK for loans was spent, both from ISPA/CF and SEF budgets.

## **Operational Programmes**

Operational programmes enable support from European funds, this means from Cohesion Fund (CF) and European Regional Development Fund (ERDF).

Operational Programme Infrastructure (OPI) had been opened up to 2006; nowadays the enclosure of financing and programme evaluation has been going on. Due to the economic crisis, a special measure was adopted, which allows to prolong the supporting process, originally designed to 2004 – 2006. It was used for remaining financial resources from Technical Assistance. In 2008, another 5 new projects were registered. Within priority axis 3 and 4, which are focussed on the environmental issues, total amount of 3.9 billion CZK was spent.

Operational Programme Environment (OPE) was adopted in December 2007; it is supposed to be in action up to the year 2013. In 2008 the first bunch of projects was started, up to now 2 349 applications were approved, which represents 38 bill. CZK of subsidies. Out of the total allocation of the programme, up to now total amount of 1.577 billion CZK was really spent. Up to the end of 2008, 7 calls were announced; many more are planned for the year 2009, in accordance with the adjusted schedule, for all the priority axis. Thanks to the agreement of Ministry of the Environment and the State Environmental Fund and in response to the economic crisis, the conditions of receiving support were changed and softened. In addition, some new measures for insulation of residential houses could be added into the existing frame of OPE. This change of ERDF conditions for providing financial support has been enabled thanks to successful negotiations between the Czech Republic and the European Commission.

## **National Programmes**

Submitting applications for support from national programmes is regulated by Ministry Guidelines No. 13/2006, on provision of financial funds of SEF. Definite programmes are annually announced in Annexes to Ministry Guidelines. In 2009, available programmes are detailed in Annexes I, II and III. More expenditures are supposed to be spent for already contracted actions and for actions with Support Approval, already signed by the Minister.

Nowadays, in Annexes I, two following programmes have been announced:

### **2.6. Earth Ozone Layer Protection Programme**

#### **3.1.6. Purchase of estate in specially protected areas, their protective zones and significant localities**

Eligible applicants of 2.6. programme are both profitable and non-profitable legal bodies. Applications to this programme have to be submitted in response to current call, which in 2009 has not been announced yet. Applications to 3.1.6 programme can be submitted continuously, but applicants are limited to Agency for Nature Conservation and Landscape Protection and National Parks administration only.

According to Annexes II, support is provided to natural bodies for use of renewable energy sources. The following programmes have been announced:

1.A. Investment support for environmentally considerate means of space heating and hot-water heating for apartments and family houses for natural bodies:

- a) biomass boilers,
- b) solar systems for year-round hot-water heating,
- c) solar systems for auxiliary space heating and year-round hot-water heating

4.A. Investment support for heat pumps for apartments and family houses for natural bodies

Support is provided for already completed projects only. Applicants could ask for support not later than 18 month after bringing the equipment into permanent operation. Support is provided in form of grant. In programme 1.A., subsidy is provided up to an amount of 50 % of the base for calculation of support (for biomass boilers and solar systems for hot-water heating, a maximum of 50 thousand CZK for one project, for solar systems for auxiliary heating and hot-water heating a maximum of 65 thousand CZK for one project). In programme 4.A., subsidies are provided for heat pumps to a maximum of 30% of the base for calculation of support (for heat pumps soil-water, water-water max. 75 thousand CZK for one project, for heat pumps air-water max. 55 thousand CZK for one project). Applications were accepted up to 31 March 2009, and further the support for use of renewable energy sources will be provided under new GIS programme. Total amount of 100 million CZK was allocated for Annexes II programmes in 2009. According to the fact, that application submitting is after 31 March 2009 no longer possible, it is supposed, that this sum will not be used in whole, and remaining financial resources will be transferred to programmes under Annexes III.

Annexes III are aimed for support of environmental education, advisory and consulting. Suitable applicants are non-profitable legal bodies, except foundations and foundation funds. The following programmes have been announced:

1. Investment support programme for environmental education, advisory and consulting for NUTS II region Prague
2. Non-investment support programme for developing the network of environmental education centres
3. Non-investment support programme for projects aimed to current environmental issues

Total allocation of financial resources for the year 2009 for these programmes is for the time being 50 million CZK. Support is provided in form of grants. For programme No. 1 is subsidy limited up to 70% of the base for calculation of support and a maximum of 30 million CZK for one project, for programme No. 2 up to 75% and 10 million CZK for one project and for programme No. 3 up to 90% and 3 million CZK for one project. Applications for programme No. 1 were accepted from 9 February until 3 April 2009, for programmes No. 2 and 3 will be announced the period from 4 May to 22 June 2009.

You may find more about national programs of SEF on the website of SEF.

### **Green Investment Scheme Programme**

New programme of support - Green Investment Scheme (GIS) - was announced on 7. April 2009. Financial resources are obtained from purchasing surplus of Assigned Amount Units under GIS of Kyoto Protocol. Conditions for providing support and for

administration of applications within framework of this programme are stated in Ministry Guidelines No 5/2009, on providing financial resources of SEF under GIS, and its Annexes. Applications have been accepted since 22 April 2009 and the programme is planned until 30 December of 2012 or until all the financial resources will have been spent. Support will be aimed to the following areas:

**A Savings of energy for space heating**

A.1. Complete insulation of the shell of the building leading to a low energy standard

A.2. Insulation of selected parts of the houses (partial insulation)

**B New construction of residential buildings with passive energy standards**

**C Use of renewable energy sources for space heating and hot-water heating**

C.1 Replacement of environmental damaging heating for low emission biomass boilers and heat pumps

C.2 Installation of low emission biomass boilers and heat pumps in new constructions

C.3 Installation of solar-thermal collectors

**D Subsidy bonus for selected combination of measures**

Eligible applicants are owners of family and apartment buildings (non concrete-slab); in area of support C can apply the owners of concrete slab apartment buildings as well. Support is provided to projects, where the implementation will be completed after 1 April 2009. The date of completion is stated in accordance with applicable law.

It is possible to submit an application before launching of the project, or after the project is completed, no longer than 12 month after implementation is completed. Payment of support will be realised just after completion and proper documentation of fulfilling all the required conditions of the programme. The amount of support is related to succeeded specific annual heat needs (without heating system effectivity impact), after insulation of the residential house.

In area of support A.2 Insulation of selected parts of the houses (partial insulation) there are five partial measures, which lead to energy savings:

1. insulation of outer walls
2. insulation of the roof or highest ceiling
3. insulation of the floor above the ground, the ceiling of an unheated cellar, floors over an unheated area or the walls between a heated and unheated area
4. replacement of windows and of entrance doors
5. installation of a system of forced ventilation with a waste-heat recuperation

At least three out of these five partial measures have to be realised, or two, in case of simultaneous replacement of heating source. The amount of support is different in both cases (three or two measures realised).

Amount of support is shown in following chart:

Supported measure	Unit for support	Amount of support
<b>Family houses</b>		
complete insulation of FH, 40 kWh/m <sup>2</sup>	CZK/m <sup>2</sup> ; max. %	1950; 50
complete insulation of FH, 70 kWh/m <sup>2</sup>	CZK/m <sup>2</sup> ; max. %	1300; 50
partial insulation of FH – three or more measures	CZK/m <sup>2</sup> ; max. %	850; 50
partial insulation of FH – two measures	CZK/m <sup>2</sup> ; max. %	650; 50
new passive FH structure	thous. CZK	220
biomass boiler in FH with a manual fuel feed with an accumulation tank or biomass boiler with an automatic fuel feed	%; max. in CZK thous.	60; 80
biomass boiler in FH with manual fuel feed without accumulation tank	%; max. in CZK thous.	50; 50
heat pump soil-water, water-water	%; max. in CZK thous.	30; 75
heat pump air-water	%; max. in CZK thous.	30; 50
solar-thermal collectors on FH, only hot water	%; max. in CZK thous.	50; 55
solar-thermal collectors on FH, hot water and additional heating	%; max. in CZK thous.	50; 80
subsidy bonus for combination of measures for FH (see list of combinations below the table)	CZK thous./FH	20
<b>Apartment buildings (non concrete-slab)</b>		
complete insulation of AB, 30 kWh/m <sup>2</sup>	CZK/m <sup>2</sup> ; max. %	1350; 50
complete insulation of AB, 55 kWh/m <sup>2</sup>	CZK/m <sup>2</sup> ; max. %	900; 50
partial insulation of AB – three or more measures	CZK/m <sup>2</sup> ; max. %	600; 50
partial insulation of AB – two measures	CZK/m <sup>2</sup> ; max. %	450; 50
new passive AB structure	thous. CZK/flat	140
biomass boiler in AB	%; max. in CZK thous./flat	50; 25
solar-thermal collectors on AB, only hot water	%; max. in CZK thous./flat	50; 25
solar-thermal collector on AB, hot water and additional heating	%; max. in CZK thous./flat	50; 35
subsidy bonus for combination of measures for AB (see list of combinations below the table)	CZK thous./AB	50

FH ... family houses, AB ... apartment buildings

You may find more about Green Investment Scheme on the website of SEF, including application forms, list of cooperating banks and list of certified suppliers.

## References

1. <http://www.mzp.cz>
2. <http://www.sfzp.cz>
3. <http://www.opzp.cz>
4. <http://www.zelenausporam.cz>

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# TAX INCENTIVES FOR ENVIRONMENTAL INVESTMENTS ABROAD<sup>1</sup>

## *Tax Incentives for Environmental Investments*

Vítek, Leoš

### **1. Introduction**

Due to the fact that at present – and well in a connection with the ongoing economic crisis – there is under way a broad debate on possible tax incentives for environmental investments, it is worthwhile to analyse tax incentives schemes of environmental protection. Within the European Union it is the Netherlands with the most refined tax incentives mix for environmental investments, stimulating environmental investments for already more than 10 years. According to our information, in other developed countries no such complex system of tax incentives for environmental investments exists.<sup>2</sup> On the contrary, Belgium had introduced tax incentives for environmental investments only a year ago. The third country, where the system of tax incentives for environmental investments is analysed, is USA where exists very diverse scope of incentives present both on the federal- and individual state levels of the Union.

### **2. The Netherlands**

The Netherlands is the only country both in the EU and among developed countries where operates a comprehensive and state-wide system of fiscal incentives for investments into environmental technologies and other assets.

The system is based on the following instruments:

- a. System of a possibility to arbitrarily depreciate the investment - VAMIL (1991)
- b. System of Green Funds (1995)
- c. Allowances for environmental investments (1997)
- d. Allowances for pollution prevention - MIA (2000).

#### **2.1 System of green investments in Green Funds**

The system is based on tax allowances for investors who invest in “Green Funds”. Each project that competes for finances from the system of Green Funds needs to obtain a governmental certificate (today there are annually issued ca 600-700 certificates while at the time the system has been initiated the number had ranged ca 300-400). Its projects are divided into several categories, among others also based on the degree of technological innovation, on hi-tech (systems of heating, systems of greenhouse control, systems standards for low energy consumption, etc.) and low-tech (e.g. eco-farms, systems of forest and natural sanctuary protection). System of Green Funds has so far contributed towards reduction in CO<sub>2</sub> emissions by more than 2% of the total volume.

Most Dutch banks participate in the system of Green Funds. The banks issue mutual fund bonds with a fixed nominal value, maturity, and coupon, or issue mutual fund share securities

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<sup>1</sup> The article has originated during work on the Ministry of Environment of the Czech Republic (MŽP)’s project No. SPII/4i1/52/07 “Modelling impacts of the environmental tax reform: II. phase of ETR (EDR)”. Opinions brought forward do not represent official viewpoints of institutions where or for which the author works.

<sup>2</sup> In part some elements may be found also e.g. in the Great Britain, Finland and Spain. Still, however, the most advanced are the systems of the Netherland and in the USA for the field of energetics.

on the Green Funds. Interest rates from the bonds or dividends from share securities are usually lower than regular market rates and dividends. On the other hand, this means that the banks are able such comparatively (vis-à-vis the general market) more favourably obtained proceeds from the green mutual funds also invest more favourably in green projects. From the collected proceeds, the banks credit “green” certificated projects while at least 70% of their Green Funds is required to be used for financing green projects (in reality it is ca 85% of the Green Funds that is invested in green projects). The reminder is allowed to be used arbitrarily whereas the whole process is controlled by the central bank and financial offices. In total, by the end of 2005 in the funds there had been € 8bn and the estimate for 2008 is around € 10bn.

Individuals are in the Netherlands subjected to 1.2% capital gain tax from the invested amount, but investments in Green Funds are from this tax exempted up to the maximum annual amount of € 53,421ths (2007). Simultaneously, personal income tax on the gains from such investments is also reduced by 1.3% and so the resulting total tax incentive on these investments is nominally 2.5%. This stimulates individual investors to invest in less profitable bonds or share securities of the banks issued for mutual Green Funds (the average gross return is 1.4–2.2% bellow the average return from government bonds) since the combination of a lower return (-) and reduced taxes (+) approaches approximately the net return from alternative investments.

The system has joined over 200ths individual investors with a total volume of investments exceeding € 5.5bn invested into more than 5.5ths environmental projects. In 2006 have annual investments reached €1.5bn on 600 projects and the growing trend is expected also for the following years. The interest rate on green credit is on average by 1pp lower compared to commercial borrowings, which fact e.g. in case of eco-farms a level that decides about a profit or loss. Most of the investors in financial instruments for green funds are older persons with higher incomes and invest on average ca € 25ths. The total government costs on the System were in 2005 ca €125mil.

The projects divide into several main categories:

Nature, forests and landscape	Renewable energy
Eco-farms	Sustainable consumption
Organic greenhouses	Bicycle infrastructure
Use of agricultural products in production	Voluntary soil desalination
Other	

Source: The Green Fund Scheme (2006).

The System is controlled by 4 ministries – Finance, Environment, Agriculture and Transport. The Ministry of Environment is responsible for the co-ordination in the launching and running. The system of issuing green certificates for individual projects is administered by the Department of Applications of the Ministry of Agriculture along with *SenterNovem*, a company commissioned by the Ministry of Environment. In recent years, annually are issued between 600 – 700 green certificates of which almost 70% cover spheres of nature, forests and landscape, and organic greenhouses. From the perspective of the finances’ allocation, ca 50 – 55% finds its place in the sphere of eco-greenhouses and ca 25 % in renewable energies.

## 2.2 Systems VAMIL and MIA

Furthermore exist in the Netherlands several systems of tax incentives of investments in environmentally-friendly technologies. These are the systems:

- VAMIL (voluntary system of depreciating environmental investments): it is the oldest investment-supporting scheme drafted in 1991 by the Ministry of Environment and the Ministry of Economic Sciences. The system is based on an option to depreciate environmental activities at an arbitrary speed. The option to accelerate depreciation offers investors advantage in the range 3 up to 8 % of the value of the investment (i.e. cash-flow effects and higher interests).
- MIA (deduction of an environmental investment): a system proposed by the Ministry of Environment and launched by it. The principle is based on deducting of a part (15–40%) of the carried and acknowledged environmental investment from the tax base of the given year.

The scope of a deduction (given by the List) is determined by three factors:

- Environmental effectiveness of a given technology/investment;
- Degree of technology innovation and its availability on the market; and
- Degree of increase in costs of the investment compared to traditional technologies.

The System has been introduced, along with other similar ones, as a certain way to compensate sectors with high energy demandingness (e.g. transportation, gardening, or intensive animal breeding) and as such these were the main target sectors for those instruments. Approx. 1/4 of expenditures of both programmes are directed towards agriculture and gardening. The aim of both systems is to reduce the total costs of an environmental investment. Both systems may, for certain activities, be combined. Prime strength of both systems is their relative ease of accessibility for businesses (e.g. the application form has only 2 pages); their main problem is the determination of technologies for the List and uselessness for uneconomical subjects.

Example:

Company purchases a biological air filter (List code A 4050) for € 50ths; a standard depreciation period for such equipment is 5 years with a final price 0. The equipment is, according to the VAMIL/MIA, type A, i.e. concurrently may be applied both a 30% deduction (MIA) and a one-off depreciation (VAMIL). Deduction MIA =  $0.3 * 50\ 000 = 15\ 000$ . Full deduction immediately within the first year of procurement (VAMIL) reduces the tax base by 50ths. The total reduction of the base is  $50\ 000 + 15\ 000 = 75\ 000$ . Considering current Dutch rate of 25.5%, in this given case is the tax saving in the considered year  $0,255 * 75\ 000 = 19\ 125$ .

This example does not assume partial foregoing of a deduction/accelerated depreciation due to a business loss. It is a static computation – over the following years, this once-off depreciation would increased the tax obligation. The total tax allowance would then result only from the time value of money – see Part 2 C of the paper.

Target groups of all systems are small and medium enterprises (SME); nonetheless, the systems' tax incentives are available to all subjects.

The key condition necessary for an investment is a compatibility with one of the technology categories covered by the List. The List covers nine main sectors and seven categories of devices broken down in accordance with the corresponding tax allowance type. Devices are in turn broken down into the following groups:

A – 30% MIA + VAMIL	B – 15% MIA + VAMIL
C – VAMIL only	D – 30% MIA
E – 15% MIA	F – 40% MIA + VAMIL
G – 40% MIA	

The List may include only technologies that satisfy also other criteria – simple technological and cost definition, and a market share on the relevant market less than 30% (novelty of the technology). Once the technology reaches more than 30% market penetration as such it can no longer be to the VAMIL/MIA accepted and the following year is from the List excluded. This way long-term deformation of the innovation market is avoided since regular update of the List guarantees dynamics of incentives.

Both private and public sector take part in design and update of the List of Environmental Technologies (SET) – the first List has been created for the Ministry of Environment by an external contractor. SET is on a regular basis updated by the Ministry of Environment. The List is published regularly both on www pages and in paper, since 2008, however, only electronically. Annually some 300–400 new technologies are nominated for an inclusion in the List

The systems apply only on costs of purchase, modification and additional equipment and exclude operating costs of the device.

The VAMIL/MIA system is linked with the governmental Programme of Research and Development – 60% of technologies covered by the List have during their development been financed by the government within its support of R&D. In turn, VAMIL/MIA supports establishment of such sponsored and developed innovations onto markets.

Both VAMIL and MIA systems are administered by the Ministry of Finance and the Ministry of Environment (ministry responsible for environmental investments). The tax paperwork is managed by the Dutch tax administration and other agendas related to the VAMIL and MIA by the *SenterNovem* agency of the Ministry of Economy. *SenterNovem* is responsible for implementation of the politics of innovation, energy, climate, ecology and territorial planning. The System established a helpdesk for applicants (both in the case of *SenterNovem* and the tax administration that alone manages in total over 110 sector systems of a tax support).

Reflecting the current political and environmental priorities of the government, the budget of both systems is annually updated and financed from the central budget. Given different priorities, for MIA/VAMIL may be declared every year a specific technology/area with which is a part of the budget (ca 30-50%; the proportion from year to year fluctuates) associated (in the past e.g. cleaner diesel engines). Budgeted volumes represent ceilings beyond which may not granted support precede. In case the estimated volume of supports exceeds the ceiling set for the given year, for the rest of the year the Ministry of Finance closes the programme to further applications.

The number of VAMIL+MIA applications hovers over the last 3 years above 8.5ths and moderately increases (in 2003, e.g., 8ths applications) with 90 – 95% applications from small and medium size enterprises. As an example, in 2005 is the total volume of investments for which had been submitted an assistance application estimated at € 0,94bn translating into

estimated costs to the central budget € 132mil minus est. 25% (€ 33mil) as a result of subsequent tax controls and expected rejections of preliminarily awarded relieves. Operating administrative costs for the whole system's operation are estimated at € 1.5mil.

**Table 1: Budget of the VAMIL/MIA system (EUR mil)**

	2004	2006	2008
<b>VAMIL</b>	28	38	38
<b>MIA</b>	50	123	86
<b>Total</b>	78	161	124

Source: <http://www.vrom.nl>

Approximately one third of expenditures is financed from the governmental budgetary priority "air pollution reduction". The rest is represented by a reduction in revenues of the central budget (it is possible to use an argumentation the real case is that of recycling proceeds from eco-taxes / energy taxes on expenditure programmes for handicapped sectors).

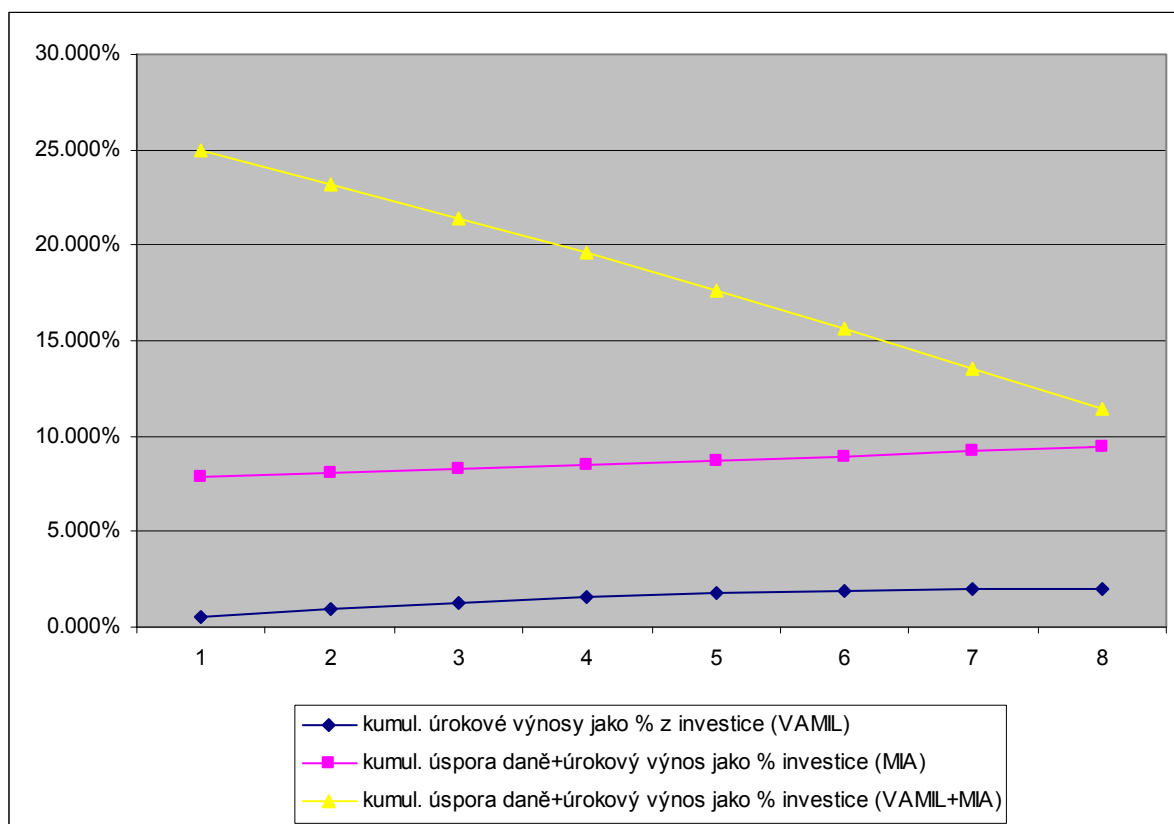
The Netherlands seeks to conduct *ex post* evaluation of incentive systems. In 2005 and 2007 there were carried 2 evaluations of the systems of investment support that have confirmed functionality of both MIA and VAMIL. The problem in evaluation had been separation of the results of both instruments since VAMIL and MIA may be awarded simultaneously. Key factor that influences effectiveness of both instruments equally is the List of Environmental Technologies. The Ministry of Finance now suggests to focus on its content and to remove technologies that do not / no longer contribute towards the agreed targets, but rather on the contrary may be called "free riders". Together with evaluation of both programmes it is necessary to assess the quality of investment projects and to set up a database of a satisfactory minimum quality of a successfully qualifying project. Differences in impacts of individual systems on decision-making are summarised in the following table and chart.

**Table 2: Share of tax savings and additional interest revenues of the VAMIL and MIA systems on the total project costs**

entering price of asset A		1,000,000							
usual depreciation	8	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
tax base after depreciation of asset A		9,875,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000
VAMIL	100%	1,000,000	0	0	0	0	0	0	0
tax base after VAMIL		9,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
MIA	40%	400,000	0	0	0	0	0	0	0
tax base after MIA		9,475,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000	9,875,000
tax base after VAMIL+MIA		8,600,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
usual tax	19%	1,876,250	1,876,250	1,876,250	1,876,250	1,876,250	1,876,250	1,876,250	1,876,250
tax after allowances	19%	1,634,000	1,900,000	1,900,000	1,900,000	1,900,000	1,900,000	1,900,000	1,900,000
tax reduction to due to relief V+M		242,250	-23,750	-23,750	-23,750	-23,750	-23,750	-23,750	-23,750
cummulative tax reduction due to allowance		242,250	218,500	194,750	171,000	147,250	123,500	99,750	76,000
interest income from allowance	3%	7,268	6,555	5,843	5,130	4,418	3,705	2,993	2,280
cummulative interest income from allowance		7,268	13,823	19,665	24,795	29,213	32,918	35,910	38,190
cummul. Interest income as % of investment		0.727%	1.382%	1.967%	2.480%	2.921%	3.292%	3.591%	3.819%
cum. tax reduction + cum. Interest income		249,518	232,323	214,415	195,795	176,463	156,418	135,660	114,190
cum. tax saving+interest income as % of investment (VAMIL+MIA)		24.952%	23.232%	21.442%	19.580%	17.646%	15.642%	13.566%	11.419%

Source: own calculations.

**Chart 1: Share of tax savings and additional interest incomes of the systems on total costs of the project (scenario for the VAMIL system, system MIA and their combination)**



Note: it is assumed all prices are constant, terminal value of the asset A is nil, absolutely linear depreciation takes 8 years, existent taxes are calculated on accrual basis, for simplicity interest income calculations assume all flows take place at the beginning of the year, it is not compounded and for the entire year. Assumption of compounded increase in interests is insignificant (ca 01% of the investment's price over the entire tracked period).

Source: own calculations.

The above presented calculations confirm that for Dutch environmental technology investors is the most advantageous to combine together both VAMIL and MIA. Such option, however, is possible only in case of selected technologies (they must be on the List in groups A or B or F with the group F being for investors the most advantageous).

### 2.3 System EIA

Allowance on energy investments is targeted towards energy-friendly business investments and sustainable energy investments. In specified cases, in addition to standard depreciation is also possible to exert an extra 44% write-off from the tax base in accordance to the investment's value.

Deduction of EIA at 44% an investment may be credited against the tax base. The minimum value of each such investment, however, is EUR 450 per year and the total annual sum of energy-conserving investment has to be at least EUR 2 100. Maximum amount of energy-saving investment that may qualify for EIA is EUR 110mil. per year. Amounts exceeding that limit are not taken into account.

For taking advantage of EIA it is necessary to qualify for an environmental certificate that also favours investments carried in a not too distant future. Compared to the past the certificates are to a lesser extent based on general energy-saving standards. For investments in energy savings in engineering structures the energy saving per invested EUR must be at least 1.3 Nm<sup>3</sup> equivalent of natural gas (NGE) but no more than 2 Nm<sup>3</sup> NGE per year and for an invested EUR. For investments into energy savings using technologies or modification of processes are annual energy savings required to range between 0.7 and 2 Nm<sup>3</sup> NGE per invested EUR. In case of energy savings using means of transportation need savings of energy range between 0.3 and 2 Nm<sup>3</sup> NGE.

EIA is accessible also for investments in improving cultivation and production of bio-fuels the 1.5<sup>th</sup> or 2<sup>nd</sup> generation. Means for the production of sustainable energy must utilise by at least 70% resources made from sustainable energy. For EIA qualified are also producers of heat from waste. In their case, however, recognised are not costs of distribution networks. For EIA may also apply investments on improvements in engine effectiveness and further developments in electromotors.

An application – part of which is also a confirmation that the investment is being carried for the EIA programme – has to be sent in 3 months following the purchase of the property. Subsequently is sent to the Special Finance Office for Investment Deductions and Special Deductions in Breda. To qualify for the possibility to include the EIA deduction in a tax return it is required to obtain a certificate of the Ministry of Economy confirming the business investment satisfies requirements of EIA. The certificate is issued in the name of the Ministry by *SenterNovem*.

In case the budget available for EIA is exhausted, the Ministry temporarily closes the whole system. EIA is in general available for expenditures associated if creation of an asset or its parts – to the extent that the energy criteria are met. The EIA manual contains a fundamental list of accepted and unaccepted expenditures. Partners in public business companies apply for the EIA allowance individually on the basis of their corresponding share in the firm. The allowance also covers rented solar boilers and panels for household heating – the lessor may apply for EIA against the renting devices in the same as on its business asset.

EIA may be combined with the VAMIL system under the condition that are met requirements of them both. An investor may choose whether to use EIA or the MIA system. Use of both MIA and EIA systems simultaneously is not possible.

In case the investment is not registered within 3 months after acquisition, it is no longer eligible for EIA. The application needs to be sent within 3 months from acquisition of an asset. By acquiring is understood any fixed-price sale agreement. In case the asset is obtained by own production, the application must be sent in within 3 months following the end of a calendar quarter in which the production costs were incurred. Part of the application must be an approval confirmation for all the required construction permissions, environmental permissions of sustainable energy, etc. *SenterNovem* may require further information necessary for issuing the certificate. The certificate is usually issued within 8 weeks after the application had been sent in and simultaneously is also informed the financial office. Appeal against the *SenterNovem* decision may be registered within 6 weeks.

Issued certificate authorises the use of EIA for a deduction from the tax base. The financial office, however, may check legitimacy of awarding the certificate and may possibly deny the title for a deduction. In case the given year are investment's expenditures spent but the final product is not yet in an operation, for the given year it is possible to apply a deduction of the

incurred costs. The rest is allowed to be claimed in the following years but beyond the year in which such investment is put in operation. The system also allows to reflect years with a loss and to claim the EIA deduction in the years with a positive tax base.

In case annual sale of a property against which an EIA deduction had been claimed exceeds EUR 2 100 (disinvestment) and an EIA allowance has been claimed against it, such property is required to be backwardly included into tax return at a value that corresponds with the principle of a market retrocede. The disinvestment percentage is identical to the share of the asset sold to the total extent of the assets for which had EIA been applied. The disinvestment procedure covers only property of less than five years since its putting in use.

### **3. USA**

In the United States of America exists extensive and diverse system of federal and notably state tax relieves in two fields: a support of renewable energy sources and a support of energy effectiveness.

Tax relieves on a support of renewable energy are constructed in a way to maximally support purchasing, installation or design of the systems, devices and equipments for renewable energy. The aim is to reduce investment costs.

Investors are most frequently supported by tax rebates, but also allowances or accelerated depreciations. Some states limit the period over which the relief from a purchase or an installation is allowed.

As eligible are considered solar and photo-galvanic systems, geothermal and wind energy, biomass-sourced energy, hydro-energy technologies and alternative fuel technologies.

Personal income tax allows individuals to deduct the costs from adjusted gross income, provided they have incurred costs in connection with a replacement of household furnishings due to a transition from electricity or gas towards using renewable energy sources. Some states allow use of deductions as a predetermined percentage, some as a nominal amount from the size of costs of such technology changeover; such reductions range between 5 – 40%. The reduction may also be restricted by the number of years following the purchase or installation of the new device.

For businesses it is possible – for the same reasons as in the case of individuals – to claim different tax allowances in different US states in interval ranging between 10 – 35% of the costs of technology's procurement. Furthermore, there exist allowances for industrial and business firms that offer energy savings or recycle waste. Some states limit tax allowances to a certain limited investment volume – in case the firm invests less than that, allowance may not be claimed. Reliefs may also be claimed e.g. for solar and wind and water devices as well as for license fees from patents securing energy savings or supporting energy effectiveness.

Property taxation is the most common form of renewable energy investments' support. Tax reliefs vary – from direct exemption of the property that relates to renewable energy sources up to specially rewarding the property based on the degree by which it contributes towards renewable energy sources.

Relieves in taxation of consumption usually mean exemption of expenditures on renewable energies from the state sales taxes.

Tax reliefs for the support of energy effectiveness were introduced in order to reduce costs, reduce risk of installing new technologies and the like. The most common is a tax rebate for “green” buildings and a rebate on efficient appliances. These programmes of support usually

apply on a purchase, instalment or designing of energy-efficient products. Aim of these supports is in the case of buildings growth in market share of such technologies – by state favouring via tax advantages such technologies are also set apart and made visible, supporting their introducing. As their market share grows they become more profitable and expected could also be decrease in their price. At the same time it is in the next step possible – after the desirable technologies and construction practises have spread – to adjust construction rules and regulations in a way that new (stricter) standards are set area-wide.

The bulk of corporate income tax allowance procedures are time-limited to 5 – 10 years following which the tax relief system needs to be extended otherwise it automatically expires. Some states also limit the after- purchase or installation period within which it is permissible to apply for a tax relief.

For personal income taxation exist in many states allowances permitting to deduct from an adjusted gross income acquisition expenditures for energy-efficient technologies. Normally, these are rebates or allowances within the range 5 – 40% of expenditures. The relief may be limited by the number of years following the purchase or installation of the new appliance.

For same reasons as households, businesses may have different access to allowances depending on the individual state – the interval lays in the range 10 – 35% costs of purchasing energy efficient technology.

Property taxation is the most frequently used form of support to investments that go into energy efficient technologies. Tax relieves are various – from direct exemption of the property related to renewable energy sources up to special reward based on how the property contributes towards renewable sources of energy.

Relieves in consumption taxation are usually represented by exemption of purchases of devices for energy efficient technologies from the state-collected sales taxes.

The system of tax relieves for savings in energy consumption and a support of renewable resources is very wide-ranging. For example, only for the area of corporate income taxation there are 7 federal and 46 state tax relieves. The following tables show the number of tax relieves for renewable resources and for efficient use of energies.

**Table 3: Tax incentives for renewable energy sources in USA, 2008**

	<b>Personal Income Tax</b>	<b>Corporate Income Tax</b>	<b>Sales Taxes</b>	<b>Property Taxes</b>
<b>Federal government</b>	3-F	4-F		
<b>Alabama</b>	1-S			
<b>Arizona</b>	3-S	1-S	1-S	2-S
<b>California</b>				1-S
<b>Colorado</b>			1-S 1-L	2-S
<b>Connecticut</b>			2-S	1-S
<b>Florida</b>		2-S	1-S	1-S
<b>Georgia</b>	1-S	1-S	1-S	
<b>Hawaii</b>	1-S	1-S		
<b>Idaho</b>	1-S		1-S	1-S
<b>Illinois</b>				2-S
<b>Indiana</b>				1-S
<b>Iowa</b>	1-S	1-S	1-S	3-S
<b>Kansas</b>				1-S

<b>Kentucky</b>	1-S	2-S	1-S	
<b>Louisiana</b>	1-S	1-S		1-S
<b>Maryland</b>	2-S	2-S	2-S	4-S 5-L
<b>Massachusetts</b>	2-S	3-S	1-S	1-S
<b>Michigan</b>				1-S
<b>Minnesota</b>			2-S	1-S
<b>Missouri</b>		1-S		
<b>Montana</b>	3-S	1-S		3-S
<b>Nebraska</b>			1-S	
<b>Nevada</b>				3-S
<b>New Hampshire</b>				1-S
<b>New Jersey</b>			1-S	1-S
<b>New Mexico</b>	3-S	3-S	2-S	
<b>New York</b>	2-S	1-S	1-S	2-S 1-L
<b>North Carolina</b>	1-S	1-S	1-S	2-S
<b>North Dakota</b>	1-S	1-S		2-S
<b>Ohio</b>		1-S	1-S	1-S 1-L
<b>Oklahoma</b>		1-S		
<b>Oregon</b>	1-S	1-S		1-S
<b>Pennsylvania</b>				1-S
<b>Rhode Island</b>	1-S	1-S	1-S	2-S
<b>South Carolina</b>	1-S	2-S	1-S	
<b>South Dakota</b>				3-S
<b>Tennessee</b>				1-S
<b>Texas</b>		1-S		1-S
<b>Utah</b>	1-S	1-S	1-S	
<b>Vermont</b>		1-S	1-S	1-S
<b>Virginia</b>				1-S
<b>Washington</b>			1-S	
<b>West Virginia</b>		1-S		1-S
<b>Wisconsin</b>				1-S
<b>Wyoming</b>			1-S	
<b>Puerto Rico</b>	2-S	1-S	2-S	1-S
<b>Total</b>	<b>33</b>	<b>37</b>	<b>30</b>	<b>59</b>

Note: the figure expresses number of tax incentives, F = federal support, S = state/territorial support, L = local support

Source: Database of State Incentives for Renewables & Efficiency, 2008.

**Table 4: Tax incentives for efficient energy use in USA, 2008**

	<b>Personal Income Tax</b>	<b>Corporate Income Tax</b>	<b>Sales Taxes</b>	<b>Property Taxes</b>
<b>Federal government</b>	2-F	4-F		
<b>Arizona</b>	1-S			
<b>Connecticut</b>			1-S	
<b>Georgia</b>		1-S	1-S	
<b>Idaho</b>	1-S			
<b>Indiana</b>	1-S	1-S		

<b>Kentucky</b>	1-S	1-S	1-S	
<b>Maryland</b>	1-S	1-S		2-S
<b>Massachusetts</b>	1-S	1-S		
<b>Michigan</b>	1-S			
<b>Missouri</b>	1-S		1-S	
<b>Montana</b>	1-S	1-S		
<b>Nevada</b>				1-S
<b>New Mexico</b>	1-S	1-S		
<b>New York</b>	1-S	1-S		1-S
<b>North Carolina</b>			1-S	
<b>Oklahoma</b>	1-S			
<b>Oregon</b>	1-S	1-S		
<b>South Carolina</b>	1-S		2-S	
<b>Texas</b>			1-S	
<b>Vermont</b>			1-S	
<b>Virginia</b>			1-S	1-S
<b>West Virginia</b>			1-S	

Note: the figure expresses number of tax incentives, F = federal support, S = state/territorial support, L = local support

Source: Database of State Incentives for Renewables & Efficiency, 2008

#### 4. Belgium

Allowances from the base of personal income tax related to environmental protection were newly introduced starting from 2007 and include deduction of costs related to energy savings, allowance for a new “clean” car, for diesel car with a filter and an incentive related to purchase of a passive house. Costs incurred when replacing a boiler, conversion to solar energy, installation of double glazing and similar by a taxpayer on its own or rented house is possible to claim as an allowance at 40% of the costs, maximally EUR 2 600.

In case of the corporate income tax deductible are investments in environmental R&D, energy savings and investments in renewable a recyclable packaging. The size of an allowance is determined from the value of the purchased investment over the given year and the base rate. For 2007 that rate was for investments in energy savings and patents set at 14.5% (for small and medium enterprises at 21.5%).

As for depreciation, applicable is a special depreciation regime in case of investments in devices that conserve energy and research facilities (linearly, 3 years, 33.3% p.a.) – standard depreciation scheme applies to machinery while equipment/devices are put in 20 % category.

#### References

1. Deketelaere K. (199), The Use of Fiscal Instruments in European Environmental Policy: Review Essay, *Energy & Environment*, Volume 10, Number 2, 1 March 1999 , pp. 181-207(27)
2. [http://ec.europa.eu/environment/etap/pdfs/oct06\\_dutch\\_tax\\_relief.pdf](http://ec.europa.eu/environment/etap/pdfs/oct06_dutch_tax_relief.pdf)
3. [http://ec.europa.eu/environment/urban/pdf/assessment\\_annex.pdf](http://ec.europa.eu/environment/urban/pdf/assessment_annex.pdf)
4. <http://gristmill.grist.org/story/2008/6/11/84254/3288>
5. <http://www.bio.org/local/industrydev/newjerseyhightechjobcreationandretentionact2.pdf>

6. <http://www.cbs.nl/en-GB/menu/methoden/toelichtingen/alfabet/t/2008-tax-relief.htm>
7. <http://www.climateactionnetwork.ca/e/news/climate-action/can-2008-08-15.pdf>
8. <http://www.conferenceboard.ca/documents.asp>
9. [http://www.conferenceboard.ca/Libraries/PUBLIC\\_PDFS/ETSectorprofile.sflb](http://www.conferenceboard.ca/Libraries/PUBLIC_PDFS/ETSectorprofile.sflb)
10. <http://www.dsireusa.org/>
11. [http://www.eesi.org/eere\\_tax\\_credits](http://www.eesi.org/eere_tax_credits)
12. <http://www.ens-newswire.com/ens/oct2008/2008-10-03-02.asp>
13. <http://www.floridadep.org/energy/energyact/files/Investment-Tax-Credit-App-Form-62-16-900-4.pdf>
14. <http://www.google.cz/search?hl=cs&q=evaluation+of+the+VAMIL+MIA&lr=&aq=f&oq=>
15. <http://www.irs.gov/newsroom/article/0,,id=177937,00.html>
16. <http://www.leg.state.or.us/08ss1/measpdf/sb1000.dir/sb1091.intro.pdf>
17. <http://www.oecd.org/dataoecd/61/1/41105608.pdf>
18. [http://www.olis.oecd.org/olis/2006doc.nsf/LinkTo/NT0000776E/\\$FILE/JT03221359.PDF](http://www.olis.oecd.org/olis/2006doc.nsf/LinkTo/NT0000776E/$FILE/JT03221359.PDF)
19. [http://www.olis.oecd.org/olis/2007doc.nsf/LinkTo/NT00005CD6/\\$FILE/JT03241008.PDF](http://www.olis.oecd.org/olis/2007doc.nsf/LinkTo/NT00005CD6/$FILE/JT03241008.PDF)
20. <http://www.oregonpriorities.org/news/february-15-tax-credits-to-reward-the-sustainable-business-from-salemwatch/>
21. <http://www.senternovem.nl/sn/index.asp>
22. [http://www.theglobeandmail.com/servlet/Page/document/v5/content/subscribe?user\\_URL=http://www.theglobeandmail.com%2F servlet%2Fstory%2FRTGAM.20080813.wcoont13%2FBNStory%2FspecialComment%2Fhome&ord=12912660&brand=theglobeandmail&force\\_login=true](http://www.theglobeandmail.com/servlet/Page/document/v5/content/subscribe?user_URL=http://www.theglobeandmail.com%2F servlet%2Fstory%2FRTGAM.20080813.wcoont13%2FBNStory%2FspecialComment%2Fhome&ord=12912660&brand=theglobeandmail&force_login=true)
23. <http://www.theglobeandmail.com/servlet/story/RTGAM.20080813.wcoont13/BNStory/specialCo>
24. [http://www.ukbudget.com/UKBudget2007/Environment/budget07\\_environmentaltaxes.cfm](http://www.ukbudget.com/UKBudget2007/Environment/budget07_environmentaltaxes.cfm)
25. [http://www.valero.com/NewsRoom/NewsReleases/NR\\_2002-03-19.htm](http://www.valero.com/NewsRoom/NewsReleases/NR_2002-03-19.htm)
26. <http://www.vrom.nl>
27. <http://www.wind-works.org/FeedLaws/Netherlands/NLgreentaxes.pdf>
28. Ministry of Housing, Spatial Planning and the Environment (2005): The Green Funds Scheme, Annual Report 2005, [http://www.senternovem.nl/mmfiles/GB\\_Annual%20Report2005\\_tcm24-196674.pdf](http://www.senternovem.nl/mmfiles/GB_Annual%20Report2005_tcm24-196674.pdf)
29. Vermeend, W. A. Vermeend, Jacob van der Vaart (1998), *Greening Taxes: The Dutch Model: Ten Years of Experience and the Remaining Challenge*, Kluwer, 1998

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# **ECONOMIC TOOLS FOR ENVIRONMENTAL FRIENDLY TRANSPORT IN THE CZECH REPUBLIC**

**Jarmila Zimmermannová**

## **1. Introduction**

The sector of transport represents hot problem in the area of air and climate protection. The amount of emissions of greenhouse gases, particulates and NO<sub>x</sub> from mobile sources increased in last years. This article focuses on economic tools, which should support purchase and extension of environmental friendly cars with lower fuel consumption and lower emissions, extension of environmental friendly fuels and biofuels and fulfillment of targets of National program of cutting of emissions in the Czech Republic.

The article is going to introduce environmental aspects of road taxation, excise taxation, car registration fee, entrance fee and charging of traffic ways in the Czech Republic.

## **2. Road taxation**

The road taxation in the Czech Republic is regulated in act no. 16/1993 Coll., on road taxation, as amended by recent acts.

The tax is imposed on motor vehicles and their connecting vehicles for entrepreneur purposes, which are registered and operated in the Czech Republic. The tax is also imposed on all vehicles with the weight above 3, 5 ton which serve for haulage purposes.

The road tax includes some environmental aspects. Particularly it is exemption, lower or higher tax rate and tax abatement for environmentally friendly vehicles.

The last amendment of act no. 16/1993 is valid from 4th July 2008. The main reason for changes in legislation was on the one side support of new environmental friendly vehicles, on the other side higher taxation of old vehicles, which do not fulfill emission limits EURO. The main target of the latest act on road taxation is creation of such market conditions, which would motivate entrepreneurs for environmental friendly vehicle purchase.

### **Exemptions**

The act on road taxation enables the full exemption due to environmental protection reasons for:

- Vehicles used in public national transport – the vehicles must travel more than 80 % of km in public national transport;
- Vehicles used in transport of persons or goods with the weight up to 12 ton with:
  - electromotor,
  - hybrid propulsion (combination of electromotor and combustion engine),
  - LPG or CNG as a fuel,
  - special engine for combustion of E85 fuel (ethanol 85 and gasoline).

### **Tax rates**

Tax rates are distinguished for the purpose of support of the vehicles fulfilled strict technical and environmental parameters. On old vehicles, which do not fulfilled emissions limits prescribed by technical regulations, is imposed higher tax rate, on the other hand new vehicles have lower tax rates depending on the date of the registration. Precisely the tax rates are following:

- 36 months after first registration – 48 % of basic tax rate;
- another 36 months - 40 % of basic tax rate;

- another 36 months - 25 % of basic tax rate;
- vehicles registered before 1990 – increase in tax rate 25 %.

### **Tax abatements**

Tax abatement is applied in case of vehicles used in combine transport. The extend of the tax abatement depends on the amount of drives in combine transport way.

The minimal amount of drives in combine transport way for the tax abatement allowing is 31. In this case it is possible to obtain the tax abatement 25 % from the total amount of the tax. When the total amount of drives in combine way is higher than 120, than the tax abatement is 90 % from the total amount of the tax.

Vehicles used only for combine transport can apply for the tax abatement 100 % from the total amount of the tax.

### **3. Excise taxation**

The excises in the Czech Republic are regulated in act no. 353/2003 Coll., on excise taxation, as amended by recent acts, and act no. 261/2007 Coll., on stabilization of public budgets, as amended by recent acts.

Excise taxes are on the list of taxes harmonized by European Commission. The minimal tax rates and possibilities of exemptions are set by directive 2003/96/EC, restructuring the Community framework for the taxation of energy products and electricity.

Until 31. 12. 2007, the possibility of exemption of biofuels was enabled by act no. 353/2003 Coll., on excise taxation. Precisely it was exemption for the following commodities:

- vegetable and animal fats and their fractions (products falling within CN-codes 1507 - 1518) used for electricity generation, heating purposes and mobile sources;
- denatured fermentative absolute alcohol (products falling within CN-code 2207);
- biogas (products falling within CN-code 3824 90 99);
- 47 % of bio-component of ethyl-tercier-butyl-ether (products falling within CN-code 3824 90 99);
- esters of vegetable and animal oils (products falling within CN-code 3824 90 99), used for heating purposes and mobile sources.

Directive 2003/96/ES enables exemption of biofuels for the transport purposes, but the member states must prepare multi-annual program of biofuels support and submit it to European Commission for the notification. The Czech Republic had not prepared this program in time, therefore the exemption of biofuels must be abolished and currently the biofuels are taxed in the same regime as fossil fuels.

In February 2009, the government of the Czech Republic approved “Multi-annual program of using of biofuels in transport”. This Program was created by Ministry of Agriculture and notified by European Commission at 23rd December 2008. Following the Program Ministry of finance prepared new act on excise taxation, which includes also exemptions for biofuels and which will come into force from 1st July 2009. The new act includes the following:

- full exemption: straight oil, straight methyl ester of fatty acids and biogas;
- lower tax rate: mixture of diesel oil and methyl esters of fatty acids (FAME), whereas FAME represents at least 31 % of all matters of the mixture;
- refund of excise tax: fuel E85 – possibility of refund of excise tax from the yield of fermentative absolute alcohol or denatured included in mixture;
- exemption in regime of pilot projects: fuel E95.

The excises imposed on natural gas and other gases are regulated in act no. 261/2007 Coll., on stabilization of public budgets, as amended by recent acts, part 45.

Currently there exists excise tax imposed on natural gas for transport purposes with zero tax rate. This tax rate is valid for the period from 1.1.2008 until 31.12.2011. For the next period from 1.1.2012 until 31.12.2014 there will be tax rate 34, 20 CZK/MWh of gross heating value, for the period from 1.1.2015 until 31.12.2017 68, 40 CZK/MWh of gross heating value, for the period 1.1.2018 until 31.12.2019 136, 80 CZK/MWh of gross heating value and finally for the period from 1.1.2020 the tax rate will be 264, 80 CZK/MWh of gross heating value.

The proposal of new act no. 363/2003 Coll., on excise taxation, includes also amendment of act no. 261/2007 Coll., on stabilization of public budgets, which includes full exemption of biogas for transport purposes. The new legislation should come into force from 1.7.2009.

#### **4. Car registration fee**

The important yield of old vehicles, which do not fulfill emission limits EURO, in vehicle park of the Czech Republic causes heavy pollution of air. The average age of motor vehicle in EU15 states is 7-8 years; in new member states of EU it is around 15 years. It is also case of the Czech Republic.

Due to increase of intensity of individual automobile transport the influence of transport on air pollution is steadily rising. Improvement of situation is possible also with help of the replacement of old cars in vehicle park for new cars fulfilled the latest emission limits EURO.

The new act no. 185/2001 Coll., on waste, as amended by recent acts, introduces in § 37e) the new economic instrument - car registration fee for the purposes of support of collection, processing, utilization and abolition of car wrecks. The main target of this fee is discouraging people from buying of old, second-hand and the most polluting cars.

The fee focuses on the following categories of vehicles: M1, N1 or tricycle motor vehicles, except free-wheeler vehicles. The new act is valid from 1.1.2009. The rates of car registration fee, depending on fulfilling of emission limits EURO, are following:

- 3 000 CZK – fulfilling emission limit EURO 2,
- 5 000 CZK – fulfilling emission limit EURO 1,
- 10 000 CZK – fulfilling no emission limit EURO.

Vehicles, which fulfill emission limit at least EURO 3, are exempted. The fee is paid during the first registration of the vehicle in the Czech Republic. If the vehicle is already registered, the fee is paid during the first registration after 1.1.2009.

#### **5. Entrance fee**

In January 2009, Ministry of finance prepared and submitted to the government the new act no. 565/1990 Coll., on local fees, as amended by recent acts. At the time of preparing this article the new act has not been approved by government yet.

The proposal of new act includes economic instrument, which can be used for decreasing of negative influence of transport in area of particular municipalities. Precisely it is possible to impose the entrance fee up to 1.000, - CZK on entrance of motor vehicles into defined area per day. Entrance fee is facultative instrument; particular municipalities can introduce this fee as a local fee through the municipal ordinance.

The fee is paid by individuals or corporations after their entrance to the selected area. Free entrance to this area is prohibited and it is boundary by traffic sign with title “ENTRY IS

ALLOWED AFTER PAYMENT”. Persons with permanent residence, house owners and their relatives, catering services and people using property for their enterprise are exempted.

Currently the level of the fee is 20 CZK per day, which is not motivating.

## 6. Charging of traffic ways

Act no. 13/1997 Coll., on land communications, as amended by recent acts, imposes obligation for users of land communications to pay for roads utilization. Payment can be imposed in two forms:

- highway stickers (so called „time fee“);
- road-toll – payment is distinguished on the basis of vehicle type and passed kilometers on the road.

Road-toll rates for highways and trunk roads in the Czech Republic are regulated in act no. 484/2006 Coll., on rates of time fees and road-toll and are based on fulfilling of emission limits EURO as following:

Table of road-toll rates (CZK/km)					
Emissions until Euro II			Emissions Euro III and better		
Axle number					
2	3	4<	2	3	4<
2,30	3,70	5,40	1,70	2,90	4,20

Source: act no. 484/2006 Coll.

There are additional plans regarding the current system of payments – for example spreading of both communications and cars, which are subject of road-toll or modification of road-toll rates, which can be based on emission parameters or on types of vehicles.

## 7. Conclusion

Economic instruments, which are presented in this article, certainly can not solve all problems represented by increasing of transport sector in the Czech Republic, on the other hand it can support faster alteration of the vehicle park in the Czech Republic, utilization of environmental friendly fuels, environmental friendly cars and higher utilization of public, railway and combine transport.

In addition to economic tools, there are also other instruments, which can support decreasing of harmful impact of transport on environment, such as technical standards and requirements regarding new cars, noise barriers, building of retarders, roundabouts and grass strips in towns, strict requirements for permitting procedure regarding new transport infrastructure or exemplary behavior of public administration in case of environmental friendly cars purchase.

## References

- act no. 16/1993 Coll., on road taxation, as amended by recent acts
- act no. 353/2003 Coll., on excise taxation, as amended by recent acts
- act no. 261/2007 Coll., on stabilization of public budgets, as amended by recent acts
- act no. 565/1990 Coll., on local fees, as amended by recent acts
- act no. 185/2001 Coll., on waste, as amended by recent acts
- act no. 13/1997 Coll., on land communications, as amended by recent acts
- act no. 484/2006 Coll., on rates of time fees and road-toll, as amended by recent acts

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## EMAS SCHEME REVISION

Pavel Růžička

*On July 16, 2008 the European Commission approved a package of documents on sustainable consumption and production, which also included proposal for a Regulation (EC) of the European Parliament and the Council allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS). From January to April, the proposal was subject to discussions in the European Parliament and in the Council, and subsequently it was approved. As of January 1, 2010, the new regulation will supersede the current version of the EMAS Scheme which is provided for in the Regulation No. 761/2001.*

The aim of the EMAS Scheme is to continuously improve the environmental performance (profile) of organisations (companies, institutions, authorities) by means of an environmental management system that the organisations will establish and maintain, by means of systematic assessment of the efficiency of this system, by publication of validated information on its environmental performance, by holding an open dialogue with all stakeholders and by active awareness raising among their employees. Taking these steps, i.e. subscription to the scheme and formal registration of the organisations under EMAS, is a voluntary act.

The main objectives of the revision, as announced in the introduction of the document, are to:

- Increase the number of organisations participating in the Scheme;
- Ensure recognition of EMAS as the benchmark for implementation of environmental management systems;
- Enable organisations that have established an environmental management system according to other standards (e.g. ISO 14001, national standards) smooth transition to EMAS;
- Require that the organisations registered under EMAS take into account environmental criteria when selecting their subcontractors and service providers.

The basic requirements for organisations that wish to register remain unchanged in the proposal for the Regulation compared to Regulation No. 761/2001. Organisations must define and publish their environmental policy, carry out an initial environmental review, establish the environmental management system (that continues to be based on the requirements of the international ISO 14001 standard), and carry out internal audits of the system and prepare an environmental statement. This is followed by an external audit of the system, validation of the environmental statement by an independent (accredited) environmental verifier, and by a registration procedure at a competent body. After its registration, the organisation shall publish the validated environmental statement and then, under specified conditions, it will be allowed to use the EMAS logo.

In order to remain registered under the Scheme, the organisations must maintain their environmental management system and regularly publish information on their environmental performance proving continuous mitigation of the negative impact of the organisations' activities on the environment. Again, it is necessary to have the functioning of the environmental management system certified and the published information validated by an independent environmental verifier.

However, compared to the requirements and options set out in Regulation No. 761/2001, the Scheme has also seen certain changes. From the perspective of the environmental management system itself, these include:

- Stronger emphasis on the organisation's compliance with the environmental legislation – the organisations must clearly prove by documentation that they comply with the relevant legal requirements and that they have introduced a system securing this compliance; the Member States must establish a system providing the organisations with an assistance in identifying legal requirements and relevant regulation and inspection bodies/authorities;
- Strengthening of the role of environmental reporting – key environmental indicators are defined, which all organisations must include in their statements; the indicators concern energy efficiency, material efficiency, water consumption, waste production, biodiversity and emissions;
- Use of reference documents specific for the given sectors (industry) – the European Commission will draw up reference documents for individual sectors (industries) comprising information on the best practice in the area of environmental management, and appropriate environmental indicators for the given sector; the use of these documents by organisations will be, to a major extent, voluntary.

Among other proposed changes there are, inter alia, the following:

- Closer harmonisation of the accreditation, certification (validation) and registration procedures;
- The possibility to register under the Scheme will also be open for organisations outside the EU/EEA;
- The possibility to register in “clusters” (e.g. industrial estates) and as corporations (organisations with several branches in various countries will be allowed to have to a single European registration);
- Simplifying the conditions for the use of the EMAS logo; however, it will no longer be possible to use the logo on products and packaging;

Another important aspect of the EMAS revision is that administrative procedures will be simplified and the wording of the Regulation itself will become more user-friendly.

The Regulation creates a framework for providing benefits to the registered organisations (e.g. in the form of reduction the burden resulting from environmental inspections and checks, extension of the validity of environmental permissions, tax relief), and it enables the above-mentioned registration in clusters or as corporations (thus cutting the administration and costs for individual registration).

Furthermore, the Regulation requires that individual Member States simplify the registration under EMAS for those organisations that have already implemented an environmental management system based on other standards, and to establish the above system for identification of legal requirements and of the respective regulatory and inspection bodies/authorities.

Formally, the text of the proposed Regulation – unlike the current one – is clearly divided into chapters specifying the rights and duties of the individual entities, i.e. organisations, competent bodies, environmental verifiers, accreditation bodies, Member States and the European Commission. In addition, the Regulation incorporates texts of so-called interpretation documents that have been issued in connection with the Regulation No. 761/2001.

From this point of view, the proposal meets the objectives of the “Better Regulation” initiative (simplifying the regulation and reducing the administrative burden of companies), taken within the renewed Lisbon Strategy.

The Member States must – where necessary – modify the current systems and procedures in terms of registration of organisations and accreditation of environmental verifiers, within one year from the date when the Regulation comes into force (i.e. December 31, 2010) at the latest. Organisations registered under Regulation No. 761/2001 will remain in the register, and their compliance with the conditions pursuant to the new Regulation will be reviewed as part of the next audit (validation). The same procedure will be applied in case of environmental verifiers and their accreditation.

The Regulation requires that the European Commission review it within 5 years from the date when the Regulation comes into force and, if necessary, propose any appropriate changes.

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# REVISION OF EUROPEAN ECOLABELING SYSTEM THE FLOWER

Daniel Hájek

On 16 July 2008, the European Commission adopted draft of revision of the Regulation of the European Parliament and of the Council (EC) No. 1980/2000 on revision of a Community Ecolabel Scheme (The Flower), as part of a package of documents relating to sustainable consumption and production. The duty to revise the current Regulation (No. 1980/2000) is directly embedded in it. According to Article 20, the work on revision was commenced already before 24 September 2005, based on experience gained during its being in effect, and also based on a study ordered by the European Commission with the aim to identify The Flower programme weaknesses and bottlenecks which mostly hamper its development<sup>1</sup>

In its draft, the European Commission through the proposed changes primarily aimed to reduce bureaucratic processes and accelerate non-bureaucratic processes (for example, technical development of directives) during the preparation of criteria and in claiming for ecolabel for the particular products. The Commission also aimed to enhance the attractiveness through limiting the level of fees.

An overview of amendments proposed by the European Union against the valid version:

- transformation from „certification scheme“ (with certification before the ecolabel award) to „registration scheme“ with ex-post certification. It is rather a psychological change. This does not mean a reduction or „softening“ of requirements but just the fact that applicant will have to demonstrate the product properties not before application but only after registration. Max. two months will be allowed for certification by the competent authorities. A guarantee against misleading a customer will be delaying the right to use the logo until the moment of certification of product properties;
- reduction of registration fee, whose maximal amount after revision should be 200 Euro. Annual fees were entirely cancelled;
- in preparing new criteria, the position of industry as well as of consumer associations or other non-governmental organizations will be strengthened – the proposal of a product group, followed by the preparation of criteria (so far in the competence of the EU Member States only), nevertheless, all will proceed within the framework of the European Union Ecolabelling Board (EUEB). The final decision will remain fully in the competence of Member States – Regulatory Committee;
- should there exist criteria for the given product group in different ecolabel award scheme, the criteria for „The Flower“ may be accepted in accelerated regime (EUEB agreement). On the other hand, should there exist a product group under „The Flower“ programme and national programmes would not contain such a product group, they may subsequently accept this product group only with the criteria for „The Flower“ or with stricter ones;
- a „review“ of the competent bodies based on a questionnaire forwarded to them by the European Commission. These institutions would fill in the questionnaire and send it back to the Commission which would then make these questionnaires available to other competent bodies and the public;

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<sup>1</sup> EVER Study, Bocconi University, Italy, 2005

- increased emphasis on „marketing“, for example, a possibility to draw from the EU funds financial resources for ecolabelling promotion;
- extension of The Flower ecolabel award scheme framework, for example, for certain food-stuffs.

There should be achieved, in particular: moving from the current 25 product groups to 40-50 by 2015, and so reaching a 10% market share in product groups covered by ecolabel (The Flower), broader consumers' awareness and higher credibility of The Flower ecolabel.

During the handling of the proposal to revise the Regulation at the Council Working Group meeting, followed by the Trialogue with the European Parliament, the text was revised on the basis of comments raised by the interested parties.

The final version of the Revision therefore contained amendments against the original proposal prepared by the European Commission. The following areas were revised:

- conditions of ecolabel award:
  - all operations and their progression during the criteria validation process before ecolabel award, during award itself and subsequent checks on compliance with these criteria are now clearly defined;
- fees:
  - registration fee was increased to 1200 EUR for large enterprises, to 750 EUR for small and medium-sized enterprises and to 350 EUR for microbusinesses
  - a new proposal also defines in more detail, who will cover the costs of the respective acts and operations;
  - there was re-established a possibility for Member States to collect annual fee (1500 EUR for large enterprises / 750 EUR for medium and small-sized enterprises / 350 EUR for microbusinesses) as a guarantee of the eligibility to develop the criteria relating with a possibility to develop the criteria by any member of the European Union Ecolabelling Board;
  - the final version allows for a rather wide range of amounts of the fees to reflect the conditions in particular Member States of the EU and, at the same time, also the size of enterprise is taken into account;
- framework extension for food-stuffs:
  - the newly proposed version should guarantee that The Flower framework extension for food-stuffs including fishing products and seafood products will not mean a danger of The Flower ecolabel mistaking for „ecological“ agriculture product ecolabels. This should be achieved through undertaking a study, which should clearly demonstrate the benefits of the framework extension for food-stuffs and exclude a possibility of misleading a consumer;
- contents of chemical substances:
  - potentially hazardous substances will continue to be allowed to be used in exceptional cases only, where their use cannot be technologically excluded, which means that ecolabel criteria should motivate the substitution of these substances for their safer alternatives.

The final version of the proposed revision of the Regulation was adopted at the COREPER session on 25 March 2009, and subsequently by the European Parliament at its plenary session on 2 April 2009. The resulting proposal should enhance the attractiveness of the ecolabel and modify and simplify the ecolabel award scheme. It also aims to enhance consumers' awareness of environmental impacts of products and services, and to achieve comprehension and general recognition of this ecolabel award scheme in the European Union and on global scale. A medium-term indicator of success should be acceptance of the ecolabel by consumers and companies in the whole of the EU.

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## **SELF-DECLARED ENVIRONMENTAL CLAIMS AS ONE OF THE VOLUNTARY TOOLS OF ENVIRONMENTAL PROTECTION**

**Pavel Hrubý**

A self-declared environmental claim is a statement, a symbol or a figure, which relate to environmental aspects of a product, its packaging or a part of the product. These claims are issued by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such claims. The environmental aspects are products' characteristics related to their environmental impact. Such green claims have been used widely as an information and marketing tool about environmental characteristics of products for decades. Since they are, however, very easy to misuse, basic requirements for their use were defined in ISO 14021 norm. This standard forms a basis for control of green claims in various countries. In the Czech Republic such framework is included in the National Environmental Labeling Programme (Národní program environmentálního značení – NPEZ) issued by the Minister of the Environment.

In addition to the rules specified by the norm, the Programme offers possibility for the issuers of green claims to have the validity of their claims verified and displayed in an on-line database. This verification process involves CENIA, the NPEZ Council, which is an advisory body of Czech Ministry of the Environment and the Ministry itself. Organizations issuing such a claim may apply at CENIA and provide documentation proving validity of the claim according to ISO 14021 norm. The complete documentation is then provided to the NPEZ Council for review. If there are no objections or additional requests by the members of the Council, the Ministry sends an official letter to the applicant informing about successful verification. Subsequently, the claim is published in the WWW database at <[www.cenia.cz/zelena-tvrzeni](http://www.cenia.cz/zelena-tvrzeni)>. So far, the service is provided free-of-charge. Although CENIA has received 42 inquiries about the use and registration of green claims since the inception of the Programme in mid 2007, only one claim has been registered so far. Insufficient awareness about the formal concept of self-declared environmental claims and the related international norm among the public, especially corporate sphere, in the Czech Republic is thought to be the main reason for the low interest.

This programme serves as a supplement to the type I ecolabeling programmes in the Czech Republic and the EU for products or services which have environmentally preferable characteristics in at least one aspect but cannot be awarded the ecolabel for various reasons. This registration provides a quasi-third-party verification of the validity of the claim for consumers. The registration is valid maximum 3 years after which it can be prolonged provided the holder provides information proving credibility of the claim. If an ecolabeling criteria document for the particular product category comes into effect in the meantime, the registration is valid no longer than one year.

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# MATEMATICAL - ECONOMIC COMPUTER AIDED MODELS AS A SUPPORT FOR ENVIRONMENTAL MANGEMENT DECISION – MAKINGS

Zuzana Chvátalová

## Introduction

The current turbulence of economic environment, social environment and the environment itself in decision-making of all integrated management system (IMS) elements of every company requires to respect potential changes of differing levels of significance. The ability to properly react and respond to such change then determines the company success, and potentially its further development and prosperity. To be able to make sophisticated decisions for future development, company's own past has to be learnt. And so, in spite of low popularity or even almost unpopularity of means and tools of the quantitative disciplines for part of the general public and also specialists community, it is particularly the „disciplines of mathematics“ in a number of forms which gain more and more ground. Nevertheless, fast modelling of the real situations, calculation skills, possibilities of the visualization, animation and simulation and ability to perform their rational interpretations are increasingly becoming not only a need but also a general development trend for managers. They often have to solve problems of interdisciplinary character in the conditions defined by time limits. They have to make their decisions on the basis of provable, most often quantifiable criteria and statistics, they have to respect standards, etc. It is certainly also a consequence of rapid development and user deployment of means of information and communication technologies (ICT), globalization and other megatrends joining different scientific disciplines, objectives, communities, etc., which supports these facts.

The quantification, quantitative methods, scientific calculations and graphic outputs therefore increasingly become the means which are present in decision-making and improvements at both micro- and macro-levels of socio-economic and environmental development. The effectiveness and orderliness of management form important support for corporate success in market environment. The primary goals of management system have to include not only meeting the needs of all stakeholders, but also further permanent increases in satisfaction through the analyses, reflexion and acceptance of mainly so-called development changes<sup>1</sup>. A set of ISO standards (created by International Organization for Standardization) defines requirements on corporate management, excluding the concretization of corporate production, size and type, and supports the improvements in corporate operations particularly through taking into account the use of quality management system (QMS) – see Deming cycle: *Plan-Do-Check-Act (PDCA)*<sup>2,3,4</sup>.

At present, there exists a number of computer systems, for example, product Maple (<http://www.maplesoft.com/>) of Maplesoft Inc., (Canada), product MuPAD

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<sup>1</sup> Certain facts mentioned in this paper form part of preparatory materials for a chapter to be included in the publication by RNDr. Miroslav Rusko, Ph.D. from the Faculty of Materials and Technology of STU in Bratislava, 2009 – currently, in hand.

<sup>2</sup> Hřebíček J.: Preparatory materials for a lecture *Integrated Management Systems*. Moravian University in Brno, Brno 2009.

<sup>3</sup> Pospíšil M. *Documentation management in SME*. Diploma paper, paper leader prof. RNDr. Jiří Hřebíček, CSc. Faculty of Informatics of Moravian University in Brno, Brno 2007.

<sup>4</sup> [http://www.podnikinfo.eu/podnikinfo/jakost/osobnosti-mng.aspx?sekce=5&menu=1386&id=8a049a38-57f7-4bb6-96fa-46e23\\_da6ef48](http://www.podnikinfo.eu/podnikinfo/jakost/osobnosti-mng.aspx?sekce=5&menu=1386&id=8a049a38-57f7-4bb6-96fa-46e23_da6ef48) : (Deming W. E. *Out of the Crisis*. Cambridge, MA:MIT, Center for Advanced Engineering Study, 1988).

(<http://www.mupad.de/products/>) developed by SciFace Software GmbH & Co. KG, (Germany), product Mathematica (<http://www.wolfram.com/>) developed by Wolfram Reasearch, Inc. (USA), produkt MathCAD (<http://www.ptc.com/appserver/mkt/products/home.jsp?k=3901>) developed by PTC Corporate Headquarters, (USA), etc. which support mathematical disciplines and their applications in technical and social science branches. The need of scientific calculations in economy is given primarily by the necessity to address real problems (which are described often by large numbers of the data) in correspondence with the rules and laws of economic theory. Economic „experiments“ largely cannot be managed. Nevertheless, the needed data have to be acquired with sufficient accuracy in time and space, they have to be effectively processed and analyzed, which leads to sophisticated solutions in the area of the given economic issues. The complexity of solution then requires sufficient space for the flexibility of considerations, intellectual creativity, modifiability, and also available communication, awareness, etc. And, of course, the facts have to be perceived in broader context as integrated process from the beginning of arising problem to the feedback after its final resolving<sup>5</sup>.

Product **Maple** of a Canadian computer company **Maplesoft Inc.** in competition with high-quality computer systems takes a significant place. The system development in the course of thirty years (originally also at significant European scientific workplaces) resulted in a number of versions. Its successful profile can be seen not only from user popularity worldwide, popularity of its use is increasing also in the Czech Republic (Chvátalová 2008)<sup>6</sup>. The current version Maple 12 is the third basic version in its series, which is based on a new philosophy for system control (and the subsequent version Maple 13 at present is immediately before the start of distribution). Significant development attributes of Maple system, which indisputably contribute to its success, include frequent dynamic and continual innovations responding to current suggestions given by users and practice.

### **An example of Maple use and a method to determine the future corporate strategy**

A method to address this problem requires the mapping of the development of economic indicators in time sequence, however, not only in the form of absolute numerical information, but primarily from the viewpoint of their changes. And this all in the context of the qualitative and other quantitative analyses of both external and internal conditions of a company. The method addresses problems of a company with a long-time existence, which manufactures machines of a known mark for both household use and industrial use. The company in its long-term development experienced a number of forms from the viewpoint of production and property relations, and also a number of approaches to addressing environmental issues (in connection with manufacture, in particular). After 1989, the company followed up with the former „pre-socialist“ tradition. A fundamental change occurred in 2000 from the viewpoint of internal and external environment of the company. To properly understand the existing company status and to form its strategy for the future, it was necessary to appropriately identify and explain the past development of company performance model. It was necessary to identify the cohesion of the processes and reasons leading to such development. The information was gathered primarily from annual reports and through personal consultation (Popelková 2008).

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<sup>5</sup> Certain facts mentioned in this paper form part of preparatory materials for a chapter to be included in the publication by RNDr. Miroslav Rusko, Ph.D. from the Faculty of Materials and Technology of STU in Bratislava, 2009 – currently, in hand.

<sup>6</sup> Certain facts mentioned in this paper form part of execution of the project 2413/2008 FRVŠ MŠMT; project manager is RNDr. Zuzana Chvátalová, Ph.D.

Company performance so was identified on the basis of elaborating the financial analysis, i.e. the analysis of absolute indicators (horizontal and vertical analyses), ratio indicator analyses (indebtedness, liquidity, activity, rentability indicators), and the analysis of systems of indices (company standing and bankrupt models). Horizontally modelled financial indicators were taken for the period between 2002 and 2007. Also their limit values were traced and moments of their optimal change or moments of change close to optimal change were identified. These moments then were subjected to the vertical analysis of corporate external and internal environment. This led to the identification of the decisive factors, which probably were of most effect on these „positive“ changes. In this way, through historical deduction, ground was prepared for the determination of future corporate strategy (Chvátalová 2008).

Due to a limited scope of this paper, the following text brings the horizontal analysis of only one of the financial indicators, namely **added value (AV)**, whose changes, as it appeared in further analyses of vertical character, markedly corresponded with changes, above all, in corporate environmental management.

### Regression model of added value

From the financial statements, the following inputs to formulate regression model of added value were gained:

Table 1 Empirically identified values for model of added value

Years		2002	2003	2004	2005	2006	2007
<b>Time variable</b> (autonomous variable)	$t$	1	2	3	4	5	6
<b>Added value (dependent variable)</b>	$AV$	40611	77671	105148	93587	77689	77814

We can easily obtain regression model of added value in Maple through opening the relevant library “*Statistics*“ and through its statistical tools.

**Nota bene:** Arbitrarily high numerical accuracy can be selected in Maple, which is its important advantage mainly in multi-step calculations. The system contains built-in dictionary and manual which will provide explanation of facts for correct applications, for example, here *Regression; Linear Fitting*, etc.). Dictionary and manual can be easily contacted also using Help, it is drawn up in the form of hypertext references and examples.

**Demonstration:** Basic two information on regression provided by Maple system:

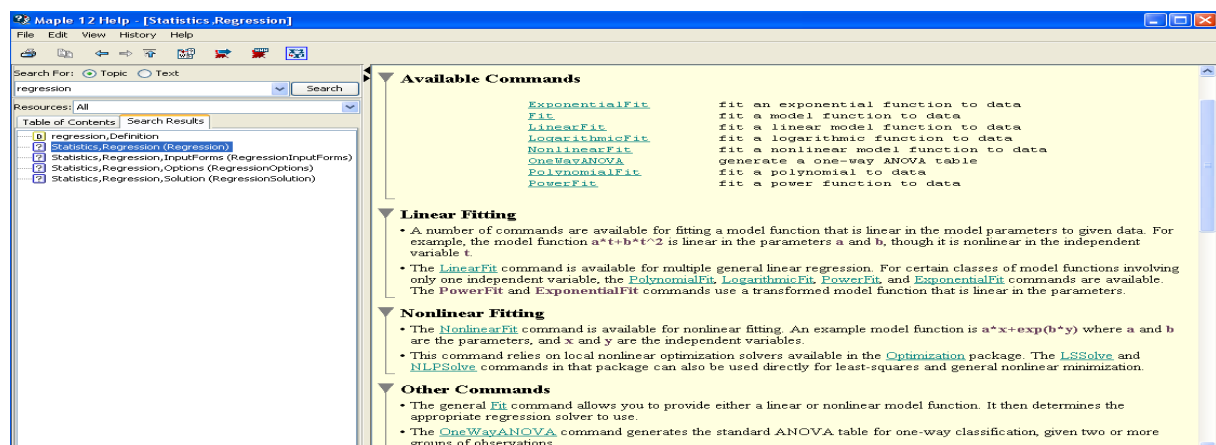


Figure 1 Statistical regression

Opening of menu LinearFit provides the next possibilities of opening menu pads (on Figure marked with arrows oriented to the right) detailing Description, Options, Notes and in conclusion also Examples<sup>7</sup>.

The model has been designed as follows: based on the principle of least squares method using predefined procedure in Maple) we create a model of added value  $AV$  as biquadratic polynomial of time variable  $t$  (as empirically acquired values form time series), including demonstration of selected elements of simple statistic diagnostics also directly set by Maple system (for example, residual standard deviation, number of degrees of freedom, confidence intervals, covariant matrix, etc.)<sup>8</sup>. Biquadratic polynomial will not directly pass through all empirically acquired values. As degree of freedom is 1, it sufficiently approximates the acquired values, which is appropriate for the given methodology. Regression model of  $AV$  can be expressed as follows:

```
restart :
with(Statistics) :
X := Vector([1, 2, 3, 4, 5, 6], datatype = float) :
Y := Vector([40611, 77671, 105148, 93587, 77689, 77814], datatype = float) :
PH = LinearFit([1, t, t^2, t^3, t^4], X, Y, t);
PH = 22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.8125000002547 t^4
```

In Maple, it can be expressed exactly (also in expressing in the form of decimal figure, arbitrary number of valid ciphers can be selected):

$$PH = \frac{16605}{16} t^4 - \frac{2674079}{216} t^3 + \frac{5799233}{144} t^2 - \frac{2040368}{189} t + \frac{132989}{6}$$

For easier demonstration, let us round off:

$$PH = 1037.812500 t^4 - 12379.99537 t^3 + 40272.45139 t^2 - 10795.59788 t + 22164.83333$$

Example of selected statistical diagnostics elements in Maple:

```
m := LinearFit([1, t, t^2, t^3, t^4], X, Y, t, output = solutionmodule) :
m:-Results()

"residualmeansquare" = 2.44515040039679036 10^7, "residualsumofsquares" = 2.44515040039679036 10^7, "residualstandarddeviation" = 4944.8462063009,

"degreesoffreedom" = 1, "parametervalues" = [ 22164.8333333356604, -10795.5978836020022, 40272.4513888909060, -12379.9953703707543, 1037.8125000002547 ], "parametervector" = [ 22164.8333333356604, -10795.5978836020022, 40272.4513888909060, -12379.9953703707543, 1037.8125000002547 ], "leastsquaresfunction"

= 22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.8125000002547 t^4, "standarderrors"

= [ 43108.1698092332881 70581.2173458255130 36943.5639699921958 7656.33477228619086 545.118055555566912 ], "confidenceintervals"

= [ [-5.2557639806457 10^5 .. 5.6990606473125 10^5, -9.0761499600813 10^5 .. 8.8602380024093 10^5, -4.2914003609781 10^5 .. 5.0968493887559 10^5, -1.0966295251574 10^5 .. 84902.961774993, -5888.5691192747 .. 7964.1941192747 ], "residuals"

= [ 311.496031746028166 -1557.48015873014106 3114.96031746028894 -3114.96031746029985 1557.48015873015606 -311.496031746032429 ],

"leverages"

= [ 0.996031746031748488 0.900793650793733192 0.603174603174578827 0.603174603174607471 0.900793650793644707 0.996031746031752708 ],

"variancecovariancematrix"
```

<sup>7</sup> Certain facts mentioned in this paper form part of preparatory materials for a chapter to be included in the publication by RNDr. Miroslav Rusko, Ph.D. from the Faculty of Materials and Technology of STU in Bratislava, 2009 – currently, in hand.

<sup>8</sup> Due to a limited scope of this paper, the mentioned coefficients are not analyzed in detail. It should also be noted that statistical diagnostics can be performed in much more detail, using predefined procedures in Maple.

$$= \begin{bmatrix} 1.85831430430169226 \cdot 10^9 & -3.00210132493183517 \cdot 10^9 & 1.53331306358226490 \cdot 10^9 & -3.09039842272394060 \cdot 10^8 & 2.13950660034734123 \cdot 10^7 \\ -3.00210132493183517 \cdot 10^9 & 4.98170824201865960 \cdot 10^9 & -2.58840678149429750 \cdot 10^9 & 5.27820429023961186 \cdot 10^8 & -3.68470581170930266 \cdot 10^7 \\ 1.53331306358226490 \cdot 10^9 & -2.58840678149429750 \cdot 10^9 & 1.36482691880490566 \cdot 10^9 & -2.81503599916070104 \cdot 10^8 & 1.98243964754405022 \cdot 10^7 \\ -3.09039842272394060 \cdot 10^8 & 5.27820429023961186 \cdot 10^8 & -2.81503599916070104 \cdot 10^8 & 5.86194621453186348 \cdot 10^7 & -4.16015172289756128 \cdot 10^6 \\ 2.13950660034734123 \cdot 10^7 & -3.68470581170930266 \cdot 10^7 & 1.98243964754405022 \cdot 10^7 & -4.16015172289756128 \cdot 10^6 & 2.97153694492682116 \cdot 10^5 \end{bmatrix}$$

## Function of added value increments and its maximum in the monitored time period

Function of  $AV$  increments is determined as derivation of  $AV$ :

with (plots) :

$$PH = 22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.81250000002547 t^4,$$

$$PH = 22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.81250000002547 t^4$$

$$přírůstky_{PH} = \text{diff}(22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.81250000002547 t^4, t);$$

$$přírůstky_{PH} = -10795.5978836020022 + 80544.90278 t - 37139.98611 t^2 + 4151.250000 t^3$$

Then also the maximal increment is derived through predefined procedure in Maple „maximize“:

$$\text{maximize}(-10795.5978836020022 + 80544.90278 t - 37139.98611 t^2 + 4151.250000 t^3, t = 0..6, \text{location});$$

$$40575.73287, \{[t = 1.424609155], 40575.73287\}$$

Consequently, for  $t = 1,424609155$  (i.e. during the first period between 2002 and 2003), the highest added value increment in the monitored period occurs. Let us economically construe the situation, in more detail, also from confrontation of the information gained by the visualization.

## Visualization of measured values (dot chart), model of added value and function of its increments

with (plots) :

```
data := [[1, 40611], [2, 77671], [3, 105148], [4, 93587], [5, 77689], [6, 77814]] :
p1 := plot(data, t = 0..7, style = point, color = black, thickness = 5, legend = Empiricky zjištěné hodnoty) :
p2 := plot(22164.8333333356604 - 10795.5978836020022 t + 40272.4513888909060 t^2 - 12379.9953703707543 t^3 + 1037.81250000002547 t^4, t = 0..6, thickness = 3,
legend = Křivka přidané hodnoty) :
p3 := plot(-10795.5978836020022 + 80544.90278 t - 37139.98611 t^2 + 4151.250000 t^3, t = 0..6, thickness = 3, color = blue, legend
= Křivka přírůstků přidané hodnoty) :
display({p1, p2, p3});
```

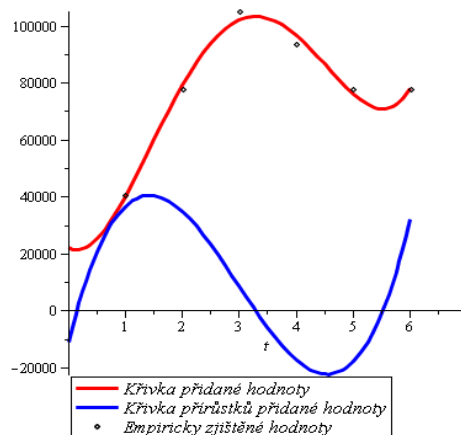


Figure 2 Dot chart of empirically measured values, model of added value and model of added value increments

## Final assessment

- Most significant for the monitoring of an increase in added value there appears to be the period of around the **middle between 2002 and 2003**. Through a subsequent

detailed vertical analysis<sup>9</sup> of external and internal environment of the company it has been identified that this change can be understood as a response to a change of property relations in the company (also with regard to the total costs and receipts). At that time, a new pricing policy was negotiated, with the effect of increasing *AV*. Secondly, an increase can be attributed to implementation of a new organization structure and to a pressure on reducing costs of production, above all in the area of direct material, overhead, labour consumption and measures of environmental character. Operatively, measures were concluded, due to changes in subsystems of integrated management of the company (particularly its environmental management) it was possible to reassess the proportionality of components of the total costs, raise fixed costs (before, there were efforts to minimize fixed cost with regard to certain production risks) and sufficiently cut variable costs<sup>10</sup>.

- Nevertheless, from the visual assessment of the overall situation on Figure 2 it is evident that also in the **last monitored period** the function of added value increments shows markedly rising tendency, and, therefore, the factors which might have influenced this fact, were again subjected to vertical analysis.
- In connection with this, we state that using horizontal financial analysis of *further indicators*, also their optimal values were identified:
  - in the last period, also optimal soundness of *cash flow* was identified, with this success having been triggered by transferring corporate short-term debts to long-term debts at the end of 2003, when company within the concern exploited cash pooling, when it could draw down „commercial credit“ up to the amount of several thousands EUR. This corresponds with another important impetus to change, when agreement on reducing debt maturity date was concluded,
  - in the last monitored period, also maximal decline in *costs* occurred. This happened in consequence of transferring the company to one owner with Czech capital. Positive for the development of receipts and costs in the last period was also the fact that downward trend of costs was steeper than downward trend of receipts,
  - it has to be remarked that both these facts also partly resulted from the company environmental management interventions.
- To set future corporate strategy, the information gained through the mapping of changes are essential, from both the **quantitative** and **qualitative** viewpoints.
- It is evident that proper use of an appropriate ICT system appears to be efficient, convenient and fast. In proper application of the quantitative methods and economic interpretation then the outputs for decision-making are sophisticatedly provable, modifiable and targeted. Nevertheless, supreme presence of human factor is essential. Computer **system Maple** offers a number of tools to support connection of all stakeholders and, furthermore, its applications respects both the logical and intuitive user needs in addressing special problems.

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<sup>9</sup> As not necessarily needed, the vertical analysis is not stated in the present text.

<sup>10</sup> Certain facts mentioned in this paper form part of preparatory materials for a chapter to be included in the publication by RNDr. Miroslav Rusko, Ph.D. from the Faculty of Materials and Technology of STU in Bratislava, 2009 – currently, in hand, and also form part of outputs (Popelková 2008).

- In the end, we should remark that certain facts in the paper are not concretized, they are only generally referred to for the reason of adherence to agreements with the given company on internal information.

## References

1. Hřebíček J., Chvátalová Z. *Zvyšování výkonnosti podniku užitím systému Maple*. Sborník konference CQR Request 2008. Vyd. Centrum pro jakost a spolehlivost výroby a FSI VUT v Brně. Brno 2008.
2. Hřebíček J., Žižka J. *Vědecké výpočty v biologii a v biomedicině*, Institut biostatistiky a analýz, Masarykova univerzita Brno, Brno, 2007.
3. Hřebíček J. a kol. *Corporate sustainability reporting in the Czech Republic*. Sborník konferenci EMAN 2009 - Environmental Accounting and Sustainable Development Indicators. Praha, 2009. UJEP v Ústí nad Labem, 2009.
4. Chvátalová Z. *Využití Maple v závěrečných pracích na Fakultě podnikatelské VUT v Brně*. Sborník 30. konference o matematice na VŠTEZ 2008. Lázně Bohdaneč, 2008. Vyd. Jednota českých matematiků a fyziků. Praha 2008.
5. Chvátalová Z. *Ekonomické modelování s Maple*. Fakulta podnikatelská VUT v Brně, přípravný materiál pro učební text v rámci projektu FRVŠ MŠMT 2413/2008. Brno 2008.
6. Karpíšek Z. *Matematika IV: Statistika a pravděpodobnost*. 1. vyd. Brno: Akademické nakladatelství CERM, s.r.o. Brno 2002.
7. Maroš B., Marošová M. *Základy numerické matematiky*. 2. vyd. Brno: PC-DIR Real, s.r.o. Brno 1999.
8. Popelková I. *Purpurové řeky. Matematické modelování výkonnosti podniku*. Diplomová práce, vedoucí práce Z. Chvátalová. Fakulta podnikatelská VUT v Brně. Brno, 2008.
9. Šauer P. *Základy ekonomiky životního prostředí I*. Praha: Nakladatelství a vydavatelství litomyšlského semináře, 2008.
10. *Maplesoft* [online]. Dostupný z WWW: <<http://www.maplesoft.com>>.
11. *Maplesoft* [online]. Dostupný z WWW: <<http://www.maplesoft.cz>>, informační systém CzMUG.

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# THE IMPORTANCE OF REVERSE LOGISTICS AND ITS POSITION IN PRACTICE

Radim Keřt

## Introduction

Logistics played, plays and will play a big role in the creation of competitive advantages in business. Nonetheless, we still come across companies whose top management (i.e. the company management strategic level) has never heard of or does not take into consideration integrated logistics, or more precisely the *supply chain management*, i.e. reverse logistics which in the modern sense of logistics is viewed as a part of the *supply chain management*.

Companies usually link logistics as such only with warehouses and transport; logistics departments are at the most entrusted with loading or dispatch activities. The same problem is, however, not only characteristic for the Czech Republic but also for Germany and Austria, for instance – logistics operations focus only on warehousing, packing and dispatch, loading operations, transport and warehouse administration. Whereas, at a strategic level, customer – supplier coordination takes first place. Which means that they do not view logistics as strategic distribution of resources – capacities (including production capacities), staff, goods and information, respectively logistics as a strategist of fully integrated chains, supply chains. And nothing indicates that companies deal with material back-flows from customers (flows of devalued, morally or physically outdated products, wrappings and sales returns), i.e. reverse logistics.

## The importance, components and increasing influence of reverse logistics not only in the logistics field

The term *reverse logistics* (also referred to as “reverse flow logistics”) started to be used in the early 1990’s. Originally, reverse logistics only focused on, and was therefore also connected with, product recycling. However, today, about 20 years later, we can say that the dominant value, sense of reverse logistics lies in the collection, sorting, dismantling and processing of used products, components, side-products, surplus supplies and wrapping material, where the main aim is to secure the new utilization or material improvement thereof in a way that is environmentally friendly and economically interesting.<sup>1</sup>

The term *reverse logistics* is interchanged with the term *green logistics* not only in company practice, but also in theory. This is because both logistics deal with some issues but it is essentially incorrect to view these terms as synonyms, because reverse logistics focuses on the movement of used goods with the aim to further enhance such goods and green logistics focuses on minimizing the impact of logistics on the environment. Green logistics, for instance, measures the effect of specific types of transport on the environment; it has to do with certification in accordance with ISO 14000; it attempts to reduce the energy, material intensity of logistics activities, etc.<sup>2</sup> Both reverse logistics and green logistics deal with issues concerning returnable wrappings; product, wrapping and waste recycling.

Reverse logistics forms a part of logistics, the logistics system. Reverse logistics concerns all logistics levels, i.e. micro logistics, meta logistics and macro logistics (Micro logistics is the logistics operation of a single company. Meta logistics relates to the logistics of cooperating

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<sup>1</sup> Škapa, R. *Reverzní logistika*, Brno, Masarykova univerzita, 2005.

<sup>2</sup> Rogers, D.S., Tibben-Lembke, R.S. *Gong backwards: Reverse logistics trends and practices*. Reno: University of Nevada, 1998.

companies within value-forming chains. Macro logistics represents a national view on logistics activities.).

Micro logistics deals with wrapping policies, returned products or claims and the reuse or disposal of such products or waste. These activities naturally increase a company's costs, in fact we may say that they very significantly increase a company's costs and that is why the effective way to go about things is to cooperate with companies that engage in recycling, i.e. micro logistics are interlinked with meta logistics. And at a micro-level, reverse logistics is affected, for example, by state activities or EU activities through legislation (refer below).

Rather extensive legislation, which on the one hand tries to protect the environment and on the other hand takes into consideration restricted economic sources, then especially leads companies to concentrate on reverse logistics. We can divide the methods that induce companies to behave in a more environmentally-friendly way and to engage in sustainable development into two basic strategies, namely the push strategy and the pull strategy.

The push strategy includes:

- Environmental protection legal regularization;
  - Activities by non-profitable organizations aimed at environmental protection;
  - Employee environmental awareness;
  - Rival ecological behavior;
  - Association guidelines that take into consideration environmental protection;
  - Guidelines for the grant of loans taking into consideration environmental protection
- ....

The pull strategy includes:

- Environmental awareness of our customers;
- National, EU subsidy programmes for ecological activities;
- Customer wishes and requirements;
- Ecological prizes.

We can observe the growing influence of reverse logistics not only in the logistics field from the beginning of the 21<sup>st</sup> century. Nonetheless, the main stimulus (as stated above) is European standards the objective of which is to reduce at least a little the extensive wastefulness that goes hand in hand with modern consumption and which is left untouched by the market. The problem, in fact, is that back-flow is very costly, several times so in comparison with goods flow towards the customer (references state nine or ten times more). Another problem lies in the economical and ecological impossibility to recycle everything unnecessary that logistics chains and consumption spheres release (For example in the case of wrappings, costs of transport and energy consumption are limited.). In the end, costs are of course reflected in retail prices and may affect the competitiveness of products and suppliers.

The solution clearly lies in the consumer behavior of customers, i.e. restraint, and in constructional minimization of material consumption, which in the case of wrappings, for example, is enforced by EU directives. The aim, therefore, is to assert logistics standpoints as early as in the construction phase and that in respect to products as well as wrappings and at the same time to prevent undesirable customer behavior.

## **Conclusion**

The aim of this paper was not to proclaim that reverse logistics will become a dominant, critical point for all branches. Reverse logistics is a very specific field. The aim of this paper was to point out that companies should be initiative and should themselves deal with material

back-flows from customers. The aim of this paper was also to underline the advantages that may be had through reverse logistics; even though, as stated above, the main stimulus for the development of reverse logistics is still (and will most probably continue to be for some time) legislation which to a greater or lesser extent successfully attempts to induce companies to be environmentally friendly.

## References

1. Drahotský, I., Řezníček, B. *Logistika – procesy a jejich řízení (praktická příručka)*, Computer Press, 2003, ISBN 80-7226-521-0.
2. Pernica, P. *Logistika – vymezení a teoretické základy*, VŠE, Fakulta podnikohospodářská, Praha, 1994, ISBN 80-7079-820-3.
3. Rogers, D.S., Tibben-Lembke, R.S. *Gong backwards: Reverse logistics trends and practices*. Reno: University of Nevada, USA, 1998.
4. Sixta, J., Mačát, V. *Logistika – teorie a praxe*, Computer Press, 2005, ISBN 80-251-0573-3.
5. Škapa, R. *Reverzní logistika*, Brno, Masarykova univerzita, 2005, ISBN 80-210-3848-9.

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# TO SOME QUESTIONS REGARDING INTERCONNECTION BETWEEN ECOLOGICAL LOGISTICS AND CORPORATE STRATEGY

Zuzana Marečková

As well as any corporation is significantly influenced by the system of economical tools, every individual economy of the EU states is influenced by common strategy of economical development. It is logical, that every economy of the EU member states strives for maintenance or increase of its competitiveness among member states, but also on a world-wide level. Many-times we can hear opinions, that implementation of ecological innovations reduces the competitiveness of the corporation that put off on this journey and at the end it can have significantly negative impact on economic situation of this corporation, primarily on ability to compete on world-wide level. Obviously, EU is aware of this and tries for example to „solve the climate changes internally and on the international level to support environmental permanent sustainability, reduce dependency on external resources and to provide for competitiveness of European economies. Cessation of loss of biodiversity, protection of natural resources that are under pressure and protection of public health also require immediate measures.”<sup>1</sup> Because of this it is very important that current and future environmental challenges will be also joined by other economies, whether qualitatively strong, eg. USA or Japan and other, quantitatively strong, eg. China, Russia or even developing ones, at which we expect significant growth in the near future. According to EU environmental ministers „environmental technologies and eco-innovations are one of the strongest pillars of European economy. With the population growth, continuing globalization and even more number of technologically developed countries competing in growth and employment, the ability to cover green markets is clearly becoming key factor of economic success.”<sup>2</sup> European council alongside the systematic appeal to the rest of the world on its meeting in Brussels on March 8-9, 2007 set following objectives:

1. obligatory objective, which is 20% share of energy from renewable resources on total EU energy consumption by 2020
2. obligatory minimal objective for all member states, which is 10% share of biofuel on total consumption of petrol and diesel in transportation in EU by 2020.<sup>3</sup>

According to Zitnansky, EU will need in next 20 years billion euros to satisfy expected demand for energy, and therefore old continent can gain competitive advantage by focusing on resource-effective technologies.<sup>4</sup>

Agreed objectives will be elaborated in economies of member states with direct impact on individual businesses.

Company can negatively affect with its production process the environment mainly by: consumption of raw materials, substances and energy, that enter into production process, during the production are partially transformed into new product and partially as by-products – emission are spread to the surroundings and are encumbering the environment, perhaps even as production waste are encumbering environment by its storage. Moreover by utilizing the transportation from supply to sale, inclusive internal transportation within company, and

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<sup>1</sup> Zelená kniha o trhovo orientovaných nástrojoch na účely environmentálnej politiky. Brusel, 2007

<sup>2</sup> Zelená budúcnosť pre európsky biznis. Portál o EÚ, 2007

<sup>3</sup> Závery predsedníctva Európskej rady v Bruseli, 2007

<sup>4</sup> Žitňanský, E.: Európa chce rásť a neničiť sa. In: Profit 5/2007, str.22

secondary by utilizing and consumption of its product including liquidation of packaging or non-utilizable waste. Hence it is needed to create on corporate level „effective preventive system of environmental care. It requires by corporate entities not only identification of factors important for ecological environment, but also development of studies of existing environment in connection with production system, also estimate of changes and requirements for provision of ecologization in future time, as well as recapitulation of effects on current and future environment.”<sup>5</sup> In relation with abovementioned it should be required that companies in their corporate strategy incorporate entry analysis that should be focused on company’s approach towards protection of environment. In this analysis the statement should not be absent, whether there is a consensus in the management of the company about the need of realization of environmental policy, whether the company has within its supplier and consumer relationships business contacts with other companies, that consider environment not only theoretical, but also practical meaning, whether the company explores or evaluates attributes of its products and supplied services also from the environmental point and at the same time whether research and technical know-how take into account aspects of protection of environment and not least whether the company has sufficient financial resources for all of this. Part of the entry analysis should also be analysis of external effects, which takes into account macroeconomic development of society but also development of industry in which the company runs its business. This presumes development in social region, for example public opinion, opinions on priorities etc., development in legislation, e.g. existing or prepared legal acts in the domain of creation and protection of environment, liability for environmental damages but also disciplinary actions, penalties and fines, as well as development in economic region with focus on market analysis, examination of demand, monitoring of competitive actions with regard to environmentally suitable products and likewise. After the evaluation of abovementioned analysis the company should adopt strategic decisions with ambition to achieve it by fulfilling partial operational decisions.

Hence the quality of environment is without any doubt affected by the economic activity of the company. However this effect could not be only negative, but also vice-versa, it could be positive. Typical examples of positive effect on environment were in the past for example agricultural companies. Nowadays though, the specialist as well as local public is mainly facing negative affecting of environment. Policy of creation and protection of environment practiced by enterprises can be executed by fulfilling only the legislative requirements, that is called passive policy of environment protection, or company can fulfill requirements above the legislation and thus pursuing so called active policy of environment protection.

Passive policy characteristics are, that the company is realizing measurements for creation and protection of environment only after this requirements are set by the law.

Active approach to creation and protection of environment presumes harmonization of environmental requirements with requirements of profit maximalization. Application of ecological innovations can many times also directly increase profit, e.g. by energy savings, reduction of costs for chemicals, eventually other production costs by waste recycling etc. Moreover in some sectors ecologically clean products are significantly appreciated on the market, it means that their selling ability is substantially higher – it is apparent for example in the agricultural sector.

However, we have to remember, that along environmental edification, appellation for environmental sentiment of consumers, throughout industrial corporate realm, corporate management, up-to government department sphere, the active policy of the state has

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<sup>5</sup> Dupal, A.: Trendy v manažmente výroby na Slovensku a corporate governance .In: Ineco, seminárny buletin – Správa a riadenie podnikov, Bratislava, 2003

unsubstitutable place. “On EU level the mostly used market oriented tools are taxes, fees and systems of marketable allowances. In the economic area these tools are working very similar way.”<sup>6</sup>

European Commission requires that member states will tax natural gas, electricity, coal and coke, hence products that are burdening the environment and are increasing dependency of the integrating alignment. The directive allows, that new taxes will not be paid by households and agriculturalists. One cubic meter of natural gas for companies should be additionally taxed after recalculation by 0,0059 EURO (0,18 Sk), one kilowatt-hour of electricity by almost 0,0007 EURO (0,02 Sk), one ton of coal by 3,1534 EURO (95,00 Sk) and for tonne of coke the consumer should pay to the state budget approximately 4,9791 EURO (150,00 Sk). When in Slovakia these taxes will become effective probably at the beginning they should be half.<sup>7</sup> At present the ecological logistics on the level of the company from the point of direct support of the government does not reach desired level. Current tax system gives not enough support for full development of protection of the environment. Just for illustration, if we compare our country with neighboring Czech, we do not give even contributions for certification, nor financial support for introduction of individual programs. Neither counting on enormous consciousness and active perception of vision for creation and protection of the environment through customers probably is not the best solution. It is at the site to make the statement, that EMAS and EVP in Slovakia are not expanding with sufficient pace, that so called “green logistics” is on the corporate level developing slowly, because it does not yet bring the companies added value, what environmental policy proclaims. Neither on the basis of certification or exertation of environment protection in logistics and subsequently in the production process of the companies there is not the desired development, because these companies are not obtaining any advantages on the market. In the course of applying ecologically balanced production in the Slovak conditions the limiting factors are relative instability of enterprises, also only moderate support from the state, as well as waking up, but we believe that still not sufficient, edification and promotion among population.

## References

1. Dupal', A.: Trendy v manažmente výroby na Slovensku a Corporate Governance. In: Ineco, Seminárny bulletin – Správa a riadenie podnikov, Bratislava, 2003
2. Závery predsedníctva Európskej rady V Bruseli. 2007.  
[http://www.rokovania.sk/app/material.nsf/0/087AB78D7F206067C12572BA002C022E/\\$FILE/Zdroj.html](http://www.rokovania.sk/app/material.nsf/0/087AB78D7F206067C12572BA002C022E/$FILE/Zdroj.html) (08.03.2007)
3. Zelená budúcnosť pre európsky biznis. Portál o EÚ, 2007  
<http://www.euractive.sk/ekonomika-a-euro/clanok/zelena-buducnost-pre-europsy-biznis>. (12.06.2007)
4. Zelená kniha o trhovo orientovaných nástrojoch na účely environmentálnej politiky. Brusel, 2007  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0140:FIN:SK:HTML> (03.04.2007)
5. Žitňanský, E.: Európa chce rásť a neničiť sa. Profit č. 05/2007

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<sup>6</sup> Zelená kniha o trhovo orientovaných nástrojoch na účely environmentálnej politiky. Brusel, 2007

<sup>7</sup> Žitňanský, E.: Európa chce rásť a neničiť sa. In: Profit 5/2007, str.22

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# **DOES SUSTAINABILITY MATTER IN CORPORATE GOVERNANCE? RESEARCH RESULTS FROM CZECH AND EUROPEAN CONFERENCE PROCEEDING FOCUSING ON ENVIRONMENTAL REPORTING**

**Jakub Stránský**

## **1 Introduction**

To change our live style so that we do not undermine lives of future generations is the only truly global and society-wide mission that binds together the world and citizens of each state. Sustainable development embraces three levels of our everyday striving – economic prosperity, respect towards environment and social responsibility. Sustainable development is the only way of social development congruent even when studying its long-term impact. It stands for the very best of our knowledge and experience today and so far there is no reasonable alternative for human kind. These prerequisites set out the context for further consideration of business performance and corporate governance.

Numerous papers on the implications of the idea of sustainability for businesses have been published and theoretical concepts of business sustainable development have been researched so far. An interesting question has emerged – to what extent do businesses embrace sustainability, what was the role of public as stakeholder face to face businesses in doing so or whether managers are socially responsible and willing to be held accountable.

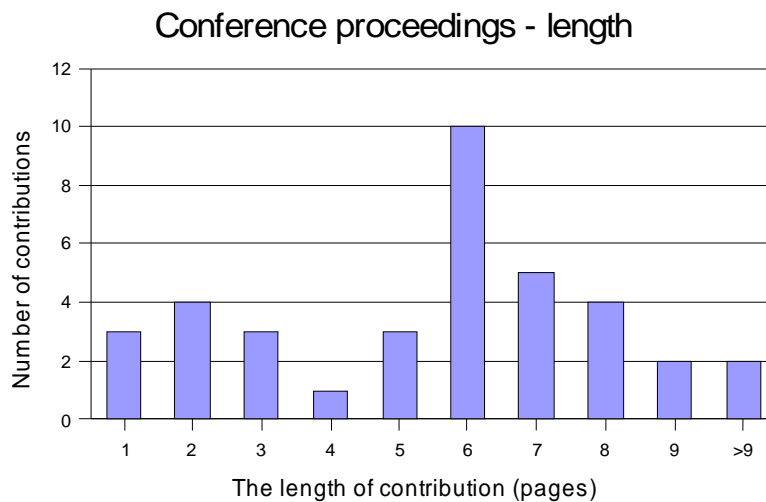
An interesting insight into current situation can easily be gathered from conference proceedings dedicated to sustainable development. Let us have a look in the contents of Czech conference Sustainability Accounting & Reporting on Microeconomic and Macroeconomic Level (held in Brno in May, 28 – 30 this year) and a dedicated section of the Annual Congress of European Accounting Association (held in Lisbon in April, 25 – 27 this year). Both conferences are the ones important of their kind in Czech or European context and allow us to compare local and regional development.

Both sets of conference proceedings prove one thing: Sustainable development is a new topic not only to the Czech Republic but also for the world. The research and practice show the topic is smashed into pieces and the approaches are not well organised. On the world scale this means a tremendous space for relevant work of big scientific teams and, most important, a huge potential for business improvement and development in all sectors. For Czechs this means that for the first time since a long time ago we are at the cutting edge of world development and we have a unique opportunity to contribute to the world project from the very beginning.

## **2 Conference on Sustainability Accounting & Reporting on Microeconomic and Macroeconomic Level**

The Czech set of conference proceedings in contrast to the European one is more practice oriented according to the nature of the conference). It contains a colourful mosaic of 38 contributions that are rather shorter (6 pages in average but 25 per cent have only 1 to 3 pages). They most often do not come with scientific analysis but rather describe Czech legislation or diverse projects.

**Fig. 1 The length of conference proceedings contributions**



Source: Own calculations.

This fact may be harming the scientific reputation of the conference but offers a fresh and lively insight into the Czech research. As can be observed from the contributions the Czech Ministry of Environment is used to collaboration with universities – the universities featured were Masaryk University (Brno), J. E. Purkyně University (Ústí nad Labem), Mendel University of Agriculture and Forestry (Brno), University of Economics (Praha), Technical University (Brno), University of Pardubice, Mining and Technical University (Ostrava), Czech Science Academy and Slovak Technical University (Bratislava). Among the university research teams we discover even representatives of the Union of Industry and Transportation and the Union of Chemical Industry, representatives of Czech Statistical Office and CENIA, the director of Czech Centre for Environmental Management EMPRESS and Czech Environmental Management Centre or the head of department for environment at Most Coal Mines.

The contents of the conference proceedings is far from being balanced but unveils what is important for the broad range of sub-topics covered by sustainable development for local researchers and entrepreneurs:

- Savings thanks to cleaner production
- Consumer Rights and environmental labeling as an important factor involved in supply chains
- Emission Allowance Management
- Environmentally Adapted Gross Domestic Product

## **2.1 Cleaner production myths**

Entrepreneurs are more likely to react on environmental issues the more convinced they get that solutions of these issues would boost financial bottom line of the company. This can be easily understood through the optic of economic theory and the practice in fringe benefits policy. Thanks to a couple of contributions to the Czech conference proceedings we work with real business cases and hope for more to come in future.

The director of Czech Centre for Energy Consumption Management EMPRESS, Vladimír Dobeš, emphasises that Czech businesses fail to notice their processes and flow management systems are not yet optimised. The EMPRESS projects provide grounds for such statement. Ten projects, real business cases, contributed for a cut in CO<sub>2</sub> emissions of about 21 500 tons per year and saved up to CZK 50 million on expenses yearly. These projects that implemented

the concept of the so called Cleaner Production have made evident that the Czech production can be maintained while saving about 25 per cent in material and/or energy flows. According to previous research manufacturing companies capture but a small fraction of all costs related to waste production – they add up a dozen times more in the finished products evaluation.

Klára Najmanová of CENIA affirms these impressive figures (CENIA is the National Centre for cleaner production in the framework of a UN programme run by UNEP). UNEP defines Cleaner Production as a never ending prevention strategy that leads to higher process efficiency and lower risks towards people and the environment, i.e. something that otherwise should have been quite natural for businesses. Projects of the Brno Cleaner Production Centre also uproot the myths about our capacity to improve. People are wrong if they believe that the investment needed to save on energy in production is not reasonable. In fact these savings are feasible without high investment, it is largely sufficient to bring technology and organisational measures to a higher level. Real business cases brought consumption of chemicals down by 45 % or consumption of water down by 70 % or production of liquid waste down by up to 85 %. The author illustrates with real numbers important savings in agriculture, manufacturing, water utilities, education and health care. In context of lamenting heads of industry unions these findings are very solid and persuasive.

## **2.2 Green Procurement and Environmental Labelling**

An interesting comparison of Czech and Slovak conditions is available in contributions on “Green Public Purchasing”. The European Union has published a series of conceptual documents that recommend to local governments to buy environmentally certified products. The EU is thus committing a certain pressure on ministries but also opens up opportunities for responsible entrepreneurs. Although Slovakia has had its legal framework on Green Purchasing in force since 2006 it lacks its thorough analysis on government purchases so far. Daniel Hájek of Czech Ministry for Environment has conducted a research in the Czech Republic where environmental aspects have to be taken into consideration when purchasing publicly. The Czech public sector may specify a choice according to “economic effect of the offering” which enables it to specify an “environmental aspects of the object of purchase as one of core criteria. This type of choice was used for 58 per cent of public tenders that accounted for CZK 84,5 billion but unfortunately we lack data as to how many took environmental aspects into consideration. The Czech government recommended in 2000 to take into consideration “environmental friendliness of products purchased” and to “prefer their direct purchase”. Unfortunately we also lack numbers for success of these measures; that is why the author only quotes the Czech Ministry for Environment purchase statistics. The Ministry in 2005 bought environmentally labelled products for CZK 140 million of total value. The ratio of environmentally labelled versus generic products is different of each category; the average was 79 %. The highest ratio (89 %) was hit in the category of stationary in the value of CZK 53 million. The same amount was paid for the purchase of environmentally friendly office inventory.

The Green Purchasing is tightly connected to environmental labelling. The actual legislation mentions the prevalent system of labelling “Ekologicky šetrný výrobek” (environmentally friendly product). But this label cannot be applied to a broad range of consumer and industry products. This fact has resulted in the creation of the National Programme of Environmental Labelling in summer this year. This concept may bring a significant shift to Czech environmental labelling because the new Programme will enable to quasi-totality of products to be certified. Consumer products would then have chance to get the label and industrial products would see their first opportunity for labelling ever. After some time we will be able to conclude whether this plan would have meant success or not.

### **2.3 Emission Allowance Management**

The Czech Republic has but short experience with Emission Allowance trading but there has been an extremely polarizing debate over it. Most surprisingly this did not mean higher number of contributions at the Brno conference. The most interesting one was a thorough analysis of the sales revenues from Emission Allowances realized by ČEZ in 2005. Tomáš Chmelík's paper tries to argue, against public opinion assuming that ČEZ had lobbying hard to increase profits, and assists author's opinion with detailed figures. The analysis is a contribution to the public debate that will certainly prevail during following years. The good news is that the economic tool really makes businesses take emissions seriously and results in cuts in emissions. The same is conclusion of a study by Pavel Zámyslický from the Czech Ministry for Environment who states that the Kyoto Protocol fulfils its role and so does the European market with emission allowances. The study analyses the fall in prices of emission allowances during last period and forecasts its price for the new period between 2008 and 2013. The author estimates the prices to stay above EUR 20 EUR per ton of CO<sub>2</sub> which would still guarantee the motivation factor that stimulates investment in efficiency of electricity production and lowering emissions. Another hypothesis states that eventual rise in allowance price above EUR 30 per ton would make power plants switch from solid fuels to gases.

### **2.4 Environmentally Adjusted Gross Domestic Product**

An interesting appendix to the conference was a paper suggesting a measure of country economic performance other than gross domestic product. I. Ritschelová and E. Sidorov explain what is the latest development by the scientific community the concept of System of integrated environmental and economic accounting (SEEA). Environmentally adjusted aggregates (EDP) should bring into consideration also the expenses on depletion and depreciation of domestic resources:

$$\text{EDP} = \text{Gross Capital Creation} - \text{Environmental Costs} + \text{End Consumption} + \text{Foreign Trade Surplus}.$$

The problem of EDP is again the limiting factor of economics which is the difficulty to take into (measurable) account all environmental exposures.

## **3 Social and Environmental Accounting Section of the 30th Annual Congress of the European Accounting Association**

The EAA Annual Congress documents year by year the focus of research teams in Accountancy throughout Europe. The EAA makes the Congress profile similar to a scientific conference and this choice has an impact on the selection process of presented papers (the Conference has only accepted 1051 out of 1389 applications). The EAA Congress proceedings has a much broader scope than the Czech conference but we will deliberately look only in the SEA section dedicated to social and environmental accounting. The section hosted 86 papers but we will mention here the most interesting for Czech businessmen only. The sub-topics to sustainable development found in SEA section are the following:

- Link between financial and environmental performance
- Environmental reporting legitimising environmentally harmful processes
- Environmental reporting – a volunteer or compulsory basis
- True and fair picture in environmental reports
- Positive experience with environmental reports

### **3.1 Link between financial and environmental performance**

The authors of contributions to the EAA Congress have often treated questions that are relevant for both managers and academics who have ever got into contact with sustainability reports. Must solid financial performance imply environmental responsibility, or in other words, do we have to wait for environmental measures and get rich at any cost? And what happens if we pursue environmental performance instead of financial one? Will we lose money? We have to say that not all of these interesting did find the answer.

J. Saghroun and J-Y Eglem (05p) were introducing French investors whether they were taking non financial measures from social and environmental reports. The survey shows “some encouraging shifts in the optic of financial investors on environmental issues”. This is supposed to be the most positive way of stating the results, the investors seem to get along these aspects. A similar survey was conducted in Spain; J.M.M. Abadia and E.O. Fredes (12p) were testing a sample of European companies from the Dow Jones Sustainability Index for hypothesis that there was a correlation between performance in sustainable development and the market value of the company. The previous research has not proven scientifically that the environmental performance additional profit. The researchers have improved the techniques of conducting the survey but did neither discover anything new nor validate the hypothesis.

The core problem of both researches may be wrong hypothesis or too general approach to the research by the choice of wrong proxies. Two Germans A. Haller and J. Ernstberger (11p) analysed the research so far in corporate social responsibility and voluntary disclosure and have found many shortcomings, the most frequent one being the wrong choice of proxies. European researches tend to use too simple models that do not allow to dig deeper into the issue not to speak about blurred indicators in wrongly defined contexts. They recommend to future researchers to use multi-dimensional proxies which only have the potential to cover the complexity of currently researched problems. E. Guenther and H. Hoppe (06r) from Dresden Technical University have offered a substantial choice of proxies that turned out to be well usable on the basis of a sample of 166 research reports in the area of management accounting.

One of the Spanish research projects could serve as a best practice example. M.V.L.Pérez, M.C.P. López and L.R. Ariza (34p) studied a very specific question with straightforward implications: Are sustainable businesses innovative? They conducted an extensive survey out of the sample of 217 European companies, half of them being listed on the Dow Jones Sustainability Index between 1998–2004. And the results? Innovative companies filing more patents for registration were also more likely to be on the studied Index. In other words sustainability goes hand in hand with innovation.

Maybe the most interesting concept was applied by M. Marcinkowska from University of Lodź in her paper Triple - bottom – line reporting: A framework for banks (07r). This concept of reporting is a direct response to sustainable development with a clear message: Knowing that economic benefit is not always the right guideline for judgement businesses shall be evaluated with a triad of measures that correspond to the three pillars of sustainable development. These are economic performance, social development and impact on the environment. The author proposes an report applied to the banking sector.

### **3.2 Environmental reporting legitimising environmentally harmful processes – corporate image or even alibi**

A key argument against environmental accounting often says that companies publishing nice glossy sustainability reports may in fact be harming environment. And truly we can say that the winner of the Best Czech Sustainability Report prize in 2005 was Czech Coal – a company devastating landscape and lobbying systematically for breaking into the protected

areas. A series of Congress papers focused on questions whether environmental reports only mask off issues or really unveil them to the public and whether public can be considered an equal partner in dialogue about business policy through these reports.

By carrying out a lexical analysis of the US 10k reports Ch. Cho (42p) tested and validated the hypothesis that the way of presenting information (i.e. Vocabulary, grammar, syntax, colour of verbs) often outweighs the quantity and contents of information in environmental reports. In his second paper (43p) the same author analyses two major French environmental accidents – the sinking of an oil tanker in Brittany in 1999 and the explosion of an AZF plant in Toulouse in 2001). He paid particular attention to the way the corporation had communicated news in their environmental reports and concluded that the reports served as tool to disguise the problems and to legitimise their businesses instead of opting for greater transparency and responsibility. A similar conclusion was made by F. Dejean and B. Oxibar (03r) who analysed reporting of a French chemical Pechiney (today a part of Canadian based group Alcan) for the period of last 50 years. They discovered a strong link between public opinion and corporate environmental reports.

M. Jones (17p) observed a sample of Britain's Top 100 whether they referred to environmental reporting as to an innovation or if they articulate it as reporting about their impact on environmental issues and on future generations. The basis for his research was six prerequisites of environmental reporting: Existence of severe environmental issues and related social risks, a limited capacity of traditional accounting to cover a holistic view on business and the need for alternative, responsibility and each company's share on tackling the issues, the required commitment of companies to report on their impact on the environment and the acute need to begin to solve environmental problems. A rather sad finding was that out of 55 respondents only a couple of them declared responsibility and willingness to participate on problem solving.

M. Laine (10p) has studied all reports of a Finnish chemical plant during last 34 years and aimed to see their vocabulary change over time in function to social context – this hypothesis was validated. The author emphasised the business need to react promptly on social changes and fulfil expectations of diverse stakeholders with pieces of information in reports – the company thus legitimises its own position face to the public. Another Finnish study showed that companies abuse the reports to justify unpopular decisions. H. Mäkelä and S. Näsi (35p) were aiming to understand strategies to calm public opinion down when closing a paper mill. The company voluntarily limited its social dialogue only to economic part of the mill and tried to justify the decision even though the public would have had appreciated holding the company responsible for social decline in the community.

Ch. Ax and J. Marton (33p) researched a sample of big Swedish corporations to validate hypothesis that serves as a standard argument in favour of environmental reports. The idea is that the environmental reporting has a real impact on business processes. The findings did not validate the hypothesis but uncovered another aspect. Businesses that consciously designed their processes with respect to sustainable development were emphasising the need to mention this fact in their reporting – but in fact failed to do so. A strange discrepancy not explained by the authors.

### **3.3 Environmental reporting – a volunteer or compulsory basis**

The debate about environmental reporting often takes form of an extremely bipolar conflict between those who tend to authoritative solutions and the liberals. The first claiming environmental reporting should be standardised and enforced by laws, the latter reason that such a measure would not have brought anything positive but a raise in bureaucracy. Do have researchers anything to say?

A. Brown and I. Pignatelli (04p) were studying annual reports and separate environmental reports of French blue-chip companies listed on the CAC40 in 2005 with a special attention to their motives for disclosure. Strong motives were an ISO 14000 certificate or important CO<sub>2</sub> emissions but the strongest of all was legal binding to do so. S. Giordano-Spring and J-N Chauvey (40p) were studying a broader sample of companies listed on SBF120 index where the majority of companies have no obligations towards environmental reporting. And still many do disclose the information but the quality of such reporting is so poor that the authors suggest the contents of environmental reports shall be standardised or given by laws. It seems like the French seem to recommend higher legal regulation.

V. Perez-Chamoro (10r) was researching whether or not the introduction of a Spanish law on compulsory environmental reports since 2002 improved the reporting. The reports flourished under the legal pressure of the law but they seemed to be like an form filling exercise rather than real reports. Research finding support a simple idea that a law if not followed by an educational campaign does not change much over night. An another interesting point – the most responsible reports were those of the most environmentally risky industries that find themselves under pressure of media.

### **3.4 True and fair picture in environmental reports**

Environmental reports are considered an accountancy tool (in the “accountability for resources” sense of the term accountancy) and as such they shall obey to accounting principles. Businesses often consciously limit the contents of environmental reports, thus breaking the principle of true and fair view.

M. Fernandez-Chulian (13p) studied sustainability reports of six Spanish financial institutions from 2002 to 2005 and found out three interesting statements. Firstly the language concentrates on environmental effectiveness but does not speak about environmental justice or the desired changes in corporate values. Secondly the corporate reports try to avoid any definition of sustainability; this makes readers think that sustainability means economic growth. And lastly the business jargon tends to emphasise procedural (opposite to substantial) approach to reporting when focusing on fulfilment of requirements rather than disclosure of environmental issues. Very often even substantial facts get ignored as documented by E. Ortiz-Martinez and D. Crowther (15p) for period of 1998 – 2003 when Shell manipulated the classification of oil reserves in order to influence the price of own stock in favour of managers holding stock options. When analysing corporate reports a reader would not have had any clue. This behaviour undermines general trust in accounting reports – and it gets even worse for companies not disclosing anything.

A similar experience comes from Austria. S. Ji and C. Deegan (28p) first dressed up a list of industrial contaminated sites on the basis of a public registry and with the aid of intelligence provided by NGOs. They compared this list with disclosed data in company reports and concluded that in important number of cases the companies failed to disclose the sites at all even with obvious materiality of that information. And the worst aspect – the companies are held responsible by a law to do so and the evident discrepancy was passed unnoticed even by auditors.

### **3.5 Positive experience with environmental reports**

Spain has been coping with corruption from the seventies and so was fast to seize an opportunity in 2004 when the UN recommended to include ten anti-corruption principles in corporate reports. I.A. Etxeberria, J.A.C. Sanchez and A. Garayar (37p) have observed how was finding its place in practise the UN Global Compact recommendation to use the measure of SO<sub>2</sub> from the framework of Global Reporting Initiative. The good news is that most of the

reports contain the measure the bad news says that the text part on anti-corruption principles is missing. The new GRI3 shall resolve this issue.

One of the tools of environmental accounting is the concept of full costs, i.e. the traditional costing method now covering even externalities. This concept is often criticised for its complexity which means it may be too expensive to implement. I. Criado-Jiménez and C. Larrinaga-González (21p) have tried to propose a new concept of Full Cost Accounting that would be easy to implement. The claimed advantage however is still waiting for validation.

A relatively surprising message were the research findings of Brazilian team on trading with atmospheric carbon. A.J. rezende, F.Z. Dalmácio, M. de S. Ribeiro, M. P. Rosas and V. Slomski (23p) were applying carbon reports on free markets and concluded that the air carbon trading (combining both allowances and consumption tickets) could eventually generate sufficient sustainable income for forestry. According to their forecasts a new wave of forest plantation would be a profitable business in Brazil somewhat in between 5 and 50 per cent of return on investment.

#### **4 Conclusion**

We have compared and analysed two sets of conference proceedings that stand for examples of current development in sustainability issues in corporate governance in the Czech Republic and in Europe. The European research is no doubt of better quality than local research however it does not necessarily mean it could provide more comprehensive answers on today's questions. When reading the conference proceedings one can easily think of more relevant and more important questions than the researchers ask themselves – but answers are always very hard to find. Let us hope the sustainability research will go from its current very beginning much further in the future.

#### **References**

1. Iva Ritschelová, Miroslav Farský, Jaroslava Hyršlová (ed.): Účetnictví a reporting udržitelného rozvoje na mikroekonomické a makroekonomické úrovni (Sborník z mezinárodní konference), Brno, 28.-30. května 2007. Univerzita Pardubice, 2007. Pardubice. Individual contributions are referred to as to individual authors in this paper.
2. Carlos Baptista da Costa, Linda Pereira (2007): Programme and Collected Abstracts to the 30th Annual Congress of the European Accounting Association, Lisbon, April 25-27, 2007. EAA, 2007. Available on-line at <http://www.eaa2007lisbon.org>. All contributions were part of the SEA section and they are referred to with their respective codes in this paper. The codes stand for the following contributions:
  - 02r Multinational corporations' corporate social and environmental reporting on websites
  - 03r Corporate social disclosure and legitimation strategy: A longitudinal study of Pechiney
  - 04p French environmental accounting : A theoretical and quantitative disclosure study of French reporting practices
  - 05p Global corporate performance : Is social and environmental information taken into account by financial analysts in France?
  - 06r Does the measurement approach for economic performance affect the results of empirical studies on the relationship of environmental and economic performance?
  - 07r Triple - bottom – line reporting: A framework for banks

- 09r An exploration of the level of dialogue and engagement of stakeholders in Spanish companies
- 10p Ensuring legitimacy through rhetorical changes? A longitudinal interpretation of the social and environmental disclosures of a leading Finnish chemical company
- 10r The effect of accounting regulation on corporate environmental disclosure practices by listed Spanish companies
- 11p Determinants and consequences of CSR and CSR reporting: What can we learn and what could we learn from European research?
- 12p Are financial markets influenced by sustainability matter? Evidence from European companies
- 13p Sustainability reporting as organizational discourse: A qualitative analysis of Spanish reporters
- 15p Disclosure to stakeholders: The Shell case as a study of inadequacy
- 17p Accounting for the environment: Towards a theoretical perspective for environmental reporting
- 21p Full cost accounting: A tool for corporate sustainability reporting
- 23p A case study of the potential of carbon credits to generate sustainable income from reforestation in Brazil
- 28p Accounting for environmentally contaminated sites: Preliminary Australian evidence
- 33p Human capital disclosures and management practices. A study of large, listed companies in Sweden
- 34p Sustainable development and innovative performance: An empirical analysis
- 35p Economic and social dimensions of CSR. Stakeholders' demands and companies' legitimising strategies in downsizing operations
- 37p Reporting of corruption in Spanish companies: The relation between Global Compact and GRI
- 38p Voluntary disclosure of social and environmental Innovest ratings: Evidence from European companies
- 39p Corporate firm characteristics and human resource disclosure in Spain
- 40p Assessing the quality of corporate social reporting through reporting principles: An empirical study of French listed companies on SBF 120 stock index
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# CONCEPTION OF CORPORATE SUSTAINABILITY ACCOUNTING METHODOLOGY IN THE CZECH REPUBLIC

Jaroslava Hyršlová

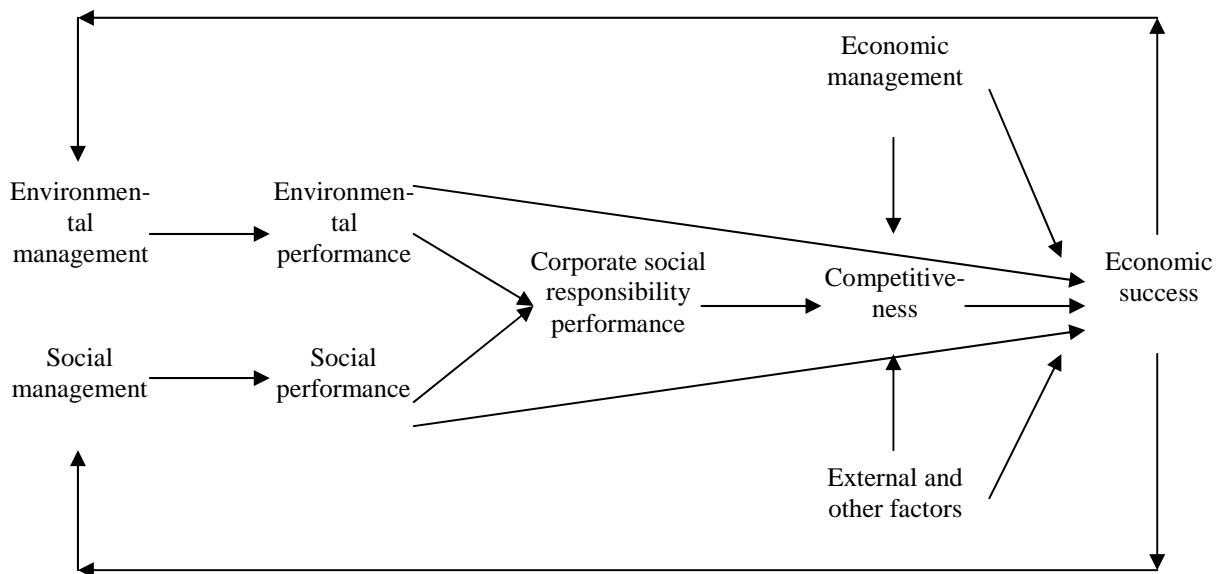
Corporate Sustainability Accounting Methodology (hereafter methodology) was prepared at the end of 2008 for Ministry of the Environment of the Czech Republic. This methodology is available for organizations since 1.1.2009. The aim of this methodology is to provide companies with basic information on sustainability accounting, representing an important tool for promotion of the sustainable development concept at the corporate level [7]. The methodology focuses on definition of sustainability accounting, on aims this accounting system sets, and on benefits of the system for a company. High attention is paid to costs and benefits of sustainable development. The methodology is continuation of the *Environmental Management Accounting Implementation Guideline*, available to companies since January 1, 2003 (see [http://www.enviweb.cz/download/ea/metodika\\_metodicky\\_pokyn\\_cz.pdf](http://www.enviweb.cz/download/ea/metodika_metodicky_pokyn_cz.pdf)). The objective of this paper is to characterize the basic conception of this methodology.

Methodology of sustainability accounting results from following conception:

**1. Business success depends, in particular, on economic performance of a company, but it is influenced also by environmental performance of the company and the company approach to social problems.**

Mutual relations among economic performance, environmental performance, and social performance, are shown in Figure 1.

**Figure 1 Impact of environmental performance and social performance on business success**



Source: [4]

**2. The influence of environmental performance and social performance on business success changed significantly during last decades.**

Companies usually do not have passive approach either to identification of social environment where they carry out their business activities, or to modifications of accounting and communication systems and management systems. The company management influences, via its business activities, the social environment, and looks for new approaches to solving the arising problems. In order to promote the atmosphere of mutual trust, it is necessary to act transparently, to involve stakeholders in the problems, and to communicate with them. Adequate accounting and reporting systems significantly contribute to this. Sustainability accounting and reporting role is changed in individual stages of development of business environment (see Table 1).

**Table 1 Role of sustainability accounting and reporting in the individual stages of development of business environment**

<b>Business environment</b>	<b>Expectations of stakeholders</b>	<b>Importance of sustainability accounting</b>	<b>Importance of sustainability reporting</b>
„Trust me“	No	Improvement of use of materials and increasing of efficiency of the company processes	Internal communication for achieving aims in the field of improvement of use of materials and increasing of efficiency of the company processes
„Tell me“	Communication	Collecting information connected with the most visible problems, and formally required information	Sustainable development becomes to be an important element of both internal and external communication
„Show me“	Communication and explanation (substantiation)	Collecting information on the company sustainability performance	Basic communication element, part of voluntary communication activities
„Prove to me“	Measurement, responsibility, communication, explanation (substantiation)	Basis of management of the company performance towards sustainable development Basic precondition for achieving transparency Basis for verification	Important part of activities for increasing the company credibility (for example, within the framework of dialogue with stakeholders who actively participate in the communication process)

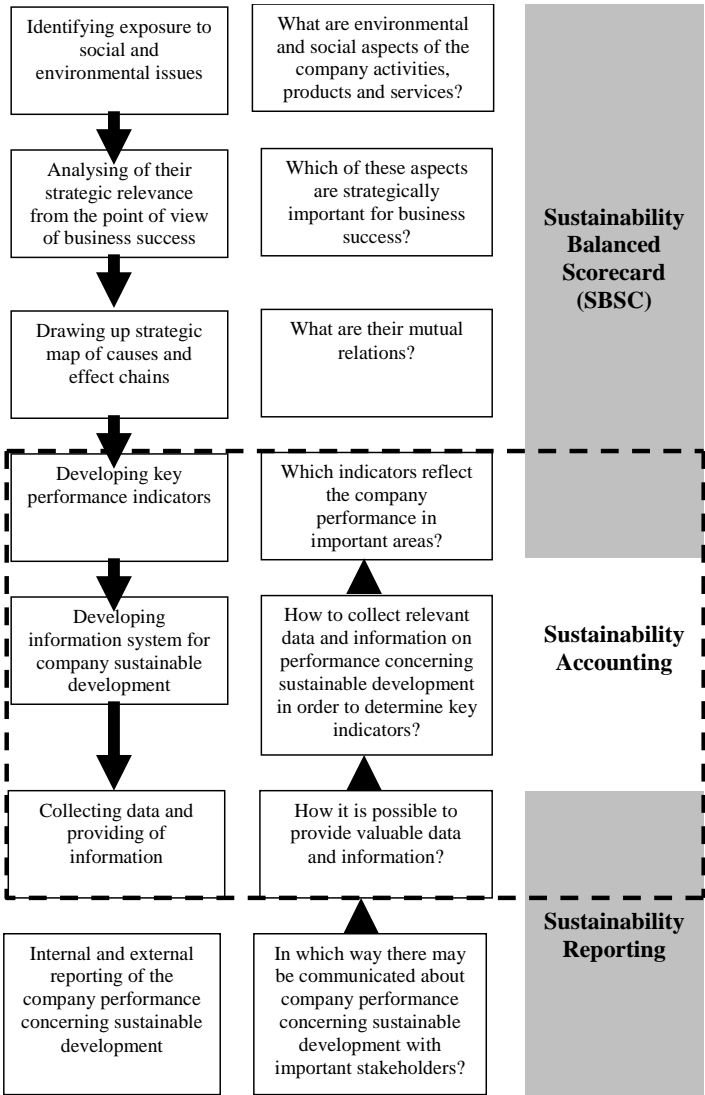
Source: [7]

Sustainability accounting and reporting are not a "panacea" for solving all problems connected with the efforts to support actions towards sustainable development. However, they play an important role, because accounting information serves for support of decision-making, and is irreplaceable both in internal reporting and in external communication with stakeholders.

**3. It is necessary to manage sustainability performance.**

Sustainability Performance Management (SPM) is a new term within the framework of the issue of business and corporate social responsibility. It focuses on economic, environmental and social aspects of the company management generally, and, in particular, from the point of view of the corporate social responsibility. On the one hand, it tries to interconnect environmental and social management with economic management and competitiveness, and, on the other hand, it aims to integrate environmental and social information with information on economic performance. SPM is very closely linked also to external corporate sustainability reporting. The whole system is obvious from Figure 2.

**Figure 2 Sustainability Performance Management**



Source: [5]

**4. Sustainability accounting (at the corporate level) is defined as the system collecting, recording, analysing and reporting information on: environmentally and socially induced financial impacts; environmental and social impacts of the economic system (for example, company, production plant, place of work, etc.); mutual relations among environmental, social, and economic aspects of business [7].**

Within the framework of the methodology, attention is paid especially to financial information. Sustainability accounting is defined as a system which collects, records, processes, analyses and reports information (usually financial information) connected with environmental and social aspects of business, in order to improve the company environmental, social, and economic performance [8].

The aim of the sustainability accounting is to provide high-quality and relevant information which serve, on the one hand, to the management to support decision-making in order that the company achieves sustainability, and, on the other hand, to other external users who are interested in this type of information and use them for support of their decision-making processes.

The term sustainability accounting emphasises that this system forms a part of the company information system, using accounting methods with the aim to provide high-quality information for support of the company development towards sustainability. Sustainability accounting cannot be separated from sustainability reporting. Accounting information of itself, if it is not transferred to users, cannot contribute to the company sustainable development. Reporting is also necessary for evaluation of state and development of the company towards sustainability.

**5. Sustainability accounting is in narrow connection with environmental accounting.**

Environmental accounting focuses on two sustainable development pillars - on environmental and economic aspects of business and their mutual relations [3; 6]. Sustainability accounting is based on the environmental accounting concept, and broadens the field of its interest by social aspects of business. Thus, environmental accounting can be unequivocally regarded as a part of sustainability accounting.

**6. System of sustainability accounting is possible to structure on sustainability financial accounting and sustainability management accounting.**

Sustainability financial accounting is a system providing information (usually financial information) connected with environmental and social aspects of business, in particular to external users. Thus, sustainability financial accounting may become an essential part of external corporate sustainability reporting. It enables companies to demonstrate to the general public, and other external stakeholders, responsibility for the environment and social issues (thus, environmental and social aspects of business). However, it is a new area without "tight" rules or standards, in which only a few top world companies participate yet. Nevertheless, interest of external stakeholders in environmental and social financial (and non-financial) information is growing. The methodology is based on recommendations of *The Sigma Guidelines – Toolkit, Sustainability Accounting Guide*, published in 2003 [8]. These Guidelines represent an output of a project which was supported, inter alia, also by the Association of Chartered Certified Accountants.

Sustainability management accounting represents a very important tool for support of decision-making processes in the conditions when the sustainable development concept becomes to be a new business approach, and the company tries to achieve it in practice. As a matter of priority, it is focusing on future, and meets information needs of the management. The methodology focuses on environmental and social costs and benefits which represent an

important part of sustainability management accounting, and identification, recording and analyses of which may contribute to understanding of mutual relations among the company economic performance, environmental performance and social performance. High attention has been paid to the issue of environmental costs and benefits in the world in the recent years. In this area, the methodology is based on the following recommendations:

- The document *Environmental Management Accounting: Procedures and Principles*, issued by the United Nations Division for Sustainable Development in 2001 [1]; this document formed the main basis for formulating the *Environmental Management Accounting Implementation Guideline*, which was drawn up for the Ministry of Environment of the Czech Republic in 2002, and has been available to the companies since January 1, 2003.
- Methodology drawn up by the organization International Federation of Accountants (IFAC) in 2004, described in the document *International Guidance on Environmental Management Accounting*.

Classification of costs and benefits of sustainable development, used in the methodology, is based on the expert article published in the magazine *Environmental Research, Engineering and Management* in 2005 [2].

## Conclusion

Sustainability accounting represents a relatively broad concept; it includes already existing, and in the practice of industrial companies used, methods of environmental accounting, as well as social aspects of business. It is a tool of economic, environmental, as well as social management; its importance for the future should reside, in particular, in interconnection (integration) of all the three areas of sustainable development. Sustainability accounting should contribute to significant change in behaviour of business entities.

The methodology is intended for internal use of companies. It may be used by companies of all sectors, small, medium, as well as large organizations. A part of the methodology is formed also by short case studies, demonstrating the presented problems; they are usually incorporated into the annexes. The whole methodology, as well as the case studies, is based on available expert world publications concerning this topic.

## References

1. Jasch, C.: *Environmental Management Accounting: Procedures and Principles*. Nations Division for Sustainable Development, 2001.
2. Jasch, Ch., Stasiškiene, Ž.: From Environmental Management Accounting to Sustainability Management Accounting. *Environmental Research, Engineering and Management*, 34, 4, 77-88, 2005. ISSN 1392-1649.
3. Schaltegger, S. and Burritt, R.: *Contemporary Environmental Accounting*. Sheffield: Greenleaf Publishing, 2000.
4. Schaltegger, S. and Wagner, M.: Managing and Measuring the Business Case for Sustainability, in: Schaltegger, S. and Wagner, M. (Eds.): *Managing the Business Case for Sustainability*. Sheffield: Greenleaf Publishing, 1 – 27, 2006.
5. Schaltegger, S. and Wagner, M.: Managing Sustainability Performance Measurement and Reporting in an Integrated Manner, in Schaltegger, S., Bennett, M. and Burritt, R. (Eds.): *Sustainability Accounting and Reporting*. Dordrecht: Springer, 681 - 697, 2006.

6. Schaltegger, S. et al.: *Corporate Environmental Accounting*. Chichester: Wiley and Sons, 1996.
7. Schaltegger, S., Bennett, M. and Burritt, R.: Sustainability Accounting and Reporting. An Introduction, in Schaltegger, S., Bennett, M. and Burritt, R. (Eds.): *Sustainability Accounting and Reporting*. Dordrecht: Springer, 1-33, 2006.
8. Sigma project: *The Sigma Guidelines -Toolkit. Sustainability Accounting Guide*. London, 2003.

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# SUSTAINABILITY ACCOUNTING AND REPORTING

Dana Dvořáková

## New dimensions of An Enterprise in the Context of Sustainable Development

The view on an enterprise is changing in context with the adoption of sustainable development conception. An enterprise is interpreted as a unit of economic, social and environmental dimensions<sup>1</sup>, and only the reproduction of these three dimensions allows its sustainable development. The social and environmental dimensions of business are closely related to the economic dimension. But it is not possible to say that all the results of environmental and social influences of an enterprise are included (directly or indirectly) into the reported performance and its financial position (ergo in traditionally perceived economic dimension).

Externality is an outside impact of an economic decision, or activity born by somebody else, not its originator. Externalities are gains or losses of other subjects that cannot be adopted by an originator (in case of gains – positive externality) or that cannot be claimed from him (in case of losses – negative externality). It is clear that the internalization of these losses and gains is in the interest of sustainable development.

A multidimensional view on an enterprise shows us three lines of reporting – traditional economic dimension and besides it a new communication area including also social and environmental aspects of business.

## Results of an empirical study

An empirical study about the specific reporting of social and environmental business aspects was conducted as an initial part of this research. The aim of the empirical part of research was to identify the ways which enterprises use in environmental and social information reporting, and to determine whether such information are linked up with financial information (whether a reporting brings comprehensive, multidimensional view on an enterprise). At the same time the reliability and information potential of reported information was assessed.

The empirical study was made in all production enterprises listed on Prague Stock Exchange. The choice was not aimed at the selection of either random sample or characteristic sample of Czech enterprises, but vice versa, it was to choose the enterprises with an assumed high quality and standard of reporting. All assessed enterprises prepared their financial statements in compliance with the International Financial Reporting Standards. A lot of these enterprises use Environmental Management System and are holders of ISO 14001 certification.

Sources of the empirical study:

- information about the issuers of securities on Prague Stock Exchange <http://www.bcpcp.cz/>,
- information presented on official web pages of individual enterprises.

Questions surveyed in the empirical research:

1. Has the information about environmental aspects been reported in the annual report?

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<sup>1</sup> E.g. Bent, etc.: The Five Capitals Model, Kovanicová, D.: Sustainability accounting and reporting, paper from conference „Accounting in process of international harmonization“ Horní Bezděkov, 2008, ISBN 9788024513935, or Eklington, J.: Cannibals with Forks: The Triple Bottom Line of 21 st Century Business, New Society Publisher, Gabriella Island, BC.

2. If the answer to question number 1 is positive – is the information linked with the figures in the financial statements?
3. Has the information about social aspects been reported in the annual report?
4. If the answer to question number 3 is positive – is the information linked with the figures in the financial statements?
5. Has the information about environmental aspects been reported in a separate environmental report?
6. If the answer to question number 5 is positive – is the information linked with the figures in the financial statements?
7. Has the information about social aspects been reported in a separate social report?
8. If the answer to question number 7 is positive – is the information linked with the figures in the financial statements?
9. Has the information about social and environmental aspects been reported in a separate social and environmental report?
10. If the answer to question number 7 is positive – is the information linked with the figures in the financial statements?
11. Is the complex conception of a business concerning environmental area disclosed?
12. Is the complex conception of a business concerning social area disclosed?

Simultaneously it was surveyed whether the enterprises use Environmental Management Systems (EMS) on the basis of ISO14001.

### **Interpretation of the empirical research results**

#### **a) Separate periodical reporting on environmental and social information**

One third of the total number of enterprises reported a separate environmental report; the relation to financial statements in annual reports was recognized only by two reports. At the same time, all those enterprises reported the information about environmental aspects in their annual reports, the information was often duplicate.

Separate environmental reports of investigated enterprises had almost no relation to economic dimension of the enterprises. The enterprises reported mostly only on their successes. The information was presented only in a verbal form. Comparable figures (from the previous years) of reported environmental indicators (in measured units) were not reported. And this fact significantly decreases the information potential.

Separate social reports have not been submitted by any enterprise.

#### **b) Reporting of environmental and social aspects in annual reports**

Two thirds of the enterprises reported the social and environmental information in their annual reports. The rest of the enterprises did not report such information with annual periodicity; an interesting fact is that two thirds of these enterprises use EMS.

As far as the relations between the social or environmental information and economic (financial) information are concerned, the financial statements of one third of the enterprises show a link to the environmental information, only one sixth to the social information.

However, the frequency of links is higher than in separate environmental reports.

The reported links to economic figures in financial statements are rather sporadic and are not systematically processed.

None of these enterprises comments on the environmental and social information in notes to their financial statements, such information is presented only in the other parts of their annual reports.

Enterprises have a strong tendency to report only positive information (almost as advertisement) and we can justifiably be worried that such information is not complete. Enterprises are not motivated to present comprehensive information, they are motivated to create their positive image. It is not exceptional that an enterprise presenting its favourable and positive approach to sustainable development is known from mass media for its problematic attitude to the environment. We suppose that a closer link of such information to real numbers in their financial statements would bring more truthful and reliable information.

Our empirical research univocally confirms the lack of links between the information on economic, environmental and social dimensions of a business. This lack weakens the potential of the information that is presented separately.

An issue of multidimensional, comprehensive view on an enterprise is widely solved neither in practice nor in the expert literature. It can be stated that most publications concentrate on this issue only from the position of a managers. The absence of the link to financial accounting and reporting is often explained that financial accounting is linked with national or international accounting standards, and these standards do not facilitate separate recognition and reporting on these issues. This idea is true only partially. Financial accounting needs to be viewed as an instrument which is developing in many aspects and which, with the help of information technologies, is capable of flexible adaptation to the information needs of accounting information users. Furthermore, financial accounting is the only instrument by which a comprehensive view on an enterprise can be reached (even if at present, conventional financial accounting views a business only from an economic side).

In the following part of our research we will try to assess whether a comprehensive view on an enterprise based on financial accounting and reporting is possible. We will focus on the assessment of “applicability” of financial reporting system regulated by International Financial Reporting Standards (IFRS) for this purpose.

### **Advantages of disclosing environmental and social aspects of a business in annual reports and their interconnection with economic information**

#### **a) Comprehensive view of an enterprise**

A basic advantage of reporting on environmental, social and economic dimensions in one document is that a comprehensive view of an enterprise can be achieved. The presentation of the information in an annual report enables to specify the influence of environmental and social aspects of business on performance and on financial position of an enterprise, and to assess the future risks connected with these aspects.

And, on the contrary, separate reporting on environmental and social activities results in an independent report (reports) that separates in fact closely connected areas.

Critical question which we will attempt to answer in the following text is whether financial accounting and reporting (within traditional standardized approaches) are prepared for this new role.

#### **b) Higher reliability of information presented in financial statements**

Higher reliability of data reporting on the environmental and social factors - in connection with financial accounting and reporting is also an advantage as the data are independently audited (an audit is either obligatory or initiated by an enterprise).

Critical question is whether an auditor is ready to verify environmental and social issues.

### **Reformulation of Financial Accounting and Reporting Aims, Extension of Financial Accounting Scope**

Financial accounting, as described in national and international accounting standards, aims to present a true and fair view of an entity. Such “true and fair view” traditionally means that the accounting information truly informs about financial position of the entity and its performance and such information allows to estimate the progress of these two aspects of business success in the future. At present financial accounting concentrates only on the economic dimension of business activities connected with business aim - to maximize the profit and market value of an enterprise. (further in the text the present system of financial accounting will be called “conventional accounting”). Conventional accounting (regulated by national and international accounting standards) still views an enterprise only as “a machine bringing profit” and does not take into account the impacts of the enterprise’s activities on the society and environment. This approach may satisfy only narrowly formulated aims of investors (even though this statement is not generally applied) but it often conflicts with the interests and information needs of other groups of accounting information users.

### **Classification of environmental and social activities impact and its link to conventional financial accounting**

The impacts of environmental and social activities of an entity can be divided into two groups:

1. Impacts projected into conventional financial accounting (transactions recognized by the conventional definitions of existing standards that affect assets, liabilities, equity, revenues and expenses).
2. Impacts not projected into conventional financial accounting (do not affect assets, liabilities or profit). These impacts are called externalities (defined above) and in most cases they cause the incompleteness of the data reported in conventional financial statements.

#### **Ad 1. Information that can be monitored separately in conventional accounting**

The first group of impacts is in most cases easy to separate by means of suitable analytical accounts and to disclose either directly in financial statements or in notes to financial statements. Such information can easily be verified by an auditor, and thus will carry a high level of reliability and comparability (in the time and also among enterprises).

In conventional accounting regulated by IFRS the following data can be recognized and monitored: social and environmental expenses, environmental investments, liabilities and receivables connected with social and environmental aspects.

#### **a) Social and environmental expenses**

Primary expenses can be recognized and monitored by the appropriate configuration of analytical accounts. Social and environmental expenses are particularly: disposal or waste recycling costs, elimination of products of combustion expenses, expenses on preventing environmental damages, expenses on environmental damages disposal, expenses on social activities (e.g. requalification courses), penalties imposed for environmental damages. Penalties and fines should be reported separately as they do not positively contribute to the environment, unlike the other above mentioned expenses.

Monitoring of secondary social and environmental expenses can be carried out by managerial accounting.

Complex recognition of these expenses is the first condition to their subsequent reduction that will positively influence both the total efficiency of an enterprise and the environment.

Particular definition of expenses related to the environment and social sphere is always to a certain extent controversial and dependent on each enterprise which sets its clear definition. However, the basic classification of the environmental and social dimensions should be standardized to enhance the comparability of the information among enterprises.

Consistent with the accrual principle, environmental and social expenses should be adopted from the period they arose in. The correct estimation of future expenditures related to the present events is vital. The enterprise should create provisions on those future environmental and social expenditures.

### **b) Environmental investments**

It is necessary to distinguish between the expenses on sustainable development and the costs on long-term tangible or intangible ecological assets acquisition or subsequent expenditures for such assets appreciation (their increased capacity, useful life, efficiency, etc.). In conventional financial accounting these expenditures are recognized either as long-term assets or as the expenses that decrease net profit in that period in which they are spent in case the criteria for assets recognition settled in conventional accounting are not met. In both cases the expenditures should be disclosed separately in notes to financial statements.

Let us go to the point:

An asset is in IFRS defined as a resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity. However, benefits are perceived only narrowly, from the economic view point.

A practical example of an application of general asset's definition is the prescribed approach to environmental investments in IAS 16. Equipments that were acquired for better safety or for environmental protection but that do not increase future economic effects of other parts of long-term assets - but only allow their running due to legislative requirements - should be measured only in the recoverable amount (as defined in IAS 36).

The costs exceeding the recoverable amount should not be capitalized and should be account as expenses (the prudence principle applied). There is a question– if an enterprise acquires an ecological equipment not needed for its business (e.g. this equipment is not required by law) it will be very difficult to prove the value from use of such installed equipment. Also the fair value of the installed equipment (if available) will probably be smaller than purchased costs. The restriction on capitalization of purchased cost or the application of IAS 36 can have a negative impact on decision making whether to acquire such asset. In such a case, environmental and economic criteria are in contradiction.

The rules for the recognition of internally generated intangible assets (see IAS 38) are even stricter.

### **c) Recognition and measurement of liabilities and receivables connected with the environment and social aspects**

IFRS require that liabilities originated from ecological and social activities of an enterprise are recognized and reported in time. These liabilities are important for the assessment of creditor's risks (see IFSR Framework and IAS 37). IFRS simultaneously restrict liabilities to be compensated with receivables from the third party (e.g. from insurance). IAS 37 also requires the duty to recognize and report constructive obligation.

Contingent liabilities should be included in notes to financial statements.

It is evident that the definition of liabilities (IFRS Framework), and the requirement to reporting of provisions (IAS 37) and contingent liabilities reporting in accordance with the accrual and prudence principle is a good base for separate measuring and reporting of liabilities related to the environmental and social issues.

#### **d) Grants and tax reliefs**

An important condition to get a grant on social and environmental programs is to monitor and prove the efficiency of the grant. An entity must obtain such information from financial accounting. It is appropriate to report the titles and amount of grants and tax reliefs within the environmental and social reporting. The expenses that are fully or partially compensated from the grant must be monitored separately. Providing of such information in accounting system is a standard practice.

However, in case that a grant is used as a compensation of lost profits (e.g. a grant requires an entity not to engage in specified activity) it is appropriate to evaluate also the lost profit from e.g. no engaging in specific activity, to apply a multidimensional approach. The lost profit could be a lost opportunity cost that cannot be recognized and reported in financial conventional accounting (though managerial accounting is able to work with this category).

#### **Ad 2. Social and environmental aspects of business that cannot be monitored in conventional financial accounting (externalities)**

Externalities (definition above) are social and environmental consequences of business which cannot be recognized in conventional financial accounting. General view on the phenomena cannot be identified as there is a variety of them. Externalities are pragmatically divided in two groups: positive externalities and negative externalities.

##### **a) Positive externalities**

Positive externalities are e.g. counterbalance, gains to environmental investments (mentioned above) which are often recognized as the expenses in that period in which they were spent (see IAS 16 and IAS 38), or counter (gains) from social investments (expenses on employment of disabled people, expenses on education of employees, on social development of a region, etc.). Some of these gains can be evaluated (measured). They should be reported as a complex of profits or losses quantified from conventional financial accounting. From the multidimensional point of view they are the “missing” part of profits or losses.

If the expenditures to social and environmental investments decrease the profit of an entity because they are quantified only by conventional financial accounting and the entity is not able to show the effects from such investments, it can be demotivating for such an entity to spend such expenditures.

If externalities cannot be measured they should be verbally described.

##### **b) Negative externalities**

An entity “pays” for achieved profit (revenues) with polluted air, water, decreasing ozone in the atmosphere, expensive disposal of waste. But these negative effects of business cannot be monitored in conventional accounting as they are not paid by an entity in fact. The whole society bears these effects.

Remark: Society (governments) have been trying to internalize these externalities in the last decades. Governments try to internalize the negative externalities on an entity by imposing direct payments or levying taxes (e.g. taxes on disposal of future waste, payments for air pollution, etc.), and impose undirected economic instruments (e.g. emission permission). Such measures cannot be applied in all cases and even if it is possible the total devastation cannot

be recovered. It is nearly impossible to evaluate some damages which are in many cases irreversible.

Generally can be said that the quantification of these externalities is difficult. If they were measurable in money (remarks above), the society would internalize them to an entity.

In such cases the “accounting based on physical measuring units” which expresses, for example, the volume of product combustion released into air can be recommended. The data should be in all cases supplemented with comparable data from the last year (alike the information from financial statement). If the values increase there is a clear signal that sustainable development is endangered. In literature this approach is named “The Environmental Sustainable Cost Approach”<sup>2</sup>. This approach offers further improvements –a connection with economic data, e.g. the comparison of an amount of negative externality with an amount of production or the comparison with revenues. An index indicator allows abstracting from the changes in the volume of production. The other approaches “The Inventory Approach”, “The Resource Flow/Input-Output Approach” will not be mentioned due to the extent and aim of this paper.<sup>3</sup>

### **Disclosure of future conception of an accounting unit and the disclosure of used methods including all three dimensions of business**

In the previous two parts of this paper. We have discussed the economic, social and environmental aspects of business and looked for possible ways how to report all those factors and their interconnections.

Reported information would not to be complete without the disclosure of entity’s policy, its approaches to recognizing and reporting on particular elements, its methods of measurement, presentation and reconciliation of changes between the beginning and the end of the current period and, last but not least, its resort strategy and tactics concerning its future development. Such information is common, by IFRS required part of financial information in annual reports. In conventional accounting such information concentrates only on economic information. If we want to include in an annual report also the information about environmental and social dimensions of a business and connect this information with economic information, we should disclose the information in the same structure as the information about economic dimension. (see illustration No. 5). Thanks to the information a user of accounting information (respectively sustainable accounting information) can have a complete, multidimensional view of the present situation but also of the future development of an entity, its future opportunities and risks.

### **References**

1. Bebbington, K., J., Thomson, I.: Business Conception of Sustainability and the Implications for Accountancy, London 1996
2. Burritt, R.,L.: Sustainability Accounting and Reporting Links Between Government Agencies and Corporations Australian Aquaculture. In: Sustainability Accounting and Reporting Micro-economics and Macro-economics levels, Proceedings from international scientific conference, Brno, May, 2007
3. Dvořáková, D.: Financial Accounting and Reporting in accord IFRS, second edition, Computer Press Brno, 2008, page 102

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<sup>2</sup> Gray, R., Bebbington, J.: Accounting for the Environment, second edition, SAGE, reprint 2003, ISBN 0761971368.

<sup>3</sup> In detail e.g. in: Gray, R., Bebbington, J.: Accounting for the Environment, second edition, SAGE, reprint 2003, ISBN 076197136.

4. Gray, R. Bebbington, J.: Accounting for The Environment, second edition, SAGE, reprint 2003
5. Hyršlová, J., Mísařová, P.: Sustainable Development and Systems of Environmental Management in the Czech Republic, Planeta XV, 2/2007
6. Kovanicová, D.: Sustainable Accounting and Reporting, paper from conference „Accounting in process of international harmonization”“ Horní Bezděkov, 2008

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# **APPROACHES AND POSSIBILITIES OF USING ACCOUNTING INFORMATION TO MEASURE SUSTAINABLE DEVELOPMENT OF CORPORATION**

**Jana Fibírová**

## **INTRODUCTION**

Environmental accounting, which is essentially linked with a request to extend corporate accountability for managing the results of its activities, imposes a task to corporations to solve basic matters of corporate performance measurement. It should provide for the sustainable development of the corporation i.e. the achievement of its economic development while the requirements of environmental protection are respected, natural resources are used cautiously and human needs are recognised. It is the 'Significant mediator' indicating to stakeholders (investors, customers, ecologists, employees, municipalities ..) whether the corporation orients its policies, plans, products and processes to support sustainable development. There are a number of documents which always focus on a concrete profile of comprehensive problems of sustainable development (Social, Environmental, Sustainability, Eco-.. Reports). It is evident that the method of finding information to be disclosed is important for the informational utility of these statements. Environmental accounting<sup>1</sup> should provide for the integration of information about the influence of the corporation on the surrounding environment into accounting.

As regards environmental accounting, the most frequent subject of interest is the question of what information should be provided to users of environmental statements, what is its relation to financial accounting and financial statements, what indicators should measure sustainable performance? Most suggestions include the augmentation of information in financial accounting with environment costs and cost savings, non-financial criterion characterising the influences on and changes to the environment.

The limited informational utility of such approach is evident. Augmenting financial statements with selected measurable influences of the development of the environment and social development enables us to include the measurement of financial performance and the position of the corporation in accordance with the requirements of financial accounting but does not enable us to measure the sustainable development of the corporation globally. The quantification of environmental costs and benefits not currently disclosed in accounting and connected to externalities is relatively complicated, assuming the material specification of influences on the environment and human beings, the assessment of these influences, and the allocation of these common costs among independent accounting units.

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<sup>1</sup> This contribution does specify terms, the use of which is not unified to the fullest.

The term "environmental" includes the environment and social influences, human needs i.e. it is used in connection with the sustainable development of the corporation in relation to its surroundings.

The term "environmental accounting" is used in the so-called narrower conception, attention is focused on potential application of prerequisites and accounting principles to environmental questions, disclosure and recognition of environmental natural and value quantities in the accounting system of the corporation, mainly according to the needs of its management and in comparison with applicable legislation.

On the other hand, the term environment accounting is not used herein in the so-called broader concept i.e. in the context of managers' accountability to all parties interested regardless of the extent of direct impact of the corporation on these parties and without the ability of interested parties to enforce managers to assume this accountability.

Let's focus our attention not on "what" should be disclosed upon the measurement of sustainable development of the company - how to suitably complete accounting information by other criteria - but on whether and how accounting information may be used to measure the sustainable development of the corporation. How to fulfil the requirements to disclose the activity of the business in a comprehensive performance measurement with its financial position, the criterion character of this measurement, its comparability and continuity in time?

Let's start with the question of the basic prerequisites and qualitative characteristics of environmental accounting. To what extent are they identical or on the other hand, how are they different from financial accounting? Further to this comparison let's suggest an approach to provide for the respective information for environmental accounting. In particular, we should focus our attention on how to overcome the restriction of informational utility of financial accounting.

## 1 Assumptions and qualitative characteristics of environmental accounting

Historical experience with the informational utility of financial accounting has confirmed that as for the reliability of information disclosed it is necessary to specify (and subsequently adhere to) initial presumptions and qualitative characteristics of accounting information. Particularly it is necessary to pay attention to the fact that environmental influences are not very often realised in the same period of time as the activity which brings them about (causes) and that they do not 'work' within the borders of the corporation. Let's review, for completeness, that international accounting standards IFRS, both already explicitly in the Framework or implicitly in the contents of standards, recognise as basic assumptions the qualitative characteristics of disclosed accounting information<sup>2</sup>:

<b>Basic assumptions</b>	<b>Qualitative characteristics</b>
<i>The entity assumption</i>	<i>Relevance</i>
<i>The accruals basis of accounting</i>	<i>Reliability</i>
<i>The going-concern assumption</i>	<i>Comprehensibility</i>
<i>The precautionary principle</i>	<i>Neutrality</i>
<i>The concept of materiality or significance</i>	<i>Completeness</i>
	<i>Prudence</i>
	<i>Comparability</i>
	<i>Timeliness</i>
	<i>Verifiability</i>

### The entity assumption

In order to specify accountability and prevent significant liabilities from not being assessed within the financial position of the corporation (balance sheet) it is necessary in financial accounting to determine the statutes and limits of the entity. It is necessary for environmental accounting to prevent the originator or co-originator of environmental influences from being hidden in formally legal boundaries such as with the purchase of "sensitive" material (i.e. the purchase of hardwood from rainforests.....).

If a corporation is a part of a supply chain, environmental accounting should include the influences of the whole life cycle of the product, from resource mining to the liquidation of manufacturing processes. Should it be controversial, or even falsified, consolidated environment statements should be required to be prepared by separate legal entities within the whole supply chain. The traditional concept of an accounting unit of financial accounting,

<sup>2</sup> English terms are given also in the Czech version with regard to their informational utility and widespread use

which is eligible for the legal protection of owners, requires modification in environmental accounting.

Environmental reporting should provide for the statement, or accompanying verification statements to define clearly the scope in which the entity (defined for the needs of financial reporting) is a fully disclosing entity with regard to the importance and influence of its environmental activities. The rules of environmental reporting should specify the entity disclosing data in relation to legal specifications and the comprehensiveness of disclosure with regard to environmental aspects.

### **The Accruals Basis of Accounting**

Practical application of the accruals basis of accounting requires that the results and influences of activities are recognised in the period in which they are realised. The need of timely disclosure and recognition of decisive environmental influences requires the accrual approach related to the moment of decision making about starting production in the future not upon realisation as it applies in financial accounting. In some cases it would be necessary to incorporate the remote influences of emissions (acid rain), soil contamination (affecting the water sources), exhausting of material resources (break of ecological balance). Environmental accounting should include the accrual concept in such a form which ensures that manufacturing activities, emissions and wasting will be reasonably linked to the perspective of business activities in the future. Separate discussions are devoted to the timing and measurement of provisions for environmental obligations and the cost of liquidation, in particular the cost of the removal of fixed assets (e.g. oil equipment or nuclear reactors)-

It is evident that the accrual principal should be adhered to in environmental accounting but an evident connection between an event and its environmental influence may not exist. Under certain circumstances there is no evident environmental impact (consequence) of the event until it happens. In other cases the environmental influence or consequence may be identified (e.g. contaminated soil) even if the event, which caused it, will never be identified.

### **“Going-concern“**

A business which is a “going concern“ is generally assumed to continue its activities in the foreseeable future<sup>3</sup>. This principle is immediately connected in financial accounting to asset evaluation, which is disclosed either in real or historical costs not in liquidation value.

Obligations arising from environmental costs (soil recultivation) should be recognised in financial accounting by the going concern concept for the time when legal responsibility exists. It should be stipulated that if there are significant environment liabilities, clear data should also be given about how the corporation is able to find suitable procedures to remove them and pay for it. Particularly corporations which operate in environmentally sensitive branches should be required to make adequate provisions.

*Let's remind the reader in this context<sup>4</sup> that, according to international accounting standards (IFRS 37 Provisions, Contingent Liabilities and Contingent Assets), provisions for cost which will have to be paid in connection with activities of the entity in the future are not recognised. Only such liabilities will be disclosed on the balance sheet which exist as of the date of the balance sheet, which arise from previous events existing independently of future activities of*

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<sup>3</sup> “foreseeable future“ is an audit term showing a prerequisite of available information about the existence of the business in the foreseeable future, at least 18 months following the date of the balance sheet.

<sup>4</sup> International Standards of Accounting Reporting (IFRS<sup>TM</sup>) 2005 including International Accounting Standards (IAS<sup>TM</sup>) and interpretation as of January 1, 2005. Czech translation. London: IASB 2005

*the entity (i.e. future business activities). If the entity plans or has to spend due to commercial pressure or legal regulations the provision is not recognised. However, the entity may avoid such cost in the future, for example, by changing the methods of its activities. The rise of ecological damage will become an event constituting a liability in financial accounting if the new legal regulation requires the existing damage to be removed (contractual obligation) or if the entity publicly assumes responsibility for a remedy in the manner, which establishes an out-of-contract obligation.*

### **The Precautionary Principle**

From the view of majority stakeholders pollution prevention is always the preferred alternative with sufficient return and cleaning the contaminated environment. The rules for publishing information of environmental accounting should include a requirement to inform users about how the requirement for prevention is applied, how it is included in environmental policies, programmes and decision-making processes.

### **The Materiality Principle**

The basic prerequisite of the principle of importance in financial accounting is the importance of information for the user in financial context i.e. the existence or absence of the influence on future increment or decrease in funds. In order to fulfil financial targets, importance (from financial point of view) is usually assessed by the person/entity processing the accounting information or by the auditor including the determination of the generally required extent of influence expressed most frequently in percent of selected accounting variables – income from sale operating profits, net assets. ....

The application of the importance principle in environmental accounting should be more comprehensive than in financial accounting. It depends on the nature and circumstances of each particular case and its scope. The basis to be assessed is the capacity of natural recovery (e.g. waste depositing, air pollution degree ..). It is necessary to assess the principle of importance in relation to empirically reviewed and scientifically sustainable natural space.

Similarly as fixed assets, **qualitative characteristics of information of environmental accounting** are also assessed from the viewpoint of their usability for decision-making.

### **Relevance**

In comparison to financial accounting it is necessary for the relevancy of information in environmental accounting particularly the rate by which attention can be focused, opinion formed, and knowledge gathered, rather than a suggestion of a criterion for unambiguous decision making.

### **Reliability**

Information is reliable unless it is biased and corrupt. Users should be able to assess the reliability of information. There is a number of the respective mutually related characteristics:

#### **Valid description**

As for understanding on the part of users, the method how environmental aspects are described is important. It is really extraordinarily important in environmental accounting because a lot of information is of technical character. That is why attention should be devoted to the use of commonly used criteria with relevant details.

#### **Substance**

From the informational utility of environment accounting's point of view comparability and continuity of measurement are more important than accuracy of data (e.g. furniture

manufacturer does not need information such as wood consumption but selected qualitative kinds, trees from particular “endangered“ localities). Without context and comparison even accurate data is hardly usable in environmental accounting.

### **Neutrality**

Information is neutral if none is missing or its selection does not depend on decision-making or assessment. It is very difficult to provide for neutrality of environmental accounting information it is easy to attack it intentionally.

### **Completeness**

Completeness of information helps neutrality and prevents distortion. All essential problems which are considered as significant should be disclosed and recorded. To provide for the neutrality of information of environmental accounting is similarly as difficult as providing for completeness.

### **Prudence**

Prudence is connected with the principle of prevention. Uncertainty is the main factor of environmental accounting, particular with regard to the uncontrollability of environmental influences. It should be ensured so that unfavourable influences are not marginalized and that uncertain influences and environmental damage are disclosed in advance.

### **Comprehensibility**

The prerequisite of comprehensible financial accounting (statements) is a standard level of expert knowledge of accounting. On the other hand it is difficult to expect that users of environmental accounting have a certain level of environmental education and experience. In this context it is necessary to determine which level of technical information is to be published in order for this information to be understandable.

### **Comparability**

It is important for users of environmental accounting that information of different enterprises in the same branch (sector) of business is comparable. Similarly as in financial statements information of environmental accounting should be comparable and consistent with information disclosed in previous years. There are a number of initiatives in this field, which concerns this problem; their main result is the determination of generally usable criteria (ISO<sub>14031</sub> criteria of the assessment of environmental performance), or specific criteria (in the field of water economy and telecommunications). There is assumption that criteria used in the future shall have to fulfil “generally regarded“ test.

### **Period of time**

The essential problem different from financial accounting is that environmental changes and influences are difficult to be identified in a short period of time. However, the basic question should not be whether and how the period of time of environmental accounting is different from the usually annual accounting period of financial accounting but that it is always clearly determined, including reasons for the selection of the period. Information is to be compared for the period under review or “period of changes”, assess changes in comparison to targets.

### **Verifiability**

Even if information of environmental accounting is often difficult to be objectively determined and physically measurable disclosed information should be reviewed by independent auditors who will assess particularly the scope of the field under review.

## 2 Providing for assumptions and qualitative characteristics of environmental accounting from the viewpoint of information

Providing for assumptions from the informational viewpoint and qualitative characteristics of environmental accounting is, on one hand, the supreme goal for the gradual establishment of a relatively separate sub-system of accounting information (in addition to tax, financial and management accounting). On the other hand these basic assumptions and qualitative characteristics of environmental accounting provide a conceptual background for the assessment of the compatibility and connection of particular sub-systems of accounting information, or their internal incompatibility.

From the viewpoint of time orientation and rate of reliability, financial accounting information is quite differently outlined than the information of environmental accounting. The information of financial accounting is followed immediately by real cash flows of economic entities including distributed dividends and profit. International accounting standards do not pay attention to the problems of environmental accounting.

*E.g. IAS 1 (Presentation of Financial Statements) highlights that only the financial statements are subject to IFRS – i.e. statement of financial position, statement of full financial result, statement of changes in equity capital, cash flow statement and comments and not other information and statements published by the entity.<sup>5</sup>*

One of main problems of environmental accounting is the comparability of some categories and their segmentation, e.g. from the viewpoint of difficulty of evaluation<sup>6</sup>

- conventional costs (best valuable, allocated to processes and performance);
- potentially hidden costs (costs and income which is not usual allocated to relevant performance and processes – wages of environmental inspection, training on safety at work);
- dependant costs (potential liabilities and receivables conditioned by future events – potential costs of treatment or decontamination due to leaked dangerous substance) ;
- costs of relationships and image (potential liabilities or receivables linked to subjective perception of groups of interest – stakeholders, for example resistance of population against enlargement of a factory);
- social costs – costs and income for surroundings of the corporation which it has initiated but which is not part of its business (smoother traffic thanks to mass transport of corporate employees).

Experience with the classification of environment aspects in financial accounting confirms that in some cases it is possible to do so and without troubles (classification and enlargement of detailed environmental division of kinds of cost by “conventional“ environmental costs, enlargement of asset classification ..). In a number of cases, the rules of financial accounting do not enable the disclosure of environmental influences, or may be in discrepancy (provisioning). This is the conclusion of a task force of the United Nations ISAR (International Standards of Accounting and Reporting, international task force of experts for international standardisation of accounting and reporting of the United Nations), which

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<sup>5</sup> see the same source

<sup>6</sup> Stránský, J.: Environmental Accounting Measurement of Corporation Performance from the View of Sustainable Development, Collection from scientific conference Progressive Changes in Performance Management System, VŠE Praha 2006, str.223-251

formulated recommendations in respect of the potential inclusion of environmental aspects into financial reporting.<sup>7</sup>

In financial accounting, requirements for the measurement of financial performance of the corporation are conceptually different from the requirements for the measurement of the sustainable development of corporation. The utility of the information of financial accounting fulfils the requirements of tactical corporate management, which arises from the concept of one year as the basic period under review, assessed on the basis of really achieved and market-verified results.

Financial criteria put stress mainly on the reasons and responsibility for results achieved not on factors influencing long-term development. In order to assess how the strategic targets of the corporation are fulfilled, it is necessary to bear in mind, in addition to financial criteria, also other factors, which are quantified with difficulties, usually expressed in natural units.

Financial criteria characterise the actually achieved financial performance of the corporation, and do not assess the position of the corporation with regard to its impact on external surroundings – both social and ecological. Objective criteria of this position could be comparisons with rivals, connections of quantitative characteristics subject to the findings of the information system of the corporation. The target is to support those actions of corporation, which essentially influence the strategic development of the corporation in the future.

### **3 Information to measure and manage the sustainable development of the corporation**

The key task of corporate management is to set up expected plans and targets of its future development, including the specification of criteria by which the extent of fulfilment of these targets is to be assessed. The advantages of financial (value) criteria are their objectivity (they are verified by market) and synthetic expression (they enable management to measure the result in various profiles of activity/ies), for the corporation as a whole). Paradoxically these basic characteristics, the advantages of value criteria, are concurrently restrictions of their informational utility from the viewpoint of corporation strategic development.

Profit and profit-deducted criteria by which the effectiveness is measured in the period under review are the so-called output measures (lagging indicators)<sup>8</sup>. Through profit results of previous success and decision in the period under review are measured (profit from the sale of “existing“ performance, to “existing“ customers, assessment of the market position established in the past, appreciation of the “existing“ assets etc.). That is why it is necessary to expand the scope of value criteria with other criteria, which will enable us to consider/assess and express parameters of the future development of the corporation under review (including social and ecological).

The target of information and criteria of environmental accounting is not to replace traditional financial criteria but to enlarge them with other criteria, which will enable us to assess and express the future development of the corporation. The task of these supplementary criteria, both of a value and particularly a natural character, is to assess the causal relations between the development of value indicators and development in other fields of corporate activities.

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<sup>7</sup> Hyršlová,J., Prajslerová,M.: Activities for Experts for International Standardisation of Accounting and Reporting in the Field of Environmental costs and Obligations, contribution for a meeting of task force of MŽP Praha, quoted from <http://www.env.cz/> ....)

<sup>8</sup> Experts frequently use the terms “lagging indicators“ and “leading“. These terms have been first used and specified by the authors of the management concept Balanced Scorecard, R.S.Kaplan and D.P.Norton. Let’s mention from their publications at least the Czech translation Kaplan Robert S., Norton David P. Balanced Scorecard, Strategic System of Corporate Performance Measurement, Management Press Praha 2000./Strategický systém měření výkonnosti podniku

Thus characteristics are to be measured which enable us to assess the speed, reliability and innovation of internal processes, working conditions of employees, their loyalty and thus reduce the extent of uncertainty of the future development of the corporation. An important idea in the establishment of the system of environmental accounting criteria is the knowledge of characteristics, which the corporation is able to influence by its activities, the determination of a certain number of criteria and indicators based on the recognition of casual connections of their influence on the ecological and social environment of the corporation. By a suitable combination of value and natural criteria, the standardisation of their measurement and the incorporation into the information systems of corporate information systems may be established which fulfil basic requirement for comparability, time continuity and conclusiveness of information.

In the assessment of informational utility of the information system of environmental accounting it is important to use it while long-term targets are set up and fulfilled (or non-fulfilled), while optimal allocation of resources is assessed, corporate activities are co-ordinated, standards of performance as a fixed point of orientation in uncertainty of future development is determined. Usable criteria of environmental accounting are the tools of strategic management accounting – Life Cycle Costing, Target Costing.

## References

1. BENETT, M., JAMES, P., *Sustainable Measures*, Sheffield: Greenleaf Publishing, 1999. 586 s. ISBN 18-747-191-60
2. *Mezinárodní standardy účetního výkaznictví (IFRS<sup>TM</sup>) 2005 incl.IAS<sup>TM</sup> and interpretation as of January 1, 2005*. Czech translation. London, IASB 2005. ISBN 1-904230-79-2.
3. STRÁNSKÝ, J., *Environmentální účetnictví – měření výkonnosti podniku pohledem udržitelného rozvoje, sborník z vědecké konference Progresivní změny v systémech řízení výkonnosti*, Praha, VŠE 2006, ISBN
4. ŠOLJAKOVÁ, L., *Manažerské účetnictví pro strategické řízení*, Praha, Management Press 2003, 146 str. ISBN 80-7261-087-2
5. Portál MŽP <http://www.env.cz/> Portály EU a USA <http://www.eman-eu.net/> a <http://www.epa.vic.gov.au/bus/accounting/>

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# **INVESTOR PROTECTION AND VALUE RELEVANCE OF ACCOUNTING INFORMATION: EUROPEAN UNION SETTING**

**Patpanichhot Suntaree**

## **1. Introduction**

With increased international investment and cross-listing of multinationals, accounting harmonization becomes an important issue. By the end of 2005, listed firms in at least 65 countries are required to prepare their financial reports according to IFRS. European Union's mandatory adoption of IFRS is an important example for such accounting harmonization. In the year 2002, European Parliament decided that all European Union listed firms must follow the standard issued by International Accounting Standard Board and endorsed by European Commission<sup>1</sup> in their consolidated financial statement no later than the year 2005.

While accounting harmonization is supported on the ground that it leads to greater comparability of financial statements across countries and more useful accounting information, the opponents of accounting harmonization raised concern about the benefits actually obtained from accounting harmonization. Ball (2006) questioned whether convergence in actual accounting practice will (or should) occur, when political and market force - which influence the financial report preparers' behavior - remain local. The problem can be highlighted in case of IFRS mandatory adoption, since the adoption of IFRS requires increased amount of judgment, especially when fair value accounting is applied. This raised concern about the consistency of accounting standard application. While legal and market mechanism can enhance the degree of IFRS compliance of firms in each country, these factors are not identical across countries. Therefore, it is doubtful whether fair value accounting is applied consistently and, in turn, whether accounting data is more comparable and more accurate to the level that we expect from accounting harmonization.

The importance of institutional factors, both legal and market, is illustrated based on the concept of "investor protection", i.e. how well investors - especially minorities - are protected against expropriation by the insiders. Investor protection is important since it affects cost and benefit of the insiders to expropriate and in turn the quality of accounting information. In circumstance where law is aimed to protect minorities and is well-enforced, and where capital market is diverse and equity-based financing, investors are better protected, making it difficult for the insiders to expropriate. In such case, the insiders need to employ more complicated technique for expropriation. As a result, cost of expropriation is high, net benefit of expropriation is reduced, and the insiders have less incentive to expropriate. As the level of investor protection influences financial report preparer's incentive, the quality of accounting information is expected to be higher in the countries with high investor protection.

To evaluate the effect of investor protection on quality of accounting information, this study focuses on "Relevance", which is considered as one of the earning quality attributes. Value relevance is defined as how faithfully the information represents what it purports to represent without bias. More accurate and more informative financial statement implies that accounting is more value relevant. Giving the importance on capital market, relevance is an important

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<sup>1</sup> IFRS issued by International Accounting Standard Board must be endorsed by the European Commission before being implemented in European Union. European Commission has power to reject any standard or part of standard that it believes does not meet endorsement standard.

attribute since the value-relevant information will be useful for investors in evaluating the past, present and future of the firms and in making equity investment decision.

Therefore, this paper is aimed to examine whether investor protection have influence on value relevance of earning and book value of equity. Using the sample of firms listed in European Union during the year 2005 to 2007, the results show that investor protection has a significant impact on value relevance of earnings and book value of equity. Also, regressions of market and legal factors related to investor protection show that the influence of investor protection is mainly contributed to market factors, i.e. the importance of equity market in the country and corporate ownership structure. Legal enforcement also plays role on value relevance of earning. However, the impact is apparent only in case of securities law enforcement, rather than general law enforcement.

This analysis has important implication for accounting harmonization issue. The findings raised awareness to the financial report users that convergence in accounting practices may not be completely achieved, due to the existence of the cross-country variation in legal and market factors, which influences the level of investor protection. Also, the findings will encourage standard-setter to pay attention to legal and market factors, which influence the financial report preparers' incentive and the level of investor protection.

In addition, this analysis extends prior literatures relating to investor protection. Following the approach recommended by Sellhorn and Gornik-Tomaszewski (2006), this study uses the sample of European Union firms during the mandatory IFRS adoption. This setting allows for the test of the influence of cross-country investor protection on value relevance of accounting information, while holding accounting standard constant across countries. Therefore, this paper can effectively exclude potential effect of differences in accounting standard across countries.

The remainder of this paper is organized as follows. Section 2 contains discussion on investor protection as well as legal and market factors which are used as investor protection proxy. Section 3 presents the hypothesis development. Section 4 describes the research methodology. Section 5 reports the empirical results, and section 6 concludes the paper.

## **2. Investor protection**

### **2.1 Importance of Investor Protection**

Accounting principles and practices are influenced by several factors, ranging from environmental factors such as culture to the stage of economic development and the country's political and legal system (Jaggi and Low, 2000). How legal and market factors influence accounting practices can be explained based on the concept of investor protection.

Investor protection is defined as “the protection of outside investors by the enforcement of regulations and laws (Shleifer & Wolfenzon, 2002 quoted in Boonlert-U-Thai et al., 2006) or as a key institutional factor affecting firm policy choices such as shareholder voting rights and financial system policies (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000: 3-27; Shleifer & Vishny, 1997, all quoted in Boonlert-U-Thai et al., 2006)”.

Investor protection is important in preventing shareholders from being expropriation. Under the concept of “cost versus benefit of expropriation”, controlling shareholder has private benefit of control to expropriate against minority shareholder. This benefit is equal to diverted amount of profit after deducting “cost of expropriation” or “cost-of-the-theft”. Such cost depends on the quality of shareholder protection. In other word, the degree of investor protection determines the value of the insider's private benefit of control. Without investor protection, insiders can efficiently expropriate profit for themselves. When investor protection improves, the insider's private benefit of control reduces. The insiders need to use more

complicated and costly technique to expropriate, such as setting up an intermediary company to divert profit into. To the extreme where investor protection is very strong, private benefit of control will be so small that it is better not to expropriate and to just pay dividend. In such case, financial report preparer has low incentive to manipulate accounting numbers. Since investor protection can influence the financial report preparer's incentive, strong investor protection can lead to high quality of accounting information.

## **2.2 Legal and Market Factors as Investor Protection Proxy**

### *Legal Factors*

A key determinant of investor protection is legal rule and enforcement. La Porta et al. (1998) stated that, while investor protection rights are crucial, these rights are not inherent in securities themselves, but depend on legal rule and enforcement of the country in which securities are issued.

Strong investor protection is found in countries which give importance to legal rule relating to minorities investor protection and have stringent legal enforcement. La Porta et al. (1998) found that common-law countries have more frequently equipped with various measures of minority investor right protection and offer stronger legal enforcement than civil-law countries. Ball et al. (2000 and 2003) characterize common law system as "shareholder" model, under which standards are set and enforced by private-sector functions, primarily to serve public demand for information by investors. Monitoring role is largely played by shareholders and analysts, rather than supervisory board members. In term of enforcement, the frequency and expected cost of litigation are high in common-law countries. On the other hand, civil law system is characterized as "stakeholder" model. Stakeholders involve supplier of capital (such as bank), labor, major suppliers and customers, and government. The standards are set and enforced by public-sector functions, and are developed to satisfy stakeholder's demand, such as compliance to tax code, bonus payout policies or dividend to banks who are major shareholders, rather than to respond for public demand of information by investors. Lower cost and frequency of litigation are found in civil-law countries.

Since legal rule and enforcement determines the level of investor protection, which in turn affects the cost and benefit of the insider's expropriation and the financial report preparer's incentive, these legal factors have influence on the quality of accounting information. Habib (2007) reviewed literatures relating to legal environment and concluded that countries with strong legal protection have greater transparency, higher disclosure, lower earning management, more timeliness in loss recognition, and greater use of brand name auditor than those with weak legal protection.

### *Market Factor*

In term of market factor, investor protection has an impact on corporate ownership structure and financial market development. These factors determine the level of public demand for high quality of accounting information, and in turn the financial report preparer's incentive and the quality of accounting numbers. La Porta et al. (1998, 1999, and 2000) explained that, with high investor protection, investors are willing to pay more for securities, making it easier to raise fund through equity-financing. This results in highly-developed financial market, and a diverse corporate shareholding structure. Equity-financing from a large base of small shareholders is a major source of capital. In this case, information asymmetry is resolved through public disclosure of information, resulting in high public demand for high quality of accounting information. In contrast, when investor protection is low, making it difficult to raise fund through equity issuance, debt-financing is a major source of funds. This results in less-developed and small equity market, with highly-concentrated corporate ownership

structure. In such case, financial reporting focuses on creditor protection with conservative measurement rules, and information asymmetry can be resolved by inside communication. As a result, public demand for high quality of accounting information is low.

Difference level of public demand for accounting information plays role on financial report preparer's incentive and the properties of accounting information, as evidenced by Francis et al. (2001)'s findings that civil law countries have less developed financial market as well as less timely and less transparent accounting relative to common law countries.

In sum, legal factors is important in determining the level of investor protection, which in turn affects cost and benefit of the insider's expropriation, and the financial report preparer's incentive, respectively. In term of market factors, investor protection can encourage financial market development, and in turn increase public demand for high quality of accounting information. Therefore, both legal and market factors can influence the financial report preparer's behavior, and in turn the quality of accounting information.

### 3. Hypothesis development

While accounting harmonization is promoted with the attempt to enhance the comparability of accounting numbers across countries, there are concerns that mandatory adoption of single accounting standard (in this case, IFRS) may not lead to complete accounting harmonization. This is consistent with Bradshaw and Miller (2008: 233-270), who found that the properties of accounting outputs of non-US firms that adopts US GAAP are improved and converge toward those of US firms, but the convergence is not complete. Possible explanation for such incomplete convergence is that, although accounting standard has been harmonized, such harmonization only reduces but does not eliminate discretionary accounting choices. Since a certain level of discretion still exists for the firms to choose among choices within the set of allowable accounting rules, inconsistency of accounting standard implementation still exists.

Ball (2006) indicated that uneven implementation of IFRS across countries is rooted from institutional factors still being local, not global. These institutional factors include legal and market factors, which influences the degree of investor protection and the financial report preparer's behavior.

In term of legal factor, legal rule and enforcement shapes the expropriation techniques used by insiders. With stringent legal rule and enforcement, the insiders need to employ complicated techniques to expropriate. This in turn reduces the insider's private benefit to expropriate and the financial report preparer's incentive to manipulate accounting numbers. Ali and Hwang (2000) found that value relevance of accounting information is lower for countries where private-sector bodies are not involved in the standard-setting process. Also, value relevance is lower for Continental model countries than for British-American model countries. Defond et al. (2006) found that annual earnings announcements are more informative in countries with better enforced insider trading laws. Given that legal factors can influence the degree of investor protection and the financial report preparer's incentive, it is hypothesized that

**H1: given the IFRS application across EU countries, value relevance of earnings and book value is higher in the countries where legal rule and enforcement is stringent.**

In term of market factor, La Porta et al. (2000) indicated that investor protection influences corporate ownership pattern and financial market development. The countries with strong investor protection have more capability to access to equity-based financing, exhibit lower ownership concentration, and have more developed financial markets than those with weak investor protection. La Porta et al. (2002) found that valuation of firms (as measured by Tobin's q) is higher in countries with better protection of minority shareholders.

In turn, these market factors (i.e. the importance of equity market and corporate ownership concentration) affect the level of public demand for high quality of accounting information, and in turn, can influence the properties of accounting information. For example, Ali and Hwang (2000) found that value relevance is lower in countries with bank-oriented financial systems than in countries with market-oriented financial system. Fan and Wong (2002) found that earning informativeness is negatively associated with ultimate owner's control level. Therefore, the influence of market factors on value relevance of earnings and book value of equity can be hypothesized as follows:

**H2: given the IFRS application across EU countries, value relevance of earnings and book value is higher in the countries where the importance of equity market is high and the level of ownership concentration is low.**

In sum, institutional features – legal and market forces – influence investor protection and public demand for information, and in turn the properties of accounting information. Prior researches (Ball et al., 2000; Jaggi and Low, 2000; Hope, 2003; Wulandari and Rahman, 2004 and Francis et al., 2001) provide evidence that common-law countries which are characterized with shareholder model have more value-relevant, more timely and more conservative accounting information as well as higher level of disclosure than code-law countries which are characterized as stakeholder model. This can be explained as common law countries have stronger investor protection than civil law countries, and the level of investor protection affects cost and benefit of expropriation by the insiders. Strong investor protection increases the insider's cost of expropriation and, in turn, reduces the insider's incentives to expropriate and to manipulate accounting numbers. This leads to the following hypothesis:

**H3: given the IFRS application across EU countries, value relevance of earnings and book value is higher in the countries with strong investor protection than those with weak investor protection.**

## 4. Research design

### 4.1 Sample

The sample consists of listed firms in European Union Countries<sup>2</sup> over the period ranging from the year 2005 to 2007. Data on price and accounting information are collected at firm-level from Compustat Database. Since the paper aims to investigate the effect of cross-country investor protection, the sample includes only the firms of which the country of incorporation is the same as the country of stock exchange in which the firms are listed. This criterion enables us to exclude cross-listing firms from the analysis. In addition, firm in financial industry, firms with fiscal year ended other than December 31, firms with negative book value, and firms with incomplete data on price, EPS, or book value are excluded from the analysis. To ensure the use of single accounting standard, the sample firms must follow IFRS (i.e. the firms whose Compustat's "Accounting Standard" code equals "DI") during the year 2005-2007. Furthermore, to avoid the problem of outlier, the firms with Cook's Distance greater than 1 are deleted.

This results in the panel data of 1,449 firms from 14 countries, or 4,347 firm-years in total (1,449 firms \* 3 years).

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<sup>2</sup> Out of 27 European Union members and 3 countries in European Economic Area (EEA), only 14 countries are included in the analysis. Bulgaria and Romania are excluded, since these countries later joined European Union in the year 2007. Also, several countries are excluded due to unavailability of accounting and/or institution data.

## 4.2 Variable Definition and Model Specification

Value relevance of earnings and book value of equity are measured by the association of earnings and book value of equity on price.

$$P_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 EPS_{it} + \varepsilon_{it} \quad (1)$$

where  $P_{it}$  is market price of the firm  $i$  at balance sheet date  $t$  plus two months.

$BV_{it}$  is book value of equity per share of firm  $i$  at the end of year  $t$

$EPS_{it}$  is earning per share of firm  $i$  at the end of year  $t$ .

$\varepsilon_{it}$  is the error term

To mitigate the problem of scale effect, each variable in model (1) is deflated by lagged price ( $P_{t-1}$ ), which is used as a proxy for the unobservable scale factor.

$$P_{it} / P_{it-1} = \beta_0 + \beta_1 (EPS_{it} / P_{it-1}) + \beta_2 (BV_{it} / P_{it-1}) + \varepsilon_{it} \quad (2)$$

To examine the effect of investor protection on value relevance of earnings and book value of equity, legal and market factors are used as the proxy for investor protection. Investor protection proxy is introduced into the model by using each individual institutional factor as well as overall factor score.

$$P_{it} / P_{it-1} = \beta_0 + \beta_1 (EPS_{it} / P_{it-1}) + \beta_2 (BV_{it} / P_{it-1}) + \beta_3 \text{InvProtection Factor}_{it} + \beta_4 \text{InvProtection Factor}_{it} * (EPS_{it} / P_{it-1}) + \beta_5 \text{InvProtection Factor}_{it} * (BV_{it} / P_{it-1}) + \varepsilon_{it} \quad (3)$$

where InvProtection Proxy for each regression is either Anti-director Rights Index, Legal Enforcement, Importance of Equity, Ownership Concentration, or Factor Score.

Each component of investor protection proxy can be described as follows:

(1) *Anti-director Rights Index (ANTI\_DIRECT)*: The index was developed by La Porta et al. (1998). It is a 6-point index covering six areas, which are (1) vote by mail, (2) the requirement for shareholders to deposit their shares prior to general shareholders' meeting, (3) Allow for cumulative voting or proportional representation of minorities in the board of director, (4) an oppressed minorities mechanisms to seek redress in case of expropriation, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10 percent, and (6) shareholders have preemptive right to subscribe to new securities issued by the company, which can be waived only by a shareholders' vote. This paper uses a more recent version of anti-director right index, which was revised by Djankov et al. (2006) based on law and regulations applicable to publicly-traded firms in May 2003.

(2) *Legal Enforcement (LEGAL)*: This variable is calculated as the mean score of "Rule of Law" and "Control of Corruption". The two measures are part of Worldbank's Worldwide Governance Indicator (WGI). For Worldbank Database, Rule of Law score is defined as "the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence", while "Control of Corruption" measures the extent to which public power is exercised for private gain (Kaufmann, Kraay, and Mastruzzi, 2007: 4).

(3) *Importance of Equity Market (EQUITYMKT)*: To capture the breath and dept of equity market as well as the importance of equity-financing as the firm's source of fund, this measure is computed as mean rank of 1) Aggregate Market Capitalization held by minorities<sup>3</sup>

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<sup>3</sup> Aggregate Market Capitalization held by minorities is computed as the median of Free Float in the 10 largest non-financial privately owned domestic firms, multiplied by Aggregate stock market capitalization.

/GDP, 2) Number of listed domestic firm/Population in millions, and 3) Domestic credit granted by banking sector / Stock Market Capitalization

(4) *Ownership Concentration (OWNER)*: Using “Free Float”<sup>4</sup> data in Datastream database, this measure is calculated as “1 - the median of Free Float in the 10 largest non-financial privately owned domestic firms”.

(5) *Factor Score*: Factor Component Analysis is used to combine the above four variables, resulting in 1 factor score.

## 5. Empirical result

### 5.1 Descriptive Statistics

Table 1 presents the distribution of sample and the descriptive measures for price, earnings and book value of equity, all deflated by lagged price. France has the highest proportion of firm-years, followed by Germany and UK. Table 2, which presents Pearson Correlation among accounting variables, shows that earnings and book value of equity are significantly correlated to price.

**Table 1: Distribution of the sample and Descriptive Statistics**

	No. of Firm	Firm-Years	Percent	Price <sub>t</sub> / Price <sub>t-1</sub>	EPS <sub>t</sub> / Price <sub>t-1</sub>	BV <sub>t</sub> / Price <sub>t-1</sub>
Austria	22	66	1.52%	1.25 (0.44)	0.05 (0.11)	0.78 (0.67)
Belgium	50	150	3.45%	1.17 (0.35)	0.09 (0.17)	0.73 (0.43)
Finland	89	267	6.14%	1.15 (0.43)	0.04 (0.10)	0.52 (0.28)
France	278	834	19.19%	1.13 (0.54)	0.05 (0.10)	0.64 (0.58)
Germany	251	753	17.32%	1.22 (0.57)	0.05 (0.18)	0.71 (0.55)
Greece	75	225	5.18%	1.30 (0.64)	0.06 (0.11)	0.84 (0.61)
Ireland	17	51	1.17%	1.15 (0.43)	0.03 (0.11)	0.48 (0.30)
Italy	143	429	9.87%	1.09 (0.42)	0.02 (0.12)	0.64 (0.43)
Netherlands	74	222	5.11%	1.19 (0.36)	0.06 (0.07)	0.49 (0.26)
Poland	25	75	1.73%	1.46 (0.80)	0.07 (0.08)	0.48 (0.29)
Portugal	30	90	2.07%	1.15 (0.39)	0.04 (0.16)	0.75 (0.69)
Spain	42	126	2.90%	1.20 (0.40)	0.05 (0.05)	0.43 (0.19)
Sweden	162	486	11.18%	1.18 (0.49)	0.04 (0.13)	0.51 (0.31)

<sup>4</sup> “Free Float Number of Shares” is defined as the percentage of total shares in issue available to ordinary investors. In other word, it is total number of shares less the strategic holdings.

United Kingdom	191	573	13.18%	1.09	0.04	0.44
				(0.39)	(0.09)	(0.27)
Total	1,449	4,347	100.00%	1.17	0.05	0.60
				(0.50)	(0.12)	(0.47)

Variables:  $P_t$  is market price at balance sheet date  $t$  plus two months.  $EPS_t$  is earning per share at the end of year  $t$ .  $BV_t$  is book value of equity per share at year  $t$ .

Number in parentheses represents standard deviation of the variable

**Table 2: Pearson Correlation of Accounting Variables**

	$Price_t/Price_{t-1}$	$Eps_t/Price_{t-1}$	$BV_t/Price_{t-1}$
$Price_t/Price_{t-1}$	1.00	0.28**	0.14**
$Eps_t/Price_{t-1}$	0.28**	1.00	0.13**
$BV_t/Price_{t-1}$	0.14**	0.13**	1.00

Variables: See details in Table 1

\*\* Correlation is significant at the 0.01 level (2-tailed)

**Table 3: Investor Protection Proxy by Country and Year**

	Year 2005				Year 2006				Year 2007			
	Anti_Director	Legal	Equity Mkt	Owner	Anti_Director	Legal	Equity Mkt	Owner	Anti_Director	Legal	Equity Mkt	Owner
<b>Austria</b>	2.5	1.90	4.00	42.50	2.5	1.93	4.67	44.50	2.5	1.96	5.00	46.50
<b>Belgium</b>	3	1.45	8.67	31.00	3	1.42	9.00	29.00	3	1.49	8.00	41.50
<b>Finland</b>	3.5	2.15	12.00	9.00	3.5	2.26	12.00	11.50	3.5	2.23	12.33	13.50
<b>France</b>	3.5	1.37	9.67	20.00	3.5	1.41	9.33	8.00	3.5	1.32	9.00	22.50
<b>Germany</b>	3.5	1.83	4.67	10.00	3.5	1.81	4.33	20.00	3.5	1.79	5.00	23.50
<b>Greece</b>	2	0.53	8.00	34.50	2	0.54	9.00	0.00	2	0.47	10.00	12.50
<b>Ireland</b>	5	1.64	5.67	31.00	5	1.69	5.67	24.00	5	1.76	5.00	27.00
<b>Italy</b>	2	0.46	3.33	51.50	2	0.39	3.33	51.00	2	0.44	2.67	51.50
<b>Netherlands</b>	2.5	1.86	7.33	13.00	2.5	1.90	7.33	15.00	2.5	2.01	6.67	16.00
<b>Poland</b>	2	0.26	5.33	51.50	2	0.22	5.67	47.50	2	0.21	6.33	58.00
<b>Portugal</b>	2.5	1.12	1.00	61.50	2.5	1.02	1.00	60.00	2.5	1.04	1.67	60.00
<b>Spain</b>	5	1.22	9.67	43.00	5	1.12	9.00	44.00	5	1.14	9.67	52.50
<b>Sweden</b>	3.5	1.95	12.67	9.00	3.5	2.05	12.67	13.50	3.5	2.14	12.00	15.50
<b>UK</b>	5	1.78	13.00	4.50	5	1.83	12.00	5.50	5	1.82	11.67	5.00

Variables: ANTI\_DIRECT is La Porta’s anti-director right index (revised version by Djankov et al., 2006), which is calculated by adding 1 when (1) shareholders are allowed to mail their proxy vote, (2) shareholders are not required to deposit their shares prior to general shareholders’ meeting, (3) Allow for cumulative voting or proportional representation of minorities in the board of director, (4) an oppressed minorities mechanisms is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders’ meeting is less than or equal to 10 percent, and (6) shareholders have preemptive right that can be waived only by a shareholders’ vote. The revised score is based on laws and regulation applicable to firm in May 2003, and is assigned for all 3 sample years.

LEGAL( Legal Enforcement) is the mean score of “Rule of Law” and “Control of Corruption”.

EQUITYMKT represents the importance of equity market, and is calculated as the mean rank of 1) Aggregate Market Capitalization held by minorities/GDP, 2) Number of listed domestic firm/Population in millions, and 3) Domestic credit granted by banking sector / Stock Market Capitalization.

OWNER is ownership concentration, and equals to “1 - the median of Free Float in the 10 largest non-financial privately owned domestic firms”.

Table 3 presents investor protection proxy during the year 2005 -2007. For antidirector proxy, UK and Ireland scores the highest, corresponding to their common law origin. Finland has the highest LEGAL scores, followed by Sweden. In term of market factor, Finland, Sweden and UK share the top three highest EQUITYMKT scores, indicating the high importance of equity market in these countries. Out of 4 investor proxies, OWNER shows the highest variation across three years.

Table 4 provides Pearson correlation coefficient for investor protection proxy. Each individual investor protection proxy tends to capture unique dimension of investor protection, since they are not highly correlated with each other. This support our analysis based on each individual proxy in order to explore information about these unique dimensions. In term of factor score, the results shows strong correlation between each investor protection proxy (Anti\_Director, Legal, EquityMkt, and Owner) and factor score, implying that the factor score can well represent each component of investor protection proxies.

**Table 4: Pearson Correlation of Investor Protection Proxy**

	<b>Anti_Direct</b>	<b>Legal</b>	<b>Equitymkt</b>	<b>Owner</b>	<b>Factor Score</b>
<b>Anti Direct</b>	1.000	0.489 **	0.450 **	(0.344) **	0.700 **
<b>Legal</b>	0.489 **	1.000	0.401 **	(0.565) **	0.774 **
<b>Equitymkt</b>	0.450 **	0.401 **	1.000	(0.709) **	0.825 **
<b>Owner</b>	(0.344)*	(0.565) **	(0.709) **	1.00	(0.848)**
<b>Factor Score</b>	0.700 **	0.774 **	0.825 **	(0.848) **	1.000

Variables: See details in Table 3

Factor score is obtained from factor analysis on ANTI\_DIRECT, LEGAL, EQUITYMKT, OWNER.

\*, \*\* Correlation is significant at the 0.05 and 0.01 level, respectively (2-tailed)

## 5.2 Regression Results

Table 5 provides the regression results for model 1, 2, 3 and 4 which examine each of individual investor proxies independently, as well as model 5 which examine overall factor score of investor protection. Consistent with the correlation analysis, the result in all models shows that both earnings and book value of equity are value-relevant.

Multicollinearity problem is detected in model 1, as VIFs of all independent variables (except the dummy variable ANTI\_DIRECT) exceed 10. High degree of multicollinearity can result in regression coefficient being incorrectly estimated or even having the wrong sign. Therefore, the result that ANTI\_DIRECTOR has insignificant impact on value relevance of earnings and book value of equity is inconclusive.

Model 2 examined LEGAL variable and found that legal enforcement has no impact on value relevance of earnings and book value of equity. Similar results (not shown in the table) are obtained when examining each components of LEGAL, i.e. rule of law and control of corruption, separately.

**Table 5: Regression analysis of investor protection and value relevance of earnings and book value**

$$P_{it} / P_{it-1} = \beta_0 + \beta_1 (EPS_{it} / P_{it-1}) + \beta_2 (BV_{it} / P_{it-1}) + \beta_3 \text{InvProtection Factor}_{it} + \beta_4 \text{InvProtection Factor}_{it} * (EPS_{it} / P_{it-1}) + \beta_5 \text{InvProtection Factor}_{it} * (BV_{it} / P_{it-1}) + \varepsilon_{it}$$

	Investor Protection Proxy in Each Model						
	Anti_Direct (1)	Legal (2)	Private Enforce (2a)	Public Enforce (2b)	Equity mkt (3)	Owner (4)	Factor Score (5)
<b>Intercept</b>	1.0804 (0.0000)	1.0811 (0.0000)	1.0944 (0.0000)	1.0504 (0.0000)	1.0633 (0.0000)	1.0609 (0.0000)	1.0569 (0.0000)
<b>EPS<sub>it</sub> / P<sub>it-1</sub></b>	<b>0.9454</b> <b>(0.0019)</b>	<b>1.0511</b> <b>(0.0000)</b>	0.4332 (0.1702)	<b>0.5679</b> <b>(0.0485)</b>	<b>0.4593</b> <b>(0.0678)</b>	<b>1.2818</b> <b>(0.0000)</b>	<b>1.0524</b> <b>(0.0000)</b>
<b>BV<sub>it</sub> / P<sub>it-1</sub></b>	<b>0.1974</b> <b>(0.0034)</b>	<b>0.0902</b> <b>(0.0746)</b>	<b>0.1995</b> <b>(0.0074)</b>	<b>0.2417</b> <b>(0.0000)</b>	<b>0.1565</b> <b>(0.0063)</b>	<b>0.1072</b> <b>(0.0027)</b>	<b>0.1046</b> <b>(0.0000)</b>
<b>InvProtection<sub>it</sub></b>	(0.0061)	(0.0173)	(0.0897)	(0.0175)	(0.0013)	(0.0004)	(0.0064)
	(0.6512)	(0.4946)	(0.3703)	(0.8008)	(0.7708)	(0.6408)	(0.6111)
<b>InvProtection<sub>it</sub> * (EPS<sub>it</sub> / P<sub>it-1</sub>)</b>	0.0428 (0.6446)	0.0193 (0.9069)	<b>1.5609</b> <b>0.0127</b>	<b>1.1727</b> <b>(0.0641)</b>	<b>0.0874</b> <b>(0.0016)</b>	<b>(0.0088)</b> <b>(0.0794)</b>	<b>0.1898</b> <b>(0.0084)</b>
<b>InvProtection<sub>it</sub> * (BV<sub>it</sub> / P<sub>it-1</sub>)</b>	(0.0306) (0.1513)	0.0102 (0.7822)	(0.2295) (0.1243)	<b>(0.2733)</b> <b>(0.0011)</b>	(0.0071) (0.2760)	0.0000 (0.9810)	(0.0106) (0.5746)
<b>F- Value</b>	87.3210 (0.0000)	85.4069 (0.0000)	93.5714 (0.0000)	95.5266 (0.0000)	91.5458 (0.0000)	87.0256 (0.0000)	87.1755 (0.0000)
<b>Adj. R<sup>2</sup></b>	0.0903	0.0885	0.0978	0.0996	0.0943	0.0901	0.0912
<b>N</b>	4347	4347	4272	4272	4347	4347	4347

Variable: See details in Table 1 and 3. For InvProtection variable, one of the following proxies – ANTI\_DIRECT, LEGAL, PrivateEnforce, PublicEnforce, EQUITYMKT, OWNER and FACTOR\_SCORE - is substituted in each regression. PrivateEnforce is Bushman and Piotroski (2006)'s index of private enforcement of securities law, which is computed as the mean of La Porta (2003)'s indices: Disclosure Index and Burden of Proof Index. PublicEnforce is Bushman and Piotroski (2006)'s index of public enforcement of securities law, which is computed as the mean of La Porta (2003)'s 4 indices: Supervisor Characteristics Index, Investigative Powers Index, Orders Index and Criminal Index.

Number in parentheses represents p-value

While the result of model (2) does not support hypothesis 1, it is noted that LEGAL measures legal enforcement in general. Additional analysis is conducted to specifically focus on securities law enforcement. Securities law is important to investors, since it is adopted as a supplement of general legal law in order to enhance good governance of the firms as well as related parties, such as auditors. In these analysis, Bushman and Piotroski (2006)'s variables (i.e. private and public securities law enforcement) are used instead of LEGAL. Public enforcement measures the efficiency of public enforcer (such as SEC) in term of freedom from political interfere, investigative power, and power to impose sanctions. On the other hand, private enforcement measures how efficient mandatory disclosure and burden of proof can encourage good reporting practice. The results show that both Private Enforcement variable and Public Enforcement variable have positive significant impact on the association

of earnings and stock price. However, contrast to the prediction, public securities law enforcement shows negative impact on value relevance of book value of equity.

In term of market factor, both EQUITYMKT (model 3) and OWNER (model 4) have significant impact on value relevance of earnings. The more important equity market is, the higher association of earning and stock price is. On the other hand, ownership concentration is negatively related to value relevance of earnings, implying that the more diverse corporate ownership structure is, the higher value relevance of earnings is. The results support hypothesis 2.

Hypothesis 3 is supported, as in model 5, overall investor protection (represented by factor score) has a positive and significant influence on the relationship of earnings and stock price.

In sum, it is found that investor protection has a significant impact on value relevance of earnings. The influence is mainly contributed to market factor, i.e. the importance of equity market and ownership concentration. The result is supplemented by the significant influence of securities law enforcement on the association of stock price and earnings. Overall findings highlight the importance of financial market.

A possible explanation is that investor protection encourages the development of financial market. In countries where investors are well-protected, the firm can easily raised funds through equity market, resulting in broad and diverse equity market with low ownership concentration. This market structure demands higher public demand of information than the debt-based financing market with high ownership concentration, which relies mainly on inside communication. As a result, this leads to higher demand of high quality public information. Such demand, in accompanied with stringent securities law enforcement, increase cost (and reduce benefit) of the insider's expropriation, and in turn increase the quality of accounting information. This can explain why higher value relevance of earnings is found in case of high investor protection.

## **6. Conclusion**

This paper investigates the impact of investor protection on the value relevance of earnings and book value of equity, and found that investor protection has a significant influence on value relevance of earnings. Analysis of each legal and market factors related to investor protection demonstrates that the influence of investor protection mainly result from market factors, which are represented by the importance of equity market and ownership structure. While the findings do not show significant findings for legal factor, the importance of legal protection should not be ignored. On the other hand, the findings that securities law enforcement has significant impact on value relevance of earnings implies that government must pay attention to specific law, i.e. securities law, which is important to protect investors.

This study adds contribution to accounting harmonization issue. The findings that institutional factors underlying investor protection have significant impact on value relevance of accounting information have several implications. First, the findings highlight to the standard-setters about the importance of legal and market factors that affect investor protection and the financial report preparer's incentive. Standard setters should not use IFRS as a shortcut to improve their accounting quality, since the outcomes could not be optimal without simultaneous change in their economic and political infrastructure. On the other hand, it is important to strengthen investor protection— both legal and market mechanism – in order to promote the compliance of the standard.

In term of investors, the findings raised awareness to the investors that they should not be misled by the word “accounting standard harmonization”. Although IFRS is mandatory

adopted in several countries, judgment is required to implement standard, which in turn provide opportunities for the managers to manipulate accounting numbers. Since institutional factors underlying investor protection, ranging from the breadth and depth of equity market, the source of the firm's financing, and the effectiveness of securities law enforcement, still varies across countries, perfect comparability - that is expected from the single use of accounting standard - cannot be achieved.

Future research can extend this study to other attribute of accounting quality, such as conservatism or earnings management. While prior researches (such as Bushman and Piotroski, 2006, and Luez et al., 2003) investigated these issues, the analysis can be re-conducted by using European Union countries and/or other countries with IFRS-mandatory adoption, since this setting allows the researchers to hold accounting standard constant, and therefore excludes any potential effect of accounting standard on the quality of accounting information. Also, due to the limitation on ownership data, freefloat-based proxy is used in this analysis. Future research can be extended by using other ownership proxy (such as Fan and Wong, 2002).

## References

1. Ali, A. and Hwang, L. 2000. Country-Specific Factors Related to Financial Reporting and the Value Relevance of Accounting Data. *Journal of Accounting Research*. 38 (1): 1-21
2. Ball, R., Kothari, S.P., and Robin, A. 2000. The Effect of International Institutional Factors on Properties of Accounting Earnings. *Journal of Accounting and Economics*. 29: 1-51.
3. Ball, R., Robin, A., and Wu, J.S. 2003. Incentives versus Standard: Properties of Accounting Income in Four East Asian Countries. *Journal of Accounting and Economics*. 36: 235-270.
4. Ball, R. 2006. International Financial Reporting Standards (IFRS): pros and cons for investors. *Accounting and Business Research, International Accounting Policy Forum*. 5-27.
5. Boonlert-U-Thai, K., Meek, G.K., and Nabar, S. 2006. Earnings Attributes and Investor-protection: International Evidence. *The International Journal of Accounting*. 41: 327-357.
6. Bradshaw, M. and Miller, G. 2008. Will Harmonizing Accounting Standards Really Harmonize Accounting? Evidence from Non-US Firms Adopting U.S. GAAP. *Journal of Accounting, Auditing and Finance*. 23(2):233-270.
7. Brown, S., Lo, K. and Lys, T. 1999. Use of  $R^2$  in Accounting Research: Measuring Changes in the Value Relevance over the Last Four Decades. *Journal of Accounting and Economics*. 28: 83-115.
8. Bushman, R.M. and Piotroski, J.D. 2006. Financial Reporting Incentives for Conservative Accounting: The Influence of Legal and Political Institutions. *Journal of Accounting and Economics*. 42: 107-148.
9. Defond, M., Hung, M. and Trezevant, R. 2007. Investor Protection and the Information Content of Annual Earnings Announcements: International Evidence. *Journal of Accounting and Economics*. 43(1): 37-67.
10. Ding, Y., Jeanjean, T., and Stolowy, H. 2005. Why do national GAAP differ from IAS? The Role of Culture. *The International Journal of Accounting*. 40: 325-350.

11. Ding, Y., Hope, O., Jeanjean, T. and Stolowy, H. 2007. Differences between Domestic Accounting Standards and IAS: Measurement, Determinants and Implications. *Journal of Accounting and Public Policy*. 26: 1-38.
12. Djankov, S., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. 2006. The Law and Economics of Self-Dealing. Retrieved from [www.doingbusiness.org](http://www.doingbusiness.org)
13. Fan, J. and Wong, T.J. 2002. Corporate Ownership Structure and the Informativeness of Accounting Earnings in East Asia. *Journal of Accounting and Economics*. 33: 401-425.
14. Francis, J.R., Khurana, I.K., and Pereira, R. 2001. Investor Protection Laws, Accounting and Auditing Around the World. Working Paper, University of Missouri-Columbia. 1-38.
15. Habib, A. 2007. Legal Environment, Accounting Information, Auditing and Information Intermediaries: Survey of the Empirical Literature. *Journal of Accounting Literature*. 26: 1-75.
16. Holthausen, R.W. 2003. Testing the Relative Power of Accounting Standards versus Incentives and Other Institutional Features to Influence the Outcome of Financial Reporting in an International Setting. *Journal of Accounting and Economics*. 36: 271-283.
17. Hope, O. 2003. Firm-level Disclosures and the Relative Role of Culture and Legal Origin. Working Paper, University of Toronto. 1-35.
18. Jaggi, B. and Low, P.Y. 2000. Impact of Culture, Market Forces, and Legal System on Financial Disclosure. *The International Journal of Accounting*. 35(4): 495-519.
19. Kaufmann, D., Kraay, A., and Mastruzzi, M. 2007. Governance Matter VI: Aggregate and Individual Governance Indicators 1996-2006. Worldbank Policy Research Working Paper. 1-93.
20. La Porta, R., Lopez-de-Silanes, Shleifer, A. and Vishny, R.W. 1997. Legal Determinants of External Finance. *Journal of Finance*. 52: 1131-1150.
21. La Porta, R., Lopez-de-Silanes, Shleifer, A. and Vishny, R.W. 1998. Law and Finance. *Journal of Political Economy*. 106: 1113-1155.
22. La Porta, R., Lopez-de-Silanes, Shleifer, A. and Vishny, R.W. 1999. Investor Protection : Origins, Consequences, Reform. Financial Sector Discussion Paper No. 1, The World Bank.
23. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R. 2000. Investor Protection and Corporate Governance. *Journal of Financial Economics*. 58: 3-27.
24. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R. 2002. Investor Protection and Corporate Valuation. *The Journal of Finance*. LVII(3):1147-1170.
25. La Porta, R., Lopez-de-Silanes, and Shleifer, A. 2003. What Works in Securities Law ? Working Paper, Harvard University and Yale University.
26. Luez, C., Nanda, D., and Wysocki, P.D. 2003. Earnings Management and Investor Protection: an International Comparison. *Journal of Financial Economics*. 69: 505-527.
27. Regulation (EC) No.1606/2002 of the European Parliament and of the Council of 19 July 2002 on the Application of International Accounting Standards.
28. Schipper, K. and Vincent, L. 2003. Earning Quality. *Accounting Horizon*. 17 (Supplement): 97-110.

29. Sellhorn, T. and Gornik-Tomaszewski, S. 2006. Implication of the IAS Regulation for Research into the International Differences in Accounting Systems. *Accounting in Europe*. 3: 187-217.
30. Wulandari, E.R. and Rahman, A.R. 2004. A Cross-country Study on The Quality, Acceptability, and Enforceability of Accounting Standards and the Value Relevance of Accounting Earnings. Working Paper, Nanyang Technological University. 1-27.
31. [www.doingbusiness.com](http://www.doingbusiness.com)
32. [www.govindicators.org](http://www.govindicators.org)
33. [www.worldbank.org](http://www.worldbank.org)

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# APPLICATION OF SEGMENT INFORMATION REGARDING ENTREPRENEURIAL COMPANIES IN THE CZECH REPUBLIC

Bohuslava Knapová

## Introduction

Such question is often discussed in our practice, if information about the entrepreneurial process in the classification by geographical or business segments are or are not much more or even entirely only internal information for the management and decision making of a company both in the long-term horizon as for the strategy of the accounting unit, so from the shorter-term view point, if for example the using of the present capacities is judged.

## Accounting information as resources of segment information

Segment information can exist in practice as a direct way out the accounting programme or can be elaborated on the basis of the accounting information with the help of other programmes, for example table programme Excel and so on..

It is supposed in the segment information statement, that an entrepreneurial company creates two groups of similar outputs (products): electric instruments for households (HOU) and electric instruments for „production“ using, for instance for hotels and restaurants (PRU). The creation of outputs is made in the Czech Republic (the production of final products) and in the Slovak Republic (the production of semi-finished products of the own production). Products are sold (customer allocation) in the Czech Republic (CR), in countries of the European Union (EU), in the USA a Canada (USAC) and other countries of the Europe and world (OTH).

Total information about costs, revenues, control result, assets and liabilities in the classification by segments follow with the expression of items, which are common items to more segments (COM) and items, which are not included in segments, i. e. are not dependent on segments (NO).

## Segment information (in thousands of crowns)

<i>Items</i>	<i>Products</i>				<i>Production allocation</i>				<i>Total</i>
	HOU	PRU	COM	NO	CR	SR	COM	NO	
External costs	10	8	2	10	11	9	0	10	30
Internal costs					12				12
Total costs	10	8	2	10	23	9	0	10	42
External revenues	22	18	0	0	40	0	0	0	40
Internal revenues						12			12
Total revenues	22	18	0	10	40	12	0	0	52
Results	12	10	-2	-10	17	3	0	-10	10
Assets	45	40	5	10	60	30	0	10	100
Liabilities	14	16	0	20	17	13	0	20	50

<i>Items</i>	<i>Customer allocation</i>						<i>Total</i>
	CR	EU	USAC	OTH	COM	NO	
External costs	5	6	7	1	1	10	30
Internal costs							0
Total costs	5	6	7	1	1	10	30
External revenues	11	12	13	4	0	0	40
Internal revenues							0
Total revenues	11	12	13	4	0	0	40
Results	6	6	6	3	-1	-10	10
Assets	20	28	34	8	0	10	100
Liabilities	8	10	11	1	0	20	50

### Statement with information about business segments

<i>Items</i>	<i>Business segments</i>		<i>Eliminated</i>	<i>Total</i>
	HOU	PRU		
External revenues from sale of segments	22	18		40
Revenues from sale among segments	0	0	0	0
Total revenues from sale of segments				40
External costs of segments	10	8		18
Costs among segments	0	0	0	0
Total costs of segments				18
Result of the segment	12	10		22
Common costs				-2
<b>Operating profit</b>				<b>20</b>
Other costs				-10
Net profit				10
<b><i>Other information</i></b>				
Assets of segments	45	40		85
Common assets				5
Other assets				10
<b>Total assets</b>				<b>100</b>
Liabilities of segments	14	16		30
Common liabilities				0
Other liabilities				20
<b>Total liabilities</b>				<b>50</b>

### Statement with information about geographical segments of the production

<i>Items</i>	<i>Geographical segments</i>		<i>Eliminated</i>	<i>Total</i>
	CR	SR		
External revenues from sale of segments	40	0		40
Revenues from sale among segments	0	12	12	-12
Total revenues from sale of segments				28
External costs of segments	11	9		20
Costs among segments	12	0	12	-12
Total costs of segments				8
Result of the segment	17	3		20
Common costs				0
<b>Operating profit</b>				<b>20</b>
Other costs				-10
Net profit				10
<b><u>Other information</u></b>				
Assets of segments	60	30		90
Common assets				0
Other assets				10
<b>Total assets</b>				<b>100</b>
Liabilities of segments	17	13		30
Common liabilities				0
Other liabilities				20
<b>Total liabilities</b>				<b>50</b>

### Statement with information about geographical segments of the sale

<i>Items</i>	<i>Geographical segments</i>				<i>Eliminated</i>	<i>Total</i>
	CR	EU	USA C	OTH		
External revenues from sale of segments	11	12	13	4		40
Revenues from sale among segments	0	0	0	0	0	0
Total revenues from sale of segments						40
External costs of segments	5	6	7	1		19
Costs among segments	0	0	0	0	0	0
Total costs of segments						19
Result of the segment	6	6	6	3		21
Common costs						-1
<b>Operating profit</b>						<b>20</b>
Other costs						-10
Net profit						10
<b><u>Other information</u></b>						
Assets of segments	20	28	34	8		90
Common assets						0
Other assets						10
<b>Total assets</b>						<b>100</b>
Liabilities of segments	8	10	11	1		30
Common liabilities						0
Other liabilities						20
<b>Total liabilities</b>						<b>50</b>

Cost items and revenue items, which are allocated to segments, must fulfill characteristics of the cohesiveness, their direct allocation to segments of appropriate levels, the division of common cost items and revenue items to segments on the economic basis.

Experiences in the Czech Republic confirmed the necessity of the rational determination of segments inside of the company and the rigorous supply of information among these segments. Simultaneously they showed the importance of the allocation of costs and revenues among segments and its accounting presentation, on the need of the real determination of bases for the allocation of common costs (first of all indirect overhead costs) and common revenues. The greatest problem in segments area is pricing of transactions among segments.

### **Conclusion**

The providing and using of information by important segments are usually functional not only in great Czech companies with the diversified entrepreneurial process, with the geographical assets allocation and customers allocation, but it is successful also for middle companies with smaller number of operating segments. It enables to judge strategically on the basis of segment information the spread of risks and the return in the interest of the progressive development of the given company.

### **References**

1. Knapová, B.: Information Reporting about Segments under Conditions of Czech Entrepreneurial Companies. Pardubice, University 2008, pp. 105-108.
2. Kovanicová, D.: How to Understand to World, European and Czech Financial Statements. Prague, Bova Polygon 2004, pp. 304.
3. Krupová, L. – Vašek, L. – Černý, V.: International Financial Reporting Standards. Prague, VOX 2006, pp. 1050.
4. [www.iasplus.com](http://www.iasplus.com) - International Financial Reporting Standards (IFRS) / International Accounting Standards and interpretations (IAS), Prague 2005.

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# **IN ALBANIA BUSSINES OPERATORS (SMALL AND MEDIUM ENTERPRISES) AGAINST THE ACCOUNTING STANDARDS REQUIREMENTS**

**Agim Binaj**

In Albania, during the transition period from the centralized economy to the market economy was established a new frame of reporting through the double registration accounting. Actually the operators and the Albanian business operate based on the accounting laws passed in 2004. Before this date was enforced the accounting law of 1993.

We need to emphasize that the double registration system in Albania and the culture related to this system, originates in the 19<sup>th</sup> century, when Albania was part of the Ottoman Empire. Back at that time, the Empire executed a special *Ferman* of the Sultan to keep a double registration accounting, based on the French experience.

Later, in 1912 (when Albania was independent from the Ottoman Empire) till 1990, during the Kingdom and Communism, the accounting faced its ups and downs.

During the Kingdom of Zog 1<sup>st</sup> it was established the first Merchant School of Vlora. It educated the first Albanian Accountants, and the Decree of King Zog of the Accounting Law in 1929, laid the foundations of the further development of accounting in Albania.

Starting from 1 January 2008, the balance sheets and financial statements are prepared based on the accounting standards, national and international standards based on the groupings of the entities (small, medium, and large with joint capital).

We believe that this step in Albania is a real revolution in the accounting area, financial reporting, assessment of the entity's wealth not with the historic cost, but with the market price demands, etc)

## **Why the accounting standards? Why now and under the conditions in Albania?**

The effective operation of large global markets is essential to our economic wellbeing. In our point of view, under the globalization conditions of the world economy the infrastructure of the financial statements is being build based on: **1.** The accounting standards which are ongoing, comprehensive, and based on clean principles enable financial statements and balance sheets to reflect the economic reality. **2.** Effective governing practices by including the necessity of strong internal audits are a tool of implementing the accounting standards. **3.** Auditing practices which give confidence in the users of the balance sheets and financial statements, essentially is a reliable reflection of the economic performance. **4.** An enforced and careful mechanism that ensures that the principles derived from the accounting standards and the auditing are followed. **5.** The ongoing revision of the accounting system based on the best international principles and practices. (G20 – April 2009)

**The key: FINANCIAL REPORTING BASED ON STANDARDS, UNDER THE CONDITIONS IN ALBANIA, IS ESSENTIALLY A TRANSPARENT AND REAL ASSESMENT OF THE WEALTH AND INTELLECTUAL STATE OF THE COUNTRY, THE ECONOMIC DEVELOPMENT, ATTRACTION OF INVESTMENTS, THROUGH THE IMPROVEMENT OF THE TRANSPARENCY AND INFORMATION QUALITY,**

## ENCOURAGEMENT OF THE MARKET DISCIPLINE AMONG THE PLAYERS OF THE FINANCIAL MARKET, ETC.

### 1. The requirements of the accounting standards and the problems that arise during their implementation

Actually from the operators and businesses (small and medium enterprises) in Albania there is a will to implement the standards; there have been improvements especially during 1996- 2008 to prepare more qualitative Financial Statements and Balance Sheets. This originates **first**, in the awareness and culture of the business administrators to reflect their real activity, and **second**, in the professional control of the fiscal administrate. **Third**, it originates from a more professional work of the Accounting and auditing professionals. But this is not enough. It is necessary to strengthen the institutional and professional capacities and avoid the excessive requirements in the reflection of the economic and financial activity of the entity, to realize a more reliable and qualitative financial reporting. Yet, based on the investigations performed by foreign and local independent institutions, it results that the financial reporting in Albania still lacks reliability. This happens due to the deep informality of the country's economy, mentality not to pay taxes, etc. The second invoices that do not represent the performed transactions have become normal practices. **We all witness that, but we continue to live on this falsity.**

Still, the relations with the state should be such as to produce transparency from one side, and legitimacy and reliability on the other one.

This low level of the financial transparency in our country especially before 2008, discouraged the foreign and local investments, which has influenced negatively in the medium and small enterprises, which make up 92% of all business enterprises, to get loans from the formal financial sector. Moreover, under the conditions of insufficient reliable financial information, the third parties as well, (stockholders, creditors, etc) do not know the effectiveness of directing and management, or the results of their invested capital. But this situation, especially during 2008, when the financial reporting was done based on the standards, the reliability and transparency began to increase. E.g. large companies which manufacture construction materials, and energy are currently working in Albania, among them are business companies from Chezk Republic. Their investments are more than 2.5 billion Euros. This is a good sign toward the further development of Albania.

- Until now the financial reporting from the business with all its improvements does not guarantee a high quality for the entities of high public interest, e.g shareholder companies, based on which we can make economic decisions for the further development of the business. Key issues have not been covered yet such as: consolidations, leasing (financial rent), construction contracts, devaluation of the entity's assets, etc. The new accounting law treats these issues on terms of the accounting standards, **but is the environment of their implementation prepared?**
- Besides the publishing and translation, and approval from the National Accounting Committee, it is required the qualification of the accounting professionals and accounting experts. But we need to be realistic that the education and qualification level in the process of before and after certification of the accountants and accounting experts is inadequate to fulfill the existing needs in giving the knowledge and experience. Under these conditions, if we want to improve the situation, the directing staffs of the entities, the stakeholders, accountants, accounting authorized experts, and professors of

accounting and finance need a qualification starting from the basic knowledge up to the most advanced ones. This qualification should be organized based on the types of business, separate for the manufacture business, construction, commerce, insurance, banks, etc.

- ***The monitoring and implementing mechanisms, to endorse the accounting standards application in the business units should be of special importance.*** Excluding the Bank of Albania, which has monitoring structures for the bank system operating in Albania, the other areas are not monitored. **The reasons are:** lack of a clear legislation, lack of capacity or operational authority, lack of qualified and specialized structures to carry out this important mission under the conditions of our country.

Under these conditions it is an emergency the establishment of the Supervisory Authority for the free professions, such as the accountant, and the authorized accounting expert, so that their work is supervised. In addition, some advanced countries are establishing the 'taskforce' structures for these professions. It is time not to practice auto-supervision, especially under the conditions of the Albanian economy. This would dramatically increase the quality and transparency of the financial reporting of all economic and financial activity of the economic entities.

- The National Accounting Committee is currently working to establish a unit which would respond to the problems related to the implementation of the standards in the practice of the Albanian business. Meantime, this body will respond to the questions up to which level of enterprises should the standards implementation (IFRSs) extend, etc.

## **2. Legal frame has still unsolved problems, which required revision and harmonization**

In the Albanian environment, the legal frame of financial reporting for the business units is not harmonized. This because of the different patterns picked to be implemented in our country.

- The accounting law, entered into force in 1 January 2006, **excluding Article 4**, which entered into force in 1 January 2008, with the accounting personnel excluding several courses from the accounting associations, no preparatory work with the stakeholders, administrators, accountants, and accounting experts has been carried out. It has been difficult, but the balance sheets and financial statements of 2008 (the balance sheets are handed over in 31 March of the successive year), were in general done based on the Standards' requirements.
- We need to emphasize that the standards implementation brought into light the absence of the financial market components, the assessment criteria, the property conflict, the identification of real estates, their assessment, etc. The financial market has remained only in the level of treasury bonds, meantime, there is not a market of capital instruments, there is no emission of stocks, the instruments such as transactions of conversion of debt into capital are not known, which brings a gap in the chain debit-credits. Even though the standard requires that many elements of the financial statements are assessed with their fair value, it is only in paper, because it could not be used in the effective interest rate, because in Albania there is no market and stock exchange to find this effective interest rate with a reliable accuracy. Moreover, regarding certain elements of the financial statements there is no market price to find their fair value because in Albania there is no market for specialized assets. The experience of some other countries that created a 'Database', with the necessary information needed to calculate the fair value of the

elements of the Financial Statements, are studied to be implemented in Albania as well, and from the Ministry of Finances and the National Accounting Committee.

- The new accounting and financial statements law determines for all the entities, that their legal representatives are responsible up to the supervisory board, but it is not determined if the responsibility is common or divided, and which sanctions are implemented in case of non-reconciliation or infringement. We hold that to protect the users of the financial statements, it is required a legal system to punish occasions of non-reconciliation with the financial reporting legal requirements, which now is missing. The financial crisis dictates us to revise entirely the accounting regulation and the punishment for those who do not apply them.
- In Albania there is no complete commercial code, there is no law that regulates the relations of a financial instrument, the transactions for the future values, etc. On the other hand, the salary instruments are known up to the level of cheque, meantime other debt instruments are not known as commercial such as promissory notes, certificates of deposits, payment orders, etc.
- Under the best international practices, the law for the commercial companies requires that the stockholders approve the entities' financial statements, which dictates that based on our law this requirement be established through the respective modification. The right of the shareholders to approve the balance sheet and the entity's financial statements is important, because it allows the owners to control the performance of the directing staff and the administration of the best management of material and human resources and their invested capital.
- The new accounting law requires that all entities deposit their legal financial and consolidated statements (audited when required) close to the courts of respective districts (judge of the court district) one month after their approval in the shareholders assembly. But there is no district court that has the capacity, means or appropriate staff to fulfill this requirement.

Regardless the requirements of "the accounting" law, which sanctions the publishing of the balances and financial statements from every entity, it is not explicit if all entities should fulfill this requirement; or it is not determined where the accounting information will be published. Under these circumstances the law is not clear, because it leaves space for confusion and interpretation by failing to complete its purpose to make the accounting information in the entities more transparent. There are other confusions in the law, and to be available to the accounting information of the workers of the entity or shareholders, etc.

The legislation non-compliance problems are related to the insurance companies, banks, etc. which require a special attention and respective regulation.

E.g. under the conditions of the bank system or the society with a financial capital, what will bring under the Albania conditions the use of the fair value in the compilation of the financial statements? From the Bank of Albania, professional organizations, or National Accounting Committee there is still no serious attempt or attitude about this. This attitude should be supported in the Albanian reality, in the development of the capital and monetary market, in the development of loan market, pensions insurance and reply to the following dilemma:

- If the use of fair value will represent the economic activity of the financial institution and its special operations.
- If the use of fair value in the financial reporting will ensure a better communication that up to now for the investments, loans, etc. in the preparation of the financial statements.
- If the use of fair value in the financial reporting will fulfill a more reliable information for all the users of the financial statements.
- If the use of the fair value will help to facilitate the decision-making.
- If the use of fair value will reduce the complexity and understanding of the financial statements.
- If it will help in the transparency and comparability of the financial continuity.

So, in practice the use of fair value in the Financial Statements and in Accounting has begun to be applied in Albania as well. But based on the attitudes held by the other countries from where the financial institutions have derived (Banks – there are 18 of them, which about 80% are foreign capital Greek, Italian, Austrian, etc) or main shareholders which in the first phase of application, has caused a confusion on the way of its practice in accounting, and on the way of explanation of the Financial Statements. In our opinion an emergency is at least:

- Practicing of the fair value in accounting and financial statements uniformly from all financial institutions.
- The determination of a national hierarchy (Central all inclusive institution) for the fair value

In this process plays a vital role the Bank of Albania, the Supervisory Financial Authority, respective accounting associations, and the National Accounting Committee. But the choice requires a quick national consensus, not only for this but other problems as well.

### **3. The accountant profession is not yet regulated by law and not in the appropriate levels to respond to the qualitative implementation of the standards.**

Unlike the practices in the developed countries, the Albanian accountants are educated with the practices of implementing the tax accounting requirements and not those described in the accounting law. The balance and the financial statements here are seen more as an information product done according to ‘the orders of the tax office’ and not to reflect the wellbeing of the entity’s financial activity. Lack of understanding the difference between reporting for fiscal purposes and financial reporting of the economic activity continues to bring about confusion in the financial statements. Such examples may be found in many business practices, especially those of creating provisions, which by the fiscal system are not known as a legal expense, but that no leader or accountant has not dared so far to create them and for the devaluation of the assets and for expenses (e.g. Regarding judicial issues, or the amortization of the effects in the difference in the exchange rate by reflecting them in the financial statements of the economic activity of the entities. In some occasions it happens that in recognizing the receivables, the dubious ones are reflected separately and in a second moment to be considered as ‘dubious clients’, with no hope of receiving. This phenomenon is experienced today by the business in increasing the debit-credits between the supplier entities and manufacturing entities / construction, whereas the banks experience the creation of dubious loans, which imply a systematic risk, especially today in the situation of financial crisis. There are problems as well in

the assessment of shareholder capital, which in Albania has not been solved yet. According to the IFRS-s, the shareholding capital should be kept at historic cost, whereas Bank Accounting Manual requires that the banks reassess their capital by using a coherent exchange rate, which leads in the creation of a difference from the exchange rate. Such an accounting treatment according to the IFRS-s requires that the capital is considered as a 'non-monetary' means and as a consequence is measured based on the historic cost, etc.

Such non-reflections lead to inaccurate activity reflection in the financial statements and balance sheets. This practice should be stopped, by determining clearly based on legal disposition, and based on other countries patterns, the reporting requirements for fiscal purposes and the entity financial activity. The tax office should know that there should not be other statements besides the ones required by the International and National Standards.

**Education and qualification of the accounting professionals should be revised, to increase the quality of this service which is crucial in the conditions of Accounting Standards implementation.**

Under the conditions of our country we think there is a deficiency in accountants who are experienced in the IFRS-s. This is more emphasized in the companies with foreign investments, where there are difficulties in finding qualified accountants to keep accounting based on the international standards. To reach this level, is needed a special qualification. The entities are facing considerable difficulties in measuring the assets and liabilities in compliance with the IFRS-s. In those companies which cannot calculate the accounting value of long term assets based on the IFRS-s, lack of internationally qualified assessors may cause serious difficulties in using the IFRS-s.

The accurate knowledge of assets and liabilities is a challenge for the entity based on the IFRS-s. Many from the entities and their professionals will try to proceed keeping the accounts in Cash (based on the receivables and payables system) and similar transactions, or for reporting purposes will continue to keep to different books to avoid the taxes. A majority of entities try (this surely will continue for some time) to keep an accounting based on the observed rights and liabilities (explanatory notes). Under the conditions of standards implementation the entities will face difficulties in identifying the transactions within the group. E.g. in construction and in the contracts of this kind. This identification was not necessary in the past, because of their focus in the financial statements or lack of structure of the group in the previous accounting legislation.

Same, there may be problems in the entities that operate in the market such as: the long term assets are not measured in compliance to the respective standard (e.g. standard 16) based on the market value, but are kept in accounting with the coefficient reevaluation in a certain date e.g. 31 December 2008. Consequently the related expenses with the amortization may be over or underestimated, by denaturalizing the result of the activity of the respective entity.

There are problems in the reevaluation of the liabilities and loss insurances, expenses and loss regulation and unearned liabilities of insurance primes in foreign currency with the cost of exchange rate in the date of balance sheet closure. The insurance companies are not capable of (at least this is the conclusion of several audits) determining if the received primes are declared accurately and there are not enough data to asses some insurance liabilities.

These deficiencies, actually present should be eliminated because the reader (user) of the financial statements cannot draw complete conclusions regarding the financial state of the entity and as a consequence the decision-making will not be effective. The transparence for the

accounting information should be seen as beneficial for the writer of the information (entity) and reader (tax office, shareholders, potential investors, etc.)

The accounting professional is required today to use simultaneously the eyes, ears, hands, and soul of cleanness and sincerity, in compiling accurately the balance and other financial statements. Only this way he may achieve his mission to produce a realistic picture (balance) of the entity in compliance to the accounting standards, to serve its users in decision-making.

### **Recommendations**

1. A full revision of the legislation related to accounting, such as the law for the commercial companies, civil code, etc. to eliminate in them incomplete requirements, unclear or conflicting, and they should comply with the requirements of IFRS-s. The creation of a complete legal base for the accounting profession and compilers of the balance sheets and financial statements and their certifiers.
2. A complete analysis of the business structure in Albania, in order to put appropriate limits for simplified requirements of the financial reporting, especially for the SME-s. The world practice separates these enterprises into three levels. Only in the enterprises of the first level quoted in the exchange stock the accounting standards are obligatory. Whereas in the two other levels are not obligatory, but the enterprises may implement it to make the financial statements more reliable against their users.
3. Lobbying and compensation of the entities with pure accounting, creation of prices for a high quality balance sheet and financial statements.
4. Harmonization of the accounting legislation and financial reporting with the tax frame. IFRS-s and National Accounting Standards will introduce new categories of incomes and expenses, so will be needed special directives to clarify them. Under the conditions of lack of these directions, the entities would confuse the tax standards and the accounting ones in preparing the balances and financial statements. A model of a financial statement for the tax office and the shareholders, and other users.
5. Documentation, distribution, and implementation of a clear strategy to compile and adapts standards, which includes an efficient consultation process. This will help in solving the issue of low level of knowledge and implementation of accounting standards.
6. Create systematic institutionalized mechanisms of monitoring and implementation, to ensure the compliance with the accounting standards. The legislation should be improved to determine clearly the authority of bodies that encourage the implementation of the accounting standards, supervisory authority of free accounting and auditing professionals, to investigate their work, etc.
7. Categorization based on the nature of the activity, legal audit, such as: certified accounting auditor, financial certified auditor, bank, insurance etc. *This would increase the professional competence and will directly influence this area, by giving up from specialist for each industry.*
8. At last, the education and qualification in qualitative level of the accounting professionals within the professional organizations (associations), by establishing permanent centers to ensure a contemporary treatment in accounting, financial reporting and other aspects

related to them. Revision of the qualification program and testing procedures by creating an objective assessment base.

### **References**

1. Albanian accounting law – April 2004
2. IFRS 2008 – WILEY Text ( The official standards approved by the EU, 2008)
3. International Financial Reporting and Compliance – European Networking Group – Conference September 2008, Madrid Spain
4. Materials of section 26 of UN “Regarding the Accounting Standards in the Small and Medium Enterprises”. November 2008.
5. Directive 2008/30/EC of the European parliament and of the Council of 11 March 2008. “ On statutory of annual accounts and consolidated accounts amending council Directives 78/660/EEC and 83/349/EEC and repaling Council Directive 84/349/EEC.

# USING THE SIMULATION BY EVALUATION OF PROJECTS SUSTAINABLE DEVELOPMENT

Viliam Cibulka

This contribution introduces author's experience in the field of simulation use for evaluation of sustainable development investment projects, in the phase of feasibility evaluation. The simulation enables to record the complex relations of projected systems, to follow their dynamic and stochastic characteristics, including economic factors. In this way it is possible to catch the influence of separate parameters on different evaluating indicators of the project (net current value, recoupment period, inner yield percentage, cash flow and others required indicators). Such simulation brings also risk analyses and empirical analysis of project variable sensibility. It is possible to include all the above mentioned factors into the simulation models, with adequate accuracy, and to gain relevant information for stating the effectivity of the project after it is completed. These are the important factors, which make substantial basics for sustainability assessment of future projects.

## **1. Simulation and evaluation the feasibility of a project**

Using the simulation in projecting, it create to senior manager some assurance, that he could really realized the planned tasks in time horizont, when the animation of project progress should visual demonstrated, predict the behaviour and help to verify fairly the results of concrete processes of project. The risks in project processes are bared too before the project is ended. The simulation models of project representing „experimental business” in computer, where the many and different variants of proposed solutions are verifying.

Every change of any project are connected with realization of some measurement. These measurements are changing the existing status of project and they are always connected with risk of result of their realization. The simulation allows to decreasing the risk because it give the chance for simulated the progress of future project realization. This serves for look to the future and avoid to the possible problems.

The author's experiences and the outland experiences confirmed, that the using of the simulating project optimizer Project Management Forecast (PMF) in project simulation, either in preliminary study of feasibility or project study of feasibility, in phase before the project are open or in during the project, it allows the complex optimalization of project variants with refer to the risks (threats and opportunities) and verify the project sustainable development.

## **2. Modelling the sustainable development of project**

If the project is enable to secure the planned project goal is the main what are investors and evaluative most interested. It means the planning output accomplishment, financial index with economic return, cash flow, project present value, the risk connected with project in time horizont to 5 and more years after the project is finished, or another valuation indexes.

It means to verify the reaching of project planning results in to the future in operation conditions with provision for cash flow, what is important for project operational capability. When the project is not responsible to generate sufficiency sources for filling the obligation the investor is in the risk of liquidity. That is the risk when the payments payable should not be realized. In this case it could create new money lent, for example by oversized rate of interest. Risk of liquidity is very important, because most of money lent, credits gets worse position of business.

The successful of liquidity risk management is depend of success management of project cash. When the project is carried with delay and when the problems with putting in operation, problems with supplies and acceptance of production are occurred it could call into existence of cash decrease, and liquidity risk. It is important to model the cash flow for discount and undiscount inflows and efflux of financial resources.

All factors are possible to make provision with simulation model with sufficient precision and than take importance information for decision about project fruitfulness after it's finished.

The program system allows the modular access for modelling of project processes. Projector prepares the particular processes of project and he/she connected them together into toe final model of project. First he or she could analyze and optimize particular processes of final project and then the whole project.

Simulation model allows the modelling [4]:

- variability of process parameters,
- cycles in project processes,
- branching of the processes,
- optimalization of project variants,
- risk analysis of simulated project,
- economical ascents of project,
- empirical analysis of project variable sensibility,
- independently repetition of project simulation

Allowance of all factors in simulation model allows for projector reach the complex evaluation of project processes and realize the decision about project proposal on higher level.

### **3. Conclusion**

Every quality preliminary study of feasibility or study of feasibility of project proposal should be verified by simulation which allows verify the project sustainable development together with optimalization of project variants, risk analyzing, economical ascents and empirical analyzing of sensibility. It's appear from the fact that to every business proposal it perform many risk factors which could negative influenced hole project in future. In that case is necessary to consider every possible risk before the project realization and their impacts for consequential project form and his sustainable development. The multitude applications of simulation confirm it's justness and contributions founded from successful application of projects in practice.

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### **References**

1. CIBULKA, V. Výhody aplikovania simulácie Project Management Forecast pri projektovaní. In: Finanční a logistické řízení, Malenovice: 2007, s. 68-72, ISBN 978-80-248-1406-3.
2. CIBULKA, V. Optimalizovanie variantov podnikateľských projektov pomocou simulácie In: Forum manažéra, 2006, č. 3, s. 30-35. ISSN 1336-7773.
3. CIBULKA, V. Aplikovanie Project Management pri projektovaní, In: TRANSFER 2007, 9. medzinárodná vedecká konferencia, Trenčín, s. 129-132, ISBN 978- 80-8075-236-1, ISSN 1336-9695.

4. CIBULKA, V. Využitie simulácie pri projektovaní, Vydavateľstvo STU v Bratislave, 2009, 140 s.
5. WEINBERGER, J. Project Management Forecast, príručka pre „Modulárny systém Dištančného vzdelávania v projektovom manažmente s podporou e-learningu a informačných technológií“, október 2006, Trnava, 100 s.
6. WEINBERGER, J. Project Management Forecast release 2.0 for Windows, Timing Praha, 2006.

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# **MATERIAL FLOW COST ACCOUNTING AND PREPARATION OF A NEW ISO STANDARD**

**Miroslav Hájek**

At present, one of the most important activities in the area of environmental management accounting (EMA) is enforcement of new ISO standards. In recent years, Japan initiated this activity which served as a basis for successful commencement of works on the preparation of a new standard. This virtually means benefits brought about by Expert Working Group which was established under the United Nations Division of Sustainable Development (UNSD Expert Working Group), which worked in the period 1999 – 2005 and contributed to a detailed definition of EMA and its worldwide expansion.

Draft of a new standard was prepared by Japan in autumn 2008 and handled by the Technical Committee TC207/ISO during international consultation lasting more than 12 months. The draft was submitted to the ISO members for voting with the term of 7.3.2008. The whole title of the proposed standard is Environmental Management – Material Flow Cost Accounting – General Principles and Framework. The standard is included in the group of ISO 14000 standards and has already been assigned with the denomination ISO 14051. Under the Technical Committee TC207/ISO, Working Group 8 (WG 8) was established for handling the issues of this standard.

Chairperson of the Working Group 8 is prof. Katsuhiko Kokubu (Kobe University), deputy chairman is Marcelo Kos Silveira Campos from the Brazilian Association of Chemical Industry. The Working Group secretary is Yoshikuni Furukawa from Nitto Denko Corporation and his assistant is Hiroshi Tachikawa. At present, the Working Group comprises 35 members.

## **The process of preparation**

So far, two meetings of the Working Group focusing on the preparation of ISO 14051 took place. The meetings included, in particular, a workshop and discussion on the presented draft. In addition, at the first meeting there arose a need to describe in detail the relation between material flow cost accounting and other standards under ISO 14000. Furthermore, the necessity of meeting with the representatives of International Federation of Accountants was accentuated. Members of the Working Group were invited to present case studies so that practical applicability of material flow cost accounting could be discussed and given evidence of. A common form for the preparation of case studies was proposed by Prof. Michiyasu Nakajima:

Title

Organizational structure

Scheme of material flows of major processes

Description of material losses

Results of analyses of material flow cost accounting

Improvement objectives based on analysis of material flow cost accounting

Conclusion

The aim of the workshops was to present material flow cost accounting and its use abroad. The presentations were primarily of methodological significance, from the viewpoint of approaches to the monitoring of material flow cost accounting, and also from the viewpoint of conditions under which this method can be applied. From the presentations there has resulted, among others, a definition that the system in question is a system of the monitoring of

material flows and supplies in the manufacturing process in physical and monetary units, where costs of wastes and emissions are identified. It was also reminded, for example, that material flow cost accounting was developed in Germany and later modified in Japan. Material flow cost accounting focused on reduction of costs, having strived for significant productivity and environmental improvements through innovations in the manufacturing process.

### **Time schedule of the handling**

Time schedule of the handling can be shown in the following table.

<b>Date</b>	<b>Activity</b>
June 2008	Working Group 8 (WG 8) discussions
July-October 2008	Working Draft (WD) presentation
November 2008	WG 8 discussions
March 2009	Commission Draft (CD) presentation
June 2009	Comments on Commission Draft
June 2009	WG 8 discussions
November 2009	WG 8 discussions
March 2010	Draft of International Standard (DIS) presentation
June 2010	WG 8 discussions
December 2010	Final Draft of International Standard (FDIS) presentation
March 2011	Issuance of standard

### **Problems discussed by Working Group**

In handling the draft of a new standard, particularly definitions and terms were discussed. Much of discussion was dedicated to what all is included in material flows. In spite of the fact that at first sight the methodology takes account of material only, material flow cost accounting includes, in addition to all materials, also natural resources including water as well as all energies. Discussions also concerned the types of businesses, which the methodology is intended for. For the time being, the prevailing opinion is that no organizations should be excluded from application. Nevertheless, definite conclusion will probably be arrived to not sooner than after discussions on case studies which should be used for different types of organizations. An important term is a so-called negative product. In the Czech Republic, for example, we use the term non-product output. Nevertheless, for the time being, after a longer discussion, the existing terms positive and negative product remained in the game. Much of discussion concerned the term „quantity centre“, as, for example, the term „processing unit“ is often used in other ISO standards. Also various cost items were discussed and it is evident that, for example, transport costs should not be included in this methodology. As regards other items, for example, the reuse of waste material was incorporated in material flow.

### **Future development of material flow cost accounting**

From the discussion on a new standard there has resulted, among others, a number of impulses for future use of material flow cost accounting. This particularly means the implementation of material flow cost accounting for small and medium-sized enterprises, because so far mostly large enterprises were concerned. Furthermore, material flow cost accounting should be expanded also to supply chains. Interesting as well is a consideration on integration with other methods of environmental protection, for example, with life cycle analysis (LCA). The consideration on integration with LCA is based on the fact that material

flow cost accounting does not include the process of assessment of environmental benefits due to waste and emission reductions. On the other hand, the LCA does not include the process of assessment of economic benefits. Therefore, from this viewpoint, the integration would be beneficial.

### **Conclusion**

The preparation of a new standard „Environmental Management – Material Flow Cost Accounting – General Principles and Framework“ proceeds in line with the set time schedule. Discussions held during the preparation are incentive to the standard preparation itself and also to material flow cost accounting improvements and further development in this area.

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# **MFCA AS MATERIAL FLOW MANAGEMENT TOOL (ON EXAMPLE OF A COMPANY MANUFACTURING FURNITURE)**

**Jaroslava Hyršlová, Marie Kubáňková**

The paper focuses on Material Flow Cost Accounting (MFCA); it characterizes MFCA as material flow management tools and points out the significance of MFCA information for the optimization of production processes. The aim is to present MFCA system outputs (on example of a company manufacturing furniture) and compare them with traditional calculation of production costs.

## **1. MFCA – material flow management tool**

In flow management, enterprise is understood as a system of material flows. On the one hand, this system contains material flows relating with added value generation (from purchase of input materials, through particular processing stages to distribution of products to the customers). On the other hand, inseparable part of material flows is formed by material losses that occurred in the course of corporate processes (for example, defective products of poor quality, scrap, waste, damaged products, products with expired term of consumption, etc.). This means that materials leave enterprise in the form of undesirable residues – undesirable from both economic and environmental viewpoints. As a matter of fact, these are waste flows of all states (solid waste, waste water and emissions to the air).

Within MFCA, emphasis is primarily laid on transparency of material flows and on the relating costs. Thus, there are created basic conditions for proposing measures that are connected with significant material and cost savings [1; 2; 3]. Measures aiming to reduce consumption of materials are associated also with cost savings in the area of handling the materials as well as in the area of waste management.

To achieve transparency in the area of material flows, it has to be built on the knowledge of the following categories [6; 9]:

- material,
- system,
- product delivery and waste disposal.

To assess the value of materials and of the relating costs, it has to be started from the knowledge of their quantities (volumes), in link with the particular flows and also in the area of inventories. The existing material record-keeping systems and production planning systems provide a number of information which can be started from, and systems can be modified in line with new requirements. Based on the quantitative information (on quantities and volumes) and based on material purchase costs input analyses can be performed to acquire the information on the value of the particular materials and on the relating costs.

System costs are defined as all costs arising in the course of corporate material flows handling (for example, personnel costs, depreciation). Movement of material is understood as cost driver. This means that system costs in enterprise are expended in order to ensure that movement of material is realized in a desirable way. Every material flow in enterprise can be considered a carrier of system costs, irrespective of whether raw materials, unfinished production, semiproducts, products or material losses are concerned. System costs should be allocated to cost carriers on the basis of causal relationship. It is necessary to allocate all costs being incurred by enterprise in connection with ensuring the course of material flows. System costs are always allocated to output flows (for example, to outputs from production centres) and are further passed to subsequent flows and inventories.

The flows leaving enterprise need to be further allocated to by costs relating with their delivery to the customers or with the disposal of such flows. These costs include payments effected to external third parties. They include all costs expended in connection with the „material“ to leave enterprise. This means that they include not only costs of products transportation, but also costs of produced waste disposal (for example, air pollution charges, waste disposal charges, waste water treatment charges, etc.).

MFCA represents accounting approach providing entirely new information – information on the value aspect of material flows. The system provides information not only on the value of material input in enterprise, but, it is also a source of information on costs of such material processing from particular production phases to final products delivery to the customers (these products are indicated as positive products). This allows to monitor gradual increase in the value of material which through unfinished production and semiproducts becomes a completed product intended for customers (a positive product). In the course of production process material losses (wastage) and devaluation occur, poor quality products and wastes (solid, liquid and gaseous) may be produced – these outputs are indicated as negative products. The system informs users not only about costs expended on production of products intended for customers, but also about the „value“ of poor quality products and wastes (i.e. negative products) and about the costs of their disposal (costs of their management).

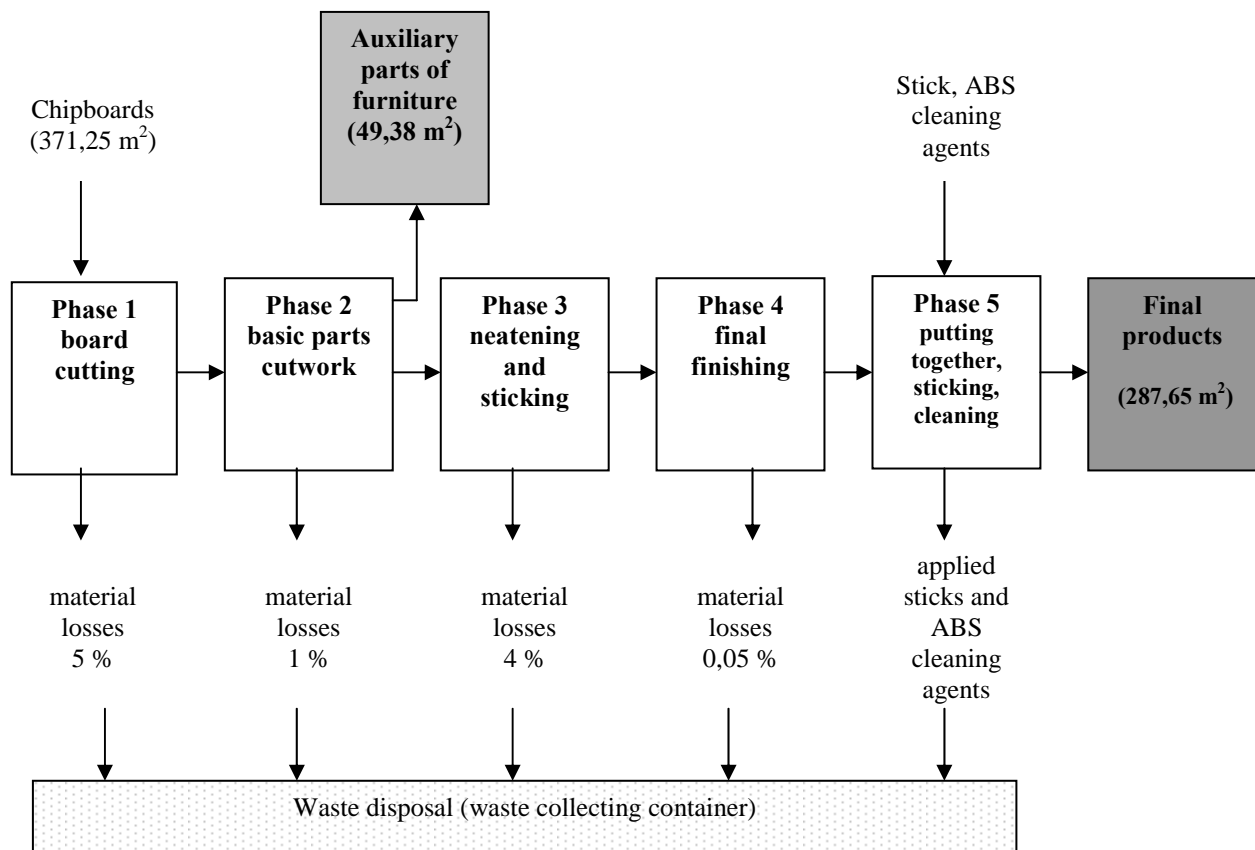
## **2. MFCA application in a company manufacturing furniture**

MFCA case study focuses on the manufacturing plant of a company which more than 10 years has been carrying business in the area of job-order manufacture of furniture. Its most significant customers include Kenvelo, Grand Optical, Paradox, Diva, Uncle Sam. Product portfolio of a company comprises furniture and furnishings for commercial purposes, office furniture and furniture for education, health care and hotels. The products are manufactured according to customers' requirements with detailed specification of materials, surface finishing, colours and special complements.

The basic material for manufacture are chipboards sized 2700 x 2750 mm. Most frequently used material is a light-brown profile, whose purchase cost amounts to 700 CZK per 1 board. This material was selected for material flow study within the MFCA.

For the MFCA analysis, first it is necessary to map out material flow through the particular manufacturing phases. In **phase 1**, the basic material has to be trimmed by saw. In this trimming process, solid waste in amount of approx. 5 % of input raw material is produced. This is followed by **phase 2**, with furniture parts being cut by the same saw according to cutting plan. In **phase 3**, furniture edges are neatened and if products are to be fitted with plastic or veneered edges, they are stuck on. Waste produced in this manufacturing phase is sawdust exhausted into collecting bags. Solid waste from first two manufacturing phases and sawdust produced in phase 3 are taken away once a week in a collecting container. For waste disposal, the company pays waste charge in amount of 800 CZK (for carrying away one full container). **Phase 4** involves the use of NC machine tool, where, based on customers' requirements, furniture parts are shaped and formed, complemented by supports or hinges. This is followed by **phase 5**, in which product parts are put together, stuck together and agglutinated. Using ABS agents, the product is cleaned to reach glossy surface. Completed product is packed and waits for delivery to the customers. The scheme of the entire manufacturing process is shown on Figure 1.

**Figure 1 Scheme of manufacturing process**



Source: Company data

Total material balance (per month) is shown in table 1.

**Table 1 Material flows (manufacturing process)**

Inputs			Outputs			
Physical units			Physical units			%
Chipboards 2700* 2750 mm	371,25	m <sup>2</sup>	Final products	287,65	m <sup>2</sup>	77,48%
			Auxiliary parts of furniture	49,38	m <sup>2</sup>	13,30%
			Material losses in manuf. phase 1	18,56	m <sup>2</sup>	9,22%
			Material losses in manuf. phase 2	3,53	m <sup>2</sup>	
			Material losses in manuf. phase 3	11,99	m <sup>2</sup>	
Material losses in manuf. phase 4	0,14	m <sup>2</sup>				
Stick	0,300	l	Final products	0,291	l	
			Material losses	0,009	l	
ABS cleaning agents	0,500	l	Final products	0,475	l	
			Material losses	0,025	l	

Source: Company data and preparation by authors

Within the framework of the manufacturing process, losses in amount of 9,22 % of input basic material are incurred. Other material losses (stick, ABS cleaning agents) are negligible.

The total system costs for the monitored period (1 month) amount to 201 333,33 CZK. Within MFCA, system costs are allocated to so-called positive and negative products on the basis of a ratio, in which the basic material proceeds to the mentioned products (i.e. according to material flow balance). Monthly costs of waste disposal amount to 4 000 CZK.

The values of positive and negative products (including costs of waste disposal) are shown in tables 2 and 3.

**Table 2 Material flow balance in monetary units (manufacturing process)**

Inputs			Outputs		
Monetary units			Monetary units		
Chipboards 2700* 2750 mm	35 000,00	CZK	<b>Positive products</b>	<b>214 605,45</b>	<b>CZK</b>
Stick	15,00	CZK	<b>Final products</b>	<b>183 173,12</b>	<b>CZK</b>
ABS cleaning agents	50,00	CZK	Material costs	27 180,05	CZK
			System costs	155 993,07	CZK
			<b>Auxiliary parts of furniture</b>	<b>31 432,33</b>	<b>CZK</b>
System costs	201 333,33	CZK	Material costs	4 655,00	CZK
			System costs	26 777,33	CZK
			<b>Negative products (excl. costs of waste disposal)</b>	<b>21 792,88</b>	<b>CZK</b>
			Material costs	3 229,95	CZK
			System costs	18 562,93	CZK
<b>In total</b>	<b>236 398,33</b>	<b>CZK</b>	<b>In total</b>	<b>236 398,33</b>	<b>CZK</b>

Source: Company data and preparation by authors

**Table 3 Material flows in monetary units (manufacturing process)**

Products	Material costs (CZK)	System costs (CZK)	Costs of waste disposal (CZK)	In total (CZK)
<b>Positive products</b>	<b>31 835,05</b>	<b>182 770,40</b>		<b>214 605,45</b>
Final products	27 180,05	155 993,07		183 173,12
Auxiliary parts of furniture	4 655,00	26 777,33		31 432,33
<b>Negative products</b>	<b>3 229,95</b>	<b>18 562,93</b>	<b>4 000,00</b>	<b>25 792,88</b>
<b>In total</b>	<b>35 065,00</b>	<b>201 333,33</b>	<b>4 000,00</b>	<b>240 398,33</b>

Source: Company data and preparation by authors

The table 3 shows that material costs represent 14,6 % of the total production costs. The value of the negative products amounts to 25 792,88 CZK per month (i.e. 10,7 % of the total production costs). Costs of their disposal represent only 15,5 % of the total value of the negative products. For enterprise, negative products are not costly due to the costs relating with their disposal, but primarily due to the fact that they contain materials which were purchased (materials costs) and further processed (system costs) to leave enterprise in the form of waste.

### 3. Comparison of MFCA information outputs with traditional calculation of production costs

Under current conditions, the management of a company concerned has available the information which is summarized in table 4.

**Table 4 Calculation of production costs of the particular products**

Products	Material costs (CZK)	Costs of waste disposal (CZK)	Other production costs (CZK)	In total (CZK)
Final products	30 115,26	3 413,94	194 497,91	228 027,11
Auxiliary parts of furniture	4 949,74	586,06	6 835,42	12 371,22
<b>In total</b>	<b>35 065,00</b>	<b>4 000,00</b>	<b>201 333,33</b>	<b>240 398,33</b>

Source: Company data

From the current cost accounting system it results that in connection with waste flows enterprise incurs monthly costs in amount of 4 000 CZK. Corporate management is not informed about the amount of other costs expended in connection with the negative products (see table 5).

**Table 5 Costs relating with waste flows (traditional approach versus MFCA)**

TRADITIONAL APPROACH		MFCA APPROACH	
Item	Costs (CZK)	Item	Costs (CZK)
Costs of waste management:		Costs of waste management:	
- costs of waste disposal	4 000	- costs of waste disposal	4 000
		<b>Subtotal</b>	<b>4 000</b>
		Other costs of negative products:	
		- purchase cost of materials leaving enterprise in waste flows	3 230
		- system costs	18 563
		<b>Subtotal</b>	<b>21 793</b>
<b>In total</b>	<b>4 000</b>	<b>In total</b>	<b>25 793</b>

Source: Calculation by authors

### Summary and conclusion

MFCA provides users with information support in addressing a number of decision-making tasks (for example, in the area of resource management, environmental aspects and impacts management, proposed changes in material inputs and technologies applied, etc.) [4; 5; 6; 7; 8]. MFCA informs managers and other stakeholders on the total amount of resources, whose expending failed to contribute to profit making. In a demonstrated example, this expenditure reaches the amount of 25 793 CZK monthly (i.e. 10,7 % of the total production costs). Although it is evident that in the course of the manufacturing process there will generally always be produced waste which is given by the technical and technological character of input material transformation to final products, the information gained from the MFCA may contribute to searching for ways to improvements. The information gained from the MFCA analysis may thus be of significant help in the management of corporate production processes. Within the MFCA, the data in physical units are interconnected with monetary data. Material flow through enterprise is identified, which allows to see what part of materials enters the product and what part of materials leaves enterprise in waste flows. MFCA focuses on reducing the costs through a reduction in quantities (volumes) of consumed materials. This has also positive environmental impacts. Better utilization of materials leads to a reduction of

waste flows burdening the environment. MFCA so represents a very significant tool of environmentally oriented management and a tool of improving the eco-efficiency.

## References

1. Fichter, K., Loew, T., Redmann, C. and Strobel, M. (1999). *Flusskostenmanagement, Kostensenkung und Öko-Effizienz durch eine Materialflussorientierung in der Kostenrechnung*. Wiesbaden: Hessisches Ministerium für Wirtschaft, Verkehr, und Landesentwicklung.
2. 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.
3. Jasch, Ch. (2009). *Environmental and Material Flow Cost Accounting. Principles and procedures*. United Kingdom: Springer, IÖW, EMAN.
4. Kokubu, K. and Nakajima, M. (2004). Sustainable Accounting Initiatives in Japan: Pilot Projects of Material Flow Cost Accounting. In: J. D. S. Hausmann, C. Liedtk and E. U. Wezsacker (Eds.), *Eco-Efficiency and Beyond*. Greenleaf Publishing, pp. 100-112.
5. Kokubu, K. and Nashioka, E. (2005). Environmental Management Accounting Practices in Japan. In: P. M. Rikhardsson, M. Bennett, J. J. Bouma, and S. Schaltegger (Eds.), *Implementing Environmental Management Accounting: Status and Challenges*. Springer, pp. 321-342.
6. Strobel, M. (2000). *Systemisches Flussmanagement. Flussorientierte Kommunikation als Perspektive für eine ökologische Unternehmensentwicklung*. Augsburg: Universität Augsburg.
7. Strobel, M. and Redmann, C. (2001). *Flow Cost Accounting*. Augsburg: Institute für Management und Umwelt.
8. Wagner, B. and Enzler, S. (2006). *Material Flow Management: Improving Cost Efficiency and Environmental Performance*. Heidelberg, New York: Phsica-Verlag.
9. Wagner, B. und Strobel, M. (1999) Kostenmanagement mit der Flusskostenrechnung. In: J. Freimann (Ed.), *Werkzeuge Erfolgreichen Managements*. Wiesbaden: Ein Kompendium für die Unternehmenspraxis, pp. 49-70.

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# THE MONITORING SYSTEM OF THE LEAD PRODUCTION PLANT IN BAIJA MARE CITY

Iozsef Juhasz, Vasile Hotea, Ana-Irina Smical, Elena Pop

## 1. INTRODUCTION

SC Romplumb SA plant has been working since 1844 being named „Firiza Plant” that in 1876 was processing the whole extracted ore in Baia Mare. In 1930, modern lead refining technologies were applied and in 1933 the first Water Jacket furnace was built. The metals recovery from raw material started to become more diversified so that the following components could be extracted: metallic lead, sulphuric acid, Pb-Sb alloy, converter copper, Cu SO<sub>4</sub>, metallic bismuth, so on.

By starting the Copsa Mica plant activity in 1966, the SC Romplumb SA policy was changed and the lead melting sector was closed. Also, the sulphuric acid factory was closed as well, so that the sulphur in concentrates was discharged into atmosphere.

Since the starting of the lead electrolysis activity in 1971 at Copsa Mica, it was established for Firiza Plant to be performed only the extracting copper of the attained raw lead.

Other investments achieved in time on the Ferneziu platform are:

- In 1975 a foundry for steel and castiron pieces was achieved.
- In 1982 the installation for MnO<sub>2</sub> started having a capacity of 2500 tonnes/year.
- In 1984 the installation for lead waste processing was put in function but which due to the high pollution was closed at the end of 1989.

SC Romplumb SA also has got a small oxygen factory having an oldness of over 30 years (Q=80Nm<sup>3</sup>/h).

The applied measures during these years for improving the work conditions as would be the technological processes adjustments and the ventilation system improvement followed a continuously diminishing of the noxes discharged into atmosphere.

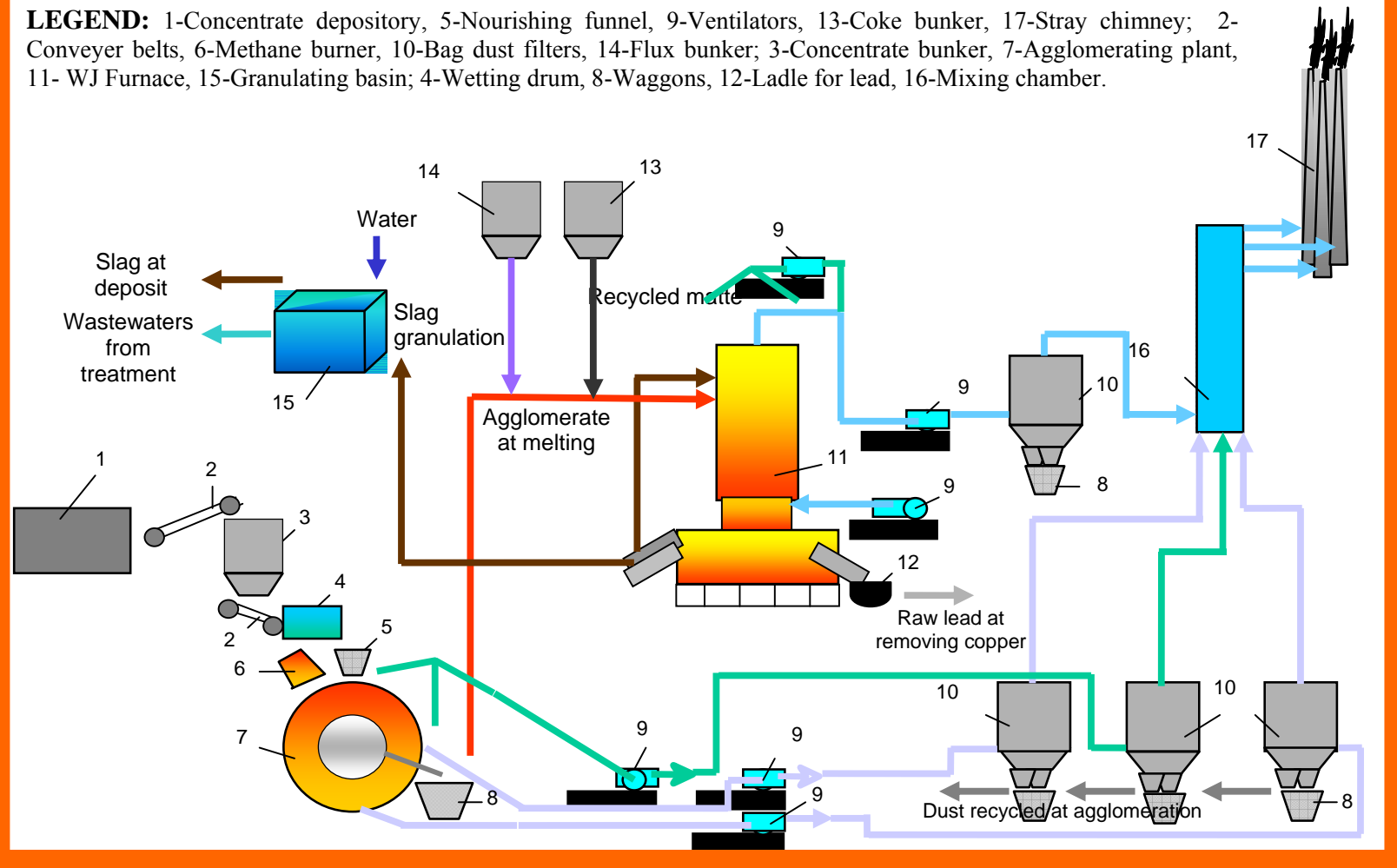
Despite of all these measures, SC Romplumb SA Baia Mare is not in accordance with the sanitary and environmental laws and regulations regarding the sulphure dioxide and lead.

For the purpose of pollution decreasing, in 2002 was started the building of a chimney with a height of 120 m, new bag dust filters were placed and the possibility of sulphur dioxide retaining at agglomeration phase I has started to be studied.

Equipments flow scheme at SC Romplumb SA Baia Mare is shown in Fig.1.

Figure 1 Equipments scheme at SC Romplumb SA Baia Mare

**LEGEND:** 1-Concentrate depository, 5-Nourishing funnel, 9-Ventilators, 13-Coke bunker, 17-Stray chimney; 2-Conveyer belts, 6-Methane burner, 10-Bag dust filters, 14-Flux bunker; 3-Concentrate bunker, 7-Agglomerating plant, 11- WJ Furnace, 15-Granulating basin; 4-Wetting drum, 8-Waggons, 12-Ladle for lead, 16-Mixing chamber.



## 1.1. General description of the discharging gas system

The stray chimney consists in 3 pipes  $\Phi=1400\text{mm}$  with total height of 120m, disposed in angle of  $120^\circ$ , as a club and set on a foundation of a steel concrete with bolts. The three chimneys are situated on a metallic structure made as a tower type structure with railings. At the under side of the each tower there is a socket for condensate evacuation acid and the horizontal section immediately following the section of a door visitation.

The inner of the chimney, of the link pipes and mixing chamber are protected against acid with a thickness lead plate of 2.5 cm and exterior are painted and thermal insulated with mineral cotton having a thickness of 90 mm and being protected with aluminium plate of 1 mm thickness.

The mixing chamber is a steel cylinder construction protected by a lead plate of 2.5 thickness,  $\Phi_i=4500\text{mm}$  and  $L=12000\text{mm}$ .

By achieving the new system (mixing chamber-homogenization, new chimney), the discharging gases route from the agglomeration and melting installation, were reconfigured and new connection were made:

- 2 pipes (Melting and Agglomeration Hygiene I+II) with  $\Phi=1422 \times 8.7\text{mm}$ .
- 2 pipes (Agglomeration and II-technological gases) with  $\Phi=1016 \times 7.92\text{mm}$ .

These routes neither are lead-covered inside nor thermal insulated outside. On these routes near the mixing chamber 4 lappet (2 pcs. with  $\Phi=1400\text{mm}$  and 2 pcs. with  $\Phi=1000\text{mm}$ ) made of stainless steel are assembled.

Lappets are designed to open and close different routes according to their technological needs.

## 2. Considerations regarding the emissions

### 2.1 Characteristics of resulted gases from the agglomeration process

- Technological gases
  - Flow : 80.000- 100.000  $\text{m}^3/\text{h}$ .
  - Temperature : 10- 70  $^\circ\text{C}$ .
  - Humidity : 3 – 5 % vol.
  - $\text{SO}_2$  Concentration : 0,4 - 1 %vol.
  - Dust in gas : 10  $\text{mg}/\text{m}^3$ .
- Hygiene gases
  - Flow : 100.000  $\text{m}^3/\text{h}$ .
  - Temperature : 5 - 35  $^\circ\text{C}$ .
  - Humidity : 1- 3 %.
  - $\text{SO}_2$  Concentration : 0,01 - 0,02 %.
  - Dust in gas : 10  $\text{mg}/\text{m}^3$ .

### 2.2 Characteristics of resulted gases from the melting process

- Flow : 100.000  $\text{m}^3/\text{h}$ .
- Temperature : 70  $^\circ\text{C}$ .
- Humidity : 1- 2 %.
- $\text{SO}_2$  Concentration: 0,05 %.
- Dust in gas : 10  $\text{mg}/\text{m}^3$ .

For atmosphere, the pollutants are noxes in gases, uncontrolled escape from the working halls, containing SO<sub>2</sub> and dust. Powder is considered pollutant because of the lead content.

The measurements performed showed a gas flow discharging of maximum 240.000 m<sup>3</sup>/h, with 3,5 kg/h dust, (from which lead: 0,4 kg/h ) and 851 kg/h SO<sub>2</sub>.

At S.C. ROMPLUMB SA, diffuse emission sources in the plant is important.

It is expected an improvement in the conditions of transport by using a pneumatic system for this powder transport in the future.

In table 1 are given, relatively speaking, the performed measurements values and limits provided by the actual legislation (concentrations are expressed in mg/m<sup>3</sup>).

Table 1 The real measurements

Component	Ord,462/93	ROMPLUMB
SO <sub>2</sub>	500	3700
Total dust: of which	50	14,6
Lead	5	1,7
Cadmium	0,2	0,01

In conclusion, the measured values indicate a reduction in actual terms of the amount of dust in the discharged gases from the chimney. In reference to SO<sub>2</sub>, values are high and their place under limits being possible by sulphur content reducing in the raw material and the discharged gases dilution with air or by SO<sub>2</sub> retaining at I phase of agglomeration (where de discharged amount is the highest).

In 2002, the measurements for emissions on the platform were resumed.

In order to determine the characteristic parameters of gas emissions, measures in discharging were performed in accordance with the Minister Decision no 462/93 – ANNEX "Methodological norms regarding the atmospherical pollutant emissions assay originated from stationary sources". The result are put in analyses bulletin. The analyses made for sections are presented in table 2.

Table 2 Measurements in discharges under Order 462/1993

Pollutant	Mass flow [kg/h]	Gas flow [mg/h]	Strength [mg/mc]	Alert Threshold	Intervention Threshold
Particles	21.744	88000	50.81	35	50
SO <sub>2</sub>	338.68	88000	3848.63	350	500
NO <sub>2</sub>	16.1	88000	182.95	350	500
CO	755.9	88000	8589.77	-	-
Pb	0.5672	88000	6.45	3.5	5
Cd	0.05982	88000	0.68	0.14	0.2

Measurements showed exceeds towards the alert and intervention threshold for dust, sulphure dioxide and metals. Nitrogen oxides are not necessary to be monitored.

### 3. Environmental balance

From supplied data by the customer, when the installations are working with maximum capacity, the gas amounts and compositions are given in table 3.

Table 3 Quantities and composition of gases released into the atmosphere

	ACCORDING TO THE LIST OF POLLUTANTS COMPONENTS (ANNEX 1 ORDER 1144/2002)		TOTAL FLOW	STRENGTH		DAYS ON YEAR OPERATING	QUANTITY ISSUED ON YEAR	
	Carbon dioxide	Sulfur dioxide		Carbon dioxide	Sulfur dioxide		Carbon dioxide	Sulfur dioxide
	kg/h	kg/h		Nm <sup>3</sup> /h	g/m <sup>3</sup>		g/m <sup>3</sup>	days
I agglomerations	205	585	86525	2,36	6,76	335	1645089	4703400
II agglomerations	205	585	86525	2,36	6,76	335	1645089	4703400
Melting	3765	75	44272	85,04	1,69	335	30269643	603000
<b>TOTAL ISSUED</b>	<b>4174</b>	<b>1245</b>	<b>217321</b>	<b>19,21</b>	<b>5,73</b>	-	<b>33559821</b>	<b>10009800</b>
ANNUAL VALUE OF THRESHOLD ORDER REQUIRED 1144 / 02 (FROM WHICH EMISSIONS ARE REPORTED)	-	-	-	-	-	-	100 000 000	150 000
CONCENTRATION LIMITS VOLUME IN ORDER 462/1993	-	-	-	-	0,5	-	-	-

#### **4. Environmental legislation regarding the air pollution**

As for the local environmental laws the following are in force and have to be respected:

- Minister Decision 462/1993 for approval of technical conditions on the atmosphere and protect the Methodological Norms on the emission of air pollutants produced by stationary sources [1].
- Emergency Ordinance 195/2005 regarding the environmental protection, with the further modification.
- Minister Decision M.A.P.M. nr.1144/2002, establishing the Registry polluters discharged from activities covered by Article 3) paragraph 1) g) h) of the Emergency Ordinance no. 34/2002 on the prevention, reduction and control of pollution and the reporting thereof.
- Emergency Ordinance 34/2002, on the prevention, reduction and control of pollution [3].
- Minister Decision no. 592/2002, the norm for determining the limit values, threshold values and criteria and methods for assessment of sulfur dioxide, nitrogen dioxide and nitrogen oxides, suspended particulate, lead, benzene, carbon monoxide and ozone in ambient air.

#### **5. Determination of measurement parameters**

To monitor emissions at chimney, according to the requirements of environmental laws in effect presented above, it is still necessary to measure the following parameters:

1. technological gas flow suppressed on route 1 -chimney, field: 0-120000 m<sup>3</sup> / h
2. technological gas flow suppressed on route 2 - chimney, field: 0-120000 m<sup>3</sup> / h
3. technological gas flow suppressed on route 3 - cart, domain: 0-120000 m<sup>3</sup> / h
4. temperature of the suppressed gas on route 1 - chimney, domain 0-60 ° C;
5. temperature of the suppressed gas on route 2 - cart, domain 0-60 ° C;
6. temperature of the suppressed gas on route 3 - cart, domain 0-60 ° C;
7. pressure of the technological gases in mixing chamber, field 0-200 Pa;
8. dust amount in technological gases suppressed on route 1-chimney, domain 0-60 mg/m
9. dust amount in technological gases suppressed on route 2-chimney, field 0-60 mg / m
10. dust amount in technological gases suppressed on route 3-chimney, field 0-60 mg / m

#### **6. Determination of measurement points**

In order to monitor the discharged gases from chimney the following measuring points have been established:

- Measuring the temperature and flow is performed on each horizontal segment between the mixing chamber and the vertical sections.
- Measuring the amount of dust is performed at height + 43.3 m.
- Measuring the SO<sub>2</sub> content and the pressure is performed in pipes mixing homogenization chamber.
- Measurement of CO content is performed on the pipe at melting the nozzle done in this room over-mixing homogenization chamber.

Monitoring system of the new stray chimney from SC Romplumb is shown in Figure 2.

## 7. Establishing monitoring equipment

The chosen monitoring equipment is the most recent generation and it is able to answer the requirements of environmental legislation and European companies.

As field equipment were used:

- Annubar tube type transducers with differential pressure transducers to measure flow;
- Thermally sensitive resistance elements Pt100 with the adapter head for measuring temperatures;
- Differential pressure transducer for measuring pressure;
- Horiba gas analyzer for CO and SO<sub>2</sub> with the following characteristics:
- Method of measurement: absorption non-dispersive in IR.
- Field of measure: 0 - 1000 mg / m<sup>3</sup>; 0 - 10,000 mg / m for SO<sub>2</sub>; 0 - 5000 mg/m<sup>3</sup> for CO;
- Temperature max. gas: <250 ° C;
- Pressure max. blend in the room: 60 hPa.
- Triboelectric transducer for determining the quantity of dust from gas.

The equipment uses a secondary concentrator data, the same production at the existing one on the platform, assembled on the "new building" near the chimney

On the same place there were also assembled the sources for loops nourishment, Gas Analyzer and the network communication ETERNETH.

Data concentrator ensures the technological parameters permanent monitoring and the continuous link with the server located in the environmental laboratory of the platform.

Through this server the technological parameter controlling is assured by the environmental responsables and the data are transmitted to the plant technologists and also to the Environmental Protection Agency of Maramures County. The system also allows the data transmission from EPA imission to Romplumb SA in order to take measures to reduce pollutant emissions.

On the platform a network of computers has been achieved that takes technological information from the existing process automaton further doing calculations, storage and visualization after the hierarchy that will be established by the plant managers.

The general scheme of monitoring equipment is shown in Figure 2.

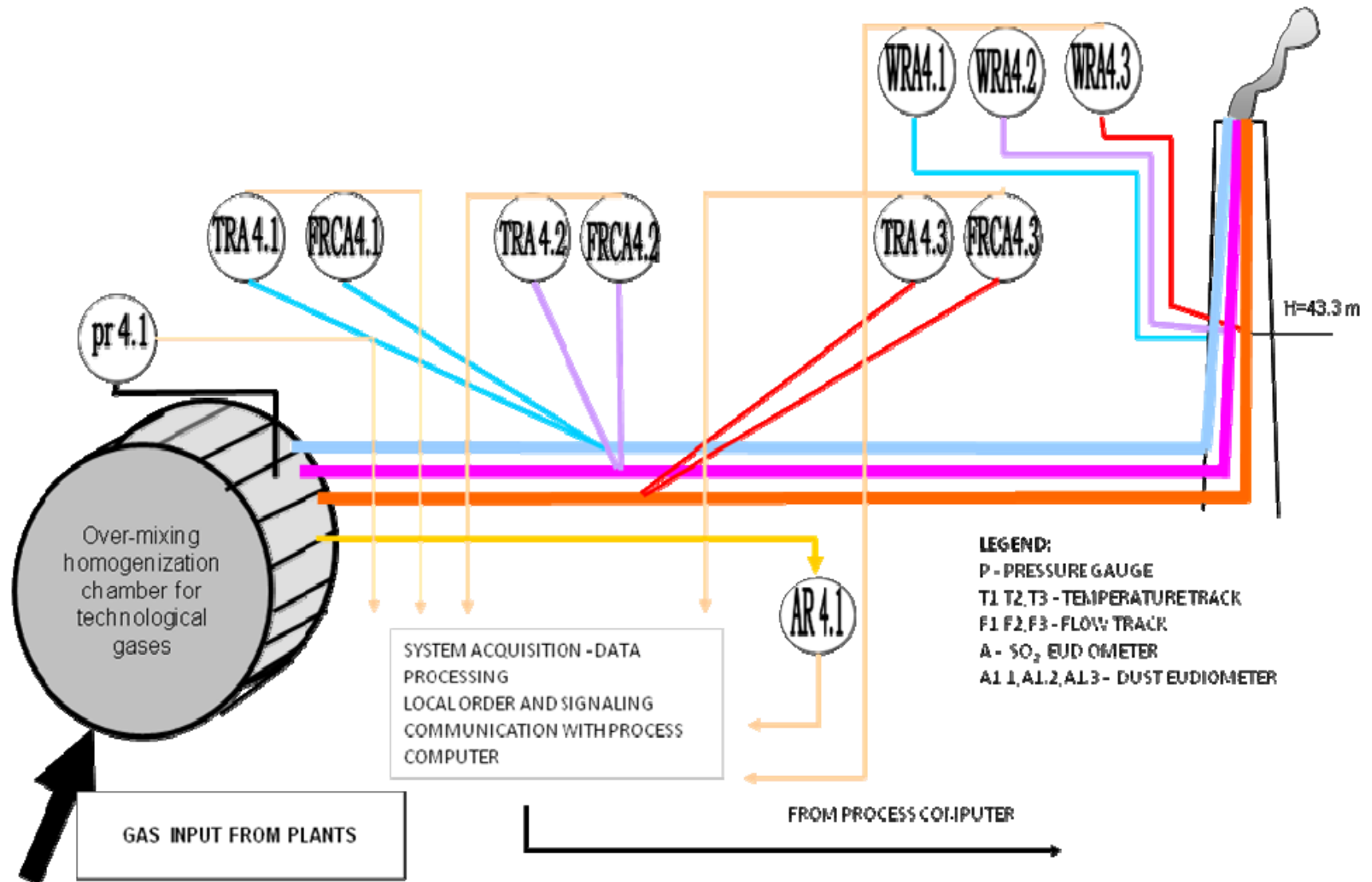


Figure 2 Monitoring system to the new chimney emission dispersion from SC Romplumb SA

## **References**

1. Order 462/1993 for approval of technical conditions on the atmosphere and protect the Methodological Norms on the emission of air pollutants produced by stationary sources.
2. Emergency Ordinante no 195/2005 regarding the environmental protection.
3. Emergency Ordinance 34/2002, to prevent, reduce and control pollution.

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# **ECONOMICAL CONSIDERATIONS CONCERNING THE LEAD CONTENT DIMINISHING IN METALS RESULTED FROM COPPER-LEAD CONCENTRATES PROCESSING**

**Vasile Hotea, Irina Smical, Elena Pop, Gh. Iepure, Juhasz Iozsef**

## **1. Introduction**

At lead-copper complex concentrations processing in furnaces with vat by pyrometallurgical procedure, the matte represents the melting in which the most of copper included in the raw material accumulates as copper sulphide ( $\text{Cu}_2\text{S}$ ). Besides the copper sulphide, in matte there are variable but significant valuable amounts of lead sulphide ( $\text{PbS}$ ) and iron sulphide ( $\text{FeS}$ ). There are also present zinc sulphides, arsenic sulphides and antimony sulphides but in small amounts.

The copper extraction from matte is made by its processing in converters, obtaining raw copper (about 98%). The other components pass into various by-products from which the useful elements get a practical application through recycling in agglomerant sintering or melting processes. Thus, lead and zinc pass in significant ratio into gases as oxidic powders. They are powders caught in the filtration systems. The powderless gases containing sulphur dioxide can be used for sulphuric acid making. The iron in matte is eliminated into slag as fayalite ( $2\text{FeO}\cdot\text{SiO}_2$ ).

## **2. Economical considerations**

The caught powders in the filtration systems, containing about 40% Pb and 7 – 8% Zn are processed (either as they result or after a prior pelletizing) by reciclation at the agglomerant sintering phase.

It is obviously that a high content in matte will generate a bigger volume of powders that must be processed in order to lead valuable, processing that requires expenses, affecting the finite lead cost. Moreover, when the filtration systems work faulty, powders are dispersing into the working place atmosphere and into the out plant perimeters damaging the environmental quality. A low content in matte conducts to a lead proportional higher extraction in the agglomerant sintering phase. Simultaneously, the matte volume subjected to conversion is smaller for the same copper amount, resulting a conversion costs diminishing, conducting as well to the copper extraction yield increasing.

These several considerations mentioned before highlight the economical advantages that result from the lead content reducing in matte, mainly:

- Small powder amounts with lead content at conversion;
- Lead higher extraction yields at reducing melting phase and for copper at conversion phase

## **3. The causes that generate the high lead content in matte**

A lead amount emergence in matte is due to a weakly sulphur removal of the lead-copper concentrates at agglomerant sintering. In this case, the agglomerate that is to be processed in vat will content a lot of lead sulphide. During agglomerate melting in the furnace with vat, taking into account the reducing atmosphere as well as the other conditions, the sulphur removal is in the best case at values of 15-20% so that approximately 80% of lead sulphide in the agglomerate passes into matte. We have to mention that the agglomerant sintering under pressure is more performant (regarding the sulphur removal) in proportion to agglomerant

sintering under aspiration, because through air injection, the oxidation air penetrates more uniform the charge layer upon the belt.

Another cause of the lead content increasing in matte is due to the presence of lead sulphate in the agglomerate that is subject to melting. In the agglomerant sintering process at temperatures of 500-650 °C, the lead sulphate is obtained in accordance with the reactions:



The sulphure trioxide is got by sulphure dioxide oxidation the catalyst role blonging to Fe<sub>2</sub>O<sub>3</sub> that appear after iron sulphide is oxidated.

At regime temperature (850 – 950°C) of the agglomerant sintering process, the most of the sulphates decompose but even the lead sulphate has got the dissociation stress ( $P_{\text{SO}_3}$ ) very low, the destructure being able to take place only at temperatures over 1250°C, much more value towards the agglomerant sintering thermal regime.

From the usual sulphates of non-ferrous metals, PbSO<sub>4</sub>, has the bigger stability. At temperature of 900°C, the dissociation temperature has a low value:

$$P_{\text{SO}_3 \text{ at } 900^\circ\text{C}} = 0,054\text{mmHg}$$

and the value of 1.0 atm is registered at 1390°C.

Likewise, the PbSO<sub>4</sub> formation free enthalpy variation has negative values in the conditions od the agglomerant sintering process:

$$\Delta^f G_{\text{PbSO}_4(1200\text{K})}^0 = -22,7 \text{ kcal / mol}$$

that demonstrates the stability of this sulphate at temperatures of 800 – 1000°C.

In proportion to the table 1, several sulphates are given, the experimental assayed temperatures at which the dissociation stress has got the values of 0.1 and 1.0, respectively.

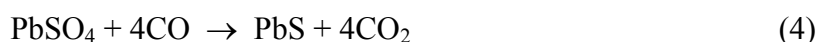
**Table 1 The experimental temperatures at which the dissociation stress of several sulphates has got values of 0.1 and 1.0, respectively**

Pb(SO <sub>3</sub> )	Temperature °C			
	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	CuSO <sub>4</sub>	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	ZnSO <sub>4</sub>
0.1 atm	630	625	620	760
1.0 atm	750	785	730	860

The partialy decreasing of the lead sulphate content in agglomerate is made through the interraction between sulphide-sulphate:



During the agglomerate melting in the furnace with vat, the lead sulphate passes into lead sulphide in accordance with the reactions:



The most of the resulted lead sulphide passes into matte.

#### 4. The ways of the lead content decreasing in matte

When the lead-copper concentrate agglomerate has got a high sulphide content in sulphate, it can act for decreasing the lead content in matte by adding waste iron (preferable as small smoothing iron) in the melting furnace charge. This addition is based on the fact that at temperature higher than 500<sup>0</sup>C, the iron easily reacts, taking the sulphure from these sulphides:



The resulted sulphide passes into matte. This process is not economical because it increases the iron amount in the balance of concentrates processing which triggers a bigger slag volume that rises the metals amount involved and the operating expenses per one tonne of concentrate.

Another procedure would concern the usage of the copper waste as addition in the furnace melting charge. The copper wastes act similarly with iron ones conducting to the diminishing of the lead content in matte:



This procedure has also got economical disadvantages. Every copper waste can be used for recovery at a much closer phase to the raw copper, at thermal refining or in the worst case at conversion, respectively. The passing of an amount even of a waste amount from the metallic phase as sulphide (after previously it had been extracted from concentrates) obviously appears as noneconomically. A procedure that we consider more adequately consists in necessary flux addition for slag the iron from concentrates at agglomerate sintering phase. At 910<sup>0</sup>C, the calcium carbonate energetically decomposes, the free enthalpy variation entering the negative range ( $\Delta G < 0$ ).

In presence of calcium oxide and the temperature regime at which the agglomerant sintering process is on-going, the lead sulphate passes into calcium sulphate and lead oxide:



Likewise, the lead sulphide in presence of calcium oxide passes into calcium sulphide and lead oxide:



In this way, the limestone addition at agglomerant sintering phase, makes possible the passing of lead sulphate and lead sulphide into sulphate and calcium sulphide respectively, finally diminishing the lead content in matte. The lead oxides resulted from reactions (8) and (9), together with silica forms lead silicates which at the melting phase are reduced at metallic lead.

Similarly, the lead sulphate decomposes in presence of silica:



In industrial trials more limestone species were used (granulometrical species), the best results being given by those with as much as fine granulometry.

For avoiding the expenses related to limestone grinding, the calcium carbonate has been used in the caustification process in soda industry. Besides the advanced fineness it has got humidity too that prevents the dust dispersion at handling.

The limestone in the mixture subjected to agglomerant sintering is directly made in the dosing silos, hence through belts and mixing drummer it homogenous disperses in all charge mixing mass.

In the charge subjected to agglomerant sintering limestone was added in ratio of 3.5-4% getting the mixing structure given in the table 2.

**Table 2 The mixture structure of the agglomeration charge**

Crt. No	Total Pb %	From which Pb as:			CaO
		PbO %	PbS %	PbSO <sub>4</sub> %	
1	24,5	5,8	11,7	6,2	3,6
2	23,5	4,2	12,5	6,2	3,5
3	23,1	4,8	10,7	7,4	3,6
4	25,5	5,1	11,5	7,6	3,4
5	25,5	5,6	13,0	5,8	3,2

The agglomerate resulted from the above charge mixture processing, had the structure illustrated by the table 3.

**Table 3 Agglomerate structure**

Crt. No	Total Pb %	From which Pb as:			PbO.SiO <sub>2</sub>
		PbO %	PbS %	PbSO <sub>4</sub> %	
1	24,5	11,0	3,5	3,8	6,0
2	23,5	10,6	3,4	3,4	6,0
3	23,1	7,5	4,7	2,0	8,5
4	25,5	12,0	4,3	3,2	6,2
5	25,5	10,0	3,8	3,1	7,0

From the analyses presented in tables 2 and 3 results that the lead sulphide decreases at about 1/3 of mixture, based on the sulphur removal and reaction of change between the calcium oxide and lead sulphide.

The lead sulphate reduces aproximalely at half of it as a result of its passing into calcium sulphate in presence of calcium oxide.

At the agglomerate melting in the furnace with vat mattes resulted matte with the structure presented in the table 4.

**Table 4 Lead-copper matte structure**

Crt. No	Total Pb %	From which Pb as:		Cu %	S %
		PbS %	Pb liber %		
1	10,8	4,8	5,1	20,1	22,2
2	11,8	6,2	4,3	19,3	21,2
3	11,4	6,2	4,5	20,7	22,2
4	12,5	8,0	4,2	18,3	22,9
5	9,2	6,1	2,6	28,4	23,2

Without the limestone addition, in the past, on the same agglomerant sintering and melting assemblies the lead content in matte had been between 18-22%.

## 5. Conclusions

The specific literature data have been practically verified regarding the advantages of adding limestone at agglomerant sintering phase.

Using limestone addition, it is expected a diminishing of lead in matte of about 40%.

The limestone which gives the best results is originated from the caustification process having the advantage of an advanced finesse (without grinding expenses) and of a corresponding humidity in order to prevent the dust dispersion at handling.

The limestone addition in ratio of 4% at agglomerating, expressed in CaO, conduct to get a autoflux, homogeneous agglomerate, having the advantage of melting furnace with vat productivity increasing

## References

1. Fl. Oprea, The metallurgical processes theory, E.D.P. 1966
2. Fl. Oprea, Dragoş Taloi, Ion Constantin s.a., The metallurgical processes theory, E.D.P. 1983
3. Petru Modovan s.a., Metallurgical Technologies, E.D.P. 1984
4. C.D. Nenişescu, General Chemistry, E.D.P. 1981
5. Rodica Valcu, Chemical Thermodynamics, Technical Publisher. 1994
6. D. Leaua, The diminishing of lead content in matte, The Chemistry Review, 10/1967, pag. 593 - 595

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# THE INTRODUCTION OF BIOGAS STATIONS IN FARMS FROM THE PERSPECTIVE OF SUSTAINABLE DEVELOPMENT

Jitka Šišková

## Introduction

In the last about 200 years, significantly changed the conditions of the relationship of man and nature in all countries with developed economies. In this relatively short period of time, the number of people on Earth more than doubled and over-concentrated in the huge local sites caused catastrophic accumulation of waste as industrial and agricultural as well as households.

Accumulation of these wastes causes in the last approximately 30–50 years, already a significant change in the environment that need to pay their elimination is inevitable. The first proponents of this solution are starting to raise its objections about the second third of the 20th century. There is a concept of environmentalism as an ideology of human relations and the environment. From the findings of opinion, defines the concept of "sustainable development" as the current generation of efforts to maintain the current living conditions and for the next generation.

## The use of biogas stations

One of the most effective use of waste as biogas station, which has for several years to successfully operate primarily in sewage treatment plants in cities (Jonáš, 1988). Their use is much broader nature, since they are very well able to handle not only the industrial waste, as well as any waste animal and vegetable farms. Therefore, their use on farms, especially with a significant proportion of livestock, appears to be very promising.

The farm is an absolute majority of processable waste biogas stations. For biogas plants and consequently of electricity in cogeneration units can be used as materials of animal, and plant production. In contrast, the combination of both appears to be advantageous, as waste from livestock production is more profitable for the production of methane, but mixed with plant material usually improves the course of fermentation (% dry weight, the ratio of N: C, etc.). It must, however, maintain a neutral pH optimum, since the amount of phytomass above 20% there is a significant hyperacidity and stop fermentation (Kára, 2006). This can be avoided by adding alkaline substances.

Digest the residual after the end of fermentation serves as a high quality fertilizer, which is almost the same N content as the starting products and it is mostly nitrogen bound in organic links (urea, methans' remains of dead bacteria), which are slower in the soil mineral and better use of plants. Ammoniacal nitrogen resulting from the decomposition of urea is either accepted or plants oxidised to nitrate by bacteria. Assimilation of urea is an active metabolic process that is not only a source of plants for nitrogen but also carbon (Zehnálek, 2006).

For use in the biogas and cogeneration units can use the following material (Straka, 2006):

- a) intentionally grown crops
  - Oilseeds
  - Cereals
  - Potatoes
  - Maize
  - Diabetes

- b) sewage plants
  - Remnants of the primary agricultural production unused or unsuitable for food processing
  - Harvested material of the maintenance of the countryside
  - Harvested material of the maintenance of grasslands
- c) residues from animal production
  - Waste from livestock farming
  - Waste from slaughterhouses
- d) residues from forest production

### **Consideration of the possibility of introducing biogas stations**

Sustainable development is defined as the synergy and balance the three basic pillars of society - economic, environmental and social. All activities of business entities should be directed to the intersection of all three optima disciplines. For this reason it is necessary to assess the planned projects on the use of cogeneration units in farms not only in economic terms, but also take into account the impact on the environment and quality of life of residents.

#### **Assessed aspects:**

- a) economic
  - High input costs-investment between 2007 and 2013 to benefit from EU subsidies and the Ministry of the Environment, under conditions which may be 50–85% of the entry investment costs - according to the Operational Program Environment, Priority axis sustainable use of energy resources - the construction of new facilities with order to use renewable energy sources (Oliva, 2007) and also investment in rural development program
  - Since the beginning of operation, only the cost of depreciation and operating costs
  - Cost to heat and energy for the operation of the farm
  - Cost for the purchase of fertilizer
  - Cost to ensure the quality of manure storage (from 2008, according to the nitrate directive 108/2008 Coll. already counts with the capacity to half a year - a significant additional investment in these facilities)
  - Income from sale of excess energy (above the costs of operating the stations make up about 55% of revenues from the sale of electricity to networks - Chmel, 2006)
  - Significant reduction depending on rising energy prices
- b) environmental
  - High-quality biomass return to the natural cycle
  - Improving the use of agricultural land (limit the uncontrolled weeds in the abandoned area and the possibility of better use of crop rotation)
  - Agricultural production of animal and plant almost waste-free
  - Environmental protection (reduction of vapor or leakage of poor quality fertilizers)
- c) social
  - Improve the conditions in places of storage of fermented manure (odorless)
  - Increase in jobs in agriculture (rural development program, in the period 2007–2013 to benefit from EU subsidies)

- Restrictions depending on the continuous supply of energy (see the current situation with the interruption of gas supply)
- Protection of the population in crisis management (technological disasters, terrorism)

### **Discussion**

For the design of these installations still apply mainly the economic aspect. Investment costs for the acquisition of a cogeneration unit according to the size range of approximately between 20 - 60 mil. Return on investments is also very different in its further use. If the station is fully used and surplus power would be further reported to dispose of some authors (Hrůza, 2007) return on investments from above 9 years. This often but not enough viable especially for small agricultural farms, where the station was used mainly as a source to cover their own energy. There would be a very prolonged period of return.

Nevertheless, should the construction companies or biogas cogeneration stations of interest, since it is currently published a large number of subsidies for the following directions and business projects. All activities within the use of renewable energy are supported by subsidies from the EU and in the programs of the Ministry of the Environment.

### **Conclusion**

The above arguments support the view of the introduction of biogas stations or cogeneration units on farms. This direction is supported by the state effort to increase the creation of energy from renewable sources by 2010 to about 8% of total consumption. Unfortunately, now is the implementation of these stations offered their high investment cost burden, especially for smaller farms.

Despite all the difficulties should encourage the introduction of biogas stations. The global trend of environmental activities focusing similar direction, as evidenced by the latest declaration of a new American president Obama, who declared in the United States instruct state agencies to moving towards energy independence and cleaner economy.

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# **CULTURE OF RELATIONSHIPS WITH EMPLOYEES AS IMPORTANT STAKEHOLDERS IN A CHEMICAL INDUSTRY COMPANY**

**Marie Bednařiková**

## **Introduction**

A company, in a comprehensive sense of the word, represents a certain type of a cultural system. Within this system, individuals that are part of this company constantly interact with one another. Each and every company has its own style and way of behaviour and acting in given situations, they prefer diverse value charts, and they have diverse ideas about working and accomplishing their business intentions. The above-described facts are a manifestation of so-called corporate culture, which, in its content, substantially influences the way of operation and the performance of the entire company.

Employees are an important group of stakeholders within a company. Although strong emphasis is currently placed on information and communications technologies, human resources are the primary source enabling the existence and running of a company. As a result, companies today pay a lot of attention to their employees and to mutual communication. At present, business entities start to focus on ethics of the business environment. There are certain rules and standards of business and management behaviour that observe ethical principles and encourage mutual trust and respect. The companies make an effort to set up appropriate working conditions (working environment, working hours and regime, working tools, etc.) to enhance the qualifications, skills and abilities of their employees. In order to recruit and keep high-quality employees, the companies offer them a variety of corporate benefits, bonuses and other extra payments.

## **1 Corporate culture**

Corporate culture helps to reconcile views of the employees and the company and helps the employees to identify with the company. These are unwritten “rules of play” that are shared and implemented by all employees of the company. Corporate culture is part of each and every company and it continually evolves. It is crucial for understanding of the company itself and of all the processes in it and activities connected with the company and its surrounding environment.

As a set of basic preconditions, values, attitudes and code of conduct shared within the company, corporate culture influences the communication and decision-making in the company, the day-to-day behaviour of employees and the general atmosphere present in the company. Apart from being a way of thinking and a mind-set with which the employees identify, corporate culture should also have an external function – it simultaneously determines the conduct of the company on the market and its flexibility towards outside environment. Both the above functions are of crucial importance for the company – they substantially determine its performance.

The degree and nature of the impact of corporate culture on the conduct of a company depends on the content of the culture, i.e. on the values, code of conduct, etc. that are shared in the company, as well as on the intensity of the culture, i.e. on the degree to which certain values, code of conduct, etc. are shared. Indeed, both these aspects of the culture influence the activity, efforts and quality of the employees’ working life, as well as the direction taken by the company. Where managers of a company know the content of corporate culture and

understand it, they can better understand and anticipate the behaviour of employees and the conduct of the company as a whole.

Corporate culture offers a range of positive aspects for running a company that can be used and developed [3]. It:

- Facilitates a clear insight into the company and makes it more transparent and comprehensible for the employees,
- Lays ground for direct and unambiguous communication,
- Enables quicker decision-making,
- Speeds up the implementation of changes, plans and schemes,
- Reduces requirements on formal control of employees,
- Enhances motivation and encourages team spirit,
- Ensures stability of the social system of the company,
- Mitigates any disputes within the company, encourages social cohesion,
- Secures continuity, facilitates coordination and control, ensures desired behaviour and discipline,
- Mitigates doubts, influences working discipline and emotional well-being,
- Constitutes a competitive advantage, if the corporate culture is strong.

Although corporate culture has many strengths, there are also negative aspects (although to a lesser extent). The weaknesses of corporate culture include:

- Tendency to isolation,
- Excessive adherence to traditions, lack of flexibility, blocking new initiatives,
- Collective effort to avoid criticism, conflicts, to press others to be flexible,
- Focus on the past, on established standards and persons.

## **2 Stakeholders**

A stakeholder is, in the widest sense of the word, every single person or organisational unit that has certain clout in a company or has certain relation to it [8]. A group of stakeholders, therefore, consists of any persons, institutions and organisations that influence the company's running itself, and vice versa, they can be influenced by the company's operations. The specific relationships among the people within a company, within working teams, within company units as well as relations to outside entities are very important and essential for company's success [6].

The concept of stakeholders' groups in business practice originated in the 1960s as a consequence of dynamic development of the entire society. Originally, it was considered that the only stakeholders' groups were represented by shareholders and partners. However, other groups were later also included in the list of stakeholders and companies began to understand that their accountability was not limited just to the owners. Therefore, it is evident that, in its business activities a company must also take into account other entities connected with the development of the company [7].

The following entities are considered to be stakeholders:

- shareholders – interested in growth and prosperity of a company,
- local organisations – monitoring the impacts of the company's activities on the local environment,
- employees – judging the working environment and conditions in a company,
- clients – focusing primarily on the quality of products and services,

- financial institutions – monitoring company’s economic results, based on which they provide loans, credits and any other financial products,
- distributors,
- competitors,
- marketing and PR agencies,
- media,
- the public.

Management, building relations and mutual communication, especially with the key stakeholders, are currently considered to be a significant competition tool. The interconnection among individual stakeholders based on trust and compliance with contractual obligations is beneficial for all the parties involved.

### **3 Employees**

Employees are an important group of stakeholders within a company. Today, it is obvious that the success of a company is not based only on the quality of their work, but also on the quality of work of the work team as a whole. For this reason, companies now pay a lot of attention to the quality of the working environment, care for employees, improvement of relationships among employees, and their satisfaction and identification with the company [4]. Relationship with employees is the key to a successful business, as it is the employees who can significantly contribute to this achievement. For a company, employees are deemed to be the second most important group, the first being the clients.

Skilled workers are a strategic factor of a successful business. Where knowledge is essential for the given working activity, human capital cannot be replaced. Employees having know-how are becoming less and less dependent on the company. The positions of employees and of the company are becoming equal. Employees need companies to apply their specialised know-how in practice, while companies need employees to achieve their objectives, to earn their living. We witness a clash between two worlds in the business practice – the world of objectives and of demands on human performance and the world of intellectual potential – human resources. For success and competitiveness of companies, these two worlds should work in synergy and harmony [2].

By participation in the work, employees in a company do not pursue only their personal material objectives. What is important for their work satisfaction is the social position they have in a hierarchy of interpersonal relations at the workplace and certain respect and prestige connected with the position [5]. In order to ensure that these relations have a positive affect, the manager should also encourage informal relations. It is also necessary to inspire friendly meetings outside the company. However, back at the workplace, it must be clear that the work mission is the priority.

Each and every employee is unique and (s)he should be treated as such. In fact, we can consider employees to be internal customers of the company. While individual approach to customers is often urged, the same should also apply to employees. Where this approach is based on long-standing ethical principles leading to harmonious balance between people and nature, it becomes essential for competitiveness of the company. Ethics in the business and management environment should, in particular, not be excluded from those company’s activities such as disclosure of information about the company, employment and working relations, environmental protection, combating corruption, consumers’ interests, competition, science and technology development or tax system.

The company environment, corporate culture as well as ethics are closely related to the methods of communication. It is an indispensable precondition for a competitive company

that its employees are well informed. This is so, because communication ensures functioning of the entire system and efficient running of the system, it makes workers more motivated, facilitates feedback to everyone and is a precondition for development and innovation. Communication should always be held on an equal footing, where possible. Only in this way barriers will be removed, managers will know the true opinions, people will be more relaxed, they will be capable of more self-disclosure, and they will identify themselves more with the group and the company. Moreover, they will satisfy their need for self-fulfillment, come up with creative ideas and prepare efficient projects.

A comprehensive care for employees is a very wide area and comprises a number of areas that cannot be enlisted in an exhaustive way. The basic activities within care for employees encompass, for instance, employees' training, their stimulation, employment benefits, social services, emphasis on team work, working environment and working hours and regime. The responsibility of managers for training and development of their employees has substantially increased; however, the attitude of the employees themselves to training has also changed. They often consider education to be an important stimulus and benefit. Other benefits include, for instance, occupational pension schemes, personal security in the form of a variety of insurance schemes, financial aid (loans, discounts on goods and services, assistance in moving, etc.), personal needs (e.g. annual leave, children care at summer camps or at spa, retirement counselling, financial consulting in the times of crises, fitness-centres, holiday resorts, etc.), company cars and fuel, leisure-time activity benefits (culture, sports, education, health care or holiday allowances), subsidised catering, clothing allowances, mobile phones and credit cards.

Group work and team work are becoming increasingly popular and important in today's work at modern companies [1]. Team work can enhance the competitiveness of the company; what is important is that the atmosphere in the team be relaxed, that the working mood be optimistic, that the communication be open and spontaneous, that potential criticism be constructive, that members of the team value their participation in the team. It can be said that a team is efficient when it is united. A Performance of a team is higher than performance of an individual. It is difficult to build a highly-performing team and it requires not only the work of the team manager, but also the creation of good external conditions for proper functioning of the team in the company.

The working environment, its structure and quality has an impact on the working mood, performance and health condition of the employees. The company should concentrate on the layout of the workplace (the location, walking areas, suitable desk height, etc.), physical conditions at work (air quality, temperature, humidity, colours of the workplace) and socio-psychological conditions (contact with employees, isolated work). It is important that the workplace be ergonomic, i.e. that the arrangement of the workplace suit the physical characteristics of the employee. What is also relevant are the colours of the workplace, as colours influence human emotions and conduct.

An essential aspect of working hours also lies in their regime, their flexibility. This can be achieved by flexible hours, or by the number of working hours (shorter or irregular working hours). The aim of this care for employees by adjusting their working hours and their regime is to facilitate a work-life balance for them, to adjust the working hours in a way so that they suit both the employees and the employer.

## **Conclusion**

The purpose of corporate culture lies in promotion of ethical aspects of work and fair treatment of employees. Although the primary goal of a number of companies is to gain profit, it is obvious that it cannot be pursued at all costs. For this reason particularly large

companies increasingly draw up their own ethical codes. These codes usually define relations to all stakeholders; they especially aim at good relationship with employees, they encourage friendly behaviour towards clients, correct approach to all business partners, subcontractors, government bodies, business environment and the environment.

A responsible company satisfies demands of not only clients, but also of other (legal as well as natural) persons with whom they cooperate during its activities. Thus, the company has a positive impact on the entire society and regulates its impact on the environment. For all companies, employees are an important group of stakeholders.

Employees should contribute to achieving the goal of a company as a whole, be loyal to the company. The company should create such conditions and working environment for its employees that motivate them to good performance and that give them the feeling of self-fulfillment and relevance. Employees should enjoy working for the company and should be happy in it. Companies should definitely take good care of their employees. This will not only enhance the sense of employees' loyalty towards the company, but thanks to the friendly attitude, the company will also be able to recruit the best experts. And this is crucial for the present as well as for the future of the company.

### References

1. Armstrong, M., Koubek, J.: Řízení lidských zdrojů: nejnovější trendy a postupy. Grada Publishing, Praha 2007. ISBN 978-80-247-1407-3
2. Beck, J., Hlavatý, K.: Management inovací v teorii, praxi a ve výuce. Vysoká škola manažerské informatiky a ekonomiky, Praha 2007. ISBN 978-80-86847-27-6
3. Bedrnová, E., Nový, I.: Psychologie a sociologie v řízení firmy. Prospektum, Praha 1994. ISBN 80-7175-010-7
4. Dytrt, Z.: Etika v podnikatelském prostředí. Grada Publishing, Praha 2006. ISBN 80-247-1589-9
5. Nová, A., Durynek, A.: Sociologie pro ekonomy a manažery. Grada Publishing, Praha 2006. ISBN 80-247-1705-0
6. Petříková, R.: Lidé v procesech řízení: multikulturní dimenze podnikání. Professional Publishing, Praha 2007. ISBN 978-80-869-4628-3
7. Putnová, A., Seknička, P., Uhlář, P.: Etické řízení ve firmě: nástroje a metody: etický a sociální audit. Grada Publishing, Praha 2007. ISBN 80-247-1621-6
8. Šimberová, I.: Řízení vztahů se stakeholdery na průmyslových trzích v kontextu současných marketingových koncepcí. Vutium, Brno 2008. ISBN 978-80-214-3585-8

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# EXPENSES FOR SECURITY AND SUSTAINABLE DEVELOPMENT

Dana Procházková

## 1. Introduction

The humans for their lives and their development need quality landscape and quality human seats. Therefore, the management and the planning, being its basic part, are the tools for realisation of given intent. They must take into account the cognition of both mentioned subsystems of the human system and of their mutual links. In conception both tools must go from the prognoses of human system development in time and in space. The inherent part of conceptions there are the financial expenses that are necessary for ensuring the security and sustainable development of system in which the humans live. The mentioned expenses must be properly distributed because good governance includes the segments as the prevention, the preparedness, the response and the renovation. It is now generally known that reactive management directed only to response is not the best tool for ensuring the specified targets, but that there is necessary to apply the proactive, systemic and strategic management based on obtained knowledge and experience. It means that it is not sufficient to create only conditions for rescue at emergencies but it is necessary by directed prevention to create the safe territory and the safe community (see present goals of the European Union in the 7<sup>th</sup> Frame Research Programme - FRP).

On the basis of present knowledge there is necessary to apply the strategic management in surround that we comprehend as a system [1]. The basic assets of human system are humans, environment, property, welfare, technologies, infrastructures and links and flows among them. Today we know that these links and flows are not simple and that there are also been in existence the links and flows across the individual subsystems that represent system structural components that one another intersect and generate so called interdependences (internal links) that have not been fully known yet, and therefore, they are the subject of present research in the European Union, the USA and in further advanced countries [2].

The basic assets of human system are given in Figure 1. Basic terms that are necessary at application of the system concept as security, danger, safety, recklessness, disaster, vulnerability, impact and further ones are defined in work [1]. At application of rational management there is necessary to comprehend that the human system is open dynamic system in which there are under way the processes, activities, phenomena and events the sources of which are outside and inside of system. Their results are also disasters. The occurrence of a disaster at a given site and time induces in dependence on size and physical nature of disaster and on amount and vulnerability of assets in the given site the losses, harms and hurts of assets, i.e. emergency situation.

**Fig. 1. Human system assets**



A consequence of disaster impacts on the human system it is a disruption of security and of sustainable development of human system, and therefore, the humans must carry out the effective response and renovation to restore the conditions for security and sustainable development. Each activity and real measure need sources, forces and means, i.e. expenses. With regard to targets the management strategy must demand in order that the measures performed for protection of one asset might not intensify the risks of other asset [1].

Because activities and measures supporting the security and the sustainable development are carried out in different management stages, i.e. they are preventive, preparatory, reactive and renovate ones [3], there is necessary to consider their optimum combination in order that the final expenses for security and sustainable development of humans were reasonable and acceptable.

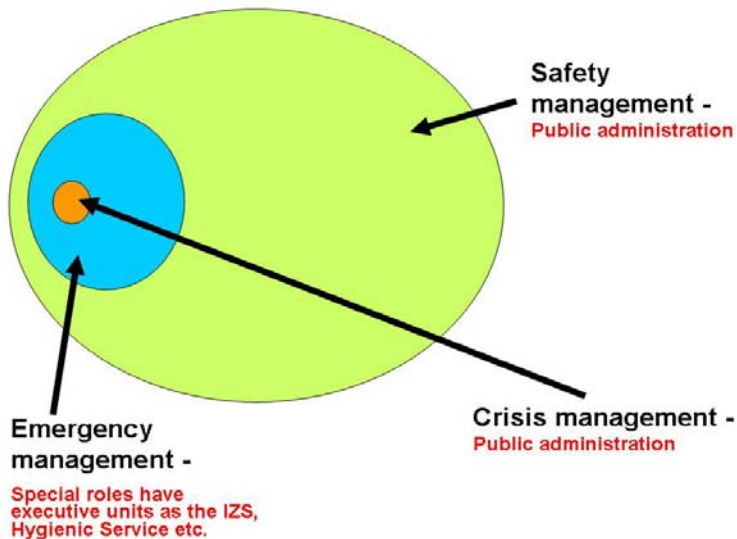
## **2. Good Governance of Public Affairs and Its Targets**

A good governance of public affairs has five principal features, namely the openness, the public participation in a decision making process, the responsibility, the effectiveness and the continuity of strategies and real activities, and from the viewpoint of present knowledge it must respect basic principles of sustainable development [4,5]. The good governance of public affairs is the project and process management of safety in which the basic role is played by negotiation with risks [5]. The good governance of public affairs has in reality three levels (Figure 2), namely:

- directed safety management which concentrates to ensuring the security and sustainable development of human system, i.e. to ensuring the security and sustainable development of assets of human system. Its main aim is to perform the human activities by the way in order that the human system changes may not result in unacceptable disruption of human system and in order that they may result in prevention of possible phenomena that disrupt security and sustainable development of human system,
- emergency management that is used in the cases in which serious problems occurred and it is necessary to carry out measures in order that the originated losses, damages and harms on basic assets might be acceptable at using standard sources, forces and means,

- crisis management that is used in the cases in which critical problems occurred and it is necessary to carry out measures in order that the originated losses, damages and harms on basic assets might be acceptable at using both, the standard and the beyond standard sources, forces and means (main attention is devoted to human lives and health and environment).

**Fig. 2. Levels of public affairs good governance**



Rights on good governance of public affairs are guaranteed by the European Charter [6]. The good governance of public affairs is impossible without knowledge of risks and their effective management. From the general viewpoint the risks are connected with:

- disasters,
- disaster impacts,
- vulnerabilities of territory and assets being in the given territory,
- domino effects that might happen in certain site,
- human factor,
- errors and failures at management and governance of territory, namely at measures and activities of response and renovation that being usually performed under the time pressure,
- random combinations of possible phenomena in a site.

Public affairs governance is based on qualified planning and it systematically interconnects all living sectors important for ensuring the security and sustainable development [1]. The same holds for a private sector that is dependent on profit, and therefore, it has specific risks as:

- risk of profit loss,
- risk of expiration of concord with requirements of public administration in a given territory.

Tools of public administration ensuring the security and development of system, by other worlds the preservation or protection and development of assets [1,4] are the following:

- management (strategic, tactic and reactive) based on qualified data, professional evaluations and correct methods for decision-making,
- education and training of citizens,
- science, research and system TSO organisations providing the professional support to public and private sector,
- specific education and training of technical and managerial workers,
- technical, medical, ecological, social, cyber and other standards, norms and rules, i.e. the tools for regulation of processes that might lead to origination of disasters or to intensification of their impacts,
- inspections,
- executive units for overcome of emergency situations,
- systems for overcome of critical situations,
- land-use, emergency and crisis planning,
- specific systems for overcome of critical situations (in the CR this type of management is denoted as a crisis management; in many countries there is talked about a response management or on a management of disasters with catastrophic impacts).

### **3. Security and Sustainable Development**

In present privilege concept there is considered that the security has also dimension to future, i.e. it is not sufficient only to ensure the present required human system state but also its required state in near future and as long as in far future, i.e. the security inherently includes such system development in which the security is also guaranteed in future, i.e. it goes on sustainable development (i.e. the development supporting the development of human and human society in require direction in time) [1,7-12]. It is necessary to take into account that in all considerations on security and sustainable development there is necessary also to consider the surroundings of human system because the human system is open.

The sustainability / sustainable development of human system is from the professional viewpoint the concept that is anchored in time and is related to the system as a whole. The human seat sustainability, mainly towns goes from so called the Aalborg Charter (1994) that formulated further given main goals:

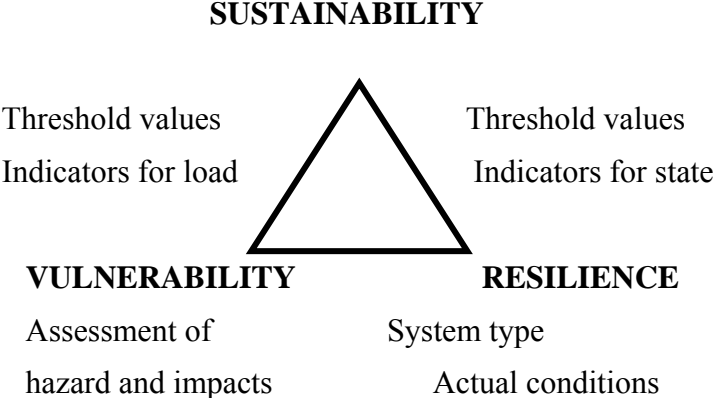
1. Determination and sharing the principles for town sustainability.
2. Support to local strategies for sustainability.
3. Sustainable use of land for development.
4. Prevention of ecosystem intoxication.
5. Search for tools for sustainability management.

With the Aalborg Charter it is indirectly connected the concept of so called sustainable community. In connection with these documents there is necessary to mention the new view on sustainability, given in work [12], that talks that for support of live in community there is necessary the sustainable area budget. This way for search of a balance reflects the fact that present economic grow does not include the mechanisms for long-term survival (especially, it has not a sufficient resilience).

From the system viewpoint the sustainable system must have such attributes as productivity, resilience, adaptability and vulnerability of system. It means that it is possible to suppose the coherences given in Figure 3. Because followed attributes are mutually interconnected so in

relation to system existence the sustainability is on the vertex. The decision-making on system adaptive capacity is so given by relation expressed in decision-making matrix in table 1.

**Fig. 3. The relation among the sustainability, vulnerability and resilience**



The goal of management of human seat sustainability through the risk management or through the higher management type, i.e. through the safety management there is to preclude in order that the system could not reach inconvenient, i.e. unacceptable states and arrangement [13]. The sustainability management must go out from the resilience management [14] that has two targets:

1. To preclude in order that the system might reach inconvenient states as a consequence of external defects and outer load.
2. To preserve elements activating the system re-organisation and renovation in consequence of massive changes.

From the viewpoint of risk management [1] there is necessary to concentrate to suppress the system vulnerability because *the sustainability is a permanent system adaptation to changing conditions* [13]. It means that the sustainable object must be the nature system (so called green infrastructure), the system created by humans (so called grey infrastructure) and their interconnections. The concentration to interconnections of grey and green infrastructures leans on technologies that the might be resolved actual and future problems. New technologies, however, bring into green infrastructure the uncertainties and indefiniteness, because technology impacts into environment are heavily predicted. Therefore, it is necessary to use and to process the methodology of foresight not only for technological level but also for societal level that is directed to trends of behaviour of grey infrastructure (e.g. theory of normality of accident, high reliable organisation, industrial ecology) and of green infrastructure (e.g. theory of adaptive environmental management, industrial ecology etc.).

**Table 1. Adaptive capacity of system**

Impacts	Adaptive Capacity	
	<i>Low</i>	<i>High</i>
<i>High</i>	<i>Vulnerability</i>	Opportunities for development
<i>Low</i>	Residual risks	<i>Sustainability</i>

From the above given facts it follows that the target would not be only enumerative determination of critical elements, critical phenomena etc., but the goal would be the monitoring the sustainable livelihoods because in it there are accumulated all influences of green and grey infrastructures. In publication [15] it is given that methods suitable for analysis of sustainable existence must specify parameters for different system sustainability, i.e. for sustainable:

- economic and technological system, i.e. for diversity of sectors, qualified labour force, innovation, robust infrastructures, expedient movement of goods and services, accessibility of technologies, ecological effectiveness,
- social system, i.e. for community solidarity, social capital, protection, safety and safe environ, relation to a site, preservation of culture heritage, mobility, equality of chances, green infrastructure and recreation possibilities,
- environmental system, i.e. for sound and quality soil, biodiversity, functional green infrastructure, bio-corridors and interlinked bio-localities, environmental flows, quality of water and air, the landscape character.

Ensuring the sustainability of all systems, however, needs the quality public administration, i.e. the transparency and responsibility in decision-making, competency, capability to anticipate the future situations.

#### **4. Analysis of Expenses for Security and Sustainable Development**

Because the security and sustainable development depend on way by which we negotiate with risks, i.e. firstly on the fact if we correctly find, understand and evaluate the risks in human system and if we optimally get over them. The negotiation with risks consists in correct estimation of size of possible disasters of all kinds that are risk sources in the human system. The disaster size normatively determined is denoted as a hazard. A risk is normatively determined a probable size of unacceptable impacts (losses, damages and harms) on assets at a given site caused by disaster with size equals to the hazard value . It depends partly on the hazard value in a given site and partly on a vulnerability of site against real disaster, namely territorial one (predisposition to liquefaction, caving, slipping), technical one (predisposition to domino effect origination), and that determined by a number of present humans and by their features [3].

The negotiation with risks [16] goes from present possibilities of human society and it consists in distribution of risk handling into following categories:

- part of risk that is reduced, i.e. risk realisation is averted by preventive measures,
- part of risk that is mitigated, i.e. unacceptable impacts are reduced or averted by functional preventive measures of response and preparedness (warning systems and other measures of emergency and crisis managements,
- part of risk that is insured,
- part of risk for which there are prepared reserves for response and renovation,
- part of risk being uncontrollable or too expensive or too frequent for which the contingency plan is prepared.

To this it is attached the separation of risk control among all stakeholders (all participants). The separation in the frame of good governance goes from the reality that all participants must participate in the risk control and that the real risk control is allocated to a subject that is prepared in the best [17].

For classical / standard risk management and for risk governance for support the security, i.e. the safety management [1] it is necessary:

1. To understand the process of disaster origination and the conditions under which the process goes on.
2. To know the sites in which the disaster can originate and its probable physical and other characteristics.
3. To identify the hazard that disaster means for a given site according to stipulated rules.
4. To determine the impacts of disaster with size equals to a hazard on assets.
5. To eliminate the unacceptable disaster impacts in cases in which it is possible with acceptable expenses.
6. For residual impacts to calculate by help of predictive models their occurrence probability respecting the fact that there are also considered possible failures of preventive measures.
7. To calculate possible harms of assets in real territory with regard to assets, that are really in the territory and by help of occurrence probability to determine the risk size.
8. To identify and to realize the mitigation measures with regard to humans, property and environment in the way that they may be ALARP (so low as reasonable achievable).
9. To prove that all measures for averting and mitigating the risks were performed.

The acceptable risk can be achieved by hazard reduction of disasters, which are only connected with human activities, and above all by reduction of vulnerability of territory, building, equipment or human society that are a subject of risk assessment.

## **5. Adequate Expenses for Security and Sustainable Development**

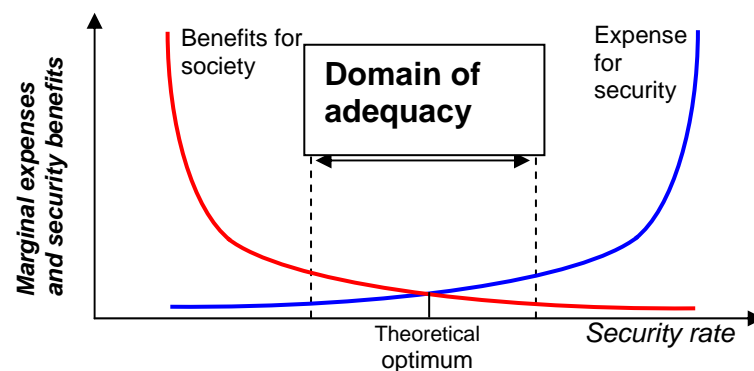
With regard to above mentioned facts the expenses for ensuring the security and sustainable development are the sum expenses exerted into negotiation with risks. I.e. they are expenses for measures and actions of prevention, preparedness, response and renovation, expenses for insurance and reserve expenses for unforeseen situations caused e.g. by low probable accumulation of unfavourable phenomena. From the effectiveness viewpoint the most effective there are expenses for prevention [3]. These are, however, challenged for knowledge, sources, forces and means, their outputs are not immediately visible and are evident after time, i.e. after disaster, and therefore, for their application the public administration and other stakeholders are usually accelerated for their use only after the huge disaster. For ensuring the assets protection and sustainable development there is necessary legally to promote the enforceability of basic preventive measures by legal rules.

At ensuring the acceptable level of human system security containing inherently the sufficient level of sustainable development we cannot ignore the reality that human sources are limited and that each activity and measure need sources, forces and means. Therefore, a possible level of security corresponds to the human system state in which marginal expenses for prevention are equal to marginal expenses for removing the damages (i.e. expenses for response and renovation). It is possible to note that such defined security level is the economic optimum for human system [1], Figure 4. The theoretical optimum is not of course generally valid, it is only valid for real territory or community because conditions and sources, forces and means of territories and communities are variable. The domain of adequacy is determined by the public administration that directly in its authority or through the legal rules requires from other stakeholders the realisation of certain activities and measures leading to the ensuring the security including the sustainable development. Naturally, the good governance may be only performed by qualified public administration and only on basis of sources that are to disposal.

At present there are known qualified procedures for identification of damages, possible losses and possible harms in a given territory at individual disasters (methodologies used by Swiss

Re, Munich Re and further ones described in work [3]) in dependence on assets being in a given territory and vulnerabilities of real given territory. There are also procedures for quantification of expenses on activities connected with negotiation with risks, and therefore, it is possible with regard to possible sources, forces and means of real community to predetermine the level of security including the sustainable development that is situated in vicinity of theoretical optimum. From this it is evident that reach regions or states have a predisposition to ensure the higher level of security including the sustainable development than poor regions and states among which also belong regions and states being economically reach but only concentrating to economic grow and marginalizing the other needs of humans and human society today and in future.

**Fig. 4. Security understand as economic optimum for human system**



## 6. Conclusion

Above given data show the real look at world, i.e. even if we have effort to ensure the security including the sustainable development we must correctly spend sources, forces and means because our possibilities are limited. The negotiation with each risk is connected with increase of expenses, with shortage of knowledge, technical means, qualified humans etc. Therefore, in practice there is searched for a boundary to which it is acceptable to reduce the risk in order that the expenses might be reasonable. Optimally it is necessary at negotiation with risks to select site specific approaches because availability of sources, forces and means is distributed in a territory an in a time. Risk reduction rate (certain optimisation) is mostly a subject of top management and political decision-making at which there are used present scientific and technical findings and considered economical, social and other conditions.

***Basic turn in human system management with regard to required goals cannot be reached by individual measures but only by complex approach regarding the site conditions.*** The complicated division of competences being in followed domain in the Czech Republic leads in practice to serious difficulties and in the whole it does not cover the complete domain. To ensure the security and sustainable development of human system there is necessary to use co-ordinated and purposeful approach. It enables step by step and in harmony with their importance and urgency to solve the set of tasks in all sectors and parts and to achieve the required state of human system in a real territory. The solution of problems consists in domain of investment, technology, organisation, governance and management, science, research, education etc. The effective output of problems cannot be ensured without the strategic and conceptual management for which detail, objective and systematic data must be prepared by a

specific research. The reactive approach at problem solving without linking to the strategic plans is not usually the correct solution at medium-term and long-term prospect.

## References

- [1] D. Procházková: *Strategie řízení bezpečnosti a udržitelného rozvoje území*. ISBN 978-80-7251-243-0, PA ČR, Praha 2007, 203p.
- [2] D. Procházková, K. Balog: *Management of Critical Infrastructure Safety*. In: Security and Safety Management and Public Administration. Police Academy of the Czech Republic, Praha 2008, ISBN 978-80-7251-289-8, 286-296
- [3] D. Procházková: *Metodika pro odhad nákladů na obnovu majetku v územích postižených živelní nebo jinou pohromou*. SPBI SPEKTRUM XI Ostrava 2007, ISBN 978-80-86634-98-2, 251p.
- [4] D. Procházková: *Bezpečnost lidského systému*. SPBI, Ostrava 2007, 139p. ISBN 978-80-86634-97-5
- [5] D. Procházková: *Principles of Good Governance of Public Affairs with regard to Security*. In: Security and Safety Management and Public Administration. Police Academy of the Czech Republic, Praha 2008, 266-275.
- [6] EU: *Charter of Fundamental Rights of the European Union*. Nice 2000.
- [7] W. E. Rees: *Economic, Ecolog, and the Role of Environmental Assessment in Achieving Sustainable Development*. In: P. Jacobs, B. sadler (eds): *Sustainable Development and Environmental Assessment: Perspectives on Planning for a Common Future*. CEARC, Ottawa 1989, pp 123-141.
- [8] D. Devuyst: *Sustainaability Assessment: the Application of a Methodological Framework*. In: Proceedings of the 19th Annual Meeting of the International Association for Impact Assessment. Glasgow, 15-20 June 1999, 37p.
- [9] P. Hardi, T. Zdan: *Assessing Sustainable Development. Principles in Practice*. Intenational Institute for Sustainable Development, Winnipeg 1997.
- [10] D. Procházková: *Bezpečnost a krizové řízení*. ISBN 80-86477-35-5. POLICE HISTORY, Praha 2006, 255p.
- [11] K. Buselich: *An Outline of current Thinking on Sustainability Assessment*. Institute for Sustainability and Technology Policy, Murdoch University, 2002, Western Australia, <http://www.wistp.murdoch.edu.au>
- [12] URL: *Sustainability*. <http://www.centerforsustainablecities.com>
- [13] D. Procházková: *Podmínky udržitelného rozvoje krajiny a lidských sídel, kritické prvky a příslušná kritéria*. Odborná zpráva č. 4 k projektu MZe 1R56002. CITYPLAN spol. s r.o. Praha 2007. 255p.
- [14] T. Walker: *Resilience Management in Social-Ecological System*. Conservation Ecology, 6(1), 2002, URL<<http://www.consecol.org>>
- [15] K. Neefjes: *Environments and Livelihoods - Strategies for Sustainability*. Development Guidelines, Oxfam Publication, Oxford 2000.
- [16] D. Procházková: *Safety, Security and Risk*. In: Security and Safety Management and Public Administration. Police Academy of the Czech Republic, Praha 2008, ISBN 978-80-7251-289-8, 276-285.

[17] D. Procházková: *Principles of Good Governance of Public Affairs with regard to Security*. In: Security and Safety Management and Public Administration. Police Academy of the Czech Republic, Praha 2008, ISBN 978-80-7251-289-8, 266-275.

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## REPORTING PURSUANT TO THE GRI

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The dictionary of loanwords defines the word reporting as provision of summary accounts ([information](#)) on the development and status quo of given [activities](#) or work. Environmental reporting means, therefore, provision of clear reports on environmental conduct of a company. This is one of voluntary tools which may be employed by a company to inform other parties (shareholders, authorities, subcontractors, clients, the public, etc.) about its environmental profile. The term environmental reporting means a process that starts by collection, recording and processing of environmental information, and is followed by analysis, evaluation, validation and presentation of the results of the company to the target groups.

Companies may present three types of environmental reports:

1. Environmental report – provides the stakeholders with information about corporate environmental responsibility of the organisation,
2. Report on health, safety and environment – complements the environmental report by sections on health and safety,
3. Report on sustainable development of an organisation – informs about environmental, social and economic aspects without emphasising any of them.

At present, we can also come across with a “Report on Corporate Social Responsibility”, which encourages companies to draw up reports on ethical behaviour, i.e. to behave in a way so that the company’s conduct is sustainable.

There is no provision that would exactly specify binding frequency, indicators or structure. This is a voluntary tool and only recommendations are available.

A helping hand was offered to the companies by the Global Reporting Initiative (GRI), which has produced a set of rules and guidelines for writing reports on sustainable development of an organisation. GRI follows the principles of sustainable development and its aim is to promote voluntary disclosure of environmental, economic and social aspects of companies.

Global Reporting Initiative (GRI) was founded in 1997. It is a global initiative independent of institutions. Its purpose is to create generally applicable recommendations for reporting on sustainable development of an organisation. In 2000 GRI published its first guidelines, Guidelines 2000. The year 2002 saw a release of further guidelines: Sustainable Reporting Guidelines 2002. Currently, updated guidelines of the third generation are in force – so-called G3, which were issued in 2006. The GRI Guidelines on reporting constitute probably the most comprehensive framework for reporting on sustainable development of a company – i.e. on economic development that observes environmentally-sound approach and takes into account social aspects of business (Hřebíček, Kokrment 2005). Although GRI focuses mainly on reporting on sustainable development, the environmental indicators recommended by GRI can also be used for assessment of the environmental profile of a company.

The environmental indicators should determine the degree to which the company has an impact on the environment (including the ecosystem, soil, air and water) with respect to sustainable development. They focus on use of inputs (material, energy, water) as well as on the character of outputs (e.g. products, emissions, industrial wastewater, waste). The indicators are also concerned with biodiversity, compliance with the legislation on protection

of the environment and other information relevant from the point of view of the environmental aspects.

Reporting pursuant to GRI includes information from three areas – economic, environmental and social areas.

- **Economic indicators** – focus on economic performance (strengths, weaknesses, threats, opportunities, changes in the structure, etc.), on the market share and indirect economic impacts. In general, they cover the cash flow among stakeholders and economic impacts on the company.
- **Environmental indicators** – focus on the organisation’s impacts on the environment, soil, air and water. They concern mainly inputs (e.g. material, energy, water) and outputs (e.g. waste, emissions). The most important aspects that need to be published are those regarding the material, energy, water, waste and transport.
- **Social indicators** – include identification of working procedures (internationally recognised standards, education, occupational safety and health protection, employment, equal working conditions, etc.), human rights (complaints, discrimination, etc.), community (corruption, public policy, etc.), responsibility of the company for its products (products’ labels, their quality, protection of consumers, etc.).

Indicators usually consist in numerical data determining the value of a precisely defined variable, e.g. quantity of waste per year. Where it is difficult to express a variable in numbers (satisfaction with the state of the environment in the neighbourhood of a production plant), it will be described in words. Nevertheless, in that case, these descriptions may be quantified by means of a certain scale (not satisfied at all, not satisfied, satisfied), and the verbal evaluation may be assigned with a score (e.g. 3, 2, 1).

Indicators of company reporting enable the companies to address issues connected with the environment and with the impact of a company on the environment and to provide all this information to the stakeholders by means of company reports. The indicators should primarily focus on those impacts that are the most relevant for the given company. They should also monitor those impacts that the company may influence by its operation, management, activities, products and services. The indicators should be sufficiently sensitive to show significant changes in the company’s impact on the environment. In other words, the indicators should help the management take further measures in relation to the environment and, at the same time, facilitate the provision of information to the owners and stakeholders.

Not only the GRI guidelines, but also an EMAS recommendation, can be used to select indicators for company’s reporting.

When establishing an environmental management system, organisations can also make use of Regulation (EC) No. 761/2001 of the European Parliament and the Council as of March 19, 2001 (EMAS). This is accompanied by other, so-called interpretation documents. The latter include, e.g., the Commission Recommendation on guidance for the implementation of Regulation (EC) No. 761/2001, concerning the selection and use of environmental performance indicators.

The Commission recommendation states, with regard to the indicators, that, by selecting and using the right indicators, the organisation may reach better understanding of and improve its environmental management as well as its environmental profile. The indicators should be selected with respect to cost-efficiency and they should conform to the size, type, needs and priorities of the organisation.

The indicators of the environmental profile of a company summarise extensive data on the environmental aspects and the company's impact on the environment into a limited set of key pieces of information. Another important role of indicators is to help the companies address issues related to the environment and to the impact of their activities on the environment. The indicators should primarily focus on impacts that are the most relevant and that the company can influence by its operation, management, activities, products and services. The indicators should be sufficiently sensitive to reflect significant changes in the company's impact on the environment. In fact, the purpose of the indicators should be two-fold: to help the management of the company, and at the same time, to help to provide information to the owners, or potentially to any other external stakeholders.

EMAS has defined the basic requirements for environmental indicators.

The environmental indicators must:

- Provide precise information about the impact of the company's activities on the environment;
- Be intelligible and unambiguous;
- Enable inter-annual comparisons in order for it to be possible to monitor the trends and improvement in time;
- If possible, enable comparisons between several sectors, national and regional comparisons;
- If possible, enable checking against legal requirements.

Let us refer back to GRI as an international initiative that directly sets out guidelines for preparation of reporting. Thanks to these guidelines, it should be possible to compare individual reports of companies based on a standardised report's content.

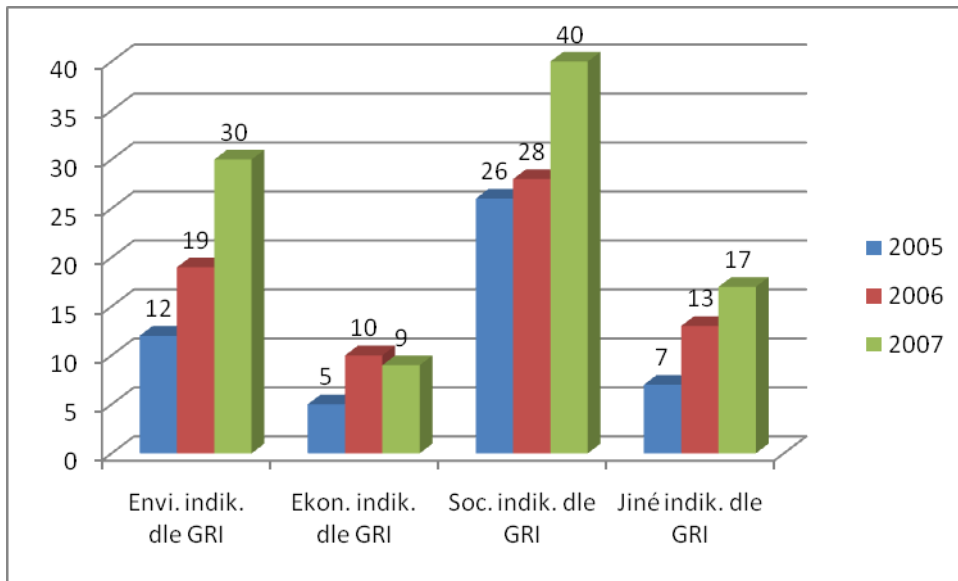
In 2008, there were 898 organisations worldwide which undertook "Sustainability Reporting" based on the GRI initiative and G3. From January 2009 to February 2009, these reports were already published by 15 organisations.

However, if we choose the only Czech company – Czech Coal Group – on the GRI list of registered companies (which is available at the website of this initiative) and compare it with other international companies, we come to intriguing findings.

The company reports should serve not only for the purpose of informing the individual stakeholders about the company itself, but should also facilitate mutual comparison among individual companies or comparison of company's results in individual years.

When the number of indicators is chosen as the comparative criterion for Czech Coal, we find out that the comparison of the trends in the individual years is not possible. From 2005 to 2007, the number of indicators in the individual areas changed. Inter-annual comparison is possible for a summary overview of environmental indicators of individual production companies of the group.

Fig. 1 Indicators of Czech Coal (GRI)

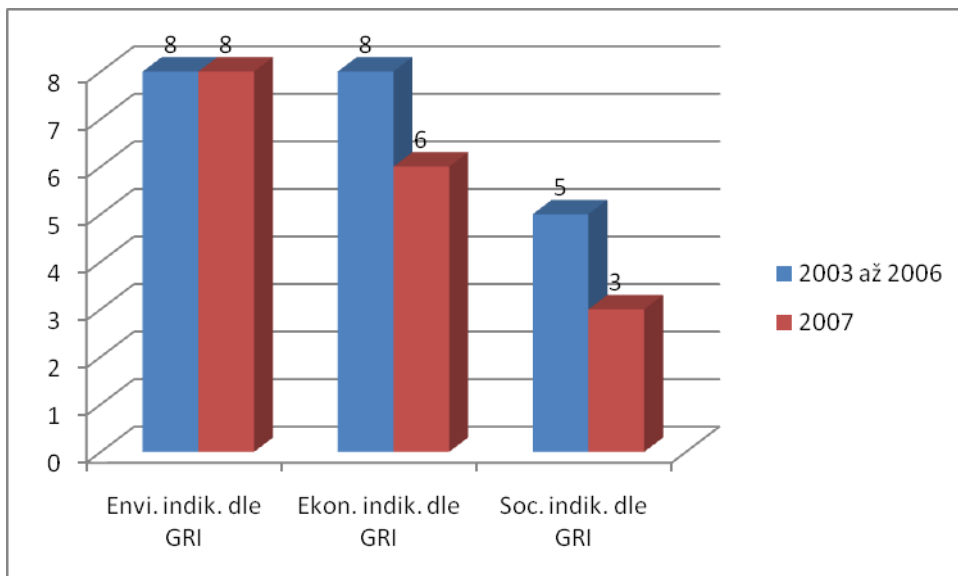


The chart also includes indicators from other than environmental, economic and social areas pursuant to GRI 2002, as the group also issues indicators in compliance with the GRI Mining and Metal Sector Supplement of 2002. From 2007, it has observed the G3 indicators guidelines of 2006, and the GRI Mining Guidelines issued in 2005.

It is obvious that the number of indicators is not balanced. The company focuses mainly on the social impact of its mining activity in the regions affected by mining.

For further comparison, only international companies were selected. First, let us have a look at the Allianz Group.

Fig. 2 Indicators of Allianz Group (GRI)



The company has divided indicators into three areas as required by the GRI initiative. However, apart from that, it also uses other indicators that are not presented by other companies. For this reason, it is not possible to achieve precise inter-annual comparison within the company (different indicators), or comparison with other companies (different indicators – some indicators were not included in all the years).

It was found that there was a discrepancy between the description and the title of the indicators in this company. This was due to the fact that the table displayed only indicators with specific annual data, but without describing the indicators pursuant to the GRI guidelines.

Henkel has taken advantage of the possibility given by GRI and does not present all the indicators. It has only used some of them and those that are presented comply with the G3 guideline. Of the basic indicators in the social area, it has excluded the indicator of non-discrimination, freedom and association for the purpose of collective bargaining. Neither has it used indicators concerning compliance with legislation and indicators of marketing communication and compliance with the basic regulations. Inter-annual comparison of the indicators is not possible as the key indicators are linked to a different GRI index.

## **Conclusion**

Several other companies have also been assessed in this way. With the exception of one company, all the companies have made their reports available on their web pages or in a printed version. The question as to whether the issued report has or has not been validated is another aspect attesting to the quality of the company's reports. Again, most of the companies have had their published reports validated externally. Most of the companies have self-declared the Application Level, except for Czech Coal, whose B+ Application Level has been validated by GRI.

It is impossible to assess the reports according to the number of languages in which they are published. Each and every company have issued the reports in a different number of languages. The companies are only consistent in the fact that they all have published their reports in English.

In assessing the indicators themselves, we conclude that it is possible to compare only certain key indicators, only among certain companies and only in certain years. Some companies have shown the indicators used also with specific description, which contains e.g. calculation or the units in which the indicators are quoted. Many companies have complemented the indicators by tables and charts.

The best-balanced presentation of indicators in the three areas (economic, environmental and social) is the one displayed by Johnson Controls. The Czech Coal Group has also used 17 indicators pursuant to GRI Mining. On the other hand, Philips has only used the basic indicators specified by the G3 guideline. It is clear from the research that some companies have presented more indicators than required by G3, some have presented only the basic indicators and some have not even presented all the key indicators.

It is not possible to assess whether any of the key indicators have decreased or increased. The trends in individual indicators within a single company have differed, as well as has the development of the same indicator in all companies. Therefore, it is not possible to mutually compare the indicators and to determine whether there has been a clear decrease or increase in specific indicators among the companies. In some companies, it is even impossible to perform inter-annual comparison of the key indicators. This is caused either by a different GRI index, different units or measurement in different years. The companies can only be compared by the number of indicators presented in the individual areas.

The above research raises the question whether it is beneficial to have a GRI initiative that is applicable for all companies (both small and large) and for companies from diverse sectors. Wouldn't it be helpful to prepare a set of indicators e.g. according to the sector, where a

company is active? The selected companies are active in diverse sectors and it is clear that each of them has published reports with a different focus and different extent. In addition, in the Czech Republic, the government administration does not give any benefits or allowances to companies that publish these reports.

## References

1. Hřebíček, J., Kokrment, L. (2005) Standardization of Environmental Reporting in the Czech Republic. In *Environmental Accounting and Sustainable Development Indicators..* Praha : Jan Evangelista Purkyně University in Ústí nad Labem, Charles University in Prague, 2005. pp. 309-317.
2. BARTELOVÁ, P. *Environmentální reporting v podniku*. Bakalářská práce 2007, Brno: MZLU v Brně, 53 p.
3. Doporučení Komise o návodu pro implementaci Nařízení č. 761/2001 týkajícího se výběru a použití indikátorů výkonnosti v péči o životní prostředí [online] Ministerstvo životního prostředí ČR, 22 s. [cit 2007-01-21] Dostupný z <[http://www.env.cz/AIS/web-pub.nsf/\\$pid/MZPPRF7UZ0TP](http://www.env.cz/AIS/web-pub.nsf/$pid/MZPPRF7UZ0TP)>
4. Global Reporting Initiative, (2006): Sustainability Reporting Guidelines. Retrived 21. January 2007 from <<http://www.globalreporting.org>>
5. Global Reporting Initiative, (2006): April 2008 from <<http://www.globalreporting.org/ReportingFramework/G3Online/DMA/>>
6. Ministerstvo životního prostředí: Dobrovolné podnikové zprávy o vztahu k životnímu prostředí, o zdraví a bezpečnosti, a o udržitelném rozvoji. Planeta [online]. 2006, č. 1 [cit. 2009-03-11]. Dostupný z WWW: <[http://www.env.cz/osv/edice.nsf/106A5F9EEBC5C7BEC1257125003FE719/\\$file/planeta1-06-press.pdf](http://www.env.cz/osv/edice.nsf/106A5F9EEBC5C7BEC1257125003FE719/$file/planeta1-06-press.pdf)>.
7. <http://www.philips.com/about/sustainability/sustainabilityreports/index.page>
8. [http://www2.johnsoncontrols.com/bluesky/gri\\_matrix/default\\_copy\(1\).asp](http://www2.johnsoncontrols.com/bluesky/gri_matrix/default_copy(1).asp)
9. [http://www.johnsoncontrols.com/publish/us/en/sustainability/sustainability\\_reporting/sustainability\\_report.html](http://www.johnsoncontrols.com/publish/us/en/sustainability/sustainability_reporting/sustainability_report.html)
10. [http://www.henkel.com/cps/rde/xchg/henkel\\_com/hs.xsl/publication-downloads-12152.htm](http://www.henkel.com/cps/rde/xchg/henkel_com/hs.xsl/publication-downloads-12152.htm)
11. [http://knowledge.allianz.com/en/sustainable\\_allianz/](http://knowledge.allianz.com/en/sustainable_allianz/)
12. <http://www.czechcoal.cz/en/ur/zprava/index.html>

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# VOLUNTARY REPORTING IN THE CZECH REPUBLIC AND INDICATORS OF SUSTAINABLE DEVELOPMENT

Jiří Hřebíček

## 1. Introduction

In 2007, the Masaryk University launched the project falling within the research competence of the Ministry of the Environment SP/4i2/26/07 „*Draft of new indicators to continually monitor the efficiency of sectoral environmental management systems (NACE) and a system of their environmental reporting with assessment of relations between the environment, economy and society*“, whose main objective is the research of how to continually and exactly monitor the environmental development by sectors (NACE) and identify the relations between the environment, economy and society, and transform them into the relevant indicators for corporate environmental reporting and EMAS annual reports.

This objective should be achieved through the fulfilment of partial goals in the course of the project SP/4i2/26/07 execution in the period between 2007 and 2010. These goals are presented on the project web site<sup>1</sup>. The project execution proceeds in the course of 39 months from September 2007 to November 2010 and based on the set goals it is divided into three phases:

- I. The analysis and draft of indicators in the selected branches – between months 1 and 18 of the project
- II. The preparation of the MoE Guidance Document – between months 18 and 30 of the project
- III. The creation of „open source“ software INDICATORS – between months 25 and 39 of the project

In this paper, the results of the project phase I execution which proceeded until the end of February 2009 are summarized.

## 2. The analysis and identification of indicators in the area of environmental management systems

Within the framework of the project phase I execution, retrieval of information on indicators in the area of environmental management systems (EMS) was performed. In this area it was necessary to clarify how the term indicator is generally perceived. The indicators are perceived as the statistics, measures or parameters which may serve for the monitoring of changes in environmental and socio-economic conditions. They are considered at mezzolevel (sectors and branches) and microlevel [5]. The indicators are developed through the synthesis and transformation of the data (environmental, economic, demographic, scientific and technical data) to form the required information [4]. They may provide a basis for the political decisions on the existing as well as potential issues (problems) of local, national, regional and global interests. They may also be used as parameters for assessments, controls and predictions. [4]

The indicators underwent a long lasting development which is described in [1]-[5], and the parties which participated in this development include **UN Summit on Environment and Development** in Rio de Janeiro 1992, **OECD - The Organization for Economic Cooperation and Development**, which commenced a special programme of environmental indicators in 1990, **ADB - Asian Development Bank**, which launched a regional technical

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<sup>1</sup> [http://projects.cba.muni.cz/indikatory/index.php?option=com\\_content&view=article&id=44&Itemid=56](http://projects.cba.muni.cz/indikatory/index.php?option=com_content&view=article&id=44&Itemid=56)

auxiliary project in 1993, **UN CSD - The UN Commission on Sustainable Development**, which in 1995 took the initiative to help countries develop indicator frameworks for sustainable development, and further the United Nations Organization, which under the **UNEP Programme** (The United Nations Environment Programme) in 2000 took the initiative to develop indicators of Human Environment Index (HEI) to monitor the progress in meeting the objectives of environmental protection.

**The Environmental Sustainability Index (ESI)**, developed by Yale University in 2001 in cooperation with the World Economic Forum and Columbia University, aimed to perform the comparison and ranking of countries according to sustainable development levels. So-called **International Development Goals (IDG)** were formulated and agreed by international communities at various UN conferences which took places in the recent decade. For the purpose of achieving sustainable development, the set goals describe the need to formulate national strategies for sustainable development in developing countries by 2005, and reverse the current trends leading to losses of unrenovable environmental resources at both global and national levels by 2015. These goals have been integrated into Millennium Development Goals (MDG).

In the European Union, an important role in the development of indicators is played by the **European Environmental Agency (EEA)**, which divides indicators into two basic categories [2], [4]: *basic set of indicators* and *other indicators*, which in principle comprise all indicators monitored in the EU that fall within the EEA competence. Furthermore, the EEA divides indicators into groups and monitors the particular anthropogenic activities and their impacts on the environment, namely *agriculture, air, biodiversity, climate change, energies, fishery, land and landscape, transport, wastes* and *water*.

Research and development of environment-related indicators has almost fifteen-year tradition in the Czech Republic. It was opened by publishing a „Report on the State of the Environment in the Czech Republic in 1993“, through the inclusion of „a system of indicators based on a so-called core set of environmental indicators which already earlier had been in use in the OECD. From 1993 on, variously modified sets of indicators have been used in a number of publications, yearbooks, state policies and strategies, scientific and research reports, conference proceedings, etc. The major workplaces in the Czech Republic which are involved in developing the indicator issues include the Ministry of the Environment, Charles University Environment Centre, CENIA (Czech Environmental Information Agency, formerly Czech Environment Institute), Czech Hydrometeorological Institute, T. G. Masaryk Water Research Institute, Ministry of Health Care, Ministry of Agriculture, Ministry for Regional Development, Institute for Ecopolicy and other institutions.

Since 1994, the issues and elaboration of sustainable development indicators have been dealt with by Charles University Environment Centre in Prague<sup>2</sup>. Research there focuses on assessments of environmental loads which occur in exploitation of resources – materials, energies and land. The theoretical basis is a concept of socio-economic metabolism, which considers the anthroposphere an environmental subsystem which is interconnected with its surroundings mainly through energy and material flows. Material flow analysis is applied and developed here, material flow accounts have been compiled which provide a database for deriving aggregate indicators of environmental sustainability. The features monitored here include, for example, material intensity, transfer of load caused by material flows abroad, dematerialization, etc. Final effort in this area is the application of findings in the sphere of decision-making, i.e. the use of indicators for assessing the status and trends of the environment and sustainable development. In addition to cooperation with a number of

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<sup>2</sup> <http://www.cozp.cuni.cz/COZP-13.html>

national organization, the Environment Centre is a member of the OECD and Eurostat Working Groups for MFA and a member of expert platform Ecological Footprint Network.

For the purpose of assessing compliance with the objectives of the State Environmental Policy of the Czech Republic 2004-2010, an extensive set of indicators was prepared and divided into two basic groups: a) *social and economic indicators*; b) *environmental indicators*. A listing of selected indicators incorporated in the State Environmental Policy of the Czech Republic 2004 - 2010<sup>3</sup> starts, in a modified form, from the original concept of the core set of indicators developed in the beginning of the 1990s in OECD, where indicators became a tool for assessing the effectiveness of environmental policy of member states of OECD. OECD indicators are based on conceptual model of „effect–status–response“ interaction between human society and the environment (this framework was later extended by the European Environmental Agency for the monitoring of „driving power–pressure–status–impact–response“) [4], [5].

The current Strategy of Sustainable Development of the Czech Republic (the "Strategy") was adopted by the Government Resolution No. 1242 of 8.12.2004. The strategy defines the major (strategic) objectives, partial goals and tools. They are formulated to maximally reduce imbalance in mutual relations between the economic, environmental and social cornerstones of sustainability.

CENIA<sup>4</sup> website presents a set of indicators assessing the compliance with the Strategy objectives, it forms part of Progress Reports on the Strategy that are prepared by the Council for Strategy and by Indicators Working Group of the Government Council for Sustainable Development. At present, CENIA website focuses on detailed presentation of sets of *indicators of the State Environmental Policy of the Czech Republic 2004–2010*, key environmental indicators of the Czech Republic (in hand) and *indicators of Strategy of Sustainable Development of the Czech Republic*. At present, *indicator structure* is based on three cornerstones of the Strategy (economic, environmental and social), which are complemented by three other areas included in the Strategy (research and development, education, European and international context and finally public administration). It is a set of selected indicators covering the most important themes and objectives of the Strategy of Sustainable Development of the Czech Republic. In 2008, the third Progress Report on the Strategy<sup>5</sup> was prepared, having validated the above facts.

### 3. Voluntary reporting

The term *Voluntary corporate report on assessing the links between the environment, economy and society* means such a report („voluntary report“ or „report“) of an organization<sup>6</sup>, which is elaborated and integrated at international level (stemming, for example, from the Global Reporting Initiative (GRI)<sup>7</sup> and programme EMAS<sup>8</sup>) and which is voluntarily (i.e., for example, beyond the framework of legislative regulations) prepared by organizations on their economic, environmental and social performance profile within the framework of their corporate social responsibility (CSR). The basis for it are discussions held by a so-called European Multistakeholders Forum which as the EU advisory forum in 2004 arrived to

<sup>3</sup> <http://issar.cenia.cz/issar/page.php?id=99>

<sup>4</sup> <http://issar.cenia.cz/issar/page.php?id=359>

<sup>5</sup> [http://www.env.cz/osv/edice.nsf/AC7B747D2291ED5BC1257577004FD5A6/\\$file/OVV-situacni\\_zprava-2009.pdf](http://www.env.cz/osv/edice.nsf/AC7B747D2291ED5BC1257577004FD5A6/$file/OVV-situacni_zprava-2009.pdf)

<sup>6</sup> Company, corporation, firm, enterprise, authority or institution, or their part or combination, irrespectively of whether registered or not, public or private, which have their own functions and administration.

<sup>7</sup> <http://www.globalreporting.org/Home>,

<sup>8</sup> [http://ec.europa.eu/environment/emas/index\\_en.htm](http://ec.europa.eu/environment/emas/index_en.htm), <http://www.iema.net/emas/emas>, [http://www.cenia.cz/\\_C12571B20041E945.nsf/\\$pid/MZPMSFGSEV4B](http://www.cenia.cz/_C12571B20041E945.nsf/$pid/MZPMSFGSEV4B) .

essential conclusions on the principles of social responsibility of carrying business. Its essential element is the declared principle of voluntary integration of social and environmental commitments of an organization into their business activities which are realized beyond the framework of the valid legislation and commercial contracts. Corporate social responsibility is defined as a concept, under which organizations in cooperation with their stakeholders voluntarily integrate social and environmental aspects into their business activities. In practice, CSR means that a responsible organization voluntarily carries business in line with high ethical principles; fosters good relations with its business partners; cares for its employees; supports the region in which it acts; and strives to minimize the negative environmental impacts. CSR represents a complex approach to the organization management, which implies all the essential areas of sustainable development: i.e. economic and social development within the Earth limits or environmental limits.

The reporting by organizations can be generally defined as a complex system of reporting in an organization which provides the internal and external stakeholders<sup>9</sup>, groups and individuals, with the information on all activities of the organizations which may concern or affect them. The term *reporting* also means the visualization of the information. We can say that the process concerned is transformation of the data in the process of getting to know. This process may, based on the concrete situation, represent a simple task, nevertheless, also a more complicated or complex solution may be concerned.

The term *reporting* in sense of corporate accounts and reporting<sup>10</sup> appears in the Czech Republic not sooner than after 1990, where the relevant statistical accounts and reports on organizations' operations and further mandatory accounts and reports ensuing from the environmental legislation, accounting legislation, statistical legislation, social care legislation, etc. are concerned. Programmes of statistical reports contain lists of statistical reports and characteristics of particular reports defined by Act No. 89/1995 Coll., on National Statistical Service, as amended. They will be mentioned in Chapter 2.

*Reporting* in modern concept is discovered by organizations in the Czech Republic with a certain delay in connection with the transformation of national economy to market economy and with the arrival of foreign business capital. This modern concept also includes *voluntary reports* (for example, Voluntary Corporate Reports on Assessing the Links between Environment, Economy and Society). As regards the contents concept of *report*, there also occurred a certain shift from the formerly narrowly perceived definition in sense of internal corporate accounts of economy and of environmental compartments intended mainly for owners and managers, to a very broad concept of all kinds of information on various operations of the organization concerning sustainable development (its environmental, economic and social aspects), social responsibility and ethics of business. Such information is provided to both internal and external stakeholders and the general public. The process of searching for appropriate approach to making the *reports* available to the public has not been finished yet in a number of organizations in the Czech Republic and the present publication should contribute to that.

From the practical viewpoint, *voluntary reports* may, based on the level of their elaboration and integration of steps in their realization, be divided to those using *standardized tools* and those using *recommended approaches* [7].

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<sup>9</sup> An individual or a group which is concerned with or affected by organization's performance or operations.

<sup>10</sup> Authorized to impose reporting duty by law are generally only state administration authorities. National Statistical Service – comprising the Czech Statistical Office and workplaces of the National Statistical Service of the ministries and/or other central state administration authorities (see Competence Act) – impose the reporting duty pursuant to §10, §11 and §15 of the Act No. 89/1995 Coll., on national statistical service, as amended.

As regards *voluntary reports* using standardized tools, implementation techniques at international level have been more or less in detail defined, or even standardized (this concerns, for example, the GRI initiative, EFQM excellence model<sup>11</sup>, OECD<sup>12</sup>, UN<sup>13</sup>, Responsible Care<sup>14</sup>, etc.). It is basically the application of certain methods or systematic procedures or guidance which are being transformed to the conditions in the Czech Republic.

As regards *recommended approaches*, the realization of voluntary reports has not been fully uniformly defined, therefore, voluntary reports often adapt to the requirements of *target groups*, which they are intended for. Characteristic of this approach is to take into consideration different needs and different merits of the target groups, and then to release reports which really comply with these needs and merits. To achieve these objectives, it is necessary to perform at the beginning the analysis of the target groups and of information which they need. This analysis determines the key target groups, which the voluntary reports should be addressed to or which want these reports to be addressed to them. These target groups include:

- *Employees* – It could be said that employees are interested in all what regards their organization, see Fig. 1.
- *Customers* – Of concern for every customer is primarily all what regards the organization's activities, products and services and sometimes also its behaviour towards the environment and observance of social responsibility. This implies that important factors for the customers include mainly the information on environmental, social and economic impacts and the relating policy and integrated management system of the organization.
- *Suppliers* – Similarly to customers, suppliers are interested in market behaviour of the organization. Not less important information for suppliers are financial aspects of the organization.
- *Authorities* - Local, regional and national public administration authorities which are delegated to perform certain control functions in relation to the organization activities, will be interested in almost all about the organization from the viewpoint of compliance with the legal regulations and possibly also with integrated management systems, and from the viewpoint of environmental, economic and social behaviour of the organizations. The authorities are mostly concerned with mutually beneficial relation between the organization and the given region.
- *Neighbours* – Neighbours of the organization are primarily concerned with its behaviour and impacts of its operations and services on the surroundings (such as the environment).
- *Investors, shareholders, banks and insurance companies* – Financial sector, i.e. investors, shareholders, banks and insurance companies are mostly concerned with financial aspects of the organization. They are only superficially interested in other information, nevertheless, also such information should be included in the report.

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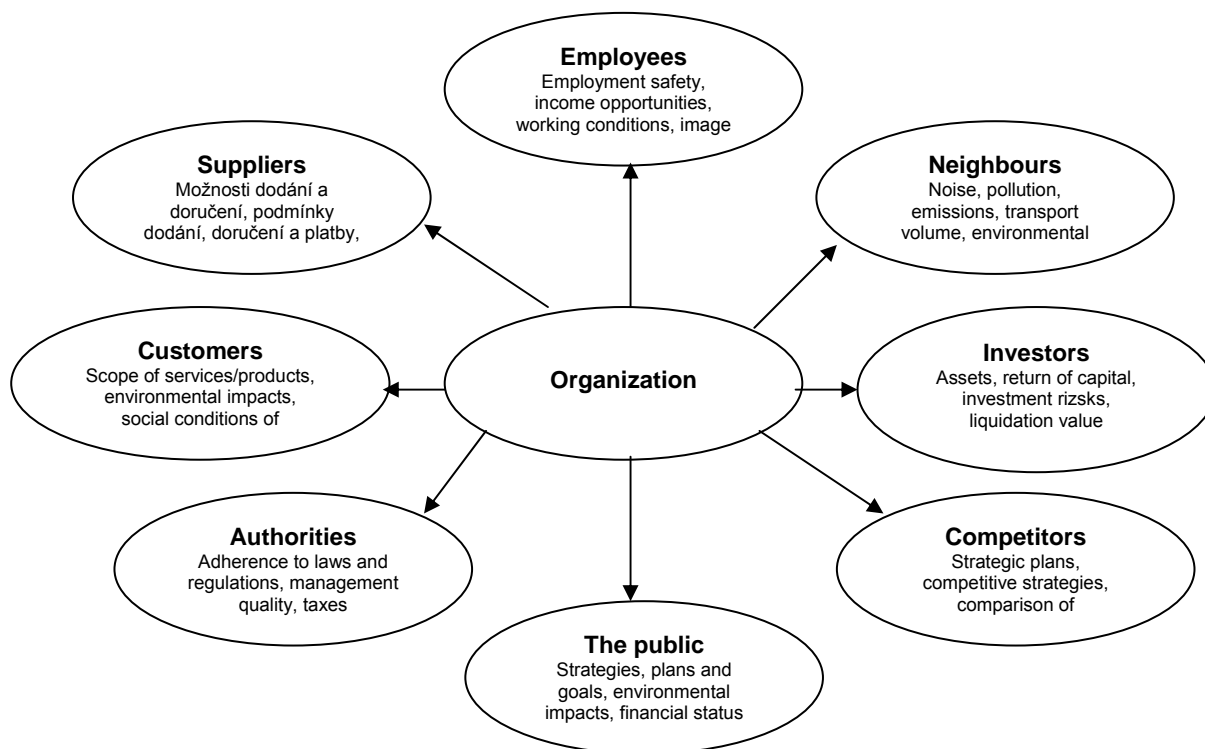
<sup>11</sup> <http://www.efqm.org/>.

<sup>12</sup> OECD Directive for transnational companies, of 27 June 2000, Article III. Disclosure of Information, [http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xsl/mez\\_ekon\\_organizace\\_12363.html](http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xsl/mez_ekon_organizace_12363.html).

<sup>13</sup> International Labor Organization, World Business Council on Sustainable Development.

<sup>14</sup> [www.responsiblecare.org/](http://www.responsiblecare.org/) , <http://www.schp.cz/html/index.php?s1=1&s2=4&lng=1> . Responsible Care is the only global initiative of the chemical industry, helping it systematically improve in all aspects of health, safety and environment, and openly inform of its activities and results.

- *The public/media/non-governmental organizations* – The public and the media are primarily concerned with the organization's behaviour towards the environment, i.e. mainly its environmental impacts and intended plans and goals and impacts on the social area (for example, conditions for employees, etc.). The next interesting information for the public will certainly be the financial status of the organization. On the other hand, integrated management system is of no such importance to the public.



**Figure 1** Target groups and their concern with information in report

If we want to correctly understand the significance, the meaning and the objectives of the reporting, we have to start from the analysis of target groups, i.e. potential users of information in reports and their requirements. In principle, the users can be divided into two broad groups: internal and external stakeholders (i.e. internal and external users), see Fig. 1.

*Internal users* (internal stakeholders) are the organization's employees who form an internal counter-interest group – on the one hand, they are concerned with the organization's prosperity and repute, but, on the other hand, they are interested in the maximization of their wages which may increase the costs and worsen the economic results of the organization. Internal users also include the organization's owners and management at various levels. For example, board of directors and supervisory board in joint-stock companies, and co-partners and owners in limited liability companies. These are basically addressees who have powers to take decisions and are responsible for the results of the organization's operations.

*External users* (external stakeholders) may comprise a very wide range of competent auditing and surveillance authorities and special interest groups and individuals. They also include the general public, social organizations and various civil activities, for example, in the area of environmental protection, etc., see Fig. 1.

From the listing of users it is evident that only one form of communication and reporting or of content of voluntary report cannot satisfy all requirements of the stakeholders. The organization's communication and reporting therefore has to establish information system, which will be differentiated and oriented at particular target groups of users.

#### **4. The Amsterdam Declaration on Transparency and Reporting**

In issuing the Amsterdam Declaration on Transparency and Reporting<sup>15</sup> in March 2009, the Board of The Global Reporting Initiative (GRI) called on governments to implement State Environmental Policies and Sustainable Development Strategies which require from organizations to include in their voluntary reports the public reporting of environmental, social and governance (ESG) indicators<sup>16</sup>.

The Declaration states that the causes of the current economic crisis may have been identified by a global transparency and accountability system based on the exercise of due diligence and the public reporting of ESG performance. The profound loss of trust in key institutions is best addressed by the adoption of a global reporting framework that enhances transparency and informs of the legitimate interest concerning all key areas of the organization. The Board of GRI calls on governments to take leadership in reconstruction of economy by:

- *Introducing corporate policy (strategy) requiring companies to report on ESG indicators or publicly explain why they do not so.*
- *Requiring ESG reporting by public bodies – in particular: state owned companies, government and public pension funds, investment agencies.*
- *Integrating sustainability reporting within the emerging global financial regulatory framework being developed by leaders of the G20.*

The preceding intergovernmental meetings recognized the necessity of publishing voluntary corporate reports with sustainability indicators in 2007 at the G8 summit in German Heiligendamm, where the GRI reporting framework was officially promoted. It is intended to serve as a means of achieving good public administration and its transparency, and thus to achieve poverty reduction and prevention of conflicts, and to support sustainable investment decision-making and the development in developing economies.

#### **5. Conclusion**

The presented project SP/4i2/26/07 „*Draft of new indicators to continually monitor the efficiency of sectoral environmental management systems (NACE) and a system of their environmental reporting with assessment of relations between the environment, economy and society*“ has, in principle, ambitious goals bringing into the area of indicators in the Czech Republic a number of new elements. The project also has a potential to bring in these issues entirely new views and inner structure.

Highly significant aspect of the whole project is utmost emphasis laid on completeness of information on indicators which ensue not only from the local requirements, but also from the European Union (EEA, EUROSTAT) and also from international commitments (OECD, UNEP). For this reason, very significant part of the project is also the process of assessment of the particular indicators and their mutual comparison.

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<sup>15</sup> <https://www.globalreporting.org/CurrentPriorities/AmsterdamDeclaration>

<sup>16</sup> <http://www.ga-institute.com/esg-matters/esg-factors-master-lists-categories.html>

In 2008, the project output itself was the MoE handbook „VOLUNTARY CORPORATE REPORTING on assessing the relations between the environment, economy and society“ [4]. In 2009, the project output will be the methodology of assessing the indicators and also an expected set of the „minimal“ indicators, ensuing from the performed analysis and the Amsterdam Declaration. In this case, emphasis is laid on economic costs of assessment and, the information gained from output set of indicators should be as integrated and as complete as possible.

## References

1. Hřebíček, J., Misařová, P., Hyršlová, J. (2007): Environmental Key Performance Indicators and Corporate Reporting. In *Environmental Accounting and Sustainable Development Indicators*. Praha: Universita Jana Evangelisty Purkyně, s. 147-155. 23.5.2007, Praha, ISBN 978-80-7044-883-0.
2. Hřebíček, J., Růžička, P. (2007): Key Indicators of Environmental Performance and their Assesment. In *Sustainability Accounting and Reporting at Micro-Economic and Macro-Economic Levels*. Pardubice : University of Pardubice, s. 35-42. 28.5.2007, Brno, ISBN 978-80-7194-971-8.
3. Hřebíček, J., Kisza, K., Štefaník, M. (2008): Analysis of branch indicators of EMS with respect to NACE. In *Proceedings of conference. Sustainable accounting and reporting on micro-economical and macro-economical level*. Pardubice: Univerzita Pardubice, s. 73-78, 19.5.2008, Brno, ISBN 978-80-7395-081-1.
4. Hřebíček, J., Soukopová, J.(2008): DOBROVOLNÉ PODNIKOVÉ ZPRÁVY o hodnocení vazeb mezi životním prostředím, ekonomikou a společností. Praha: Ministerstvo životního prostředí, 61 s., ISBN 978-80-7212-495-4.
5. Hřebíček, J., Piliar, F., Soukopová, J. (2008): Závěrečná zpráva o řešení projektu SP/4i2/26/07 v roce 2008. Brno: Masarykova Universita, 70 s.  
[http://projects.cba.muni.cz/indikatory/index.php?option=com\\_content&view=article&id=56&Itemid=71](http://projects.cba.muni.cz/indikatory/index.php?option=com_content&view=article&id=56&Itemid=71)
6. Remtová K. a kol. (2006): Dobrovolné environmentální aktivity -- Orientační příručka pro podniky. Planeta 2006, č. 6. , Lanškroun. ISSN 1801-6898.
7. Ritschelová, I., Sidorov, E. (2007): Environmentally Adjusted GDP: Theoretical and Methodological Approaches, In *Proceedings from international conference - Sustainability accounting and reporting at microeconomic and macroeconomic levels*, Brno, 28.-30.5.2007, s. 102-114, ISBN 978-80-7194-971-8.
8. Ritschelová, I., Sidorov, E., Hájek, M., Hřebíček, J. (2008): Corporate Environmental Reporting in the Czech Republic and its Relation to Environmental Accounting at Macro Level. In *11th Annual EMAN Conference on Sustainability and Corporate Responsibility Accounting. Measuring and Managing Business Benefits*. Budapest : AULA, 55-60, ISBN 978-963-503-370-6.

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# CASE STUDY OF VOLUNTARY REPORTING IN SMEs

Jiří Hřebíček, František Piliar, Jana Soukopová

## 1. Introduction

Since 2007, the Masaryk University has been executing the project falling within the research competence of the Ministry of the Environment (MoE) of the Czech Republic SP/4i2/26/07 „Draft of new indicators to continually monitor the efficiency of sectoral environmental management systems (NACE) and a system of their environmental reporting with assessment of relations between the environment, economy and society“, whose main objective is the research of how to continually and exactly monitor the environmental development by sectors (NACE) and identify the relations between the environment, economy and society, and transform them into the relevant indicators for corporate environmental reporting and EMAS annual reports.

This objective should be achieved through the fulfilment of partial goals in the course of the project SP/4i2/26/07 execution in the period between 2007 and 2010. These goals are presented on the project web site<sup>1</sup>. The project execution proceeds in the course of 39 months from September 2007 to November 2010. The paper presents certain results from the first phase of the project SP/4i2/26/07 execution [1], [2], which concern the area of environmental reporting in the selected branch of chemical industry, mainly in small and medium-sized enterprises. The paper also follows up with the published results of the MoE Research and Development Projects execution:

- Project 1C/4/25/04 „Research of Support for Sustainable Production and Consumption“, which in 2004 – 2005 dealt with research of support for sustainable production and consumption, and with orientation of voluntary corporate activities in this area from the viewpoint of a manufacturer [3].
- Project 1C/4/13/04 „Application of Environmental Accounting at Microeconomic and Macroeconomic Levels in the Conditions of the Czech Republic“, which in 2004 – 2005 dealt with research of issues of sustainable development at macroeconomic and microeconomic levels. The project aim at macroeconomic level was to use the methodology of macroeconomic accounts SEEA 2003 for assessing sustainable development in the Czech Republic. At microeconomic level, the project addressed issues of measuring corporate sustainability, issues of environmental accounting, in detail environmental reporting [7], [8] and the effectiveness of EMS implementation.

The term *Voluntary corporate report on assessing the links between the environment, economy and society* means such a report („voluntary report“ or „report“) of an organization<sup>2</sup>, which is elaborated and integrated at international level (stemming, for example, from the initiative of a transnational organization The Global Reporting Initiative (GRI)<sup>3</sup> and programme EMAS<sup>4</sup>) and which is voluntarily (i.e., for example, beyond the framework of legislative regulations) prepared by organizations on their economic, environmental, social and governance performance within the framework of their corporate social responsibility

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<sup>1</sup> [http://projects.cba.muni.cz/indikatory/index.php?option=com\\_content&view=article&id=44&Itemid=56](http://projects.cba.muni.cz/indikatory/index.php?option=com_content&view=article&id=44&Itemid=56)

<sup>2</sup> Company, corporation, firm, enterprise, authority or institution, or their part or combination, irrespective of whether registered or not, public or private, which have their own functions and administration.

<sup>3</sup> <http://www.globalreporting.org/Home>

<sup>4</sup> [http://ec.europa.eu/environment/emas/index\\_en.htm](http://ec.europa.eu/environment/emas/index_en.htm), <http://www.iema.net/emas/emas>  
[http://www.cenia.cz/\\_C12571B20041E945.nsf/\\$pid/MZPMSFGSEV4B](http://www.cenia.cz/_C12571B20041E945.nsf/$pid/MZPMSFGSEV4B)

(CSR) [1]. Its essential element is the declared principle of voluntary integration of economic, environmental, social and governance commitments of an organization into their business activities, which are realized beyond the framework of the valid legislation and commercial contracts.

*Reporting* in modern global concept is discovered by organizations in the Czech Republic with a certain delay in connection with the transformation of national economy to market economy and with the arrival of foreign investors. This modern concept also includes *voluntary reporting* (for example, Voluntary Corporate Reports on Assessing the Links between the Environment, Economy and Society). As regards the contentual concept of *report*, there also occurred a certain shift from the formerly narrowly perceived definition in sense of internal corporate accounts of economy and of environmental compartments intended mainly for owners and managers, to a very broad concept of all kinds of information on various operations of the organization concerning sustainable development (its economic, environmental, social and governance aspects), social responsibility and ethics of business. Such information is provided to both internal and external stakeholders and the general public. The process of searching for appropriate approach to making the *reports* available to the public has not been finished yet in a number of organizations in the Czech Republic, and the present paper is intended to contribute to that purpose.

## 2. Voluntary reporting in the Czech Republic

From the practical viewpoint, *voluntary reports* may, based on the level of their elaboration and integrations of steps in their realization, be divided to those using *standardized tools* and those using *recommended approaches* [3]. As regards *voluntary reports* using standardized tools, implementation techniques at international level have been more or less in detail defined, or even standardized (this concerns, for example, the GRI initiative, OECD<sup>5</sup>, UN<sup>6</sup>, Responsible Care<sup>7</sup>, etc.). It is basically the application of certain methods or systematic procedures or guidance which are being transformed to the conditions in the Czech Republic and adapted to end users. The reasons for that may be seen in the fact that target groups are becoming more critical to corporate activities, products and services. In addition to how the current reporting is developing, reports are analyzed by users having higher qualifications and also higher demands and expectations. This means that employees, customers, local authorities, and at present primarily investors, financial analysts and other want information of high quality and expect that organization has such a reporting tool to really meet their specific needs.

On the Czech market, there appears an increasing number of companies which disclose their voluntary reports, and whose main orientations are summarized below. It is Business Leaders Forum Czech Republic (BLF)<sup>8</sup>, an association of international and Czech businesses and organizations, which strives for ethical business practice, for actual compliance with Corporate Social Responsibility and supports cooperation between business sector, public sector and nonprofit sector. BLF member firms include, in particular, large companies, such as ABB, American Express, ČEZ, ČSOB, Vodafone, DHL, Deloitte, Ernst & Young, Komerční banka, McDonald's, Metrostav, Plzeňský Prazdroj, PriceWaterhouseCoopers,

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<sup>5</sup> OECD Directive for transnational companies, of 27 June 2000, Article III. Disclosure of information, [http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xml/mez\\_ekon\\_organizace\\_12363.html](http://www.mfcr.cz/cps/rde/xchg/mfcr/hs.xml/mez_ekon_organizace_12363.html).

<sup>6</sup> Global Compact

<sup>7</sup> [www.responsiblecare.org/](http://www.responsiblecare.org/) , <http://www.schp.cz/html/index.php?s1=1&s2=4&lng=1> . Responsible Care is the only global initiative of the chemical industry, helping it systematically improve in all aspects of health, safety and environment, and openly inform of its activities and results.

<sup>8</sup> <http://www.blf.cz/>

Skanska, Škoda Auto, Telefónica O2, Unilever, and also a number of other ones, including small and medium-sized enterprises.

The next significant sector is chemical industry which has its international guideline for voluntary reporting „Health, Safety and Environmental Reporting Guidelines“<sup>9</sup> from 1998 and its update „Responsible Care. Management Framework and Guidance on Use“<sup>10</sup> from 2006. In the Czech Republic, voluntary reports are released within the initiative of Association of Chemical Industry of the Czech Republic (ACI CR), which is a voluntary association of manufacturing, trading, design, research and other organizations relating to the chemical, pharmaceutical and petrochemical industries and to plastics and rubber processing industry. At present, ACI CR associates 121 organizations (64 manufacturing and 57 non-manufacturing organizations), of that 84 are individual members and 3 are collective members – Association of Paint Manufacturers of the Czech Republic (AVNH CR), Chemical Traders and Distributors Association of the Czech Republic (SCHOD CR) and Czech Association of Cleaning Stations (CACS). The majority of medium and large enterprises in chemical industry as well as trading and distribution companies in the Czech Republic voluntarily joined environmental protection programmes within movement „Responsible Care“, which is an example of programmes aiming to improve environmental and safety indicators of production.

In 2002, ACI CR released a modified translation of this guideline under a title „Guidance on Programme Preparation, Implementation and Assessment of Results for Member Companies. Programme „Responsible Care“, which also contained a guidance on how to fill in the summary table „*HSE Results Monitoring Indicators*“. These indicators represent a common framework for reporting of results and monitoring of corporate behaviour towards staff health and safety and towards the environment. Summary table after filling in the results for the preceding year is forwarded to ACI CR, to allow the preparation of summary report for CEFIC for the entire chemical industry of the Czech Republic, so that the results of permanent improvements may be presented in the Czech Republic, in the EU and abroad.

The same indicators based on CEFIC definitions may also be used by organizations in their annual *Corporate Environmental Reports*, which are made available to the public<sup>11</sup>. In addition to these „mandatory“ indicators, an organization may use in these reports also other company-specific indicators characterizing its production, issues of environmental effects of its production in the given region, or other optional indicators recommended by CEFIC. In annual environmental reports then indicators in time context will present improvements that are being achieved in the protection of health, safety and environment (HSE).

In February 2006, at an international conference on „Management of Chemical Substances“, the International Council of Chemical Associations (ICCA) presented a draft of The Responsible Care Global Charter. The Board of Directors of ACI CR entered for implementation of this Responsible Care Global Charter on 18 April 2006, similarly to 51 national associations, including all European national associations of chemical industry. In 2006, CEFIC released a new RC Programme handbook „Responsible Care. Reporting Guidelines 2006“<sup>12</sup>. According to the implementation plan adopted by the Board of Directors of ACI CR, the preparation of a new method of handling a claim for the granting of right to use RC logo is under way, and the documentation will be prepared to be incorporated into a

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<sup>9</sup> <http://www.cefic.be/activities/hse/rc/guide/01.htm>

<sup>10</sup> <http://www.cefic.be/files/Publications/RC-Management%20Framework%20and%20Guidance%20on%20Use.pdf>

<sup>11</sup> [http://www.unipetrol.cz/docs/Unipetrol\\_EKO\\_07\\_CZ.pdf](http://www.unipetrol.cz/docs/Unipetrol_EKO_07_CZ.pdf)

<sup>12</sup> <http://www.cefic.org/files/Downloads/Responsible%20Care%20Reporting%20Guidelines%202006.pdf>

new Czech RC Programme guidance document, which will be based on the above mentioned Responsible Care Global Charter and on a handbook „Responsible Care. Reporting Guidelines 2006“.

As of 26 June 2008, in total 65 member companies and collective members of ACI CR entered for the Responsible Care programme and, as of this date, 39 member companies were holders of a certificate entitling them to use the logo Responsible Care. Member organizations of ACI CR, which have the right to use the logo Responsible Care, have also an obligation to release a „Report on Corporate Environmental Impacts“ (Environmental Report). Nevertheless, such report may also be released by organizations which otherwise do not do so, as such reporting is voluntary.

**3. Voluntary reporting for small and medium-sized enterprises**

The first draft of a Czech standard for voluntary environmental reporting was prepared by Vaněček [8], and in 2008 the draft was followed up with by Hřebíček and Soukopová [1]. Draft of information structure describing the overall corporate performance is shown on Fig. 1.

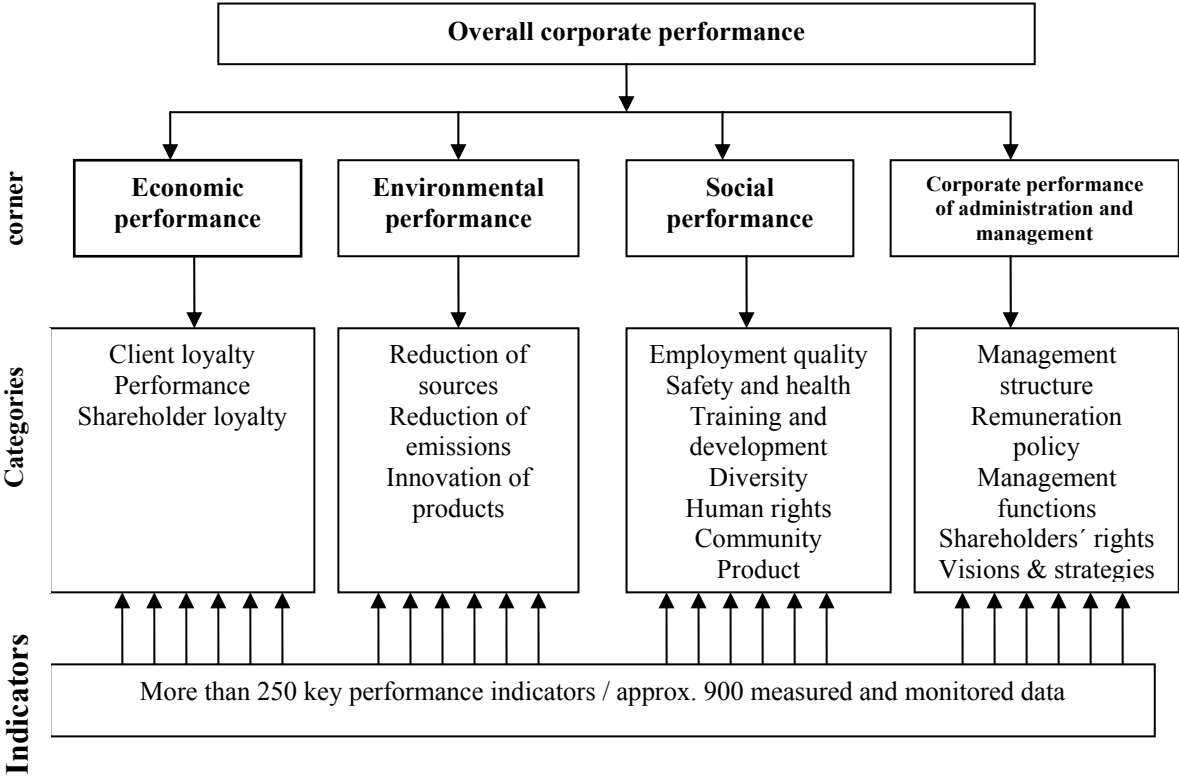


Figure 1 Information structure describing overall corporate performance

It is a voluntary public presentation of information on overall corporate performance, its activities and potentially also products for user target groups (owners, employees, customers, suppliers, purchasers, competitors, banks, insurance companies, investors, rating organizations, citizens living near organization, public administration, the media, etc.). The MoE Handbook/Guidance Document [1] was based on The GRI Guidelines which represent the third and so far the latest generation of The GRI Guidelines from 2006, and on Responsible Care recommendations. The GRI vision is that the reporting on corporate economic, environmental and social performance together with governance performance will become common and comparative, similarly to mandatory corporate financial reporting.

The Amsterdam Declaration on Transparency and Reporting<sup>13</sup> from March 2009 also becomes an inspiration to voluntary reporting of small and medium-sized enterprises. Professor Mervyn King, Chair of the Board of Directors of the GRI and Chair of the UN Global Corporate Governance Committee underlines: "Should we make efforts at recovering our economic system following the global financial crisis, we have to ensure in voluntary reporting the transparency of economic, environmental, social and governance performance of an organization. This must be essential in corporate reporting for financial market regulators (investors), entrepreneurs and the public to find there complex information, which would allow them assess strategic risks and opportunities". Ernst Ligteringen, Chief Executive of the GRI added: "Only through a new reporting model, which takes account of forward looking data, as well as previous corporate financial data, will we be able to work out how companies are positioned to meet the future market challenges."

Voluntary report prepared by an organization should also be easily available; released in both printed and electronic versions. It should be possible to download electronic version of voluntary report from organization's web site, usually in pdf format. Nevertheless, ICT and the Internet allow numerous other possibilities for flexible and up-to-date disclosure of reports, and they also allow immediate response by stakeholders, especially potential investors.

The core of a report should be a description of organization's performance in economic, environmental, social and governance areas. A report should include the quantitative and qualitative information on corporate impacts of activities, processes, products and services on the society in the areas of market, working environment, local community and the environment itself. To report overall corporate performance, it is appropriate to use exact, quantitatively measured data, wherever possible. Indicators derived from such data should be animated in report by examples from practice, by tables, charts and figures. It is therefore recommended to complement the indicators by an interesting text accompanied by a photograph; in this way, the information is „clarified in more detail“ and not „only disclosed“.

#### **4. Case study for small and medium-sized enterprises in chemical industry**

Within the research, the project SP/4i2/26/07 addressed the assessment of available (on the Internet) voluntary reports presented by chemical industry organizations which have the right to use the logo Responsible Care. At present, in total 39 organizations are entitled to use the logo Responsible Care, see [2]. Furthermore, the search included voluntary reports prepared by the next 26 manufacturing organizations in the chemical industry which are not members of ACI CR, although they are not involved in the programme of Responsible Care, [2].

The following qualitative indicators were subjected to the assessment: *availability of reports; structure of reports; intelligibility of reports*<sup>o</sup> and *in what detail the information is provided*, etc. The research mapped the current status of voluntary reporting and of the main indicators in chemical industry organizations from several viewpoints. One of them was the implementation of environmental management system (EMS or EMAS), which has been implemented in 26 organizations of 39, which were awarded the RC logo. The reports were acquired from corporate web sites for the individual years, in time sequence from the moment of having been awarded the right to use the RC logo.

The research was conducted in the form of assessing the particular reports according to predefined aspects which are partly consistent with aspects used for assessment based on the

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<sup>13</sup> <https://www.globalreporting.org/CurrentPriorities/AmsterdamDeclaration>

GRI Guidelines version G3. Within the framework of research, the aim was to identify the current status in the sector of chemical industry and, at the same time, to follow up with the research [6] and perform updated assessment of: *types of disclosed reports; forms of reports; structure of reports; the number of indicators in particular classifications; provided information ratio; verification of reports; types of reported information; corporate approach to sustainable development described in reports, the level of reported information.*

It was very difficult to perform this assessment of reports, as it concerned organizations of differing size and not only small and medium-sized enterprises. Its aim was also to identify whether and what types of reports are released by small and medium-sized enterprises. The assessment focused on the form of communication and type of report, where the following aspects were concerned:

1. *Type of released report:* Environmental Report; Report on Health, Safety and Environment; Report on Sustainable Development; Report on Responsible Care

It has been found out [2] that most often released report type is Environmental Report which is disclosed on the Internet by 27 organizations of 39 having the RC logo. These are organizations which have implemented EMS, certified to meet the standard ISO 14000. The next frequently released report type is „Report on Responsible Care“, this report is disclosed by 25 of 39 organizations. Report on Sustainable Development has been released by none of the organizations.

2. *Form of released report:* Separate report (corporate web site or printed form); part of Annual Report (corporate web site or printed form); otherwise.

Most frequent forms of report releases include electronic and printed forms, or as part of Annual Report. Detailed research focused only on electronic forms of report releases which are most often used by organizations and are commonly available to the public. It can be stated that released report type and form, and the number of particular corporate performance indicators can be identified at corporate web site almost immediately, or they have to be found using a locator at corporate web site. The navigation of paths to reports at corporate web sites differs from organization to organization, having been not standardized yet. The next significant research viewpoint included the disclosed corporate performance indicators, their number, transparency, rationality or compliance with indicators recommended by various initiatives. Therefore, the investigation concerned the following information.

3. *The number of corporate performance indicators* in the categorization according to the GRI Guidelines version G3, which are used in reports of the analyzed organizations, i.e.: the number of economic performance indicators; the number of environmental performance indicators; the number of social performance indicators and the number of governance performance indicators.

Corporate performance indicators are mostly used in the categorization according to the GRI Guidelines version G3. Three groups of indicators were examined: environmental, economic and social indicators, [2]. Social indicators were further divided into the following categories: Labour, Human Rights, Society and Responsibility for products. Every group comprises a set of basic and complementary indicators.

Environmental indicators disclosed in reports reach the number of 16 in average. Environmental indicators again belong to most frequently disclosed indicators in corporate environmental reports or HSE reports. These indicators concern water, air, energy, waste and materials.

To much smaller extent, economic and social indicators are presented in reports. Reported economic indicators reach the number of 3, and social indicators the number of 5 in average. As regards the group of economic indicators, primarily those expressing environmental investments and ecological/environmental costs such as charges, fees and penalties were reported. Social indicators were mostly represented by occupational health and safety indicators, i.e. those expressing the numbers of employment accidents, occupational diseases, days lost, hours absent or the numbers of deaths relating with performance of work. Indicators from the area of corporate staff education and training were also often reported.

Furthermore, the aspect of report credibility was examined, i.e.:

4. *Report certification by one of the following manners:* Certification by ACI CR, whose member the organization concerned is and has been awarded the RC logo; by independent third party (usually a renowned certifying organization which certified, for example, EMS system; by other manners.

Corporate report may be certified by an independent third party (parties 1 and 2 are the reporting organization and the target groups of recipients, respectively). A third party may be a renowned certifying organization or also an independent nonprofit-making organization. The majority of organizations had certifications prepared by ACI CR, whose members they are (for example, through awarding or being successful in defending the logo „Responsible Care“). The information on the certification by an independent third party was mostly presented directly in the report and also at corporate web site. The reports further contained and documented also the circumstances which demonstrated integrated management system of the organization, for example, they contained a document on the quality system and EMS certification, a document on awarding the title „safe enterprise“ or awarding the logo „Responsible Care“, etc.

Organizations in their reports mentioned their EMS systems. Sometimes, an „ecologist“ in corporate hierarchical structure was mentioned in report, sometimes efforts at „cleaner production“, environmental policy or cooperation with other subjects and staff training were reported. In the event that organization had EMS system implemented, the report included copies of certificates, information on implementation, certification/validation, environmental objectives and target values, on audits, etc.

5. *It was also examined whether reports contain information on:* corporate activity impacts on the environment, corporate products' impacts on the environment; EMS system.

Certain reports contained information on corporate activity impacts on the environment, such as pollution sources, significant environmental aspects and major environmental impacts, old ecological burdens, etc., while others not. Such information belong to those probably mostly searched for by the interested parties (especially by the public).

Certain reports also contained information on corporate products' impacts on the environment, in particular, if consumer goods were concerned. Demonstrations of responsible supervision of products („Product Stewardship“<sup>14</sup> initiative gaining importance) were mentioned, such as take-back of packaging, take-back of used products, product life-cycle assessment (for example, ISO 14040 through 14048). Certain organizations were awarded domestic or foreign labels of „environmentally friendly product“ type.

Corporate reports also contained assessments of the information „quality“ according to the criteria, which were used in research focusing on reports prepared in line with the GRI

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<sup>14</sup> <http://productstewardshipcouncil.org/about.htm>,  
[http://www.ecy.wa.gov/sustainability/Resources/prod\\_steward.htm](http://www.ecy.wa.gov/sustainability/Resources/prod_steward.htm)

Guidelines G3. These criteria were assessed according to score scale of between 1 and 5, with 1 being the worst and 5 the best value (see table).

Table 1 Quality assessment of 26 analyzed environmental reports

Score	Comparability	Accuracy	Timeliness	Clarity	Reliability
1	2	5	4	0	4
2	2	5	0	2	9
3	5	8	0	5	8
4	2	6	0	9	3
5	15	2	22	10	2
<b>In total</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>

6. *The level of reported information was assessed according to the following criteria: comparability; detail accuracy/level; timeliness; clarity and reliability, in detail see [2].*

In conclusion, as regards report quality assessments, it can be stated that organizations report to the interested parties corporate performance information, comparable for certain period of time. nevertheless, such information is less detailed and balanced. On the other hand, positively assessed is their intelligibility and timely disclosure.

## 5. Conclusion

The presented selected results of the project SP/4i2/26/07 phase I execution bring to the area of voluntary reporting and indicators in the Czech Republic a number of new elements which also have a potential to bring into these issues entirely new views and inner structure.

The project output itself in 2008 was the MoE Handbook/Guidance Document „VOLUNTARY CORPORATE REPORTING on assessing the relations between the environment, economy and society“ [1]. A number of valuable information were also published in the Final Report on the Project Execution for 2008 [2]. In 2009, there will further be elaborated the methodology of assessing the indicators, and also an expected set of the „minimal“ indicators ensuing from the performed analysis and from the Amsterdam Declaration. In this case emphasis is laid on economic costs of assessment and, furthermore, the information gained from the output set of indicators should be as integrated and complete as possible.

## References

1. Hřebíček, J., Soukopová, J. (2008): DOBROVOLNÉ PODNIKOVÉ ZPRÁVY o hodnocení vazeb mezi životním prostředím, ekonomikou a společností. Praha: Ministerstvo životního prostředí, 61 s. ISBN 978-80-7212-495-4.
2. Hřebíček, J., Piliar, F., Soukopová, J. (2008): Závěrečná zpráva o řešení projektu SP/4i2/26/07 v roce 2008. Brno: Masarykova Univerzita, 70 s.  
[http://projects.cba.muni.cz/indikatory/index.php?option=com\\_content&view=article&id=56&Itemid=71](http://projects.cba.muni.cz/indikatory/index.php?option=com_content&view=article&id=56&Itemid=71)
3. Remtová K. a kol. (2006): Dobrovolné environmentální aktivity – Orientační příručka pro podniky. Planeta 2006, č. 6., Lanškroun. ISSN 1801-6898.
4. Ritschelová, I., Sidorov, E. (2007): Environmentally Adjusted GDP: Theoretical and Methodological Approaches, In *Proceedings from international conference* -

*Sustainability accounting and reporting at microeconomic and macroeconomic levels*, Brno, 28.-30.5.2007, s. 102-114. ISBN 978-80-7194-971-8.

5. Ritschelová, I., Sidorov, E., Hájek, M., Hřebíček, J. (2008): Corporate Environmental Reporting in the Czech Republic and its Relation to Environmental Accounting at Macro Level. In *11th Annual EMAN Conference on Sustainability and Corporate Responsibility Accounting. Measuring and Managing Business Benefits*. Budapest: AULA, 55-60, ISBN 978-963-503-370-6.
6. Šaročová P. (2008) Využívání environmentálních zpráv v podnicích chemického průmyslu. Diplomová práce. Universita Pardubice, Fakulta chemicko-technologická.
7. Študent J., Hyršlová J., Vaněček V. (2005) UDRŽITELNÝ ROZVOJ A PODNIKÁNÍ. (Environmentální reporting. Hodnocení udržitelného rozvoje a Environmentální účetnictví). Edice CEMC – Příručka pro odborníky a vedení organizací. LK TISK, v. o. s., Praha. ISBN 80-85990-09-1.
8. Vaněček V. (2006) Dobrovolné podnikové zprávy o vztahu k životnímu prostředí, o zdraví a bezpečnosti, a o udržitelném rozvoji. *Planeta*, ročník XIII., číslo 1/2006. DOBEL, Lanškroun. ISSN 1801-6898.

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