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MANAGEMENT OF ENVIRONMENTAL ACTIVITIES OF ENTERPRISES

Abstract: This article deals with the research of environmental activities arising from sustainable development demands on two levels. The first one reflects the state politics of environment, when the state influences the behavior of individual economic subjects with the help of the implementation of different environmental protection tools. The second level observes the environmental activities of a company. Attention is focused on the usage of alternative energy sources. The economic pros and cons of usage of these sources are studied with regard to current legislation in the Czech Republic.

Keywords: environmental policy, environmental instruments, energy sources, photovoltaic power stations, efficiency of enterprises.

1. Introduction

The turn of the millennium has brought about many important changes in practically all areas of human existence, including the environment. Thanks to expanding globalization, we witness that the link between the environment and the economy, in consonance with the requirements for sustainable development, has been getting stronger.

The idea of sustainable development not only covers the necessity to develop suitable incentive tools for those economic entities that do not want to adapt themselves and conform voluntarily to the sustainability requirements, but also the need of support of such market-compatible mechanisms that will allow – while maintaining the market functionalities – the sound protection of the environment. Such tools should contribute to the continuous development and improvement of environmental protection.

A wide variety of environment-friendly technologies help to better utilize natural resources at a lower consumption of materials and energies as well as a lower generation of waste and contaminants in general. The Czech Republic, as a fully-fledged member of the European Union since May 2004, has been implementing into its legislation various requirements and resolutions of international institutions and associations. Possible directions of future development must be drawn up by the

Czech Republic in accordance with the requirements for sustainable development, as declared by individual EU documents. Current state environmental policy is aimed at the requirement to maintain and possibly further improve our environment to assure a better life for future generations of Czech Republic citizens.

2. Environmental protection tools in the Czech Republic

The general aim of the environmental policy is to preserve and further improve the quality of the environment, life and health of citizens, while respecting the sustainable development requirements. In 2004 the Czech Republic government approved the State Environmental Policy for the period 2004-2010 (hereinafter referred to as "SEP CR"), defining the consensual framework for long-term and medium-term directing of the development of the environmental dimension of sustainable development in the Czech Republic.

The priority areas of SEP CR, compatible with the 6th Environmental Action Program (EAP), are especially aimed at resolving ongoing and newly emerging environmental issues in the following areas:

- Protection of nature, landscape and biological diversity;
- Sustainable use of natural resources, protection of waters and protection against floods, optimization of material flows and waste management;
- Reducing the damage to the environment from human activities, improving environmental standards for quality of human life;
- Protection of the climate system of the Earth and prevention of long-range transport of air pollution.

SEP CR offers various tools to meet the goals set.

2.1. Administrative tools

These tools are based on the coercive authority of state bodies and authorities. This category covers: regulations, limits, standards and technical norms. The environmental protection control system is based on the statutory administrative measures, the aim of which is to affect the behavior of polluters, to control them and possibly also to impose sanctions on them (penalties, fines) in case the preset conditions are not fulfilled. Despite the measures being efficient, they have many imperfections, such as extensive office work, high social costs, and the low level of motivation for positive environmental behavior.

2.2. Economic tools

These tools affect economic entities who only indirectly cause harm to the environment. The system of environmental protection using these tools has been constantly developing since 1990.

The economic tools, for instance, cover environmental protection related payments (taxes, fees, duties); markets with tradable quotas, expenditure from public budgets (subsidies, credits etc.).

3. Environmental activities of enterprises

Enterprises should assume responsibility for the harm their activities cause to the environment. They should include these negative externalities into their costs. The low efficiency of economic tools is the consequence of the insufficient evaluation of the economic aspects of environmental protection, also the link between the environmental goals and the tax legislation is not optimal as the current tax incentives are rather flat and present almost no motivation for enterprises. The concept of environmental tax reform is – with its key idea "from taxation of labor to taxation of products and services causing harm to the environment" – quite interesting and European countries adopt it as a potential tool for the meeting of sustainable development goals in the long-term.

Together with the sustainable development requirements and the increasing general awareness of environmental protection, new voluntary approaches to environmental protection have been emerging since the 1980s. In industrially advanced countries, environmental protection questions are as important for enterprises as financial controlling, tax issues and other traditional aspects of management.

Voluntary activities support the strategy of preventive approaches the companies achieve beyond the scope of the legislative frame in order to reduce the negative impacts of their activities, to strengthen their market position, improve their competitiveness and promote their goodwill. These voluntary activities represent a certain diversion from the traditional tools towards preventive measures and actions penetrating into the decision-making processes of companies and affecting their environment-related actions.

3.1. Voluntary tools

The implementation of some tools is at the full discretion of companies. Their existence is not dependent upon the fulfillment of further conditions or activity by other entities. Other tools cannot go without the concurrence or support from other entities. The most frequently used voluntary tools are:

- **EMAS (Eco-Management and Audit Scheme)**

Defined as "a part of the environmental management system covering the organizational structure, planning, responsibilities, techniques, procedures, processes and resources for development, execution, implementation, evaluation and promotion of the environmental policy".[1]

[1] Regulation (EC) No. 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organizations in a Community eco-management and audit scheme (EMAS), Article 2, Definitions, subparagraph k).

This tool actively involves all company employees, searches for new opportunities and challenges/tasks in this area. The fulfillment of the tasks is controlled by internal auditors as well as independent external auditing companies. The environmental declaration made by the relevant company within the scope of EMAS must be validated by an independent verifier. This tool requires concurrence from other entities.[2]

- **EMS (Environmental Management System)**

This is a regulation but also an educational tool, as the main goal is to assure the reduction of the negative impact of the company on the environment and also the education of the groups concerned. In the Czech Republic EMS is governed by a binding standard.[3] The requirement for the implementation of EMS is quite extensive. EMS affects the market position of the company as it is often required as one of the preconditions of mutual business cooperation.

- **Ecodesign**

Ecodesign is an approach to the design of a product with special consideration for the environmental impacts of the product during its whole lifecycle. Besides the standard features (utility value, economic efficiency), the product should have the lowest possible negative impact on the environment (low consumption of materials and energies, selection of environment-friendly materials, minimum waste).

- **Ecolabelling**

The definition of the ecolabelling program[4] sets the goals and the key idea behind this method. The purpose is to create a market with environmental-friendly products – to offer them as an alternative to less environmentally-friendly products and influence the market (both demand and supply) so it is oriented to green products and services. The aim is also to reduce the negative impact of ecologically harmful productions on the environment.[5]

- **Environmental management accounting**

EMA is a part of the enterprise information system that helps the company management to implement measures and adopt resolutions in the field of environmental protection. It is created as an accounting subsystem oriented to the identification, recognition and interpretation of company processes causing harm to the environment.

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[2] EMAS Programme was established in the Czech Republic on the basis of Resolution of the Government of the Czech Republic No. 466/1998, on approval of the National Programme of Implementation of the Eco-Management and Audit Scheme.

[3] Basic precondition for initiation of EMS certification is the documented and developed system of environmental management pursuant to ČSN EN ISO 14001:2005.

[4] Pursuant to ČSN EN ISO 14024 – Environmental Labels and Declarations.

[5] In the Czech Republic any enterprise may apply for Czech or EU ecodesign. The associated costs are relatively high and they are compensated by the company (besides the paid attests and certificates there is also the registration fee of approx. CZK 20,000.00).

- **Environmental benchmarking**

Environmental benchmarking is based on the comparison of certain environmental activities of an enterprise with similar activities of the leader in the branch.

3.2. Recommended approaches

This is a relatively new tool that is just developing in our business environment. It gives space for the creativity of enterprises, covering a wide range of approaches and solutions. It is impossible to formulate a uniform methodology of how to proceed to implement this tool in the business environment of each company. The basic approach of this tool that has been newly introduced to many Czech companies is Corporate Social Responsibility, in particular defined in the Communication from the Commission to the European Parliament as the "concept under which the enterprises voluntarily incorporate the social and environmental questions and aspects into their business activities and relations with the parties concerned".[6]

Corporate Social Responsibility should be introduced into the management and decision-making processes of enterprises in order to improve the level of responsibility towards the environment, to find new links, opportunities and processes that will help the companies to change their orientation from short-term goals such as profit maximization to long-term market-oriented and socially responsible strategies. Corporate social responsibility is a complex tool oriented towards socially responsible management, socially responsible consumption and socially responsible investments.

The implementation of these activities is realized at corporate level where the subsequent effects may be analyzed and measured. The companies select the voluntary approach only when the solution will not bring the prospect of extra costs. The implementation of voluntary tools into the corporate environment is a great opportunity, but still there are some risks and doubts that should be resolved in the course of the next few years. The potential pros and cons of the implementation of voluntary environmental tools are summarized in Table 1 [16, p. 157].

Table 1. Overview of pros and cons associated with the implementation of voluntary environmental activities

Pros	Cons
1	2
Flexibility – based on their individual situation the enterprises may choose the most efficient methods and solutions and focus on their specific issues and problems.	Guarantee – there is no legal guarantee as the tools are not regulated by legislation.

[6] *Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee* – Implementing the partnership for growth and *jobs*: making *Europe* a pole of *excellence* on Corporate *Social* Responsibility. KOM (2006) [online], http://eur-lex.europa.eu.

1	2
Reflection from the neighborhood – the use of individual tools is based on the consensus and dialogue between private and regulating entities.	Insufficient publication – the risk of inadequate transparency of individual processes.
Thorough meeting of goals set, their stability – target parameters are achieved more reliably that using other tools. Environmental procedures are implemented directly into company plans, goals are planned on a long-term basis.	Long negotiations – a solution may result from long, expensive and administratively demanding negotiations between the concerned entities (e.g. voluntary agreements between the state authority and industrial companies or associations).
Cost-efficient achievement of goals – cheaper enforcement, lower expenses than in the case of other tools.	Disputable efficiency of goals set – the goals may be inadequately set without any feedback – they may be in conflict with corporate goals and strategies.
The tool for resolution of conflicts – situations not stipulated as mandatory may be resolved creatively (a big role is played by motivation).	Reduction of the effect of regulatory tools – reduction of state budget incomes (taxes, fees) in favor of private incomes.
Qualitative change of relations – in their future practice companies are enforcing the principle of independency and responsibility in the business environment.	Credibility – the adequate credibility in the eyes of the general public is not assured.

Source: author's own work.

From the list of opportunities and risks associated with the voluntary tools, it is obvious that the voluntariness brings huge opportunities on the one hand and risks on the other hand. In order to turn these tools into complex instruments for meeting company environmental goals, the companies must be sufficiently advanced and responsible, so they are able to deal with the environmental issues independently, but in consonance with the state environmental policy directions and strategies. The conclusion therefore is that in the Czech Republic the implementation of voluntary environmental activities stands at the beginning of a relatively long process.

4. The use of alternative energy sources by enterprises

Enterprises have various possibilities of how to approach environmental protection. They often prefer the individual pillars of corporate social responsibility, make use of environmental management systems as well as environmental accounting.

Another option is the use of renewable sources of energies. The Czech Republic, within its membership in the EU, committed itself that by the end of 2010 it will produce 8% of all energies consumed using renewable sources of energies. The current goal is to produce 20% of all energies consumed using these alternative sources by 2020.

In accordance with the Czech Act No. 100/2001 Coll., on Environmental Impact Assessment, as amended, the definition of renewable source of energy is: "Renewable natural resources are – while being gradually consumed – capable of partial

or complete renewal. This is a natural process without any human intervention" [4]. The widely known renewable sources of energy are solar radiation, wind and water energy, biomass. Other renewable sources are tidal energy and geothermal energy.

Recently the generation of energies from renewable sources has been significantly supported by the European Union. Good evidence of this is the increasing number of newly connected photovoltaic power plants in 2008. Nowadays solar-energy power stations represent the most popular tool for using solar energy as a renewable source. The use of this source of energy is frequently discussed, especially with regard to the price of electricity generated and the potential support of this production. Quite important is also the fact that the generation of energy from renewable sources is not always environment-friendly. So far no method for the generation of electricity has been invented that would be perfect and completely harmless to the environment.

4.1. Renewable energy sources

Here it is suitable to analyze the individual types of renewable energy sources and their key pros and cons.

4.1.1. Water power plants

The energy from water courses is one of the oldest sources of energy. In 1896 the first water power plant was put into operation on the Niagara river. In the 19th century water power plants were also used a in our country, particularly in Písek. In the 20th century energy was generated by two water power plants in Prague. One in Těšnov and the other one at Štvanice (which still exists).

Currently the most important water power plants in the Czech Republic are Dalešice (capacity 115 MW), Mohelno, Dlouhé stráně. They are situated on the Vltava river. ČEZ Group also operates power plants on the Labe, Dyje and Morava rivers.

4.1.2. Wind power plants

The first mention of the use of wind energy in the territory of the Czech Republic dates back to 1277. It was a windmill situated in the garden of Strahov Church in Prague. The biggest boom of wind power plants in the Czech Republic came in the period 1990-1995, followed by years of stagnation.

The energy generated through wind power plants is quite environmentally-friendly, however their aesthetic impact on nature is disputable and so is the fact that these power plants has caused harm to birds in the past.

4.1.3. Biomass

The document entitled "Renewable energy sources" says that: "The energy obtained from the combustion of biomass is historically the oldest energy source used by humans. Fire served our predecessors to prepare their food and heat their caves" [12]. Biomass is an organic plant and animal waste. From an energetic point of view the most widespread biomass are woodchips and other forest waste, herbs and wood (especially poplar and willow trees). Currently it is necessary to look for other methods for obtaining biomass, such as the cultivation of energy crops and plant species. A clear advantage of such cultivation is the possibility to make use of soil that is no longer wanted or suitable for food production.

The big advantage associated with the use of biomass is the limitation of the greenhouse effect (despite also in this case a low amount of CO_2 is released to the air at combustion). The main consequence of the greenhouse effect is the global warming phenomenon. In the course of the past 140 years the temperature of the Earth's surface has increased by 0.8°C.

Another advantage of biomass is the fact that after combustion it may be used as a fertilizer. Processing and production of biomass is a tool that may bring new job opportunities and strengthen the local economy.

4.1.4. Photovoltaic power plants (PVPP)

Recently the development of solar energy power plants has been on a downtrend in the Czech Republic. In 2008 a rapid growth of newly connected solar systems was experienced. The concern of investors about the development of solar energy power plants increased because of lower investment costs (due to the economic crisis).

The first power plant generating electricity directly from solar energy was put into operation in 1998 and its output (capacity) was about 10 kW. It was situated on Mravenečník mountain in Jeseníky. Jakubes et al. state: "Solar radiation may be directly used for the generation of heat, cold and electricity, and indirectly as the energy of water courses, sea waves and thermal energy of environment" [12].

At first sight, solar energy may look like the most environment-friendly renewable source of energy. In 2006 only 28 photovoltaic power plants were operating, but in 2009 there were more than 2,583 photovoltaic power plants. With this type of equipment we can expect some environmental problems upon the expiration of their lifetime as it is not obvious how to dispose of solar panels properly. Another disadvantage is the devastation of soil due to the establishment of "solar fields[7]" Currently we still do not have a sound solution for keeping the energy during the idle time of the power plant or when a surplus amount is generated. The suggested solution could be the erection of a standby conventional source.

[7] "Solar field" is considered as a solar farm built on green field.

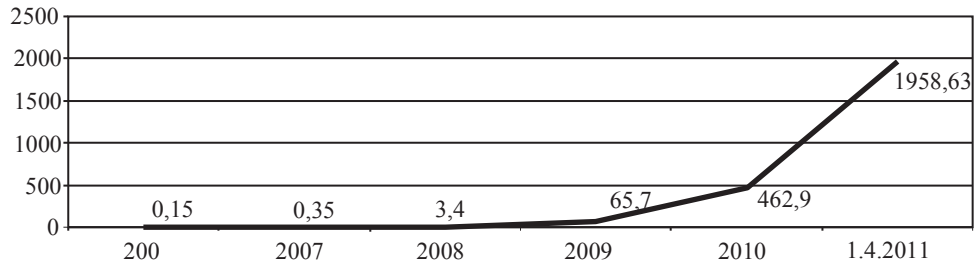

Figure 1. Installed PVPP capacity (GWh) in the period 2006-2011

Source: [21, p. 4-5]; graph – author's own work.

Depending on the number of photovoltaic power plants connected, Graph 6 shows the rapidly increasing values of the installed capacity in MW/year since 2007.

5. Legislative aspects of undertaking in the field of alternative energy sources

The utilization of renewable energy sources brings the obligation to follow the applicable legislation. The most popular renewable energy source of recent years for entrepreneurs has been solar energy. Until 2008 the legislation associated with the generation of electricity through solar energy power plants was insufficient, however during the past few years the legislation has been considerably improved.

The generation of electricity through photovoltaic power plants is considered as an undertaking on the basis of other than the trading license pursuant to special regulations. As the generation of electricity from renewable energy sources is considered as an undertaking, it shall be governed by the Income Tax Act, Value Added Tax Act as well as Acts on social security and health insurance. Also the Energy Act provisions shall apply.

a) provisions of the energy act and the act on accountancy: the generation of electricity is realized on the basis of a license issued by the Energy Regulatory Office. The preconditions for this undertaking are stipulated in section 3 of the Energy Act.[8] The subject of business shall be the generation of electricity. In the Czech Republic, based on state approval, the business activities in the energy branches may be realized by physical persons or legal entities, subject to the license issued by the Energy Regulatory Office.

b) provisions of the income tax act: the incomes from the operation of photovoltaic power plants are classified as incomes from undertaking and other self-employment profit-making activities (Section 7, par. 1, subparagraph c) of the Income Tax Act). The tax base is calculated as the difference between the incomes from undertaking and other self-employment profit-making activities and the

[8] Energy Act No. 458/2000 Coll., and the related regulations.

expenses spent on achieving, assuring and maintaining the incomes (Section 7, par. 3 of the Income Tax Act). Tax payers may claim/recognize the expenses either at their actual amount (documented expenses) or using the lump-sum amount (Section 7, par. 7, subparagraph d) of the Income Tax Act).

c) provisions of the value added tax act: the electricity generated through renewable energy sources is supported either through the system of purchase (buyout) prices or the system of green premiums. In accordance with the Value Added Tax Act, both forms of support are classified as the provision of a service subject to taxation pursuant to Section 2 of the VAT Act and the taxable fulfillment pursuant to Section 14, par. 1 of the VAT Act.

d) provisions of the act on health insurance and social security: the solar energy power plant operator is characterized as an entrepreneur on the basis of special regulations. At the same time he/she becomes a payer of health insurance pursuant to Section 5, subparagraph b) of the Act on Public Health Insurance. The insurance payer shall notify the relevant health insurance company (the insurance premium will be paid to) within 8 days following the commencement of his/her business activities.

6. Analysis of specific investment into alternative source of energy

For the analysis of decision-making concerning the profitability of investment into an alternative energy source, a photovoltaic power plant with a rated capacity of 5.2 kW was selected. The power plant system extends over an area of 40 square meters, comprising 24 solar panels. The power plant generates 4,990 kWh of electricity per year. The expected life is 20 years. During this period a constant output is expected. The power plant is owned by a natural person – entrepreneur – and the power plant operation is an auxiliary activity for him. This variant allows to clearly demonstrate the hidden potential of similar investments. The entrepreneur consumes 7,000 kWh of electricity per year. The solar system generates 4,990 kWh of electricity per year. All the electricity generated through the photovoltaic power plant is consumed for his own purposes. Due to some significant changes in the income tax legislation with regard to alternative energy sources, the comparison of the period of 2010 (conditions for investments in this area were quite favorable) and 2011 (due to amendment of the legislation the conditions became less favorable).

6.1. General attributes of investment

Total annual consumption of electricity	7,000 kWh
Annual consumption of electricity (PVPP*)	4,990 kWh
Electricity purchased from the supplier	2,010 kWh
Input price	CZK 566,000.00
Green premium	CZK 6.57 (year 2011); CZK 11.28 (year 2010)

Annual consumption of electricity

The annual consumption of electricity is the amount of electrical energy required for the relevant operation and it is determined for individual years at the constant amount of 7,000 kWh per year. The consumption depends on the size of household, operation or object, selected tariff for electricity consumption and other related factors, such as thermal insulation, quality of roofing etc.

Annual generation of electricity from photovoltaic power plant system

The annual generation of electricity from the photovoltaic power plant system means the amount of electricity generated through the solar energy power plant, where the unchanged capacity of panels is expected over the whole life of the system. In this particular case a power plant with the capacity of 5.2 kW generates 4,990 kWh per year.

Consumption of electricity from own production

This parameter is only relevant for green premiums and it is based on the presumption of the existence of these premiums (the PVPP operator makes use of the electricity generated for his own purposes at first).

Depending on whether the photovoltaic power plant operator decides to generate electricity for his own purposes only or is willing to sell the excess electricity, the particular form of support is selected. The Energy Regulatory Office issues price decisions where the amount of support of the production of electricity from renewable energy sources is determined. This support is realized in two forms – green premiums or purchase (buyout) prices.[9]

Green premiums represent the first of the two variants of support of electricity generation from renewable energy sources. It is a premium to the market price of electricity the power plant operator is eligible for based on the statement submitted. Should the operator (electricity generator) select this form of support, he must find a customer for electricity generated in his power plant, which means a certain level of uncertainty. The operator gets green premiums to all electricity generated. Green premiums are based on the presumption that part of the electricity generated is consumed by the operator himself and the rest is sold to the distribution grid. Such a surplus is sold for contractual prices that are determined at the amount of the difference between the purchase (buyout) prices and green premiums. For 2011 the green premium for photovoltaic power plant with the capacity of 30 kW amounts to 6.57 CZK/kWh and for power plants with the capacity over 30 kW was 4.94 CZK/kWh. However in 2010 the green premium for power plants up to 30 kW was 11.28 CZK/kWh.

The system of support through purchase prices is based on the agreement under which the generator of electricity from the renewable energy source (power plant

[9] Information from the Energy Regulatory Office.

operator) sells the electricity generated to the distribution grid operator. The distribution grid operator shall be obliged to purchase the electricity from the power plant operator. For 2011 the purchase price for photovoltaic power plants with the capacity up to 30 kW was determined at 7.65 CZK/kWh and 6.02 CZK/kWh for power plants with a capacity over 30 kW. For 2010 the purchase price for photovoltaic power plants with the capacity up to 30 kW was determined at 12.25 CZK/kWh.

The acquisition price also depends on the form of support. If the operator selects the purchase prices as a form of support, the acquisition price will be higher by approx. CZK 30,000.00. This is due to the fact that the installation is more complex and expensive for the implementation of support through purchase prices. The operator is not connected within the existing network, but a completely new connecting line must be established. A circuit-breaker must be installed at parameters required for the relevant distribution grid. For the circuit-breaker the grid operator charges a monthly fee.

Total electricity purchased from the supplier

The amount of electricity the power plant operator must purchase (on top of his own production) – in cases of green premiums this is the difference between the total consumption of electricity and the electricity generated by the photovoltaic power plant (and consumed by the power plant operator for his own purposes).

Input price

The input price consists of the price for solar panels, converters (changing the direct current to alternating current), distributors (leading electricity to individual consumers), electrometer and labor. This is the acquisition price plus the related costs.

6.2. Selection of optimum tax solution

a) under conditions of the year 2010

Under the conditions of 2010, the operator could select one of four options for claiming/recognition of expenses (natural persons – entrepreneurs). The first option was the enforcement of the period of exemption with the subsequent transfer to claiming of expenses in their actual amount. Another option was the claiming/recognition of lump-sum (fixed) costs only. The third option was claiming/recognition of documented (provable) expenses only. And the fourth option combined all the previous approaches, i.e. exemption period with the subsequent transition to recognition of expenses in documented amount and – after amortization of the whole system – transition to lump-sum expenses. From these four options the most optimal (with regard to taxes) was the last option. Due to exemption of incomes from taxation, the power plant operator was not obliged – during the first six years of operation – to pay income tax. Starting from the seventh year of operation, when amortization of

the whole system was started, the power plant operator recognized the expenses in their actual (documented) amount, as depreciations were covered in the expenses which helped to reduce the tax base significantly. After the whole system was amortized, the enforcement of expenses in their documented amount was no longer advantageous (at that time the expenses only cover insurance and amounts for petty repairs). Therefore the lump-sum expenses amounting to 40% of incomes were the optimal solution for a low tax base. The individual variants and the related income tax burden as well as payments of health insurance are shown in Figure 2.

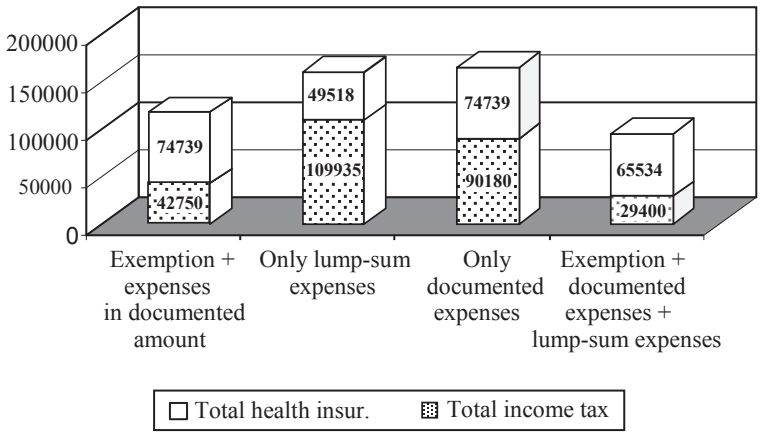

Figure 2. Overall tax burden for individual variants of expenses claiming/recognition (year 2010)

Source: author's own work.

b) under conditions of the year 2011

Under conditions of the year 2011, exemption from taxation is no longer applicable. The tax optimization is almost completely meaningless. The amendments of the legislation allow for two variants of tax optimization. The first one means that the power plant operator will claim/recognize expenses in the actual (documented) amounts, including depreciations. The overview of depreciations is shown in Table 3. Another option is that the power plant operator will claim/recognize his expenses at the lump-sum amount. We may conclude that the application of lump-sum expenses is the more favorable option. Under the newly set legislative conditions, the power plant operators will probably make their decisions only on the basis of comparison of the actually spent expenses and the lump-sum expenses. The truth is that if the operator decides to claim the expenses in the amounts actually spent, he will have to keep accounting books which may bring additional costs for accounting and tax-related consultancy.

Table 3. Overview of depreciation in t particular years of power plant life

Year	Green premium		
	Depreciation	Depreciation reserves	Net book value
1.	12 169	12 169	553 831
2.	29 149	41 318	524 682
3.	29 149	70 467	495 533
4.	29 149	99 616	466 384
5.	29 149	128 765	437 235
6.	29 149	157 914	408 086
7.	29 149	187 063	378 937
8.	29 149	216 212	349 788
9.	29 149	245 361	320 639
10.	29 149	274 510	291 490
11.	29 149	303 659	262 341
12.	29 149	332 808	233 192
13.	29 149	361 957	204 043
14.	29 149	391 106	174 894
15.	29 149	420 255	145 745
16.	29 149	449 404	116 596
17.	29 149	478 553	87 447
18.	29 149	507 702	58 298
19.	29 149	536 851	29 149
20.	29 149	566 000	0

Source: author's own work.

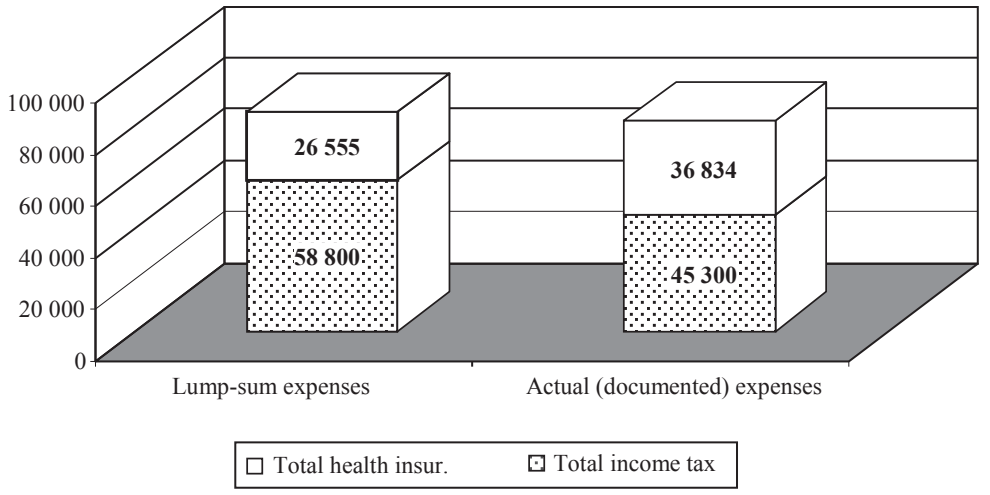

Figure 3. Total tax burden for individual variants of expense claiming (2011)

Source: author's own work.

Should the photovoltaic power plant owner decide to claim the expenses in their actual amount, the income tax for the whole life of the power plant (20 years) would be CZK 45,300.00 and the payments of health insurance premium would be CZK 36,833.00. In total, the power plant owner would pay for taxes and insurance CZK 82,134.00.

Should he decide to claim the expenses using the lump-sum amount, for the same period he would pay CZK 58,800.00 for the income tax and CZK 26,555.00 for health insurance. In total he would have to pay CZK 85,355.00.

The graph in Figure 12 shows that both variants are almost equal, respectively that the variant of actual (documented) expenses is more favorable in terms of tax and insurance payments.

6.3. Application of basic methods for economic evaluation of the investment

In order to be able to determine the optimum tax policy (calculation of the lowest possible tax base), it is recommended to carry out the economic evaluation of the investment. For this analysis three methods were selected – rate of return, net present value and profitability index. The evaluation is again prepared for the conditions of the year 2010 and then for 2011 (consideration is given to legislative changes).

a) Evaluation under conditions of historical costs

Under conditions of 2010, the manufacturers guaranteed a rate of return from 8 to 10 years. Their assumptions were based on the annual incomes from power plant operation, compared with the investment costs. In this particular case the rate of return was calculated from the annual CF. Also considered were the annual costs required for power plant operation (insurance + repairs). The resulting rate of return was 11.53 years. If the same investment was evaluated under the conditions of legislation of 2011, the rate of return on the basis of historical costs would be determined at 24.42 years.[10] If the calculation only considers the investment costs and incomes from power plant operation (not the annual operating expenses), the investment would be reimbursed in 17.26 years.[11]

b) Evaluation under conditions of discounted values

This evaluation is closer to real conditions, especially because it considers the time factor. The rate of return in this model case was calculated at 18.01 years. The indicator of net present value was positive and the investment was therefore classified as acceptable.[12] The same applies to the calculation of the profitability index,

[10] The calculation is again based on the formula DS = IN/CF, where DS is the period of repayment, IN are the investment costs and CF is the annual cash flow.

[11] The calculation would be based on the formula DS = IN/Incomes, where DS is the period of repayment and IN are the investment costs.

[12] To determine the discount rate, 4.2% government bond was used. The government bond value was increased by factor β (i.e. 0.9% for the area of renewable energy sources)

exceeding 1 in this case. Under the conditions of 2011 the rate of return was determined close to the lifetime of the power plant. This means that if the calculation is based on discounted values, the rate of return would exceed the repayment period of the investment.

c) Evaluation of investment considering collateral effects

Collateral effects cover annual savings from unconsumed electricity and annual payments for purchased electricity. By considering these two factors the calculation is as close to reality as it can be. It is not a simple evaluation of investment, but rather the overall assessment of operation associated with the investment. It is what the investor really needs to know in order to be able to determine whether the investment into the photovoltaic power plant will bring some profit.

After the inclusion of collateral effects into the calculation of financial analysis, the rate of return was determined at 21.6 years, which is 1.6 years over the guaranteed lifetime of the power plant. The net present value is negative and the profitability index below 1. All these three indicators therefore show that the investment would not be profitable in this particular case.

From the procedures described above it is clear how important the individual parameters considered are during the economic assessment of an investment – whether the assessment is only aimed at the investment or it is more important for the investor to determine the future profit from the operation of the investment. The results of all three variants are shown in Figure 4.

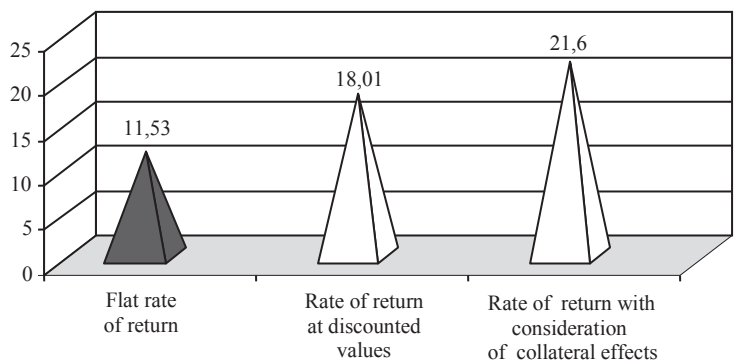

Figure 4. Rate of return under the green premiums regime

Source: author's own work.

While evaluating the potential investment under the conditions of 2010, to get the most realistic results the investor found that he cannot rely on the declarations by manufacturers of photovoltaic power plants regarding a lifetime of 8 to 10 years. Such declarations would only be true in the case of the calculation of the rate of return under the conditions of historical costs and considering both the costs for

investment and the annual incomes from the investment. Should however all effects associated with the operation of the power plant be considered including the time factor, the rate of return would exceed the guaranteed lifetime of the power plant and the investment would be not worth it.

The change of legislative conditions for 2011 makes the investments into solar energy power plants even harder. Crucial is especially a considerable lowering of green premiums and purchase (buyout) prices, but also the fact that the incomes are no longer exempt from taxation. These are the crucial changes making the rate of return of the solar energy power plants much longer.

The conclusions presented above show the effects of the development of especially tax legislation on the efficiency of a hypothetical investment into the alternative energy source. Logically, the results would be different for other types of power plants or other economic entities. However the clear deflection from the support of environmental solutions that has been obvious in the past few years, especially in the tax legislation, would affect every investment made in this area.

7. Conclusion

In recent decades the Czech Republic, as a fully-fledged member of the European Union, has generated multiple initiatives considerably improving the approach of our country to environment-related issues. Within the scope of state environmental policy, state authorities have developed and implemented a complex mix of environmental tools in order to – at least partially – transfer the negative externalities into the costs of enterprises. The mix of environmental tools covers administrative tools represented by a complexity of orders and regulations aimed at the protection of the environment. Recently, economic tools have also been considered as quite important, represented especially by fees collected from those economical entities causing harm to the environment. A relatively new tool for the solution of environmental issues is the Czech tax system. In consonance with the idea of ecological tax reform, ecological taxes were implemented into our tax legislation, and since 2008 the environmental footprint of human labor has also been considerably reduced.

It is undisputable that individual activities of economical entities, especially business entities, play an important role in environmental protection. The enterprises approach environmental protection actively, monitor their environmental profile and make use of the voluntary tools and methods available to improve the general awareness of the environmental aspects and issues among the general public.

One of the ways of how to reduce the harmful environmental footprint of corporate activities is the use of alternative energy sources. The paper monitors the current situation with regard to the use of these alternative sources in the Czech Republic, in particular the legislative options for the use of alternative energy sources within the scope of business activities. This topic is covered in accounting as well as

tax legislation also affecting the acts on health insurance and social security. As a consequence of significant changes in the tax legislation in the last three years, the level of support of the development of environment-friendly facilities for the generation of energies as well as tax incentives have been considerably reduced. The paper analyzes the legislative conditions valid in 2010 when multiple tax incentives were available with regard to investments into alternative energy sources and the economic assessments of prospect investments into these projects were relatively positive in most cases. As a contrast, the analogical calculations for 2011 are presented. In this year, due to the amendment of the related legislation, the investments into alternative energy sources are no longer considered as unambiguously profitable, especially because of the higher tax burden and also on the basis of an analyses of the efficiency of individual investment variants.

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ZARZĄDZANIE ŚRODOWISKOWE W PRZEDSIĘBIORSTWIE

Streszczenie: Opracowanie dotyczy dwóch aspektów badań prowadzonych w zakresie działań środowiskowych wynikających z wymogów w zakresie rozwoju zrównoważonego. Pierwszy punkt widzenia uwzględnia państwową politykę środowiskową, w ramach której państwo, wdrażając różne instrumenty służące do ochrony środowiska, wpływa na zachowania poszczególnych podmiotów gospodarczych. Z drugiej strony badaniami objęto działania środowiskowe podejmowane na poziomie przedsiębiorstwa. Uwagę poświęcono wykorzystywaniu alternatywnych źródeł energii. Zbadano korzyści ekonomiczne i wady wykorzystywania tych źródeł w ramach działalności przedsiębiorstwa przy uwzględnieniu obecnych przepisów prawa obowiązujących w Republice Czeskiej.

Słowa kluczowe: polityka ochrony środowiska, źródła energii, elektrowni fotowoltaicznych, efektywność przedsiębiorstw.