

AN EVALUATION OF REGIONAL DEVELOPMENT IN THE CONTEXT OF ECONOMIC AND ENVIRONMENTAL BENEFITS

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Abstract: Local government units have an important role in creating local policy on building energy security. Their targeted and proactive actions may result in a significant reduction in consumption of used media, which correlates with a reduction in harmful emissions and reducing their costs. In this article is an attempt to determine the impact of management actions set related to monitoring media consumption to reduce their consumption by local government units of Czestochowa. The studies include the analysis of the results of monitoring conducted since 2003, of the consumption of energy and water media based on the data transferred from the 118 educational buildings administered by institutions subordinate to the city. Determination of the factors generating tangible environmental benefits and financial results can enrich the knowledge base for possible use in other local government units but also to provide measurement in the study of human development in terms of understanding and respect for the common good.

Key words: energy management, energy security, public goods, level of social development, local government.

Introduction

Local government units have to fulfill a number of tasks of the municipality. One is to ensure the smooth functioning of the system of public buildings and facilities for education. This involves covering the operating costs of the buildings, in particular, cover the cost of supply of electricity, heat, water supply and sewage. Here it is important also creation of local policy on energy security. Active measures may result in a significant reduction in consumption of media used, which correlates with a reduction in harmful emissions and reducing their costs. Monitoring the media consumption of energy and water delivery and sewage disposal allows for active management on managerial actions. The aim is to optimize the use of media and reduce operating costs. Studies suggest that the evaluation of the results achieved through management activities and increase awareness of the users surveyed objects leads to significant environmental benefits and cost savings.

Local government as a creator of local energy policy

European Energy Policy (COM, 2007) provides a framework for the construction of a common energy market in which energy production is separated from the distribution, and a key priority is to ensure security of supply and network of

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energy media. One of the main objectives is protecting the environment in the area of air quality and resource efficiency including also fuels.

Polish Energy Policy 2030 adopted by the Council of Ministers on 10th November 2009 positively responds to the requirements and priorities outlined in the European policy documents, giving the key areas of impact include:

- improving energy efficiency in generation, transmission and energy consumption,
- improve the level of energy security, based on its own resources of raw materials,
- increasing the use of renewable energy sources,
- the development of competitive fuel and energy markets.

All of these elements are also relevant to the local energy, shaped and implemented at the level of local government units. The European Union assigns a special role hosts and organizers of the making and implementation of local energy policy. According to The Polish Constitution it is local government unit. The provisions of the Polish Energy Policy oblige governments to implement targeted actions, enabling complete commitments to improve energy efficiency, use of renewable energy sources and reducing CO₂ emissions into the atmosphere by using the following tools:

- implementation of the plans, taking into account the priorities of energy policy, including the applying of public-private partnerships,
- planning, to ensure the implementation of energy policy in the effective supply of land development in the energy utilities in the implementation of the principle of minimal impact on the environment,
- developing local strategic documents for the procurement community in energy, which are the assumptions and plans for the supply of electricity, heat and gas fuels supply,
- take actions that lead to efficient managing energy and fuels, by implementing a catalogue of actions consistent with objectives of the National Action Plan for Energy Efficiency.

Local authorities implementing principles of sustainable development must work with all local institutions and more than local social organizations and NGOs, as well as businesses and residents for whom quality of life is a measure of the degree of satisfaction of their needs. These needs relate to areas such as public safety, housing, health care, education, access to cultural objects and achievements, communication, work, adequate (not degraded) environment, access to energy utilities, which the progress of civilization of the area, allow for placement development and the realization of the investment in services and manufacturing.

It should be noted that the municipality is required to carry out their duties in accordance with the national energy policy. The condition of the proper use of energy resources by the community is multi-faceted education population in this area. These actions result in joint initiatives, allowing for improved quality of life

in the area of low emission reduction and air quality improvement. Moreover, contribute to the creation of civil society, actively involved in decision-making on sustainable development of the local economy, energy and the environment (Ślusarczyk and Modrak, 2010, Brzeziński et al., 2013).

Energy and environmental management as part of management of local government

Under current trends, management is not just an organization or company. It equally applies also to local government units. Its proper functioning is dependent on correct undertaken and carried out management processes. Therefore, the definitions describing the management of the organization can safely refer also to the local government units, which are a specific form of organization implementing public tasks (Korzeniowski, 2011). Effectively implemented process of managing energy and the environment, which is part of the energy policy community, resulting in benefits for both the financial and environmental (Grabara and Nowakowska, 2009). First, local governments need to address the management of public services, property management and then only after the management of energy and the environment.

Although the management of energy and the environment is becoming more and more important in the activities of the municipalities are responsible cannot be forget about the other obligations of the entity which is the unit of local government. Energy and environmental management will be effective and will benefit only when combined with effective management of services and infrastructure that must meet, inter alia, the necessary technical requirements. This process can also be used in communal housing, where the main goal is to improve the quality of life and the positive impact of the activities carried on air quality. Management actions implemented in urban infrastructure are interrelated and together constitute the only efficient and effective management process.

Implementation of measures in the field of energy and environmental management can significantly reduce energy consumption while maintaining or improving the living standards of modern societies. In this area are crucial investments in the field of thermal insulation and heat changes for greener (Kot and Ślusarczyk, 2013, Matušíková and Plavčanová, 2012).

Evaluation as a process of economic benefits and environmental

The term evaluation means to estimate value. In practice, the Polish government mid-90s this term, however distorted, explaining it as a rating. However, evaluation is a process in which assessment is only one element. Moreover, the evaluation also creates a discipline, field of knowledge, combined with the practice of applied sciences of public policies (Olejniczak, 2008). The adoption of an appropriate definition of the evaluation depends on the subject matter and other elements of its specificity. Therefore broadly speaking, the evaluation is

the systematic study of the socio-economic gathering evidence, evaluating and providing information on the quality and value of the program, project or policy (Górniak and Keler, 2008). It can also be successfully used as one of the modern trends in the management of power consumption (Szkutnik and Jakubiak, 2012), heat and water. In this way, an evaluation may be of paramount importance to reduce the total cost of media consumption. Evaluation is an important step in the life cycle of public policies. It should not be construed as bureaucratically imposed, unnecessary and expensive element. Properly conducted, can first of all reduce the allocation of public funds for activities irrelevant, ineffective, inefficient and not benefiting society (Olejniczak, 2008, Marinescu E. and Marinescu L., 2011).

In the private sector effectiveness is easily verified by the mechanisms of the free market. However, public sector activities, although often carried out under market conditions, there can only be evaluated from the perspective of profit. The criteria for evaluation of public programs are varied and depend on many factors, including prevailing beliefs or current social needs (Olejniczak, 2008). The evaluation is based on a systematic research process, provides criteria, methods and means to assess the reasonableness of public action (Górniak and Keler, 2008). Measures to promote evaluation in the public sector in Poland, focused primarily on improving the knowledge and skills of officials involved in the management of public funds.

Energy and environmental management in public buildings

City of Czestochowa since 2003 implements the program “Energy and environmental management in public buildings”. It involves carrying out full monitoring of utility consumed and water and wastewater facilities for up to 120 under the local government unit. Detailed reports provide technical, operational, and energy analysis conducted analysed objects form the basis of a unique knowledge base operating costs of educational facilities. Based on the obtained values are used to monitor the operation of facilities and costs incurred by them (Stefko et al., 2011).

Obtained data from individual objects and their mutual statement gives you the ability to make the right management decisions. Analysis of media consumption allows you to make recommendations on the systems operational. The acquisition of technical data objects and use these objects of utility support decision – making process of upgrading some systems and retrofitting activities. The impetus to introduce monitoring of educational institutions in the city has been observed high operating costs and the high volatility compared to similar objects. Before the introduction of the obligation to report quantities consumed administrators media objects independently administered the media and educational institutions bear the charges in accordance with the terms of their provision, proposed by the utility companies. Most often, this resulted in inflated costs for supplied utilities and their excessive consumption, resulting from the lack of expertise in this field among administrators objects. In

addition, complex and powerful business tariffs significantly impede optimization of costs for media delivery. It should be noted that in the case of educational facilities costs shall be borne by the municipality thus reducing operating costs directly affects implemented by the local government budget.

Implementation of the energy and environmental management in public buildings delivers real environmental and economic benefits. Table 1 and figure 1 shows a summary of water consumption and sewage disposal in the years from 2003 to 2012 in 118 educational facilities covered by the program. The base score assumed consumption in 2003 and reported savings relate to the base year 2003. The introduction of monitoring of water and sewage lead to a reduction of water consumption and the need to receive sewage reduced the value of 527 783 m³, to the level of 1 486 157 m³, representing 26,21% of the consumption in the period of time. It should be noted that the evaluation process meant that for the first seven years of operation of the monitoring system has been gradually reduced the amount of water used from the 201 403 m³ in 2003 to 127 164 m³ in 2009. In subsequent years, consumption of water is maintained at a level of from 131 490 m³ to 134 576 m³, which means reduction of water consumption ranges from 66 827 m³ to 69 913 m³ per year. The mechanisms introduced for monitoring and control of media consumption and the resulting effect of reducing water helped reduce the costs incurred by the local government. Given the increasing costs of providing water and sewage Czestochowa city in 2012 saved 149 344 Euro and together in the period gave the amount of 947 839 Euro. Figure 1 shows the graphical changes arising out of the use of monitoring.

Table 1. Changes in water consumption and sewage disposal, and their economic effect in 118 educational facilities in Czestochowa during 2003 – 2012.

Year	Water consumption	Reduction of water consumption	Price for supplied water and sewage disposal	The cost of providing water and sewage disposal	Savings relative to 2003
	[m ³]	[m ³]	[Euro]	[Euro]	[Euro]
2003	201 403	–	1,31	263 187	–
2004	183 797	17 606	1,33	244 070	23 380
2005	159 275	42 128	1,38	220 326	58 276
2006	145 259	56 144	1,48	215 184	83 171
2007	139 770	61 633	1,53	213 378	94 091
2008	129 064	72 339	1,71	220 370	123 515
2009	127 164	74 239	1,88	239 043	139 554
2010	134 576	66 827	1,96	263 389	130 792
2011	131 490	69 913	2,08	274 060	145 717
2012	134 359	67 044	2,23	299 291	149 344
Together:	1 486 157	527 873	–	2 452 297	947 839

Studies on changes of heat energy supplied for educational facilities in Czestochowa, was based on data provided from the municipal system of media monitoring. Analyzing the data of district heat consumption in buildings of education in each year must be taken into account changing weather conditions and the length of the heating season. Table 2 provides data on the heat energy consumption in 118 educational facilities in the years 2003 to 2012 and weighted average temperature and length of the heating season. This made it possible to estimate the heat energy consumption taking into account changes in temperature and length of the heating season, taking the base year 2003. Due to the lack of data on the length of the heating season and the weighted average temperatures in 2012 cited value does not include adjustments related to changes in temperature and length of the heating season in 2012 and ends in 2011.

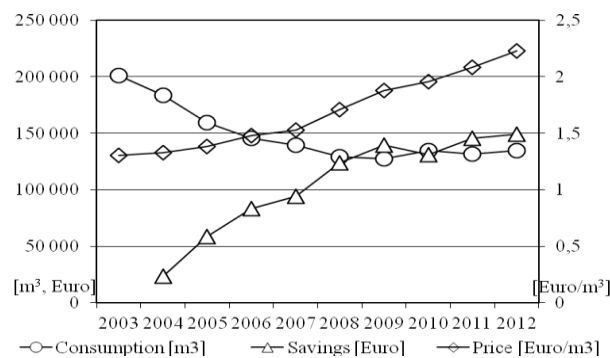


Figure 1. Changes in water consumption and sewage disposal, and their economic effect in 118 educational facilities in Czestochowa in the years 2003 – 2012.

Analysis carried out on the basis of the changes in the environmental conditions as detailed show achieved savings from management actions. Analyzing values of heat energy as well as the adjusted values of power consumption (table 2) it should be noted that in various years has clearly limiting the energy consumption of 175 199 GJ 128 469 GJ value and after the correction 122 509 GJ. The greatest relative reduction in energy consumption to the value of 107 652 GJ occurred in 2007, taking into account the relatively high average weighted temperature of 278,85 K and the length of the heating season 245 days.

The cost of providing thermal energy to heating object is a significant part of the costs of the facility. Reducing energy utility costs can be achieved by lowering the price of delivered media or restrict their use. In the case of thermal energy district heating price is determined by the approval of tariffs for heat transfer and the Energy Regulatory Office. The principle of third party access in the heating market virtually non-existent due to the high technical limitations of heat transfer and the reluctance of companies with transmission and generation to share an outlet with other companies.

Table 2. Consumption of heat energy during the heating season to take account of changes in temperature and length of the heating season in relation to 2003 (own study).

Year	Heat consumption	Average weighted temperature during the heating season	Number of heating days	Heat energy consumption during the heating season to take account of changes in temperature and the length of the base of the heating season in 2003
	[GJ]	[K]		[GJ]
2003	175 199	274,89	209	175 199
2004	150 036	276,18	215	145 167
2005	138 276	275,88	216	133 312
2006	129 339	275,01	193	140 000
2007	128 015	278,85	245	107 652
2008	137 047	278,91	236	119 616
2009	138 382	277,22	216	132 771
2010	149 747	277,47	266	116 562
2011	128 469	277,63	217	122 509
2012	132 349	–	–	–

Establish a system of monitoring and control of utility consumption in 2003 and sent in analysing data and making recommendations for administrators operating facilities resulted in a significant reduction of heat energy consumption in the studied buildings.

Table 3 shows the increase of prices for district heating supplied. In 2003 for 1 GJ of energy price was 9,49 Euro while in 2012, the price of heat amounted to 15,01 Euro. For the energy supplied to the sample 118 objects a local government in the years 2003 to 2012 paid 16 669 899 Euro. Analysing the energy consumption changes with respect to 2003 and energy consumption changes reflect the changes in temperature and length of season, it should be noted that the general trend is maintained reducing energy consumption confirms the evaluation process for monitoring operation of educational facilities. These processes have led to substantial savings of 4 250 931 Euro and taking into account the changes in temperature and season length 5 261 253 Euro.

Each unit of local government in their resources has a number of objects (not just education), which generate costs associated with their operation. Administrators individual objects do not have specific knowledge of the range of possible solutions to reduce the cost of ownership of energy utilities. Although the costs are directly or indirectly affect local governments in their structures also lack of specialists. Currently, there is still little specialized departments within

the structures of local government units dealing with media consumption constraints. In 2012, in Silesia only four municipalities were created units dealing with these issues. In Czestochowa since 2003, operates the Municipal Engineer's Office issues such as monitoring and management activities in the field of energy and water and wastewater facilities in all municipality is about 230 buildings and premises used by educational institutions and municipal companies. Activities office brings tangible benefits to the city due to reduction in operational costs of administered objects. Implementation of the recommendations resulted in significant savings in water consumption and reduce costs in this respect, and contributed to a better use of facilities.

Table 2: The economic effect resulting from management actions based on its monitoring heat energy consumption for 2003 also taking into account the changes in temperature and length of season.

Year	Cost of heat energy	Price network heat supplied	Change of energy consumption in relation to 2003.	Change of energy consumption in relation to 2003 with correction	Savings	Savings with correction
	[Euro]	[Euro]	[GJ]	[GJ]	[Euro]	[Euro]
2003	1 662 641	9,49	–	–	–	–
2004	1 531 794	10,21	25 163	30 032	256 902	306 616
2005	1 408 074	10,18	36 923	41 887	375 990	426 539
2006	1 420 741	10,98	45 860	35 199	503 755	386 648
2007	1 452 212	11,34	47 184	67 547	535 259	766 261
2008	1 619 584	11,82	38 152	55 583	450 870	656 866
2009	1 745 221	12,61	36 817	42 428	464 322	535 085
2010	1 946 809	13,00	25 452	58 637	330 893	762 320
2011	1 896 402	14,76	46 730	52 690	689 807	777 784
2012	1 986 421	15,01	42 850	42 850*	643 134	643 134*
Sum:	16 669 899	–	345 131	426 854	4 250 931	5 261 253

* due to the lack of data on the length of the heating season and the weighted average temperatures in 2012 cited values do not reflect adjustments related to changes in temperature and length of the heating season in 2012.

Demonstrated usefulness of the monitoring carried out a large media consumed energy, water and sewage mainly measured values obtained economic benefits for local government and environmental benefits caused that to improve the functioning of the system has been developed IT tool – Media Monitoring System, which since 2010 has been working on the online platform of the city. Implemented IT tool allows you to login through individuals and independent data entry of accounting documents. The individual data are automatically checked first and then validated by experts from the City Engineer's Office. Approved the produce statistics used in the management of energy both at the individual level

of education and local government. Implemented IT tool has improved greatly simplifying the system to make comparisons and analyses.

Conclusion

This system energy and environmental management in public buildings consist largely one of continuous evaluation (monitoring) consumed energy utilities, water and sewage discharged. In Czestochowa, it is conducted continuously since 2003. It allowed for a significant reduction in energy utilities, water and sewage reducing environmental pollution. These effects were obtained by non-cost management actions to optimize procurement processes and the use of available resources. Obtaining a particular economic result is the result of public awareness of the media on the need to make efficient use of scarce resources and implemented recommendations by professionals employed by a local authority. The resulting economic effect is a significant reduction of costs in the budget of the municipality, which, given the limited resources and ever-rising costs of energy utilities can improve the financial condition of local governments.

Owned database of media consumption of energy and water is a unique collection of data describing such a large amount of educational facilities. Mutual comparison of media used by objects, analyzing the causes of the increased salaries energy, draw conclusions and propose solutions to reduce energy consumption have achieved a very good environmental and economic effects. The implementation of such system is a little complicated undertaking and low budget. The data is, however, properly interpreted, suggest some modifications and facilities to convince users to change habits. Such a task should take a person or a group of professionals employed in local government with high professional qualifications.

The presented system should be implemented in all local government units helping to increase public awareness and environmental responsibility. The economic effects may be an additional incentive to implement the described project. Unfortunately, the low level of awareness among those in charge of local government units in the possibility of reducing energy consumption and a small number of specialists limit the possibility of the cheapest forms of saving natural resources by reducing fuel consumption.

References

- Brzeziński, S., Zborowski, K., Pietrasieński, P., 2013, *The effect of the liberalization of electricity market in Poland*, "Polish Journal of Management Studies" 7.
- Communication from the Commission to the European Council and the European Parliament "An Energy Policy for Europe", COM (2007) 1, Brussels, 10.1.2007.
- Górniak J., Keler K., 2008, *Ewaluacja i wskaźniki w cyklu planowania i realizacji polityk publicznych*, „Zarządzanie Publiczne” 3 (1).
- Grabara J. K., Nowakowska A., 2009, *Procurement Process in Power Energy Enterprise*, "Annales Universitatis Apulensis Series Oeconomica" 11 (2).

- Korzeniowski L., 2011, *Podstawy zarządzania organizacjami*, Difin, Warszawa.
- Kot S., Ślusarczyk B., 2013, *Aspects of Logistics in Biomass Supply for Energy Production*, Applied Mechanics and Materials.
- Marinescu E., Marinescu L., 2011, *Accounting Approach of Sustainable Performance in the Overall Context of Sustainable Development*, "EuroEconomica" 30 (5).
- Matušiková, D., Plavčanová, D., 2012, *Congress tourism in Slovak conditions and its importance in regional development*, Visnyk of Volyn institute for economics and management.
- Olejniczak K., 2008, *Mechanizm wykorzystania ewaluacji: studium ewaluacji średniokresowych INTERREG III*, SCHOLAR, Warszawa.
- Ślusarczyk B., Modrak V., 2010, *The Role of Business in Achieving Sustainability*, Part 2, Implication for Industry, Kosice, Presov.
- Stefko, R., Dorcak, P., Pollak, F., 2011, *Virtual social networks and their utilization for promotion*, "Polish Journal of Management Studies" 4.
- Szkutnik J., Jakubiak D., 2012, *New Trends in Consumption Management of Electric Energy*, "Polish Journal of Management Studies" 5.

EWALUACJA ROZWOJU REGIONALNEGO W ASPEKCIE KORZYŚCI EKONOMICZNYCH I ŚRODOWISKOWYCH

Streszczenie: Jednostki samorządu terytorialnego pełnią ważną rolę w kreowaniu lokalnej polityki w zakresie zabezpieczenia energetycznego. Ich ukierunkowane, aktywne działania mogą skutkować znaczną redukcją zużycia wykorzystywanych mediów, co koreluje ze zmniejszeniem emisji szkodliwych substancji oraz ogranicza ponoszone koszty. W artykule podjęto próbę określenia wpływu podejmowanych działań zarządczych związanych z monitorowaniem zużycia mediów na ograniczenie ich zużycia przez jednostki samorządu terytorialnego Miasta Częstochowy. Prowadzone badania obejmują analizę wyników prowadzonego od 2003 roku monitoringu w zakresie zużycia mediów energetycznych oraz wody na podstawie danych przekazywanych ze 118 budynków oświatowych podległych miastu. Określenie czynników generujących wymierne korzyści środowiskowe oraz finansowe może wzbogacać bazę wiedzy dla możliwych zastosowań w innych jednostkach samorządu terytorialnego, ale również stanowić miary w badaniu rozwoju społecznego w zakresie zrozumienia i poszanowania wspólnego dobra.

Słowa kluczowe: zarządzanie energią, bezpieczeństwo energetyczne, dobra publiczne, poziom rozwoju społecznego, samorząd terytorialny.

区域发展中的经济和环境效益方面的评价

摘要: 地方政府单位可以在创建本地策略构建能源安全的重要作用。他们针对性和积极主动的行动可能会导致消费使用的媒体，相互关系以减少有害物质排放和降低其成本的大幅度减少。在这篇文章是尝试确定由地方政府单位的琴设置相关的监测媒体消费，以减轻他们的消费管理行动的影响。研究包括监测结果的分析进行了2003年以来，消耗的能源和水媒体基于传输从118教育大厦由机构进行城市管理的数据测定的产生有形的环境效益和财务结果的因素可以丰富可能用在其他地方政府单位但还好提供测量在研究人类发展的理解和尊重共同的知识基础

关键字: 能源管理、能源安全、社会发展水平、地方政府的公共物