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## GREEN PUBLIC PROCUREMENT FOR WATER INFRASTRUCTURE IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT AND RESPECT FOR WATER

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### ZIEŁONE ZAMÓWIENIA PUBLICZNE DLA INFRASTRUKTURY ŚCIEKOWEJ W KONTEKŚCIE ZRÓWNOWAŻONEGO ROZWOJU I POSZANOWANIA WODY

#### **Abstract**

The paper presents the results of research aimed at examining how public institutions implement sustainable development policy at the stage of preparation of tender documentation for construction and extension of wastewater treatment plants and water and wastewater infrastructure. The most important assumptions of sustainable development policy at national and European level are also briefly discussed.

**Keywords:** sustainable development, water infrastructure, green public procurement

#### **Streszczenie**

W artykule przedstawiono wyniki badań, których celem było sprawdzenie, w jaki sposób instytucje publiczne realizują politykę zrównoważonego rozwoju na etapie przygotowywania dokumentacji przetargowej na budowę i rozbudowę oczyszczalni ścieków i infrastruktury wodno-ściekowej. Krótko omówiono również najważniejsze założenia polityki zrównoważonego rozwoju w wymiarze krajowym i europejskim.

**Słowa kluczowe:** zrównoważony rozwój, infrastruktura wodno-ściekowa, zielone zamówienia publiczne

## 1. Introduction

The public procurement system, due to its role in the economy, forms the basis for policy-making in regard to public spending as well as is one of the elements of sustainable development and environmental policy, setting its trends.

This indicates that the development of civilization has led among other things to improving the quality of life of its inhabitants. The topic of sustainable construction is discussed extensively in the literature and is mainly related to buildings [1, 2].

One of the criteria for assessing the standard of living of citizens is access to drinking water and providing ways of solving the problems of the sewage generated. The increase in well-being should not take place at the expense of the environment. Significant importance is attributed here to the transformation of environmental policy into a resource-efficient economy.

The condition for the proper functioning and development of water management is the appropriate development of water and sewage infrastructure. Hence, not only water management, understood as sharing water resources, is important, but also of water/sewage management, responsible for the efficient use of its resources.

It is estimated that only 2.5 percent of the Earth's water resources is fresh water, and only 0.6% constitutes water which could be a source of drinking water [14]

Only a small portion of fresh water, approx. 0.3%, is available in the form of rivers, lakes and swamps. As a result of various factors, mainly climatic and hydrological conditions, Poland is threatened by a water deficit [15]. Data from the National Water Management shows that Poland has an average of approx. 1580 m<sup>3</sup> of water per year per capita (in times of drought this coefficient falls below 1000 m<sup>3</sup>), and the average resources per capita in Europe are 4560 m<sup>3</sup>/year, while on Earth approx. 7300 m<sup>3</sup> [4].

In contrast, according to the Central Statistical Office (CSO) data [13], in Poland in 2009, approx. 88% of urban population and only 27% of rural residents used the collective wastewater treatment plants. In 2014, these numbers amounted to respectively 93.90% in urban areas and in rural areas 37.40% of the population. The reason for this is negligence, at the basis of which is a lack of sufficient funds for these types of investments.

In accordance with Article 7 of the Local Government Act [7], meeting the collective needs of the community in the area of water mains, supply in water and sewage disposal is the responsibility of municipalities, which is fulfilled within the financial capabilities by the local governments. Investments in infrastructure are particularly expensive, therefore local authorities are faced with the challenge of obtaining additional sources of financing and using it effectively, for example, through the public procurement system.

One of the most important documents allowing action in this direction was the "National Strategic Reference Framework – National Cohesion Strategy 2007–2013", adopted by the Council of Ministers on 1 August 2006, defining Poland's policy objectives in relation to EU policies. "The upgrade of technical and social infrastructure, which is crucial for the growth and competitiveness of Poland and its regions", is included in a group of specific cohesion policy objectives, and within it "construction and development of environmental protection infrastructure." The Act of 6 December 2006 on the principles of development

policy (Journal of Laws No. 277, item 1658) [8] indicates that the implementation of the development strategy is based on the operational programmes in the form of national operational programmes in relation to the development strategy of the country as well as sectoral strategies, and in the form of regional operational programmes co-financed from the state budget and foreign sources, and implementing development strategies of provinces. The development of municipal water and sewage management in 2007–2013 was included in the national operational programme “Infrastructure and Environment”, adopted by the Council of Ministers on 29 November 2006, as well as in 16 regional operational programmes [3]. Operational programmes have enabled Poland to finance, among other things, sewage infrastructure projects, including sewage treatment plants, amounting to a very significant share of the cost, using European Union funds, and just a small part were to come from domestic sources. Public sector entities – the municipalities – were required to spend these funds in accordance with the provisions of the law on public procurement [9] (e.g. the public procurement act and the relevant sector regulations).

The European Union’s approach to public procurement is based on respect for the environment. The European Commission has consistently supported initiatives to protect the environment, including promoting making procurement commissioned by public authorities more green. “Green public procurement” (GPP) [6] should be understood as a process whereby public authorities seek to procure goods, services and works whose impact on the environment during their life cycle is smaller compared to goods, services and works with the same primary function that would otherwise be procured. The current *Europe 2020* strategy is a long-term social and economic program of the EU. One of its three overarching priorities is sustainable development – promoting a sustainable, ecological, resource-efficient, more “green” and yet competitive economy. This means, among other things, the need to include this priority in all types of policies at EU and national level. Public bodies that purchase goods and services using public funds are obligated to adhere to the principles laid down in the Public Procurement Law [9] and the Public Finance Act [10]. In the case of the issue which interests us, public procurement procedures are being increasingly influenced by the provisions of environmental law, construction law [11] and water law [12]. With regard to public procurement, a regularity can be confirmed with satisfaction, according to which the basic rules specific to this branch of law are subject to modification under the influence of pro-environmental legislation.

Pro-environmental criteria, meeting the needs of environmental protection and sustainable development, can be included in the procurement process at each stage. The most effective is their inclusion in the terms of reference, hence the authors present several examples and options in tabular form:

- 1) Employer’s requirements relating to water consumption in a sewage treatment plant (Tab. 1), and
- 2) Employer’s requirements on the efficiency of sewage treatment (Tab. 2),

Which could make the contract and thus the sewage treatment plant more “green”, corresponding in a greater extent to the concept of sustainable development, and the funds disbursed more effective. They are also proposals of solutions or best practices, which are more



environmentally friendly, and therefore meeting the objectives of the concept of sustainable development [5]. Results of studies showing a degree of understanding and “greening” of public procurement are also presented.

## **2. Application of environmental requirements and criteria in public procurement – own study**

The study involved proceedings, the subject of which was the construction or expansion of water and sewage infrastructure, which were initiated between 2009 and 2015, and regarded investments co-financed from EU funds in 2007–2013. During this period, a total of 113,136 projects were completed, of which 3,077 were in the field of environmental protection. In 411 cases, the project was defined as the construction or expansion of a sewage treatment plant. The study was conducted using a questionnaire developed by the Authors as part of a request for disclosure of public information.

In total, the whole study included 70 projects (out of 411; i.e. approx. 17%) in 70 municipalities, and 172 related procedures – 88 procedures concerned construction work, 19 “design and build” projects, 25 concerned design, and others concerned services, supplies, etc. The cost of the surveyed projects amounted to more than 1.24 billion PLN. This paper presents only part of the results, the proceedings, the subject of which was a contract for the development of design documentation and for the design and execution of work. Environmental requirements are most applicable at the design stage, and therefore the authors decided to focus on this stage.

The research for the analysis of public procurement in the area of sewage infrastructure covered projects carried out in five provinces. This includes two provinces where the investments were the highest (Silesian and Greater Poland provinces) and two where the least funds were allocated for this purpose (Świętokrzyskie and Warmian-Masurian provinces) as well as one province with an average score (Western Pomeranian province).

Respondents answered a number of questions, whose main objective was to investigate whether the employers apply environmental requirements, mainly in the terms of reference, as well as in the evaluation of bids (question 12 and 14). A set of questions related to water consumption and the efficiency of sewage treatment is included in Tables 1 and 2. The employers had the following response choices: Yes (Y), No (N), Not applicable (N/A). The number of responses is shown in the graphs: Fig. 1 and Fig. 3 for procedures for the development of design documentation, Fig. 2 and Fig. 4 show the results of procedures for the design and execution of works. The set of questions was the same for both “development of design documentation” and for the “design and execution of works. In five cases, detailed answers have not been given. Most of the questions concerned the construction and expansion of sewage treatment plants. In both types of procedures, in more than 60% of cases it was indicated that the projects are never consulted with environmental protection specialists.

Table 1 presents the questions related to the requirements of the employers regarding the consumption of water in the sewage infrastructure facilities.

Table 1. Requirements of the employer relating to water consumption. Source: own study

No.	Questions – requirements related to water consumption
1	Overall consumption of drinking water in the sewage infrastructure facilities (excluding water consumption in office or administrative buildings), as defined in the documentation for the procurement procedure, should not exceed: Facilities for sewage treatment: $x \text{ m}^3$ of water used per $1000 \text{ m}^3$ of sewage treated; Sewage systems – cleaning the pipes installed: $\text{m}^3$ of water used per 100 m of pipes installed
2	The contractor was required to submit documentation and grant guarantees relating to the annual consumption of water in the treatment plant, verified by summing the consumption of water in all major water-using facilities
3	Sanctions for breaching obligations for the guaranteed water consumption have been defined.
4	The contractor was required to submit documentation and grant guarantees relating to the annual consumption of water in the treatment plant and relating to the consumption of water by specific equipment depending on the type of bid, verified by summing the consumption of water in all major water-using facilities
5	The contractor was required to submit technical data sheets for the maximum allowable consumption of drinking water per $1000 \text{ m}^3$ of treated sewage, confirming compliance with the specification, and had to specify the expected usage of grey water and rainwater, for example
6	The contractor was obligated to point out systems in the sewage treatment plant, where the drinking water is not used for treatment
7	If the bid covered plant operation, did the requirement of verifying consumption include conducting checks using water meters installed for the entire treatment plant
8	Contractors should quantify the expected savings of drinking water resulting from any proposed measures, with reference to the earlier designs or independent technical assessments
9	The contractor was required to propose how to maximise the use of rainwater and grey water
10	In order to verify, the contractor was required to present calculations and documentation in relation to the amount of rainwater and grey water used in sewage infrastructure facilities
11	The contractor was required to propose how to reduce consumption of fresh water to rinse the pipes prior to installation and afterwards
12	Classification of bids took place according to the following criteria: Number of rinses before installation and after its completion; Estimated water consumption expressed by the percentage of consumption of water amounting to ... $\text{m}^3$ per m of pipeline installed
13	In order to verify, the contractor was required to present calculations and documentation related to the consumption of water in relation to the piping
14	Extra points were awarded for measures to save water going beyond the specification as defined in the procurement procedure documentation in accordance with the basic criteria

Fig. 1 and 2 below list the number of responses to issues related to water consumption.

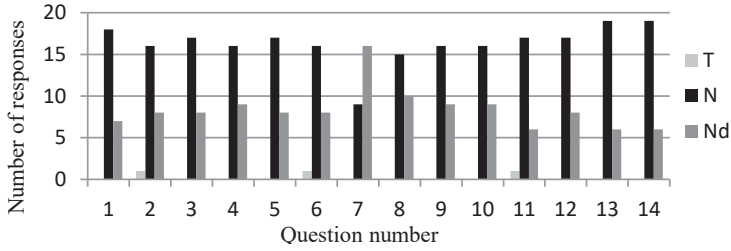


Fig. 1. Requirements for water consumption – design documentation. Source: own study

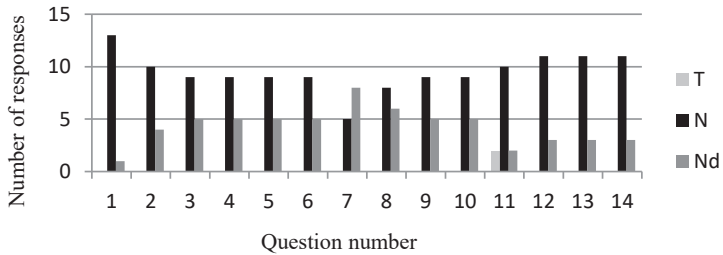


Fig. 2. Requirements for water consumption – design and execution of works. Source: own study

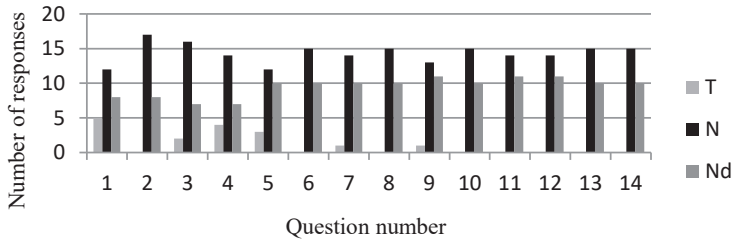


Fig. 3. Requirements for sewage treatment efficiency – design documentation. Source: own study

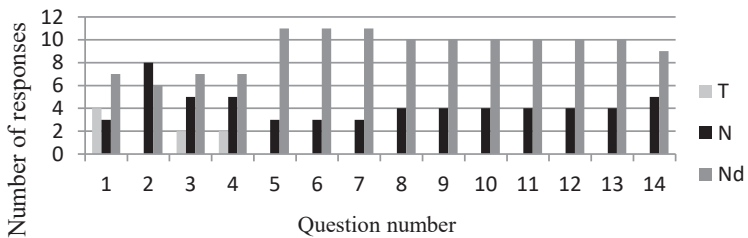


Fig. 4. Requirements for sewage treatment efficiency – design and execution of works. Source: own study

The research results shown in Fig. 1 and 2 show that the employers rarely used requirements that go beyond the basic requirements in the terms of reference at the stage of development of design documentation. In each question asked, negative questions prevail. Answers confirming the use of green requirements are practically none. Employers confirmed the use of environmental requirements in just a few cases, for example, in regard to the use of fresh water to rinse the piping.

Table 2. Requirements of the employer for the efficiency of sewage treatment. Source: own study

No.	Questions – requirements regarding the efficiency of sewage treatment
1	Contractors were required to submit documentation confirming that offered sewage treatment technology complies with the required standards for drainage
2	The employer appealed to the bidders to sign a detailed guarantee for the efficiency of the technological process
3	The procurement procedure documentation describes sanctions for breaching the above obligations
4	Methodology has been described to be used to control the efficiency of the sewage treatment plant
5	Requirements have been set out for the maximum use of chemicals used for precipitation (salts of iron or aluminium) per m <sup>3</sup> of sewage treated or chemicals used for precipitation per kilogram of phosphorus at the inlet
6	The contractor was required to submit approved calculations for the consumption of the precipitation agent or agents per m <sup>3</sup> of sewage treated or kg of total phosphorus at the inlet
7	The contractor has to calculate and document the consumption of precipitation agent or agents per kg of total phosphorus at the inlet, specifying the percentage with respect to the ratio between the traditional uses of a precipitation agent or agents divided by a phosphorus concentration at the outlet from the sewage treatment plant allowed under national legislation
8	The employer requires or promotes (e.g. by awarding additional points) increased cleaning efficiency for heavy metals
9	Contractors had to present documentation confirming the guaranteed level of heavy metals in effluent (µg/l)
10	The employer requires or promotes (e.g. by awarding additional points) increased cleaning efficiency in relation to the persistent organic pollutants, for example, nonylphenols and octylphenols; - benzo[a]pyrene
11	Contractors must submit documentation confirming the guaranteed level of the content of persistent organic pollutants (bis(2-ethylhexyl) phthalate (DEHP), naphthalene, nonylphenol and octylphenol or polycyclic aromatic hydrocarbons (PAH) in treated sewage, expressed in (µg/l)
12	The employer requires or promotes (e.g. by awarding additional points) increased cleaning efficiency for medicinal products (tramadol and primidone)
13	Contractors had to present documentation confirming the guaranteed level of tramadol and primidone in effluent (µg/l)
14	The employer requires or promotes (e.g. by awarding additional points) increased cleaning efficiency for pathogens

Fig. 3 and 4 below summarise in graphs the number of responses to issues related to water consumption.

A similar situation occurs in the case of questions concerning the effectiveness of sewage treatment. The research results shown in Fig. 3 and 4 show that the employers rarely used requirements that go beyond the basic requirements in the terms of reference at the stage of development of design documentation. A large number of “not applicable” responses is related to the fact that the subject of procedures for the “design and execution of work” mainly regarded infrastructure, e.g. construction of sewage piping. Therefore, the employers did not have to use all of the requirements.

### 3. Conclusion

The amount of water consumption is the sum of the necessary consumption and water losses. Rational consumption is the amount of water to meet all human needs. Other activities involving wasting water as a result of, for example, wasteful management, including unfriendly water/sewage infrastructure represent a loss.

Research has shown that too small requirements imposed mainly by municipalities in public tendering procedures for newly built water/sewage infrastructure, do not make full use of the role they could play as a very effective instrument, among other things, for measures aiming at saving drinking water and sustainable development.

At the moment, on the basis of legal possibilities and more often (though insufficiently) in the awareness of administrative authorities at various levels, initiatives to protect the environment are being consistently supported, and the relatively small resources of drinking water in Poland, force the need for further “greening” of public procurements for water/sewage infrastructure, for which the idea of environmental protection should be more natural. It is still necessary to promote knowledge about the admissibility of application of such criteria and the benefits of “green public procurement.”

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