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Sustainable development of Poland - indicator analysis of selected aspects of the community

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ABSTRACT

The following study covers the subject of sustainable development of cities and communities in Poland. The theoretical part presents the essence of the concept of sustainable development. The empirical part contains an analysis of sustainable development indicators in relation to cities and communities in Poland. The research goal is to determine the size of indicators in individual years. This will make it possible to illustrate the scale of actions taken by the state authorities and the authorities of local government units for sustainable development and environmental protection in Poland. The research method used is a comparative analysis. The research period covers the years 2010-2017.

Keywords: The concept of sustainable development, sustainable development of urban communes, indicator analysis, local development

1. INTRODUCTION

In the sixties and seventies, development concepts oriented mainly at increasing production and consumption began to be criticized and considered unfavorable to the general public. Currents taking into account the protection of nature and natural resources have become more and more popular. Ecological problems have become the subject of interest for representatives of many sciences. The issue of environmental protection and natural ecosystems causes the need to look for ways to adapt socio-economic development to the environment.

Solutions in this area can be found in the assumptions of the concept of sustainable development. Its main goal is to integrate environmental activities in such a way that the natural environment performs economic and social functions in the long term [1].

The concept of sustainable development is also referred to as the idea of eco-development. It evolved in response to the need to implement comprehensive changes in the global economy. The appearance of many unfavorable phenomena both in the operation of ecosystems and in people's living conditions was the reason for considering this topic. Development economics indicates income disparities [2]. Development is a category related to the value system, i.e. a set of criteria and principles through which the process of change is observed, therefore it is perceived and evaluated from the point of view of social and economic order. Significant degradation of the natural environment and hence high pollution of water, air and land has become a real threat to human health and life. There have also been economic arguments that threaten future economic growth as a result of running out of natural resources. This resulted in an increase in awareness of the holistic view on individual aspects of economic, social and environmental life [3].

Mobilization of the world of business, science, politics and business has contributed to the development of principles for sustainable development, taking into account the needs of future generations. The idea of sustainable development promotes responsible social life, taking into account environmental needs and expectations regarding progress and development [4].

2. OVERVIEW OF THE DEFINITION OF SUSTAINABLE DEVELOPMENT

The idea of sustainable development occurs in many sciences, which is why there are many definitions. In economics it is a concept that focuses the economy's ability to develop in the long term, taking into account the criterion of intergenerational justice [5]. Economically sustainable development means maximizing the benefits of economic development, while protecting natural resources for future generations and enabling their reproduction [6]. Then economic development has a twofold significance, reflecting both the real increase in income in the state and the improvement of other important elements of social well-being. In urban planning, sustainable development is one of the concepts used to manage a city. Its task is to meet all the needs of the local community, while maintaining the balance of the natural environment [7]. In ecology, however, sustainable development is the use of human and financial resources, as well as resources of inanimate and animate nature to meet the needs and expectations of societies and to increase the quality of people's lives and to transform the biosphere, taking into account economic, social and ecological factors and future needs [8].

The concept of sustainable development is gaining more and more supporters, especially in the world of science, politics and also among enterprises. Most often it meets with positive assessment. Concerning this idea, conclusions are made regarding the need to increase the degree of practical application of its principles [9]. However, a critical view can be found in both Polish and foreign literature. Most of these views are philosophical and ethical and refer to the very idea of sustainable development, while some of them point to practical issues related to the implementation of the concept [10].

It is widely believed that the ability to measure and evaluate it is necessary to implement sustainable development. Sustainable development measures are being developed to provide reliable information that can be used as a basis for making decisions at individual management

levels. Measuring the degree of implementation of sustainable development is one of the spheres in which civic participation plays an important role, especially at local and regional level [11].

Measuring sustainable development has many benefits, including [12]:

- the ability to monitor the progress of the implementation of policy objectives and strategies serving the idea of sustainable development,
- creating reliable comparative analyzes, the degree of implementation of the concept of sustainable development,
- facilitating development planning,
- arranging databases containing information on the environment and the spheres of social life,
- creating stimuli stimulating development,
- increasing the level of social participation,
- the ability to provide information that facilitates communication between entrepreneurs, politicians and citizens,
- increasing understanding of the idea of sustainable and sustainable development in society.

Properly developed indicators allow to determine the factors affecting the occurrence of specific problems in organizations or the economy. Sustainable development indicators must meet certain conditions. The most frequently mentioned conditions are [13]:

- ability to reflect the most important aspects of economic, ecological and social sustainability,
- can be used for scientific studies,
- easy interpretation,
- appropriate adaptation to changing conditions,
- ability to show development trends,
- setting a threshold value,
- based on accepted standards,
- easy access to information
- adequate data quality,
- regular updates,
- transforming and improving along with the changing needs of economic development.

It should be emphasized that sustainable development indicators are the basis for verifying the compliance of the declared degree of implementation of the principles of the concept contained in strategic documents with the facts. Sustainable development goals are the standards to be achieved by the state [14].

In Poland, sustainable development has been recognized as a constitutional principle, which is why it is so important to implement and measure the effects of its implementation [15],

The concept of sustainable development is an important element of development policy at both central and regional level. Therefore, the identification of the effects of implementing sustainable development should be a key element in the implementation of this concept [16].

3. ANALYSIS OF SELECTED INDICATORS OF SUSTAINABLE DEVELOPMENT

Indicators of sustainable development of cities and communities have been developed on the basis of set and implemented goals under the document: Transforming our world: the 2030 Agenda for Sustainable Development, adopted by the United Nations (UN) is a program of activities with a unique scope and significance, defining a model of sustainable development at the global level. According to him, modern modernization efforts should focus on eliminating poverty in all its manifestations, while achieving a number of economic, social and environmental goals [17].

The research was based on secondary data on official SDG statistics - indicators for national priorities obtained from the Central Statistical Office of Poland. [18] The empirical part contains an analysis of sustainable development indicators in relation to cities and communities in Poland. The research goal is to determine the size of indicators in individual years. This will make it possible to illustrate the scale of actions taken by the state authorities and the authorities of local government units for sustainable development and environmental protection in Poland. The research method used is a comparative analysis. The research period covers the years 2010-2017.

The empirical part analyzes selected indicators related to the sustainable development of cities and communities in Poland in the years 2010-2017. These indicators relate to Goal 11 defined as follows in Agenda 2030: "Make cities and human settlements safe, stable, sustainable and inclusive." The development of cities is an important aspect because they are centers of culture, science, industry and social development. Cities should be managed in a way that enables successful development and creation of jobs without excessive exploitation of the environment and minimizing costs. Cities and communities face many tasks resulting from the development of civilization. According to the 2030 Agenda, these challenges can be overcome in many ways to enable them to grow, while improving resource use and reducing pollution.

The goal of the tasks set for 2030 is to build cities and communities that offer many life opportunities.

The tasks specified in the document include [19]:

- providing access to adequate, safe and affordable housing,
- covering everyone with a safe, affordable and sustainable transport system, and increasing road safety,
- development of public transport,
- ensuring sustainable urbanization and participation in integrated and sustainable housing planning and management,
- development of activities for the protection and protection of the world's cultural and natural heritage,
- reduce the number of deaths in natural disasters, including floods, and reduce the number of people affected by them,
- reduction of direct economic losses in relation to global GDP, incurred as a result of disasters,
- reducing the negative impact of the city on the environment, paying special attention to air quality and the management of municipal waste and other pollutants.
- ensuring universal and easy access to green spaces and public spaces.

The degree of implementation of the assumed tasks can be assessed using the Sustainable Development Goals (SDG) indicators. Based on official SDG statistics - indicators for national priorities, for Objective 11, i.e. Sustainable cities and communities, we can distinguish indicators such as [20]:

- exposure to excessive noise,
- average usable floor space of an apartment per person in cities,
- percentage of urban population living in flats with a leaking roof, damp walls, floors or foundations, or rot of window frames or floors,
- share of buses for alternative fuel in the total number of buses serving urban transport,
- number of passenger transport per one inhabitant of urban areas,
- percentage of municipal waste intended for processing in a specific manner in relation to the amount of waste generated,
- national PM2.5 average exposure indicator,
- green area in cities [in m²] per capita.

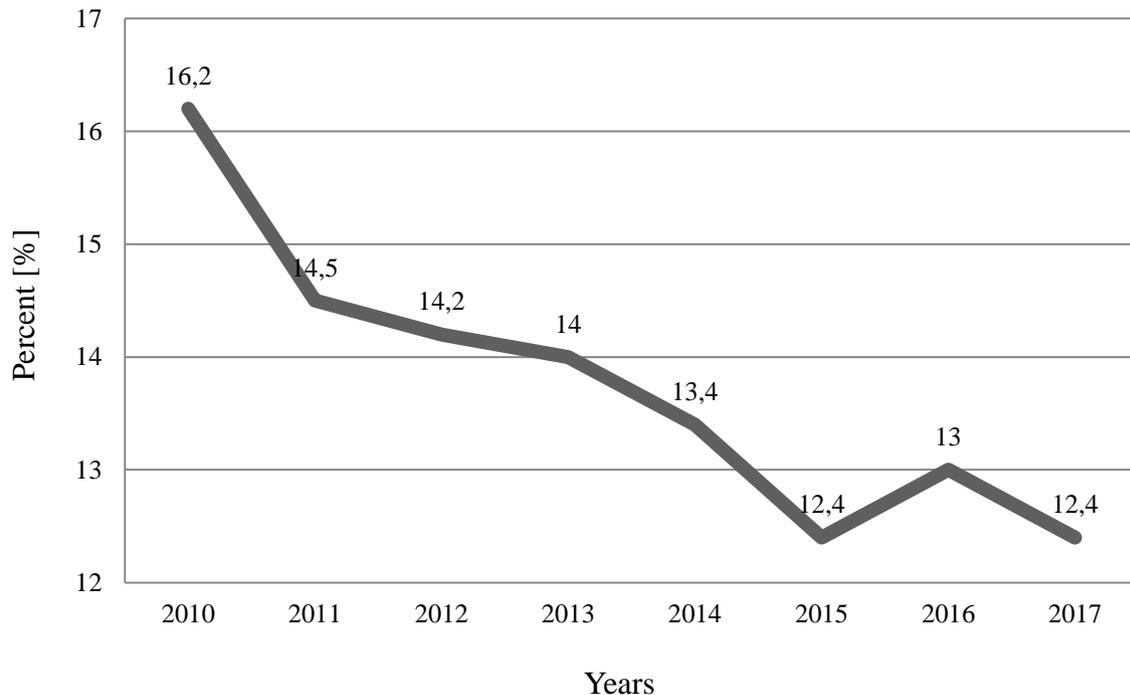


Figure 1. Exposure to excessive noise.
[Source: Official SDG statistics - indicators for national priorities,
Objective 11 - Sustainable cities and communities]

The study analyzes the values of selected indicators for the sustainable development of cities and communities. The first indicator concerns the percentage of households experiencing excessive noise in their home from their neighbors or from outside (traffic, industrial plants, economic activity). Figure 1 shows the noise level in households. Analyzing the change in the indicator in individual years, one can notice its gradual regression, which means that residents

are less expressing dissatisfaction with the noise level in their area. However, it should be noted that the assessment of noise pollution is subjective, therefore an increase in the value of the indicator need not indicate an increase in noise levels, but also a decrease in noise tolerance by residents and vice versa.

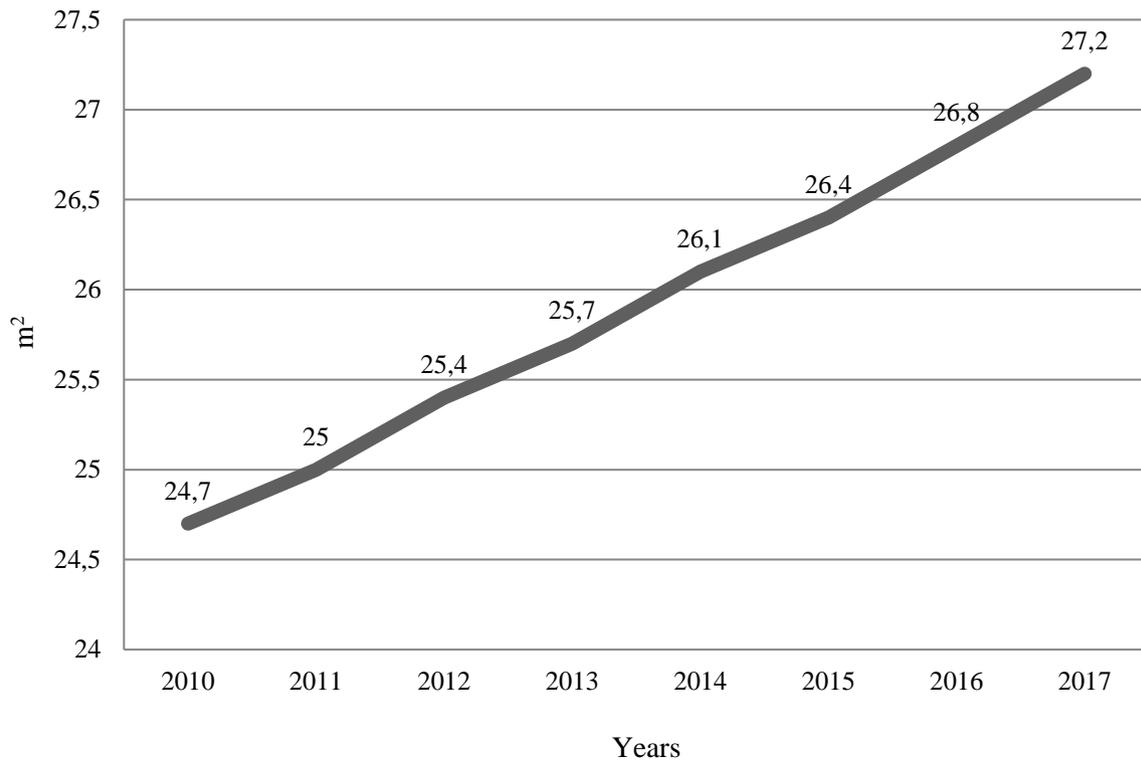


Figure 2. Average floor area of the flat per person in cities

[Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities/]

The second indicator presented in Figure 2 refers to the average floor area of the flat per person in cities. Usable floor area of the flat is the area of all rooms in the flat, regardless of their purpose and method of use. As it results from the presented data, in 2010-2017 the average usable area per one person is systematically increasing. Comparing 2017 with the base year, an increase of 10.1% can be seen.

The third indicator selected presents the share of the number of buses for alternative fuel in the number of buses serving total urban transport. Alternative fuel includes gaseous and electric fuel. The information relates to bus, tram and trolleybus communication and covers the activities of municipal, public and private transport enterprises and plants. Urban transport consists of commune passenger transport performed within the administrative boundaries of the city, city and commune, or cities and neighboring communes in the case of urban-rural communes, including servicing the rural zone in these communes.

Analyzing the data presented in Figure 3, one can notice a constant progression of the indicator value since 2014. However, over the years examined, the share of buses for alternative fuel increased by 78.2%.

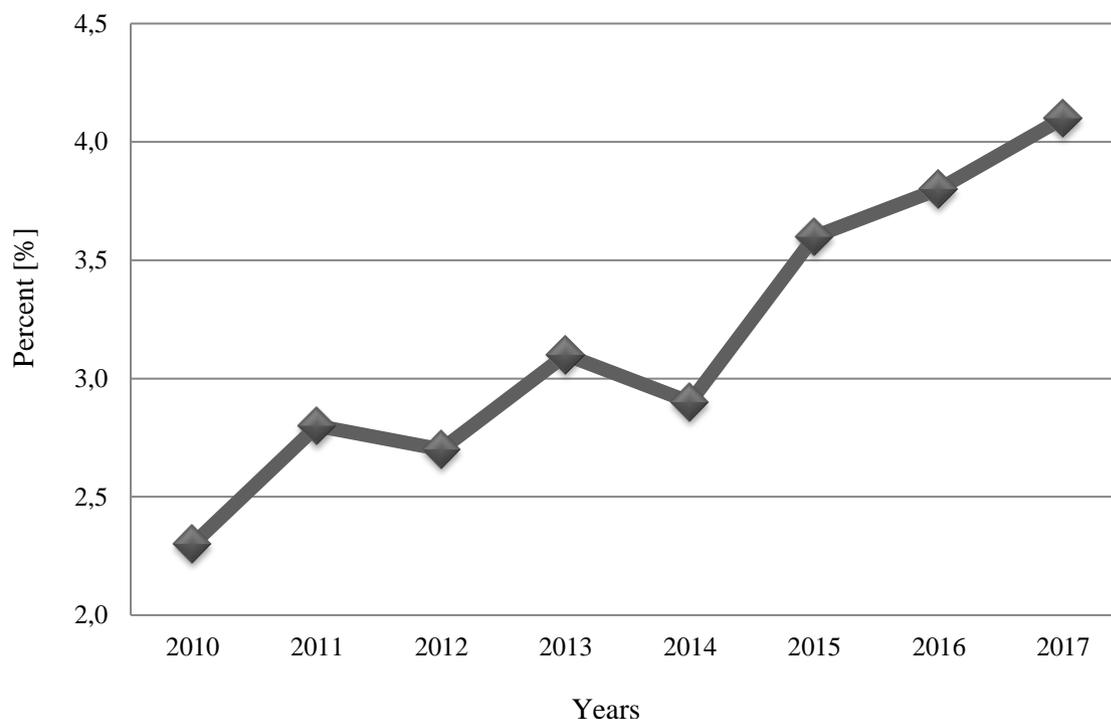


Figure 3. The share of buses for alternative fuel in the total number of buses serving urban transport

[Source: Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

The fourth indicator concerns the method of municipal waste management. Figure 4 presents the percentage share of individual municipal waste treatment methods in relation to the amount of waste generated during the year. According to the data, the largest share is still the disposal of waste by landfilling, however, since 2013 its share has been steadily decreasing, which is undoubtedly a positive phenomenon. The second most-used waste management method is recycling, which particularly applies to selectively collected waste. The share of thermal municipal waste disposal has also been increasing since 2013. Comparing 2017 with the base year, it can be seen that the share of recycling increased by 11.9%, composting or fermentation by 5.58%, and thermal transformation by as much as 24.09%. On the other hand, the share of storage in the general form of municipal waste management decreased by 25.03%.

The fifth selected indicator concerns the area of green areas in cities in square meters per 1 inhabitant. In Europe, the threat of biodiversity loss is high. The European Union places great emphasis on environmental protection.

Therefore, numerous activities related to this aspect are undertaken. One of them is increasing the area of green areas. Member countries, including Poland, have the opportunity to obtain subsidies, including for the development of green urban infrastructure. In the analyzed years, a constant downward trend in the area of green areas per capita can be observed from 2010 to 2013. In these years, this area fell by 0.4 m². However, since 2014, this indicator has been steadily increasing, reaching 21.6 m² in 2017, i.e. 0.8 m² more than in the base year.

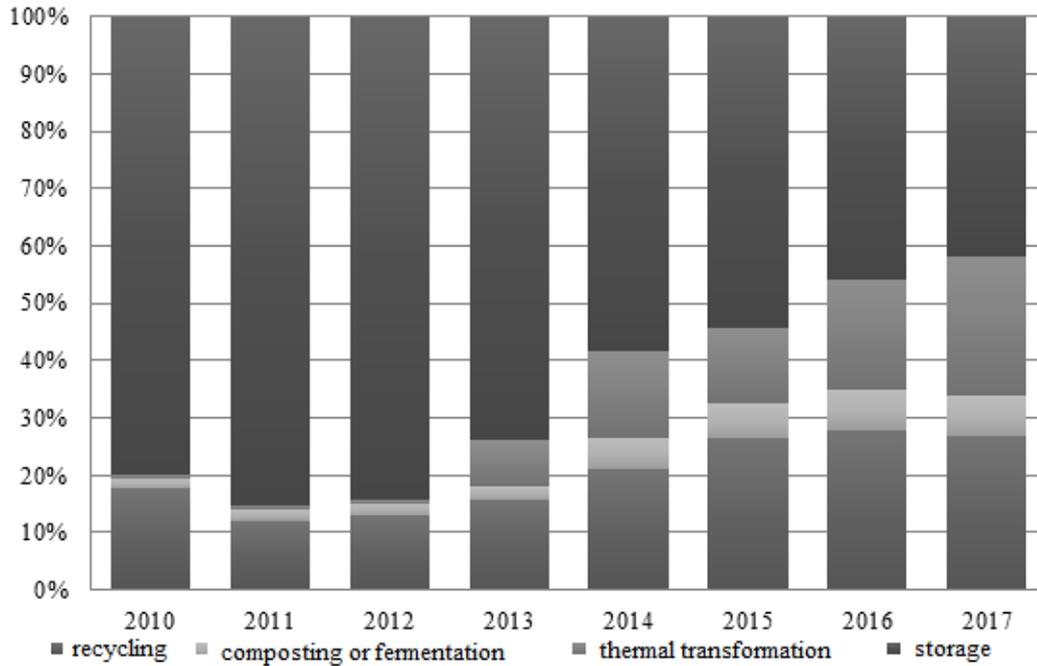


Figure 4. Percentage of municipal waste intended for processing in a specific manner in relation to the amount of waste generated

[Source: Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

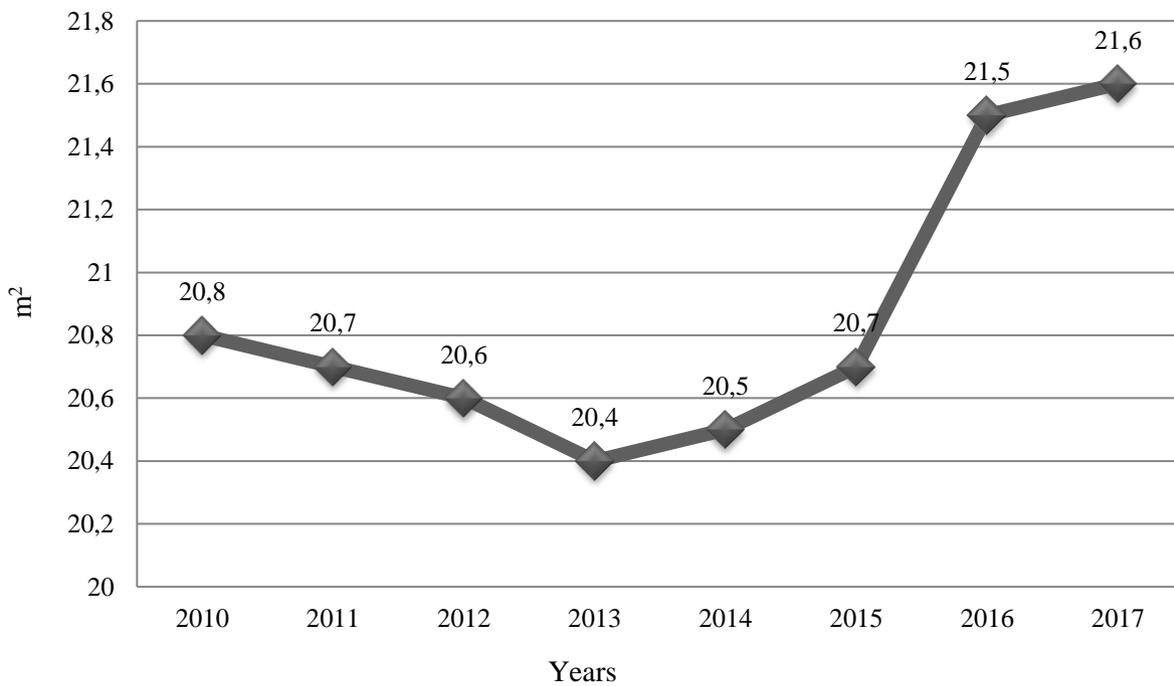


Figure 5. Area of green areas in cities [in m²] per capita

[Source: Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

This is a positive phenomenon due to the systematic increase in the area of green areas since 2014. This demonstrates that state and local authorities have taken action in this respect. The previous downward trend that occurred until 2013 shows that in previous research years less attention was paid to issues related to urban greenery, however in recent years references to this aspect can be found more and more in both central and local policy. It contributes to the growth of the green areas of cities, which in turn has a positive effect on the preservation of biodiversity.

Another category concerns strengthening the capacity of cities and urban areas to develop sustainably and create jobs as well as improve the quality of life of residents.

Passenger transport by public transport is the sum of passengers transported by all means of public transport widely available to the public, i.e. buses, trams and trolleybuses. A single passenger is considered a transported passenger by public transport. [21]



Figure 6. Number of passenger transport per one inhabitant of urban areas.
[Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

The number of passengers is estimated on the basis of the number of single and multi-trip tickets sold, taking into account the standards adopted by public transport companies regarding the number of journeys for a given multi-trip ticket.

Data refer to enterprises and public transport plants employing more than 9 people.

Data on urban residents were taken from statistical information on the number of inhabitants in cities by actual place of residence.

The figure presents the ratio of the number of passenger transport by public transport to the population in cities. According to the presented data, the largest share was recorded in 2010 and amounted to 166.5, in 2013 there was a significant decline to the level of 155.5. In the last analyzed period, i.e. in 2016-2017 it oscillated within 162-163.

Another indicator concerns the urban population, which in one case indicated that they live in flats with a leaking roof, damp walls or floors or foundations, with rot of window frames or floors. The category of households includes persons who, at least in one case, indicated that they live in flats with a leaking roof or damp walls or floors or foundations, or with rot of window frames or floors. The figure presents the percentage share in the overall urban population in 2010-2018. According to the presented data, the highest percentage occurred in 2010, then observe a systematic drop in value to the level of 8.8 - 8.9 in 2013-2014. In 2015, the index increased to 10.6 and oscillates at a similar level to 2018.



Figure 7. Percentage of urban population living in flats with a leaking roof, damp walls, floors or foundations, or rot of window frames or floors.

[Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

The last analyzed indicator refers to the improvement of air quality, especially the reduction of dust emissions arising in the domestic and municipal sector as a result of the combustion of poor quality solid fuels at low temperatures and in low-power boilers, as well as the combustion of waste. Measurements for the calculation of KW began in 2010. According to the above-mentioned by the Regulation, the national average exposure indicator for 2010 was calculated as the arithmetic average of the average annual PM_{2,5} concentrations in 2011.

The indicator for 2011 was calculated as the arithmetic average of the average annual PM_{2,5} concentrations in the years 2010 - 2011 in 2012. For 2012 and subsequent years, the national average exposure indicator is calculated as the arithmetic average of the average annual PM_{2,5} concentrations from the last three years (e.g. for 2015, the indicator was calculated in 2016 as the arithmetic average of the average annual PM_{2,5} concentrations for 2013-2015).

For the purposes of calculating KW, 30 measuring stations have been created, the locations of which have been approved by the Chief Inspectorate for Environmental Protection (CIEP). Measuring stations are located in areas with very high population density away from

sources of dust emission. In cities over 100,000 inhabitants and agglomerations not exceeding 1 million inhabitants, these measurements are carried out on one measuring stand. In the Warsaw Agglomeration and the Upper Silesian Agglomeration, measurements are carried out at two measuring stations.

Detailed information on the location of PM_{2,5} air pollution measurement stations for the purposes of calculating KW are included in the provincial programs of the state environmental monitoring. The measurements are carried out using low-flow PM_{2.5} dust collectors, i.e. the reference method by the voivodship inspectorates of environmental protection. Measurements are made continuously.

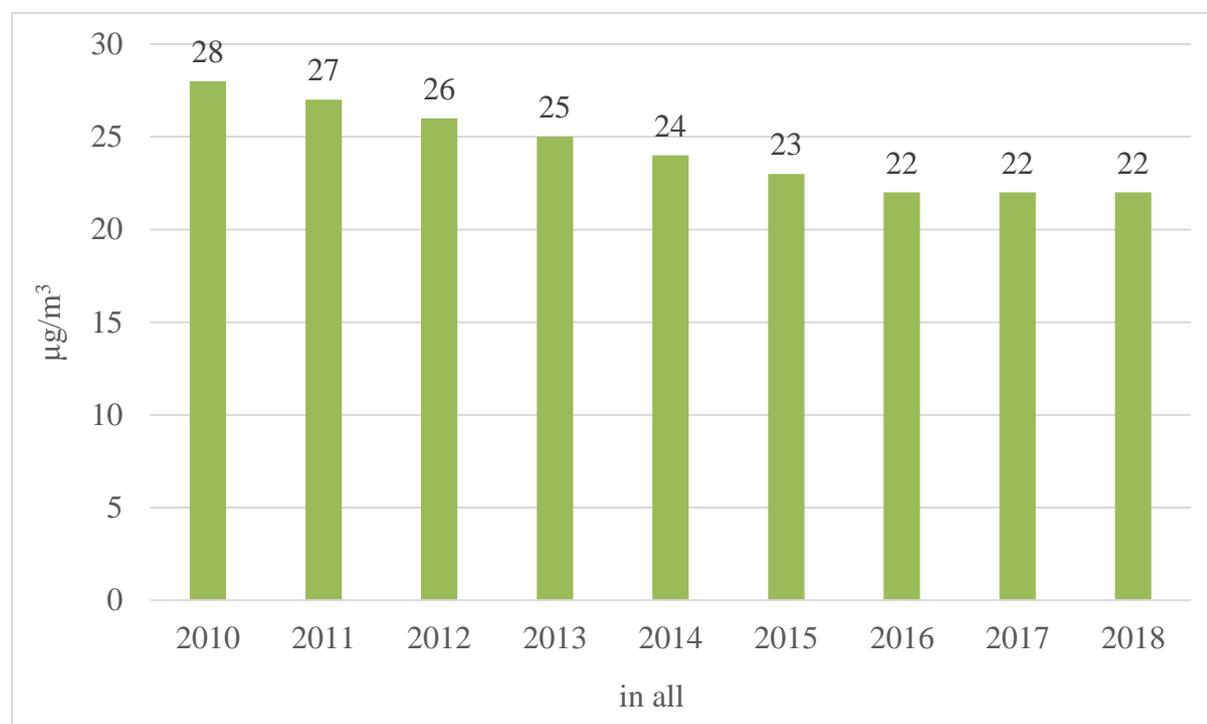


Figure 8. National PM_{2.5} average exposure indicator.

[Official SDG statistics - indicators for national priorities, Objective 11 - Sustainable cities and communities]

The indicator refers to the average level of the substance in the air determined on the basis of measurements carried out in urban background areas in cities with a population of more than 100,000. and agglomerations throughout the country; the method of calculating the national indicator (KW) is specified in the Regulation of the Minister of the Environment of 13 September 2012 on how to calculate average exposure indicators and how to assess compliance with the exposure concentration ceiling (Journal of Laws 2012 item 1029).

Data refer to agglomeration areas and cities with more than 100,000 inhabitants residents.

Objectives to be achieved by Poland in the scope of exposure to PM_{2.5} dust resulting from Directive 2008/50 / EC of the European Parliament and of the Council of May 21, 2008 on air quality and cleaner air for Europe (Official Journal EU L 152 of 11.06.2008, p. 1), transposed into Polish law:

- by 2015 - reaching the exposure concentration ceiling, i.e. KW, at 20 g / m³ (air quality standard);
- by 2020 - achieving the national exposure reduction target, i.e. KW, at 18 g / m³.

The value of the national index (KW) for the previous year is reported annually to the European Commission (in accordance with Decision EC 2011/850 / EU of 12 December 2011 laying down the rules for applying Directives 2004/107 / EC and 2008/50 / EC of the European Parliament and Advice on the system of mutual information exchange and reports on ambient air quality). The first KW value calculated on the basis of PM_{2.5} measurements from 2010-2012 was sent to the EC in 2013 and concerned the year 2012.

4. CONCLUSIONS

In recent years, interest in environmental issues has changed significantly. It has been focused on solving global problems. The concepts of sustainable and sustainable development began to gain importance. According to their assumptions, human functioning in the economy should not disturb natural ecosystems.

Due to the strong emphasis on environmental issues, state authorities, including Poland, began to take initiatives to protect the environment. The analysis and monitoring of sustainable development indicators is important in determining the appropriate course of action.

According to the 2030 Agenda, contemporary activities should focus on the continuous implementation of a number of economic, social and environmental goals. Therefore, urban development is an important aspect because of their impact on local communities and the economy. Selected indicators for determining the level of sustainable development of cities and societies are being analyzed. As it results from the presented data, in the years 2010-2017 an improvement was recorded in the level of all selected indicators of sustainable development of cities and societies, i.e. there was a decrease in the nuisance for residents of noise in the immediate vicinity, the average residential usable floor space per inhabitant increased, the use of alternative fuels increased public transport, and the area of green areas per inhabitant. In the years analyzed, there was also a significant change in the manner of municipal waste management, reducing the share of waste disposal by landfilling. The presented results of the analysis are a positive aspect of the development of cities and societies, determining further actions aimed at achieving the goals set in the document Agenda 2030 - for sustainable development [22].

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