Sustainable Transport in Poland

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Road transport is one of the key elements of economic development that helps build social and territorial cohesion. The economic development that has taken place in Poland over the last three decades has led to an improvement in road infrastructure throughout the country. Construction of new roads and improvement of existing ones promotes economic development. However, as the number of cars increases, so does the level of air emissions. In reducing pollutant emissions, the analysis of the technological possibilities used and the improvement of their efficiency with the simultaneous minimization of generated pollution is also of particular importance. The purpose of the publication is to present development trends in road transport in Poland and the possibility of reducing emissions in this respect. The method of analysing strategic documents and statistical data was used to achieve this goal. Moreover, the article shows perspectives for reducing the level of emissions from road transport and refers to the assumptions related to the modernization of the transport sector and reducing its share in carbon emissions and its sustainable development in cities.

energy economy low-carbon development electromobility road transport

1. Introduction

Air pollution is a major public health problem causing premature deaths. The World Health Organization (WHO) has estimated the number of premature deaths in Europe at 0.5 million people [1]. At the same time, transport contributes to climate change, air pollution, and noise. In the last few years, there has been a decrease in pollutant emissions in the European Union (EU-28) for many substances, e.g., NO_x by 46%, CO by 49%, PM2.5 by 31%, and PM10 by 29% [2][3]. This confirms the effectiveness of the implementation of air pollution control strategies. Despite these changes, the achieved levels of air pollution in cities still exceed the standards in the EU countries.

The implementation in Poland of low-carbon economy is associated with the reduction of greenhouse gas emissions and other air pollutants. The expectations for improving air quality are related to a reduction in the use of carbon in energy production, enhancement of energy efficiency, implementation of new technologies, as well as increasing the standard of living of society [4][5][6]. The rate of economic growth is largely determined by industrialization, urbanization, improvement of transport infrastructure, etc. These factors largely affect energy consumption. Higher energy consumption in Poland is associated with economic growth [7][8][9]. Building an economy based on strong foundations should strive to minimize or eliminate the side effects of economic growth, such as increasing negative environmental impacts [10][11]. It should be emphasized that the development of low-carbon transport in Poland and the related increase in the number of electric cars should be considered in relation to the methods of generating electricity. In Poland, over 80% of electricity is generated by burning fossil fuels. As a

result, the mere increase in the number of electric cars will, to a large extent, only change the place where pollutants are emitted into the air. Only a radical reduction in the use of fossil fuels for the production of electricity will help to positively influence the development of low-carbon transport in Poland in a comprehensive manner [12]. Mobility is one of the important measures influencing the shaping of the internal market as well as the quality of life of residents through the development of infrastructure. Investments in road infrastructure are characterized by a positive impact on economic growth [13]. The method of analysing strategic documents and statistical data was used to achieve this goal. Moreover, the article shows perspectives for reducing the level of emissions from road transport and refers to the assumptions related to the modernization of the transport sector and reducing its share in carbon emissions and its sustainable development in cities [14][15].

2. Literature Review

Sustainable development requires ensuring the mobility of residents while minimizing the nuisance to the environment [16]. The sustainable development of transport systems can enhance economic growth; it requires action between economic performance, environmental protection, and social development. From an ecological point of view, this goal is to understand the mutual environmental impacts and practices in the industry and to integrate environmental considerations into all aspects of the transport industry [17]. Transport should be cost-effective and should adapt to changing requirements. In the social dimension, this goal consists in raising the standard and quality of life. Electric transport plays an important role in sustainable development. Its development affects the support of other sectors of the economy [18].

2.1. Goals of the Climate and Energy Policy

The European Union (EU) is taking active steps to combat climate change. The European Parliament is developing legislation that defines general air quality standards for pollutant concentrations, energy efficiency and fuel quality, and limits on total pollutant emissions for the member states. This legislation is complemented by policies and measures that promote environmental protection and its integration into other sectors [19]. The main goals of the until 2030 are aimed at creating a low-carbon economy through a wide-ranging 40% reduction in greenhouse gas (GHG) emissions, increasing renewable energy sources (RES) to min. 32% of energy consumption in the EU, increasing energy efficiency by min. 32.5%, guaranteeing min. 15% of electricity interconnection levels between neighbouring member states, and supporting research and innovation (R&D) initiatives with funding tools [20].

2.2. Road Transport in Poland

In Poland, there is a visible lack of protection and control of changes in space that cause fragmentation of existing natural systems, including ecological corridors and aeration wedges in cities. This process is often associated with the lack of a vision for urban development formulated by municipal authorities, especially where such a vision is most needed. Cities should not develop in a chaotic way, and green areas in the city are very important for ensuring better quality of the environment in urban areas [21].

At the same time, the lack of effective mechanisms for implementing spatial policy often triggers the possibility of implementing individual and commercial investments in areas not covered by the local plan based on administrative decisions. According to the well-established case law, such decisions do not have to show compliance with the general spatial policy of the city, which, by undermining the logic of the spatial planning system, ultimately limits public control over investment processes.

3. Development Potential for Low-Carbon Road Transport

3.1. Actions for the Development of Low-Emission Transport

The use of economic, legal, and educational tools in the fight against air pollution from transport should be complementary to make it effective. Coordinated actions are being taken in the EU to reduce the harmful effects of transport through the integration of transport and ecological policies [22]. In cities with heavy traffic, transport remains the main source of air pollution. NO_x and particulate matter (PM) have a major impact on the environment and human health. The concentration of air pollutants is still too high despite efforts in recent years focused on introducing fuel quality standards and using cleaner technologies [23][24][25].

Road traffic is also the most common source of noise. Prolonged exposure to noise can have a variety of health effects, including irritability, sleep disturbance, negative effects on the cardiovascular and metabolic systems, and cognitive impairment in children. In addition, transport networks divide natural areas into smaller plots of land with serious consequences for animals and plants [26].

More and more attention is also paid to the issue of greener transport in cities [27]. An example of this type of solution is the exclusion of city centres for cars that do not meet current emission standards. In Poland, no city has yet introduced such a restriction. Changes in proecological behaviour in the Polish realities are progressing slowly. Income constraints, reserve, and scepticism towards zero-carbon mobility and the sharing economy emphasize the role of public collective transport as an alternative to individual motorization. Individual road transport in Poland will be based on traditional combustion engines for many years to come. On the other hand, public transport, due to its massiveness and the use of electric drive (city railways, metro, trams, trolleybuses), is much more environmentally effective [28].

3.2. Electric Cars

Electric cars will become common on our roads. This will increase the demand for electricity. It is necessary to take into account the energy transition and the actual consumption of electricity [29][30][31][32][33]. To accelerate the development of electromobility, a number of financial incentives should be implemented that reduce the price difference between an electric car and a conventional one [34]. These may be exemptions from taxes, e.g., excise duty, which in Poland, applies to electric, hydrogen-powered vehicles, or plug-in hybrid vehicles, in which the tax obligation in excise duty arose after 18 December 2018. At the same time, in relation to hybrid plug-in vehicles, release will be in force until 1 January 2021 [35]. Moreover, an effective incentive for entrepreneurs may be the use

of depreciation charges for electric vehicles, put into use after 18 December 2018, and support for investment of other solutions supporting low-carbon development in road transport [36][37].

In the era of global market and very high competition, no production plant can afford to use inefficient and above all environmentally harmful technology[38]. Contemporary pursuit of a significant reduction in pollution emissions forces modern industry to constantly improve, which contributes to obtaining products of very good quality, which are created using less energy[39].

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