Local responses to the issue of smog in the countries of Central and Eastern Europe

In Europe alone smog encumbers the economy with healthcare costs of EUR 4 billion a year and waste of working time worth EUR 16 billion. / Costs generated by smog due to lower work productivity, expenses of the health sector and lower agricultural production will reach 1% of global GDP by 2060. / Among almost 3 thousand cities analysed by WHO almost half of one hundred cities most polluted with PM10 are located in Poland. / Polish Supreme Audit Office has estimated the costs of bad air quality (PM2.5 concentration) only in five controlled regions for approximately PLN 12.6 billion a year. / Electromobility and micromobility are an opportunity for European cities to revolutionize communication systems and face up to challenges of air quality improvement. The COVID-19 pandemic is going to popularize micromobility.

Economic consequences of smog may be assessed in terms of costs generated by excessive greenhouse gas emission. They can also be analysed with reference to direct and indirect costs incurred by various economic stakeholders. First, it is estimated that (according to OECD data) increase in concentration of PM2.5 and ozone is going to raise global healthcare costs from USD 21 billion in 2015 to USD 176 billion in 2060. Additionally, a year-long absence at work affecting work productivity will then reach 3.7 billion days, while in 2015 it was 1.2 billion days per year. In Europe alone, according to European Commission's estimates, smog encumbers the economy with healthcare costs of EUR 4 billion a year and waste of working time worth EUR 16 billion. Total costs generated by smog due to lower work productivity, expenses of the health sector and lower agricultural production will reach 1% of global GDP by 2060. Economic impact of smog, covering also indirect costs, should include also premature deaths (6–9 million a year), costs of social welfare systems and change of trade flows. Indirect costs therefore are generated in areas similar to direct costs (healthcare, work productivity, agriculture), but they are delayed and more difficult to quantify.

High rate of air pollution is a critical problem, harmful for health and life of EU citizens. The air quality does not satisfy the norms in as much as 130 European cities. The situation is particularly bad in Poland. Among ten most polluted European cities in a rating of the European Environment Agency there are six Polish ones, including Katowice and Cracow.

The organisation CE Deft has also estimated that market and non-market costs of air pollution caused by traffic and transport in 2016 were between 67 billion and 80 billion, 75%–83% of which were generated by diesel engines. The costs could be reduced to about EUR 20–25 billion if the measures aimed at emission reduction applied so far are maintained.

Similar calculations have been produced by Polish Supreme Audit Office, which has estimated the costs of bad air quality (PM2.5 concentration) in five controlled regions for approximately PLN 12.6 billion a year.

The relation between urbanization and environment pollution seems obvious. Pollution usually concentrates around the place it has been produced and these are usually areas with compact residential structure (cities). City transport is responsible for 23% of gas emission in Europe. Over 80% of global population of cities has to breath air of poor quality (not meeting WHO norms), which results in around 4.5 million deaths a year. Cities of Central and Eastern Europe (except for the Baltic countries) are among areas with the worst air quality in Europe. For instance, among almost 3 thousand cities analysed by WHO, almost half of the hundred cities most polluted with PM10 are located in Poland.

Cities are considered to be the source of smog, but they can also be perceived as a source of solutions. In modern urban areas we can observe innovations, such as air filtering buses; paints absorbing pollution; plant installations cleaning the air around building structures. Considering the fact that over half of population of the Earth live in cities, the problem is serious enough to create a list of solutions that could be adapted by cities in order to reduce gas emission and improve air quality for around 6 billion people all over the world. Basically these solutions could be categorised into groups corresponding to main areas generating smog in cities. These are: transport, land development (quality of space covered with building structures and proportion of green areas), environmental impact of buildings, activities of enterprises and consumption. It is highlighted that only integrated approach to the issue of smog in cities will make it possible to find solutions of good quality. Selective solutions, despite being interesting and innovative, will not allow to change the quality of air, because there is simply too much of it.

The study analyses local dimension of the issue of smog and its impact on a city economy. It provides proposals of responses and instruments that can be applied locally, often by city dwellers themselves. The text indicates the impact that the changes introduced by municipal authorities have on the global problem of smog and how they can serve as effective instruments to counteract it. A majority of the solutions concern transport, since it is the field of activity generating a considerable portion of air pollution. The solutions include alternative ways of moving around the city, such as electromobility, micromobility and their adjustment to the needs of pedestrians. Also solutions connected with decarbonization of construction resources and counteracting smog are very important. They are largely based on modernisation of

public buildings, development of urban heating networks and replacement of heating devices in residential buildings. A response to the issue of air pollution at the level of a city is also adequate tourist traffic management and preventing excessive traffic concentration with the priority of reduction of environmental impact.

Unquestionably, both electromobility and micromobility are an opportunity for European cities to revolutionize transport systems and face up to challenges of air quality improvement. Many best practices may already be found not only in the cities of Western Europe, whose effective solutions are worth copying, but also in Central and Eastern Europe. Increased use of electric cars and personal transport devices is a realistic scenario of European agglomerations development. Implementation and acceleration of this process requires however further development of infrastructure and society education, as well as popularization of the advantages of alternative forms of transport. This requires faster pace of works on legal regulations concerning electromobility and mobility, covering also systems of financial and non-financial incentives.

This trend is in line with the concept of *walkability*. What is crucial from the perspective of adjusting cities to the needs of pedestrians, is not only the issue of air pollution (reducing forms of transport harmful for human health), but also challenges of social and health protection. Implementation of *walkability* in the cities requires infrastructural adjustment, promotion and education about benefits of *walkability* for the city as a whole and for individual citizens.

As regards buildings, the air pollution problem was considered in the context of public facilities, residential buildings and commercial buildings. Energy efficiency and the issue of heating buildings were taken into account. Measures aimed at decarbonization of construction resources and reduction of smog carried out so far in the analysed EU area are mostly based on modernisation of public facilities, development of urban heating systems and replacement of heating devices in residential buildings. Additionally, education and informing city dwellers about harmful effects of heating flats and houses with solid fuel or waste plays a substantial role. These measures should be supported by schemes of energy poverty reduction. Additionally, to reduce smog in cities, it is important to optimize commercial buildings, especially by cutting down power consumption when no people are inside. Regarding the analysed issue, the next EU 2021–2027 financial perspective will place emphasis on projects carried out as a part of the European Green Deal. It should be stressed that these measures will not be based on subsidies, but on financial benefits resulting directly from energy savings, which is a substantial change in the attitude to spending EU funds.

Correct tourism management, oriented towards reduction of exhaust fumes (smog) emission, requires most of all establishing car traffic routes followed by tourists, analysing traffic density, identification of areas of tourist traffic and mean duration of tourists' stay in such areas. Simultaneously, measures must be taken to create alternative tourist routes by showing and promoting less popular tourist attractions. It would be very desirable to develop context applications that

THE ISSUE OF SMOG AND COVID-19

The COVID-19 pandemic translated directly into the air quality in cities, although differently in different places. In Poland, as opposed to many European countries (such as the Netherlands), smaller business activity and urban traffic have not made the smog smaller, quite the opposite: at the turn of March and April 2020 the maximum level of PM2.5 and PM10 was exceeded several times. This was the case for, among others, Warsaw and Cracow. It was caused by so-called low altitude emissions, or emission of toxic dust and gases at low altitude from chimneys. The temperature in March and April was low, so people were heating their homes in which they were staying working or learning remotely. The air quality was not improved by less intensive use of office buildings, shopping malls and public facilities.

The pandemic was a time of increased interest in micromobility solutions. In the beginning of the lockdown, the mobility of city dwellers and demand for transport services fell down visibly. That was the time when city authorities started to think about how to ensure the inhabitants a safe way of transport during the pandemic, and also after reopening the economy and return to normal. For it is impossible for all the city inhabitants to move with cars or to opt for the public transport, the capacity of which for some time cannot be fully used. Many European cities saw a growing interest in personal means of transport such as bicycles. It was also a moment when an attempt was made to reorganise the city space in a way that would facilitate the movement for vehicles such as bicycles or scooters. For example in Berlin many cycle lanes were broadened, usually to the detriment of space dedicated for the car traffic. New cycle lanes were quickly marked out and separated from the car traffic with bollards. In Milan, strongly affected by the pandemic, an ambitious plan was announced to rebuild 35 km of streets to transform them into cycle- and pedestrian-friendly space. The demand for bicycles also jumped. After the time of home isolation the Europeans appreciated independence ensured by bicycles, not only as a means of transport, but also a source of leisure and fitness. According to data from the Polish bicycle market, in May 2020 the sales of bicycles were twice higher than in the same period in 2019. Because of supply chain disruptions some producers were not able to ensure adequate volume of sales. When the economy was reopening, people were encouraged to use city bicycles available as a part of *bikesharing* systems. Authorities of London, Chicago, Boston, lowered bike rental prices. In Prague and Berlin first half an hour of bike ride was free. In Poland the decisions were utterly different. During the pandemic city bike rental systems were closed. This was one of the causes of bankruptcy of one of the biggest city bike rental operators, Nextbike.

The coronavirus pandemic will definitely be conducive to popularizing micromobility in the cities, due to better awareness about the advantages of personal transport devices.

would be used to redirect tourist traffic in real time, taking into account suggestions based on habits of an individual tourist or a group of tourists on the one hand, and current situation on a given site (parking lot, tourist attraction, restaurant, accommodation establishment etc.) on the other hand.

It seems that other factors affecting air quality (e.g. energy consumption in tourist facilities) are merely products of tourist traffic density. Tackling the problem of *overtourism* will therefore translate into diminishing the intensity of air pollution.

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