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Ambient Air Pollution as a Human Security Challenge in Poland

Introduction

The concept of human security emerged in the Post-Cold War era of the briefly announced unipolar order, which seemed to implicate the end of inter-state security threats. The need to revise the concept of security and abandon territorial security – i.e. the security for land – in favour of food, employment and environmental security – i.e. the security for people – was highlighted by the authors of the 1993 *Human Development Report*. In the annual publication by the United Nations Development Programme (UNDP) after 1990, human security was identified as one of the five pillars of a people-centered world order¹ – alongside sustainable human development, new partnerships between state and markets, new patterns of national and global governance and new forms of international cooperation.

The subsequent UNDP report elaborated on the concept of human security and distinguished two aspects of human security: freedom from fear, and freedom from want. The former regards freedom from violence, as well as internal and external armed conflicts; the latter concerns the guarantee of economic and social security. Seven aspects of human security were distinguished: economic security, food security, health security, environmental security, personal security, community security, and political security.² Polluted air is one of threats to human safety

¹ United Nations Development Programme, *Human Development Report 1993*, New York–Oxford 1993, p. 2.

² United Nations Development Programme, *Human Development Report 1994*, New York–Oxford 1994, pp. 24–25.

due to its adverse impact on human health and life, and on the environment, which results in human and economic losses. The UNDP report also noted that threats to human security, including environmental pollution, are becoming global challenges, since they occur with varying intensity around the whole world. The same is true about pollutant emissions to the atmosphere.

In the 2012 publication, the Organisation for Economic Co-operation and Development (OECD) predicted that failure to take new measures to prevent air pollution would make the poor quality of ambient air the main cause of death in the world by 2050. The OECD estimated that by 2050 the number of premature deaths from exposure to particulate matter would reach 3.6 million, which would imply more than that caused by lack of potable water, sanitation and malaria combined.³ Given the absence and/or insufficiency of actions and steps taken to solve the issue, the effects of exposure to air pollution have become the major environmental risk factor affecting health much faster than the OECD projected. The World Health Organization (WHO) estimated that air pollution with particulate matter (PM) whose aerodynamic diameter is below 2.5 μm (PM_{2.5}) alone was the cause of ca. 3 million premature deaths in 2012 (including 479,000 in Europe),⁴ and 4.2 million in 2016 (including ca. 500,000 in Europe).⁵

Of the 79 health risk factors studied by epidemiology and related to lifestyle, the environment, working conditions and metabolic disorders in the human body, air pollution with PM_{2.5} and ozone is ranked among the ten most dangerous. In 2013, low quality air was considered fifth in these terms (5.5 million premature deaths and 141.5 million years of life lost/YLLs⁶), after dietary risks, high blood pressure, child and maternal malnutrition, and smoking. Health risks related to unsafe water and unsafe sanitation were in ninth position (ca. 1.4 million premature deaths and 84 million disability-adjusted life-years/DALYs).⁷ In 2016, air pollution was the sixth most dangerous health risk factor (nearly 4.5 million premature deaths and 103.1 million DALYs), possibly leading to non-communicable diseases and premature deaths. Unsafe water was not included among the top ten threats.⁸

³ Organisation for Economic Co-operation and Development, *OECD Environmental Outlook to 2050: The Consequences of Inaction*, OECD Publishing, 2012, p. 276.

⁴ World Health Organization, *Ambient Air Pollution: a global assessment of exposure and burden of disease*, Geneva, WHO Document Production Services, 2016, p. 40.

⁵ World Health Organization, *Air pollution. Key facts*, 2018, [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health) [accessed: 15.09.2019].

⁶ YLLs are years lost due to premature mortality. YLLs are calculated from the number of deaths multiplied by the standard life expectancy at the age at which death occurs. YLLs take into account the age at which deaths occur by giving greater weight to deaths at younger age and lower weight to deaths at older age. World Health Organization, *Years of life lost (percentage of total)*, <https://www.who.int/whosis/whostat/2006YearsOfLifeLost.pdf> [accessed: 18.09.2019].

⁷ M.H. Forouzanfar et al., 'Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or cluster of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013', *The Lancet*, vol. 386, no. 10010, 2015, pp. 2302–2305, <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2815%2900128-2> [accessed: 7.09.2019].

⁸ M.H. Forouzanfar et al., 'Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or cluster of risks, 1990–2015: a sys-

The goal of this paper is to identify the scale of ambient air pollution in Poland and to assess the threats it poses to human security, as Poles are exposed to air pollution above the established norms, especially during winter. Under the Environmental Protection Act of 27 April 2001, air pollution is understood as the emission of solid, liquid and gaseous substances which may be harmful to human health or the environment, may cause damage to material property, may deteriorate the aesthetic values of the environment, or interfere with other legitimate uses of the environment.⁹ The main hypothesis adopted for the purpose of the research process is that low quality air is one of the major environmental threats to Polish nationals. In order to verify this hypothesis, the following research questions were asked: first, the concentrations of which pollutants pose the greatest threat to the life and health of Poles, and what are the sources of their emissions?; second, what legal acts have been developed by the national authorities in order to ensure that air quality conforms to European standards as concerns the pollutants posing the greatest threat to the life and health of Poles?; third, are the solutions adopted sufficient to ensure human safety in terms of clean air? The attempt to answer the above questions was made using quantitative and decision-making methods, as well as an institutional and legal analysis.

Health consequences of exposure to excessive concentrations of benzo(a)pyrene and particulate matter

The quality of air in Poland is assessed based on the criteria specified in Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ EU L 152/1, 11.06.2008), and Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004, relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (OJ EU L 23/3, 26.01.2005). These regulations were incorporated into Polish legislation by the Regulation of the Minister of Environment of 24 August 2012 on the levels of certain substances in the air. Due to the adverse effects of air pollution on health, air quality is examined annually with respect to the content of twelve substances: sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), benzene (C₆H₆), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5} whose aerodynamic diameter is below 10 µm and 2.5 µm, respectively) and PM₁₀ contamination with lead (Pb), arsenic (As), cadmium (Cd), nickel (Ni) and benzo(a)pyrene (BaP). The standard concentrations of individual pollutants and the results of air quality assessment in Poland in terms of health protection in 2017 have been illustrated in Table 1.

tematic analysis for the Global Burden of Disease Study 2015', *The Lancet*, vol. 388, no. 10053, 2016, pp. 1677–1688, <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2816%2931679-8> [accessed: 7.09.2019].

⁹ Ustawa z dnia 27 kwietnia 2001 roku – Prawo ochrony środowiska [The Environmental Protection Act of 27 April 2001], Section 3, Polish Journal of Laws of 2001, no. 62, item 627.

Table 1. Exceedances of standards of air pollution concentrations in relation to human health protection in 2017 in individual air quality assessment zones in Poland

Substance	Permissible or target level of substance in ambient air	Number of ambient air quality assessment zones with exceedances
SO ₂	350 µg/m ³ , one-hour concentration, 24 exceedances allowed per year	0
	125 µg/m ³ , 24-hour concentration, 3 exceedances allowed per year	1
NO ₂	200 µg/m ³ , one-hour concentration, 18 exceedances allowed per year	0
	40 µg/m ³ , average annual concentration	4
CO	10 000 µg/m ³ , eight-hour concentration, maximum moving average calculated from one-hour concentrations	0
C ₆ H ₆	5 µg/m ³ , average annual concentration	0
O ₃	120 µg/m ³ , eight-hour concentration, maximum moving average calculated from one-hour concentrations, 25 days exceeding the target level allowed per year	6
PM ₁₀	50 µg/m ³ , 24-hour concentration, 35 exceedances allowed per year	34
	40 µg/m ³ , average annual concentration	10
Pb	0.5 µg/m ³ , average annual concentration	0
As	6 ng/ m ³ , average annual concentration	3
Cd	5ng/ m ³ , average annual concentration	0
Ni	20 ng/ m ³ , average annual concentration	0
BaP	1 ng/ m ³ , average annual concentration	43
PM _{2.5}	25 µg/m ³ , average annual concentration	19

Source: author's analysis based on Państwowy Monitoring Środowiska – Inspekcja Ochrony Środowiska, *Ocena jakości powietrza w strefach w Polsce za rok 2017. Zbiorczy raport krajowy z rocznej oceny jakości powietrza w strefach wykonywanej przez WIOŚ według zasad określonych w art. 89 ustawy – Prawo ochrony środowiska*, Warszawa 2018, pp. 20, 27, 35–36, 39, 45, 51, 71, 74, 78, 82, 86, 98.

The state monitors the ambient air quality in Poland in 46 zones constituted by agglomerations with the population of over 250,000, cities of over 100,000 inhabitants, and the remaining territories not covered by the above.¹⁰ The zones have been specified in the Regulation of the Minister of Environment of 2 August 2012 on the zones in which ambient air quality is assessed. Based on air quality assessments, the zones are currently classified as those where the concentration levels of any of the pollutants monitored do not exceed allowable/target levels (class A)

¹⁰ Ustawa z dnia..., *op. cit.*

or those where the concentration level of even one of the pollutants exceeds the allowable/target level (class C). The results of air quality assessment in 2017 presented in Table 1 demonstrate that problems with maintaining standard concentrations concerned benzo(a)pyrene contained in PM₁₀, PM₁₀ and PM_{2.5} to the greatest extent. The level of exceedances recorded was lower for ozone and nitrogen dioxide, and that for arsenic and sulphur dioxide was low.

The standard concentration level of benzo(a)pyrene was exceeded across almost the whole territory of Poland (in over 93% of zones) and numerous exceedances of values for PM₁₀ (in 76% of zones taking into account the 24-hour standard) and PM_{2.5} (in 41% zones) were recorded, which is why this article attempts to assess the threat posed by these substances to the health and life of Poles. Permissible concentration levels for BaP, PM₁₀ and PM_{2.5} occur mainly in winter, which is due to the increased emissions of matter generated by solid fuel burning for heating purposes, in particular in individual buildings. Regional environmental protection inspectorates, which perform air quality assessment, indicated heating to be the main reason for the exceedances, accounting for 100% of exceedances of the BaP target level, as well as for 91% of violations of the permissible level specified for 24-hour concentrations of PM₁₀, 88% for average annual concentration of PM₁₀ and 90% of average annual concentration of PM_{2.5}.¹¹

Benzo(a)pyrene, a polycyclic aromatic hydrocarbon (PAH) from the group of persistent organic compounds, is a product of incomplete combustion of coal, wood and household waste among others. Since the Polish power industry is coal-based, the concentration of BaP in Poland is the highest in Europe. This highly lipid soluble compound is absorbed in lungs and intestines and may lead to neoplastic lesions¹² that develop over approximately fifteen years from the first contact with significant amounts of this substance at the shortest.¹³

Particulate matter is a mixture of fine solid particles and droplets of liquid suspended in the air, which are primary pollutants emitted directly into the atmosphere, as well as secondary pollutants generated in the atmosphere as a result of chemical reactions. Primary PM comes from natural sources, such as forest fires and volcanic eruptions, as well as from anthropogenic sources related mainly to fuel combustion processes, especially those of solid fuels, and industrial processes. Due to the size of solid particles, PM is divided into fine, with particles under 10 µm and very fine, with particles smaller than 2.5 µm.¹⁴ PM below 10 µm in diameter may adsorb heavy metals and chemical compounds, especially organic. Therefore, in order to assess air quality the concentrations of benzo(a)pyrene, arsenic, lead, cadmium and nickel in PM₁₀ are examined.

¹¹ Państwowy Monitoring Środowiska – Inspekcja Ochrony Środowiska, *Ocena jakości powietrza w strefach w Polsce za rok 2017. Zbiórny raport krajowy z rocznej oceny jakości powietrza w strefach wykonywanej przez WIOŚ według zasad określonych w art. 89 ustawy – Prawo ochrony środowiska*, Warszawa 2018 p. 62, 64, 103.

¹² K. Juda-Rezler, *Oddziaływanie zanieczyszczeń powietrza na środowisko*, Warszawa 2006, pp. 76–77.

¹³ H. Mazurek, *Zagrożenie dla zdrowia czy moda na ekologię?*, Warszawa 2018, p. 28.

¹⁴ K. Juda-Rezler, *Oddziaływanie zanieczyszczeń powietrza...*, op. cit., p. 66.

The health effects of exposure to PM pollution are related to particle size and chemical composition which are associated with the source of particles. Mineral dust (e.g. desert dust) has been found to be less harmful than PM generated when combusting fossil fuels and biomass, which has a negative effect on the respiratory, circulatory, nervous and reproductive systems.¹⁵ If the PM₁₀ particles inhaled with air are not trapped in the nasal passages, they travel to the lower respiratory tract. Particles smaller than 0.1µm in diameter can additionally enter alveoli and – carried with blood – reach various human organs, including the brain.¹⁶

Exposure to particulate matter increases the incidence of respiratory infections, including pneumonia, especially in children and the elderly, and the risk of intensified symptoms of asthma and chronic obstructive pulmonary disease, and consequently the number of hospitalizations. Prolonged exposure may result in new cases of asthma.¹⁷ PM pollution not only aggravates the symptoms of current cardiovascular diseases, but also contributes to their development (e.g. coronary artery disease, hypertension) in persons considered healthy. Increased exposure to PM_{2,5} for several hours up to several weeks may result in a heart stroke or even death. The risk of hospitalization or death due to heart failure increases by 2.11% per 10 µg/m³ of PM_{2,5} and by 1.13% for PM₁₀.¹⁸ The International Agency for Research on Cancer (IARC), an agency of the World Health Organization, has determined that PM is carcinogenic to humans.¹⁹ Based on many years of research conducted in the USA, Western Europe and Japan, it was found that in the case of long-term exposure, the incidence of lung cancer in humans increases by 9% per 10 µg/m³ of PM_{2,5}.²⁰ In women expecting a child, PM_{2,5} particles easily permeate the placenta-vascular barrier and enter the foetus. This often results in low birth weight and weaker lung development, and later translates into the child's general intellectual and physical development.²¹

In 2012, exposure to ambient air pollution in Poland resulted in 5,284 deaths from ischemic heart disease, 4,514 from stroke, 1,678 from lung cancer, and 171 from chronic obstructive pulmonary disease.²² In 2015, the European Environment Agency reported that 44,500 persons died prematurely due to exposure to PM_{2,5} in Poland. YLLs attributable to PM_{2,5} exposure in Poland were estimated at 533,300,

¹⁵ J. Jędrak, A. J. Badyda and E. Konduracka, 'Wpływ zanieczyszczeń powietrza na zdrowie ludzkie', [in:] United Nations Global Compact Network Poland, *Zrównoważone Miasta. Życie w zdrowej atmosferze*, Warszawa, Publications Office of the Global Compact Poland, 2016, pp. 86, 89–95.

¹⁶ H. Mazurek, *Smog... op. cit.*, pp. 17–18.

¹⁷ United Nations Global Compact Network Poland, *Zrównoważone miasta. Poprawa jakości powietrza w Polsce*, Warszawa, Publications Office of the Global Compact Poland, 2018, pp. 75–76.

¹⁸ E. Konduracka, 'Konsekwencje ekspozycji na zanieczyszczenia powietrza dla układu krążenia', [in:] H. Mazurek and A. Badyda (eds.), *Smog. Konsekwencje zdrowotne zanieczyszczeń powietrza*, Warszawa 2001, p. 101.

¹⁹ International Agency for Research on Cancer, *Outdoor Air Pollution. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 109, Lyon, 2016, p. 34.

²⁰ J. Jędrak, E. Konduracka, *Wpływ zanieczyszczeń powietrza na zdrowie*, Kraków 2017, p. 54.

²¹ A. Rzędowska, K. Rybikowski, K. Prudel, *Jak aktywizować przedsiębiorców w wojnie ze smogiem? Rekomendacje środowiska*, Warsaw Enterprise Institute, Warszawa 2018, p. 12.

²² World Health Organization, *Ambient Air Pollution...*, p. 77.

which translates into 1,403 YLLs per million inhabitants.²³ Epidemiological studies have shown that short-term exposure to higher concentrations of PM_{2.5} increases overall mortality by 1% per 10 µg/m³ of PM_{2.5}, subject to variations in different regions of the world.²⁴ Studies conducted in the USA have confirmed that long-term exposure to PM_{2.5} increased total mortality by 4% per 10 µg/m³ and mortality related to cardiovascular disease and lung cancer by 6% and 8%, respectively.²⁵ All-cause daily mortality is estimated to increase by 0.2–0.6% per 10 µg/m³ of PM₁₀.²⁶

Major legislative initiatives launched by the state authorities aimed at the reduction of reduce ambient air pollution from municipal and domestic sources after 2015

The key legislative solutions aimed to reduce emissions from municipal and domestic sources adopted after the 2015 elections, won by Law and Justice, include the introduction of emission standards for new heating devices and the development of coal quality requirements. These regulations are important because the amount of pollutants entering the atmosphere is influenced by both fuel quality and the type and condition of the heating device. Approximately 200,000 coal boilers are estimated to be sold in Poland annually, approximately 140,000 of which currently have very poor emission parameters and should not be available for purchase.²⁷

In order to eliminate high-emission boilers from the market in Poland, the Regulation of the Minister of Development and Finance of 1 August 2017 on requirements for solid fuel boilers²⁸ became effective on 1 October 2017. The restrictions pertain to boilers with a capacity of up to 500 kW, that is those used in domestic heating. The devices available on the market have to meet the parameters for energy and emission efficiency set out for the fifth, and highest level. New hand-fuelled boilers, among other things, cannot emit more than 60 mg/m³ of PM. In the case of automatic boilers, emissions cannot exceed 40 mg/m³ of PM. Emergency furnaces, often used to burn municipal waste, cannot be installed in boilers.²⁹

²³ European Environment Agency, *Air quality in Europe – 2018 report*, Luxembourg, Publications Office of the European Union, 2018, pp. 64–65.

²⁴ E. Konduracka, 'Konsekwencje ekspozycji ...', op. cit., p. 103.

²⁵ C. A. Pope et al., 'Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution', *JAMA*, vol. 287, no. 9, 2002, p. 1137.

²⁶ World Health Organization, *Health Effects of Particulate Matter. Policy implications for countries in eastern Europe, Caucasus and central Asia*, Copenhagen, WHO Regional Office for Europe, 2013, p. 6.

²⁷ A. Guła, 'Bez regulacji czystego powietrza nie będzie', [in:] A. Dworakowska (ed.), *Efektywność energetyczna w Polsce. Przegląd 2013. Domy jednorodzinne. Efektywność energetyczna a jakość powietrza*, Kraków 2014, pp. 41–47.

²⁸ The regulation is effective from 1 July 2018 for boilers manufactured and not available for purchase or put into service before 1 October 2017.

²⁹ Rozporządzenie Ministra Rozwoju i Finansów z dnia 1 sierpnia 2017 r. w sprawie wymagań dla kotłów na paliwo stałe, Dz.U. 2017, poz. 1690.

The above regulation did not completely rule out the possibility of buying a non-class boiler, which was why an amendment was adopted after eighteen months, resulting in the withdrawal of two exemptions which businesses took advantage of to produce non-class boilers,³⁰ and clarifying the meaning of “making available for purchase.” Pursuant to the amendment, it denotes “every manner of handling a product on the territory of the Republic of Poland by any legal or factual act, including rental and selling by means of distance communication or carried out in a form other than as part of business operations.”³¹ Consequently, making available for purchase includes not only the first sale of the boiler on the market but also sales on the secondary market, including between natural persons, online sales, rental as well as installations and connections to the heating system.

One of the significant weaknesses of the regulation is that it failed to introduce the obligation of replacing old boilers that did not meet the requirements of the regulation. Approximately 1.7 million of single-family houses in Poland use coal boilers that are ten or more years old, most of them being low-efficiency manual-fed boilers.³² Primitive heating appliances that emit considerable amounts of PM and polycyclic aromatic hydrocarbon compounds should be gradually eliminated under the new regulations. However, it should be borne in mind that the average solid fuel boiler can be used for as long as twenty years, therefore the introduction of the Regulation on the requirements for solid fuel boilers should not be expected to bring a rapid improvement of air quality. Another thing is that third- and fourth-class boilers continue to be offered for sale, as found out, for instance, by one of the authors of a blog on technology and lifestyle, who called five sellers each of whom was ready to sell a heating appliance that did not meet the requirements.³³ This demonstrates the necessity for tighter control and supervision of trading in solid fuel boilers.

Another significant legislative step to ensure clean air involves the Act of 5 July 2018, amending the law on fuel quality monitoring and control system and the law on the national tax administration. Under this Act, it was prohibited to sell solid fuels such as coal sludge, flotation concentrates, brown coal and fuel mixtures containing less than 85% of coal and not adapted for combustion in individual boilers and low power installations, to households and combustion installations with a nominal heat output below 1 MW (e.g. boiler rooms in residential buildings,

³⁰ Businesses took advantage of exclusions in the regulation pertaining to (1) devices generating heat for the sole purpose of providing hot utility water and (2) non-wood biomass boilers. It was therefore possible to sell, for example, primitive heating devices as water heaters, and not as central heating boilers.

³¹ Rozporządzenie Ministra Przedsiębiorczości i Technologii z dnia 21 lutego 2019 r. zmieniające rozporządzenie w sprawie wymagań dla kotłów na paliwo stałe, Dz.U. 2019, poz. 363.

³² Ł. Pytliński, ‘Stan techniczny budynków jednorodzinnych w Polsce. Potrzeby remontowe, źródła ogrzewania i standardy izolacyjności cieplnej. Raport z badań’, [in:] E. Walczak, M. Zaborowski (eds.), *Efektywność energetyczna w Polsce. Przegląd 2017. Domy jednorodzinne. Smog*, Kraków 2018, pp. 33–74.

³³ M. Tabaka, *Próbowałem kupić kocioł niższej klasy. Ten zabroniony prawem. Po paru minutach mogłem finalizować transakcję*, [web blog], 27 November 2018, <https://www.spidersweb.pl/2018/11/kociol-nizszej-klasy.html> [accessed: 12.10.2019].

schools, and hospitals).³⁴ Sellers of solid fuel that violates the law are punishable by a fine of PLN 50,000–500,000 or imprisonment. Despite the ban, coal sludge and flotation concentrates continue to be offered online. In November 2018, journalists from *Gazeta Wyborcza* contacted fuel sellers, who offered to deliver the prohibited fuel to the customer, but refused customers with their own means of transport to pick the fuel up from them. One of the sellers said: “A lot of people are buying sludge from us now. If anything, you have to say you bought it the year before. You know what’s going on. We’ll bring the sludge under the tarpaulin, and on the site we’ll cover it with coal to mask it. Nobody will find out.”³⁵

The Act has obliged businesses to issue a quality certificate for fuel sold. If the certificate is not issued, or contains incorrect data, or if the seller fails to provide the buyer with a copy of the certificate issued, he faces a fine of PLN 10,000–25,000 if the value of solid fuel sold does not exceed the amount of PLN 200,000; or a fine of PLN 25,001–PLN 100,000 if the value of solid fuel sold exceeds PLN 200,000.³⁶ The quality of solid fuels admitted to trading is set out in the Regulation of the Minister of Energy of 27 September 2018 on the quality requirements for solid fuels, effective from 4 November 2018. This regulation is necessary to ensure clean air because domestic heating appliances are not equipped with flue gas cleaning installations. The amount of pollutant emissions depends on the quality of coal burned; for instance, SO₂ emissions are directly proportional to the sulphur content in coal, and PM emission goes up by 9–20% per 1% of ash.³⁷

The new regulations introduced quality standards (including ash and total sulphur content) for two fuel groups. The former rests on hard coal and briquettes, or pellets containing at least 85% of hard coal. The latter includes the products of the thermal processing of hard or brown coal, such as coke and semi-coke. If the fuel does not meet the quality standards set out in the regulation, it cannot be sold for use in households and installations with a thermal power below 1 MW.³⁸

In the opinion of environmental and social organisations dealing with air protection, the quality standards introduced for solid fuels are too liberal. The Polish Smog Alert (*Polski Alarm Smogowy*, PAS) demands that the following parameters for coarse and medium coal grades be lowered: maximum sulphur content from 1.7% to 0.8%; maximum moisture content from 20% to 12%, and ash content from 12–14% to 10%, as well as the introduction of a minimum calorific value of 25MJ/kg, instead of 21–22 MJ/kg for these types of fuels. In the opinion of PAS, changes should also be introduced regarding the quality requirements for eco-fine coal.

³⁴ The ban on sales has been in force since 12 September 2018, except for the ban on placing brown coal on the market, which will apply from 1 June 2020.

³⁵ P. Zapotoczny, ‘Handel mułem i flotem kwitnie. To jak my się chcemy pozbyć smogu?’, *Gazeta Wyborcza*, 30 November 2018, <https://opole.wyborcza.pl/opole/7,35086,24226459,handel-mulem-i-flotem-kwitnie-to-jak-my-sie-chcemy-pozbyc-smogu.html?disableRedirects=true> [accessed: 14.10.2019].

³⁶ Ustawa z dnia 5 lipca 2018 r. o zmianie ustawy o systemie monitorowania i kontrolowania jakości paliw oraz ustawy o Krajowej Administracji Skarbowej, Dz.U. 2018, poz. 1654.

³⁷ A. Badyda, J. Jędrak, ‘Możliwości ograniczenia emisji’, [in:] *Smog. Konsekwencje zdrowotne ... op. cit.*, p. 164.

³⁸ Rozporządzenie Ministra Energii z dnia 27 września 2018 r. w sprawie wymagań jakościowych dla paliw stałych, Dz.U. 2018, poz. 1890.

Importantly, the Ministry of Energy allows a deviation of 0.3% for sulphur content, 3% for moisture and ash content and 1 MJ/kg for calorific value. PAS deems it necessary to depart from the deviations permitted, interpreting them as an attempt to further lower coal quality standards.³⁹ The standards proposed by the organization refer to those presented by the Polish Chamber of Ecology during the consultations on the regulation.⁴⁰

The regulation does not eliminate worst-quality coal – fine coal with high ash content (as high as 31% with the permissible deviation), moisture (up to 27%) and sulphur (up to 2.1%) and with a minimum calorific value of 17 MJ/kg, before 30 June 2020. Such fuel should not be burned in domestic furnaces and boilers due to the high emission of pollutants into the atmosphere. Additionally, a high content of subgrain was allowed – up to 30%, which may lead to the mixing of fine coal with forbidden coal waste – sludge and flotation concentrate. Before the Regulation on the quality requirements for solid fuels was adopted, the Supreme Audit Office (NIK) issued a report in which it stated that “the solid fuel parameters proposed in the draft of the regulation (in particular ash, sulphur and moisture content) protect the coal sector much more than they take into account the pursuit of the protection of citizens and the environment against the negative effects of air pollution.”⁴¹

Numerous representatives of local authorities voiced their criticism of the Regulation on the quality requirements for solid fuels at the consultation stage. The quality standards for solid fuels introduced by the regulation are not consistent with anti-smog resolutions adopted by regional assemblies. These resolutions often set out higher, more restrictive standards for fuels permitted in a given area. On 20 August 2018, one month before the adoption of the regulation, Jacek Krupa, the Marshal of the Małopolskie Region, requested Prime Minister Mateusz Morawiecki and the Minister of Energy Krzysztof Tchórzewski to adopt more stringent quality standards for solid fuels, arguing that “the draft regulation does not give a realistic chance for air quality improvement.”⁴² The same opinion was shared by Wojciech Saługa, the Marshal of the Śląskie Region, who on 21 August 2018 sent a letter to the Minister of Energy too.⁴³ Despite these reservations, no changes were made to the regulation concerned. The Marshal of the Mazowieckie Region Adam Struzik stated that admitting low

³⁹ *Ibidem* and Polski Alarm Smogowy, *Stanowisko PAS w sprawie rozporządzenia dotyczącego wymagań jakościowych dla paliw stałych*, 20 August 2018, <https://smoglab.pl/stanowisko-pas-w-sprawie-rozporzadzenia-dotyczacego-wymagan-jakosciowych-dla-paliw-stalych/#sdfnote5anc> [accessed: 19.10.2019].

⁴⁰ K. Kubicka, L. Kurczabiński, K. Włodarczyk, *Propozycja wymagań jakościowych dla węgla jako paliwa dla sektora komunalno-bytowego*, Katowice 2013, pp. 3–4.

⁴¹ Najwyższa Izba Kontroli, *Ochrona powietrza przed zanieczyszczeniami. Informacja o wynikach kontroli*, Warszawa 2018, p. 88.

⁴² *Apel do rządu o zdecydowane działania w sprawie złej jakości węgla*, 20 August 2018, <https://www.malopolska.pl/aktualnosci/srodowisko/marszalek-krupa-apeluje-do-rzadu-w-sprawie-rygorystycznych-norm-dla-paliw-stalych> [accessed: 19.10.2019].

⁴³ *Stanowcze nie dla złych paliw*, 21 August 2018, <https://slaskie.pl/content/stanowcze-nie-dla-zlych-paliw?page=6&t=ekologia> [accessed: 19.10.2019].

quality coal for sale would promote smog formation, making it more difficult to combat smog. He also criticised the consultations on the provisions of the regulation conducted by the Minister of Energy, who requested comments not from local authorities and organizations dealing with air protection but from coal companies and trade unions, among others.⁴⁴

Energy poverty is indeed a major obstacle to the rapid elimination of emissions from the municipal sector, which primarily results from low income, high energy prices and low energy efficiency in buildings. As a consequence, some Poles are forced to purchase heating equipment and fuel that do not meet accepted standards and outside official trading channels. The Regulation on the requirements for solid fuel boilers liquidated low (the cheapest) and partly also middle segments (moderate prices) of the boiler market. The cost of buying a new heating device has increased several times, which is too high a burden for most of the 1.3 million Polish households inhabited by 3.35 million people affected by multidimensional energy poverty.⁴⁵

In order to protect vulnerable social groups from energy poverty, the Act of 6 December 2018 amending the Act on supporting thermal modernization and refurbishment and some other laws was adopted. Under this law, the municipality pursuing the reduction of emissions and air quality improvement may establish a low-emission municipal program. Its beneficiaries receive subsidies when exchanging high-emission heating appliances for devices that meet emission standards, or when connecting to a heating or gas network while conducting thermal modernization of their single family residential building. Depending on the household income, these investments will be subsidized up to 100% from the program,⁴⁶ for which ca. PLN 1.2 billion has been earmarked.⁴⁷

The Thermal Modernisation and Refurbishment Fund co-finances the activities covered by the program on the basis of agreements that will have been concluded by the relevant minister of economy and municipalities by the end of 2024 at the latest, for a period of up to 3 years, provided that five conditions are met. The conditions include, among other things: the anti-smog resolution has been

⁴⁴ Adam Struzik: *Jak walczyć ze smogiem? Rząd psuje przepisy*, [website], 21 August 2018, <https://www.portalsamorzadowy.pl/ochrona-srodowiska/adam-struzik-jak-walczyc-ze-smogiem-rzad-psuje-przepisy,112341.html> [accessed: 19.10.2019].

⁴⁵ J. Sokołowski, P. Lewandowski, A. Kielczewska, S. Bouzarowski, *Measuring Energy Poverty in Poland with the Multidimensional Energy Index*, Instytut Badań Strukturalnych, Working Paper 07/2019, July 2019, p. 6. The authors of this publication classified a household as suffering from energy poverty if it experiences at least two forms of deprivation. The most common are 'low income, high cost' (household has high required energy costs – above the national median level and low income) and 'high actual cost' (household spends a high share of its income on actual energy costs) which applies to 31% of energy-poor households in Poland, followed by a combination of 'presence of leaks, damp, or rot' and 'inability to keep the home adequately warm' which applies to 16% of energy-poor households.

⁴⁶ Ustawa z dnia 6 grudnia 2018 roku o zmianie ustawy o wspieraniu termomodernizacji i remontów oraz niektórych innych ustaw, Dz.U. 2019, poz. 51.

⁴⁷ *Wchodzi w życie nowelizacja ustawy o wspieraniu termomodernizacji i remontów*, [website], Ministerstwo Rozwoju, 11 February 2019, <https://www.gov.pl/web/rozwoj/wchodzi-w-zycie-nowelizacja-ustawy-o-wspieraniu-termomodernizacji-i-remontow> [accessed: 21.10.2019].

implemented by the municipality; low-emission projects have been implemented, covering not less than 2% and not more than 12% of the total number of single-family residential buildings in the municipality, excluding cities with a population of over 100,000 inhabitants; and the municipality covers part of the investment costs planned. In the case of towns with a population of up to 100,000, municipal contribution should amount to 30% of the costs, and for larger cities it should be higher than 30%.⁴⁸ The first agreement concluded within the framework of the solutions introduced by the new law provided for PLN 11.1 million to be transferred for low-emission projects in 300 single-family houses. It was signed on 1 July 2019 between the municipality of Skawina and the Ministry of Entrepreneurship and Technology.⁴⁹

Conclusions

Low-quality air is among the major environmental threats to Polish people, as highlighted by the number of casualties attributed to the lethal exposure to ambient air pollution, and associated primarily with the deteriorated operation of the circulatory and respiratory systems. The compounds that are most dangerous to the health of Poles include benzo(a)pyrene and particulate matter, whose standard concentration levels are commonly exceeded.

The main source of the pollutants concerned is the combustion of solid fuels in households. The replacement of obsolete high-emission heating devices, and allowing only high quality coal to be offered for sale, alongside appropriate monitoring and control systems, are imperative to improving air quality. Therefore, the adoption of regulations regarding emission standards for new heating devices and quality requirements for coal is a positive step forward, although it should be emphasised that the Supreme Audit Office called for the Minister of the Environment to introduce the latter as early as in 2000.⁵⁰ Additionally, the provisions introduced are not sufficient to quickly improve air quality in Poland. The biggest doubts are raised by the Regulation of the Minister of Energy of 27 September 2018 on the quality requirements for solid fuels.

The success of the actions taken by state authorities for clean air is associated with the nationwide limitation of the use of solid fuels in the municipal and domestic sector. Other future actions to this end include the elimination of solid fuels in newly constructed buildings that remain within the range of district heating or gas networks or the obligation to connect existing buildings to district heating or gas networks if such possibilities exist technically.

⁴⁸ Ustawa z dnia 6 grudnia 2018 roku..., *op. cit.*

⁴⁹ *Stop Smog – pierwszy samorząd podpisał umowę z rządem*, [website], 1 July 2019, <http://www.miasta.pl/aktualnosci/stopsmog-pierwszy-samorzad-podpisal-umowe-z-rzadem> [accessed: 21.10.2019].

⁵⁰ *NIK o smogu alarmowała od 2000 roku*, 18 January 2017, <https://www.nik.gov.pl/aktualnosci/nik-o-smogu-alarmowal-od-2000-roku.html> [accessed: 23.10.2019].

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Zanieczyszczenie powietrza zewnętrznego jako wyzwanie dla bezpieczeństwa jednostki ludzkiej w Polsce *Streszczenie*

Celem artykułu jest identyfikacja skali zanieczyszczenia powietrza zewnętrznego w Polsce oraz ocena zagrożeń, jakie stwarza ono dla bezpieczeństwa jednostki ludzkiej. Odpowiedzi na postawione pytania badawcze: (1) stężenia których zanieczyszczeń stanowią największe zagrożenie dla życia i zdrowia Polaków oraz jakie są źródła ich emisji?; (2) jakie działania podejmowane są przez władze centralne w celu zagwarantowania jakości powietrza zgodnej ze standardami europejskimi w odniesieniu do zanieczyszczeń stwarzających największe zagrożenie dla życia i zdrowia Polaków?; (3) czy przyjęte rozwiązania są wystarczające, a jeśli nie – jakie kierunki działań powinny być wzięte pod uwagę, by zapewnić bezpieczeństwo jednostki ludzkiej w odniesieniu do czystości powietrza? – prowadzą do wniosku, że powietrze niskiej jakości stanowi jedno z najważniejszych zagrożeń środowiskowych dla polskich obywateli. Konstytucyjny obowiązek podjęcia przez władze publiczne działań, które ograniczą poziom zanieczyszczenia powietrza oraz jego negatywny wpływ na zdrowie ludzi, nie jest realizowany w sposób wystarczający.

Słowa kluczowe: bezpieczeństwo jednostki ludzkiej, bezpieczeństwo ekologiczne, polityka ochrony powietrza, jakość powietrza, niska emisja

Ambient Air Pollution as a Human Security Challenge in Poland *Abstract*

The aim of this paper is to identify the scale of ambient air pollution in Poland and to assess the threats it poses to human security. Answering the research questions posed: (1) the concentrations of which pollutants pose the greatest threat to the life and health of Poles, and what are the sources of their emissions?; (2) what acts of law have been introduced by the national authorities in order to ensure that air quality conforms to European standards as concerns the pollutants posing the greatest threat to the life and health of Poles?; (3) are the solutions adopted sufficient, and if not – what course of action should be taken into account to ensure human safety in terms of clean air? leads to the conclusion that low quality air is among the major environmental threats to Polish people. Admittedly, the constitutional duty of the public authorities to take adequate measures aimed at limiting the level of air pollution and its negative effect on human life has not fulfilled at a sufficient level yet.

Key words: human security, environmental security, clean air policy, air quality, low-stack emission

Die Außenluftverschmutzung als Herausforderung für die menschliche Sicherheit in Polen Zusammenfassung

Das Ziel des Artikels ist das Ausmaß der Außenluftverschmutzung in Polen zu identifizieren und die damit verbundenen Gefahren für die menschliche Gesundheit zu beurteilen. Folgende Forschungsfragen sollen beantwortet werden: (1) Die Konzentrationen welcher Verschmutzungen bilden die größte Gefahr für das Leben und die Gesundheit der Polen und was sind ihre Emissionsquellen?; (2) Welche Maßnahmen werden durch die Zentralbehörde zum Zweck der Gewährleistung der den europäischen Standards entsprechenden Luftqualität in Bezug auf die Verschmutzungen, die das größte Risiko für das Leben und die Gesundheit der Polen bilden, ergriffen?; (3) Sind die angenommenen Lösungen ausreichend, und wenn nicht – welche Handlungsmaßnahmen sollen berücksichtigt werden um die menschliche Sicherheit in Bezug auf die Sicherstellung der sauberen Luft zu gewährleisten? Sie führen zur Schlussfolgerung, dass Luft von schlechter Qualität eine der wichtigsten Umweltgefahren für die polnischen Bürger ist. Die Behörde, die verfassungsrechtlich verpflichtet ist, die Maßnahmen zu ergreifen, die den Grad der Luftverschmutzung und ihren negativen Einfluss auf die menschliche Gesundheit reduzieren, geht dieser Pflicht nicht ausreichend nach.

Schlüsselwörter: die menschliche Gesundheit, die ökologische Sicherheit, Politik für die Verbesserung der Luftqualität, Luftqualität, geringe Emission

Загрязнение наружного воздуха как вызов безопасности человека в Польше Резюме

В статье указаны масштабы загрязнения наружного воздуха в Польше и дана оценка рисков, которое оно создает для безопасности человека. Предпринята попытка дать ответы на следующие исследовательские вопросы: (1) концентрация каких загрязняющих веществ представляет наибольшую опасность для жизни и здоровья поляков и каковы источники их выбросов?; (2) какие меры принимает центральная власть для обеспечения качества воздуха, соответствующего европейским стандартам, касающимся концентрации загрязняющих веществ, представляющих наибольшую опасность для жизни и здоровья поляков?; (3) являются ли принятые решения (а если нет то какие решения следует принять) достаточными для обеспечения чистоты воздуха? Ответы на эти вопросы позволяют сделать вывод, что воздух низкого качества представляет собой один из важнейших экологических рисков для польских граждан. Также следует указать, что государственные органы власти недостаточным образом реализуют конституционную обязанность в части принятия мер по ограничению уровня загрязнения воздуха и его негативного воздействия на здоровье людей.

Ключевые слова: безопасность человека, экологическая безопасность, политика защиты воздуха, качество воздуха, низкие выбросы