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AIR POLLUTION AND HEALTH IN POLAND: ANTI-SMOG MOVEMENT IN THE MOST POLLUTED POLISH CITIES

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ABSTRACT: The aim of this paper is assessing measures undertaken in Poland by local authorities and government to solve the problem of the poor quality of air in many regions. The low-altitude emissions (LAEs) of air pollutants (up to 40m altitude) are commonly caused by combustion of coal in household furnaces in an inefficient way. The problem is enhanced by combusting garbage and emissions from road transport. The consequences of those emissions are health problems (diseases of respiratory and circulatory systems), as well as degradation of natural environment. The paper presents the results of research carried out in selected Polish cities from the list of 50 most polluted cities in the European Union (2018), where the problem of air pollution is particularly severe. Data published in Public Information Bulletin and on official websites of cities were analyzed to answer the question about the role of socio-political factors in the fight for clean air in Poland. The main finding is that the increase in ecological awareness of residents and access to EU financial funds give local societies an opportunity to develop investment plans, whose implementation should improve the air quality. This, however, will be a long-drawn-out process, because of the scale of long-term negligence in this field and inconsistent government activities.

KEY WORDS: low-carbon economy, air pollution, health, institutions, Poland

Introduction

One of the most important factors determining the quality and length of human life is the condition of the natural environment in which a human lives. The air we breathe is especially important. In Poland, it has been known for several decades that air quality is low, which is mainly due to the promotion of electricity and heat production based on coal. Although, of course, there is a connection between coal combustion and emissions of harmful substances into the air, in Poland the particularly negative impact on air quality is not related to the functioning of the professional power sector, equipped with various installations filtering out pollutants, but to households and transport. The emission of pollutants to the altitude of 40 m is a serious problem particularly in cities and small towns, where it generates significant threats to the health and life of citizens. The main aim of research was to find an answer to the research question: What is the role of socio-political factors in the fight for clean air in Poland? In order to answer this question, in the article information available on the official websites of 35 Polish cities belonging to 50 European Union (EU) cities with the highest level of air pollution with PM 2.5 and in Public Information Bulletin were analyzed. The following information was taken into account: Adoption of the Low-Emission Economy Plans (LEEPs) and their timeliness, implementation of the Low-Altitude Emission Reduction Programs (LAERPs), linking these documents with air protection plans/programs for voivodships and the country. The article presents the literature, law, standards of air quality, and statistical data on the impact of air pollution on health in Poland, with particular emphasis on places with the highest violation of emission standards.

An overview of the literature

For many years, the influence of air quality on health has been mainly the subject of research carried out by specialists of medicine and environmental health (Hajat et al., 2016; Grimm et al., 2008, p. 756-760). Due to the rising costs of treatment and high mortality for diseases directly or indirectly related to breathing contaminated air, it is now also interesting for economists. World Health Organization estimates that around 1 in 8 deaths were attributed to exposure to air pollution, making it the largest environmental risk factor for ill health. In 2016, the percentage of outdoor air pollution-related premature deaths was as follows (https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health):

- ischemic heart disease and strokes – 58%,
- chronic obstructive pulmonary disease and acute lower respiratory infections – 18%,
- lung cancer – 6%.

In accordance with the published in 2005 *WHO Air quality guidelines* by reducing particulate matter (PM10) pollution from 70 to 20 μg/m^3, air pollution-related deaths can be cut by around 15% (WHO, 2005). The main air pollutants that pose a risk to human health are nitrogen oxides (NO_x), particulate matter PM2.5 and PM10, tropospheric (ground-level) ozone (O_3) and Sulphur dioxide (SO_2). PM affects more people than any other pollutant. The major components of PM are sulfates, nitrates, ammonia, sodium chloride, black carbon, mineral dust, and water. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air. Exposure to PM2.5 and PM10 is associated with mortality from cardiovascular and respiratory diseases and from lung cancer, as well as respiratory and cardiovascular morbidity, such as aggravation of asthma, and respiratory symptoms (WHO, 2005). In the EU countries, commercial, institutional and household fuel-burning is the main source of primary (i.e. directly released) PM10 (43%) and PM2.5 (58%). This is followed by industry and then transport, which both emit less than half the total PM of fuel-burning (EEA, 2015). However, secondary particles (i.e., those that are formed in the air through chemical reactions of gaseous pollutants), originating from agriculture, energy, transport or industry sectors, make up a significant proportion of total PM. Secondary particles are the largest relative contribution to PM in Europe, even in urban areas (*Science for Environment Policy*, 2016; Lelieveld et al., 2015).

Much attention is devoted to research of the economic costs of air pollution. The market costs of air pollution include reduced labor productivity, additional health expenditure, and crop and forest yield losses. The Organisation for Economic Co-operation and Development (OECD) projects that these costs will increase to about 2% of European gross domestic product (GDP) in 2060 (OECD, 2016), leading to a reduction in capital accumulation and a slowdown in economic growth. Non-market costs are those associated with increased mortality and morbidity (illness causing, for example, pain and suffering), degradation of air, soil and water quality and consequently the health of ecosystems, as well as climate change. The economic cost of premature deaths from ambient particulate matter pollution and household air pollution was estimated to amount to US$ 1.5 trillion in the European Union in 2010 (WHO Regional Office for Europe&OECD, 2015). In 2015, more than 80% of the total costs (market and non-market) of outdoor air pollution in Europe were related to mortality, while market costs were less than 10%

(OECD, 2016). It was estimated that the total costs for the OECD region amount to USD 1 280 (around EUR 1 100) per capita for 2015 and USD 2 880 to USD 2 950 (around EUR 2 480 to 2 540) per capita for 2060, corresponding to about 5% of income in both 2015 and 2060. The non-market costs of outdoor air pollution amount to USD 1 200 (around EUR 1 030) per capita in 2015 and are projected to increase to USD 2610-2680 (around EUR 2 250 – 2310) in 2060 in the OECD region (EEA, 2018). Air pollution continues to be the number one environmental cause of early death in the EU, with estimates of more than 400,000 premature deaths per year (EEA, 2017). This all comes at a high price to society with high external health – related costs estimated in the range of EUR 330-940 billion per year (Impact Assessment, 2013) Air quality has improved in the EU over the last decades, thanks to joint efforts undertaken by the EU and the national, regional and local authorities. As a result, since 2000, the EU's GDP grew by 32%, while emissions of the main air pollutants decreased by 10% to 70% depending on the pollutant (EEA, 2017).

For example, an estimate for Denmark shows that, the potential healthcare system savings from reducing ambient air pollution (PM2.5) and the resulting cost reductions for coronary heart disease, stroke, chronic obstructive pulmonary disease and lung cancer can reach up 0.1-2.6 million EUR per 100 000 people (Sætterstrøm et al., 2012). The productivity costs from no longer being in the labor market due to these four diseases from exposure to PM2.5 was estimated at 1.8 million EUR per 100 000 people aged 50-70 (Kruse et al., 2012).

For Poland estimations were published by Health and Environment Alliance (HEAL). Pollution from the coal energy sector causes about 3,500 premature deaths and almost 800,000 lost work days. In the case of Poland, these costs amount to PLN 34.32 billion (EUR 8.2 billion) per year (HEAL, 2013).

In its official report the Polish National Health Fund published that in 2017, the number of deaths amounted to 405.6 thousand (based on data from the Central List of Insured) and increased by 3.77% compared to 2016. The results of the analysis indicate that the increase in 2017 mainly concerned the months of January and February. In January, the number of deaths increased by as much as 23.5% compared to January of the previous year. Analysis of the average PM10 dust in the air for Poland in January 2017 was at a record level. In January 2017 the lowest average air temperature was recorded compared to the corresponding periods of last years. In addition, in January there was the peak of influenza (*Analiza*…, 2018).

Research methods

The research was conducted in the second half of 2018 with the aim of determining what actions had been taken during the previous five years in 35 Polish cities from the list of the 50 most polluted EU cities to improve the quality of ambient air. Air quality was reported in terms of annual mean concentrations of PM2.5 in micrograms per cubic meter (https://www.who.int/phe/health_topics/outdoorair/databases/). To answer the research question the following information was analyzed: EU and Polish law, international and Polish standards of air quality, and statistical data on the impact of air pollution on health in Poland, with particular emphasis on places with the highest violation of emission standards, information available on the official websites of the 35 Polish cities with the highest level of air pollution with PM 2.5 and in Public Information Bulletin. Particularly was taken into account: Adoption of low-emission economy plans (LEEPs) and their timeliness, implementation of the Low-Altitude Emission Reduction Programs (LAERPs), linking these documents with air protection plans/ programs for voivodships and the country.

Legal context of air protection in EU and in Poland

The EU's clean air policy has been developed for many years. Now it based on many documents, the most important of which are:

1. Directive CAFE (Clean Air For Europe) 2008/50/EC on ambient air quality and cleaner air for Europe including the merging of most of existing legislation into a single directive (except for the *Fourth Daughter Directive*) with no change to existing air quality objectives.
2. Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air *(Fourth Daughter Directive)*.
3. Directive 2015/1480/EC amending several annexes to Directives 2004/107/EC and 2008/50/EC laying down the rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality.
4. National Emissions Ceilings (NEC) Directive (2016/2284/EU) on the reduction of national emissions of certain atmospheric pollutants. National emission reduction targets established in the NEC Directive requiring Member States to develop National Air Pollution Control Programmes by 2019 in order to comply with their emission reduction commitments.

5. The Seventh Environment Action Programme, *Living well, within the limits of our planet* with the long-term goal within the EU to achieve "levels of air quality that do not give rise to significant negative impacts on, and risks to, human health and the environment". In line with the principle of subsidiarity, policies must be developed at national, regional and local levels, implementing measures tailored to specific needs and circumstances.
6. *The Clean Air Programme for Europe* (CAPE), published by the European Commission in 2013, aims to ensure full compliance with existing legislation by 2020 at the latest, and to further improve Europe's air quality, so that by 2030 the number of premature deaths is reduced by half when compared with 2005.

In Poland among the most important documents related to air pollution reduction are:

1. The Principles of the National Program for the Development of Low-Emission Economy, adopted by the Council of Ministers (Ministry of Economy, 2011).
2. Low-Emission Economy Plans, adopted as an independent decision of local government units, being a key factor of applying for EU funds in financial perspective 2014-2020.
3. National Air Protection Program (Ministry of Environment, 2015).

The amendment of the Environmental Protection Law specifies the current regulations so that voivodship parliaments with resolutions can determine the type and quality of solid fuels authorized for use and technical parameters or emission parameters of combustion devices.

The most recent decision of the Polish government was to adopt the *Priority Program Clean Air* financed by the National Fund for Environmental Protection and Water Management. It is addressed to owners or co-owners of single-family houses. It will be implemented over a period of 10 years, i.e., in the years 2018 to 2029. The total funds provided for co-financing projects covered by the program are PLN 103 billion, of which PLN 63.3 billion in grant financing and PLN 39.7 billion in the form of repayable loans. The program will be financed from national resources and EU funds. The overall goal of the program is to improve energy efficiency and reduce the emission of dust and other pollutants from single-family residential buildings through thorough thermal modernization of buildings with the simultaneous replacement of heat sources (https://www.nfosigw.gov.pl/czyste-powietrze/).

But not all decisions of the Polish government are conducive to the fight for clean air. For example, the Renewable Energy Sources Act implementing the *Directive* 2009/28/EC on the promotion of the use of energy from renewable sources was adopted in 2015 with a five-year delay and then quickly

revised. In 2016 the government introduced unfavorable changes to regulations particularly hampering the development of wind energy (The Act…, 2016.) The "Wind Farm Act" introduced location restrictions for wind power plants in Poland by imposing a requirement for minimum distance (setback) from settlements and other facilities, significantly changing the previous legal framework and conditions for implementation of investment projects. The act introduced a legally binding provision setting the minimum distance for wind turbines from specific types of facilities, equal to ten times the total turbine height (including the rotor blade in top position – tip height) – the so-called 10H rule. Research into the location possibilities of wind turbines in Poland shows that with the existing restrictions and the principle of a minimum one km distance from buildings, 93.9% of the country's area is excluded from investments in wind energy, while with a limit of a two km distance up to 99.1% (The State of Wind Energy, 2017). The development of the best non-emission energy source in Poland has been stopped.

In many EU cities air quality standards are still not being met. The situation is especially severe in Polish cities, which constitute the overwhelming majority of 50 EU cities with the highest of PM 2.5 $\mu g/m^3$ index.

Air pollution in Polish cities – selected facts and statistic data

According to estimates and analysis carried out by the Silesian Center for Heart Diseases in Zabrze on days, when there is a significantly high level of particulate matter PM10 contamination, the total number of deaths increases by 6%, and the number of brain strokes by as much as 9%. Mortality rates rise within a dozen or so days of the smog episode.

According to HEAL Poland (2013), smog accounts for approximately: 25% of lung cancer cases in Krakow, 22% in Nowy Sącz, 21% in Katowice, 20% in Bielsko-Biała, and 17% in Wrocław.

In Poland, the main problem involves emission of products of combustion of solid, liquid and gaseous fuels into the atmosphere from emission sources (emitters) located at a height of no more than 40 m. A characteristic feature of these emissions is that it is caused by numerous sources introducing small amounts of pollutants into the air. Emission comes from: heat production for central heating and hot water, transport, and industry (small and medium size enterprises). Main causes of emission near the ground are:

- heating houses with poor quality fuels (coal and damp wood),
- no standards for fuels used in households,
- burning garbage, including plastic, old furniture, clothes and shoes, tires, and old railway wooden sleepers etc.,

- use of outdated masonry heaters in numerous private houses and industrial heating systems, which do not meet technical standards anymore, and in which the combustion of coal takes place in an inefficient way,
- inadequate insulation of houses and loss of energy in the heating process,
- transport emission, caused by the removal of particulate filters (the Diesel Particulate Filter) from cars' exhaustion systems,
- low and even declining popularity of renewable energy sources,
- fires of landfills (over 70 in the first half of 2018) most often caused by arsons, (seldom by self-ignition).

Apart from typical combustion products (CO_2, CO, SO_2, NO_X, PM10, PM2.5) emissions from all mentioned sources contain:

- polycyclic aromatic hydrocarbons, e.g. benzo (a) pyrene and dioxins,
- heavy metals (lead, arsenic, nickel, cadmium, mercury, bismuth).

Some of these substances are detrimental to health irrespective of their concentration in the air, because of their toxicity and the ability to accumulate in organisms over time.

In addition, it is important to note the differences in emission standards according to WHO, EU and Polish regulations (table 1).

Table 1. Air quality standards for the protection of health (PM10 and PM2.5)

PM	WHO	EU	PL
PM10	50 µg/m^3 24-hour mean	Limit value: 50 µg/m^3 24-hour mean. Not to be exceeded on more than 35 days per year	50 µg/m^3 24-hour mean-acceptable threshold; 200 µg/m^3 24-hour mean-information threshold; 300 µg/m^3 24-hour mean-alert threshold.
	20 µg/m^3 annual mean	Limit value: 40 µg/m^3 annual mean	An undefined standard
PM2.5	25 µg/m^3 24-hour mean	Limit value: 25 µg/m^3 annual mean	An undefined standard
	10 µg/m^3 24-hour mean		An undefined standard

Source: WHO, 2005; EU Ambient Air Quality Directive 2008/50/EC; http://www.gios.gov.pl/pl/aktualnosci/294-normy-dla-pylow-drobnych-w-Polsce.

PM is a common proxy indicator for air pollution, therefore air quality measurements are typically reported in terms of daily or annual mean concentrations of PM10 in terms of micrograms per cubic meter (µg/m^3). Reporting concentration of PM2.5 or smaller, particularly harmful to health, requires more sensitive measurement tools. In accordance with the government agency – the Chief Inspectorate for Environmental Protection – Polish PM10

and PM2.5 standards still differ from EU and WHO standards, as if Poles were different from other nations.

Results of the research

The data from official websites of city offices and from Public Information Bulletin (online) are presented in table 2. The cities are located in 8 voivodeships: Silesian Voivodeship (12 cites), Lesser Poland (7), Łódź (7), Greater Poland (3), Masovian (2), Lower Silesian (1), Kuyavian-Pomeranian (1), and Podkarpackie (1). A total of over 2,860,000 people live in the cities included in the study. The situation in particular cities is diverse due to their size and location. In all cases exceeding the permissible pollution limits is an everyday occurrence in the heating season but in some cases, incidentally black spots were noticed (e.g., in Rybnik on January 10, 2017, the limit was exceeded by 3170%). In all cities in 2014-2016 were adopted Low-Emission Economy Plans (LEEPs) for period up to 2020. The development of plans was financed from the EU funds available under the Infrastructure and Environment Program. The scope of involvement in activities to improve air quality is very diverse among the cities studied. Krakow is definitely the leader, the largest city with population over 765 thousands, which has been pursuing a comprehensive anti-smog program for several years. Krakow was also the first Polish city where in response to air pollution a social movement *Polish smog alert* was founded. The slogan: "We decided to take matters into our own hands and start awareness-raising activities among the residents." describes the main field of activity of this group. Replacing old coal stoves with environmentally friendly heaters is a one of the most important and the most difficult to implement and expensive tasks. In Krakow, in the first year of the local anti-smog program, financial subsidies accounted for 100% of the cost of replacing old heaters, in the second year – 80%, now – 60%, but the poorest households can still receive 100% reimbursement. The interest in replacing the heaters in 2014 exceeded the financial limits of the program (https://smoglab.pl/sukcesy-porazki-krakowskiej-walki-ze-smogiem/). The poorest households can obtain other heating subsidies. In 2017, the income threshold for a single-person household was PLN 1268 per month and PLN 1068 for a multi-person household. Two thousands households benefited from such aid. The total support amounted to PLN 2 million (EUR 454,500) which gives an average PLN 1000 per household. The influence of the educational campaign is clear. The problem of burning rubbish in heaters, and leaves and other waste from gardens in open fires has also been reduced. The latter are picked up from households in special bags free of charge. In the

days with the special intensity of smog, public transport is free for those who leave their cars on parking places and in garages. Over half of the coal stoves inventoried in 2013 have been removed. This is undoubtedly success on a national scale. It is not known whether all old heaters will be eliminated. In the last two years of the plan, several thousand heaters are still waiting to be removed. It should be mentioned that activities undertaken in Krakow are not enough due to the situation in neighboring municipalities where anti-smog investment and education are not equally intense.

Table 2. Measures undertaken in the Polish cities with the highest PM2.5 emission level

	City	Voivodeship	Population thousands	Measures undertaken
1	Opoczno	Łódź	21.6	LEEP 2016 updated 2018, educational anti-smog network in cooperation with Polish Smog Alert
2	Żywiec	Silesian	32.5	LEEP 2015, information on air condition on the website of the city office
3	Rybnik	Silesian	137.0	LEEP 2015
4	Pszczyna	Silesian	25.9	LEEP 2016, LAERP 2017 Notification of exceedances of PM10 on the website of the city office
5	Krakow	Lesser Poland	765.3	LEEP 2015, updated 2018
6	Nowa Ruda	Lower Silesian	23.0	LEEP 2016
7	Nowy Sącz	Lesser Poland	84.0	LEEP 2015 monitoring PM 10, PM2.5
8	Proszowice	Lesser Poland	6.1	LEEP 2015
9	Godów	Silesian	12.5	LEEP 2015 – out-of-date, monitoring
10	Wodzisław Śląski	Silesian	49.4	LEEP 2015, updated 2017 monitoring, educational activities
11	Pleszew	Greater Poland	17.5	LEEP 2015
12	Bielsko Biała	Silesian	170. 4	LEEP and SEAP 2015, updated 2016
13	Sucha Beskidzka	Lesser Poland	9.4	LEEP 2015, information on the voivodeship website
14	Rawa Mazowiecka	Łódź	17.6	LEEP 2017, LAERP, information air condition on the website of the city office
15	Jarosław	Podkarpackie	38.9	LEEP 2015

	City	Voivodeship	Population thousands	Measures undertaken
16	Sosnowiec	Silesian	204.5	LEEP 2015, information on air condition on: http://www.katowice.wios.gov.pl/
17	Knurów	Silesian	39.4	LEEP 2015, information on http://www.katowice.pios.gov.pl/
18	Zabrze	Silesian	173.7	LEEP 2015, updated 2016, LAERP
19	Radomsko	Łódź	46.4	LEEP 2016
20	Tomaszow Mazowiecki	Łódź	63.8	LEEP 2015, updated 2016 and 2018
21	Nakło nad Notecią	Kuyavian-Pomeranian	18.7	LEEP 2015, updated 2016, monitoring PM 10, PM 2.5, Program KAWKA, educational campaign
22	Niepołomice	Lesser Poland	12.0	LEEP 2015
23	Piotrków Trybunalski	Łódź	71.6	LEEP 2015
24	Gliwice	Silesian	181.3	LEEP 2015 Target subsidies for furnace replacement
25	Dąbrowa Górnicza	Silesian	121.4	SEAP 2012, LEEP 2016, Information about PM 10, PM 2.5 on the website of city office
26	Zduńska Wola	Łódź	42.3	LEEP 2016, LAERP I, II
27	Wadowice	Lesser Poland	19.1	LEEP 2015 updated 2017, LAERP I, II, III
28	Otwock	Masovian	45.0	LEEP 2016, LAERP 2011, updated 2014 Information about PM 10, PM 2.5 on the website of city office
29	Nowy Tomyśl	Greater Poland	15.2	LEEP 2015
30	Brzeziny	Łódź	12.5	LEEP 2016, updated 2017, LAERP 2017
31	Piastów	Masovian	22.8	LEEP 2016, Info na stronie www UM
32	Myszków	Silesian	32.8	LEEP 2015, LAERP I, II
33	Wągrowiec	Greater Poland	25.6	LEEP 2015
34	Katowice	Silesian	302.4	LEEP 2014, updated 2015 and 2018
35	Tuchów	Lesser Poland	6.7	LEEP 2016, updated 2017

LEEP – Low-Emission Economy Plan; LAERP – Low-Altitude Emission Reduction Program; SEAP – Sustainable Energy Action Plan

Source: official websites of city offices and Public Information Bulletin (online).

The analysis of Low-Emission Economy Plans of all cities identified the most frequently chosen goals:

- increased efficiency of energy use and generation in facilities and infrastructure,
- increased use of renewable energy,
- effective management of the city with its orientation towards the use of low-emission solutions,
- education and building ecological awareness of citizens leading to respect for energy by society,
- development of financial support for residents exchanging old heaters for more effective,
- development of air monitoring in cites,
- introduction of household heater control and penalties for burning garbage,
- the development of low-carbon public, and private transport (development of infrastructure, management, and change of transport patterns).

It is worth emphasizing, that local self-governments are supported by voivodship self-governments (voivodship parliaments), which have adopted Air Protection Programs. The voivodship environmental protection inspectorates should also be applauded for making up-to-date measurements of pollutant emissions available on their websites.

The Low-Altitude Emission Reduction Programs (LAERPs) are executive programs of Environmental Protection Programs, whose adoption is the responsibility of communes and poviats. Investments under LAERP are financed in the form of a subsidy paid by the commune office. An investor (i.e., a resident of a municipality) eligible for the Program, bears only a part of the costs related to the replacement of old heaters and /or the installation of devices using renewable energy sources. The amount of co-financing depends on the conditions imposed by the Voivodship Funds of Environmental Protection and Water Management. Some cities are also involved in the Covenant of Mayors activities for Sustainable Energy Action Plan (SEAP), which is oriented on climate protection. Access to information about anti-smog actions on the official websites of cities is very diverse, which may make it difficult for residents to obtain subsidies.

Conclusions

Air pollution in Poland is a serious economic and health problem. In recent years an increase in public awareness of health threats resulting from breathing poor quality air has been observed. This is especially true for large

cities. However, terrible air quality especially in the heating season is also a problem in many small and medium-sized cities, 35 of which are among the 50 most polluted EU cities. Air quality became an important topic of discussion at local level during the elections of local authorities. It results in the development of local social movements for better quality air and adoption of Low Emission Plans by local authorities. Some local self-governments are very successful in gaining financial resources for improvement of energy efficiency, replacement of old heaters, development of low-emission transport etc. Despite the growing awareness of the impact of poor air quality on health, Poles are not determined to demand from the central government to take more advanced decisive action for the development of a low-emission economy. Actions at the national level are rather enforced by external regulations: EU law, and international agreements like the *United Nations Framework Convention on Climate Change* (UNFCCC).

Subjective perception of air pollution can have important implications in terms of health-protective behaviors and citizen and stakeholder engagement in cleaner-air policies. Coming with and answer to the research question: *What is the role of socio-political factors in the fight for clean air in Poland?* one can state that there is a gap between what is happening at the local and at the central levels. The steps taken by the Polish government to develop a low-carbon economy have not been sufficient. The government continues to support coal energy and introduced regulations hampering the development of renewables, especially restrictive in relation to wind energy. The Clean Air priority program adopted in 2018 is a promising exception but EU will not support any coal-based heating system, what was planned by the Polish government. Meanwhile, local authorities in many cities are very well coping with the implementation of multi-faceted activities aimed at combating smog. This is a response to the expectations of local residents. So far, the issue of the impact of environmental pollution on health has been absent from the electoral programs of the main political parties in the parliamentary elections in Poland.

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