

Addressing the asymmetry between central and local air protection policies: Insights from Poland

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Abstract: *Purpose:* This paper examines the asymmetry between the air protection policies of the central government and local authorities in Poland, using the city of Kraków as a case study. *Methodology:* The study employs a comparative method to contrast the Polish state's coal policy with the air protection efforts of the Kraków local government. A systems analysis approach is used to identify the causes and effects of the divergent policies. *Results:* The analysis reveals a lack of alignment between the central government's focus on maintaining coal extraction and the local government's efforts to reduce air pollution. Kraków authorities have taken significant measures to improve air quality, but face challenges due to insufficient support from the central government and neighboring municipalities. *Theoretical contribution:* The paper highlights the importance of policy symmetry and coordination between different levels of government in addressing complex environmental issues like air pollution. It contributes to understanding multi-level governance dynamics in the context of air protection. *Practical implications:* The findings underscore the need for a collaborative model of air protection policy that engages central authorities, local governments, private sector entities, and civil society. Establishing air protection councils at the voivodship, county and municipal levels is proposed as a mechanism to facilitate this coordination.

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Integrating air quality considerations into local governments' management control systems is also recommended.

Keywords: smog, air protection policy, politics, local government, municipal government, Kraków, municipality, air protection programme

1. Introduction

The problem of smog has been and is the subject of growing research interest, among other things, due to global air pollution caused by carbon dioxide and residents' growing environmental concerns. In addition, this problem has become a political problem, and factors that have led to, on the one hand, stricter regulation of smog prevention at the local and national level, and on the other hand, making the smog problem a tool of political struggle should be examined. Consequently, the responsibility for combating air pollution mostly rests with local government units (primarily large and medium-sized cities), while the state pursues a different policy.

Many analyses have been carried out on the causes of carbon dioxide emissions to the atmosphere, and scientists have focused on factors that may affect the particular intensity of this phenomenon in large Polish cities. These factors include the geographical and environmental characteristics of the city, the amount of carbon dioxide produced, and the method used to test the intensity of smog. However, an aspect that has been neglected is the analysis of the effectiveness of actions taken by central and local government authorities to prevent this unfavourable phenomenon. The challenge for central authorities is to develop a model of cooperation with local government units in the field of air protection policy, which could guarantee the effective spending of funds to fight the sources of smog occurring in a given area.

This study aims to analyze the effectiveness of the air protection policy of the Polish state and local government authorities against the increasing intensity of smog, as shown in the activities of the city of Kraków. This activity is analyzed considering a broad time frame (2008–2018), assuming the initial turning point, 1 Jan 2008, when voivodship self-government in Poland took over from the government administration in preparing and adopting air protection programmes.

An important factor which makes it difficult for the authorities of the city of Kraków to fight air pollution is the lack of a standard air protection policy implemented by the municipalities in its vicinity. Municipalities form an air pollution ring around Kraków. Due to the lack of joint actions, the effects of initiatives taken by Kraków are weakened and limited, or they are even thwarted by municipalities not interested in air quality in their area. The Kraków agglomeration cannot restore the ecological balance without a standard policy for Kraków and the neighbouring municipalities and with insufficient support from the central authorities.

2. Methodology

The results show that the authorities of the city of Kraków have undertaken to act almost independently in the fight against smog by being directly involved in the fight against this phenomenon, despite the lack of sufficient support from the central authorities. Kraków was the first to introduce the most comprehensive measures in this area, setting an example for all cities in Poland.

Hypotheses are:

H1: The asymmetry in the air protection policy field in Poland consists of inconsistent actions of the central and local authorities caused by differences in goals, methods and representing the interests of specific social groups, which make their actions mutually exclusive.

H2: The asymmetry in Poland's air protection policy field arose due to support for coal mining by the central authorities at the expense of the fight against smog.

The article was written based on the classic research method used in political science, which is the comparative method, thanks to which it was possible to compare the goals of the Polish state's coal policy with the goals of the air protection policy of the local government of Kraków. The comparative method also allowed us to indicate the asymmetry of the state policy in financing air protection and coal production in Poland. The system analysis method made it possible to indicate the causes and effects of

such a divergent policy of Poland's state and local government. Supplementing these methods with a case study enriched the article with reflections on the policy of the local government authorities of the city of Kraków. It allowed us to focus on the advantages and disadvantages of air protection policy in contemporary Poland.

3. Statement of the problem and discussion

The priority of the state authorities in Poland is to keep coal extraction at an increasing level, which is associated with fears of miners' strikes and their social demands, as well as the efforts of local authorities to improve air cleanliness. The problem for the central authorities is the dynamic increase of production costs, which poses significant threats to the economic and financial situation of mining enterprises and the competitiveness of Polish hard coal. In particular, this cost increase was caused by an incorrect relationship between increased wages and labour productivity and a rapid decline in production, sales and coal prices. In order to achieve the goals set for the Polish energy security system, which is primarily based on hard coal (approx. 35%), it is necessary to take long-term actions aimed at limiting the dynamics of increasing coal production costs (Supreme Audit Office (Report), 2015: 28).

The impact of the coal policy in Poland on the national air protection policy can be divided into two periods. The first period covers 2007 to 2015, while the second covers 2015 to 2020.

4. Results

4.1. First period

Hard coal in Poland "is the most important consumed primary energy carrier (...), with a share of 39.5% in 2015" (LKA.410.038.2015, p.6). The coal policy in 2007-2015 was based on an attempt to reduce the share of coal in the energy sector while maintaining the competitiveness of Polish coal sold to the EU. The state strategy for 2007-2015 assumes that: "the goal of the state's policy about the challenging coal mining sector is the rational and effective management of coal deposits located on the territory of the Republic of Poland so that these resources serve the next generations of Poles (Ministry of Economy, (Strategy of hard coal mining in Poland 2007-2015) 2006: 17).

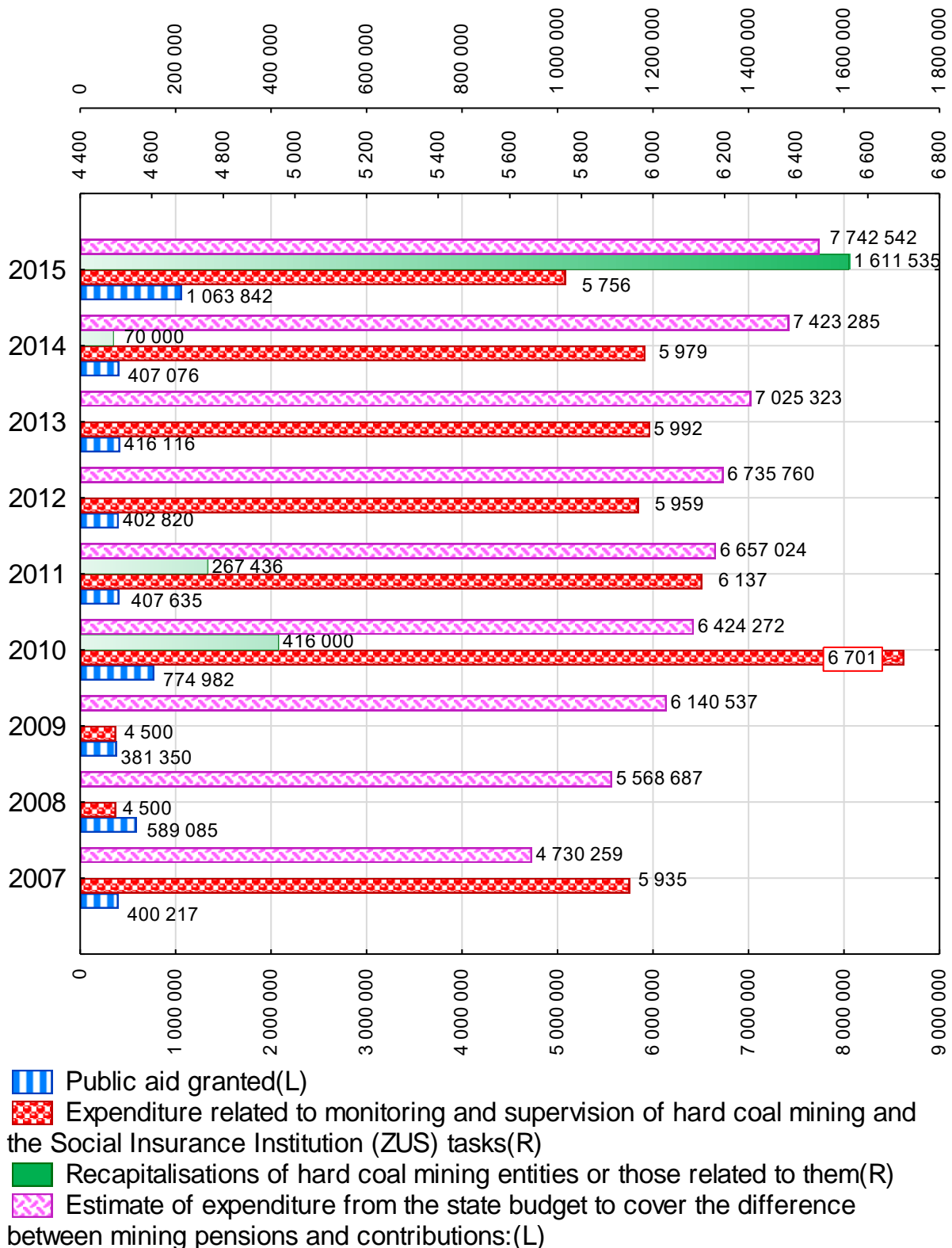
The strategic goal was implemented through activities grouped around the following partial goals:

- ensuring the country's energy security by meeting the domestic demand for hard coal, including the use of coal for the production of liquid and gas fuels;
- maintaining the competitiveness of Polish hard coal in the conditions of a free market economy;
- ensuring stable supplies of hard coal of the required quality to domestic and foreign customers;
- Using modern technologies in the challenging coal mining sector increases price competitiveness, work safety, and environmental protection and creates the basis for technological and scientific development, particularly in the Silesia and Małopolska regions.

When assessing the implementation of the Strategy, it is worth emphasizing that the omission of the design and implementation of the general model of operation of coal companies, combined with the lack of appropriate supervision, led to the risk of bankruptcy and the need to undertake actions involving significant budgetary resources to counteract this threat. As a result, the main action of the state authorities in 2007-2015 was to save coal companies from bankruptcy. According to Jerzy Hausner's calculation, since the beginning of the transformation in Poland, i.e., since 1989, the Polish state has reduced the debt of the mining company to at least PLN 150 billion, i.e., about PLN 6 billion was added to unprofitable mining each year (Dziadul, 2018). Despite this, at the end of 2013-2015, the mining industry recorded a total negative net financial result of PLN (-) 0.3 billion and PLN (-) 2.1 billion and PLN (-) 4.5 billion, respectively (LKA.410.038.2015, p. 7).

Thus, the total public-law payments made by mining entities in 2007-2015 alone amounted to approx. PLN 64.5 billion (LKA.410.038.2015, p. 15).

Figure 1: The functioning of the complex coal mining industry in 2007-2015



Source: Own elaboration based on the publication of the Supreme Audit Office, *Funkcjonowanie górnictwa węgla kamiennego w latach 2007-2015 na tle założeń programu rządowego* [The functioning of the hard coal mining industry in 2007-2015 in the context of the government programme guidelines], LKA.410.038.2015 Reg. no. 209/2016/P/15/074/LKA, Delegatura w Katowicach [Branch Office in Katowice], Warszawa 2017, p.62

From 2007 to 2015, coal mining in Poland was given priority without giving sufficient attention to environmental hazards, including air hazards. Determining what funds should be reserved in the State Treasury budget for this purpose was challenging. Meanwhile, merely PLN 9 billion was allocated to air protection in Poland from 1990-2012. This money was used to modernize mainly the domestic energy industry, including the largest conventional lignite-fired power plant in Bełchatów, the Łaziska and Turów power plants and the combined heat and power plant in Gdańsk, the largest in Europe.

4.2. Second period

The second period covers the years 2015-2020. It is characterized by the increased importance of air pollution in strategic documents such as the Programme for Hard Coal Mining for 2016–2020 with a perspective until 2027, the Strategy for Energy and Environmental Security, 2020 perspective, and the Strategy for Responsible Development until 2020 with a perspective until 2030.

The Programme for Hard Coal Mining industry indicates a new primary goal, which is to create conditions conducive to the construction of a profitable, practical and modern complex coal mining sector based on cooperation, knowledge and innovation, which, operating in a friendly and predictable programme and legal environment, allows for effective use of resource, social and economic capital to ensure Poland's high energy independence and supports the competitiveness of the national economy. This goal is set to lead to the point where the energy carrier will be acceptable from the point of view of environmental protection and the protection of agricultural production space and will support the transition of the Polish economy to a low-emission economy by improving the quality of produced raw materials and developing the production of qualified low-emission fuels (Council of Ministers (Programme for the complex coal mining sector in Poland) 2018: 55). Emphasizing a low-emission policy. The environmental impact of the coal mining sector represents a significant shift in central policy.

Another turning point was the adoption of the Energy and Environmental Security Strategy (EESS). Even though in the EESS, the limitation of air pollution was defined as a priority, in recent years, exceedances in pollutant concentrations have still been noted in most parts of the country. In 2015, air quality standards exceeded 87% of the zones where measurements are made. The Strategy assumes achieving the target value (45%) by 2020 (Ministry of the Environment (Project of State Ecological Policy 2030, 2018). Based on the actions taken, it proved impossible to implement, which directly translated into the use of the problem of air pollution as a tool of political struggle between the central government and local governments. The central government made the local government units responsible for the deterioration of the quality of life, health of the inhabitants and the condition of ecosystems by emphasizing that the main reason for exceeding the values was the low emissions associated with individual heating of buildings (household and communal sector), i.e. emissions from fuel combustion in domestic furnaces and boilers.

On 14 Feb 2017, the Council of Ministers adopted a new medium-term development strategy for the country – the Strategy for Responsible Development until 2020 (with a perspective until 2030) – SRD (Council of Ministers (Strategy for Responsible Development until 2020 with a perspective until 2030) 2020). The Coordination Committee for Development Policy (CCDP) recommended replacing the previously binding Strategy “Energy Security and Environment – a perspective until 2020”. The Strategy meets the most significant challenges of large cities through such activities as implementing low-emission strategies (public transport, energy efficiency, air quality), counteracting uncontrolled suburbanization and improving spatial order. The target value for the national average exposure indicator PM 2.5 (18%) defined in the Strategy was not achieved by 2020.

The following conclusions can be drawn from the presented analysis: the targets for combating air pollution contained in the strategies from 2007 to 2020 were not achieved due to the country's priorities in the field of carbon policy. Working out and introducing comprehensive remedial measures in the communal and housing sectors was impossible. The failure of the discussed strategies shows how serious the problem of smog is caused by the combustion of low-emission solid fuels in furnaces and the exhaust fumes of transport vehicles. However, the central authorities' efforts in horizontal integration of objectives important for Poland, relating to clean air and its good quality, should be assessed positively. Since 2007, the state authorities have been taking steps to integrate air protection into ministerial strategies. However, the horizontal approach to the problem of air pollution did not bring the expected results. Despite setting target values and guidelines for their implementation, the burden

of enforceability rests with local government units. As a result, the local government must adapt its local air protection policy to the guidelines in national documents without receiving sufficient central support. This situation causes asymmetry in implementing national and local air protection policies.

Also, in the opinion of the Supreme Audit Office, Polish authorities (national, regional and local – with one exception) are ineffective in the field of air protection and do not provide sufficient protection for people and the environment (Supreme Audit Office, (Information about control results) 2018: 12). The Minister of Energy, despite the conclusions of the Supreme Audit Office in 2000, 2014 and 2016, did not take immediate action to prepare regulations specifying the quality requirements for solid fuels. Until 2019, the Ministry of Environment did not commence cooperation with other Ministries to establish emission standards for new low-power combustion sources in households and minimum quality requirements for solid fuels.

In June 2016, the European Commission summoned Poland before the Court of Justice of the European Union for failure to comply with EU air quality regulations. On 22 Feb 2018, the Court of Justice stated that Poland breached the EU law on air quality, i.e., it breached the Directive (the Court of Justice of the European Union (Press Release) 2018) on ambient air quality and cleaner air for Europe. According to the Court of Justice, the limit values for PM₁₀ concentrations have been continuously exceeded in Poland. The Court ruled that from 2007 to 2015 inclusive, Poland regularly exceeded the daily limit values for PM₁₀ concentration in 35 zones and the annual limit values for the concentration of this dust in 9 zones, and therefore, Poland violated the EU law. Data from the annual air quality reports submitted by Poland prove that this exceedance should be considered permanent.

In response to the Judgment of the Court, in 2019, an amendment to the *Environmental Protection Law* was adopted, which shortened by three months the time to develop a draft resolution on the air protection program (APP) to be submitted and assessed by competent village mayors, mayors or presidents of cities. The exact timing and procedure apply to the draft resolution on the short-term action plan in case of the risk of exceeding the alarm level in a given zone. Air protection programmes are still prepared by voivodship marshals and adopted by regional sejmiks. However, according to the new regulations, the voivodship board must monitor the implementation of remedial actions at the municipality and county level indicated in air protection programmes and short-term action plans.

Voivodship crisis management centres must inform residents if air quality standards are exceeded. The amendment also stipulates that voivodship boards must report their anti-smog activities to the Minister of the Environment and Voivodship Inspectors of Environmental Protection every year (until 31 Mar). Previously, they were required to submit such a report every three years (The Act of 27 Apr 2001, *Environmental Protection Law*, Journal of Laws 2001 No. 62, item 627 as amended).

In the case of APPs, during 2013 - 2017, a joint programme covering all zones and substances that exceeded normative levels was developed only for the Małopolskie voivodship. The essential part presents the key aspects for its implementation – the purpose and scope of the Programme, diagnosis of the current state, remedial actions, expected effects, and the principles of its monitoring. Technical issues were included in the rest of the Programme - the location and topography of the zones, air quality analysis, inventory and technical and ecological characteristics of installations and devices, and a description of the emission model (Supreme Audit Office, (Information about control results) 2018: 117). Remedial actions were ranked into four groups, i.e., those aimed at reducing emissions from surface, line, and point sources, as well as actions such as environmental education for residents and the protection of green areas. For remedial plans, cards indicating the name and description of the action, including the estimated material scope, units performing the task, the planned date of its completion and the estimated costs of implementation and sources of financing, were developed. Despite this, the Court of Justice also stated in 2018 that none of the air protection programmes adopted by Poland at the national or regional levels mentioned that these programmes should allow the limitation of exceedances of limit values as soon as possible, which is a requirement (The Court of Justice of the European Union Press Release No. 19/18 Luxembourg, 22 Feb 2018, Judgment in case C-336/16 Commission v Poland).

In connection with the above analysis, it can be concluded that the asymmetry of the national and local air protection policy occurs not only based on strategic documents but also in activities undertaken at the central level. State authorities act with delay in the field of air protection policy. Their actions are motivated by external conditions, particularly solutions adopted at the EU level. Despite the provisions in strategic documents, they are not a manifestation of a comprehensive national policy but the result

of individual reactions showing that air pollution is not a priority for state authorities. The assessment of the Court of Justice of the EU presents comprehensive approaches to the performance of the public task of air protection based on specific administrative procedures performed not so much at the central level as at the local level. Among them, attention should be paid to developing air protection programmes and supervising their implementation in voivodships. The lengthy procedure for the development of APP, the lack of standards for obtaining information from the authorities of municipalities and counties about the state of air pollution in their area, failure to include other public and private entities deciding on air quality in a given area means that the actions taken do not present an accurate picture of the air quality level in voivodships. Consequently, the supervision exercised by the Ministry of the Environment in the scope of APP implementation is limited only to the data available from the voivodship self-government without specific procedures for managing information obtained from municipalities and counties.

4.3. Case study: Kraków in Poland

Until 2019, Poland was the most liberal country among the European Union countries regarding the rules for determining the levels of informing the public about air pollution. The smog alert is announced in Paris when air pollution with PM₁₀ particulate matter reaches 80 µg/m³. In Kraków, according to the rules in force until October 2019 in Poland (Until 2012, the alert level in Poland was 200 µg/m³: Regulation of the Minister of the Environment of 3 Mar 2008 on the levels of certain substances in the air, Journal of Laws No. 2008 No. 47, item 281), it was almost four times higher and amounted to 300 µg/m³ (The regulation adopted in 2012 increased the alarm level of air pollution with particulate matter to 300 µg/m³ – Regulation of the Minister of the Environment of 24 Aug 2012 on the levels of certain substances in the air, Journal of Laws No. 2012, item 1031). Under the influence of social pressure, local authorities and EU policy, the smog alarm in Poland is currently announced when air pollution with PM₁₀ particulate matter reaches the level of 150 µg/m³ (Regulation of the Minister of Environment of 8 Oct 2019 on the levels of certain substances in the air, Journal of Laws No. 2019, item 193).

According to the reports of WHO and European agencies, 47 thousand people die in Poland due to smog and complications resulting from poor air quality. The household and communal sector (e.g., heating furnaces, waste burning) and transport are responsible for the highest emissions of pollutants, including suspended dust PM_{2.5}, PM₁₀ and benzo(a)pyrene. According to the WHO Report 2018, Kraków is the 8th most polluted city in the European Union countries (Ślusarczyk, 2018).

Due to air pollution, the average life expectancy is reduced by 8.5 months. The local climate in cities differs from that in rural areas, including elevated surface and air temperature, known as the "urban heat island" (Borghesi & Montini, 2016; Wiesner et al., 2018; Wolsink, 2020). In Kraków, there are, on average, 394 cases of lung cancer annually. In 2013, the European Commission estimated that in 2010, the costs associated with the impact of pollution on health fluctuated across the EU between EUR 330 billion and EUR 940 billion. For Poland, the costs estimated by the OECD are PLN 405 billion, which is the cost of premature deaths caused by air pollution (Air Protection Policy Program 2020: 26).

The Małopolskie voivodship, in which Kraków is located, has a population of 767 348 thousand and is characterized by an exceptionally high pollution level. According to the WHO report, Kraków is one of the most polluted cities in Poland, with an average of 64 µg/m³ (Ślusarczyk, 2018).

Currently, there is an air protection programme in the Małopolskie voivodship, adopted by the voivodship council on 23 Jan 2017, which replaced the air protection programme introduced by the resolution of 30 Sept 2013. The years 2013-2016 are a period of intense activities undertaken by the authorities of the city of Kraków. In October 2015, the inventory of solid fuel furnaces, boilers and fireplaces, which started in 2013, was completed. As a result of the inventory, about 24,000 sources of solid fuels were found. Estimating the number of furnaces was necessary to determine the financial resources needed to co-finance the replacement of the heating method to be environmentally friendly, as well as to prepare a schedule for the gradual decommissioning of furnaces. The location of solid fuel sources helps to improve plan activities to eliminate low emissions. During the implementation of the Low Emission Reduction Programme, fireplaces in Kraków, which were not included in the inventory 2013-2015, were found. Therefore, since 2016, the city of Kraków has been working on the correction

of the inventory with a simultaneous continuous update of the possessed data, including the gradual liquidation of furnaces (https://www.bip.krakow.pl/?dok_id=80801 (2019-09-21)).

As of 1 Oct 2015, the local activities of the city of Kraków were complemented by the implementation of the LIFE project, financed by the European Union, by the Małopolskie voivodship self-government (<https://powietrze.malopolska.pl/life/>, 2020). The main activities of the project focused on the creation of a network of eco-advisers in municipalities in Małopolska, whose duty was to support the implementation of the air protection program (APP) by obtaining external funds for activities limiting the emission of pollutants and mobilizing residents to join these activities. Further activities include advising the inhabitants of Małopolska on the most effective ways to reduce emissions and sources of financing, including preventing energy poverty through measures aimed at saving energy costs. A Competence Centre was built at the regional level, offering training and a knowledge base for all local governments and supporting municipalities in implementing activities in the fight against smog. The Centre's role of offering advisory and administrative services for the inhabitants of Kraków in liquidating old solid fuel furnaces and boilers was strengthened, information points were launched, and assistance was provided to people interested in applying for co-financing of energy-saving projects. Tools for high-resolution modelling of pollution distribution in Kraków were launched, and an interregional base of emission sources for Małopolska, Silesia, the Czech Republic and Slovakia was planned, along with modelling air quality (<https://powietrze.malopolska.pl/life/>, 2020).

As a result of the activities undertaken in 2018 in 55 municipalities in the field of replacement of low-efficiency solid fuel heat sources and old heating devices, almost 6 thousand heating devices were liquidated, and the achieved emission reduction rates accounted for approximately 80% of the obtained environmental effects by all municipalities in Małopolska (Supreme Audit Office (Information about control results), 2018: 160).

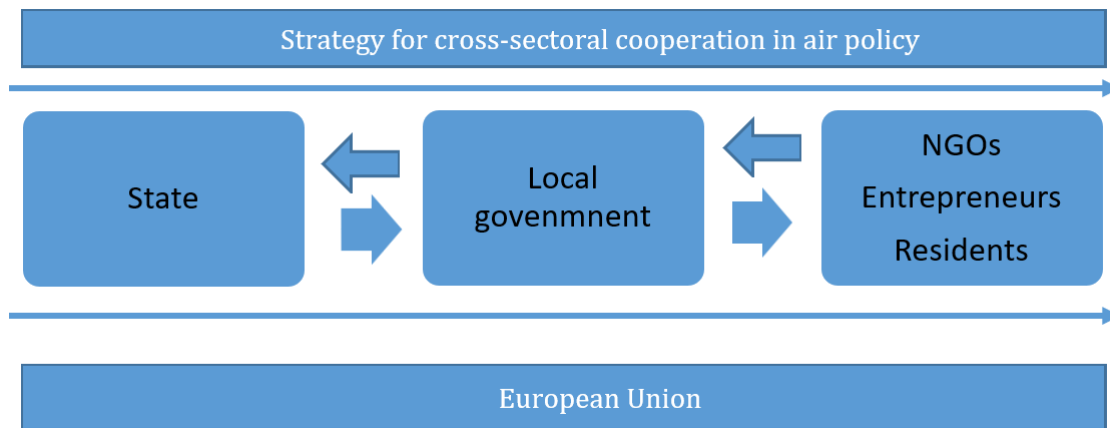
125,300 inhabitants were given help and advice as part of the LIFE project. The eco-managers organized 1,100 meetings and 268 lectures and performed thermal imaging examinations for about 1,000 public buildings. From November 2016 to April 2018, a social campaign was carried out under the slogan *You are killing with smoke from the furnace*, and a hotline was launched where the residents of Małopolska could obtain information about the requirements of anti-smog resolutions and the possibility of obtaining funding for the replacement of old boilers (Supreme Audit Office, (Information about control results) 2018: 161). Directly managing service delivery has eliminated information asymmetry issues and difficulty controlling results. Moreover, this management form provides citizens access to the service (Campos-Alba et al., 2019).

Consistent actions by the local government authorities of the city of Kraków gradually improve the air in this city. Kraków is falling in rankings, indicating the degree of air pollution and is slowly becoming a model example of a large city, which, thanks to the effective and efficient operation of local authorities, brings about a slight decrease in air pollution. Despite the seemingly positive situation, the reality is different. The problem is that local government authorities are not helped by the policy of the state authorities, which, by creating an appropriate model of cooperation in the field of air protection policy, could help the city to pursue a standard air protection policy with neighbouring municipalities currently producing more air pollution than Kraków itself.

4.4. Model of symmetry in the scope of air protection policy for central and local authorities

In order to combine and coordinate the resources of state authorities, local government units, non-governmental organizations, entrepreneurs, and residents, their activities should be integrated into the model of central symmetry and local air protection policy based on inter-sector cooperation.

Diagram 1: Air protection policy symmetry model for central and local authorities

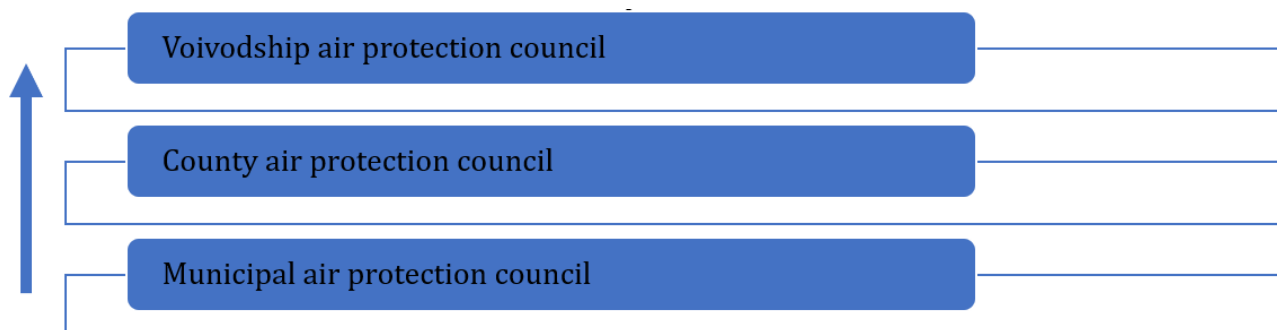


Source: Own elaboration

The main principles of this model should be the principle of partnership consisting of informing each entity about the planned directions of activities in the field of air protection policy and developing forms of cooperation; the principle of subsidiarity, expressed in the creation of advisory teams composed of representatives of the public and private sectors working in the field of combating air pollution; the principle of effectiveness related to obtaining acceptable or target levels of substances in the air in the shortest time possible. The principle of fair competition involves the selection of private entities for cooperation. These entities should operate efficiently in the market. The principle of openness consists of setting strategic documents. These documents outline directions of joint action and areas for private entities to engage in air protection policy. This is expected to lead to the development of a model of cooperation. This model will be used by specialists in the field of fighting smog.

The presented model of air protection policy symmetry also shows the flow of information in the field of air protection policy, which supports public and private organizations in learning from each other. The activity of each entity is conditioned by information provided by other organizations and residents involved in the implementation of solutions in the fight against smog. The management of these data and their use in the decision-making process allows for a faster, more effective and flexible approach to the problem of air pollution. The challenge for the cross-sectoral cooperation model is to create an information exchange platform. For this purpose, air protection councils can be appointed to associate representatives of local government authorities, entrepreneurs, start-ups, non-governmental organizations and residents.

Diagram 2: Implementation of the air protection policy symmetry model at the local level based on air protection councils



Source: Own elaboration

The model should be based on the operation of air protection policy councils at three levels: voivodship, county and municipality, which would be established in those places where the permissible and target levels of airborne substances are exceeded. The Environmental Protection Act should include the councils as advisory and opinion-making bodies composed of representatives of local government

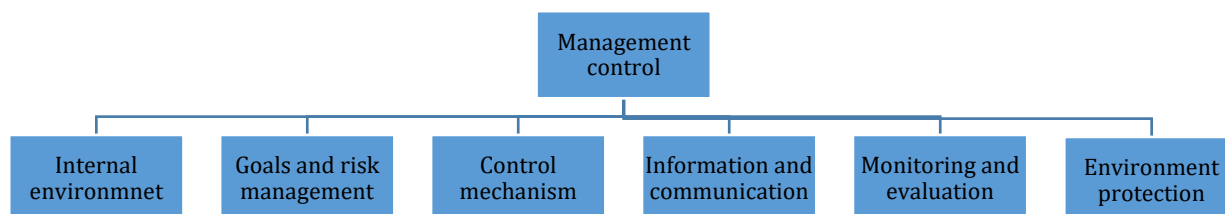
units, entrepreneurs in the energy sector and non-governmental organizations operating in the field of air protection policy, whose main task would be to provide opinions on the draft resolution of the air protection programme and present the local authorities with a strategy of implementation of the air protection programme in a given area.

As part of the cooperation model, an essential element is developing an information management system that is necessary to prepare a draft air protection programme. The management system covers three levels of action. At the regional level, the main task of the Voivodship Air Protection Council would be to prepare an air protection programme combining a tripartite approach to fighting smog from the perspective of the third sector organizations, voivodship self-government and entrepreneurs from the energy sector, and integration of these solutions with other strategic documents. The direct benefits would be increased involvement of interested entities in the implementation of the air protection policy, which could translate into increased legitimacy of voivodship authorities to set air protection directions in the voivodship air protection programme and faster implementation of solutions by including in the process of their creation entities operating in the vicinity of the local government and leading air protection policy.

Tasks diagnosed under air protection programmes should be subject to the development of specific strategies for their implementation. For example, in the Małopolskie voivodship, the air protection programme envisages introducing restrictions on the use of solid fuel heating devices, implementation of municipal low-emission reduction programmes – elimination of low-efficiency solid fuel devices, expansion and modernization of heating networks and gas networks ensuring the connection of new users, thermal modernization of buildings and supporting energy-efficient construction in housing and public utility buildings, reduction of emissions from transport, reduction of industrial emissions, education of residents on ecology, improvement of urban ventilation conditions and protection of green areas (Annex No. 1 to Resolution No. XXXII/451/17). For these tasks, it is necessary to define standards for their implementation within the framework of intersectoral cooperation and indicate entities to perform them at the local and supra-local stages. Municipal and county air protection councils should handle these tasks.

The model of cooperation in the field of air protection policy, in order to start functioning, should be included in the management control system, which is the total number of activities undertaken by the local government unit to ensure that goals and tasks are performed in a lawful, cost-effective and timely manner. Introducing into the management control system the assessment of the implementation of the objectives and tasks of a local government unit about the environment, including air quality, would result in the institutionalization of control of the activities of local government administration bodies in the fight against smog. An analysis of the performance of the tasks of a local government unit in terms of its impact on the environment will result in ensuring that each internal procedure, effectiveness and efficiency of the bodies' operation, resource protection, ethical behaviour of employees, information flow and risk management will take into account the perspective of environmental protection policy implementation, including air protection of a given area.

Diagram 3: Diagram of supervision over the performance of public tasks in management control, taking into account the new criterion of environmental protection (air protection)



Source: Own elaboration

4.5. Theoretical logic of the model

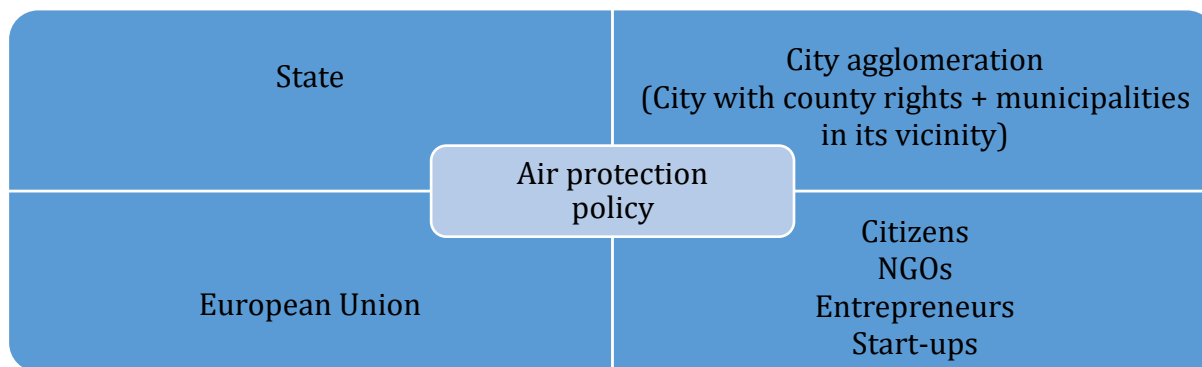
The asymmetry currently visible on the line between the central state and local government units results from the coal policy pursued by the central authorities, insufficient central programmes enabling changes in the fight against smog at the local level and unequal distribution of responsibilities in the field of air protection policy. According to the provisions of the Act of 27 Apr 2001 on Environmental Protection (AEP), the voivodship self-government is responsible for air quality, setting out tasks to be performed in municipalities and counties in the air protection programme. From the content of Art. 91 of the AEP follows that the voivodship self-government prepares and submits a draft resolution of the air protection programme to the competent village mayors, mayors, presidents of cities, and starosts for an opinion. They must issue an opinion within one month of receiving the draft resolution. Failure to do so within the prescribed period means accepting the draft resolution on the air protection programme (Journal of Laws 2001, No. 62, item 627).

The statutory provision gives rise to specific problems with the implementation of a multi-level air protection policy: insufficient support of local and supra-local authorities for the concept adopted by the voivodship sejmik may result in difficulties in the implementation of the air protection programme; insufficient involvement of other public and private entities by local authorities in the implementation of the air protection programme leads to the weakening of its effects and the extension of the planned effects over time; failure of local authorities to identify themselves with the regional air protection policy affects the low involvement of other private entities, contributing to the passivity of local community members in the fight for clean air; the lack of indicated methods of collecting information by municipalities and counties on air quality in their area causes inequality in access to data and complications with planning activities in the field of combating smog and the risk of unreliable information on air quality may cause difficulties in the supervision of the voivodship by the Minister of the Environment.

The problems mentioned above should be treated as challenges faced by Polish legislators. Changing the Environmental Protection Act may contribute to reducing the asymmetry in the responsibility of local government units for air protection policy. As part of the abovementioned problems, the following questions should be asked: How can local authorities increase their participation in implementing the Voivodship air protection programme? What form of cooperation should be proposed to build a solid local alliance of public and private entities focused on the common problem of combating smog? How can we facilitate local government units' supervision in the air protection policy field?

There is no doubt that the fight against smog is effective only when there is an integration of municipal, county, and voivodship self-government resources with private entities and an active state policy. No examples exist of joint activities by local government units, non-governmental organizations, and entrepreneurs in Poland's air protection policy field. Actions taken by these entities are scattered and incidental. There is no strategy linking public and private sector entities around one goal of air protection.

In the face of the scale of the problem, which turned from the local level into a regional and national problem, a model should be prepared to consist of building bottom-up cooperation mechanisms between public and private entities in the fight against air pollution, supported by national solutions. The model must be based on the selection for cooperation of only those entities closest to the smog sources. They bear the most significant burden of combating the pollution that results from carbon dioxide emissions. The current situation prompts us to reflect that, since air is a public good, it should be taken care of comprehensively, i.e., within the framework of close cooperation of local government units with entrepreneurs, non-governmental organizations and residents. The basis for implementing the air protection policy in the proposed model should be a network approach based on combining the resources of as many entities as possible, united by the public interest, i.e., the interest of all citizens.

Diagram 4: The network model of the air protection policy

Source: Own elaboration

The network model of the air protection policy presents all entities that the central authorities should engage in the development of solutions in the field of air protection policy. State authorities should be responsible for preparing the structure for implementing the fight against air pollution. When creating a cooperation framework, they must consider the perspective of all entities involved in the knowledge management process. When identifying the source of smog, it is essential to indicate the owner of this source who, with the support of other entities, will be responsible for developing a solution. The implementation of the air protection policy is not possible independently. If state authorities do not participate, local government units will bear the high costs of counteracting the sources of pollution in their area. Their excessive financial burden will also increase duties among local government employees. As a result, other public tasks may be performed at a lower level because the local government will be obliged to develop solutions in air protection policy, which state authorities should prepare in advance.

As air protection policy begins to play an increasingly important role, it can be treated as one of the main directions of local, supra-local and regional development, deciding on the pace of socio-economic development of a given area. The impact of regional, supra-local and local air protection policy on the functioning of entrepreneurs, start-ups, non-governmental organizations and residents leads to a feedback loop in the form of reactions of government administration bodies, which, as active entities operating centrally, will create a platform for developing standard guidelines of the air protection policy corresponding to the specificity of a given area.

Another problem in implementing the network model of the air protection policy is the lack of cooperation between the city with the county rights and municipalities in its vicinity. When one urban Centre conducts intensive activities combating the sources of air pollution in its area, in the absence of support from neighbouring local government units, the effects of its activities are limited and inhibited by entities that do nothing. The effect is then that these actions were not taken at all. Conducting an effective and efficient air protection policy requires the cooperation of local government units, which should be motivated not only by spatial proximity but also by the common interest, which is clean air, which affects the quality of life of their inhabitants.

However, when there is no perspective and no participation of entrepreneurs in the implementation of the air protection policy, it will not be possible to introduce new technological solutions in the energy sector, which would contribute to more efficient monitoring of the level of air pollution, identifying its sources and implementing devices that make it easier for the residents to control the heat loss from their households. Only the combination of the potential of the public and private sectors will enable the introduction of innovative solutions in the field of air protection.

The lack of cooperation between local authorities and residents may lead to a situation in which the vision of the air protection policy will not be implemented due to the lack of commitment on the part of the interested entities themselves. The biggest challenge for local government units is the lack of awareness of local community members of their impact on increasing air pollution in the municipality. For this reason, local government units should carry out, complementary to other activities combating sources of air pollution, educational campaigns changing local community members' inappropriate attitudes and habits and behaviour.

On the other hand, the consequences of the lack of cooperation between local government units and non-governmental organizations include the failure to use the potential of social capital in the decision-making process, which should result in the development of solutions in the field of air protection policy. Moreover, due to the lack of mutual information on the planned directions of activity, non-governmental organizations do not participate in consulting the draft legal acts and creating joint advisory and initiative teams consisting of representatives of the non-governmental sector and public administration. As a result, non-governmental organizations are excluded from providing public services in air protection policy.

Therefore, the network model of air protection policy is a response to the current problem in Poland, which consists of carrying out numerous uncoordinated actions to combat air pollution, which are mutually exclusive, repeated or limit each other. They result in the previously discussed asymmetry between central air protection and local government air protection policies. There are no winners in the dispute between the central and city governments. However, many researchers support an increase in the city's already established sovereignty, which will change its location in the city-state relationship (Filipcevic, 2017) and may contribute to increasing the effectiveness of the city's policy.

5. Discussion

The Polish carbon policy is the direct cause of the asymmetry between the central air protection policy and the local air protection policy.

The failure to allocate funds in the state budget for the air protection policy in 2007-2020 proves the lack of transparency in its financing and the marginalization and deliberate misleading of the Polish society concerning the disclosure of public information regarding the amounts spent on its purpose.

In the media discourse, the air protection policy in Poland is treated as a propaganda tool of the ruling authorities, aiming to divert public attention from the money from the state budget allocated to the coal policy.

The unfortunate actions of the state authorities, which were reflected in the Strategy for the activities of the complex coal mining industry in Poland in the years 2007-2015, resulted in a deepening of air pollution, as there were no comprehensive actions taken in urban agglomerations where the primary sources of pollutant emissions can be found.

The policy of the European Union cannot replace the national policy in combating air pollution because it would be a too far-reaching interference with the sovereignty of the country.

The city of Kraków will be unable to cope with the neighbouring municipalities that are poisoning it without a clear central government policy.

As local government units, the county and voivodship do not pursue an effective subsidiarity policy towards the city of Kraków.

The air protection policy should be an expression of symmetry of the national and local air protection policy and an expression of implementation of the principle of sustainable development, which serves the public interest, i.e., the interest of all citizens.

6. Conclusion

The study examined the asymmetry between central government policies focused on supporting the coal mining industry and local government efforts to combat air pollution using the case of Krakow. The key findings confirm both hypotheses:

1. There is a lack of alignment between the goals, methods, and interests represented by central and local authorities in Poland regarding air protection. While the central government prioritizes maintaining coal extraction levels, local governments like Krakow have taken significant measures to reduce air pollution from residential emissions and transportation. This divergence in priorities has led to mutually exclusive policies.

2. The asymmetry stems mainly from the central government's emphasis on supporting the coal mining sector, often at the expense of robust anti-smog regulations and funding for local air quality initiatives. Despite strategic documents acknowledging air pollution, implementation has fallen short.

The analysis highlights the challenges Krakow has faced in combating smog, with its efforts undermined by insufficient coordination with neighbouring municipalities and a lack of substantive

central government support. The findings underscore the critical importance of integrated, multi-level governance for effectively addressing complex environmental issues like air pollution.

From a practical standpoint, establishing air protection councils at the voivodeship, county, and municipal levels could provide a mechanism for better vertical and horizontal policy integration. These councils should engage all key stakeholders - central authorities, local governments, the private sector, and civil society groups. Adequate funding from the central government is also essential to enable robust local implementation of air quality measures.

Theoretically, this study contributes insights into multi-level environmental governance and policy coherence dynamics. The Polish case demonstrates how divergent priorities across government levels can undermine the achievement of shared goals like clean air. It points to the need for institutional designs that align incentives and facilitate coordinated policymaking and implementation across jurisdictions.

Future research could explore specific institutional models for improving cross-level coordination on air protection policies. Comparative analyses of other countries grappling with similar governance challenges would further enrich our understanding of this issue. An integrated, collaborative approach engaging all key actors is crucial for Poland to tackle its severe air pollution crisis effectively.

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Conflicts of interest

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