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Application of the public-private partnership formula in thermomodernization projects of public buildings in Poland in the years 2009–2020

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Abstract

Motivation: For over ten years, Poland has observed a systematic use of the public-private partnership (PPP) formula in implementation of investment projects. Local government units are particularly active in this area. One of the self-government's own tasks is the management of municipal property, including public utility buildings. The implementation of such tasks, in accordance with the European Commission's recommendations, should be conducted in cooperation between a local government unit and a private entity under a public-private partnership.

Aim: The aim of the study is to assess the public-private partnership market in Poland in the context of the implementation of thermomodernization projects of local government public facilities in the years 2009–2020.

Results: The market in Poland is generally flattened, as more than 90 per cent of launched projects fall into the local government sector. It is the local authorities that initiate intersectoral cooperation based on the PPP formula. Knowing their local communities, they carry out tasks that meet their needs on the one hand, and respond to climate and energy challenges on the other. This is evidenced by a growing number of projects involving the thermomodernization of public facilities.

Keywords: public private partnership; cooperation; local government; thermomodernization
JEL: H72; K23; K32

1. Introduction

For more than ten years in Poland, a systematic use of the public-private partnership (PPP) formula has been observed when implementing investment projects. Local government units are particularly active in this field.

One of the self-governments own tasks is the management of municipal assets, including public utility buildings. It does not only concern the current operations, but also the development of possessed resources, especially if they lead to an increase in value and a reduction in operating costs. Within the scope of their management and investment activities, local governments are obliged to apply quality and technical standards compliant, among others, with energy efficiency standards, which are increasingly consistent with the European environmental policy.

In December 2019 the European Commission (2019) published a statement on The European Green Deal, a new EU growth strategy to transform Europe into a climate-neutral, fair and prosperous society with a modern, resource-efficient and competitive economy by 2050. The main goal of the strategy is to reduce emissions by at least 40% by 2030 compared to 2010 consumption and by at least 55% compared to 1990.

Considering that buildings absorb about 40% of final energy, significant savings can be achieved by investing in energy efficiency measures in buildings. According to the European Commission, the increased use of energy-efficient equipment and technologies, combined with the use of renewable energy, is a cost-effective way to strengthen the security of energy supply (PAED, 2015, p. 6). At the same time, the European Commission indicates that public-private partnerships are one way to increase efficiency in this area.

Local governments, regardless of the tasks of development and maintenance of the infrastructure they own, in accordance with environmental standards, are obliged to create a local energy policy that promotes optimal use of the resources they own and savings in this area (PAED, 2015, p. 6). One of the activities is to ensure an increase in energy efficiency of public buildings through thermomodernization. The implementation of this type of investment, in accordance with the recommendation of the European Commission, should be carried out in cooperation between a local government unit and a private entity under a public-private partnership.

The literature and documents on public-private partnerships specify many terms for this cooperation (Brzozowska, 2010, p. 30; European Commission, 2003, p. 17; Flynn, 2002, p. 257; Hajdys, 2013, p. 44; OECD, 2012, p. 18; Zysnarski, 2007, p. 7). The European Parliament and the Council have a legislative, legal definition of a public-private partnership. It means "forms of cooperation between public bodies and the private sector, which aim to improve the delivery

of investments in infrastructure projects or other types of operations, delivering public services through risk sharing, pooling of private sector expertise or additional sources of capital" (Regulation, 2013, art. 2, pkt 24).

The aim of the study is to assess the public-private partnership market in Poland in the context of the implementation of thermomodernization projects of local government public facilities in the years 2009–2020.

2. Literature review

2.1. The concept of public-private partnership

PPP is a formula for implementing public tasks based on cooperation between a public entity and a private entity, which differs from the traditional model. In that model, the public sector commissions the execution of the object of the order (construction of infrastructure or provision of services) in economic entities, which is financed from public funds. PPP model assumes abandoning the principle of financing the provision of public services exclusively with budget funds and replacing them with private capital. On the basis of a civil law agreement, the private partner takes over the obligation to finance the venture and the responsibility for the majority of economic activities connected with the realization of the project. The public partner remains responsible for the level and quality of service provision. Such a division of rights and obligations allows to create a new space to generate income for private entities and for public partners to significantly increase the effectiveness and efficiency of public service delivery within budget constraints. In this type of relationship, the private party assumes most of the risks associated with the implementation of the project and the obligation to provide public services that are commonly the domain of the public sector (Campos et al., 2018, pp. 268–279; Herbst et al., 2013, p. 5; Liu, 2021, pp. 1–18; Mataśka, 2010, p. 32; Pelin Gurgun & Touran, 2014; Zawora & Zawora, 2014, p. 324).

One can talk about a venture realized in the PPP formula when an agreement concluded between the public party and the private entity includes at least the following components (Hajdys, 2008, pp. 396–397):

- the purpose, the subject and the plan of the course of the investment;
- the expected total amount of resources earmarked for the execution of the project;
- guarantee of the private party to financially secure the implementation of the investment project;
- the right of ongoing control of the investment by the public party;
- quality standards;
- duration of the agreement;
- division of risks.

Public-private partnership is regulated by the *Act on public-private partnership* (2008). A complementary act is the *Act on the concession contract for works or services* (2016). According to the definition expressed in the *Act on public-private partnership* (2008), the subject of public-private partnership is joint implementation of a project based on division of tasks and risks between the public entity and the private partner. The subject of the project may be the construction or renovation of a building, the provision of services, the execution of works, in particular, the equipping of an asset with the equipment increasing its value or usefulness, or any other service connected with the maintenance or management of an asset that serves the implementation of a public-private project, or is connected with it.

In the case of the *Act on the concession contract for works or services* (2016), the subject of cooperation may be construction works or services. The scope of cooperation specified in both acts concerns public tasks performed by local government units. This concept is related to the implementation of infrastructure projects, connected with the creation of new infrastructure or modernization of the existing one, as well as the provision of municipal services. The subjective scope of cooperation includes, on the basis of the *Act on public-private partnership* (2008), the public entity and the private partner, and on the basis of the *Act on the concession contract for works or services* (2016) — the ordering party and the contractor who, after signing the agreement, becomes the concessionaire.

Both these acts constitute public-private partnership in Poland. The legislator has left the parties a certain amount of freedom in specifying the principles of cooperation on the basis of one or the other legal act. The choice of one of them determines the way of remunerating the private partner/concessionaire and the degree of involvement of the public entity in the realization of the venture. The enactment of the above-mentioned laws has enabled the building of an effective platform for public-private cooperation. Restrictive administrative regulations were abolished in favor of flexibility in defining the terms of the agreement between the parties. At the same time, the imposition of a narrow catalogue of investment objects on partners was abandoned, and the need to prepare analyses was eliminated (Blejka, 2010, p. 62).

The aim of projects carried out under the PPP formula is such public-private cooperation that enables to obtain mutual benefits — the public party is able to meet the expectations of the society as regards the quantity and quality of public services, while the private party may achieve the intended commercial goal. It is obvious that the financial aspect is important for the private partner, but it is also important for public entities. Using a formula by the public sector is an opportunity to minimize the costs of investment realization, as a result of which the performance of public tasks involving budget funds is optimized. Thanks to PPP, the public party gains access to the know-how of the private entity. It can also focus on the final effect of a given venture, without the ne-

cessity to actively participate in its particular stages (Cheda, 2013, pp. 40–41; Zyznar-Soczewica, 2016, p. 484).

Other benefits include (Bernatowicz, 2014, pp. 227–228; Chluska & Sikora, 2018, p. 32; Kołodziej-Hajdo, 2015, p. 55; Plebankiewicz & Biadała, 2016,p. 56):

- implementation of projects in a situation of limited availability of public capital;
- reduction of the total project costs;
- better risk allocation;
- quicker and more efficient implementation of investments than using a traditional method;
- increased efficiency of the project implementation and management process;
- higher quality of public services;
- generation of additional revenues;
- postponing public expenditures and spreading them over the entire period of the PPP project;
- improved performance of public administration;
- introduction of competition mechanisms into the process of providing public services.

The most important advantage, however, is that within the framework of intersectoral cooperation, there are many different ways of arranging relations, according to the specifics and conditions of the project.

The most important factor distinguishing PPP from traditional public procurement is the issue of risk sharing between the parties to the contract. In the traditional model of financing and implementation, the entire risk is borne by the public sector (Korbus & Strawiński, 2009, pp. 101–103), which involves a significant financial and organizational burden on the local government unit. A public-private partnership makes it possible to share risk between partners. The defined risk should be taken over by the party that has adequate material, technical, personnel, and logistic resources at its disposal, enabling the undertaking of fast and effective actions preventing the occurrence of the risk, or neutralizing its effects. In a situation where an investment is carried out on the basis of a concession agreement, it is the concessionaire who bears the economic risk related to the operation of the building or the provision of services, and includes the risk related to demand or supply (Kisała, 2019, pp. 55–70). The division of responsibility for the implementation of the project and risks takes place taking into account the legal, organizational, personal and technical capabilities of the partners.

The involvement of the private sector in the implementation of public tasks has a long tradition in Europe and dates back to the industrial revolution, accompanied by the development of urbanization and communications. In West Europe, the first PPP projects appeared in the second half of the 20th century. However, intensive development of this market has been observed since the second half of the 1990s. The reports of the European PPP Expertise Centre (EPEC,

2022) show that the development of the PPP market in Europe is systematic, but uneven. The dynamics of development is mainly influenced by the economic situation.

The last 12 years have left a deep mark on cross-sector cooperation. First, global financial crisis in 2008, then the COVID-19 pandemic and finally, the war in Ukraine, all of which resulted in the energy crisis and high inflation. The data presented in Chart 1 shows that the real boom of PPP projects came in the first decade of the 21st century, reaching the highest number of financially closed projects (144) in 2006 and the highest value of over EUR 30 billion in 2007. Between 1991 and 2021, more than 2,000 PPP contracts with a total value of more than EUR 422.34 billion were signed. At the end of the first decade of the present century, the positive trend was interrupted by the global economic crisis, which was evident both in the decline in a number and value of PPP projects between 2009 and 2012. The second major break in the trend occurred between 2020 and 2021 due to the COVID-19 pandemic (Chart 1). In the last decade, the EU PPP market leaders include France with a 13.27% share, the UK (7.8%) and Germany (6.08%).

Turkey is also noteworthy as its share of the European market has been steadily increasing since 2013, when the first PPP contract was signed. By 2021 Turkey had launched six projects with a total value of EUR 6.2 billion, representing a market share of nearly 14%.

In the last decade, the largest number of projects was in industries such as transport (28% share of all projects implemented), environmental protection (21%), education (17%), telecommunications (6%) and healthcare (4%). Other industries had a share of 24%. It should be noted that the initiator-investor of the projects launched in Europe was primarily the government sector.

Compared to the West European countries, the number and value of PPP projects carried out in the CEE countries is modest. The EPEC (2022) report shows that these countries have achieved a total share of approximately 2% in the total number and 5.2% in the total value of the European PPP market. Such a result indicates that these countries are still at an early stage of market development, with evolving institutional arrangements and the significant importance of EU structural funds, which are a dominant source of funding for large investments.

Nevertheless, the public-private partnership formula is applied in practically all spheres of public services. At local government level, one of them is thermomodernization included in the area of energy efficiency.

2.2. Thermomodernization of public facilities in local government units

The concept of thermomodernization venture is contained in the *Act on supporting thermomodernization and renovation and on central emission records of buildings* (2008). According to art. 2 par. 2 of the Act, a thermomodernization project is:

– an investment which reduces the demand for heat energy for heating the building and for domestic hot water;
– an investment which reduces primary energy consumption in the local district heating network and the heat source which supplies it;
– connection of the building to a centralized heat source (and thus elimination of the local one);
– replacement (total or partial) of an energy source with a renewable one or with high-efficiency cogeneration.

Thermomodernization is a set of measures aimed at improving the energy efficiency of a building. The main objective is to reduce the costs of heating and hot water preparation. Reducing the demand for heat reduces the amount of fuel consumed, which has a beneficial effect on environmental protection by reducing pollutant emissions. Thermomodernization improvements concern mainly older buildings. Therefore, an additional benefit of this type of project is the improvement of the external aesthetics of the building, which through activities related to the insulation of external walls, replacement of old dilapidated windows, gains attractiveness (Nadolna, 2014, p. 5).

The decision to start a thermomodernization project should be preceded by an energy audit. The energy audit is a document containing a technical and economic analysis. It aims to identify the optimal variant of the thermomodernization project. The study presents ways to improve the energy efficiency of the building, among which the optimal one is chosen, i.e. the one with the shortest payback time. The information contained in the energy audit is the basis for the construction project of thermomodernization (Nakielska & Pawłowski, 2017, p. 97).

Implementation of thermomodernization ventures in the public services sector can be based on: traditional formula of financing public investments (budget funds), the Energy Service Company (ESCO) and public-private partnership. In the case of limited budgetary possibilities, local authorities most often use one of the last two solutions for thermomodernization projects.

In the ESCO model, the entity provides its own funds and regains them through staggered payments. The contract provides for the financing of the project, an extensive feasibility and profitability study, the installation of energy efficient technology solutions as well as the monitoring and verification of energy savings. This solution allows the costs of ESCO services and modernization to be covered by the energy savings from the solutions applied. Cooperating with an ESCO consists in concluding an Energy Performance Contract (EPC), on the basis of which investment costs are repaid depending on the level of energy efficiency improvement achieved. This solution offers advantages to the local authority. Firstly, the whole project is carried out by a single entity, budgetary funds are not involved in the investment, and units with low budgets can undertake large investments. The disadvantage is the fee, which is usually higher than in other financing options (Ministry of Investment and Development, 2017, pp. 12–13).

The application of public-private partnership in thermomodernization projects, as discussed earlier, requires concluding an agreement between the public sector and a private partner. The scope of a typical PPP investment in the field of thermomodernization includes designing construction works and acquiring necessary administrative decisions, approvals or permits, delivery of new heating devices and possible exchange of heat sources in buildings, realization of construction and assembly works, e.g. insulation of walls and flat roofs, new flashings, replacement of gutters and downpipes, new lightning protection system, repair of roof covering, replacement of external windows and doors, modernization of the heat distribution center (its automation and control), reconstruction or adjustment of the central heating system (Kaczyńska, 2019, p. 73), financing of design and construction works (investment stage), maintenance of completed works, installations and installed equipment in a proper technical condition (maintenance, renovations, repairs), energy management through a remote management system (monitoring of heating parameters in buildings, temperature regulation) (Ministry of Investment and Development, 2017, p. 21).

The public entity is responsible for preparing the formal side that enables the commencement of works, making the construction site available, arranging the work of the facilities, so that the works can be carried out, accepting the works done by the private partner, ensuring the supply of electricity and heat to the buildings, paying the remuneration on time, incurring operating costs, and exercising control powers as specified in the PPP agreement. Due to the fact that many works included in the thermomodernization project take place during the use of the building, it must be foreseen that there may be events which could not be foreseen at the planning stage of the investment. Hence, the optimal division of risks is extremely important. A standard division of risk for this type of ventures assumes that the private partner bears the greater part of the risk of construction and availability, whereas the risk connected with the demand for services provided by the private partner is borne entirely by the public entity (Ministry of Investment and Development, 2017, p. 23). The success of a thermomodernization project in the PPP formula depends on a properly prepared tender procedure and a well-constructed agreement with the division of tasks and risks adequate to the capabilities and skills of the parties.

3. Methods

The realization of the objective formulated in the introduction will be achieved by using the following research methods: literature and legal studies related to public-private partnerships and thermomodernization, analysis of statistical data on the PPP market in Poland and a case study of two thermomodernization projects of public utility buildings carried out in municipalities of the Lodz region.

The study was conducted in two stages. First, a review of the literature on the issues related to cooperation of a public entity with the private sector in the framework of public-private partnership and thermomodernization was depicted. Then, the market of PPP projects announced in Poland in the years 2009 and 2020 was presented in order to specify the volume, value and areas in which the formula in question is applied.

The subsequent stage involved the assessment of the percentage of PPP projects in the area of thermomodernization. As an example, two investments made in the Lodz region, in Zgierz and Pabianice, were presented. The duration and value of the contract for the thermomodernization project in the PPP formula were used as the criteria for selecting the case study.

4. Results

In Poland since 2009, the systematic development of the public-private partnership market is observed. A characteristic feature of this market is its local nature. This local government sector is the main initiator of projects based on cross-sectoral cooperation.

In the last 12 years, i.e. from 2009 to 2021, a total of 624 PPP proceedings were initiated in Poland, 164 of which resulted in signing an agreement (the number includes agreements being in progress and completed) (Table 1). Thus, the effectiveness of conducted proceedings increased from 23% in 2009 to 37% in 2021 (Ministry of Funds and Regional Policy, 2022, pp. 1–14). The value of all the proceedings announced so far amounted to PLN 26.3 billion, while the value of agreements concluded amounted to PLN 8.6 billion. The outbreak of the COVID-19 pandemic in Europe caused a drop in PPP investments. Both the number and the value of transactions were the lowest since the global financial crisis of 2008. Such a drop was also expected in Poland. Fortunately, nothing like this happened. On the contrary, the market maintained its growth dynamics, as evidenced by contracts signed in the pandemic years, 2020–2021. In 2020, thirteen contracts were signed, in the following year ten, and nine contracts were signed in 2019. Looking at their values, ten PPP contracts worth of a total of PLN 172 million were signed in 2021. Compared to the number of thirteen contracts worth over PLN 1 billion signed in 2020 and nine contracts from 2019 worth of around PLN 1.3 billion, this does not represent a significant discrepancy (Ministry of Funds and Regional Policy, 2021, pp. 4–9).

However, changes have occurred in the area of initiated proceedings. In 2019, 22 proceedings with a total value of over PLN 382m were in the tender process, a year later 31 new proceedings were initiated with a total value of nearly PLN 4 billion. In 2021, 24 proceedings worth of PLN 627m were initiated (Ministry of Funds and Regional Policy, 2020, pp. 3–9; 2021, pp. 4–9; 2022, pp. 1–14).

In the whole analyzed period 90% of contracts are in the local government sector (148). Most contracts which entered the implementation phase were signed by urban (51), rural (38) and urban-rural municipalities (25). Entities not

related to local self-government concluded sixteen contracts, of which in eight cases the contracting parties were central government administration bodies (Ministry of Funds and Regional Policy, 2022, p. 5).

Energy efficiency is an area of PPP ventures that is characterized by the greatest effectiveness of proceedings for finding a private partner. It includes projects related to thermomodernization of public buildings. In the analyzed period, in this sector, 61 proceedings were initiated for the total amount of PLN 1,018 million, and 25 of them ended with signing an agreement. The value of all concluded thermomodernization contracts at the end of 2021 amounted to PLN 408 million. Investments in the sectors of transport infrastructure and sports (24 each) and water and sewage management (22) are also successfully implemented. In terms of the value of completed projects, the dominant sector is waste management with a total value of PLN 2,242 thousand, with the two largest investments in Poznań — PLN 783 million and Tri-City — PLN 625 million (Ministry of Funds and Regional Policy, 2022, pp. 1–14) (Chart 2).

The high effectiveness of projects in the energy efficiency sector, reaching almost 41%, indicates the development of a stable model of mutual settlements and the readiness of both parties to accept the division of tasks and risks adequate to market requirements, while fitting into the scenario of benefits assumed by the public sector (Korbus, 2018, p. 15).

The benefits include the following (Kaczyńska, 2019, p. 70):

- achievement of an energy effect consisting in the reduction of electric and thermal energy consumption, resulting in lower energy consumption costs in buildings;
- savings on future maintenance costs;
- reduction of harmful substances and dust emissions to the environment by reducing carbon dioxide emissions to the atmosphere;
- raising the standard of building usage;
- improved aesthetics of the facilities and their surroundings.

Local authorities are very willing to cooperate with a private entity in the field of thermal modernization of public facilities. Between 2009 and 2021, nineteen such projects were carried out. The remaining six were connected with the construction or modernization of street lighting, and due to the purpose set out in the study are not subject to further analysis (PPP, 2022).

Most projects connected with thermomodernization were realized in Mazowieckie Voivodship (5). This was followed by investments made by municipalities from the following voivodships: Śląskie (4), Dolnośląskie (3), Łódzkie (2). One thermomodernization project was carried out by municipalities from the following voivodships: Lubuskie, Pomorskie, Świętokrzyskie, Wielkopolskie and Zachodniopomorskie.

PPP agreements for thermomodernization ventures are usually concluded for ten years. There are also contracts for shorter periods (7 and 9 years) as well as the longer ones (over 14 years). The longest thermomodernization contracts were signed for eighteen years and six months in Pabianice and eighteen years

and two months in Zgierz in Lodz region. Due to their duration, these contracts are analyzed.

In August 2015, the Municipality of the Town of Pabianice initiated a competitive dialogue procedure for the selection of a private partner for the investment project *Improvement of energy efficiency in public buildings of the Municipality of the Town of Pabianice*. After two years of proceedings, in May 2017 the town authorities signed an agreement with a consortium of companies: Siemens Sp. z o.o. — leader, Siemens Finance Sp. z o.o. The duration of the contract is 222 months. Its subject is thermomodernization and energy management in public utility buildings subordinate to the municipality of Pabianice. The investment included comprehensive thermomodernization and implementation of an integrated energy management system in eleven public utility buildings. The project covered six kindergartens, three primary schools, a lower secondary school and a nursery.

Project implementation comprises two stages: construction and management. In the first stage, a complete design and detailed documentation were prepared on the basis of the Functional and Utility Program (FUP), obtaining of necessary administrative decisions on behalf of the public entity and other arrangements, permits and decisions required by law, and execution of construction works in accordance with FUP.

At the construction stage, comprehensive thermomodernization works were carried out, involving insulation of external partitions, partial replacement of external window and door frames, modernization of central heating and hot water installations, construction and modernization of mechanical ventilation installations, replacement of internal lighting with energy-efficient lighting, installation of monitoring and remote energy management systems.

Based on the previously conducted energy efficiency audit, it was estimated that the project will result in: reduction of annual primary energy consumption in public buildings (CO32): 6,974,970.14 (kWh/year); annual decrease of greenhouse gas emissions (CO34): 1,913.09 (MGCO2/year) and reduction of final energy consumption as a result of project implementation: 17,822.75 (GJ/year) (RPO WŁ, 2017).

The total value of the project was PLN 33,729,249.58. The financing is of hybrid nature. In addition, for the cooperation with a private partner, the city authorities successfully obtained funding from the European Regional Development Fund as part of the Integrated Territorial Investments of the Regional Operational Program of the Lodz region for 2014–2020, Priority Axis IV: Low-carbon economy. The amount of funding is PLN 10,499,266.24 (RPO WŁ, 2017).

The remuneration of the private partner comes entirely from the budget of the public entity. Settlements are made in the framework of cyclical payments with verification of the level of actually achieved savings in electricity and heat in relation to the guarantee granted in this regard (PPP, 2022).

On January 30, 2017, the authorities of the Zgierz Municipality signed a contract with Engie Services Sp. z o. o for the execution of an investment in the Public-Private Partnership formula, covering the thermomodernization of twenty three public utility buildings. The conclusion of the agreement was preceded by earlier activities, which began in 2014 with the City's accession to the Cooperation Platform for Public-Private Partnerships, created on the initiative of the then Ministry of Regional Development.

The purpose of the Platform is the substantive and formal support in the analysis and evaluation of planned projects, which allows public entities to verify the rightness of decisions about planned investments in the PPP model. The authorities of Zgierz took advantage of such support while preparing for the PPP project in the area of thermomodernization of educational buildings in the city. Additionally, the activities of the authorities were reinforced with the help of the PPP advisory company, Cieślak & Kordasiewicz Kancelaria Doradztwa Gospodarczego. As a result of the undertaken activities, the conducted analyses clearly indicated that the PPP formula will be the best variant for carrying out the project of thermomodernization of public utility buildings in Zgierz.

The tender procedure was initiated in September 2015. A competitive dialogue tender procedure was completed in October a year later. Potential contractors had to submit their bids until December 2, 2018. The process was completed in January with the selection of the most advantageous offer. The Zgierz authorities signed a contract with Engie Services Sp. z o.o., based in Warsaw. The final duration of the contract is eighteen years and two months.

The total value of the PPP agreement is 56,411,000.00 PLN. This value consists of both the investment part and the costs of financing the project as well as maintenance and management of the energy management. The project has a hybrid character, as it received support from the European Regional Development Fund of the Operational Program of the Lodz region for 2014–2020 as part of the territorial instrument Integrated Territorial Investments Strategy, Priority Axis IV: Low-carbon economy. As part of the co-financing, the amount of PLN 35,260,265.04 was granted (RPO WŁ, 2021).

The Zgierz project was among ten winners of the *TOP Municipal Investments 2019* competition (Engie, 2019). The uniqueness of the project was evidenced by three elements: firstly, the largest public-private partnership project in the energy efficiency segment. Secondly, it is the first PPP agreement in the Lodz Voivodship, which so far has been lagging behind other regions of the country when it comes to using the PPP formula for implementing public tasks. And thirdly, the project is the first hybrid PPP in Poland in the energy efficiency segment (Błaszczak, 2017). The project covered a total of twenty three educational buildings: a municipal nursery, eleven kindergartens, eight primary schools and three gymnasiums, including one with a swimming pool.

The whole construction work was completed in 2018, and then the period of maintenance and management of the facilities began. The material scope of work included: preparation of project documentation together with obtaining

the necessary administrative decisions to carry out the investment, insulation of external walls, ceilings, roofs, replacement of windows and doors, modernization of the central heating system, modernization of internal lighting, installation of a remote control system and monitoring of media consumption (Zgierz Municipality, 2015, p. 4).

As a result of the work, the average estimated energy savings of the Zgierz educational buildings (according to energy audits) amount to 60%. This is a lot, taking into account the average energy savings which after thermomodernization usually reach 25% (Association of Polish Cities, 2017).

The scope of reduction of thermal energy consumption is presented in Table 2. The largest assumed savings, in the range of 10–20%, will be brought by: insulation of walls, complex modernization of heating installation, boiler replacement. Savings of 10–15% will be achieved by insulation of the roof or the ceiling under the attic, replacement of windows and modernization of lighting. The smallest savings in this area are generated by works on insulating the ceiling above the basement or introducing automation in the boiler room (Cieślak, 2015, p. 13).

The remuneration of the private entity is the availability fee linked to the achievement of the declared energy savings. Part of the remuneration is paid by the public entity from the EU reimbursement funds (PPP, 2022).

The presented projects are currently already in the operation and management phase. The visual effects of the investments are visible. The aesthetics of the objects has improved. However, the energy and financial effects are difficult to verify. Sadly, it must be noted that none of the cities informs the public about the effects of the completed thermomodernization projects and how they affect the budgets of the analyzed cities. The author's email enquiry addressed to the Departments of Development and Fundraising and Education and Youth about the level of savings generated by thermomodernization investments also received no answer. Therefore, it is difficult to conclude, only on the basis of some assumptions, about the relevance and legitimacy of an investment carried out in the PPP formula. Referring to the previous research (Grabowski, 2015, pp. 115–128), many local governments treat the improvement of energy efficiency as another obligation resulting from legal regulations, thus they may not bring the assumed energy and financial effects. However, the non-financial results that these projects bring cannot be forgotten. These include the reduction of negative impact on the natural environment and improvement of the aesthetics of the facility. In the case of public-private partnerships, measurable effects must be achieved by each of the parties involved in the project.

5. Conclusion

The PPP market in Poland, in terms of trends concerning a number of implemented projects, shows the same curve pattern as the European market. A period of growth in a number of projects is followed by a decline characterized

by a lack of stable trends. In Poland, different sectoral distribution of projects compared to West European countries is noted. The predominant sectors there include transport, environmental protection, education or health care. In Poland, however, a significant number of projects are implemented in the "sport and tourism", water and sewage, waste and energy efficiency sectors, targeting thermomodernization projects. Both in the EU and in Poland, environmental projects, which are part of the responsible and sustainable development trend, are gaining in importance.

In Poland, the PPP market is flattened, as more than 90 per cent of the projects launched are in the local government sector. It is the local authorities that initiate intersectoral cooperation based on the PPP formula. Knowing the local communities, they implement tasks which, on the one hand, satisfy their needs and, on the other hand, respond to climate and energy challenges. This is evidenced by a growing number of projects involving thermal modernization of public facilities. It should be noted that these are costly measures and, given the budgetary constraints of local and regional authorities, recourse to private capital is both justified and desirable.

In Poland, 25 investments of a total value of PLN 408 million have been made under this formula over a period of twelve years. Two largest ones are related to thermomodernization of educational institutions in the Lodz region.

Local government units play, and are likely to play in the future, the most important role in promoting and implementing energy conservation measures. Such measures take on particular importance in view of the war in Ukraine and energy crisis. Increasing problems with energy sources and galloping energy prices are already causing local authorities to consider a range of measures to reduce energy consumption. Will the need to reduce energy consumption lead to greater interest in thermomodernization projects in Polish local authorities? Will inflation and growing interest rates weaken the private sector financially to such an extent that it will not be willing to engage in PPP projects? These are just some of crucial questions that arise concerning the future of the PPP market in Poland in the context of dynamic political, economic and social changes.

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Appendix

Table 1.
Number of initiated proceedings and concluded PPP contracts in years 2009–2021

Years	Number of initiated proceedings	PPP contracts
2009	38	2
2010	60	8
2011	43	11
2012	80	15
2013	70	20
2014	52	16
2015	61	23
2016	60	10
2017	36	11
2018	47	16
2019	22	9
2020	31	13
2021	24	10
total	624	164

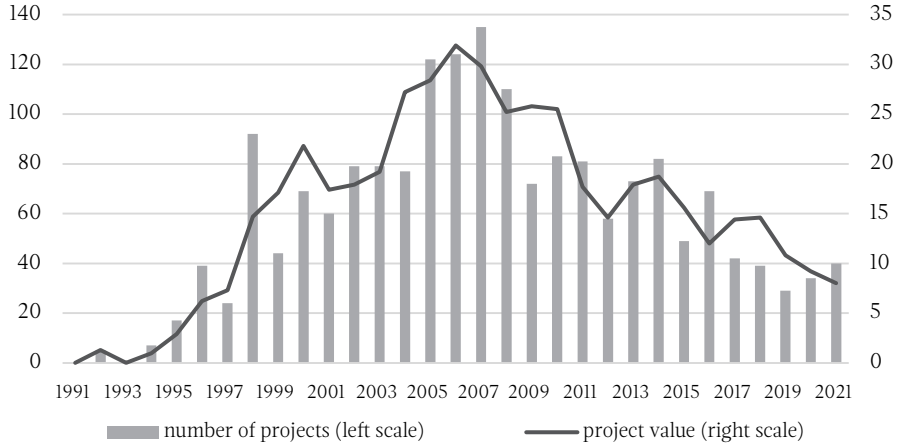
Source: Own preparation based on Ministry of Funds and Regional Policy (2022, p. 4).

Table 2.
Estimated reduction of heat energy consumption for individual thermomodernization works in Zgierz municipality (%)

Type of thermomodernisation work	Estimated reduction of thermal energy consumption
roof or loft insulation	5–15
wall insulation	10–20
insulation of basement ceiling	2–5
replacement of windows	10–15
comprehensive modernization of heating systems	10–20
introduction of automation in the boiler house	5–10
boiler replacement	10–20
modernization of lighting	5–15

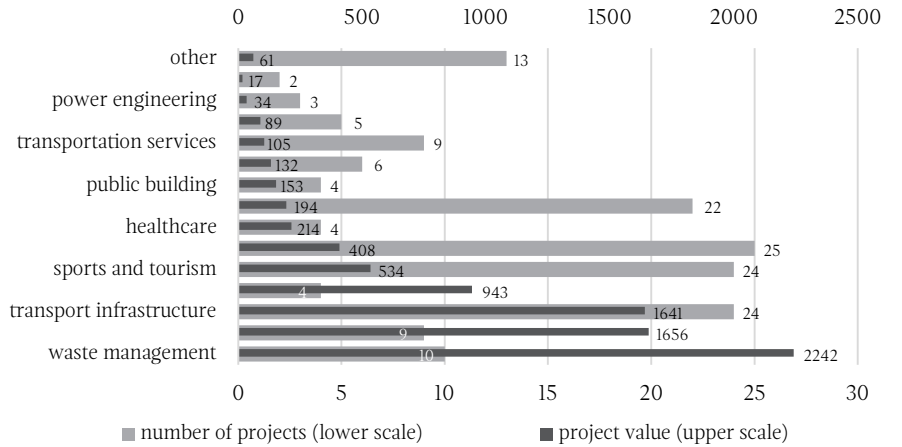
Source: Cieślak (2015, p. 13).

Chart 1.
Number and value of PPP projects in European in the years 1991–2021 (billions EUR)



Source: Own preparation based on EPEC (2022).

Chart 2.
Number and value of PPP projects in Poland in the years 2009–2021 by sector (million PLN)



Source: Own preparation based on Ministry of Funds and Regional Policy (2022, p. 5).