

FUNDING PROGRAMS AS A TOOL FOR JUST TRANSITION IMPLEMENTATION. CASE STUDY POLAND

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Purpose: The article discusses focus research conducted in May 2023. The main goal of the paper is to analyse the current funding programs for Just Transition.

Design/methodology/approach: To begin, the review was performed using the standard method of critical literature review. The next step of the research was the focus research. The last part of the research was focused on the review of adequate funding programs for the energy transition.

Findings: During the research strong emphasis on the role of instruments supporting a just transformation was indicated, this base paper focuses on the supporting mechanisms of the energy transformation.

Originality/value: The paper brings new to the science, as its conclusions are based on the author's own study - focus research.

Keywords: Just Transition, Energy Poverty, Funding programs, Energy Transition in Poland.

Category of the paper: research paper.

1. Introduction

The concept of anthropopression, exemplified by the worsening state of the environment, including climate change, necessitates a fundamental shift from our current reliance on fossil fuels for energy towards a low or zero-carbon energy system (Heffron et al., 2020). Instead of a complete switch from one dominant energy source to another, this energy transition involves phasing out fossil fuels while simultaneously increasing the utilization of renewable energy sources like solar and wind power, which have previously played a minor role in our energy mix (Delina et al., 2018). Such a profound transformation demands substantial social, economic, and technological changes. Experts widely emphasize the importance of ensuring a fair transition that avoids perpetuating environmental and socio-economic disparities, which

currently exist within the energy systems in Poland and across Europe (Middlemiss, 2020). The energy transformation is a multifaceted process, offering various economic and environmental advantages, along with certain risks (García-García et al., 2020). Transitioning to a low-emission system directly contributes to the improvement of the natural environment and the overall well-being of society. However, it also entails addressing the pressing issue of energy poverty, which affects, or has the potential to affect, a significant portion of the population (Jenkins et al., 2016).

The development of renewable energy is recognized as a crucial tool for achieving Sustainable Development Goals, as it can replace the highly polluting and hazardous "grey economy" with an environmentally friendly, healthy, and green economy (Jenkins, 2018; Kuzior, Lobanova, 2020; Kuzior et al., 2022). To facilitate this transition, it is vital to implement environmental programs that allow both regions and local communities, particularly those vulnerable to energy poverty, to access the necessary resources and funding. The article discusses focus research conducted in May 2023 on a group of 18 people living in the Silesian Voivodeship. Respondents answered a number of questions on general aspects of the energy transition, just transition and, the risks resulting from it following the climate and energy trends of the European Union. Based on the answers provided, a review of available aid programs in Poland supporting a just transformation was carried out.

Energy poverty is a critical concept that has been solidified in the legislative package known as 'Clean Energy for All Europeans,' which is designed to facilitate an equitable transition in the energy sector. According to Regulation (EU) 2018/1999 of the European Parliament and the Council (referred to as 'the Governance Regulation') and the revised Electricity Directive, the Commission is mandated to offer indicative guidance on suitable indicators for assessing energy poverty and on the definition of a 'significant number of households in energy poverty.' There isn't a universally accepted definition of energy poverty, so Member States are tasked with developing their own criteria based on their unique national contexts. Nonetheless, the recently enacted legislative package does provide valuable general principles and insights into the potential causes and repercussions of energy poverty. It also emphasizes the significance of policies aimed at addressing this issue, particularly those related to national energy and climate plans (NECPs) and long-term renovation strategies (LTRSs). In 2018, within the European Union, 6.8% of individuals residing in private households (equivalent to 30.3 million people) faced challenges in meeting their utility bills, including energy expenses, and were thus at risk of having their energy supply disconnected. Simultaneously, 7.3% of the EU's population (equivalent to 37.4 million people) encountered uncomfortable indoor temperatures in their homes. Energy/fuel poverty is one of the biggest challenges of the 21st century. Despite the rapid scientific and technological development of the modern world, quality of life does not follow the same pace. More and more households have difficulty meeting their energy needs, a situation expressed either by the inability to pay energy bills or by limited access to energy and inadequate energy services. This trend mainly arises as a consequence of low incomes,

high cost of energy and energy inefficiency of residences. It has been assessed that energy poverty in Europe affects between 50 and 125 million people (EPEE, 2009b), while it has been noted that energy poverty rates vary significantly across different Member States (BPIE, 2014). Actually, Bouzarovski and Tirado Herrero (2017) reported that energy poverty incidence is considerably higher in Southern and Eastern EU Member States. Unfortunately, an accurate assessment of the extent of the problem at the European level is impeded by the absence of a common European definition (Thomson et al., 2016) and by the scarcity of suitable data across Europe (Thomson et al., 2017). European Commission in the report “Subsidies and Costs of EU Energy Final Report”, stated that in 2012 the total value of public interventions in energy (excluding transport) in the EU-28 was 122 billion EUR. The literature suggests that enabling money transfers to individual consumer groups within national and EU legal regulations requires a proper legal framework to be established and a definite period of the subsidy duration to be defined. Furthermore, it is imperative to establish a robust monitoring system to assess the effectiveness of subsidies in achieving the program's objectives and to evaluate whether their continuation aligns with the principles of a free market and competition (Johnston et al., 2014). This consideration gains added significance when we take into account the well-documented adverse impact of subsidies to fossil fuels on economic growth, as highlighted by Mundaca in 2017. Mundaca's research suggests that "a nation that initially provides subsidies to its fossil fuels and subsequently eliminates or reduces these subsidies will experience increased economic GDP (gross domestic product) per capita growth, as well as elevated levels of employment and workforce participation, particularly among the younger population". These effects are most pronounced in countries where fuel subsidies are initially substantial. The effectiveness of energy taxes in ensuring energy security is also being examined (Kuzior et al., 2023).

2. Materials and Methods

For the transformation to be effective, it must be fair, transparent, territorially based, and acceptable to all. Most importantly, during implementation, the quadruple helix model should include importance as an influence on politics, business, academia, and society. Required for civic discourse, and also with stakeholders of transformation processes. These assumptions correlate with the SITRANS project (Life-2021-CET-Coal Regions, <https://sitrans-project.eu/project/>), which constitutes a meso-level solution and is being studied that addresses the application and management impacts, socio-economic impacts and elimination poverty to achieve decarbonization of the energy system. As part of the project, empirical research was carried out, the aim of which was to debate the stakeholders of the energy transformation in partner countries - Poland, Bulgaria, Greece, and Italy. The meetings were based on questions

prepared by the project leader. The questions were the same for all partner countries. The research was conducted in selected regions of the carbon anchor - in the case of Poland, Silesia. The empirical research focused on the following aspects; key elements that should characterize the Just Transition, actions that will help increase the participation of local civil society in the Just Transition process, challenges for the quadruple helix mode, and ways to include a place-based approach in the Just Transition management model. When designing the research process, it was decided that the best solution to obtain results from various social groups would be to use a Focus Group Interview. The method of focused group interviews is over 60 years old and widespread was made by Robert Merton and Paul Lazarsfeld and they were the first to use it against her called "focused interview" (Maison, 2001). Focus group interviews are a qualitative research method. In contrast to quantitative techniques (survey, such as a survey) to qualitative techniques it, is not about measuring the phenomenon but about its deeper analysis, i.e. answers to the questions: what is it like? and why is this so? Representativeness is not a requirement for qualitative research; Therefore, the obtained results cannot be generalized to the entire population. However, the authors decided to use such a method due to: understand deeper governing mechanisms given problem, for which statistical representativeness is not necessary.

3. Just Transition in Poland

In 2018, 5.1% of the Polish people reported that they were unable to keep their homes adequately warm - it showed a consistent drop compared to 34% in 2005. The share of households that spend a high share of their income on energy expenditure is 16.2%. Energy poverty was highest for the social housing sector in 2017, at 12% for inability to keep the house warm and 19.1% for arrears on utility bills. An essential dimension of energy poverty (EP) in Poland is related to the burning of solid fuels in the residential sector (Central Statistics Office in Poland, 2018). Due to their relatively low price, coal and wood are the main sources of energy for heating in energy-poor families. Combustion of solid fuel, in turn, results in the emission of dangerous air pollutants, including some carcinogenic substances (WHO, 2010). Smog is a major problem in many Polish agglomerations (Commission refers Poland..., 2015). According to the World Air Quality Report, Poland has some of the worst air quality in Europe, having 15 of the continent's 50 most polluted cities (IQAir AirVisual, 2018). Solid fuels were the main sources of domestic heat in 45% of Polish households in 2018. The reasons for the persistence of coal-based heating in Poland include its historical availability, low cost for domestic consumers, and the higher price and perceived supply risks of imported natural gas. Furthermore, most Polish households burn coal in low-efficiency stoves and rely on wood as a substitute during warmer periods. Yet, the refusal of daily usage of cheap energy sources can

push many families into economic hardship. Implementation of environmental policies at a reduced social cost requires knowledge of EP prevalence among others. Despite the gravity of EP in Poland, this issue is difficult to detect due to abnormally low energy expenditures in some households. Much of the debate on EP focuses on self-reported indicators or high energy expenditures. In 2017, 8.51% of Polish households declare problems with keeping home warm (EU-SILC), 4.68% frequently encounter utility bills difficulties (EU-SILC), and 18.6% experience high actual energy costs (Sokołowski et al., 2019a, Sokołowski et al., 2019b). Two key drivers of low household energy costs in Poland should be considered. First, the burning of cheap and dirty energy sources in single-family houses, major emitters of low-stack emissions. Second, self-restricted coping strategies are employed by low-income families. The usage of cheap and dirty energy, including unprocessed garbage, in detached houses as well as cutting on energy expenditures as a way to survive are considered the major expressions of HEP in Poland. Studies on EP in the CEE also confirm that the countries of this region experience high EP prevalence due to poor building quality and low income (Bouzarovski, 2014, Dubois, Meier, 2016). The energy transition in Poland is based on three pillars (Energy Policy of Poland until 2040):

- Pillar I – Just Transition is primarily about ensuring new development prospects for the regions and communities most affected by the implementation of the low-carbon energy transition. Emphasis will be placed on reducing energy poverty in coal regions and developing new industries such as renewable energy or nuclear power, which will create up to 300,000 additional jobs.
- Pillar II – Zero-Carbon Energy System is a long-term measure that will be possible after the launch of nuclear energy and offshore wind energy. In addition, distributed and civic energy growth will play an important role. Furthermore, the employment of industrial energy on a larger scale, together with ensuring energy security through the temporary use of gaseous fuels, will enable the reduction of emissions and bring Poland closer to a zero-emission energy system.
- Pillar III – Good Air Quality – in the debate on the energy transition of our country, the assumptions of Pillar III are the issue most frequently raised by the public. Air quality in Poland, especially in coal regions, is either poor or very poor. The public is aware that air quality has a significant impact on people's health, so the key objective of Pillar III is to ensure clean air for all Poles. This will not be possible without specific actions, and by specific actions, I do not mean just the ones taken by the government or local authorities, but also those taken directly by society.

4. Results of focus research

The Mineral and Energy Economy Research Institute of the Polish Academy of Sciences conducted a focus study on May 31, 2023, in the Lower Silesian Voivodeship. Representatives of science, entrepreneurs from sectors such as (mining, energy, and recycling), i.e. key industries for the energy transformation, and business environment entities were invited to the meeting. A total of 18 people took part in the consultations. The quadruple helix model was used as the research model. Innovation policy must face the pressure of ongoing changes. This approach, called "broad-scope innovation", includes, among others: taking into account non-technological innovations in the innovation system, as well as innovations responding to the broadly understood social needs of various social groups. The change in the approach to creating innovation systems and the shift of emphasis from the Triple Helix Model to the inclusion of civil society result from, among others, social changes and accompanying global phenomena, e.g. ageing of society, new types of consumption, large social migrations, new phenomena in trade (e.g. fair trade) and protection of the environment and natural resources requiring a different approach. The Quadruple Helix model takes into account society and the institutions representing it, such as non-governmental organizations, as well as the end users of innovation, i.e. citizens. The model promotes the inclusion of society in the innovation system, which leads to the emergence of new forms of innovation and a new way of organizing the network of connections between various stakeholders. The purpose of the meeting was to determine the position of the invited stakeholders on the activities, decisions made and also the significant barriers to the Fair Transformation process. The participants were asked four key questions in this area. It should be noted that all the questions aroused the interest of the participants, who spoke with great commitment to the issue presented to them. The first question was to identify the key elements that should characterize a Just Transition. Stakeholders identified several key elements that characterize a Just Transition. First of all, they believe that it is a new vision that requires a multidimensional, multi-stakeholder and integrated sectoral and territorial approach. It was recognized that the participation of stakeholder groups is necessary for radical but necessary changes. Opinions were expressed that social dialogue is crucial for the introduction of a new vision in the region. The mining sector was identified as one of the most important partners for talks with local authorities. Stakeholders stressed that a just transition means equal access to environmental resources (water, clean air, green spaces), but above all it should mean unshaken access to new labour market opportunities. Participants are concerned that if in coal regions, appropriate measures are not taken to mitigate the change and dynamize development, the energy transition to a green economy may result in negative effects on the labour market and accessibility to infrastructure, which will consequently widen disparities and development opportunities, and above all affect increasing levels of joblessness. Such a significant change, for obvious reasons, raises concerns and emotions of stakeholders in the process. The next important element that characterizes the Just Transition should be the implementation of a technological change related to RES.

The change in the widespread use of renewable energy sources, conservation of energy, water, raw materials and ecological transportation that is already taking place in Western European countries, according to meeting participants, is a key challenge for the entire region.

The second question stakeholders were asked to identify actions that can be taken to increase local civil society participation in the Fair Transition process. Participants in the meeting recognized that the involvement of local society is particularly important for this topic. Several actions were identified that can be taken to activate society. First, there should be a broad campaign to inform the public about the plans and activities related to Fair Transformation. Stakeholders believe that there is a great deal of ignorance among local groups on the subject. The planned solutions in this regard should be widely informed and shown. Participants suggested increasing public participation by allowing them to participate in public consultations. The purpose of such public consultations is to inform the local community about the planned project, present a variant course of action and provide an opportunity to make any comments. It was also proposed that for the most important measures, i.e. investments, referendums should be held. This will strengthen the position of local society in the decision-making process. Representatives of NGOs unequivocally said that as an institution that supports society, it should be asked for its opinion on key aspects of the Just Transition. Participants turned their attention to defining local society, asking whether a society defined at the level of the region, county, municipality or still narrowed down to local districts of the region should participate in decision-making processes. The third question posed to stakeholders was to identify the biggest challenges to the quadruple helix model - understood as the cooperation of politics, business, and the environment. According to the participants, it is the rulers who are increasingly aware that in the modern world, if they can't meet public expectations they will lose their *raison d'être*. According to the participants, non-governmental organizations play a particularly important role here, as citizens place more trust in them than in public sector organizations and give them support of their own choosing. Partnership with such organizations strengthens social ties and increases the level of trust in local authorities. The biggest challenge, according to the meeting's participants, is to determine the level of stakeholder involvement in the public decision-making process at such crucial stages as formulating goals, determining ways of implementation and implementing the adopted decisions. Authorities and public administration, and public organizations more broadly, have an obligation to take into account in the decision-making process the fact that stakeholders are stakeholders in the decision-making process itself, as well as in its results, while their interests can, as the consultations showed, differ significantly. According to participants, diverse and often divergent interests lead to equally diverse relationships (ranging from supremacy to partnership to competition), often causing conflict. In the last question, stakeholders were asked how a place-based approach could be included in the Fair Transformation governance model. Participants said that the very implementation of the Fair Transformation Mechanism brings many challenges and expectations. Taking into account the territorial dimension according to stakeholders offers potential development opportunities for individual territories. One of the main elements

characterizing this approach is the increased role of the regional level in activating development processes. It is recognized that the proper use of the potential of the territory and its competitive advantages, can only take place with the use of local knowledge, experience, skills, specialization and relationships occurring between different local actors. Decision-making processes should consider the region's territorial, social economic and natural conditions. What all respondents had in common was a strong emphasis on the role of instruments supporting a just transformation. The study participants clearly stated that the introduction of appropriate tools to support the transformation process is crucial to the fight against energy poverty.

5. Overview of programs

There have been different programmers to support energy efficiency – which is in line with environmental regulations. With regard to regulation, the Act on Energy Efficiency (Law Gazette, 2011) was enacted in 2011. Its aim was the development of mechanisms for stimulating improvements in energy efficiency. Primarily, the law introduced obligations for obtaining an appropriate amount of energy efficiency certificates, called white certificates, by energy sales companies selling electricity, heat or natural gas to end-users connected to the grid in the Republic of Poland territory. The Act from 2011 was replaced by a new Act from 20 May 2016 (Law Gazette, 2016) aimed at further improvements to the energy efficiency of the Polish economy and ensuring the achievement of national energy efficiency target of financing for pro-ecological investments in Poland, including in the construction sector.

In September 2018, the Polish government announced a nationwide ‘Clean Air’ programme aimed to improve air quality and combat energy poverty, for which 103 billion PLN [24 billion EUR] were allocated for 10 years. The ‘Clean Air’ programme provided a new rationale for environmental action, demonstrated political will, and leveraged additional resources for household energy transitions in Poland. It nevertheless remains a technocratic policy document primarily focused on air quality at the expense of citizen well-being – even if alleviating energy poverty was declared at one of its strategic priorities. In terms of policy implementation, initial evidence after one year showed slow progress of the ‘Clean Air’ programme because of complex administrative procedures and the insufficient capacity of regional environmental funds – the entities responsible for its implementation. So far, only PLN 3 billion has been spent from the budget set at PLN 103 billion. Looking at the number of soothers mentioned, only 5%t were realized. goal: approx. 151 thousand stoves from 3 million old stoves. Table 1 presents the most important programs of the Fund, in accordance with the 4th National Action Plan for energy efficiency.

Table 1.*Fund's programs, in accordance with 4th National Action Plan*

Supplements to loans for the construction of energy-efficient houses	
Program goal	The aim of the program is to achieve energy savings and reduce or avoid CO ₂ emissions by co-financing projects that improve the efficiency of energy use in newly built residential buildings.
Budget	Withdrawals of funds from the undertaken and planned commitments for non-returnable forms of co-financing of the program amount to PLN 300 million. Implementation period: the program is being implemented in 2013-2018. Forms of co-financing: subsidy for partial repayment of bank loan capital made via the bank on the basis of a cooperation agreement concluded with the National Fund for Environmental Protection and Water Management.
Beneficiaries	Natural persons who have valid building permits and have the right to dispose of the property on which they will build a residential building. By "disposing of" the property should be natural persons holding the right to transfer by the developer for their benefit: ownership of the property, together with a single-family house, which the developer will build on it or perpetual usufruct of land and ownership of a single-family house, which will be located on it and will constitute a separate property or property residential. The developer is also understood as a housing cooperative.
Rules	One of the conditions for obtaining support is to achieve the required demand for usable energy by meeting the conditions of the guidelines: minimum technical requirements, requirements for the construction project, requirements for the implemented project, quality assurance of construction works. The NF40 and NF15 standard for residential buildings set a series of requirements developed specifically for the needs of the financing program, which in many aspects outweigh and extend those resulting from the applicable laws and the definition of a building with low energy consumption.
Effects	Until 2017, contracts for co-financing the construction of 349 single-family buildings were concluded, in the amount of approximately PLN 12.4 million. The average area of energy efficient houses being built is 132.5 m ² , while the demand for usable energy for heating and ventilation (EUco) is on average 26.4 kWh/(m ² □year). 17 positively verified housing estates of single-family and multi-family houses.
LEMUR – Energy-efficient public buildings	
Program goal	The aim of the program is to reduce energy consumption and, consequently, to reduce or avoid CO ₂ emissions in connection with the design and construction of new energy-efficient public buildings and collective housing.
Budget	The budget for the implementation of the program is up to PLN 97.4 million, including nonreturnable forms of co-financing - PLN 1.4 million, and refundable forms of co-financing - PLN 96 million. Forms of financing: subsidy for project documentation 60%, 40%, 20% depending on the class of energy saving of the building (A, B or C); • loan for the construction of new energy-efficient buildings, up to PLN 1,200.00 per m ² for class A, for class B and C up to PLN 1,000.00 per m ² , with the possibility of redemption 60%, 40%, 20% depending on the energy efficiency class of the building (A, B or C).
Beneficiaries	Entities of the public finance sector, excluding state budgetary units; • local government legal entities, commercial law companies in which local government units (JST) hold 100% shares or stocks and which are appointed to implement JST own tasks. Non-governmental organizations, including foundations and associations, as well as churches and other religious organizations entered in the register of churches and other religious associations, and church legal entities that perform public tasks on the basis of separate regulations.
Rules	The program covers the design and construction of new buildings: • public utilities - intended for the needs of public administration, culture, education, higher education, science, upbringing, health, social or social care, tourism, sport; • a collective residence - intended for temporary stay of people (boarding houses, student houses) and for permanent residence of people (orphanages, pensioners' houses).
Effects	Buildings covered by the program are to comply with technical guidelines, defining detailed principles of shaping and the level of energy standard requirements, prepared for the needs of the program, which take into account the applicable technical and construction regulations and those concerning the calculation of energy performance of buildings.

Cont. table 1.

Prosumer - a co-financing line intended for the purchase and installation of microinstallations of renewable energy sources	
Program goal	The aim of the program "Supporting distributed, renewable energy sources Part 2) Prosumer - the co-financing line intended for the purchase and installation of renewable energy micro-installations" is to reduce or avoid CO ₂ emissions as a result of increasing energy production from renewable sources, through the purchase and installation of small installations or micro-installations renewable energy sources, for the production of electricity or heat and electricity for individuals and housing communities or cooperatives.
Budget	The budget of the program amounts to PLN 340,402 million, including: • for non-returnable forms of co-financing - PLN 122.968 million, for returnable forms of co-financing - PLN 217,434 million Implementation period: 2014-2022 with the possibility to conclude loan agreements by 30/06/2017. Forms of financing: Loans with subsidies total up to 100% of eligible costs, including: a subsidy of 20-40% of the co-financing (15 or 30% after 2015); loan with an annual interest rate - 1% (loan financing period up to 15 years).
Beneficiaries	Natural persons who have the right to dispose of a residential building; housing communities and cooperatives; local government units and their associations. Co-financing will be granted for installations for the production of electricity or heat and electricity using: biomass heat sources, heat pumps and solar collectors with installed thermal power up to 300 kW.
Rules	Photovoltaic systems, small wind farms, and micro-cogeneration systems (including microbiogas plants) with an installed electrical capacity of up to 40 kW, for the needs of single-family or multi-family residential buildings, including those under construction. High quality of installed devices is required, manufacturer's warranty of the main equipment for at least 5 years, contractor's warranty for at least 3 years, design and assembly by authorized persons.
Effects	The program promotes new technologies for renewable energy sources and prosumer attitudes (raising investor and environmental awareness), and also affects the development of the equipment and installer market, and the increase in the number of jobs in this sector.
BOCIAN - dispersed, renewable energy sources	
Program goal	The goal of the program is to reduce or avoid CO ₂ emissions by increasing energy production from installations using renewable energy sources.
Budget	Planned commitments for returnable forms of co-financing amount to PLN 570 million from NFOŚiGW.
Beneficiaries	Beneficiaries are entrepreneurs within the meaning of art. 43 of the Civil Code, undertaking the implementation of projects in the field of renewable energy sources in the Republic of Poland.
Rules	The program includes the construction, extension or reconstruction of renewable energy source installations with capacities within certain ranges, wind farms up to 3 MW, solar systems from 200 kW to 1 MW, geothermal plants from 5 MW to 20 MW, small 5 MW hydroelectric plants.
Effects	Preferential financing of investments in smaller RES installations (not including micro-installations for which funds were previously reserved in the Prosumement program), including: in wind farms with a capacity of up to 3 MWe, photovoltaic systems with a capacity of up to 1 MWe, geothermal installations with a capacity of 5 MWt to 20 MWt, small hydroelectric power plants with a capacity of 300 kWe to 5 MWe, biomass-fired heat sources with a capacity of 300 kWt to 20 MWt, large-format solar collectors with a heat accumulator, as well as agricultural biogas plants with a capacity of up to 2 MWe, electricity production in high-efficiency biomass cogeneration, as well as hybrid installations and energy storage systems accompanying renewable energy investments with a capacity not exceeding 10 times the power installed for each renewable energy source.
Improvement of air quality. Part 2 - Reduction of energy consumption in buildings	
Program goal	The aim of the program is to improve air quality by limiting or avoiding CO ₂ emissions as a result of increasing energy production from renewable energy installations or by reducing energy consumption in buildings.
Budget	The budget of the program is up to PLN 500 million, including: • for non-returnable forms of co-financing - up to PLN 300 million, • for returnable forms of co-financing - PLN 200 million

Cont. table 1.

Beneficiaries	Implementation period: 2016-2022 Forms of co-financing: subsidy (up to 85% of eligible costs), loan (up to 100% of eligible costs). Beneficiaries are registered in the Republic of Poland: 1) entities carrying out medical activities in the field of stationary and round-the-clock health services, in particular hospitals, care and treatment centres, nursing and care facilities, hospices, entered into the register of entities performing medical activities, referred to in the Act of 15 April 2011 about therapeutic activity; 2) entities running museums entered into the State Museum Register; 3) entities running student hostels, in accordance with the Act of July 27, 2005. Law about higher education; 4) entities that own the building entered in the Register of Monuments in accordance with the Act of 23 July 2003 on the protection of monuments and the protection of monuments; 5) churches and religious associations entered in the Register of Churches and other religious associations, referred to in the Act of 17 May 1989 on guarantees of freedom of conscience and religion.
Rules	Thermomodernisation concerns the following buildings not supported by EU funds: museums, hospitals, care and treatment centres, nursing and care facilities, hospices, historic buildings, sacred buildings with accompanying facilities, student dormitories, in the scope of changing the equipment of facilities with devices with the highest, economically justified energy efficiency standards directly related to the implemented thermomodernisation of buildings, in particular: insulation of the facility, including: walls, floors on the ground, ceilings, roofs, roofs and other partitions, replacement of windows, replacement of external doors, reconstruction of heating systems (including replacement of heat source), replacement of ventilation and air-conditioning systems, application of energy management systems in buildings, use of renewable energy technologies, preparation of technical documentation, including energy audits and mycological expert opinions, liquidation of dampness and its effects on a thermomodernised building, replacement of indoor and outdoor lighting for energy-saving.
Effects	Reduction of energy consumption in buildings
Green investment system GIS. Part 1) - Energy management in public buildings	
Program goal	The aim of the program is to reduce or avoid carbon dioxide emissions by co-financing projects that improve the efficiency of energy use by public buildings.
Budget	Budget: PLN 501 million - non-returnable forms (subsidies), PLN 462 million - repayable forms (loans) / funds derived from the transaction of sale of AAU emission units or other NFEPWM funds.
Beneficiaries	Local government units and their associations; entities providing public services as part of the implementation of own tasks of local government units that are not entrepreneurs; Volunteer Fire Department; universities within the meaning of the Law on Higher Education and research institutes.
Rules	independent public health care centres and medical entities running an enterprise within the meaning of art. 55 of the Civil Code in the scope of providing health services; non-governmental organizations, churches and other religious organizations entered in the register of churches and other religious associations, and church legal persons.
Effects	Thanks to obtaining funding from this program, it is possible to reduce energy consumption in used buildings. Activities include thermo-modernization of public buildings, in particular insulation of the building, replacement of windows, replacement of external doors, reconstruction of heating systems, replacement of ventilation and air-conditioning systems, preparation of project documentation for the project, application of energy management systems in buildings, the use of renewable energy technologies, or the replacement of internal lighting with energy-efficient ones (an additional task carried out in parallel with thermomodernisation of buildings). Group projects can be implemented as part of the program.
Funds of the European Union. Operational Program Infrastructure and Environment	
Operational Program Infrastructure and Environment 2014-2020 Measure 1.3.1, 1.3.2 - Supporting energy efficiency in public utility buildings and in the housing sector	
Program goal	The aim of the program is to increase energy efficiency in multi-family housing and public buildings.
Budget	Budget: EUR 431.10 million (including public utility buildings - EUR 205.52 million and housing sector - EUR 225.58 million), from EU funds (Cohesion Fund).
Beneficiaries	As part of the investment priority, support is provided for public authorities, including state budgetary units and government administration as well as subordinate bodies and organizational units, housing cooperatives and housing associations, state legal persons, as well as entities that provide energy services within the meaning of Directive 2012/27/EU.

Cont. table 1.

Rules	It is planned to support deep, comprehensive energy modernization of public and residential buildings, together with the replacement of equipment for these facilities with energy-saving facilities in the area related to, e.g: insulation of the building, replacement of windows, external doors and lighting for energy efficient, reconstruction of heating systems (including replacement and connection of a heat source), ventilation and air-conditioning systems, related to the use of weather automation and building management systems, construction or modernization of internal reception installations and elimination of existing heat sources, installation of microgeneration or micro-generation for own needs, installation of renewable energy in energy-efficient buildings (if it results from energy audit), installation of cooling systems, including renewable energy sources. understood: a) ownership (including co-ownership), b) perpetual usufruct.
Effects	Increased energy efficiency in multi-family housing and public buildings.

Source: Own study based on available information about the programs.

Even though there are many different funds available the problem of poor air quality in Poland recurs annually during the period in which houses and buildings require heating. In Poland, households are still mostly heated by burning coal in ineffective furnaces. It is related to energy poverty, which can be seen as one of the factors which influences air quality. At the national level, this phenomenon was analysed by Rutkowski et al. (2018), who observed that this problem affects 12% of Poles - mainly in rural and town environments, which often do not have access to the heating network. The authors indicate reasons why individual instruments are currently not available to energy-poor families:

- Housing and energy allowances use the criterion of the maximum size per person, which excludes most residents of single-family houses.
- The energy lump sum is awarded to war veterans, so by definition, it applies only to a specific group of recipients.
- The targeted fuel allowance is granted to people who meet the restrictive income criterion of social welfare, so it excludes energy-poor households with slightly higher incomes.
- National Fund of Environmental Protection and Water Management energy advisory services are addressed mainly to local government units, so they do not constitute real support for individual farms.
- Revitalization is a mechanism with great potential in preventing energy poverty and in removing its causes through the thermal modernization of residential buildings. At the same time, revitalization activities work better in cities than in villages, where scattered development makes it difficult to identify problem areas and undertake revitalization.
- The thermo-modernization premium works as a preventive instrument that prevents the emergence of energy poverty by improving the housing structure, but the requirement of an expensive energy audit and investment financing makes this mechanism unattractive for poorer inhabitants of single-family houses. For this type of real estate, the costs of meeting formal requirements outweigh the benefits of obtaining a bonus.

Therefore they propose three new instruments: targeted allowance (1), consultancy and minor improvements of energy efficiency (2), and thermo-modernization (3). First, targeted fuel allowance, aimed at alleviating the symptoms of energy poverty. Second, advisory services and energy-saving improvements. Third, thermal retrofit coupled with professional energy counselling. The latter two instruments are meant to eliminate the causes of energy poverty. Thermal retrofit is the most expensive but the most effective tool. Developing a mechanism for the practical identification of energy-poor households is a major challenge. It is to be tackled by local governments, especially social assistance centres.

This increased focus on energy poverty is linked to efforts to reduce air pollution, which is partly caused by the use of less efficient, more polluting energy sources such as coal. The use of coal is determined by the following reasons:

Firstly, this fuel is the dominant source of energy for space heating in areas most affected by smog and its detrimental effects (Inventair, 2018). Secondly, although hard coal sold as a product is of various quality, its parameters are monitored and can be easily calculated into standard values, which serve as the basis for the valuation of this material. This fact enhances the analysis of the product's value, while the data and statistics kept by entities operating in the hard coal market provide a large sample for the input data used in the calculations. Thirdly, the prices of hard coal are monitored, and unlike e.g. the prices of firewood, depend not only on local factors and specific regional conditions but also on global trends and the current economic situation. It is worth noting that retail prices of coal for households show a smaller fluctuation than wholesale prices, which is primarily due to the higher costs of transporting the product to household.

Resistance to a shift away from coal exists mainly due to the deep incumbency of the coal industry and a supportive government. Vested interests of the coal regime are protected due to strong links between coal corporations and the government. Most coal corporations are majority state-owned and unions are highly involved in political decisions. This makes it more difficult for coal-opposing voices to weaken the political support for coal. The main arguments put forward against a coal phase-out are similar to other countries and include aspects of energy security, energy independence concerns, fears of rising energy prices, concerns about the reliability of renewables and the prospect of unemployment in regions mainly dependent on the coal industry. Other specifics for Poland - locking the country even deeper into its dependence on coal - are past negative restructuring experiences, strong concerns about relying on Russia's energy resources, little influence by environmental NGOs, and limited financial strengths to experiment with new investments.

Important positive and negative lessons can hereby be learned from other international examples, e.g. structural policy programs guiding the phase-out of coal mining in Germany since the 1960s (Oei et al., 2019; Stognief et al., 2019), long-lasting unemployment effects in former coal mining areas in the United Kingdom (Fothergill, 2017), and just transition approaches addressing interests from labour and affected regions in negotiated settlements in Spain (Rentier et al., 2019).

6. Conclusion

A just transition stands as a fundamental pillar in Poland's energy transformation strategy towards 2040. Achieving a low-emission energy system hinges on creating new development opportunities that prioritize support for the most vulnerable communities and regions. Without such assistance, many regions are at risk of being left behind, facing mounting economic challenges and soaring unemployment rates. Effectively addressing these challenges will have a profound impact on Poland's green economy in the coming decades. The findings from conducted focus groups and an analysis of aid programs designed to support a Just Transformation in Poland reveal a notable deficiency in dedicated assistance programs. Those programs that do exist tend to have stringent eligibility criteria, particularly concerning income thresholds that beneficiaries must not exceed to access funding. Given the current environment of high inflation and ongoing increases in the minimum wage, adhering to these income limits can be a daunting prospect. It is important to recognize that the energy transformation process represents a collective challenge for the entire European Union, necessitating the active participation of all Member States. Only through this collective effort can the shared objective of achieving climate neutrality be realized. Additionally, it is worth noting that, alongside Germany, Poland is poised to be one of the largest beneficiaries of the EU transition fund.

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