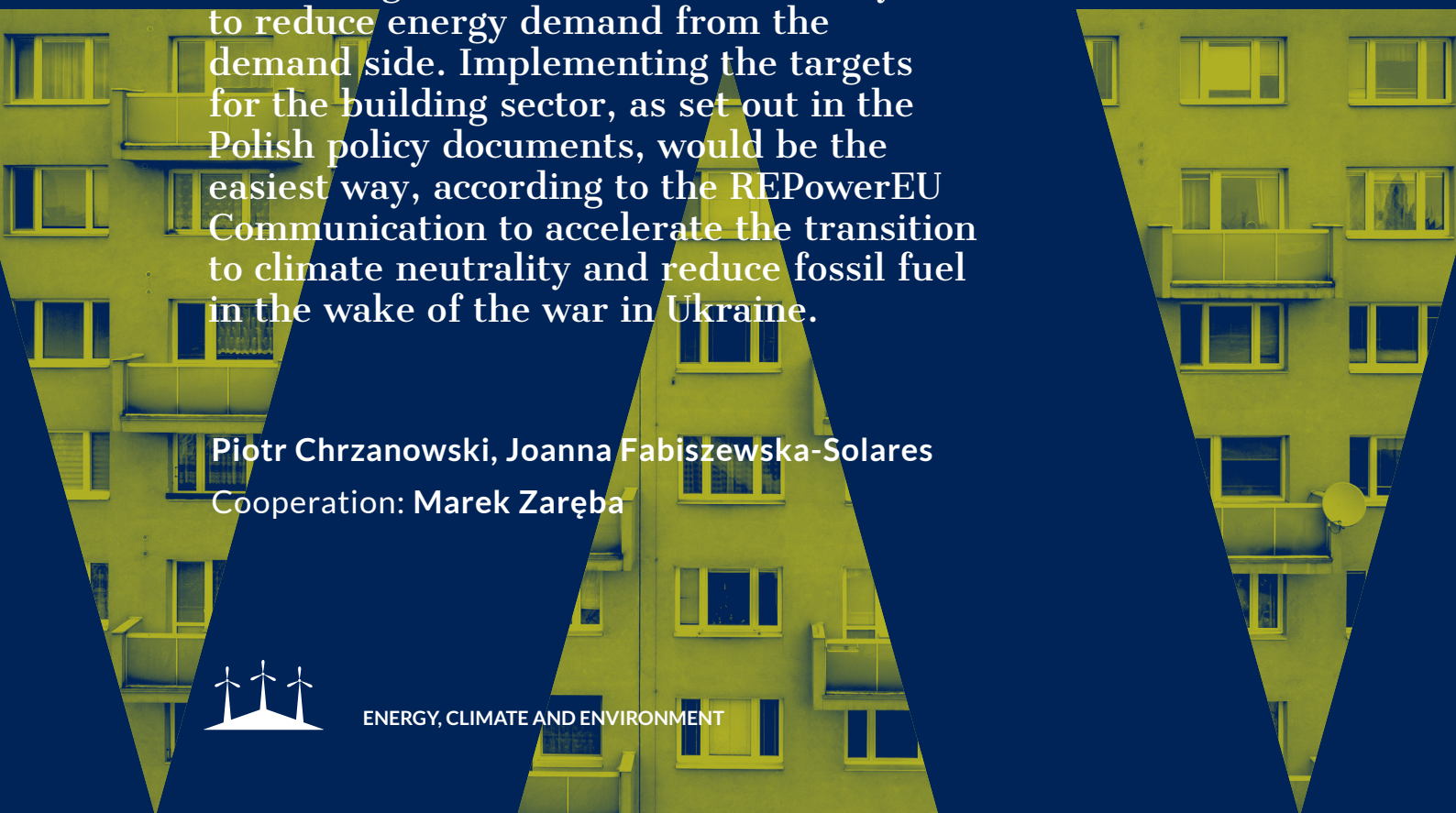
WiseEuropa

On the wave (of renovation)

Leading role of local authorities in improving energy efficiency: thermal modernisation of municipal buildings

Sustainable energy efficiency measures in buildings are the most effective way to reduce energy demand from the demand side. Implementing the targets for the building sector, as set out in the Polish policy documents, would be the easiest way, according to the REPowerEU Communication to accelerate the transition to climate neutrality and reduce fossil fuel in the wake of the war in Ukraine.



Piotr Chrzanowski, Joanna Fabiszewska-Solares

Cooperation: **Marek Zaręba**

ENERGY, CLIMATE AND ENVIRONMENT

On the wave (of renovation).
Leading role of local authorities in improving energy efficiency: thermal modernisation of municipal buildings.

Authors:

Piotr Chrzanowski,
Joanna Fabiszewska-Solares

Cooperation: Marek Zaręba

WiseEuropa – Warsaw Institute for Economic and European Studies

Ul. Królewska 2/26
00-065 Warsaw, Poland

www.wise-europa.eu

Cover design, typesetting, DTP: Studio graficzne TEMPERÓWKA

WiseEuropa

On the wave (of renovation)

Leading role of local authorities in improving energy efficiency: thermal modernisation of municipal buildings

Piotr Chrzanowski, Joanna Fabiszewska-Solares

Cooperation: **Marek Zaręba**

Warsaw, 2022

1. Strategic objectives for the buildings sector

The buildings sector holds a strategic position in the European Green Deal (EGD) and the Fit for 55 package. At the EU level, buildings are responsible for as much as 40% of energy consumption and 36% of greenhouse gas emissions. Additionally, according to EU data, currently around 75% of buildings in Europe are energy inefficient[1].

The European Union in its documents confirms the need to accelerate the transformation of the buildings sector through **increasing energy efficiency by 36%-39% by 2030**, or their deep renovation and increased share of renewable energy sources (RES). A specific target for **the rate of renovation under the** EGD has been set **at a minimum of 3% per year of the** total floor area of all **public buildings** by 2030, including a reduction in energy consumption in the public sector by 1.7% per year, with the assumption that by 2030 renovations will reduce CO_2 emissions from buildings by 5% and energy consumption by 5-6%[2]. Also important for the achievement of the nZEB (nearly zero-energy buildings) standard is the **increase in the use of renewable energy sources by 49% by 2030** and the gradual phasing out of fossil fuels in heating and cooling by 2040 at the latest. These targets are also the basis of the recently published EU plan on rapidly reducing dependence on Russian fossil fuels and accelerating the green transition[3], which emphasises the need for energy savings (not only in buildings) and proposes an increase in the achievement of energy production from renewable energy sources from 40% to 45% by 2030, as part of the Fit for 55 package.

It is worth noting that measures to permanently improve the energy efficiency of buildings are the most effective way to reduce demand for energy from the demand side. Until the Polish energy sector is fully decarbonised, this translates into the most effective actions aimed at reducing fossil fuel consumption in the heating and power sectors. At the same time, it makes it possible to minimise dependence on imports of these raw materials from outside Poland, which is an important argument in discussions on increasing the resilience of the Polish economy to external shocks, fluctuations in fossil fuels prices on global markets and supply interruptions. At the same time, taking action now will avoid a drastic increase in costs following the introduction of the planned emissions trading mechanism in the buildings and transport sectors[4].

The emissivity of the building sector in Poland is currently at a lower level than the EU average (according to data for 2019). The embedded carbon footprint of buildings (not including indirect emissions from heating and energy consumption in buildings) accounts for about 10.5% of GHG emissions in Poland, while the EU average is about 12%[5]. However, the total CO_2 emissions (taking

1 European Commission, European Green Deal: Commission proposes to boost renovation and decarbonisation of buildings

2 European Commission, In focus: Energy efficiency in buildings,

3 European Commission, REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition

4 WiseEurope, Can carbon taxation be progressive? Analysis of the proposed reforms of the European Emissions Trading Scheme and the Energy Taxation Directive in terms of expected social impacts in the European Union and Poland, 2022

5 Ministry of Climate and Environment, Poland's National Inventory Report, 2021

into account the embedded and operational carbon footprint) of 45 million tonnes of CO_2 makes the building sector one of the main areas of action necessary for the Polish economy to achieve climate neutrality and improve the quality of life for its citizens.

Unfortunately, as shown in the major report: ***Locked Potential. How to Harness the European Green Deal and Fit for 55 as Opportunities for Transforming the Buildings and Transport Sectors at the Local Level***[6], national strategic targets for buildings fall far short of EU standards. Both the Energy Policy of Poland until 2040 and the National Energy and Climate Plan **do not set a specific target for the buildings sector to improve energy efficiency**, but only indicate a general target for all sectors of the economy, i.e. to increase energy efficiency by 23% by 2030. However, the most serious shortcoming is the **discrepancy between the Polish and EU reduction targets for CO_2 emissions in non-ETS sectors by 2030,** where Polish documents set a reduction target of 7%, compared to the 17.8% set in EU documents.

The only strategic document that fits into the assumptions of the EGD, the Fit for 55 package and supports deep thermal modernisation, is the **Long-term Renovation Strategy (DSR).** It was adopted by the Polish government with delay, and has recently been accepted by the European Commission. One of the main elements of the Strategy is the assumption of the average annual rate of thermo-modernisation at the level of about 3.8% with the assumption that by 2050, 65% of buildings will achieve a primary energy consumption rate of no more than 50 kWh/m^2 per year[7]. In the context of the renovation of buildings in the stock of local authorities, it was additionally set in the Strategy to:

- increase support towards intelligent energy management in cities and take into account the possibility of transferring energy between buildings,
- develop a procedure for identifying planned/unplanned energy efficiency improvement projects in public facilities and other buildings managed by TSU (e.g. municipal residential buildings).

Unfortunately, none of the above-mentioned documents have a real impact on the level of ambition of the actions taken by municipalities. As these targets are not binding, municipalities perform their duties in terms of energy planning or deep renovation in an inefficient way, so that the vast majority of municipal buildings remain highly energy-intensive. The situation is also not improved as there is still no specific guideline for the annual indicator of demand for non-renewable primary energy used while renovating older buildings. Together, these problems translate into a lack of sufficient action to tackle energy poverty in a sustainable way.

6 https://wise-europa.eu/wp-content/uploads/2022/06/Blocked-potential.pdf

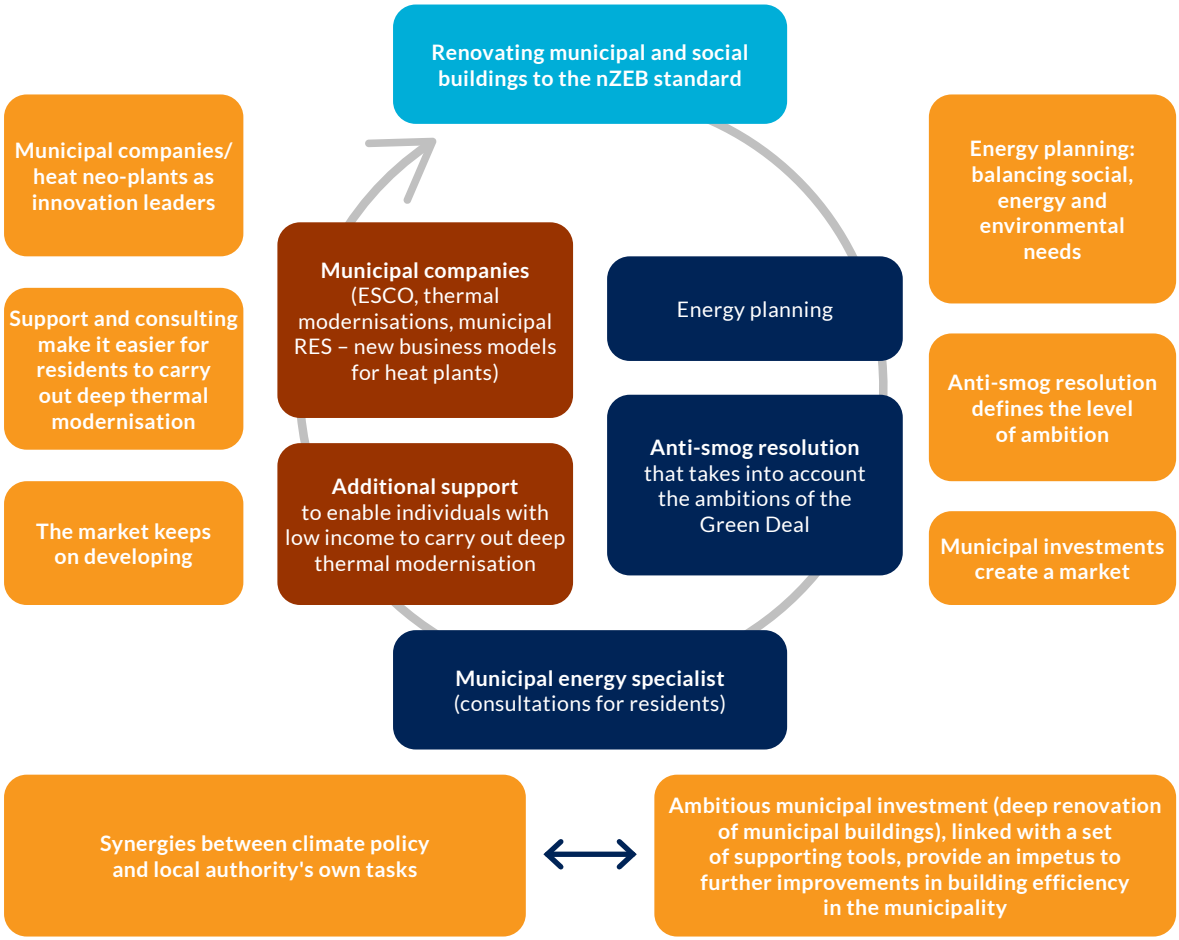
7 Ministry of Development and Technology, Long-term Renewal Strategy, 2022

2. Model municipal investment in the construction sector

While local governments carry out thermal modernisations of public buildings, it is hard to find a comprehensive plan for the thermal modernisation of **municipal buildings which are the ones that require intensive renovation**. Unfortunately, according to the analysis[8], most municipalities treat renovations superficially, focusing on shallow thermal modernisation and elimination of smog. Often modernisations consist of replacing heat sources instead of supporting long-term energy efficiency improvement, which brings little environmental effect and is quite short-sighted. In view of the enormous costs that local authorities will have to incur in connection with large-scale renovations of buildings, it is recommended to assist them by persons or institutions that will ensure appropriate coordination of activities, planning and the search for funding and the most appropriate way of financing the investments. The activities of local authorities should therefore include both "soft" activities - advice, planning - and "hard" activities of a regulatory and financial nature, as outlined below.

8 "Blocked potential. How to use the European Green Deal and Fit For 55 as opportunities for transforming the buildings and transport sectors at the local level", Chrzanowski P., Fabiszewska-Solares J., Lewandowski W. and Marszał K., Warsaw 2022

Figure 1. Model comprehensive local authority investment in the buildings sector



Source: WiseEuropa compilation

Despite the considerable financial outlay that model comprehensive investments in local authorities will entail, renovating municipal buildings to the nZEB standard can bring the most benefits. In economic terms, this means additional savings in the following years, which, according to the DSR[9], will result in savings in municipal buildings of almost 53%. In addition, it is expected that energy poverty and social exclusion will be minimised through energy transformation, the increase of RES and the shift away from solid fuels, which will also translate into lower energy bills. In detail, model investments should include measures that reduce energy loss through the building envelope and improve the energy efficiency of heating and cooling systems, ventilation, hot water and lighting. It should also be borne in mind that households can carry out actions that do not require high costs or drastic changes to the structure of the building, such as the use of temperature control in rooms, replacement of lighting or of old electrical appliances with new ones of better energy efficiency.

9 Ministry of Development and Technology, Long-term Renewal Strategy, 2022

3. Eco-consulting

As we mentioned above, in addition to the typical “hard” activities related to a comprehensive model investment in the buildings sector, local authorities should also carry out a number of “soft” activities. **Providing eco-consulting at the local level** fits perfectly with these two types of activities, supporting the transformation in the buildings sector and complementing thermal modernisation or energy-source replacement activities.

Energy planning, including civic energy in the municipality must be based on up-to-date and reliable data, thus ensuring the involvement of people with relevant competences and knowledge. It is therefore important to create a network of energy managers or to employ a dedicated person in the municipality, who will present the most effective solutions for improving air quality in the municipalities, assist in the development of strategic documents at the local level, effectively manage the risks associated with the planned investments, or allow to find the most efficient way of financing the investments. **In addition to providing direct advice to local authorities, ecomanagers should also support the local community** and carry out information and education activities.

4. Investments in the municipalities financed from external funds

Successful implementation of model investments in the buildings sector by local authorities will largely depend on effective acquisition of external funds. Unfortunately, the lack of a coherent and tailored financing system, the availability of long-term renovation loans, combined with an underestimated level of ambition in local governments, has significantly blocked the progression of deep thermal modernisation of municipal buildings. Interestingly, **between 2014 and 2019, local governments and municipalities were the main investors of low-carbon investments in buildings**, being investors in 43% of all investments and corresponding to a total investment outlay of PLN 9.89 billion[10]. It can therefore be assumed that a full elimination of blockages and an increase in ambition could significantly accelerate the transformation in the buildings sector and significantly increase the share of external funds in financing model investments.

Due to the complex and cost-intensive nature of building renovation, capital from EU funds plays a dominant role in financing investments at local level. European funds in the previous financial perspective allowed covering about 72% of the funds allocated to low-carbon investments in local governments. **As of 2019, an increase in the use of national funds has also been observed, coming mainly from NFOŚiGW and WFOŚiGW programmes**, which between 2014 and 2019 accounted for 6% of the funding received by municipalities. One of the most important programmes from which municipalities can directly benefit for energy efficiency improvement measures is the programme "Clean Air - Stop Smog" operated by the NFOŚiGW[11]. Within the framework of the budget in the total amount of up to PLN 698 million, the Thermo-modernization and Renovation Fund may implement investments concerning the replacement or liquidation of high-emission heat sources with low-emission ones, connection to a district heating or gas network or thermo-modernization of single-family residential buildings. However, municipalities wishing to take advantage of the financial support, in addition to the specific requirements of the programme (e.g. specifying the total number of buildings to be thermo-modernised or estimating the cost of all planned undertakings), must carry out additional activities including:

- passing an anti-smog resolution under the Environmental Protection Law[12] ,
- adoption of a municipal low-carbon programme on the basis of the Act on support for thermal modernization and renovation and on the central emission register for buildings[13],

10 WiseEurope, Renovation. Panorama of low-carbon investments in the buildings sector, 2020

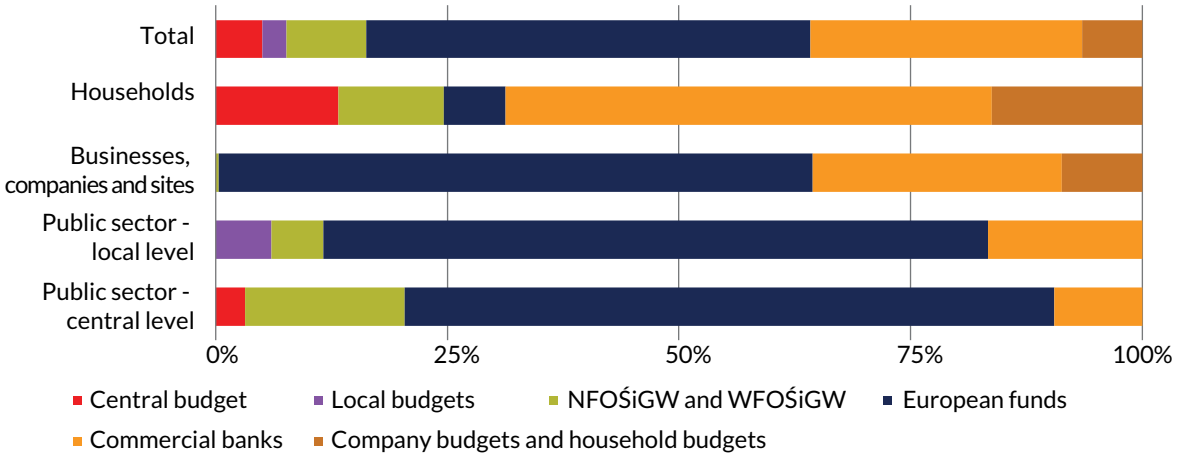
11 Ministry of Climate and Environment, Stop Smog Programme for municipalities and their inhabitants

12 Act of 27 April 2001. Environmental Protection Law (Journal of Laws 2001 No. 62 item 627 as amended)

13 Act of 21 November 2009 on supporting thermo-modernization and renovations and on central emission records of buildings (Journal of Laws 2008 No. 223 item 1459 as amended)

- adoption of a resolution on the method and conditions for the beneficiary's own contribution and the amount of this contribution.

Graph 1. Cumulative share of available funding sources for projects implemented by each investor group between 2014 and 2019



Source: WiseEuropa own study

Thanks to the funding received, in 2014-2019 low-carbon investments in local self-governments mainly concerned the thermal modernisation of public buildings and replacement of energy carriers in buildings owned by local self-governments[14]. In detail, local self-governments mainly invested in photovoltaics and installation of solar collectors, for which a total of PLN 1.9 billion was transferred, accounting for 65% of the total investment. Biomass sources accounted for 20% of the investments (about PLN 600 million) and heat pumps for 13% (total amount of about PLN 400 million). The least interest was shown in investments in geothermal energy and connection to the heat distribution network (only PLN 1 million was allocated for the latter).

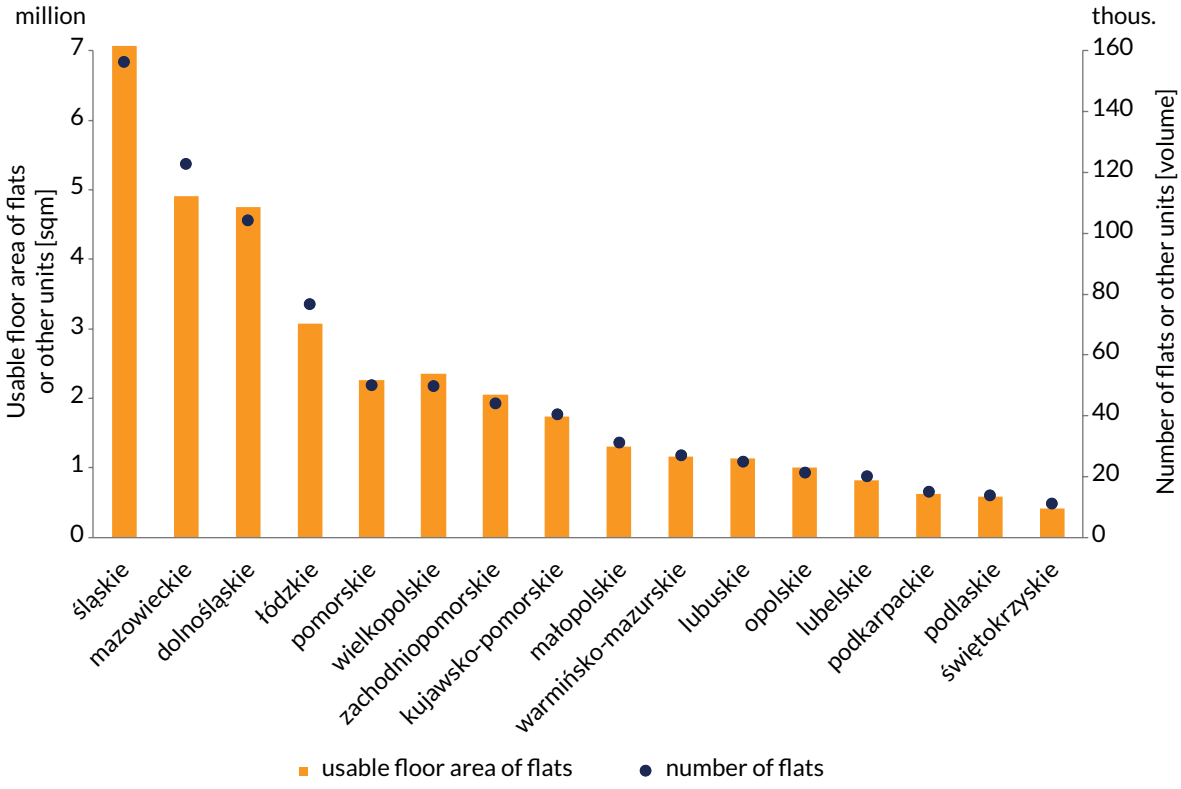
Despite the fact that most low-carbon investments were implemented by local authorities, there was still a lack of support from local authorities for comprehensive and deep renovations of municipal buildings between 2014 and 2019. Most of the funded measures were spotty and focused on heat source replacement and RES installations in buildings. Local authorities should continue to use external funding for comprehensive investments in social buildings, while not forgetting to meet their obligations in terms of energy planning, or the creation of low-carbon management plans, which can assist in setting and achieving targets in this area.

14 WiseEurope, Renovation. Panorama of low-carbon investments in the buildings sector, 2020

5. Comprehensive thermal modernisation of municipal buildings

The surface area of council dwellings in the last decade has decreased by over 25%, successively decreasing also the share of council dwellings in the general building stock. In 2020, the surface area of council dwellings in Poland amounted to over 35 million m^2 and the number of such dwellings was just over 800 000. The largest areas of such dwellings are available in the Silesian, Mazovian and Lower Silesian Voivodeships.

Graph 2. Surface area and number of municipal dwellings in individual voivodeships in Poland in 2020



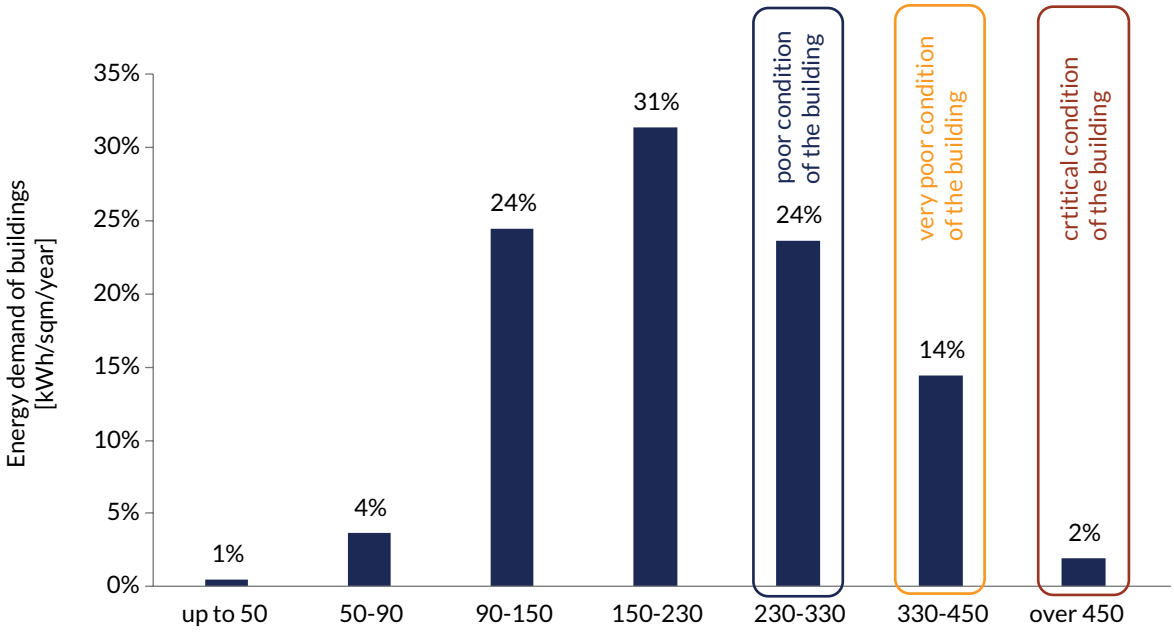
Source: WiseEuropa own study based on CSO

Thermal modernisation of municipal buildings can have a number of positive effects for both the municipality and the people living in these flats. First of all, it is important to significantly reduce the energy demand of buildings, which has a direct impact on their maintenance costs. Also important is the fact that emissions from heating the building will be reduced as a result of the

renovations. An additional important aspect is also the wise prevention of energy poverty. In many cases, the simplest solution seems to be to transfer funds for the purchase of energy carriers for heating to households affected by energy poverty, but these measures do not directly solve the scale of the problem in the long term and the problem does not disappear by itself. The solution, however, may be carrying out a comprehensive and deep thermal modernisation, which will allow for a significant reduction in the energy demand of the building and lower energy bills, which will be a real solution in the fight against energy poverty.

Estimates made for the development of the Long-term Renovation Strategy[15] show that over 70% of buildings in Poland are energy inefficient and their primary energy demand is over 150 kWh/m^2 . The energy demand of 40% of buildings is higher than 230 kWh/m^2 . Within the different ranges of power demand, demand values have been defined according to which buildings are in bad, very bad and critical energy condition. These buildings are the subject of further analysis, in which we have assumed that the proportion of municipal buildings with a specific energy condition is the same as for all buildings in Poland.

Graph 3. Ranges of energy demand of buildings with determination of their energy status

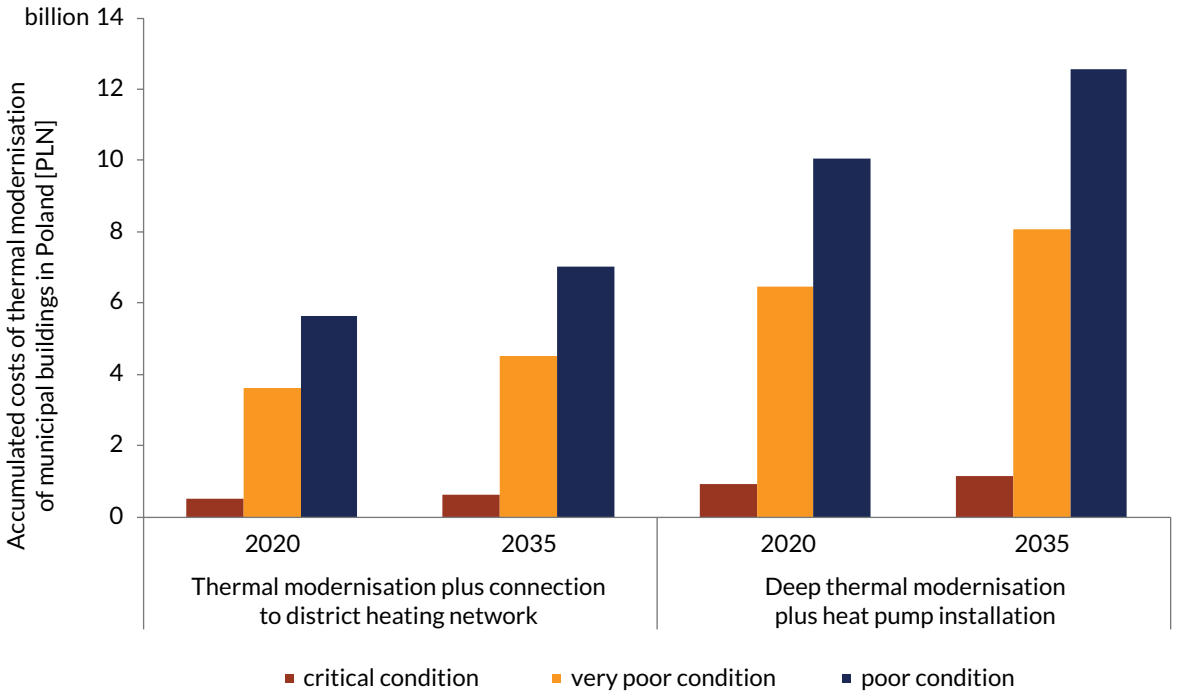


Source: WiseEurope own study based on the Long-term Renewal Strategy

The costs of thermal modernisation of municipal buildings were worked out in two variants, which take into account the full decarbonisation of the heat source in the future. The first one takes into account the costs of performing thermal modernisation and connecting the building to the district heating network. The second variant assumes performing deep thermal modernisation and installing a heat pump as the main source of heating. Cumulative costs of thermal modernisation measures for municipal buildings in Poland broken down by energy status of the buildings are presented in the chart below.

15 Ministry of Climate and Environment, Long-term Restoration Strategy

Graph 4. Cumulative costs of thermal modernisation of municipal buildings in Poland



Source: own elaboration based on the assumptions of the Long-term Renewal Strategy

As indicated in the graph above, deep thermal modernisation with the installation of a heat pump requires significantly higher investment outlays. It is connected with the necessity of using more building materials for proper insulation of external walls as well as with the cost of purchasing the heat pump. However, significant reduction of energy demand in a thermo-modernised building allows for significant reduction of building maintenance costs after the modernisation. The use of a heat pump, despite definitely higher investment costs, allows to achieve almost twice as fast a return on investment thanks to a significant reduction of operational costs.

CASE STUDY: Thermal modernisation of municipal buildings in Zduńska Wola

One example of a model thermal modernisation of municipal buildings is the investment in Zduńska Wola with a total value of approx. 4.9 million PLN[16]. The project involved the thermal modernisation of 5 municipal buildings, replacing coal-fired furnaces and connecting the buildings to the district heating network, insulating walls and roofs and replacing window joinery. The thermo-modernized buildings differed in size and square meters of flats, which in turn translates into different costs of individual actions in each building. The average cost of thermal modernisation per m^2 was about 517 PLN. According to the audit, it is expected that the full cost of the investment will be returned within 12.5 years, although this period varies between buildings and may be shorter. Unfortunately, in the case of this investment it was not decided to install photovoltaic panels or to use a heat pump.

In the case of the investment in Zduńska Wola, financing was mainly from own resources, which amounted to 52.82%, with the remainder coming from the European Regional Development Fund (43.12%) and the state budget (4.06%).

16 City of Zduńska Wola, Thermal modernisation of municipal buildings at 26,28,30,32 and 32A Sieradzka Street in Zduńska Wola.

6. Conclusions

The goals for the construction sector contained in the Polish strategy documents are not in contradiction to the European Green Deal or the Fit for 55 legislative package - but they have a much lower level of ambition. Their implementation would be, according to the REPowerEU communiqué, the easiest way to reduce fossil fuel consumption and accelerate the transition to climate neutrality in the wake of the war in Ukraine. In this context, it is also noteworthy that increasing the pace of deep thermal modernisation is one of the areas indicated in the recommendations for Poland within the European Semester[17] and in the studies of the International Energy Agency (IEA).

Keeping up with EU targets requires decisive action, mainly by local authorities, which in the buildings sector should simultaneously focus on improving energy efficiency and increasing the use of renewable energy sources. Despite a number of measures taken by local authorities, active fundraising for investment funding is mainly focused on public buildings. In addition, the actions often do not present an adequately ambitious approach - instead of deep thermal modernisations, standard thermal modernisations are carried out, bringing fewer economic and energy effects.

In the future, a significant role should be played by ecomanagers controlling the decarbonisation activities of the local economy, in particular energy efficiency and RES. Such persons should supervise investments implemented by the municipality and actively advise on the choice of technologies used or the form of financing.

It is important for municipalities to take action to reduce fuel poverty. Investments in reducing energy bills in low-income households should be a priority for municipalities. This type of investment is the easiest to implement directly in municipal buildings. What is worth emphasising is that energy efficiency is a solution for local communities to significantly reduce the costs of building maintenance. If we increase the ambition of the measures and additionally introduce RES energy and appropriate energy management to the buildings, the municipalities can take the first steps towards climate neutrality. Despite a relatively higher financial outlay at the time of investment, ambitious solutions can have a greater effect, which will significantly shorten the payback period of the measures carried out.

Deep thermal modernisation of buildings owned by local governments can be a strong impulse to stimulate the local market. Local governments can become promoters of this type of action and encourage local communities to incur higher costs of thermal upgrading, which will pay for themselves more quickly in the short term. The more deep thermal modernisations are carried out, the greater the response of the local market in terms of locally available technologies, number of experienced companies carrying out deep thermal modernisations and the offer of commercial financing.

17 European Commission, Recommendation for a Council Recommendation on the 2022 National Reform Programme of Poland and delivering a Council opinion on the 2022 Convergence Programme of Poland

WiseEuropa Foundation

WiseEuropa is an independent think-tank and research organization based in Warsaw that undertakes a strategic reflection on European politics, foreign policy and economy. The mission of WiseEuropa is to improve the quality of Polish and European policy-making as well as the overall business environment by promoting the use of sound economic and institutional analysis, independent research and evidence-based approach to impact assessment.

www.wise-europa.eu

Energy, Climate and Environment Programme

Poland, Europe and the world are currently facing unprecedented challenges associated with the environment and resources. Avoiding dangerous climate change, improving public health and increasing resource security requires a profound economic transition. Taking advantage of opportunities and avoiding the associated developmental traps requires in-depth evaluation of the short- and long-term impacts of environmental protection and natural resource management policies. Under the Energy, Climate and Environment Programme, we prepare comprehensive sectoral and macroeconomic analyses, focusing on the broadly defined low-emission economic transition in Poland and globally. We are active in areas such as: Polish and EU energy and climate policy, domestic resource policy, improving resource efficiency in the economy, protection of the environment and public health by limiting harmful emissions, sustainable transport policy. This paper is a part of the Energy and Climate Project.

ENERGY, CLIMATE AND ENVIRONMENT

Other publications:

"Blocked potential. How to use the European Green Deal and the fit for 55 as an opportunity to transform the building and transport sectors at the local level",
Chrzanowski P., Fabiszewska-Solares J., Lewandowski W., Marszał K.; WiseEuropa, Warsaw 2022

"Coal's Swan Song. Systemic risks of delaying the restructuring of the mining and coal energy sectors in Poland",
Bukowski M.; WiseEuropa, Warsaw 2022

"The Necessary Step. The impact of mining restructuring on the economy and energy security",
Bukowski M., Śniegocki A.; WiseEuropa 2022