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Economic conditions in the low-energy building industry in Poland

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Abstract: The key determinants in the development of the low-energy building industry are full and complex legal regulations for investors, designers and companies working in the building sector, as well as, economic instruments supporting the development of such buildings. Legal and administrative measures regulating the issue of energy efficiency in the building sector are reinforced by financial instruments. This article provides a detailed overview of leading programmes financing the low-energy building industry in Poland. It also discusses the basic financial instruments regarding the enhancement of energy efficiency and the support of dispersed renewable energy sources along with a preference analysis for investors.

Keywords: low-energy building industry, energy efficiency, economic instruments

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Introduction

Building construction is one of the key areas where significant energy savings can be made and greenhouse gas emissions can be minimised. Hence, energy-saving and passive buildings are important in shaping a low-emission economy (Celadyn, 2010).

The term 'energy-efficient building construction' was coined in Western Europe in the 1970s during the first energy (oil) crisis. The fuel crisis made it a necessity to save energy and to start using renewable energy sources on a larger scale in the construction industry. As a result, the concept of building energy-efficient houses appeared in the 1980s. In 1988, German physicist and construction engineer Wolfgang Feist and Bo Adamson of Lund University in Sweden invented the standards for a passive house that can function almost completely without heating (Feist

et al., 2009). A building, constructed according to these standards, would have the annual heat demand of less than 15 kWh/m² (equivalent to 1.5 l of heating oil or 1.7 m³ of natural gas or 2.3 kg of hard coal) and the annual primary energy demand, including hot water and electricity, would be below 120 kWh/m². The world's first experimental passive house was built in 1991 in Darmstadt (Germany). It was designed and built by the team of architects, H. Bott, K. Ridder and H. Westermeyer, on the basis of the standards developed by W. Feist and B. Adamson and funded by the Ministerium für Wirtschaft und Technik in Hesse. The pioneer passive house in Darmstadt is a terraced house with four apartments each with an area of 156 m². It was build of modern building materials and with the use of innovative architectural solutions. It is located in the way that allows the optimum use of sunlight. This results in an annual unit energy demand for heating and ventilation (EUco) of 10 kWh/m².

The high costs of constructing the first passive building in history temporarily halted development in energy-saving construction technologies. However, on the initiative of W. Feist, the Passive House Institute (Passivhaus Institut) was established in Darmstadt in 1996 and it still implements the idea of passive houses and the optimisation of components for their construction to this day. The main concept of building a passive house was created during construction of the building in Darmstadt. The idea was restored in 1998 through financial support by the European Union in the form of the CEPHEUS project (within the THERMIE program of the European Commission). The project included construction of 14 buildings (covering 258 residential units) to the passive house standard in Germany, Austria, Switzerland, Sweden and France. As a result, the number of energy-efficient and passive buildings, both single-family and multi-family houses, as well as public buildings, has increased in Western Europe over the last several years.

Since the 1980s, the idea of energy-efficient building construction has been spreading around the world. Most passive constructions are built in German-speaking and Scandinavian countries. According to data from 2014, there are around 40,000 passive buildings in the world and almost half of them are in Germany.

The first passive house in Poland as well as in Central and Eastern Europe, certified by the Passive House Institute (Passivhaus Institut) in Darmstadt, was built in Smolec near Wrocław. The annual unit energy demand for heating and ventilation (EUco) of the building in the standard heating season is 15 kWh/m². The same house built in accordance with currently applicable standards in Poland would consume 123 kWh/m² per year, over 8 times more (*History*, 2012). The only Polish unit authorised to certify passive buildings is the Polish Institute of Passive Construction and Renewable Energy in the name of Günter Schlagowski in Gdańsk.

Along with the development of energy-efficient building construction (including house construction of the passive standard), there has also been rapid development of construction companies specialising in energy-efficient building construction technology, companies producing energy-efficient building components (e.g. windows and window frames, doors and door frames) and companies involved in the production of modern building materials, devices and installations necessary to

obtain the standard of an energy-efficient (passive) building. Further development in energy-saving construction depends on the scale of implementation of the concept of self-sufficient (autonomous) buildings equipped with renewable energy installations (Czaplicka-Kolarz & Pyka 2010; Żurawski 2009).

The aim of the paper is the analysis and evaluation of economic instruments to support the development of buildings with low-energy consumption based on legal regulations for investors, designers and companies related to the construction sector in Poland. The scope of the article includes a detailed review of the leading programmes for financing low-energy building construction on the Polish market from a historical perspective.

1. The state of legal regulations for the low-energy building industry in the European Union and Poland

In Poland, according to law, the highest legal act is the Constitution of the Republic of Poland of April 2, 1997 (Journal of Laws, 1997, No. 78, item 483, as amended). However, it does not contain legal regulations directly related to the issue of energy-efficient building construction. Legislation in this area is indirectly introduced by the European Union. Poland by joining this international organization, under the ‘Treaty on the Accession of the Republic of Poland to the European Union, signed on April 16, 2003 in Athens’, is obliged to introduce all legal acts adopted by the European Union. Article 91(3) of the Constitution of the Republic of Poland of April 2, 1997 contains the following wording: ‘If an agreement, ratified by the Republic of Poland, establishing an international organization so provides, the laws established by it shall be applied directly and have precedence in the event of a conflict of laws’, which means that every adopted directive of the European Union must be implemented in Polish law. However, the European Union has not yet introduced full and comprehensive legal regulations relating only to energy-efficient building construction. Adopted EU directives regulate the wider issues (especially regarding energy efficiency) and only partly concern the construction of energy-saving and passive buildings. Thus, legislation in the European Union and Poland regarding the matter is not codified in one leading legal act (the regulations are currently spread over many different texts). A detailed review of the regulations regarding low-energy building construction in the European Union and Poland has already been discussed in previous papers (Ramczyk, 2015; Ramczyk, 2017).

The basic criterion for energy efficiency is obtaining the appropriate annual unit energy demand for heating and ventilation (EUco), calculated in accordance with the regulation of the Minister of Infrastructure and Development on the methodology for determining the energy performance of a building or part of a building and energy performance certificates of February 27, 2015 (Journal of Laws of 2015, item 376). By the standards of the National Fund for Environmental Protection and Water Management, it is assumed that an ‘energy-efficient building (house)’ is a building (house) for which the annual unit energy demand for heating and ven-

tilation (EUco) is $\leq 40 \text{ kWh/m}^2$, while a ‘passive building (house)’ is characterised by the annual unit energy demand for heating and ventilation (EUco) $\leq 15 \text{ kWh/m}^2$. However, there are no precise definitions of these terms in the existing legal acts. Passive buildings ensure very high thermal comfort without the use of traditional heating or air conditioning systems, but by using passive heat sources (electrical devices, solar radiation through the glazed southern facades, heat emitted by residents/users) and a radical reduction of heat loss (heat transfer through walls and ventilation heat recovery) (Celadyn 2010; Czaplicka-Kolarz & Pyka 2010; Żurawski 2009). For comparison, the energy-efficiency indicator at the EUco level for standard buildings (implemented in traditional technology and complying with current regulations) is $90\text{--}120 \text{ kWh/m}^2$. Additional criteria, besides the indicator of the annual unit energy demand for heating and ventilation EUco, used in the assessment of the energy efficiency of buildings (houses) are: thickness of the insulation layer of external walls, thermal transmittance of external walls, thickness of the insulation layer of the roof or flat roof, location of windows, thermal transmittance for windows (including window shutters and window frames), heating system and use of renewable energy (including solar energy) (Kaniszewska, 2013).

The definition of a nearly zero-energy building was introduced in EU law in 2010. According to Article 2 point 2 of Directive 2010/31/EU of the European Parliament and of the Council of May 19, 2010 on the energy performance of buildings (recast) (Official Journal of the European Union L 153 of June 18, 2010), implemented in Poland through the adoption of the law on the energy performance of buildings of August 29, 2014 (Journal of Laws, 2014, item 1200 as amended), defines a ‘nearly zero-energy building’ as a building that has a very high energy performance, as determined in accordance with Annex I of the Directive, while the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. In Poland, this standard will apply from January 1, 2021 to all buildings, and for buildings occupied and owned by a public authorities from January 1, 2019.

2. Economic instruments supporting the low-energy building industry in Poland

Legal and administrative regulations governing energy efficiency issues in the construction sector in Poland are supported by financial instruments (Burzyńska & Fila, 2007). Historically, the leading supporting programmes for the development of buildings with low energy consumption include (*Information*; Ramczyk, 2015; Ramczyk, 2017; *Resolution*):

- ‘Improving energy efficiency. Part 2: subsidised loans for building energy-efficient houses’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- ‘LEMUR - Energy-efficient public buildings’, Priority Programme of the National Fund for Environmental Protection and Water Management,

- ‘Support for distributed, renewable energy sources. Part 2) PROSUMENT: co-financing the purchase and installation of micro-installations of renewable energy sources’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- ‘BOCIAN - Distributed, renewable energy sources’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- ‘KAWKA - Elimination of low emission supporting the increase of energy efficiency and development of distributed, renewable energy sources’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- ‘Investments in energy efficiency in small and medium-sized enterprises’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- ‘Green investment system. Energy management in public buildings’, Priority Programme of the National Fund for Environmental Protection and Water Management,
- Priority Programmes of Voivodeship Funds for Environmental Protection and Water Management,
- ‘PL04: Saving energy and promoting renewable energy sources’, Priority Programme of the Norwegian Financial Mechanism and the European Economic Area Financial Mechanism,
- Swiss-Polish Cooperation Programme. Objective 2: ‘Increasing energy efficiency and reducing emission, in particular greenhouse gases and dangerous substances’,
- Operational Programme Infrastructure and Environment. Priority Axis I. Investment priority 4.III. ‘Supporting energy efficiency, smart energy management and the use of renewable energy sources in public infrastructure, including public buildings and the residential sector’,
- ‘Energy-saving construction. Part 1. Reduction of energy consumption in the construction sector’, Priority Programme of National Funds for Environmental Protection and Water Management,
- Regional Operational Programmes (ROP),
- Thermal Upgrading and Renovation Fund,
- Public Private Partnership (PPP),
- funding programmes in commercial banking.

The basic financial instrument directly supporting energy-efficient building construction in Poland was the Priority Programme of the National Fund for Environmental Protection and Water Management entitled ‘Improving energy efficiency. Part 2: subsidised loans for building energy-efficient houses’, the purpose of which is to save energy and reduce or avoid carbon dioxide emissions by co-financing projects that improve the efficiency of energy use in the newly built residential buildings. The programme with a budget of 300 million PLN is implemented in the period 2013-2022 (*Information*). The amount of contribution depends on the value of the annual unit energy demand indicator for heating and ventilation (EUco),

calculated in accordance with the Regulation (Journal of Laws of 2015, item 376) and is as follows:

- in case of single-family houses:
 - a) NF40 standard – $EU_{co} \leq 40 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ – PLN 30,000.00 gross grant;
 - b) NF15 standard – $EU_{co} \leq 15 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ – PLN 50,000.00 gross grant;
- in case of residential units in multi-family houses:
 - a) NF40 standard – $EU_{co} \leq 40 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ – PLN 11,000.00 gross grant;
 - b) NF15 standard – $EU_{co} \leq 15 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ – PLN 16,000.00 gross grant.

The programme of subsidies for energy-efficient buildings was closed in August 2016. Investors used only 2% of the funds from the amount of PLN 300 million in years 2013-2015. The programme was supposed to be an incentive to create a market for passive and energy-efficient houses in Poland (*Consultations*). There was little interest in the subsidies due to discouragingly complicated and costly procedures, including the need for the beneficiary to pay income tax on the subsidy and the obligation to take a loan in one of the banks indicated by the National Fund for Environmental Protection and Water Management. However, the price offer of these banks was not attractive for potential investors. As a consequence, it was more profitable to take a commercial bank loan than a bank loan with an additional payment from the National Fund for Environmental Protection and Water Management for building an energy-efficient house.

The Priority Programme of the National Fund for Environmental Protection and Water Management entitled ‘Support for distributed, renewable energy sources. Part 2) PROSUMENT – co-financing the purchase and installation of micro-installations of renewable energy sources’ is one of financial instruments indirectly supporting energy-efficient construction in Poland. The programme with a budget of 800 million PLN, is implemented in the period 2014-2022 and is addressed to individuals as well as home-owner associations and housing cooperatives for co-financing the purchase and assembly of small installations or micro-installations of renewable energy sources for the production of electricity or heat and electricity for the needs of single-family and multi-family houses. Therefore, installations using: 1) biomass heat sources, heat pumps and solar collectors with installed thermal power up to 300 kWt, and 2) photovoltaic systems, small wind farms as well as combined heat and power (including micro-biogas plants) with installed power of up to 40 kWe, are financed. A loan or a soft loan, including the subsidy, may be up to 100% of the eligible costs of the installation, with the subsidy being fixed at 20 or 40% of the co-financing (15 or 30% after 2015). Depending on the type of beneficiary and the project, the maximum amount of eligible costs is from 100,000.00 PLN to 450,000.00 PLN and the loan or soft loan interest rate is set at 1.00% with a maximum funding period of 15 years (*Information*).

Currently, the leading programme for financing low-energy building construction in Poland is the Priority Programme of the National Fund for Environmental Protection and Water Management entitled ‘Energy-saving building construction. Part 1. Reduction of energy consumption in the construction sector.’ The programme aims to improve air quality by reducing or avoiding CO₂ emissions as

a result of reduced energy consumption in buildings and increased energy production from renewable sources. The budget of the currently submitted applications is 400 million PLN. Support is provided through grants and loans, as well as only the grant itself or the loan itself (*Information*).

Conclusions

For the construction sector in Poland, the most important consequence of the existing legal regulations is that by December 31, 2020, all new buildings must be nearly zero-energy buildings and after December 31, 2018, new buildings occupied and owned by public authorities must be nearly zero-energy buildings. These legal requirements resulted in the adoption of a national plan aimed at increasing the number of buildings with low energy consumption by the Council of Ministers (*Resolution*) in Poland, which includes, among others financial instruments supporting the development of energy-efficient building construction.

Chapter 2 of the paper presents an overview of the most important financing programmes in the construction sector on the Polish market. The leading programmes were then characterised and critically evaluated. The analysis shows that the Priority Programme of the National Fund for Environmental Protection and Water Management entitled ‘Improving energy efficiency. Part 2: subsidised loans for building energy-efficient houses’, which was supposed to cover the period 2013-2022, was closed only after about 3 years due to the lack of any preferences in the subsidy system for building energy-efficient houses. This programme was intended to be an incentive to create a Polish low-energy houses market (*Consultations*).

In Poland, investors have been able to benefit from financial support for several years under the Priority Programme of the National Fund for Environmental Protection and Water Management ‘Support for distributed, renewable energy sources. Part 2) PROSUMER: co-financing the purchase and installation of micro-installations of renewable energy sources’. However, it is a financial instrument that indirectly promotes the development of energy-saving building construction. The programme, as well as most financial instruments included in the review in chapter 2 of the article, is not a form of comprehensive financing for the construction of low-energy houses.

Currently, the financial instrument that comprehensively supports the construction of low-energy houses in Poland is the Priority Programme of the National Fund for Environmental Protection and Water Management ‘Energy-saving construction. Part 1. Reduction of energy consumption in the construction sector’. The evaluation of its impact on the development of buildings with low energy consumption in Poland will be possible after a longer period of its validity.

In conclusion, it can be stated that the frequent change of offers in support programmes for building energy-saving houses and the lack of various forms of comprehensive financing do not ensure the stability of the energy-saving building construction market in Poland.

Bibliography

- Burzyńska, D. & Fila, J. (2007) *Financing Ecological Investments in the Enterprise*. Warszawa, Wydawnictwo Difin.
- Celadyn, W. (2010) *Energy-saving architecture in spatial planning*. Czasopismo Techniczne. Architektura, 18, 111-120.
- Czaplicka-Kolarz, K. & Pyka, I. (Ed.) (2010) *Zero Emission Technologies and Energy Efficiency. Conditions for Implementation in Poland*. Katowice, Główny Instytut Górnictwa.
- Feist, W., Muhzenberg, U., Thumulla, J. & Schulze Darup, B. (2009) *Basics of Passive Building Construction*. Gdańsk, Polski Instytut Budownictwa Pasywnego.
- History of passive buildings* (2012) <http://www.termoswiat.pl/domy-pasywne-i-energooszczedne> (08.07.2019).
- Information on the National Fund for Environmental Protection and Water Management (NFEP&WM)* <http://www.nfosigw.gov.pl> (29.10.2019).
- Kaniszevska, A. (2013) *Introduction to energy-efficient and passive building construction*. <http://chronmyklimat.pl/projektyenergooszczedne> (08.07.2019).
- Consultation of the subsidy programme for loans for energy-efficient houses*. Press materials of NFOŚiGW. 18 May 2012. Warszawa.
- Ramczyk, M. (2015) *Legal conditions of energy-saving building construction in Poland*. In: Wesołowska, M. (Ed.) *Energy-saving Building Construction in Poland – State and Prospects*. Bydgoszcz, Wydawnictwa Uczelniane UTP w Bydgoszczy, 45-56.
- Ramczyk, M. (2017) *The importance of the community legal basis development for low-energy building construction*. Zeszyty Naukowe Politechniki Częstochowskiej, 173, Construction, 23, 277-286.
- Regulation of the Minister of Infrastructure and Development on the methodology for determining the energy performance of a building or part of a building and energy performance certificates on 27 February 2015 (Journal of Laws of 2015, item 376).
- Resolution of the Council of Ministers of 22 June 2015 on adoption of ‘The National Plan aimed at increasing the number of buildings with low energy consumption.’
- Żurawski, J. (2009) *Energy-saving and passive building construction*. Building Materials, 1, 34-36.