CREATING AN ENERGY EFFICIENT MORTGAGE FOR EUROPE

BUILDING ASSESSMENT BRIEFING: POLAND
ABOUT THE POLISH GREEN BUILDING COUNCIL

Polish Green Building Council (PLGBC) is a not-for-profit organization dedicated to promoting sustainable design, construction and operations in the whole of Poland. PLGBC aims to positively influence the Polish construction industry by promoting and implementing the rule of triple responsibility: environmental, social and economic. We intend to transform the design, construction and operations of buildings in the entire country for the overall benefit of all residents as well as all participants of the construction process.

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This briefing was produced by the Polish Green Building Council with the support of WorldGBC’s Europe Regional Network. Its purpose is to assist actors interested in piloting an energy efficiency mortgage product to understand and navigate technical and regulatory aspects of energy efficiency and environmental performance of buildings in Poland. It has been produced as part of the EU Horizon 2020 funded ‘Energy Efficient Mortgages Action Plan’ initiative.

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FEbruary 2018
This report presents the current state of Polish building stock and problems connected to the thermal renovation of the housing sector. Examples of available financial support are presented. Also the barriers and opportunities in terms of implementation of the Energy Efficiency Mortgage (EEM) products to the Polish market are discussed.

In Poland, the residential housing sector is characterized by one of the worst indicators of energy consumption and CO₂ emissions (over 110 kg CO₂ per usable floor area) in the EU³. In 2009 the energy performance requirements for buildings were raised, due to the introduction of the first Directive on Energy Performance of Buildings (EPBD) from 2002. In 2014, the Ministry of Infrastructure in the ordinance on the technical conditions to be met by buildings and their location, planned gradually to further increase the requirements for buildings in 2017 and 2021 by setting:

a) the maximum values of indicators of non-renewable primary energy demand for heating, ventilation, air conditioning and domestic hot water for all building types and, in the case of non-residential buildings, additionally for lighting systems. The indicators are related to heated or air conditioned building area,

b) maximum values of heat transfer coefficients U-values.

New buildings must comply with both requirements, while modernized buildings need only comply with the second.

Requirements for the modernized buildings can be met by applying additional insulation to all partitions and replacing old windows with new ones. In order to achieve the required energy demand indicators set for new buildings, new technologies based on Renewable Energy Sources (RES) must be applied. Such technologies are still expensive thus home owners typically need to take out loans in order to finance these investments.

The financial situation of homeowners or administrators of multifamily buildings often force them to take out loans for thermo-modernization.

**EXISTING BUILDING STOCK IN POLAND**

There are approximately 5.5 million residential buildings in Poland (including about 5 million single-family houses), and the number of apartments is about 13 million⁴. Over 80% of them are buildings built before 2003, with low normative requirements related to the thermal insulation of the building envelope. These buildings are characterized by U value for partitions (calculated according to Standard EN ISO 6946) in the range from 0.70 to 1.42 W/m²K and for windows from 2.0 to 2.6 W/m²K. For these buildings the final energy indicator (related to the heated area) for heating and ventilation purposes is EF > 120 kWh/m² per year. It can be estimated that the non-renewable primary energy indicator is EP>145 kWh/m² per year. For newly built or modernized buildings the permissible U-values are: 0.23 for partitions and 1.0 W/m²K for windows. Non-renewable primary energy indicator for heating, ventilation and DHW (domestic hot water) purposes for new single-family buildings is EP= 95 and for multifamily buildings is EP=85 kWh/m² per year (according to the Regulation of the Ministry of Infrastructure). In addition, it should be noted that buildings with the value EF > 200 kWh/m² per year represent approximately 60% of the building stock. This means that 60% of buildings consume 3 times more energy than new ones.

The graph below shows the age structure of housing stock in Poland, together with estimates of the final energy consumption indicator⁵.
Expenses for heating are a substantial part of the energy bill of buildings. Heating installations in residential buildings are supplied mainly by district heating networks (41%) and heat sources fired by solid fuel, mostly coal (47%) and only a few percent (9%) are supplied by gas fired boilers. Domestic hot water installations are supplied in 30% by district heating networks, in 18% by coal-fired boilers, in 22% by electric devices, in 26% by gas fired devices\(^\text{16}\).

Often buildings and heating installations are not modernized. The energy standard of 72% of single-family buildings is low, they are poorly insulated or not insulated at all\(^\text{17}\). 70% of them are heated with individual boilers fired by cheap, low quality coal, which may be connected to the energy poverty of users. Thus the greatest potential for thermo-modernization lies in this building sector.

**Expenditure on energy**

In 2014-2016 the energy expenditure in Polish households accounted for about 11% of all their expenditure. In the previous years, there has been an increase from 9.7% in 2000 to almost 12% in 2013\(^\text{15}\). 20-30% of households are unable to maintain adequate thermal comfort conditions indoors. The level of energy poverty in Poland is higher than the European average. If the energy poverty is defined as the situation when more than 10% of income is spent for energy purposes, up to 40% of Polish people experience energy poverty or are threatened by it\(^\text{18}\).
In Poland, the Energy Performance Certificate system, as a transposition of Directive 2002/91/EC (EPBD) into national law (Construction Act and Regulation of the Minister of Infrastructure) started in January 2009. The inspection of boilers and cooling systems, as well as new energy performance requirements for buildings were implemented. The index of non-renewable primary energy needs related to the heated or cooled area became the main criterion in the building energy performance assessment. The revised energy performance requirements for buildings and improved methodology for EPC according to Directive 2010/31/EU were introduced in 2014 (in the revised Regulation of the Minister of Infrastructure and Development). The New Act on the Energy Performance of Buildings has been in force from 9 March 2015. It contains almost all issues concerning certificates, arising from the Energy Performance of Buildings Directive. The rules for maintaining the obligatory central register and verification of energy performance certificates have also been introduced. Registration concerns all certified buildings, but verification is done only for some, randomly selected ones.

The Central Register of Energy Performance of Buildings is run by the Ministry of Infrastructure and is available online at https://rejestrcheb.mib.gov.pl/. It contains the list of energy performance certificates and persons authorized to issue EPCs. The certificate may be carried out by authorized persons who have the relevant professional insurance. Modernized, sold and rented buildings must have an energy performance certificate valid for 10 years. In new buildings, the certificate must be prepared within the design project.

According to the obligatory Regulation, the energy performance can be determined by using the computational method or in special cases (very limited) based on measurements. The computational method is mostly based on the European Standard EN ISO 13790, therefore it is possible to compare EPCs for Polish buildings with the ones in another countries if they are based on the same EU Standard. The CO₂ emission is calculated using emission indicators published every year by the National Center for Balancing and Emissions Management (KOBiZE).

So far there are no alternative government assessment tools for predicting energy consumption implemented. Some commercial tools, i.e. computer programs (e.g. BuildDesk Energy Audit) are available, however, the calculation algorithms are based on the same EPC method.

For existing buildings the method of thermal diagnostics and evaluation of the energy performance of buildings based on on-site measurements was developed within a national strategic R&D project in a programme entitled Integrated System for Reducing Energy Consumption in the Maintenance of Buildings (realized in the years 2010-2013). The programme was funded by the National Centre for Research and Development. The project outcome (guidelines and papers) are available, but due to lack of legal obligatory requirements and high costs of conducting such measurements (as much as 30-40 times higher than the cost of EPCs determined by using the computational method for typical buildings, and up to 100 times higher for complex thermal diagnostics of buildings with mechanical cooling), this method has not been widely implemented.

**POLISH MORTGAGE CREDIT SYSTEM**

The housing loan market in Poland has an upward trend. As shown in the figures below, over the years 2006-2016 the number of loans has doubled. The new Mortgage Credit Act on the supervision of mortgage brokers and agents is in force since July 2017. New rules for mortgage granting have been introduced. The Act provides rules for brokers’ and banks’ operation, as well as defines debtors’ rights and obligations.
Existing Sources of Energy Efficiency Finance

Some products similar to Energy Efficient Mortgages — known as ecological mortgage loans — started to be available in Poland in 2009. Only two banks (BOS and a second bank which withdrew after some time from the market) provided preferential loans with the subsidy from the Funds for Environmental Protection and Water Management (Environmental Funds) for construction of energy-efficient houses or modernization investments contributing to a positive ecological effect. Nowadays such a loan is no longer available.

Bank Ochrony Środowiska (BOS) was established in 1991 to support environmentally friendly investments. It provided preferential loans with subsidies from the National and Voivodship Environmental Protection and Water Management Funds for modernization investments that bring about ecological effects such as thermal modernization of buildings and their technical equipment, replacement of old heat sources with new ones with higher efficiency or utilizing renewable energy. It was necessary to demonstrate the ecological effect of thermo-modernization by reducing the emission of harmful substances. Since 2015 the only products offered by BOS bank are: investment loan and EKO-loan with preferential interest rates for pro-environmental projects. So-called “green investments” i.e. expenses for improvements such as: walls insulation, windows replacement, technical installations modernization, photovoltaic assembly introduction are granted. However, calculation of energy savings or environmental effects is not required. Expenditures are financed on the basis of presented invoices. The bank determines clients’ creditworthiness according to generally accepted principles.

New Build Houses

In 2013 NFOŚiGW (National Fund for Environmental Protection and Water Management) launched a subsidy program for loans for the construction of single-family energy efficient homes NF-40 and passive ones NF-15 (annual energy demand cannot exceed 40 and 15 kWh/m², respectively). Supplements of 50,000 PLN and 30,000 PLN respectively were granted after very high energy requirements for building insulation and internal technical systems were fulfilled and confirmed by trained verifiers. The program was initially planned for the period 2013-2022, but was finished already after 3 years of operation. Investors have used only 2% of the envisaged funds. The reason for the program failure was the high cost of required documentation, certification, testing and verification. In addition, bank fees of 4 banks cooperating in this program were unattractive to investors. Regular loans offered by banks turned out to be cheaper.

Renovated buildings

The Thermo-modernization Fund has been operating since 1999 and this is one of the basic ways of financing renovation investments in the building sector in Poland. The thermo-modernization bonus is a form of state help for an investor who carries out thermo-modernization using a regular bank loan (but not a preferential loan). The bonus is paid out by the Polish national development bank BGK (Bank Gospodarstwa Krajowego) as a part of the loan granted by banks co-operating with BGK. An energy audit is mandatory in order to get the loan and the bonus. The bonus is calculated in the energy audit and must not exceed the minimum of the following three values: 20% of the loan, 16% of the investor’s own funds and twice of the value of annual savings of energy costs obtained as the result of thermo-modernization. By the end of 2016, 95% (38,557) of modernized buildings were multi-family, and only 2% (750 buildings) were single-family houses. It should be noted that the number of projects funded by the Thermo-modernization Fund in the whole housing stock is relatively small. Due to high cost of credit, audit and modernization projects the financial benefits (in the form of thermo-modernization bonus) are rather small for single-family building owners, which makes a thermo-modernization bonus not attractive. Moreover, owners of single-family buildings often do not have adequate creditworthiness.

Currently, there are several ongoing programs for home owners, housing associations or cooperatives and local government units based on preferential loans offered by Regional Environmental Funds for Environmental Protection and Water Management (WFOŚiGW) as well as grants from the National Fund for Environmental Protection and Water Management (e.g. KAWKA, PROSUMENT), financing the development of technologies using renewable energy sources (biomass boilers, solar collectors, heat pumps) and low emission suppression. The KAWKA program is mainly for local government units and developers. Programs for owners of single-family houses co-financed by the WFOŚiGW (SMOG STOP, PIECYK) have also started. Their aim is eliminating low emission by exchanging existing coal fueled heat sources.

Another program, RYS, planned for the years 2015-2023 envisaged granting subsidies from NFOŚiGW and low-interest loans for the improvement of energy efficiency in existing single-family houses. Unfortunately, the banks were not interested in such a cooperation and the program was scrapped before it actually started. A potential reason for this might have been an unstable legal situation on the RES market (in the past years) related to the lack of regulations on renewable energy sources, which did not favor the financing of such investments. Another reason might have been the necessity for banks to gather more complex documentation eg. obtaining verification of the ecological impacts or additional expertise.

At the end of 2016, the PoIREEF program (Polish Energy Efficiency Financing Program in Residential Buildings) was launched to finance the modernization of existing residential buildings or the construction of single-family energy-saving houses. The program aims to provide support to flats and residential house owners for improving the thermal comfort and increasing of the energy efficiency of buildings. Support is provided in the form of a reduced arrangement fee from one bank (BZ WBK).

Many banks have decided not to participate in some of the programs, due to the conditions imposed by the fund manager, e.g. preferential loans with the requirement of long-term financing of 30 years. Such products are not attractive to banks, which prefer loan periods up to 20 years.

Polish experts in energy efficiency (supported by the European Climate Foundation) prepared “Building modernization strategy: road map 2050”\(^{14}\). An analysis of the potential of thermo-modernization of the building stock in Poland was conducted and the proposal for the Polish government of “deep thermal modernization” process was presented. The cost-optimal procedure is used to determine the optimal set of modernization measures.
A standard renovation is expected to achieve 20-30% energy savings, while deep renovation allows for as much as 70-90% reduction of the energy consumption. The examples of deep renovations of buildings are presented in the document. There is a great need for such levels of thermal modernization in existing multifamily building stock, but additional state funding is necessary. Such a modernization requires very high investments costs. Existing forms of support (e.g. Thermo-modernization Fund and renovation fund) are insufficient. Several ESCO companies offer services in the range of modernization for Polish building sector, however their clients are mainly local governments and public sector.

There are many barriers for thermo-modernization, the most important ones are summarized below:

a) financial: lack of coherent funding system tailored to the different needs of particular construction sectors, lack of investors’ own funds, lack of long-term credit for renovations, too long payback time,

b) political and legal: lack of coherent government strategy (lack of coordination of actions), some delays in the implementation of EU directives, the problem of thermo-modernization of single-family houses has been ignored,

c) high transaction costs for preparation of audits, project as well as credit documentation which, in the case of single-family houses, discourage potential investors; moreover, often the creditworthiness of individual clients is low, leading to a higher investment risk,

d) low quality of delivery of energy efficiency measured by some companies offering cheap services; accustomed to old standards; low level of investor knowledge about new technologies (and in Poland there are no problems with access to new technologies);

e) lack of investor awareness about the benefits of thermo-modernization (environmental, investment, health).

All of the actions and Polish experiences described above may offer helpful learning points to take into consideration in introducing a green mortgage system in Poland.

BOŚ bank as the main mediator in granting ecological funds

The main shareholder in BOŚ bank is The National Fund for Environmental Protection and Water Management. The bank also co-operates with foreign institutions in the field of co-financing of pro-ecological investments. One example is the Jessica (Joint European Support for Sustainable Investment in Urban Areas) program, which aims at revitalizing districts, taking into account environmental activities. According to the bank’s development strategy for the years 2016-2020 BOŚ will support pro-ecological projects of corporate and individual clients. In the table below the activity of BOŚ is presented.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>EMISSION REDUCTION DUE TO ALL PRE-ECOLOGICAL IMPLEMENTED PROJECTS</th>
<th>PRODUCTION OF ENERGY FROM RENEWABLE SOURCES / ENERGY SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DUST</td>
<td>SO₂</td>
</tr>
<tr>
<td>2000</td>
<td>4 486</td>
<td>4 240</td>
</tr>
<tr>
<td>2001</td>
<td>1 394</td>
<td>419</td>
</tr>
<tr>
<td>2002</td>
<td>3 263</td>
<td>24 189</td>
</tr>
<tr>
<td>2003</td>
<td>421</td>
<td>4 931</td>
</tr>
<tr>
<td>2004</td>
<td>485</td>
<td>14 457</td>
</tr>
<tr>
<td>2005</td>
<td>2 996</td>
<td>345</td>
</tr>
<tr>
<td>2006</td>
<td>327</td>
<td>3 847</td>
</tr>
<tr>
<td>2007</td>
<td>7 113</td>
<td>2 724</td>
</tr>
<tr>
<td>2008</td>
<td>1 139</td>
<td>21 928</td>
</tr>
<tr>
<td>2009</td>
<td>1 021</td>
<td>9 132</td>
</tr>
<tr>
<td>2010</td>
<td>193</td>
<td>200</td>
</tr>
<tr>
<td>2011</td>
<td>221</td>
<td>366</td>
</tr>
<tr>
<td>2012</td>
<td>459</td>
<td>5 082</td>
</tr>
<tr>
<td>2013</td>
<td>155</td>
<td>1 817</td>
</tr>
<tr>
<td>2014</td>
<td>151</td>
<td>667</td>
</tr>
<tr>
<td>2015</td>
<td>268</td>
<td>2 882</td>
</tr>
<tr>
<td>TOTAL</td>
<td>139 447</td>
<td>486 565</td>
</tr>
</tbody>
</table>
Legal requirements concerning measurements of the energy used in buildings and the settlement of individual heating costs according to the actual consumption are set in the Energy Law Act and in the Regulation of Ministry of Infrastructure and Development. The obligation of “installing heat meters or hot water meters in flats in multifamily buildings by 31 December 2016 if it is technically feasible and cost-efficient” was included in the Polish Act on energy efficiency in force since October 2016. This is the introduction of the requirements of the EU Directive on energy efficiency (2012/27/EU).

Smart metering systems are being gradually implemented: heat and water meters, electronic heat cost allocators are components of remote reading systems. Smart electricity meters are expected to make up 25% of all electricity meters by end of 2017. Computer data acquisition and monitoring systems are gradually becoming more common in multi-family buildings and there are many companies offering such services. It is, however, difficult to get hold of the collected data as a third party because almost half of multifamily buildings stock is supplied from district heating systems and most flats are equipped with heat cost allocators (there are no heat meters in flats). The data of the energy used in the buildings are gathered by energy suppliers and companies which carry out settlements of heating costs for individual apartments so that every end user knows his/her own heating costs. But the data on the energy consumption for heating and DHW purposes in most multifamily buildings are available (from the building manager) and they could be used in the green mortgage system.

Regularly updated energy monitoring databases, mainly of municipal buildings, are maintained only by a few municipalities, usually those that have set up an energy management unit. Monitoring usually takes the form of a database executed in Excel or other program. Data on the consumption of electricity, heat from district heating network, natural gas and other fuels (based on invoices or readings of energy meters) are introduced monthly by appropriately trained building managers. Sometimes the database includes also water consumption. Some municipalities introduced more modern solutions, often of a pilot nature, such as web-based energy consumption monitoring systems enabling on-line data input, remote media monitoring systems or energy management systems based on recognized standards such as ISO 50001. A lack of experts on energy among building managers or administrators means there is little analysis conducted of the data available for the building stock. In most cases there are no funds for outsourced expertise. However, the vast majority of Polish communes do not conduct such regular energy monitoring.

Monitoring of the energy used for heating and domestic hot water purposes should be available after the renovation, because of the legal requirements (Energy Law Act and Regulation of Minister of Infrastructure). Data from thermography tests might be available but these tests are not obligatory, although there are many companies offering such a service. The air-tightness tests would be very useful, but such an action is not possible because of the high costs and measurement difficulties that arise in multifamily buildings.

SUSTAINABILITY RATING SCHEMES

In recent years in Poland, attention has been paid not only to energy aspects but also to issues related to comfort indoors and to respect for the environment. Since 2016 there has been a dynamic growth of the sustainable building sector, the number of certified buildings increased by 25%. There are currently four international multi-criteria certification schemes present in the country: BREEAM, LEED, HQE and DGNB. Over 550 certificates have been issued, mainly BREEAM (over 440) and LEED (over 100). In Poland, as in other countries in the world, the majority certificates were issued for office buildings. Certified residential buildings account for only 2%. Newly-built buildings also represent a majority (63%) compared to modernized buildings (37%). The total certified usable floor space is over 10 million m². Polish Green Building Council, PLGBC, has created a Polish database of all certified sustainable buildings.
Having in mind that the cost of such certificates is significant and other sustainability issues and non-energy criteria, play an important role in the evaluation, at this stage the added value of the introduction of these aspects into Polish green mortgage system seems not justified. Moreover, a simple methodology for calculating energy savings and energy costs like the one used for energy audits or the optimum cost method could be successfully applied in the green mortgage system. Determination of economic efficiency can be based on Net Present Value (currently in projects funded by Environmental Funds such an indicator is already required). It should however be noted that the prices of energy obtained from different energy sources are very different. Moreover the energy prices (e.g. from district heating) vary in the different parts of the country. This fact influences economic analyses for buildings situated in different parts of Poland and thus should be carefully considered.

Environmental impact indicators can be calculated in accordance with the methodology given for calculating EPCs.
CONCLUSIONS

Existing residential buildings have significant potential for reduction of their energy consumption. Over 70% (about 3.5 million) of single-family houses in Poland require thermo-modernization. However, the available support is insufficient, especially for single family owners. Additional funding is required. Individual investors do not have sufficient funds for thermo-modernization and, due to high transaction costs and low creditworthiness, rarely use loans, even preferential ones. Moreover, many of the potential investors do not have ecological awareness, therefore an information campaign would be needed.

New build houses, according to the legal requirements, should fulfill low-energy buildings’ standard and need to be equipped with systems based on RES. Therefore their construction generates high costs and loans are often required.

Previous experience with ecological loans and thermo-modernization actions indicated existing problems and barriers which should be taken into account.

Commercial banks with high credit costs were not interested in cooperation in ecological programs as evidenced by the RYS support programme. In 2015 the Renewable Energy Act was introduced, to rationalise the situation of RES market. Therefore, it is hoped that commercial banks will be more willing to participate in the financing of environmental investments, which are currently mostly related to the use of RES. Also BOŚ Bank, due to its mission and experience, may be interested in cooperation in the area of green mortgages.

Incorporation of the Green mortgage system in Poland is thus justified. The needs of the Polish market are large and implemented energy regulations and requirements are favorable. The green mortgage system could use the existing EPC system as the starting point. Energy Performance Certificates could be used for assessment of the energy demand for the green mortgage purposes for both new built and modernized buildings. Additionally in existing buildings the available data on measured energy could be used.
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