Green Bond

Methodology Report

mBank Hipoteczny S.A.

Client

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1 Summary

The developed certification methodology enables mBank-BH to evaluate their residential building asset portfolio to initiate a green bond based on the eligible green project category "green buildings". The residential building criteria are complying with Climate Bonds Initiative's standard and certification methodology.

The methodology approach of relative stringency of energy labels and rating tools identifies Poland's top 15% best residential buildings to be eligible for a green Bond, if its technical condition is TC 2014 or newer (e. g. TC 2017, TC 2021) and once its building energy performance complies with the low carbon trajectories for multi-family and single-family houses. The low carbon trajectories are based on the year of the green bond's issuance and term duration and are defined by the zero-emission goal in 2050 and the technical condition TC 2014 starting the green bond issuance in the year 2020.

Furthermore, mBank-BH's eligibility criteria are aligned with the EU taxonomy of Sustainable Financial Activities for climate mitigation. It requires assets built before December 31st, 2020, to comply with the primary energy demand of the nearly-zero-energy-building standard based on the Energy Performance Buildings Directive, which is implemented in the Technical Condition 2021: (Single-Family House: ≤ 70 kWh/m²yr | Multi-Family House: 65 kWh/m²yr). The green bonds assets' primary energy savings and avoided greenhouse gases' carbon emissions are benchmarked against Poland's national mean primary energy demand of 210.6 kWh/m²year and the corresponding carbon emissions intensity of 0.385 kgCO_2/kWh.

For a continuous impact reporting, the asset's energetic and carbon performance can be tracked with a developed tool, applying mBank-BH's green bond methodology. It verifies the asset's eligibility and determines the primary energy savings and avoided carbon emissions. mBank-BH's asset portfolio has been evaluated covering a bond issuance in 2020 with a duration of seven years until 2026:

Low Carbon Buildings	Year of Issuance	Type	Signed Amount[a]	Share of Total Portfolio Financing[b]	Eligibility for green bonds[c]	Average portfolio lifetime[d]	Annual primary energy savings[e]	Annual CO_2 emissions avoidance[f]
Unit	*[yyyy]*	*[-]*	*[PLN]*	*[%]*	*[%]*	*[years]*	*[MWh/year]*	*[tCO_2/year]*
MBank Green Bond	2020	Low Carbon Building	1.314.896.705	100,0	100	23,3	46.739	17.975
- Single-Family Home	2020	Low Carbon Building	526.870.176	40,1	100	23,9	25.487	9.802
- Multi-Family Home	2020	Low Carbon Building	788.026.529	59,9	100	23,1	21.252	8.173
- Single-Family Home	2020	Property Upgrade	7.305.150	0,6	0	19,4	459	176
- Multi-Family Home	2020	Property Upgrade	43.217.907	3,3	0	22,0	2.029	780

[a] Legally committed signed amount by the issuer for the porfolio or portfolio components eligible for green bond financing.
[b] Portion of the total portfolio cost that is financed by the issuer.
[c] Portion of the total portfolio cost that is eligible for Green Bond.
[d] average remaining term of Green Bond loan within the total portfolio.
[e] Primary energy savings calculated using the difference between the top 15% and the national building stock benchmarks
[f] Greenhouse gas emissions avoidance determined by multiplying the primary energy savings with the carbon emissions intensity

Future possible assets can be added and will be evaluated automatically.

2 Intent

mBank Hipoteczny S.A. (mBank-BH) wants to initiate a Green Bond for its residential building portfolio in Poland.

Drees & Sommer Advanced Building Technologies GmbH (Drees &Sommer ABT) provide consulting services to develop a methodology in compliance with the Climate Bond Initiative's (CBI) "Residential Property Climate Bonds – Low Carbon Buildings", the "EU Taxonomy for sustainable activities" and the corresponding "EU Green Bond Standard.

mBank-BHs' selected residential building portfolio is assessed and evaluated by Drees & Sommer ABT GmbH to set up a technical reporting system. Implementing an impact reporting based on the developed methodology for the green bond finalizes the consulting services.

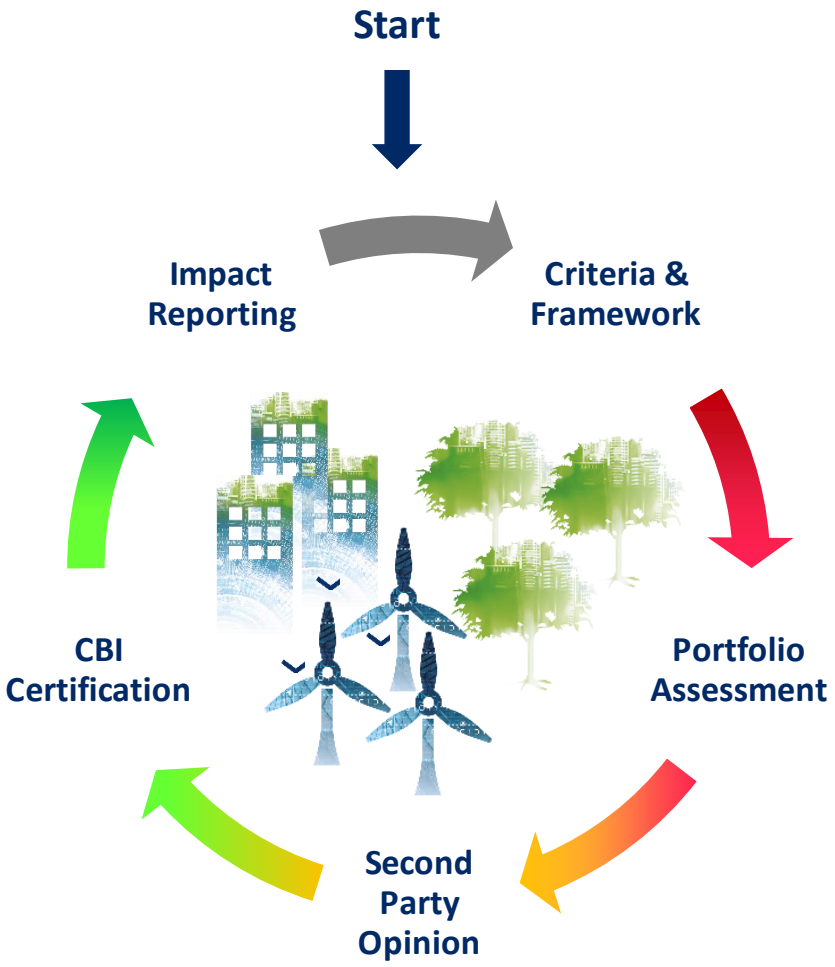


Figure 2-1: Project Milestones – proposal Drees & Sommer

3 EU Sustainable Finance

The European Commission Action Plan intends to finance sustainable growth and addresses the following key challenges:

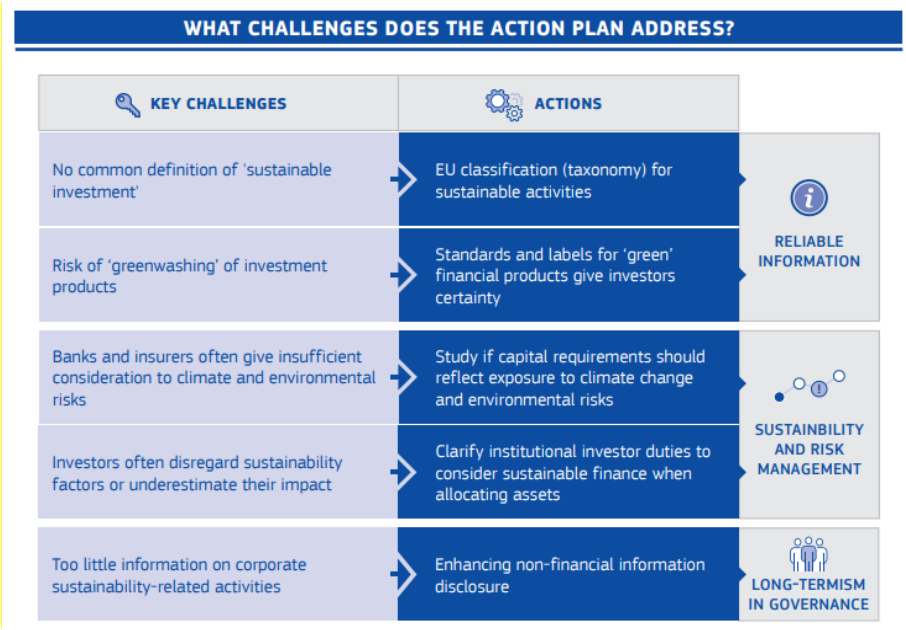


Figure 3-1: Challenges - EU Commission Action Plan - Factsheet[1]

It proposes a strategy to "further connect finance with sustainability[2]" and covers the following actions[2], quote:

- "establishing a clear and detailed EU classification system – or taxonomy – for sustainable activities.[..]
- establishing EU labels for green financial products. This will help investors to easily identify products that comply with green or low-carbon criteria
- introducing measures to clarify asset managers' and institutional investors' duties regarding sustainability
- strengthening the transparency of companies on their environmental, social and governance (ESG) policies.[..]"

The EU Commission therefore set out a mandate for the "Technical Expert Group on Sustainable Finance (TEG)" to support and develop inter alia:
- EU Taxonomy,
- EU Green Bond Standard.

[1] EU Commission Action Plan. Financing Sustainable Growth. Factsheet. January 2020
[2] Commission action plan on sustainable finance. https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_de. January 2020.

3.1 EU Taxonomy

The so called "EU Taxonomy[3]" represents a proposed EU classification system for sustainable activities. The goal is here to reduce the carbon emissions by 50%-55% until 2030 to achieve carbon neutrality "net-zero" by 2050 for climate change mitigation. Furthermore, it is the intention to build capacity and increase resilience towards climate change adaptation. Therefore, the regulated economic activities are required to make a substantial contribution to one of the six environmental objects:

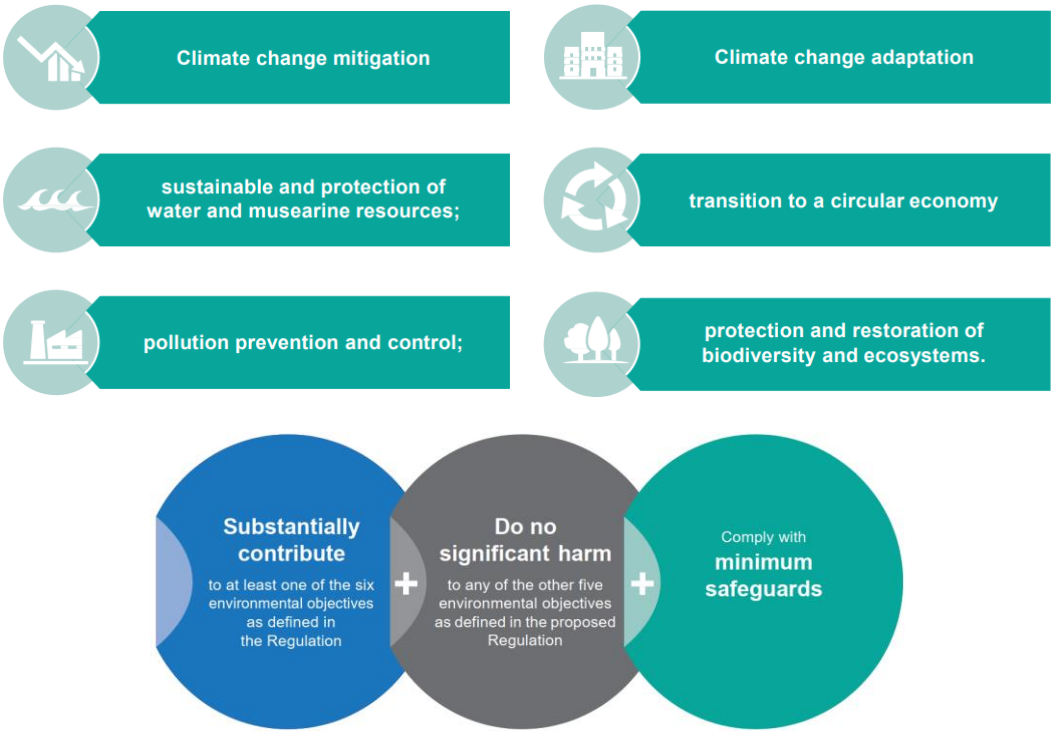


Figure 3-2: Basic principle - EU Taxonomy[4]

In addition, the EU Taxonomy sets compliance paths for the activities:

- "to be assessed to ensure they 'do not cause significant harm' to all remaining environmental objectives (DNHS)."
- "to meet 'minimum safeguards' (e.g., 'OECD Guidelines on Multinational Enterprises' and the 'UN Guiding Principles on Business and Human Rights')".

[3] EU Taxonomy for sustainable activities. Technical Expert Group on Sustainable Finance. https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf . March 13th, 2020.

[4] EU Taxonomy: Final report of the Technical Expert Group on Sustainable Finance. March 2020. Technical Report.

The key documentation by the TEG-experts for the EU Taxonomy can be described as the following:

- Technical Report[4]: Summary of the compliances and requirements
- Technical Annex[5]: Technical screening criteria and methodology catalogue for mitigation, adaption and do no significant harm
- Using the Taxonomy[6]: Supporting document with spreadsheets & tables

Figure 3-3: Supporting documents for EU Taxonomy

The final report was released in March 2020. It covers economic activities for the following sectors:

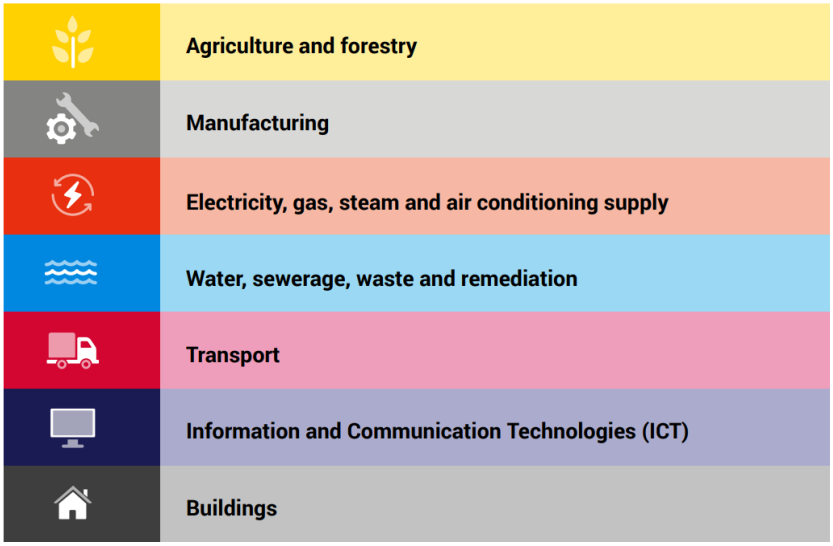


Figure 3-4: EU Taxonomy sectors[6]

[5] EU Taxonomy Report. Technical Annex. Updated Methodology & Updated Technical Screening Criteria. March 2020.

[6] EU Taxonomy. Using The Taxonomy. Supplementary Report 2019 by the Technical Expert Group on Sustainable Finance. June 2019.

For mBank-BH's low carbon buildings, the corresponding criteria and sector are the real estate activities:

	Buildings
Sector classification and activity	
Macro-Sector	F – Construction
NACE Level	2
Code	F41, F43
Description	**Construction of new buildings**. This relates to activities under NACE codes F41.1 - Development of building projects and F41.2 - Construction of residential and non-residential buildings.
Mitigation criteria	
Principle	The construction of new buildings designed to minimise energy use and carbon emissions throughout the lifecycle can make a substantial contribution to climate change mitigation by saving large part of the energy and carbon emissions that would be associated with conventionally designed buildings. **Condition for non-eligibility:** to avoid lock-in and undermining the climate mitigation objective, the construction of new buildings designed for the purpose of extraction, storage, transportation or manufacture of fossil fuels is not eligible. **Use of alternative schemes as proxies:** outside EU Member States, established schemes such as 'green building' certifications or building regulations and standards may be used as alternative proof of eligibility, provided that this is verified by the Sustainable Finance Platform. The organisation responsible for the scheme will be able to apply for official recognition of its scheme by presenting evidence that a specific level of certification/regulation can be considered equivalent (or superior) to the taxonomy mitigation and DNSH threshold for the relevant climatic zone and building type. The Sustainable Finance Platform will assess the evidence and approve or reject the application.
Metric and threshold	The metric is Primary Energy Demand (PED), defining the energy performance of a building: the annual primary energy demand associated with regulated energy use during the operational phase of the building life-cycle (i.e. 'module B6' as defined in EN15978), calculated ex-ante according to the national methodologies for asset design assessment, or as defined in the set of standards ISO 52000, expressed as kWh/m² per year. The threshold is based on 'nearly zero-energy building' (NZEB) requirements, which are defined in national regulation implementing the EPBD and are mandatory for all new buildings across EU Member States from 2021. To be eligible, the net primary energy demand of the new construction must be at least 20% lower than the primary energy demand resulting from the relevant NZEB requirements.[418] This reduction can be met through a direct decrease of the

Figure 3-5: Excerpt mitigation criteria for new construction - EU Taxonomy[5]

The climate mitigation criteria states, that Buildings built after December 31th, 2020 must comply with a 20% reduction in primary energy demand of the local nearly-zero-energy-building-standard (NZEB). For Poland, this is the Technical Condition of 2021, as

based on the Energy Performance of Building Directive (2010/31/EU)[7] and the amending Energy Performance of Buildings Directive (2018/844/EU)[8].

In Addition, the Nearly-Zero-Energy-Building standard is based on the cost optimal report for Poland[9]

For buildings built before December 31th, 2020, the taxonomy refers to the compliance with best-in-class Top15% approach, which is eligible until December 31th, 2025 based on the TEG-recommendations.

In line with the TEG-recommendations, as Drees & Sommer, we do propose the Top15% approach to be energy and carbon benchmarks expressed in kWh/m²a and or $kgCO_2/m^2a$.

It is our understanding, that the Top15% as eligibility criteria for a potential Green Bond as of today (April 2020) can be proofed to be either:

- Energy or carbon performance based on energy demand or consumption,
- Energy performance certificate with certain EPC label/rating,
- Building energy code,
- Year of construction,
- Green Building certificates as proxies (e.g. DGNB, LEED, BREEAM etc.).

Subject is to change, based on asset's usage and local country-specific benchmarks and regulations.

For the development of eligibility criteria for mBank-BH's green bond, we do offer the client the EU Taxonomy-alignment, and the compliance with the Climate Bonds Initiative standard, to be future proof and contribute to sustainability.

[7] Energy Performance of Building Directive 2010/31/EU. http://eur-lex.europa.eu/legal-content/EN/ALL/;ELX_SESSIONID=FZMjThLLzfxmmMCQGp2Y1s2d3TjwtD8QS3pqdkhXZbwqGwlgY9K!2064651424?uri=CELEX:32010L0031

[8] Energy Performance of Building Directive (2018/844/EU). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.156.01.0075.01.ENG

[9] EU Countries 2018 Cost Optimal Reports.https://ec.europa.eu/energy/topics/energy-efficiency/energy-performance-of-buildings/energy-performance-buildings-directive/eu-countries-2018-cost-optimal-reports_en?redir=1

3.2 EU Green Bond Standard

In June 2019, the TEC exprert group released a proposal for a EU green bond standard to "[..] increase transparency and comparability of the green bond market as well as to provide clarity to issuers on the steps to follow for an issuance, in order to scale up sustainable finance[10]".

The next steps of the TEG are currently to set up a market-based registration scheme for external verifiers as well as on further user guidance for the EU Green Bond Standard.

For mBank-BH's green bond, the harmonized framework as a summary of the environmental impact will use the proposed layout and scheme of the EU Green Bond Standard.

[10] TEG Report Proposal for an EU GREEN BOND STANDARD.. https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/190618-sustainable-finance-teg-report-green-bond-standard_en.pdf June2019.

4 Climate Bonds Initiative

The Climate Bonds Initiative – CBI is an international organization which engages investors and projects to develop a market "Green and Climate Bonds"[11] for climate change solutions.

4.1 Standard & Certification Scheme

CBI provides standards & certification schemes for different sectors:

Figure 4-1: Sector criteria development – CBI[12]

For mBank-BH's asset portfolio, the applicable sector for its green bond is the "low carbon buildings" representing residential buildings.

To show compliance and eligibility for a green bond, the Climate Bonds Initiative provides several pathways (illustrated in Figure 4-2) for low carbon buildings based on the availability of information and sufficient data quality.

[11] Climate Bonds Initiative. https://www.climatebonds.net/about
[12] Climate Bonds Initiative – CBI. Sector Criteria https://www.climatebonds.net/standard/sector-criteria - March 2019

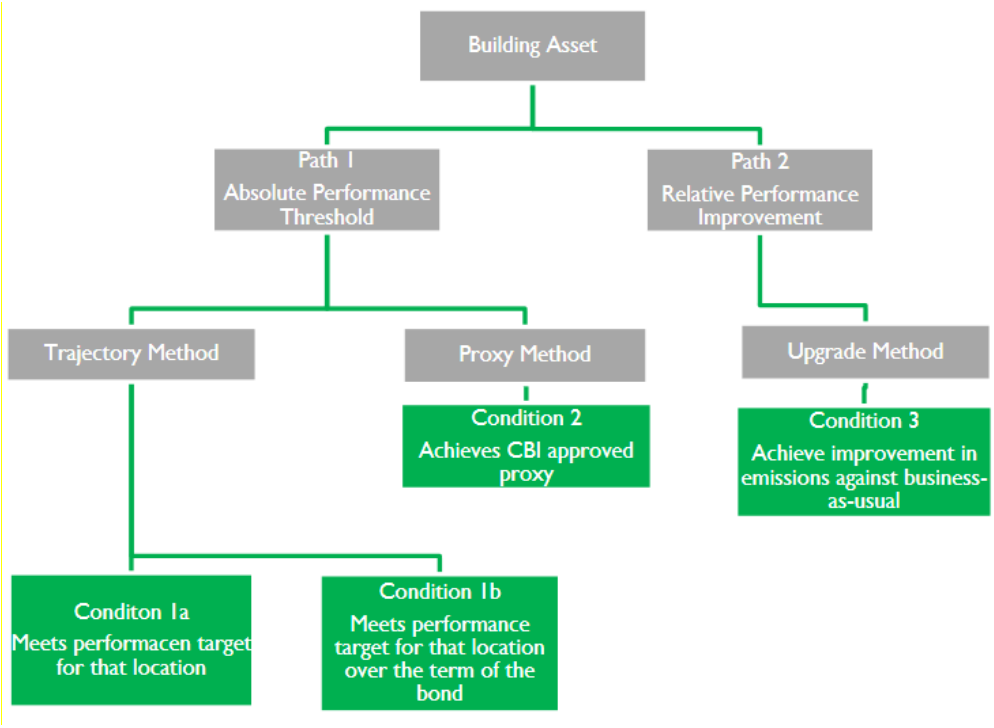


Figure 4-2: Certification pathways for bond issuers[12]

Furthermore, CBI offers detailed guidance on the possible certification methodology for either residential-, commercial buildings, or upgrade projects.

4.2 Residential Property

Climate Bonds Initiative's certification methodology for residential property climate bonds provides two methods in version 1.0 from the low carbon buildings technical working group to fulfill compliance:

- Method 1: Benchmarking against local market carbon performance
- Method 2: Relative stringency of energy labels and rating tools

The level of data information and quality determines, which method is more suitable to be used to show compliance for the green bond.

4.3 Property Upgrade

Climate Bonds Initiative's certification methodology for property upgrade includes assets which undergo or have undergone one of the following:

- major renovation,
- refurbishment,
- retrofit,
- thermo-modernization,
- or energy efficiency upgrade.

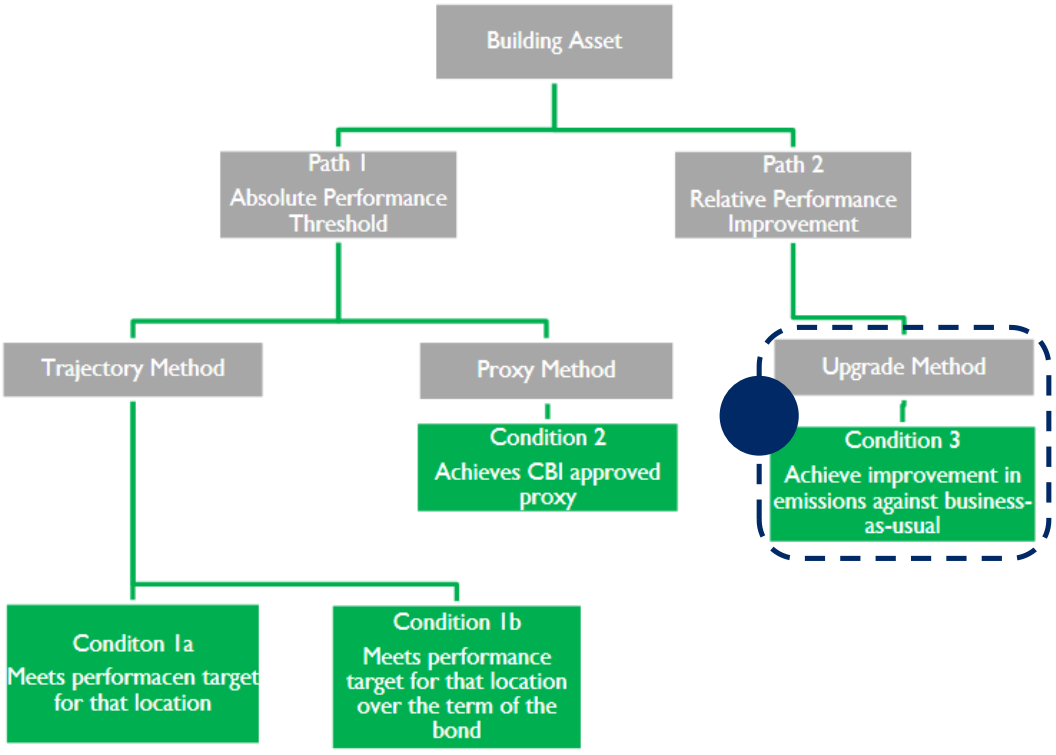


Figure 4-3: Climate Bonds Initiative's pathway to asset evaluation and certification[13]

Following the upgrade method, assets do require improvements, which result in reductions of at least 30% or more in carbon emissions based on the green bond date of issuance and duration of the term.

[13] Climate Bonds Initiative. Low Carbon Building Criteria. The Buildings Criteria for the Climate Bonds Standard & Certification Scheme. September 2018. https://www.climatebonds.net/files/files/low%20carbon%20building%20criteria.pdf

5 Literature Review

5.1 Polish Residential Building Stock

The main information sources for this literature review are governmental institutions such as the "Central Statistical Office", or "Statistics Poland", as well as commercial institutions e. g. "Buildings Performance Institute Europe" including European-wide programs and metrics as the "National Energy Efficiency Action Plan for Plan by the Ministry of Energy", "TABULA" and the EU building stock observations. Due to the fact, that most of the previously assessed polish residential building stock inventory includes data until the year 2013, additional information about the number of built new residential construction buildings in Poland were accessed and implemented into the building assessment. It can be stated, that by the end of 2011 there are approximately around 6[14,15,16,17,20] million residential buildings and approximately 13,7 million dwellings[18] .

Figure 5-1 shows a breakdown of residential polish buildings clustered into several groups of year of construction periods over time and the correlating amount of buildings.

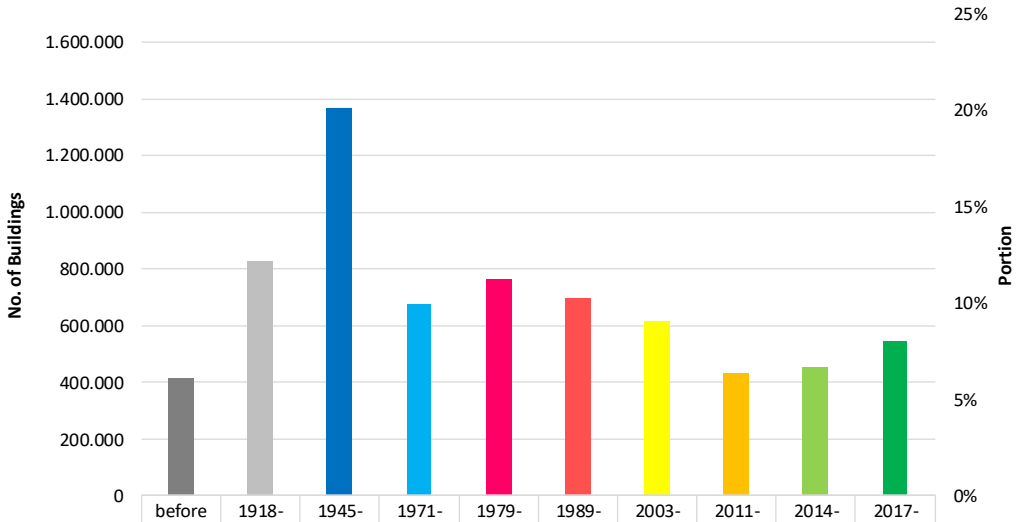
[14] Mankowski, S.; Szczechowiak, E. Strategic Research Project Entitled "Integrated System for Reducing Operating Energy Consumption in Buildings" Research Task No. 2 Volume I. Part A: Conditions of Transformations in Construction; Warszawa, Poland 2012.

[15] Central Statistical Office. Inhabited Buildings, the National Census of Population and Housing 2011; Central Statistical Office: Warsaw, Poland, 2013.

[16] Statistics Poland. Residential construction in the period of January-November 2018, 18.12.2018

[17] Statistics Poland. Efekty działalności budowlanej w 2017 r – Construction results in 2017, ISSN 25450921

[18] Buildings Performance Institute Europe (BPIE). "Implementing nearly zero-energy buildings (nZEB) in Poland – Towards a definition and roadmap". October 2012

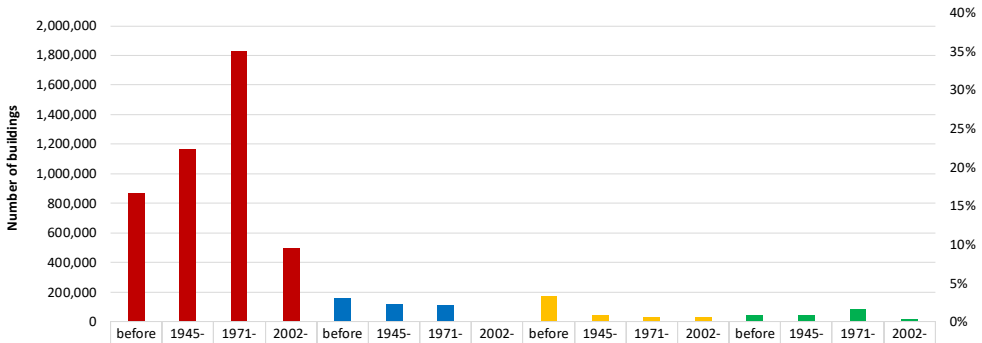


	before 1918	1918-1944	1945-1970	1971-1978	1979-1988	1989-2002	2003-2010	2011-2013	2014-2016	2017-2019
No. of Buildings	413.300	828.200	1.367.50	676.500	763.500	698.400	616.020	428.994	454.202	547.698
Share	6%	12%	20%	10%	11%	10%	9%	6%	7%	8%

Figure 5-1: Residential building stock in Poland[14,15], with updated data until November 2019[16,17]

Based on the TABULA[19] program, building occupancy types can be categorized and clustered into several periods of construction (see Figure 5-2):

- Single Family House (SFH) with 1 apartment,
- Terraced Building House (TH) with at least two to four apartments,
- Multi Family Houses (MFH1) with more than four apartments, up to eight floors, Multi Family Houses or Apartment Blocks (MFH2) with more than eight floors.



	SFH				TH				MFH1				MFH2			
	before 1944	1945-1970	1971-2002	2002-2010	before 1944	1945-1970	1971-2002	2002-2010	before 1944	1945-1970	1971-2002	2002-2010	before 1944	1945-1970	1971-2002	2002-2010
No. of Buildings	865,91	1,168,	1,831,	496,26	156,20	114,04	108,89	4,487	176,85	42,166	32,310	33,370	42,444	42,994	85,965	13,931
Share	17%	22%	35%	10%	3%	2%	2%	0%	3%	1%	1%	1%	1%	1%	2%	0%

Figure 5-2: Building type categorization based on TABULA 2012

[19] Polish building typology – Scientific report. Typology Approach for Building Stock Energy Assessment – TABULA 2011/TEM/R/091763. Intelligent Energy Europe Programme of the European Union – IEE. Narodowa Agencja Poszanowania Energii SA – NAPE. Warsaw 2012

5.2 Residential Energy Performance Building Codes in Poland

Over the years, several buildings codes in Poland exist targeting the energy performance of residential and non-residential buildings. The following table gives an overview about the applicable energy efficiency codes and standards:

Table 5-1: Polish building codes and standards targeting building energy performance[20,21]

Name	Abbreviation	Year
PN-57/B-02405	PN-57	1957-1964
PN-64/B-03404	PN-64	1964-1974
PN-74/B-034042	PN-74	1974-1982
PN-82/B-02020	PN-82	1982-1991
PN-91/B-02020	PN-91	1991-2002
Dz. U. 2002 nr.75 poz.690	TC 2002	2002-2008
Dz. U. 2008 nr.201 poz.1238	TC 2009	2009-2013
Dz. U. 2013 poz. 926	TC 2014	2014-2016
Dz. U. 2013 poz. 926	TC 2017	2017-2020
Dz. U. 2013 poz. 926	TC 2021	from 2021

Poland's building energy performance requirements contain limits and requirements for (not limited to):

- Non-renewable primary energy demand for heating, ventilation, cooling and domestic hot water in kWh/(m²year)
- Building constructions' heat transfer coefficient (walls, roofs, ceilings, windows)
- Minimum thermal insulation thickness for distribution pipes and components
- Additional requirements

Hereby the non-renewable primary energy demand includes:

"[..]annual primary energy use for the heating system, hot water supply, cooling, installed lighting systems (except residential buildings), with the addition of application of auxiliary energy for systems, taking into account the coefficients of non-renewable primary energy for the processing and delivery of an energy carrier or energy for technical systems– calculated on the basis of components of final energy requirement"- based on the definition from the polish energy performance certificate[..][27].

For residential buildings, installed lighting systems are excluded from the scope.

[20] Ministry of Energy „National Energy Efficiency Action Plan for Poland 2017". Warsaw December 2017https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/national-energy-efficiency-action-plans

[21] ISAP – Internetowy System Aktów Prawnych, http://prawo.sejm.gov.pl

Table 5-2: Building component efficiency requirements[22]

Polish building code	*Heat transfer coefficient U in W/m²K*				
	External wall	*Roof*	*Ceiling above unheated basement*	*Ceiling under unheated attic*	*External windows and doors*
PN-57/B-02405	1.16-1.42	0.87	1.16	1.04-1.16	N/A
PN-64/B-03404	1.16	0.87	1.16	1.04-1.16	N/A
PN-74/B-034042	1.16	0.7	1.16	0.93	N/A
PN-82/B-02020	0.75	0.45	1.16	0.4	2.0-2.6
PN-91/B-02020	0.55-0.70	0.3	0.6	0.3	2.0-2.6
Dz. U. 2002 nr.7 poz. 690	0.30-0.50	0.3	0.6	0.3	2.0-2.6
Dz. U. 2008 nr. 201 poz. 1238	0.3	0.25	0.45	0.25	1.7-1.8
Dz.U. 2013 poz. 926	0.25	0.2	0.25	0.2	1.3-1.5
	0.23	0.18	0.25	0.18	1.1-1.3
	0.2	0.15	0.25	0.15	0.9-1.1

Table 5-2 gives an overview about the building component efficiency requirements for each of the polish building codes.

Residential buildings built in construction time before 1991 are not very well insulated[23,24] in compliance with the former polish building codes until PN-91/B-02020[22]. According to TABULA and NAPE[25], the level of thermo-modernization and retrofitting is estimated that "[..] more than 70% of detached single-family houses in Poland (3.6 million) have no, or inadequate thermal insulation"[22]. Based on data from the Central Statistical Office in Poland, "[..] about 50% of residential buildings in Poland have been insulated in the major of cases to a sub-optimal level"[15,22].

The amount of buildings, which have undergone improvements until the year 2012 targeting their building energy performance through thermo-modernization, is illustrated in Figure 5-3.

[22] Buildings Performance Institute Europe (BPIE). "Financing Building Energy Performance Improvement in Poland – Status Report. January 2016

[23] European Commission. "EU Building Stock Observatory". https://ec.europa.eu/energy/eubuildings .

[24] Individual Building Renovation Roadmaps (iBRoad). "Factsheet: Poland – Current use of EPCs and potential links to iBRoad". January 2018

[25] TABULA Polish Building typology scientific report. Warsaw 2012

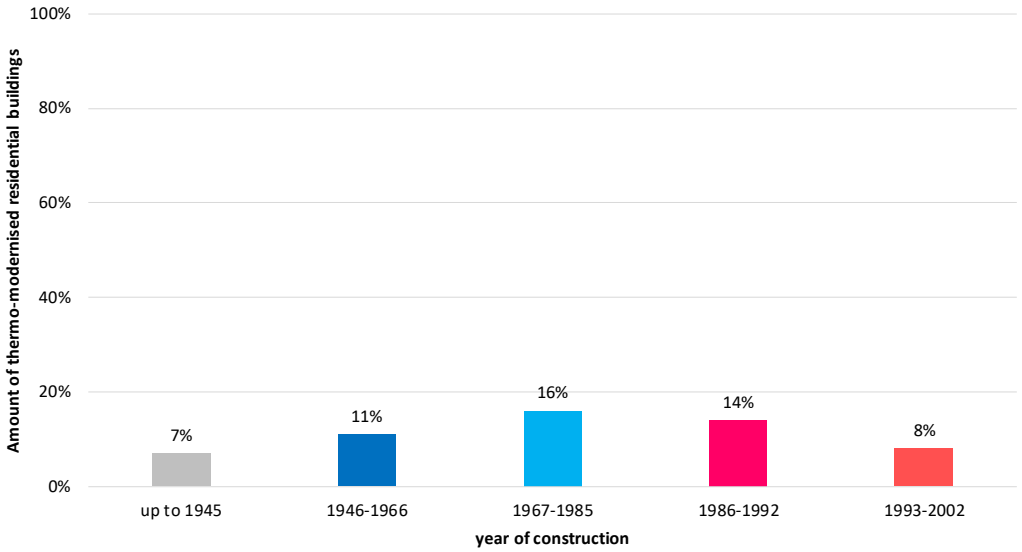


Figure 5-3: Thermo-modernization statistics, based on TABULA, NAPE 2012[25]

Referencing the polish building codes, the years of construction and the level of thermos-modernization, the building's primary energy demand based on its year of construction period can be matched to the following[14,15,25,26]:

[26] Firlag S., Oiasecki, M,. "NZEB Renovation Definition in a Heating Dominated Climate: Case Study of Poland. September 2018. https://www.researchgate.net/publication/327558353

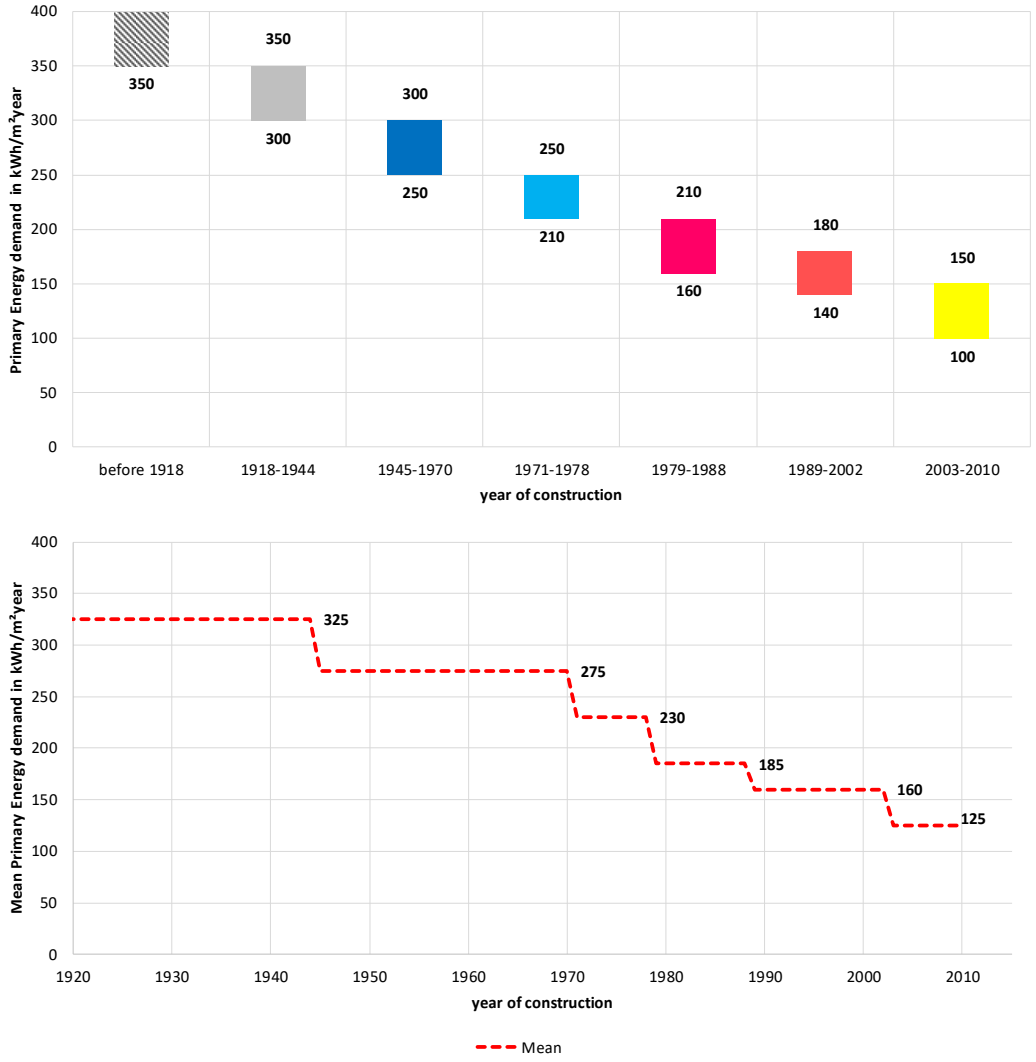


Figure 5-4: Annual and mean primary energy demand for different years of construction[14]

Today 2020, the technical condition TC 2017 ("Dz. U. 2013 poz. 926") sets the current energy performance requirements. The current maximum values for non-renewable primary energy demand[27] for residential buildings are listed below:

Table 5-3: Primary energy demand for current technical conditions[27]

Building code	Primary Energy Demand in kWh/m²year	
	SFH	MFH
TC 2014	120	105
TC 2017	95	85
TC 2021	70	65

[27] Certificates of buildings' energy performance. Gdynia, May 2018

The number of buildings and their building portions (see Figure 5-1) are clustered based on different years of construction periods and the mandatory time and use of the building energy codes (see Table 5-1). Therefore, a referencing of the building energy codes (see Figure 5-5) towards the year of construction and the number of buildings serves as the connection to match the codes' requirements for primary energy demand towards the portion of buildings.

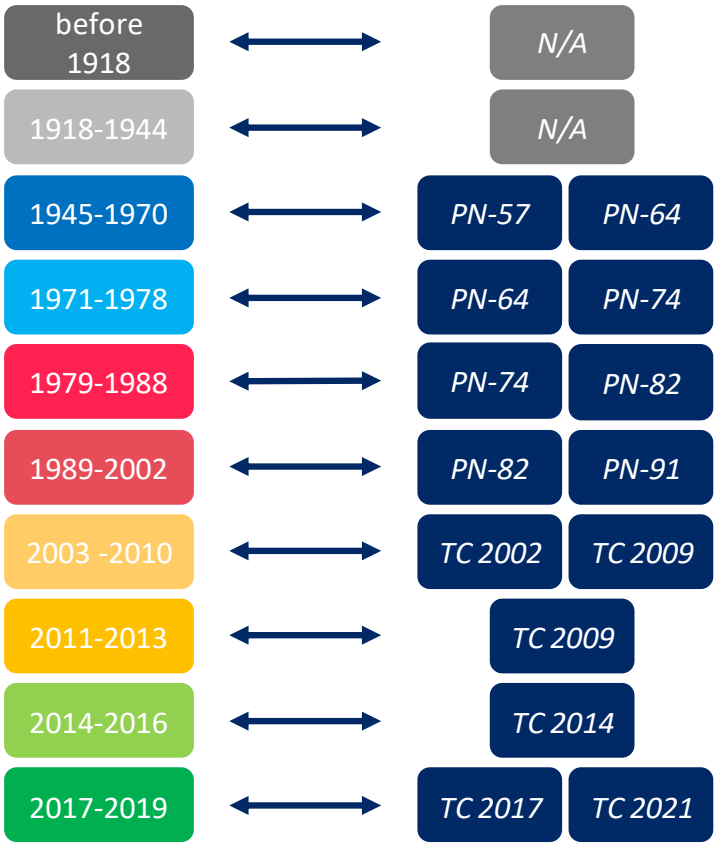


Figure 5-5: Matching applicable codes to clustered years of construction periods

Year of construction	Number of Buildings	Portion	Referenced code
before 1918	413.300	6%	N/A
1918-1944	828.200	12%	N/A
1945-1970	1.367.500	20%	PN-57 (1957-1969) PN-64 (1964-1973)
1971-1978	676.500	10%	PN-64 (1964-1973) PN-74 (1974-1981)
1979-1988	763.500	11%	PN-74 (1974-1981) PN-82 (1982-1990)
1989-2002	698.400	10%	PN-82 (1982-1990) PN-91 (1991-2001)
2003-2010	616.020	9%	TC 2002 (2002-2008) TC 2009 (2009-2013)
2011-2013	428.994	6%	TC 2009 (2009-2013)
2014-2016	454.202	7%	TC 2014 (2014-2016)
2017-2019	547.698	8%	TC 2017 (2017-2020) TC 2021 (2021-.....)
Total	6.794.314	100%	23.12.2019

Figure 5-6: Building energy codes referenced with national polish building stock information

Some clustered year of constructions contain multiple referenced codes. According to Figure 5-6 , the database provides the information, that there were e. g. 763,500 buildings built between 1979 and 1988 (see Figure 5-6). During the time from 1979 to 1988, the building codes PN-74 (being mandatory from the years 1974 to 1981) and PN-82 (being mandatory from 1982-1990) are both applicable to be referenced for the respective time period.

5.3 Poland's National Residential Mean Primary Energy Demand

For the year 2014, the mean residential energy consumption for the Polish building stock is 212.11 kWh/m²year based on the EU Building Stock Observatory[28,29].

To establish a mean primary energy demand for Poland's residential building stock in the year 2019, the mean primary energy demand for the year of constructions from 1918 until 2010 are expanded to include the primary energy demand limits for the technical conditions (TC 2014, TC 2017 and TC 2021) for the years 2014 until 2021. For the year 2011 until 2013, there were no direct information on the primary energy demand available. Therefore, an estimate was set to the average primary energy demand range from the year 2003-2010. Since there is no minimum range data available for the primary energy demand for the years 2011 and newer, the maximum limits for each technical condition was applied to serve as a minimum baseline for a conservative approach. This approach is illustrated in the Figure 5-7:

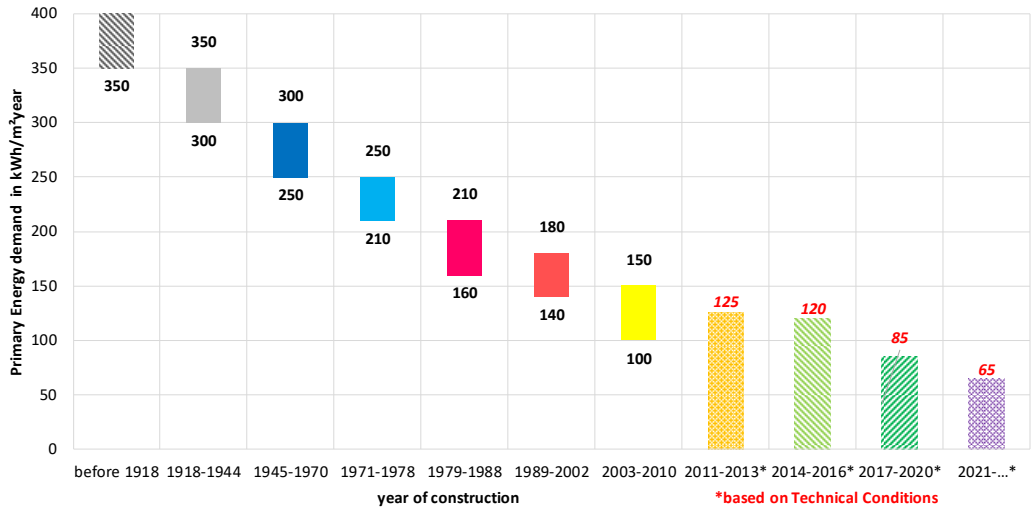


Figure 5-7: Poland's residential buildings' primary energy demand for several years of construction and technical conditions[14,18,20,21]

Applying the number of buildings for each year of construction and technical condition (see Figure 5-1), the mean primary energy demand for Poland's national residential building stock can be calculated to 210.6 kWh/m²year for the year 2019.

[28] EU Building Stock Observatory. European Commission. https://ec.europa.eu/energy/en/eu-buildings-database

[29] Individual Building Renovation Roadmaps (iBRoad). Factsheet: Poland. Current use of EPCs and potential links to iBRoad. https://ibroad-project.eu/news/8-country-factsheets/

5.4 Poland's National Residential Mean Carbon Emissions Intensity

The energy consumption of Poland's national residential buildings can be divided per one inhabitant into the following raw energy sources:

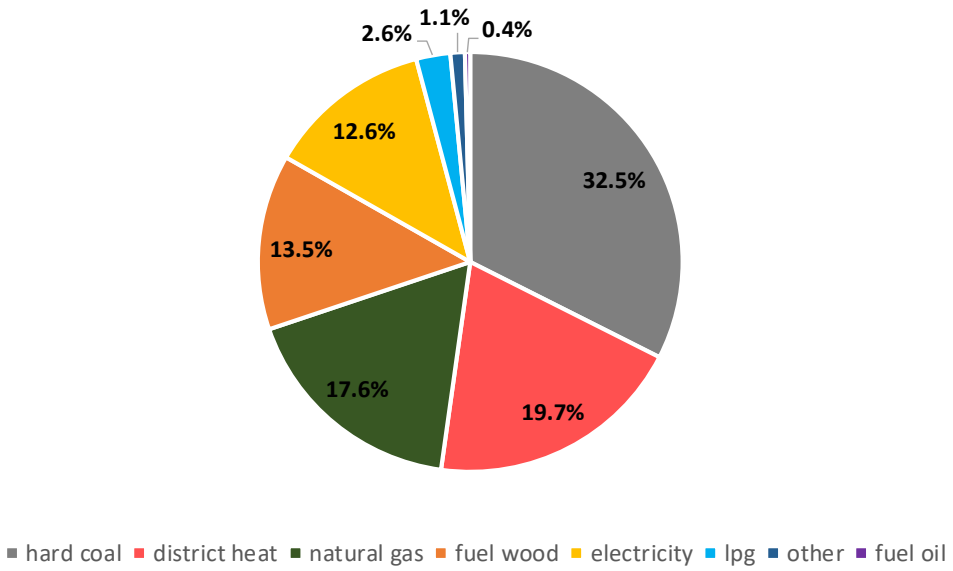


Figure 5-8: Structure of Poland's household energy consumption per 1 inhabitant in 2016[30]

The major energy carrier for residential buildings is hard coal with a third of the energy consumption, followed by district heating and natural gas.

[30] Statistics Poland. Energy 2018. Production Department CSO Energy and Raw Materials Balances Section. http://stat.gov.pl/en/topics/environment-energy/energy/energy-2018,1,6.html

For each fuel type, the standard associated equivalent carbon emissions are given in Table 5-4. The generation, distribution and use of district heat and electricity require a national approach for Poland's energy carrier since it varies for each nation.

Based on the European Environment Agency, the country-specific carbon emissions equivalents for electricity in Poland are 773 gCO_2 per kWh for the year 2016[31]. For district heating, the country-specific carbon emissions equivalents in Poland are stated with 100 $kgCO_2$/Gj which equals to 360 gCO_2 per kWh for the year 2015[32].

Table 5-4: Standard CO_2-Emissions factors from IPCC 2006[33,34]

Energy Type	Carbon Emissions Equivalent [$kgCO_2$/kWh]
Hard coal	0.354
Natural gas	0.202
Fuel wood	0.403
Liquefied Petroleum Gas	0.249
Municipal Wastes (non-biomass fraction)	0.330
Wood (non-sustainable forestry)	0.403
Fuel oil	0.279

Applying the carbon emissions equivalents to the distributed energy raw sources, the "national residential mean carbon emissions intensity" is calculated to 0.385 $kgCO_2$/kWh. Therefore, the national residential mean carbon emissions results into:

$$210.6\ kWh/m^2year\ X\ 0.385\ kgCO_2/kWh = 81.0\ kgCO_2/m^2year$$

for the mean national residential primary energy demand of 210.6 kWh/m²year.

[31] European Environment Agency. Overview of electricity production and use in Europe. December 2018. https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-2/assessment-4

[32] Buslaw Reulski.Izba Gospodarcza Cieplownictwo Polskie. Polish district heating sector – current status and challenges. June 2018. http://www.lsta.lt/files/events/2018-06-11_Varsuva/06_Boguslaw%20Regulski.pdf

[33] Intergovernmental Panel on Climate Change (IPCC). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc-nggip.iges.or.jp/public/2006gl/

[34] Covenant of Mayors for Climate & Energy. Technical annex to the SEAP template instructions document. The Emissions Factors. https://www.eumayors.eu/IMG/pdf/technical_annex_en.pdf

6 Eligibility for Green Bond

Climate Bonds Initiative's certification methodology for residential property climate bonds provides two methods in version 1.0 from the low carbon buildings technical working group to fulfill compliance:

- Method 1: Benchmarking against local market carbon performance
- Method 2: Relative stringency of energy labels and rating tools.

Method 1 is not applicable due to the fact, that the statistically representative sample and the 15th percentile of lowest carbon performance are not available for the local market benchmarking of residential and commercial buildings in Poland.

Furthermore, assets can be eligible through the property upgrade method (compare section 4.3).

6.1 Relative stringency of energy labels and rating tools

Method 2 "Relative stringency of energy labels and rating tools" is applicable to demonstrate the eligibility of a mechanism for the Green Bond and includes the following steps:

- Identification of a Database,
- Confirmation of sufficient sample size,
- Confirmation of representative Database,
- Determination of Minimum Criteria for Climate Bonds Certification.

The residential buildings in Poland are referenced with Polish building energy performance codes to comply a verified carbon performance database and to enable an analysis and comparison to the local market. The data is based on the following information sources:

- Central Statistical Office. Inhabited Buildings, the National Census of Population and Housing 2011; Central Statistical Office: Warsaw, Poland, 2013.
- Statistics Poland. Residential construction in the period of January-November 2018, 18.12.2018 Statistics Poland. Efekty działalności budowlanej w 2017 r – Construction results in 2017, ISSN 25450921
- Polish building typology – Scientific report. Typology Approach for Building Stock Energy Assessment – TABULA 2011/TEM/R/091763. Intelligent Energy Europe Programme of the European Union – IEE. Narodowa Agencja Poszanowania Energii SA – NAPE. Warsaw 2012
- Podręcznik typologii budynków mieszkalnych z przykładami działań mających na celu zmniejszenie ich energochłonności. Narodowa Agencja Poszanowania Energii SA – NAPE. Warsaw 2011

Including more than 6 million residential buildings (compare Figure 5-1), the summarized data provided by the central statistical office and Statistics Poland fulfill CBI's requirement of enabling a statistically significant size of database for a sufficient sample confirmation.

The energy labelling schemes of the mandatory building energy performance codes (see Table 5-1) do include a sufficient spread of ten different energy labels (e. g. TC 2017, TC 2014, PN-91 etc.) and can be considered representative of the market spread.

6.2 Eligibility Criteria for a Residential Green Bond

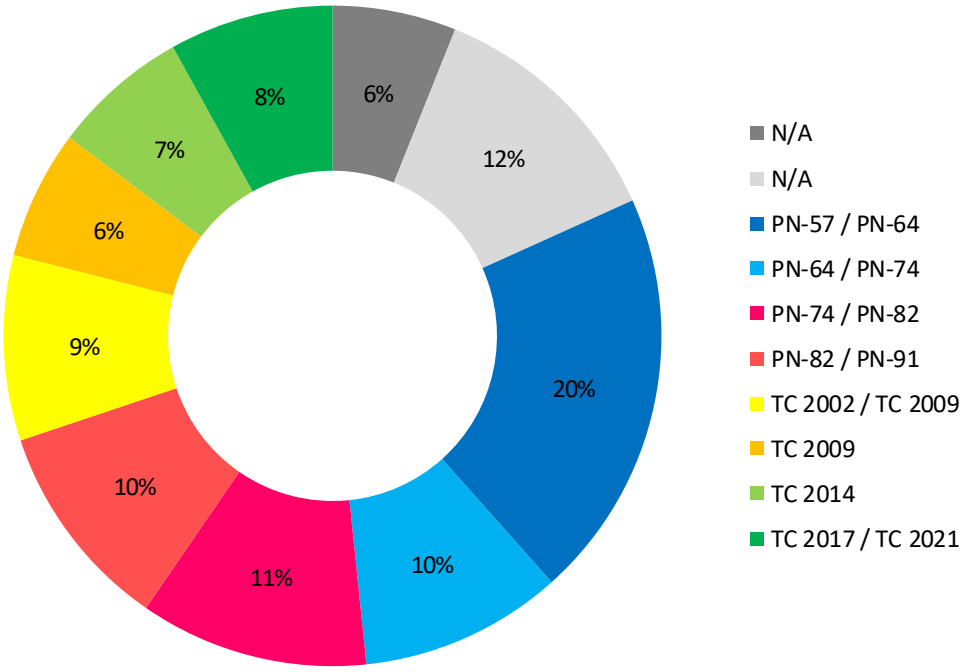


Figure 6-1: Portion of buildings referenced towards building energy codes

The clustered information analysis shows, that eight percent of the buildings fulfill the requirements for TC 2017 or TC 2021, and seven percent the requirements for TC 2014. Since the requirements for TC 2017 and TC 2021 are more stringent compared to the requirements for TC 2014, a total of 15% (TC 2017/TC 2021:8% + TC 2014:7%) of the buildings achieve the requirements of the energy building code TC 2014.

As a result, this analysis shows, that an asset which does comply with the requirements of the building energy code TC 2014, is positioned in the top 15% of the market and may be used to show eligibility for the Green Bond of mBank-BH.

Fulfilling the requirements of TC 2009 positions the asset in the next 6% of assets (i.e. in the top 16% to 21% of the market). Some buildings with TC 2009 could be positioned within the top 15% of the market, but not all. Therefore, the TC 2009 does not guarantee, that an asset belongs to the top 15% of the market. For this reason, complying with TC 2009 cannot be used to demonstrate eligibility for mBank-BH's Green Bond.

The overall goal of the low buildings criteria for the green bond is to "establish emissions trajectories (Figure 6-2) compatible with net zero carbon emissions by 2050, so that only buildings performing within these trajectories would be eligible […]"[35] for a green bond.

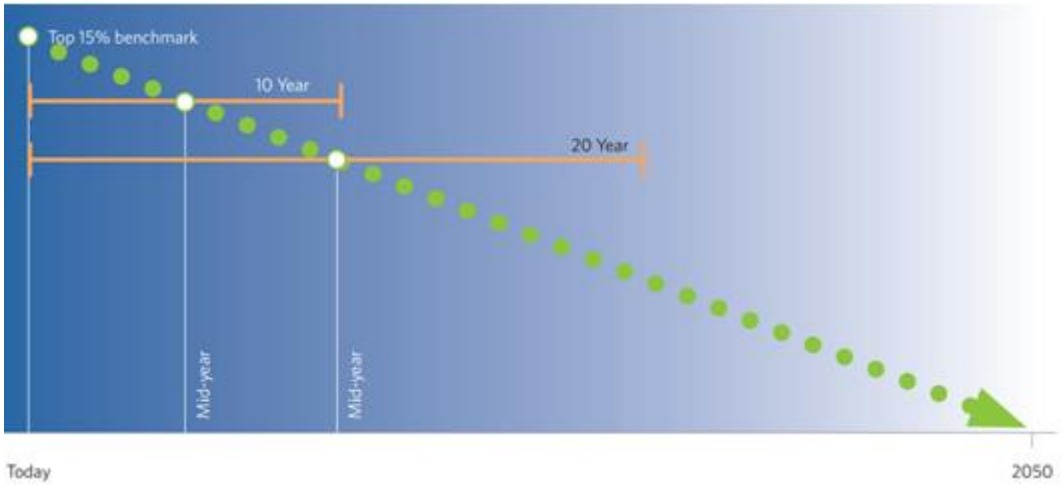


Figure 6-2: CBI's low carbon trajectory example

A low carbon trajectory for mBank-BH's green bond therefore connects

- the basis requirement TC 2014 with PE≤ 120 kWh/m²year for single family houses and PE≤ 105 kWh/m²year for multi-family houses, towards
- the zero-emission-goal in 2050 with zero non-renewable primary energy or carbon emissions.

The low carbon trajectory is based on the year of issuance of the green bond and the applied duration of the green bond due to the fact that for each year towards 2050, the requirements for carbon emissions and non-renewable primary energy are getting more stringent.

Figure 6-3 and Figure 6-4 visualize the low carbon trajectories for single- and multi-family house based on the technical condition standard TC 2014 serving as the 15th percentile baseline for the market.

According to the low carbon trajectory for single family houses, the technical condition TC 2017 serves as proof of eligibility for the green bond until the year 2025 whereas the TC 2021 validates the eligibility until the year 2032. For a multifamily house, TC 2017 may be used until the year 2028 and TC 2021 until the year 2033 towards eligibility for the green bond.

[35] Climate Bonds Initiative. Aligning Buildings with the Paris Climate Agreement: Insights and Developments from the Green Bond Market. Aligning Buildings with a Climate Compatible 2050. https://www.climatebonds.net/files/files/SEIM-01A(1).pdf

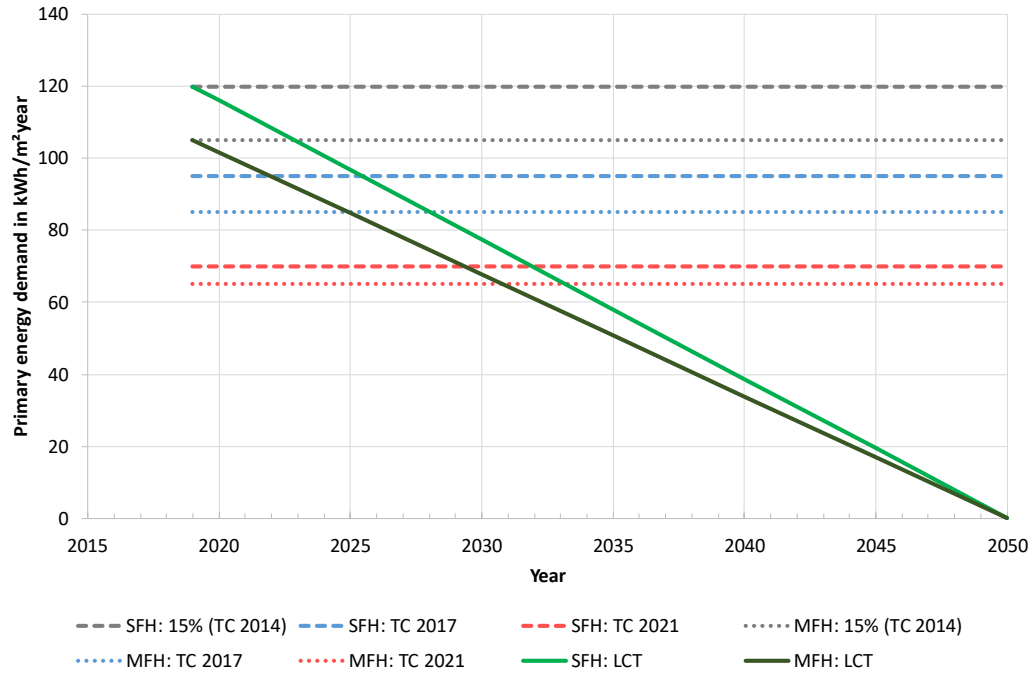


Figure 6-3: Exemplary low carbon trajectories for single- and multifamily houses

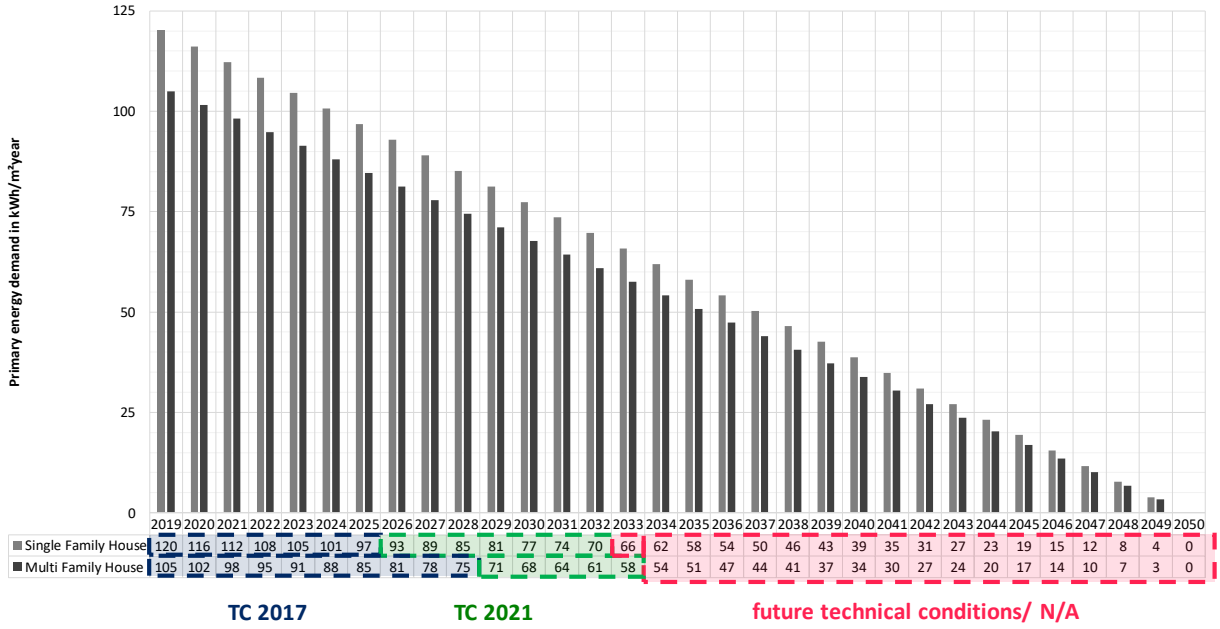


Figure 6-4: low carbon trajectories and mandatory primary energy demand

From the year 2032 (SFH) and 2033 (MFH) forward, an eligibility for assets with TC 2021 or older is not applicable. Future technical conditions need to be defined by the government to be suitable for a rating scheme or building energy code to serve as compliance method for future green bonds.

Besides the proxy method of stringency of energy labels and rating tools, property upgraded assets are eligible for the green bond once their percentual improvement in carbon emissions or primary energy demand or consumption complies with the carbon target illustrated in Figure 6-5.

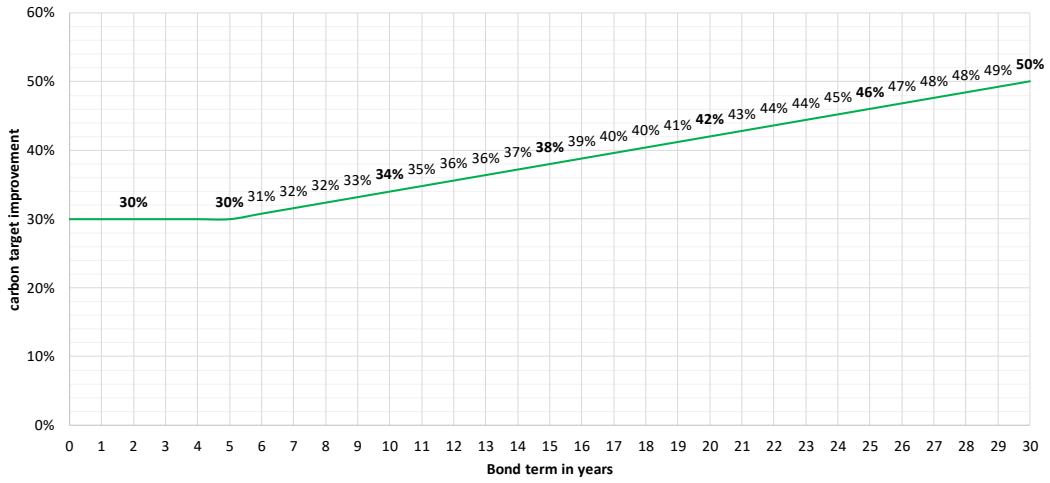


Figure 6-5: Required minimum improvement for different bond terms

Example:

A single-family house built in year 1992 with the technical condition PN 91 and a primary energy demand of 160 kWh/m²year (61.6 $kgCO_2/m^2$year) has undergone a major renovation including several energy conservation measurements and retrofits (e. g. lights, insulation, upgraded HVAC-heating ventilation air conditioning and cooling-system).

After the renovation, the building fulfils the requirements of the technical condition TC 2017 with a primary energy demand of 95 kWh/m²year (36.6 $kgCO_2/m^2$year). The percentual improvement can be stated to 40% less carbon emissions than before the renovation. Therefore, this asset would be eligible for a green covered bond with a maximum bond duration of 18 years in compliance with Figure 6-5.

6.3 EU Taxonomy-aligned eligibility criteria

In addition to the Climate Bonds Initiative methodology approach, the EU Taxonomy-aligned eligibility criteria can be developed as the following:

Buildings built after December 31st of 2020:

- 20% reduction in Primary Energy Demand (PED) of Nearly-Zero-Energy-Building (NZEB) Standard based on Energy Performance of Buildings Directive (EBPD), implemented in Technical Condition 2021 (TC 2021):
  - Single-Family House with an annual energy consumption or demand less than or equal to 56 kWh per square meter per year.
  - Multi-Family House with an annual energy consumption or demand less than or equal to 52 kWh per square meter per year.

Buildings built before December 31st of 2020:

- Top 15%-approach (best-in-class) represented by the primary energy demand of Nearly-Zero-Energy-Building (NZEB) Standard based on Energy Performance of Buildings Directive (EBPD), implemented in Technical Condition 2021 (TC 2021):
  - Single-Family House with an annual energy consumption or demand less than or equal to 70 kWh per square meter per year.
  - Multi-Family House with an annual energy consumption or demand less than or equal to 65 kWh per square meter per year.

As an alternative, the proposed CBI-compliant criteria as 2050 zero-carbon linear trajectory or 5) Energy standard or newer / Year of construction is equal or newer do comply with the Top15%-approach and therefore qualify an asset to be eligible.

Renovation:

- Major renovation meets cost-optimal minimum energy performance requirements in accordance with the Energy Performance of Buildings Directive (EBPD). Requirements for primary energy demand as referenced in TC 2014 and cost optimum report for Poland.
- Relative improvement in primary energy demand ≥ 30% in comparison to the performance of the building before the renovation

6.4 Summarized Eligibility Criteria

Low carbon green buildings: defined as the financing or refinancing buildings which meet regional, national or internationally recognised regulations, standards or certifications:

Residential real estate:

- New or existing residential buildings built after December 31st ,2020 complying with 20% reduction in Primary Energy Demand (PED) of Nearly-Zero-Energy-Building (NZEB) Standard in Poland.
- New or existing residential buildings built before December 31st ,2020 complying with the requirements in Primary Energy Demand (PED) of Nearly-Zero-Energy-Building (NZEB) Standard in Poland
- New or existing residential buildings built before December 31st,2020 belonging to top 15% low carbon buildings in Poland.
- Refurbished existing residential buildings with primary energy savings of at least 30% against the building performance before the renovation.
- Refurbished existing buildings or renovations designed to fulfill the cost-optimal minimum energy performance requirements of national or regional requirements for 'major renovation' as defined in the Energy Performance of Buildings Directive.

Threshold is subject to change, based on EU Taxonomy.

- New or existing residential buildings with an Energy Performance Certificate (EPC) in compliance with CBI's established Residential Proxy based on year of bond issuance and bond duration:
  - Single-Family House with an annual energy consumption or demand less than or equal to 95 kWh per square meter per year.
  - Multi-Family House with an annual energy consumption or demand less than or equal to 85 kWh per square meter per year.

Threshold is subject to change, based on year of bond issuance, bond duration and is mandatory to comply with established 2050 zero-carbon linear trajectories for single-family or multi-family house in compliance with Climate Bonds Initiative's criteria for low carbon buildings.

- New or existing residential buildings with year of construction in compliance with CBI's established Residential Proxy based on year of bond issuance and bond duration:
  - Single-Family or Multi-Family House built after 2017, based on the year of construction.

Threshold is subject to change, based on year of bond issuance, bond duration and is mandatory to comply with Climate Bonds Initiative's criteria for low carbon buildings.

Refurbished existing residential buildings with an improved energy efficiency reducing carbon emissions of at least 30% based on bond term

Table 6-1: Green Bond - summarized criteria

			Green Bond criteria *The object fulfills one of the following criteria:*	Residential *Single-Family*	Residential *Multi-Family*
EU Taxonomy 	New Construction **or** Existing Buildings	**1)**	**Energy standard & Primary energy demand** Buildings built after December 31th, 2020	20% reduction in Primary Energy Demand (PED) of Nearly-Zero-Energy-Building (NZEB) Standard based on Energy Performance of Buildings Directive (EBPD), implemented in Technical Condition 2021 (TC 2021) NZEB-20%: PED ≤ 56 kWh/m²year	NZEB-20%: PED ≤ 52 kWh/m²year
		2)	**Top 15%-approach (best-in-class)** Buildings built before December 31th, 2020	Primary Energy Demand (PED) of Nearly-Zero-Energy-Building (NZEB) Standard based on Energy Performance of Buildings Directive (EBPD), implemented in Technical Condition 2021 (TC 2021) NZEB: PED ≤ 70 kWh/m²year **Alternative**: *4) 2050 zero-carbon linear trajectory* **or** *5) Energy standard* or newer / *Year of construction is equal or newer*	NZEB: PED ≤ 65 kWh/m²year
	Existing Buildings	**3)**	**Renovation**	Major renovation meets cost-optimal minimum energy performance requirements in accordance with the Energy Performance of Buildings Directive (EBPD). Requirements for primary energy demand as referenced in TC 2014 and cost optimum report for Poland. **or** Relative improvement in primary energy demand ≥ 30% in comparison to the performance of the building before the renovation.	
Climate Bonds Initiative	New Construction **or** Existing Buildings	**4)**	**2050 zero-carbon linear trajectory** *(low carbon trajectory, CBI proxy Poland)*	PED ≤ 95 kWh/m²year (TC 2017) Year of bond issuance and term	PED ≤ 85 kWh/m²year (TC 2017) Year of bond issuance and term
		5)	**Energy standard or newer** **Year of construction is equal or newer** *based on CBI's low carbon buildings criteria in compliance with CBI's established residential market proxy for Poland*	Year of bond issuance = 2020 – 2025: TC 2017 **or** year of construction = 2017 with a linear decreasing bond term (mid point) of 6 years in 2020 and 1 year in 2025 **or** Year of bond issuance = 2026 – 2032: TC 2021 or year of construction = 2021 with a linear decreasing bond term (mid point) of 7 years in 2026 and 1 year in 2032	Year of bond issuance = 2020 – 2025: TC 2017 **or** year of construction = 2017 with a linear decreasing bond term (mid point) of 6 years in 2020 and 1 year in 2025 **or** Year of bond issuance = 2026 – 2031: TC 2021 or year of construction = 2021 with a linear decreasing bond term (mid point) of 6 years in 2026 and 1 year in 2031
	Existing Buildings	**6)**	**Property upgrade** *in compliance with CBI's established residential property upgrade methodology*	Major renovation with modernized technical condition including an improvement in emissions against business-as-usual based on bond duration. Minimum improvement in carbon emissions ≥ 30% . Term 1-5 years: 30% improvement | Term 5-30 years: 30%-50% linear improvement | Term ≥ 30 years : 50% improvement	

Residential criteria are based on EU Taxonomy March 2020 and Climate Bonds Initiative's Low carbon certification methodology. Criteria are valid for assets located in the Republic of Poland. Criteria and Tresholds are subject to change.

Table 6-1 summarizes the green bond criteria for residential buildings in mBank-BH's asset portfolio.

6.5 Climate Bonds Initative – pre-issuance certification

Drees & Sommer consulted mBank-BH towards a pre-issuance certification unter the Climate Bonds Initiative standard to apply the proxy for residential buildings in Poland.

The following green bond eligibility criteria were certified and do comply with the Climate Bonds Initiative standard:

Table 6-2: CBI-certified green bond criteria

			Green Bond criteria *The object fulfills one of the following criteria:*	Residential *Single-Family*	Residential *Multi-Family*
Climate Bonds Initiative	New Construction **or** Existing Buildings	4)	**2050 zero-carbon linear trajectory** *(low carbon trajectory, CBI proxy Poland)*	PED ≤ 95 kWh/m²year (TC 2017) Year of bond issuance and term	PED ≤ 85 kWh/m²year (TC 2017) Year of bond issuance and term
		5)	**Energy standard or newer** **Year of construction is equal or newer** *based on CBI's low carbon buildings criteria in compliance with CBI's established residential market proxy for Poland*	Year of bond issuance = 2020 – 2025: TC 2017 **or** year of construction = 2017 with a linear decreasing bond term (mid point) of 6 years in 2020 and 1 year in 2025 **or** Year of bond issuance = 2026 – 2032: TC 2021 or year of construction = 2021 with a linear decreasing bond term (mid point) of 7 years in 2026 and 1 year in 2032	Year of bond issuance = 2020 – 2025: TC 2017 **or** year of construction = 2017 with a linear decreasing bond term (mid point) of 6 years in 2020 and 1 year in 2025 **or** Year of bond issuance = 2026 – 2031: TC 2021 or year of construction = 2021 with a linear decreasing bond term (mid point) of 6 years in 2026 and 1 year in 2031
	Existing Buildings	6)	**Property upgrade** *in compliance with CBI's established residential property upgrade methodology*	Major renovation with modernized technical condition including an improvement in emissions against business-as-usual based on bond duration. Minimum improvement in carbon emissions ≥30% . Term 1-5 years: 30% improvement | Term 5-30 years: 30%-50% linear improvement | Term ≥ 30 years : 50% improvement	

Further guidance toward the established criteria and CBI-certified proxies can be found on CBI's residential calculator:

Eligible Residential Building Poland: (established by Drees & Sommer)
https://www.climatebonds.net/files/files/Residential%20Proxy%20Poland%281%29.pdf

6.6 Aggregation of assets and pooling

The aggregation of assets follows the "Simple Aggregation"-methodology based on CBIs' residential property certification methodology for climate bonds. Assets can be pooled into sub-pools, once they are compliant with the criteria for the green bond defined in section 5.3 "Summarized Eligibility Criteria"

The following sub-pools are applied to diverse the green covered bond portfolio based on carbon performance and energy standards:

(1) 2050 zero-carbon linear trajectory
(2) Energy Performance (Year of Construction / Energy Standard)
(3) Property upgrade

These sub pools can be adjusted to mBank-BH's requirements.

7 Green Bonds' Environmental Impact

7.1 Primary Energy Savings

Savings associated with an eligible green bond asset are calculated against the mean primary energy demand for Poland's national residential building stock of 210.6 kWh/m²year (see section 5.3).

e. g. a 300 m² Multi-Family House within the Green Bond with a primary energy demand of 80 kWh/m²year (fulfilling TC 2017) provides environmental savings of:

(210.6 – 80) kWh/m²year = 130.6 kWh/m²year

130.6 kWh/m²year x 300 m² = 39.18 MWh/year

If the asset does not have an allocated primary energy consumption or primary energy demand, the asset's current primary energy demand will be estimated on the technical condition and its referenced mean value illustrated in Figure 5-7. In case there is no information available on the technical condition, the year of construction and its associated building energy code will be used to determine the referenced mean value illustrated in Figure 5-7.

7.2 Greenhouse gases' carbon emissions avoidance

Avoided greenhouse gases' carbon emissions associated with an eligible green bond asset are calculated against the national residential mean carbon emissions of 81.0 kgCO2/m²year (including the carbon intensity of 0.385 kgCO_2/kWh, see section 5.4).

e. g. a 300 m² Multi-Family House within the Green Bond with a primary energy demand of 80 kWh/m²year (fulfilling TC 2017) provides avoided greenhouse gases carbon emissions of:

(210.6 – 80) kWh/m²year x 0.385 kgCO2/kWh = 50.3 kgCO2/m²year

50.3 kgCO2/m²year x 300 m² = 15.1 tCO2/year

8 Preliminary-Portfolio-Analysis

During the course of the project, a preliminary analysis has been conducted in order to screen the portfolio for potential eligible assets and possible criteria to be incorporated with the client.

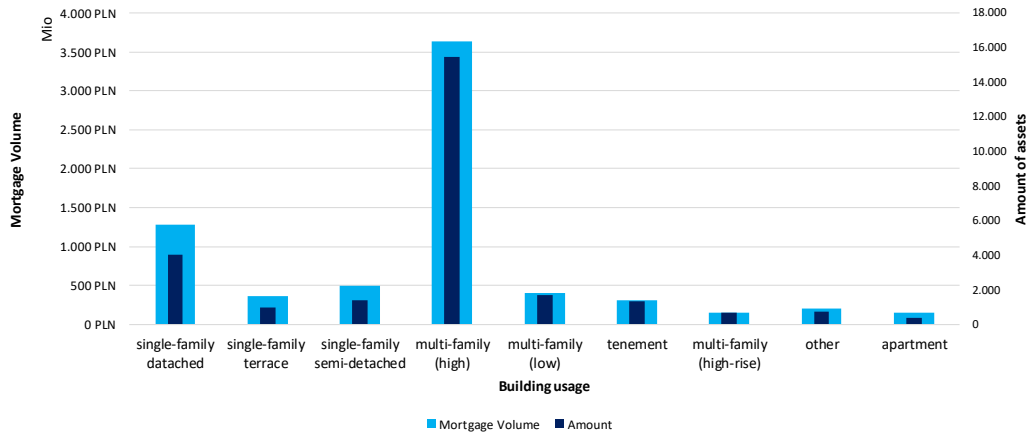


Figure 8-1: Preliminary - Mortgage volume and building usage

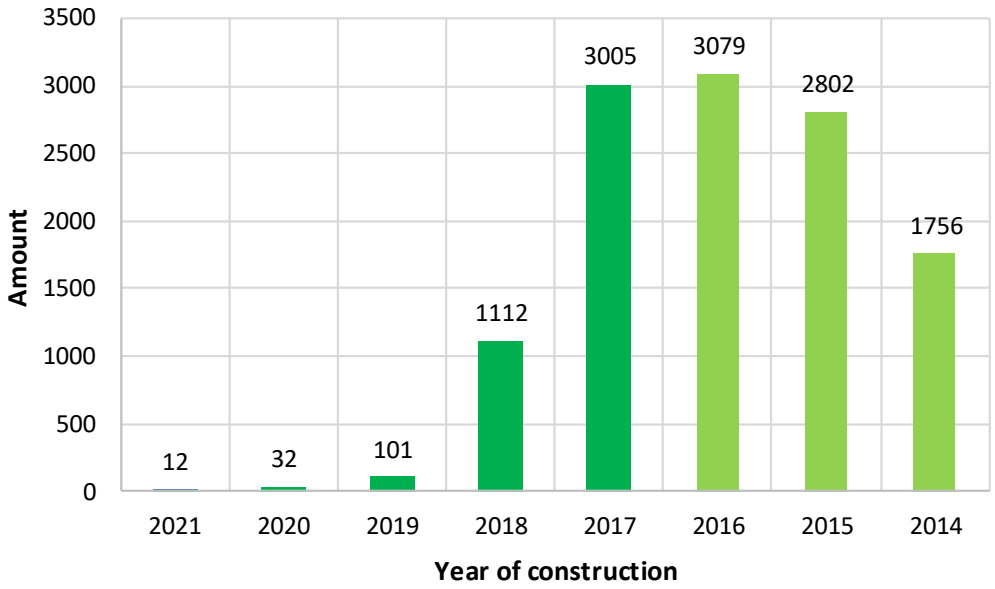


Figure 8-2: Preliminary - amount of assets per year of construction

Once the proposed eligibility criteria have been developed, the preliminary analysis has been transformed into the portfolio screening to evaluate the client's portfolio.

9 Portfolio Screening

mBank-BH's portfolio has been evaluated based on the proposed green bond methodology covering a green bond issuance starting from the year 2020 with a duration of seven years until 31.12.2026.

The following figures summarize mBank-BH's assessed portfolio:

- Number of buildings: 26 790
- Exposure: 6,877 mn PLN
- Usage: Residential (Single-Family, Multi-Family Home),

mBank-BH's Green Bond portfolio:

- Number of buildings: 4 509
- Exposure: 1 314 896 705 PLN
- Environmental Savings:
  - Primary Energy: 44 252 MWh/year
  - Carbon Emissions: 17 019 tCO_2/year

Further details can be found in the appendix.

9.1 Number of Buildings

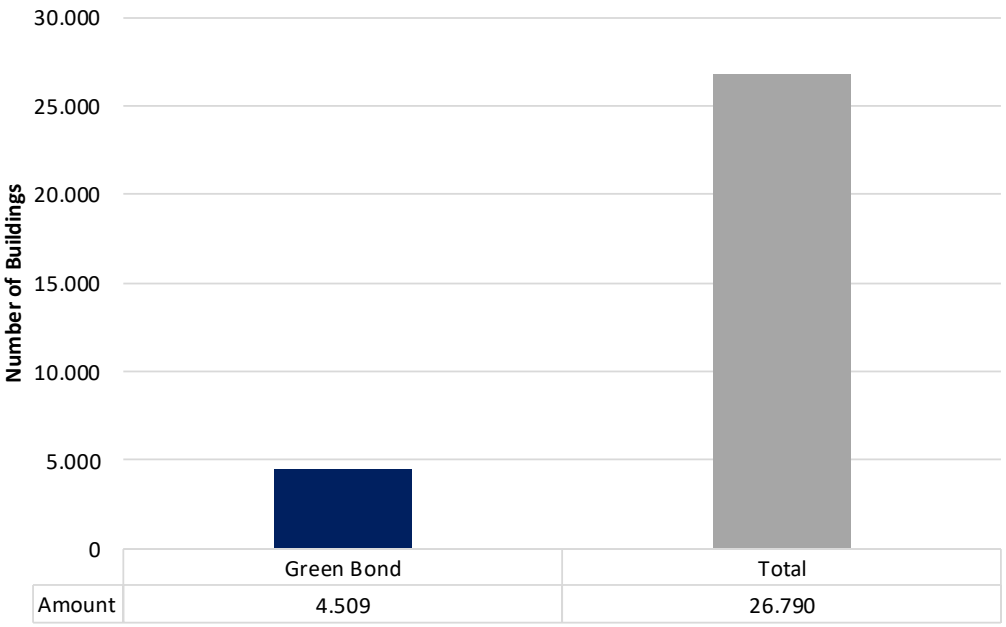


Figure 9-1: Number of buildings within mBank-BH's portfolio

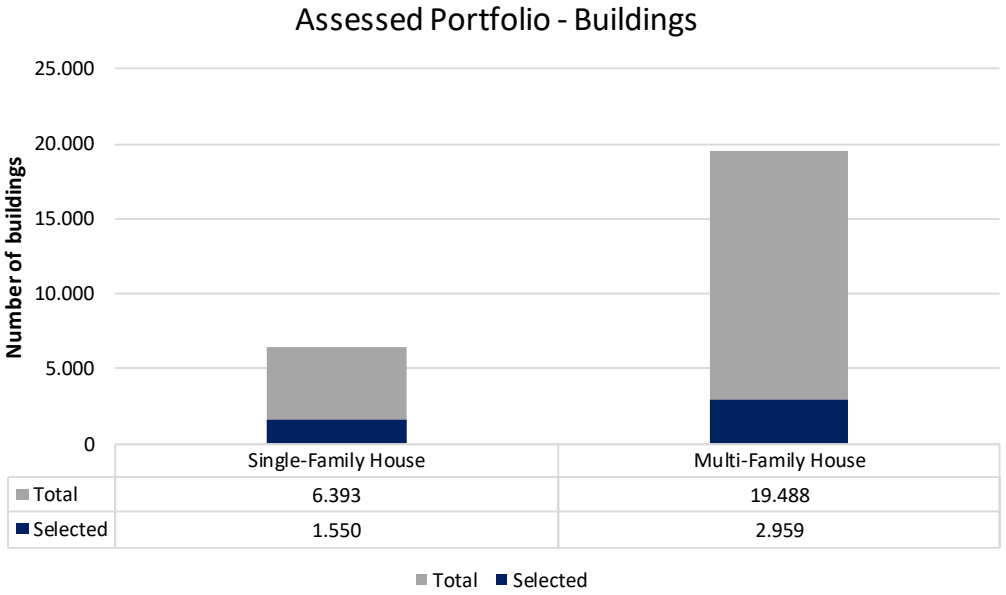
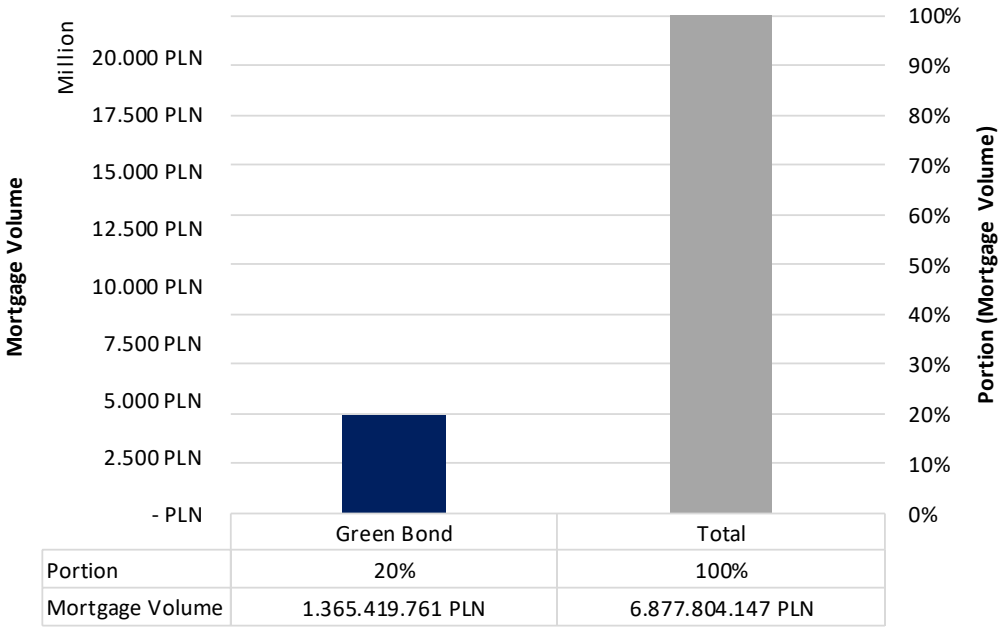


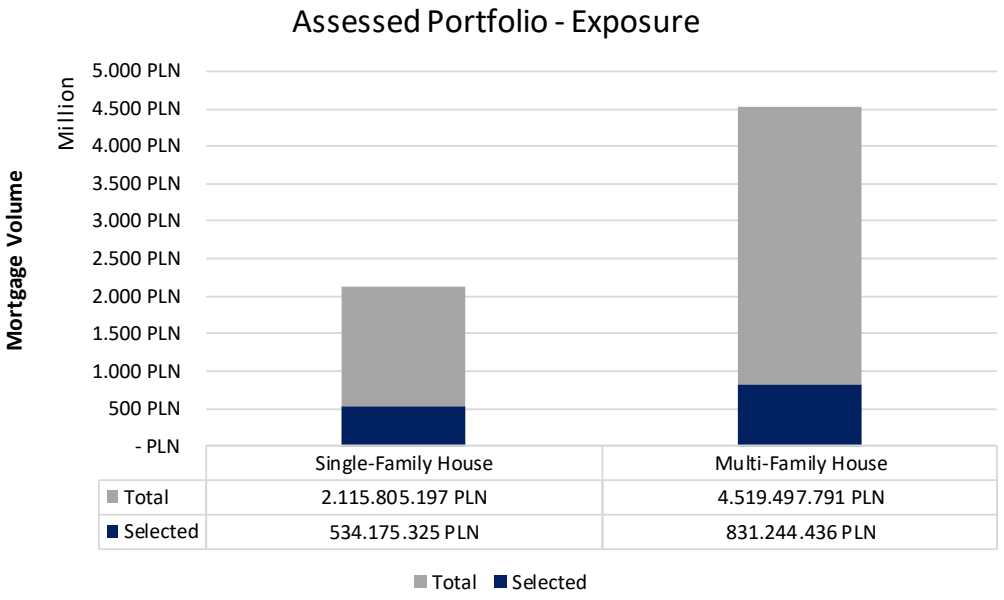
Figure 9-2: Number of buildings within mBank-BH's assessed portfolio by usage type

9.2 Exposure



	Green Bond	Total
Portion	20%	100%
Mortgage Volume	1.365.419.761 PLN	6.877.804.147 PLN

Figure 9-3: Exposure of mBank-BH's assessed portfolio



	Single-Family House	Multi-Family House
Total	2.115.805.197 PLN	4.519.497.791 PLN
Selected	534.175.325 PLN	831.244.436 PLN

Figure 9-4: Exposure of mBank-BH's assessed green bond portfolio

9.3 Building Area

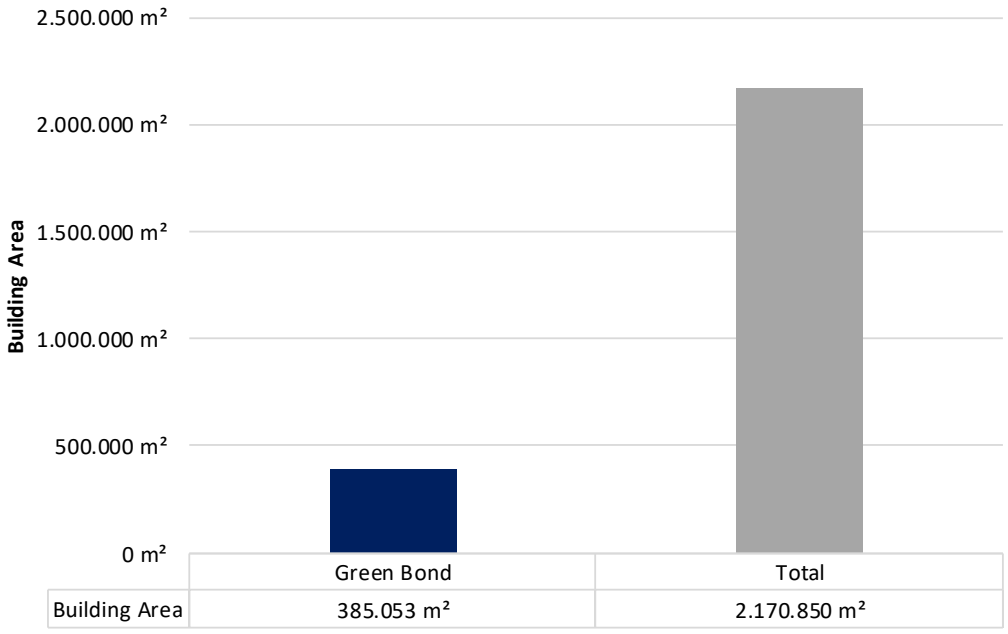


Figure 9-5: Building area of mBank-BH's assessed portfolio

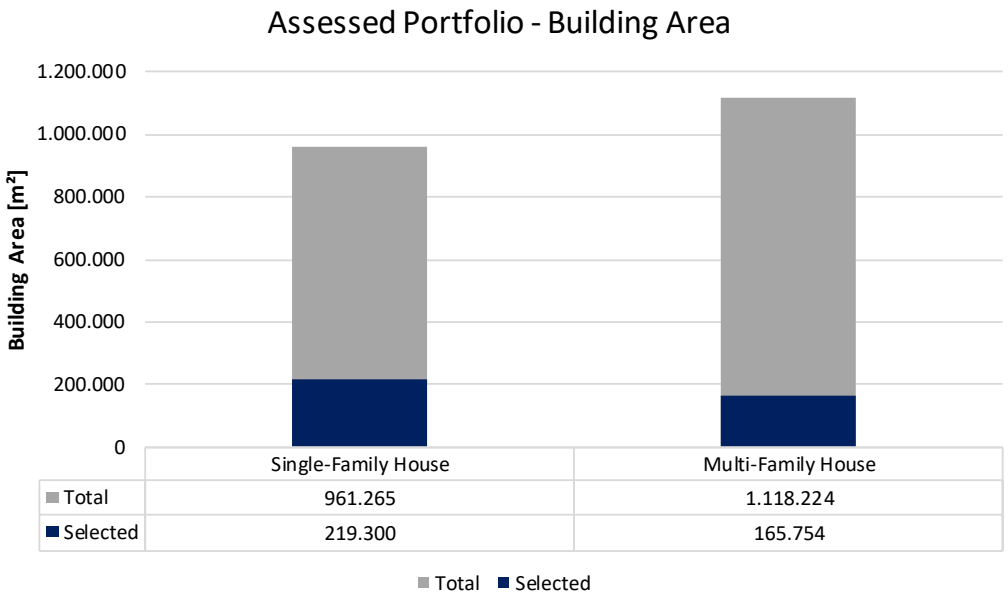


Figure 9-6: Building area of mBank-BH's assessed portfolio by usage type

9.4 Building Age vs. Exposure

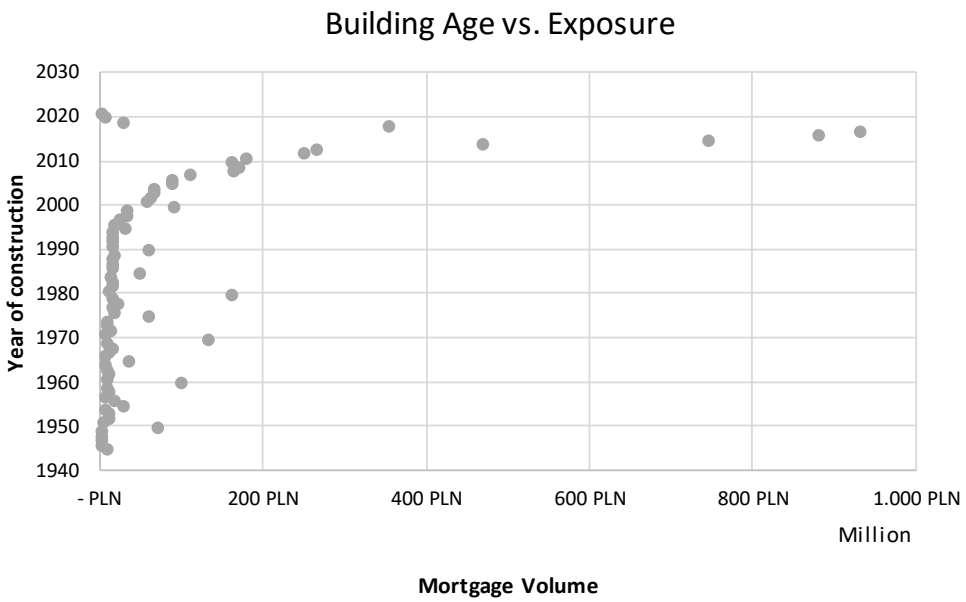


Figure 9-7: Building age related to exposure within mBank-BH's assessed portfolio

9.5 Environmental Savings

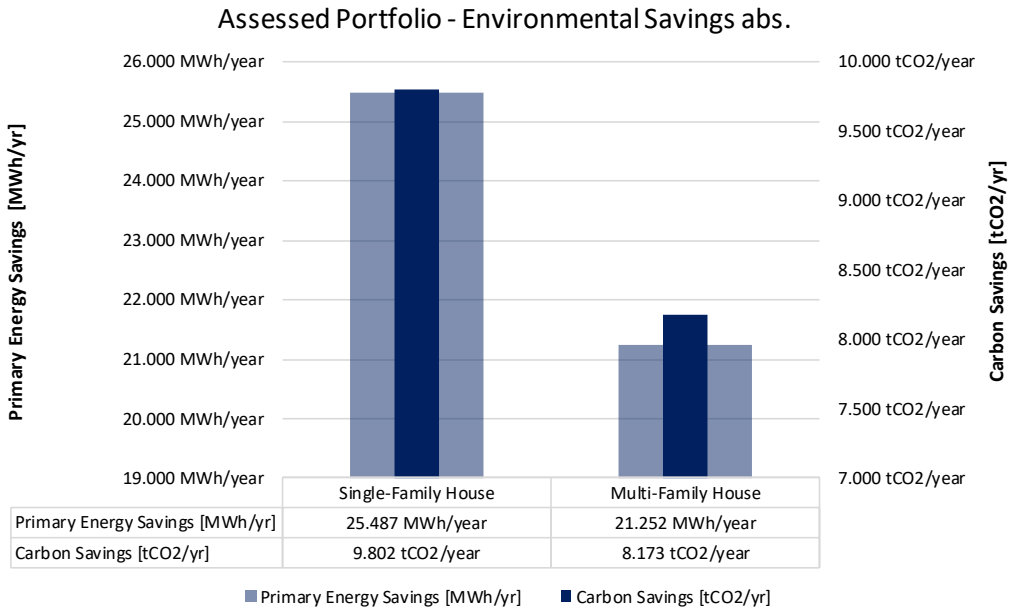


Figure 9-8: Environmental Savings by mBank-BH's assessed Green Bonds portfolio

9.6 Green Bond Sub Pools

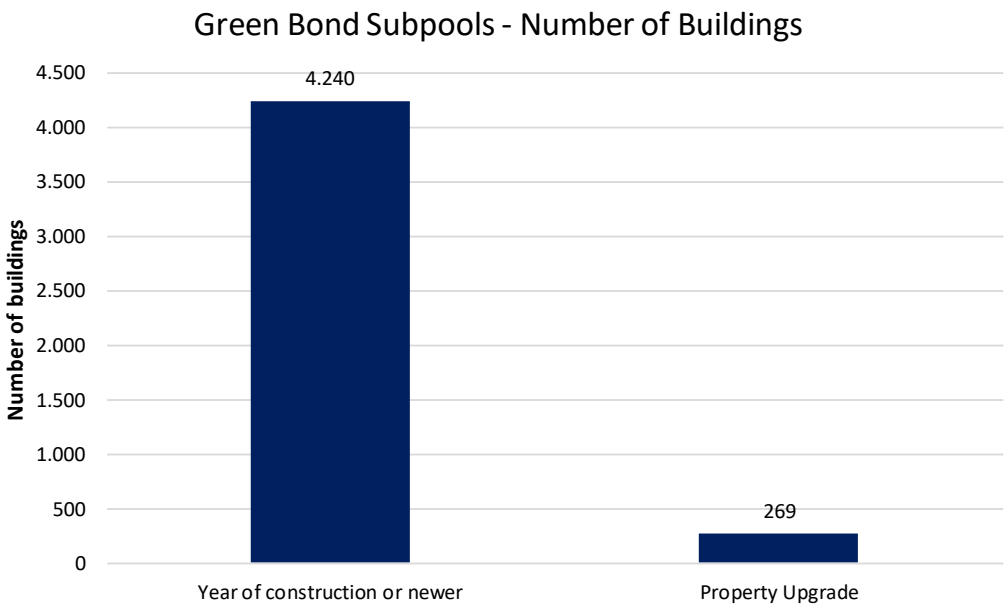


Figure 9-9: Number of buildings within mBank-BH's Green Bond Sub pools

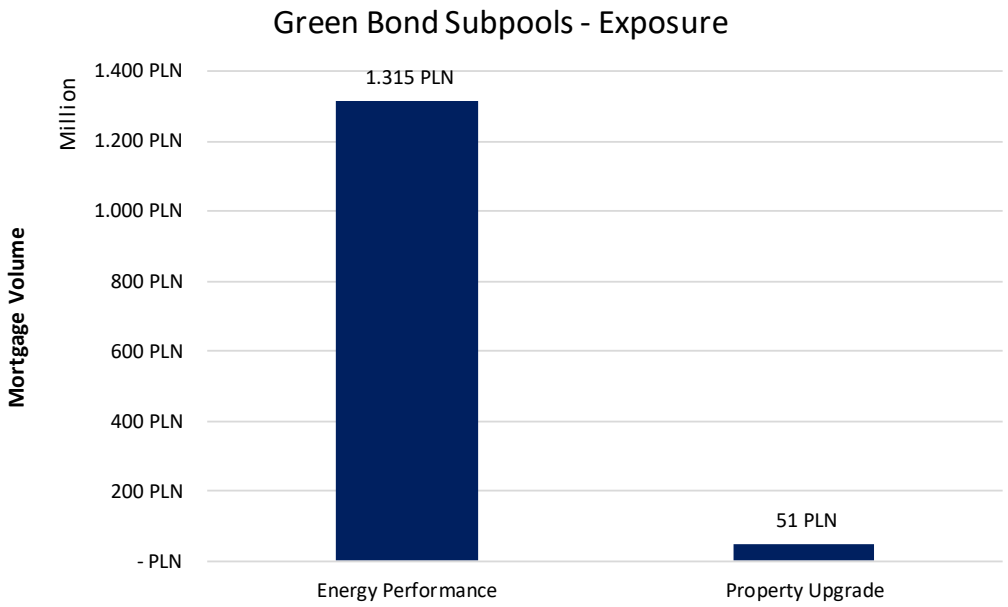


Figure 9-10: Exposure of building within mBank-BH's Green Bond Sub pools

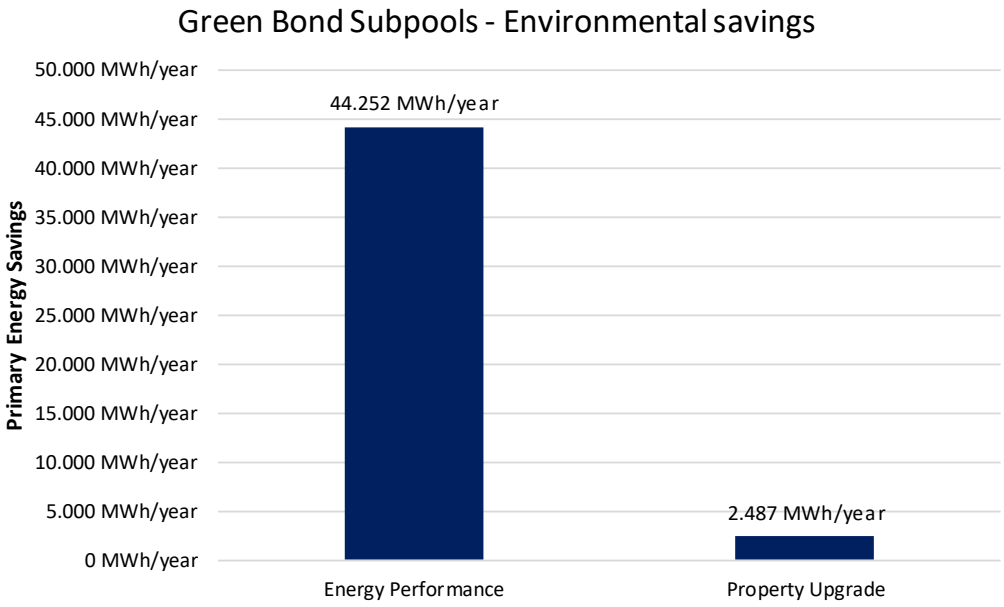


Figure 9-11: Primary energy savings of mBank-BH's Green Bond Sub pools

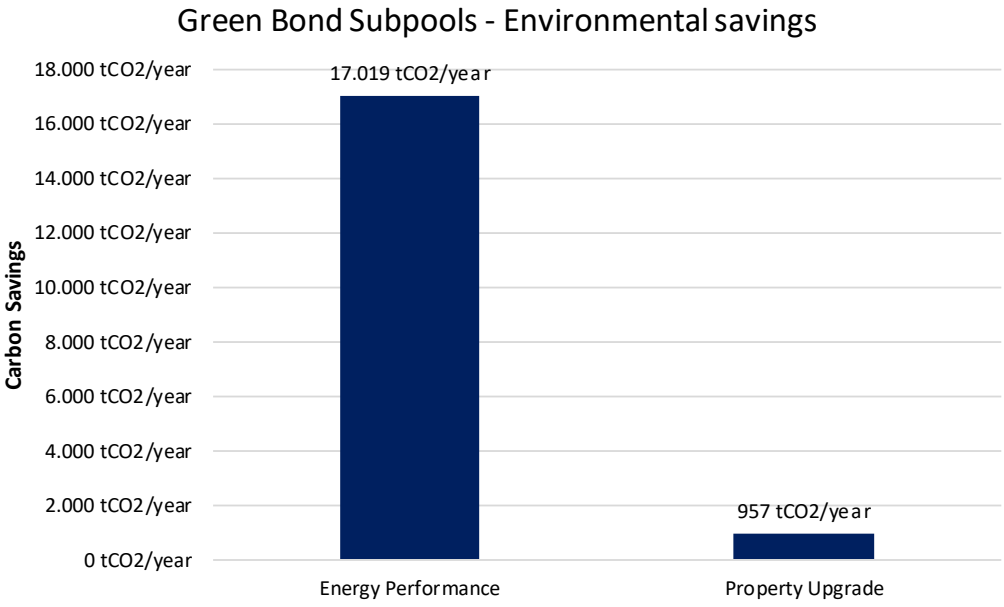


Figure 9-12: Carbon savings of mBank-BH's Green Bond Sub pools

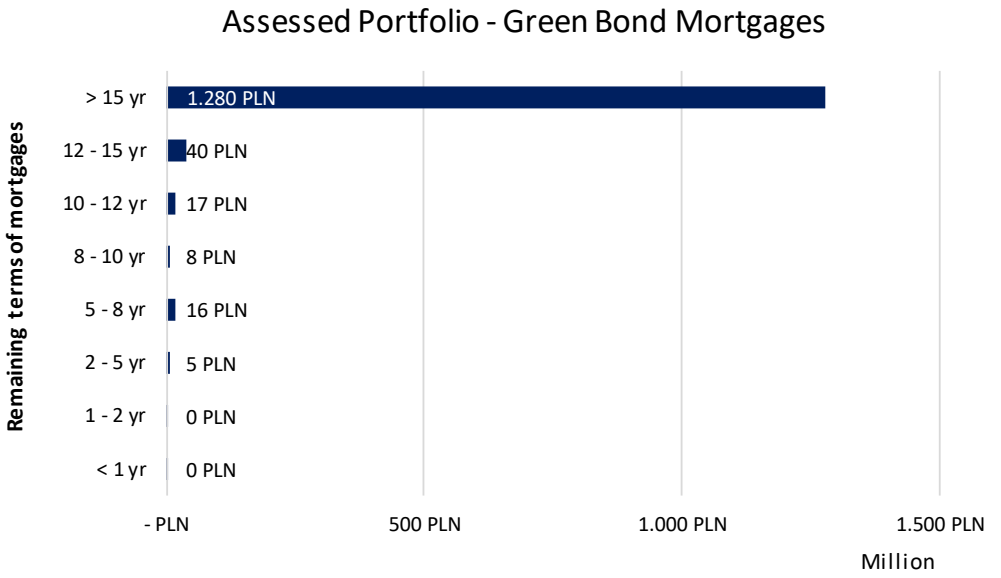


Figure 9-13: Green Bond assets - Remaining term of mortgages

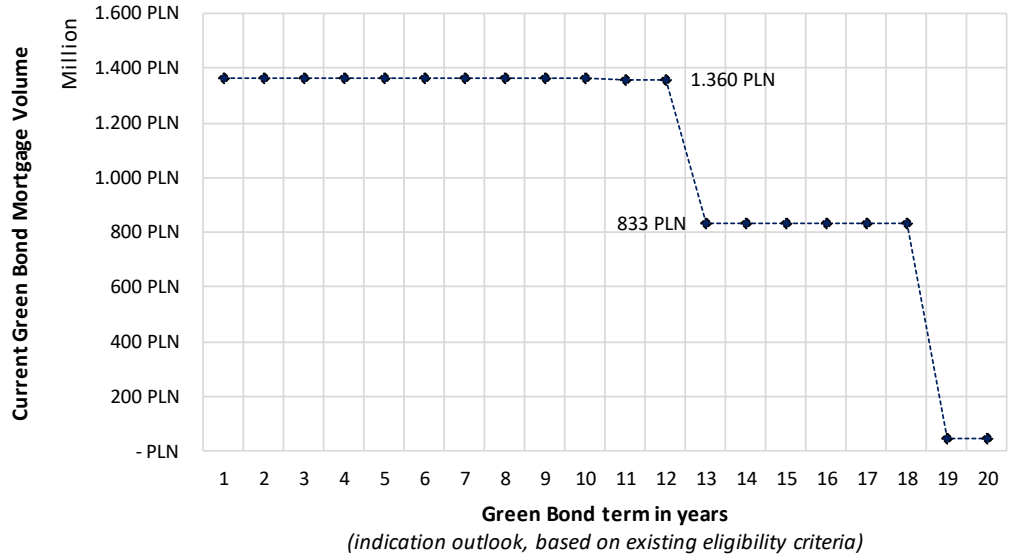


Figure 9-14: Green Bond Mortgage Volume based on term

10 Impact Reporting

A tool for continuous impact reporting based on the drafted methodology can be found in the appendix.

This tool is a Microsoft Excel-based spreadsheet, which allows the client to insert new assets and track their eligibility for the Green Bond. Furthermore, it enables a deep analysis and evaluation of the assets including their environmental energy and carbon emissions savings.

A detailed breakdown for mBank-BH' assessed portfolio and its buildings' usage, exposure and environmental savings can be found in the sections 7.1 to 7.6. The harmonized framework table completes the continuous impact reporting.

Low Carbon Buildings	Year of Issuance	Type	Signed Amount[a]	Share of Total Portfolio Financing[b]	Eligibility for green bonds[c]	Average portfolio lifetime[d]	Annual primary energy savings[e]	Annual CO_2 emissions avoidance[f]
Unit	*[yyyy]*	*[-]*	*[PLN]*	*[%]*	*[%]*	*[years]*	*[MWh/year]*	*[tCO_2/year]*
MBank Green Bond	2020	Low Carbon Building	1.314.896.705	100,0	100	23,3	46.739	17.975
- Single-Family Home	2020	Low Carbon Building	526.870.176	40,1	100	23,9	25.487	9.802
- Multi-Family Home	2020	Low Carbon Building	788.026.529	59,9	100	23,1	21.252	8.173
- Single-Family Home	2020	Property Upgrade	7.305.150	0,6	0	19,4	459	176
- Multi-Family Home	2020	Property Upgrade	43.217.907	3,3	0	22,0	2.029	780

[a] Legally committed signed amount by the issuer for the porfolio or portfolio components eligible for green bond financing.
[b] Portion of the total portfolio cost that is financed by the issuer.
[c] Portion of the total portfolio cost that is eligible for Green Bond.
[d] average remaining term of Green Bond loan within the total portfolio.
[e] Primary energy savings calculated using the difference between the top 15% and the national building stock benchmarks
[f] Greenhouse gas emissions avoidance determined by multiplying the primary energy savings with the carbon emissions intensity

Figure 10-1: mBank-BH's Green Bond - Portfolio Results for 2020

A proposal for the impact reporting layout, based on the EU green bond standard is illustrated in the following:

Project name	Project description	Sector and environmental objective	Total project cost	Share of financing	Amount of green bond proceeds allocated[a]			Project start date/end date (if relevant)	Share of proceeds used for financing vs refinancing	Nature of green asset / expenditure	Annual primary energy savings[b]	Annual CO_2 emissions avoidance[c]
Unit	*[-]*	*[-]*	*[PLN]*	*[-]*			*[PLN]*	*[-]*	*[-]*	*[-]*	*[MWh/Year]*	*[tCO_2/year]*
MBank Green Bond	Low Carbon Buildings Residential property & Property Upgrade	Low Carbon Buildings	6.877.804.147	20%		MBank Green Bond	1.314.896.705				44.252	17.019
					Low Carbon Building	Single-Family Home	526.870.176	2020 ongoing	100 % financig		25.028	9.626
						Multi-Family Home	788.026.529				19.224	7.393
					Property Upgrade	Single-Family Home	7.305.150				459	176
						Multi-Family Home	43.217.907				2.029	780

[a] Legally committed signed amount by the issuer for the porfolio or portfolio components eligible for green bond financing.
[b] Primary energy savings calculated using the difference between the top 15% and the national building stock benchmarks
[c] Greenhouse gas emissions avoidance determined by multiplying the primary energy savings with the carbon emissions intensity

Impact Reporting based on Report EU Green Bond Standard - Template from June 2019

Figure 10-2: mBank-BH's Green Bond - EU Green Bond Template

The initial impact reporting for the year 2020 was carried out by Drees & Sommer. Future adaptions can be offered to mBank-BH on demand for further consulting services.

11 Further development of Methodology & Process

Future adaptations of the impact reporting for the Green Bond methodology, requirement values, benchmarks and reference values e. g. EU laws, local laws, technical conditions, energy standards etc. can be offered to mBank-BH on demand for further consulting services.

This report covers 52 pages (incl. cover sheet and table of content, without appendix).

Stuttgart, 2020-07-16

Drees & Sommer
Advanced Building Technologies GmbH

Claudio Tschätsch

Tobias Burkard

12 Abbreviations

BPIE	Buildings Performance Institute Europe
CBI	Climate Bonds Initative
CO_2	Carbon Dioxide
Drees & Sommer	Drees & Sommer Advanced Building Technologies GmbH
EEA	European Environment Agency
EPC	Energy Performance Certificate
EU	European Union - Europe
GB	Green Bond
Gj	Giga joule – unit for energy demand or consumption
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilo Watt hours – unit for energy demand or consumption
LCT	Low Carbon Trajectory
MFH	Multi-Family House
m^2	Square meter
NAPE	Narodowa Agencja Poszanowania Energii / National Energy Conservation Agency
NEEAP	National Energy Efficiency Action Plan
PE	Primary Energy
PN	Polish norm, Poland's building energy code
SFH	Single Family House
TABULA	Typology Approach for Building Stock Energy Assessment
TC	Technical Condition

13 Appendix

13.1 Documentation on mBank-BH's Green Bond Methodology

13.2 mBank-BH's portfolio assessment