Annex to Resolution No 91 of the Council of Ministers
of 22 June 2015 (item 614)

MINISTRY OF
INFRASTRUCTURE AND DEVELOPMENT

The National Plan for Increasing the Number of Low-Energy Buildings

Warsaw, 2015

INTRODUCTION

Proper formulation of climate and energy policy to prevent environmental decay and support natural resource conservation and biodiversity is one of the essential challenges resulting from the provisions adopted by the Member States of the European Union. The implemented measures should increase innovativeness and bring about the implementation of new technologies in construction industry and in installation techniques, reduce energy intensity, generate new workplaces, and, consequently, improve the competitiveness of the economy and increase the level of prosperity of citizens.

The National Plan for Increasing the Number of Low-Energy Buildings, hereinafter referred to as the *National Plan*, was drawn up on the basis of Article 39(3) of the Act of 29 August 2014 on Energy Performances of Buildings (*Journal of Laws*, item 1200, and 2015, item 151). This Act transposes into national law part of the provisions of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13). Figures published in the *National Plan* shall provide information and implement the mandate for its preparation.

The *National Plan* includes the definition of low-energy buildings which reflects the current conditions as well as feasible and economically viable energy performance improvement measures for buildings. The document also presents government administration actions to promote low-energy buildings, including measures concerning the design, construction and alteration of buildings in a way that ensures their energy efficiency and which is aimed at increasing the use of energy from renewable sources in new and existing buildings, and sets out the schedule to achieve its objectives.

The present document was drawn up by the Ministry of Infrastructure and Development in cooperation with the members of the *National Plan* development team, basing on available sources.

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1. INTRODUCTION

1.1. Mandate

It should first be noted that under national legislation, 'nearly zero-energy buildings' are equated with and referred to as 'low-energy buildings' within the meaning of Article 39 of the Act of 29 August 2014 on Energy Performances of Buildings (*Journal of Laws*, item 1200, and 2015, item 151), hereinafter referred to as the 'Act of 29 August 2014 on Energy Performances of Buildings', which implements into national law part of the provisions of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153, 18.6.2010, p. 13) ('Directive 2010/31/EU').

The basis for the development of the *National Plan* is Article 39(3) of the Act of 29 August 2014 on Energy Performances of Buildings. Pursuant to Article 39(1) of this Act, the minister competent for construction, local planning, spatial development and housing shall prepare a draft version of the national plan for increasing the number of low-energy buildings, which shall be later adopted by the Council of Ministers by way of a resolution, in accordance with Article 39(3).

Article 39(2) of the Act of 29 August 2014 on Energy Performances of Buildings provides that the *National Plan* shall in particular include:

1) the definition of low-energy buildings and their detailed characteristics;
2) government administration actions taken in order to promote low-energy buildings, including actions with regard to the design, construction and alteration of buildings in a way that ensures their energy efficiency and which is aimed at increasing the use of energy from renewable sources in new and existing buildings;
3) a schedule for implementing the objectives referred to in point 2.

Pursuant to Article 9(1) of Directive 2010/31/EU, the Member States shall draw up national plans for increasing the number of nearly zero-energy buildings. These national plans may include targets differentiated according to the category of building.

The creation of the *National Plan* is consistent with the overall objective laid down in Article 9(1) of Directive 2010/31/EU, which provides that:

- by 31 December 2020, all new buildings should be nearly zero-energy buildings and
- after 31 December 2018, new buildings occupied and owned by public authorities should be nearly zero-energy buildings.

1.2. Main parts of the National Plan

Chapter 2 of the *National Plan*, which contains an introduction to the subject, includes the assessment of the structure of existing and newly constructed buildings together with the specification of their energy demand. Particular attention was given to households, which are one of the main energy consumers in Poland. It also includes a presentation of the changes introduced in the last years to the requirements for thermal insulation and energy-saving in buildings.

The key element of the *National Plan* is the definition of low-energy buildings in Poland, which takes into account the technical condition of existing developments, as well as feasible and economically justifiable measures to improve energy efficiency. This definition is drawn up and presented in Chapter 3 of the document.

In Chapter 4 of the *National Plan*, the overall objective and intermediate targets for the improvement of building energy efficiency are discussed together with the schedule for their implementation, with the support provided as specified in the subsequent points of this chapter.

The detailed features of the actions, taken mainly by government administration and intended to promote low-energy buildings, including actions with regard to the design, construction and alteration of buildings in a way that ensures their energy efficiency and which is aimed at increasing the use of energy from renewable sources in new and existing buildings, are also presented. In this chapter, amendments to the provisions that influence energy efficiency of buildings are discussed and a series of available financial mechanisms and other actions are specified, in particular aimed at increasing the public awareness of this subject. Furthermore, the issue of promoting the use of renewable energy sources in buildings is referred to, as well as the need to improve the technical condition of existing developments. The aspect of the comprehensive approach to energy efficiency is also emphasised.

Chapter 5 includes the summary and conclusions and Chapter 6 specifies the sources used to draw up the document.

2. NATIONAL BUILDING STOCK

2.1. Building stock structure

2.1.1. Existing development

The assessment of buildings' age structure was done on the basis of data from a publication *Zamieszkane budynki (Inhabited buildings)*[1] which presents the results of the National General Population and Housing Census carried out in 2011, and a publication *Opracowanie optymalnych energetycznie typowych rozwiązań strukturalno-materiałowych i instalacyjnych budynków (Development of the best possible options from the energy efficiency point of view as regards buildings' structure, materials, and installations)*[2] and on the basis of in-house studies.

The assessment was carried out in order to address the issue of energy efficiency with regard to existing buildings.

A significant part of existing building stock in Poland will soon require renovation or alteration. Works should include measures that improve the energy performance of buildings.

Buildings (Fig. 1) and housing stock age structure (Fig. 2) in Poland is presented below. According to the National General Population and Housing Census, in 2011 there were 5.54 million buildings in Poland, and the number of apartments amounted to 12.96 million.

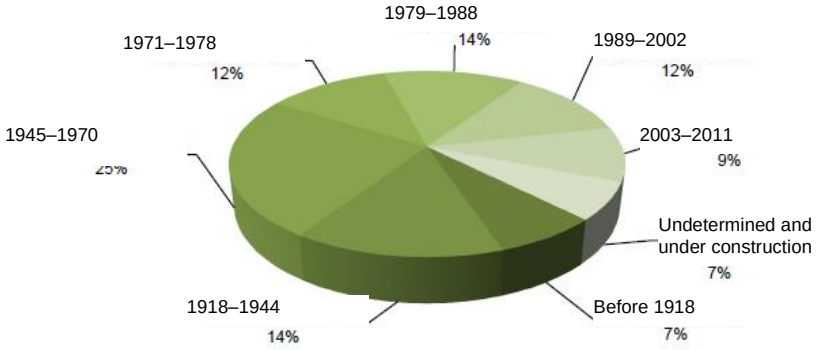

Figure 1. Share of buildings according to the period of their construction

[1] *Opracowanie założeń do krajowego planu mającego na celu zwiększenie liczby budynków o niemal zerowym zużyciu energii wraz z informacją dotyczącą przyszłości budownictwa „zero energetycznego" w Polsce*, Instytut Techniki Budowlanej (Building Research Institute), Warsaw, November 2011.

[2] *Opracowanie założeń do krajowego planu mającego na celu zwiększenie liczby budynków o niemal zerowym zużyciu energii wraz z informacją dotyczącą przyszłości budownictwa „zero energetycznego" w Polsce*, Instytut Techniki Budowlanej (Building Research Institute), Warsaw, November 2011.

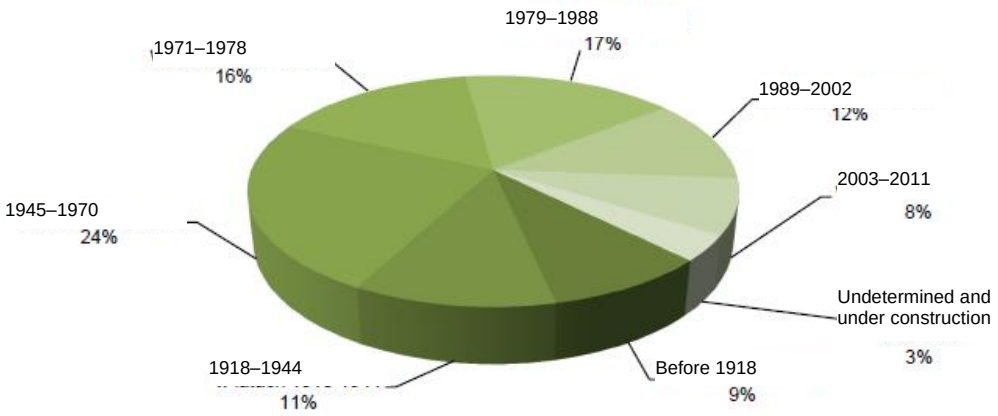

Figure 2. Share of apartments according to the period of their construction

In 2011, there were approximately 405 000 buildings from the oldest group, i.e. built before 1918. They constituted 7.3 % of the total of inhabited residential buildings. There were approximately 1.2 million apartments in these buildings, i.e. 9 % of the total number of apartments.

Buildings erected after the Second World War constitute 72.1 % of the total of inhabited residential buildings. In the cities this percentage was 71.1 % and in the countryside – 72.7 %. Apartments located in post-war buildings constituted 76.5 % of all apartments.

In the years 2003–2011, 522 600 residential buildings were put into service, while almost 30 000 were still under construction. The number of apartments in new buildings, i.e. those put into service after 2002, was approximately one million. This number of apartments may not be identified with the number of apartments in residential buildings built after 2002. Part of those apartments was built by adding extra floors, carrying out extensions or alteration works in older buildings.

The structure of residential buildings is considerably diversified age-wise (period of construction) throughout the country. In the Lubuskie, Dolnośląskie and Opolskie Provinces there is a much higher percentage of buildings constructed before 1945, compared with the provinces in central and eastern Poland.

In towns, the highest share of pre-war buildings was noted in the following provinces: Dolnośląskie – 40.4 % of the total of inhabited residential buildings, Lubuskie – 37.4 %, Opolskie – 36.1 % and Zachodniopomorskie – 35.1 %. The lowest percentage of buildings put into service before 1945 in towns is to be found in the Lubelskie – 11.6 %, Podlaskie – 11.7 % and Mazowieckie – 12.4 % Provinces.

In the countryside, buildings constructed before 1945 constituted more than a half of all inhabited residential buildings in some provinces. In the Lubuskie Province the proportion of such buildings in the countryside was 64.0 %, in Dolnośląskie – 60.6 %, in Zachodniopomorskie – 55.6 %, in Warmińsko-Mazurskie – 53.0 %, and in Opolskie – 52.3 %. The lowest percentage of buildings constructed before 1945 was in the countryside in Mazowieckie (7.9 %), Świętokrzyskie (8.1 %) and Lubelskie (10.1 %) Provinces.

In towns, the proportion of the most recent buildings, i.e. those built after 2002 or still under construction, was the highest in the following provinces: Mazowieckie (13.7 %), Podkarpackie (12.7 %) and Pomorskie (12.5 %), while the lowest percentage was in the towns of the Opolskie (7.5 %) and Świętokrzyskie (8.4 %) Provinces. In the countryside, the highest number of buildings constructed after 2002 in proportion to all inhabited residential buildings in that area was recorded in the Pomorskie (15.5 %), Dolnośląskie (12.2 %) and Wielkopolskie (11.8 %) Provinces. The lowest number of such buildings in the countryside was in the Opolskie (4.8 %), Świętokrzyskie (5.8 %), Podlaskie (6.0 %) and Lubelskie (6.1 %) Provinces.

Due to the large number of existing buildings, achieving adequate level of energy performance for

those structures shall have a significant effect on reducing non-renewable energy consumption throughout the entire building sector. Achieving a low value of the indicator of primary energy demand in existing buildings is usually more costly and the economically optimal level of energy standard is estimated to be slightly lower than for new buildings[3)].

2.1.2. New buildings

The scale of the issue of low energy demand with regard to newly constructed buildings can be illustrated on the basis of the number of buildings put into service. In 2013, 99 606 new buildings were put into service, including 77 575 new residential buildings and 22 031 non-residential buildings. Compared with 2012, there were 302 fewer new buildings put into service[4)].

[3)] *Opracowanie założeń do krajowego planu mającego na celu zwiększenie liczby budynków o niemal zerowym zużyciu energii wraz z informacją dotyczącą przyszłości budownictwa „zero energetycznego" w Polsce*, Instytut Techniki Budowlanej (Building Research Institute), Warsaw, November 2011.

[4)] *Budownictwo – wyniki działalności w 2013 r.*, GUS (Główny Urząd Statystyczny, Central Statistical Office), Warsaw, 2014, p. 40.

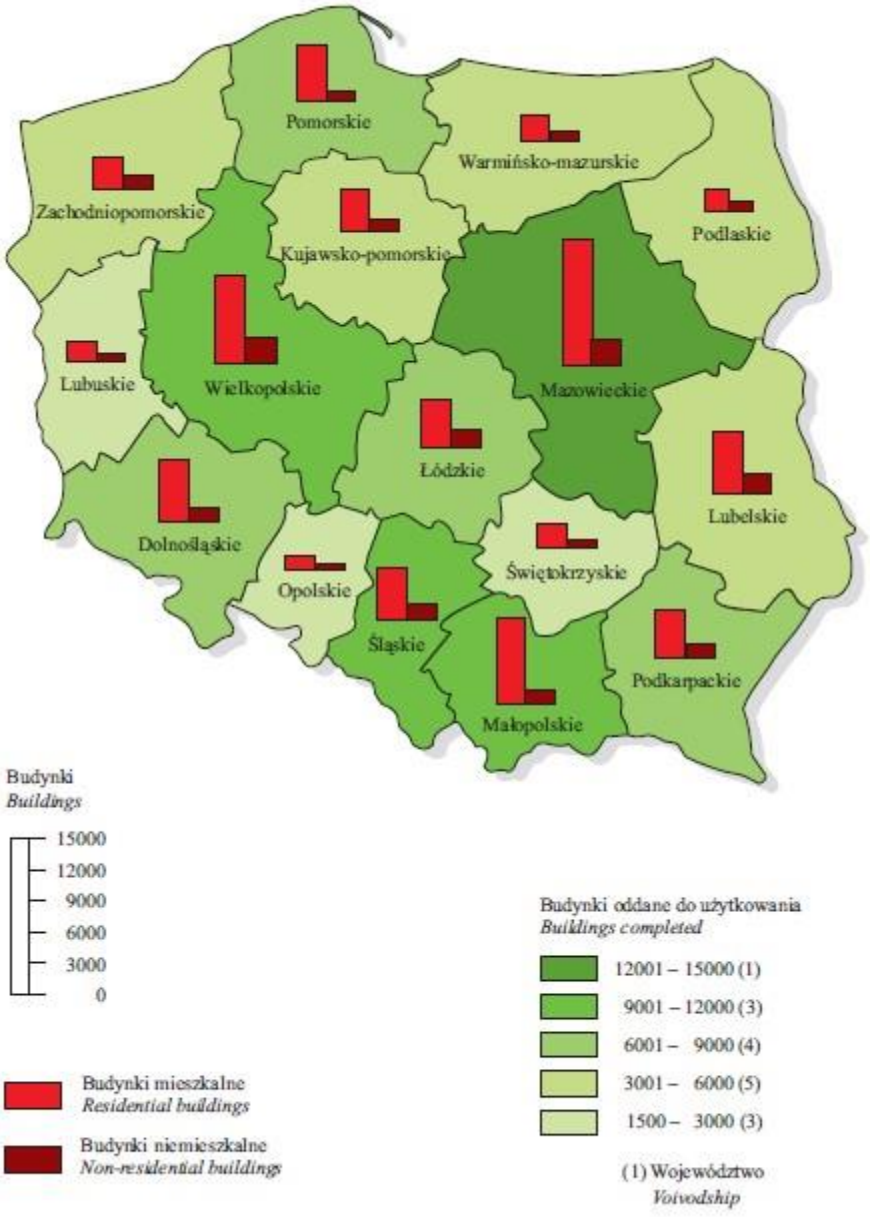

Figure 3. Buildings put into service by province and building type in 2013[5)]

[5] *Budownictwo – wyniki działalności w 2013 r.*, GUS, Warsaw, 2014, p. 72.

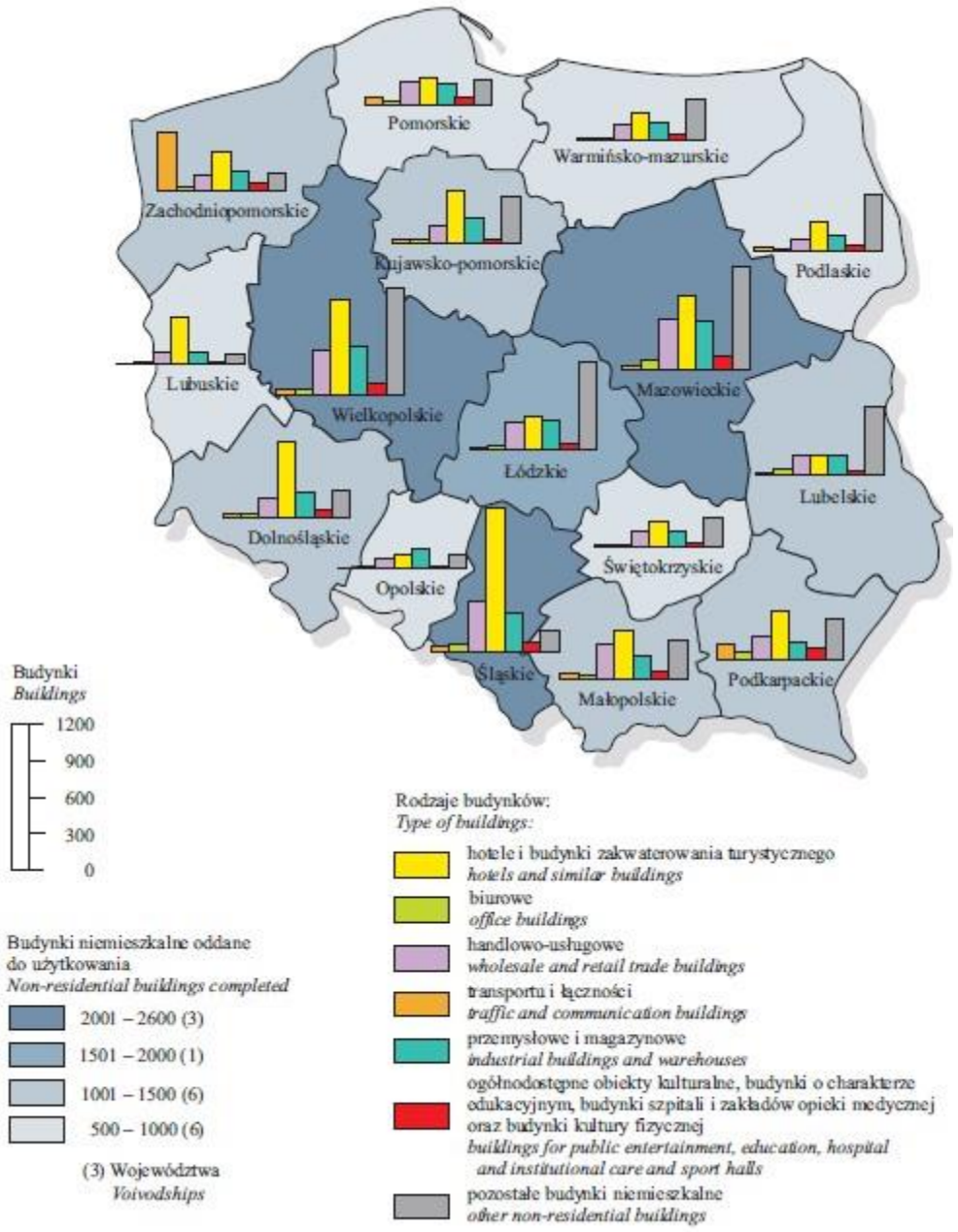

Figure 4. Non-residential buildings put into service by province and building type in 2013[6)]

Influencing the parameters which affect the value of the indicator of non-renewable primary energy or the indicator of final energy for the purposes of heating, ventilation, hot tap water preparation and lighting (except residential buildings) is usually easier in new buildings than in existing ones and the implemented measures are more comprehensive, energy-efficient and economically justifiable.

6) *Budownictwo – wyniki działalności w 2013 r.*, GUS, Warsaw, 2014, p. 123.

2.2. Use of energy

In the EU climate policy, the building sector is indicated as the one where economically viable actions will significantly contribute to greenhouse gas emission savings, enhancing energy efficiency and a higher proportion of energy coming from renewable sources.

Tables 1 and 2 and Figure 5 present the structure of using specific energy sources in Poland, including renewable sources. Taking account of this information is important to determine the optimum level of requirements regarding energy performance.

The raw material base for energy industry in Poland is made up of hard coal, lignite, crude oil, natural gas and additional energy sources, including renewable ones (above all biomass, water, wind and solar energy).
Table 1 includes data regarding primary energy consumption in Poland and its structure according to carrier types.

Table 1. Primary energy consumption and its structure in the national economy from 2008 to 2011 by carriers[7)]

Details	Year			
	2008	2009	2010	2011
Total primary energy consumption [TJ]	4 203 248	3 980 408	4 387 524	4 507 724
Proportion of consumption from specific sources [%]				
Hard coal	46.7	44.8	45.8	43.4
Lignite	12.7	12.8	11.0	11.6
Crude oil	21.3	21.7	22.1	22.8
Natural gas	13.4	13.7	13.3	13.1
Others[1)]	6.0	7.1	7.7	9.1

[1)] Firewood, peat, waste fuel, renewable energy, heat pumps.

Data from 2013 demonstrate that the most widely used renewable energy sources, contributing to 7.22 % of the total primary energy, include biomass, in particular wood and wood waste (more than 85 %) and water power (approx. 3 %), while the amount of energy generated from wind grows (to 3.5 %)[8)]. An increase in the production and consumption of renewable energy can be observed. Table 2 presents data regarding the production and consumption of renewable energy in Poland by generation sources, in tonnes of oil equivalent.

Table 2. Production and consumption of renewable energy in Poland by generation sources [%][9)]

Details	Year			
	2008	2009	2010	2011
Share of specific carriers in power generation from renewable sources				
Solid biomass	87.48	85.77	85.29	85.57
Geothermal energy	0.23	0.24	0.20	0.16
Wind energy	1.33	1.53	2.08	3.55
Water energy	3.42	3.37	3.65	2.58
Share in the total energy production [%]	7.24	8.99	10.20	11.19
Share in the total energy consumption [%]	5.23	6.37	6.56	7.22

[7] *Szósty raport rządowy i pierwszy raport dwuletni dla Konferencji Stron Ramowej Konwencji Narodów Zjednoczonych w sprawie zmian klimatu*, Ministry of the Environment, Warsaw, 2013, p. 25.

[8] *Szósty raport rządowy i pierwszy raport dwuletni dla Konferencji Stron Ramowej Konwencji Narodów Zjednoczonych w sprawie zmian klimatu*, Ministry of the Environment, Warsaw, 2013, p. 25.

[9] *Szósty raport rządowy i pierwszy raport dwuletni dla Konferencji Stron Ramowej Konwencji Narodów Zjednoczonych w sprawie zmian klimatu*, Ministerstwo Środowiska, Warsaw, 2013, p. 26.

According to the data provided by GUS (Central Statistical Office), the share of specific renewable energy carriers in the total power generation from renewable sources in 2013 amounted to: solid biofuels – 80.03 %, liquid biofuels – 8.20 %, wind energy – 6.05 %, water energy – 2.46 %, biogas – 2.12 %, municipal waste – 0.42 %, heat pumps – 0.33 %, geothermal energy – 0.22 %, solar energy – 0.18 %.

The implementation of obligatory commitments following from the energy and climate package requires that the share of at least 15 % of energy from renewable sources in the final gross energy consumption is reached by the end of 2020.

The ultimate objective with regard to RES can be achieved by implementing partial targets set in specific sectors: electricity, heat production and cooling and transportation (Fig. 5, Table 3).

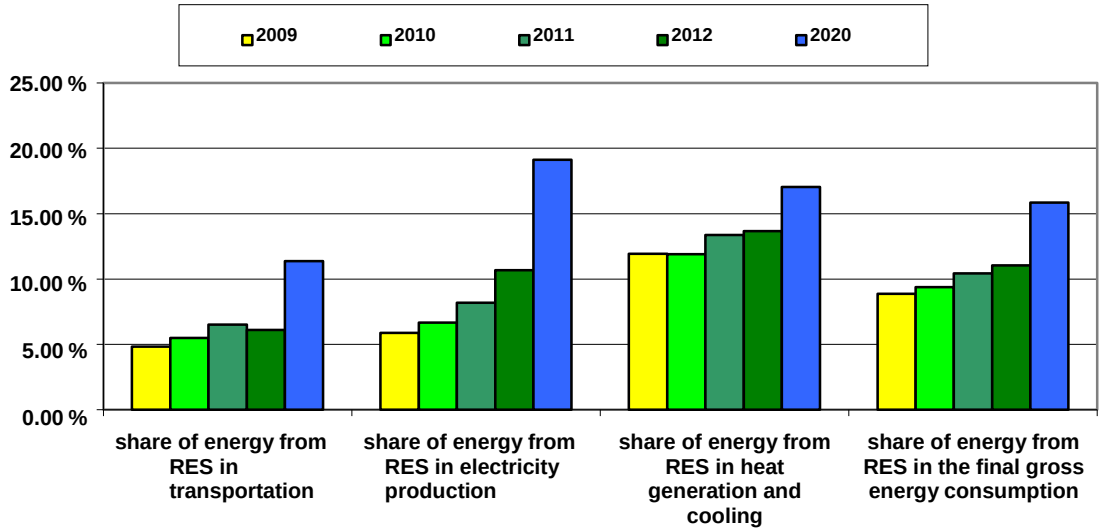

Figure 5. Share of RES in Poland and the target for 2020.

Table 3. Share of RES in Poland and the target for 2020.

	2009	2010	2011	2012	2013	2020*
share of energy from RES in transportation	4.82 %	5.49 %	6.51 %	6.09 %	6.03 %	11.36 %
share of energy from RES in electricity production	5.87 %	6.67 %	8.15 %	10.68 %	10.73 %	19.13 %
share of energy from RES in heat generation and cooling	11.92 %	11.91 %	13.07 %	13.31 %	13.89 %	17.05 %
share of energy from RES in the final gross energy consumption	8.87 %	9.39 %	10.28 %	11.89 %	11.25 %	15.85 %

** – estimated target for 2020 set in the National Renewable Energy Action Plan for Poland http://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans.*

2.3. Energy demand in households

Households in Poland are one of the largest energy consumers, contributing to the use of approx. 20 % of final energy (excluding motor fuels)[10)], which is reflected in the total energy consumption in the building sector. According to estimates, there were 14.57 million households in Poland at the end of 2011, while in 2012 and at the end of 2013 their number grew by approx. 69 500 and 56 600, respectively.

There were 13.7 million apartments in Poland in 2011. Unit energy consumption in apartments has decreased in recent years, which can be attributed to numerous actions aimed at reducing energy losses in district heating networks and increasing the efficiency of installed equipment.

[10)] *Zużycie energii w gospodarstwach domowych w 2012 r.*, GUS, Warsaw, 2014, p. 80.

The structure of energy consumption in households has a significant effect on energy efficiency of buildings. The current state and the recommendations regarding the structure of energy consumption in buildings are presented in the graphs below.

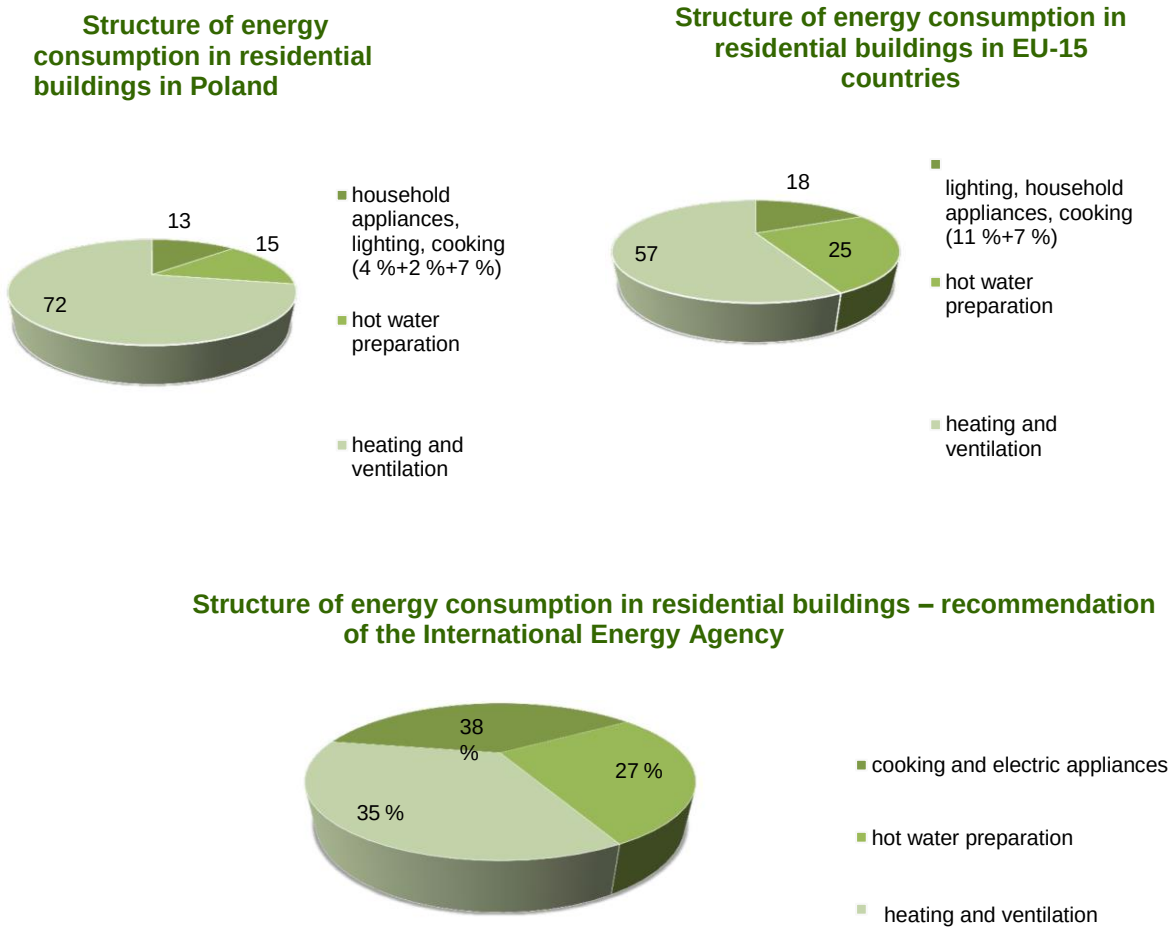

Figure 6. Structure of energy consumption in residential buildings[11)]

An important criterion in the overview of buildings is the method of heat supply for heating purposes. Heating demand in residential buildings contributes to the consumption of approximately 70 % of final energy used by households[12)].

According to a GUS study *Zużycie energii w gospodarstwach domowych w 2012* (*Energy consumption in households in 2012*)[13)], solid fuels and district heating clearly dominate in the heating of dwellings. Almost a half of Polish households (49.1 %) used heating appliances fired by solid fuels. The most commonly used were two-function central heating boilers which could be used for heat generation and for preparing hot tap water.

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11) Pogorzelski J. A., Kasperkiewicz K., Geryło R., *Budynki wielkopłytowe — wymagania podstawowe,* File 11 – 'Oszczędność energii i izolacyjność cieplna przegród. Stan istniejący budynków wielkopłytowych', Building Research Institute and materials of Thermal Physics Department of ITB, Warsaw, 2003.

12) *Efektywność wykorzystania energii w latach 1999–2009. Informacje i opracowania statystyczne*. GUS, Warsaw, 2011.

13) *Zużycie energii w gospodarstwach domowych w 2012 r. Informacje i opracowania statystyczne,* GUS, Warsaw, 2014.

Such boilers were used in 41.3 % of households using solid fuels for heating. Single-function boilers were used in 31.9 % of households using solid fuels for heating. In 19.2 % of households, the most traditional heating appliances were used: stoves, mainly ceramic (tiled). In 7 % of households using solid fuels, fireplaces were used, usually with a closed combustion chamber. In the other 0.6 % of households, the only heating appliance was a solid fuel cooker. 41.5 % of all households used district heating. Among district heating recipients, the great majority were inhabitants of multi-family residential buildings. Among district heating consumers, 60 % used it also to prepare hot tap water. The relatively low proportion of households using district heating system for this purpose has two main reasons:

- district heating is used for supplying heat to older buildings, where there was a central heating installation, but there was no internal hot water installation,
- there are small, local central heating systems whose operation in summer period is not economically viable.

Gas central heating boilers were also used for heating premises in 9.8 % of households. On the other hand, electric heating appliances were used by 5.4 % of households. However, they provided an additional (auxiliary) heating source, alongside the main heating system.

Figures No 7 and 8 below present the proportion of different methods of heating premises and hot tap water preparation, based on the study *Zużycie energii w gospodarstwach domowych w 2012 r.* (*Energy consumption in households in 2012*).

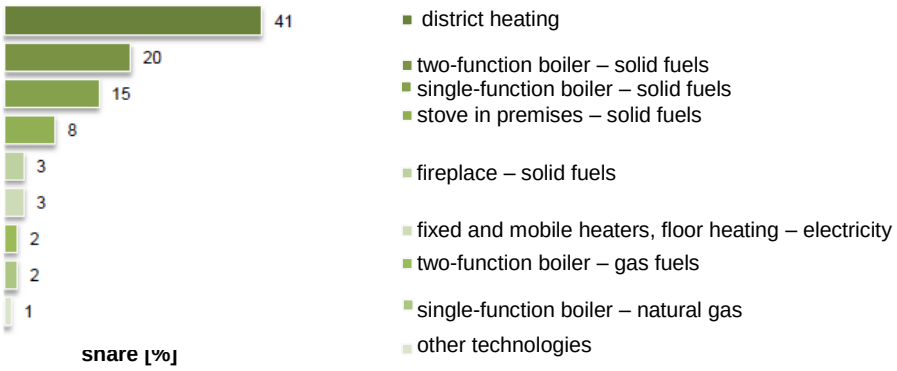

Figure 7. Methods of heating by heating technologies[14)]

[14)] *Zużycie energii w gospodarstwach domowych w 2012 r. Informacje i opracowania statystyczne*, GUS, Warsaw, 2014.

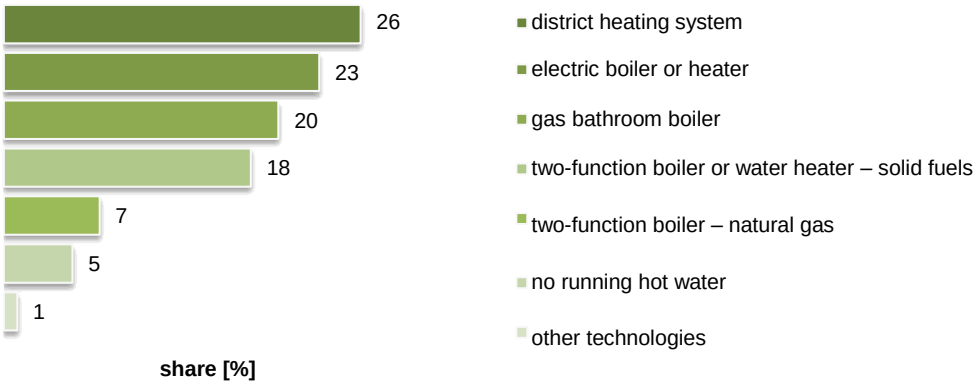

Figure 8. Methods of hot tap water preparation[14)]

2.4. Diagram of achieving the current level of requirements

2.4.1. Energy demand indicators

Depending on the year of erection, building stock is very diversified in terms of the level of demand for non-renewable primary energy, as shown in Table 4.

Table 4. Age structure of housing stocks in Poland and energy consumption[15)]

Item	Building construction period	Buildings		Apartments		EP	EK
	years	thousand	%	million	%	kWh/(m^{2}year)	kWh/(m^{2}year)
1	before 1918	404.7	7.3	1.18	9.1	> 350	> 300
2	1918–1944	803.9	14.5	1.45	11.2	300–350	260–300
3	1945–1970	1 363.9	24.6	3.11	24.0	250–300	220–260
4	1971–1978	659.8	11.9	2.07	16.0	210–250	190–220
5	1979–1988	754.0	13.6	2.15	16.6	160–210	140–190
6	1989–2002	670.9	12.1	1.52	11.7	140–180	125–160
7	2003–2007	321.6	5.8	0.60	4.6	100–150	90–120
8	2008–2011	205.1	3.7	0.41	3.2	-----	-----
9	under construction	27.7	0.5	0.04	0.3	-----	-----
10	undetermined	332.7	6.0	0.43	3.3	-----	-----
	total	5 544.3	100.0	12.96	100.0	-----	-----

Explanations: EP – represents an indicator defining annual demand for non-renewable primary energy per unit of floor area of premises with controlled air temperature, expressed in kWh/(m^{2}year); EK represents an indicator defining annual demand for final energy per unit of floor area of premises with controlled air temperature, expressed in kWh/(m^{2}year).

For years, a downward trend has been observed in the value of the indicator of energy demand for housing stock in Poland.
Figure 9 shows average values of EP and EK indicators expressed in [kWh/(m^{2}year)] for different building types.

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[15] Mańkowski S., Szczechowiak E. (ed.), Strategic research project *Zintegrowany system zmniejszenia eksploatacyjnej energochłonności budynków,* Research Task No 2, Vol. I, part A, 'Uwarunkowania przekształceń w budownictwie', Warsaw-Poznań, 2013, p. 66.

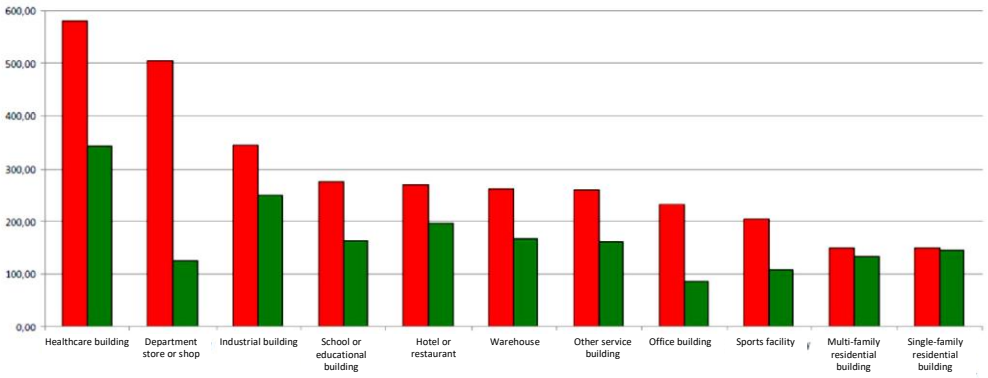

Figure 9. Average values of EP (in red) and EK (in green) indicators for buildings, according to their intended use, determined on the basis of existing energy performance certificates[15)]

2.4.2. Thermal insulation of the building envelope

The efforts to limit heat losses from buildings through the envelope and hence reduce energy consumption for heating are also demonstrated by changes introduced to the provisions regarding thermal transmittance coefficient U [W/(m^{2}K)] of exterior walls, floor slabs and windows. These changes can be studied in Table 5.

Table 5. Changes in the requirements regarding thermal transmittance coefficient U [W/m^{2}K] for multi-family buildings – heated to a temperature exceeding 16°C[16)]

Polish standard or legal provisions	External walls	Flat roof	Floor slab over unheated basement	Floor slab below unheated attic	Windows and balcony doors
PN-57/B-024051[a)]	1.16÷1.42	0.87	1.16	1.04÷1.163	-
PN-64/B-034041[a)]	1.16	0.87	1.16	1.04÷1.163	-
PN-74/B-034042[b)]	1.16	0.70	1.16	0.93	-
PN-82/B-020202[b)]	0.75	0.45	1.16	0.40	2.0÷2.6
PN-91/B-020202[b)]	0.55 0.70[d)]	0.30	0.60	0.30	2.0÷2.6
Technical and construction provisions (year 1997)[b)]	0.30÷0.65[c)]	0.30	0.60	0.30	2.0÷2.6
Technical and construction provisions (year 2002)[b)]	0.30÷0.65[d)]	0.30	0.60	0.30	2.0÷2.6
Technical and construction provisions (year 2009)[b)]	0.30	0.25	0.45	0.25	1.7÷1.8
Technical and construction provisions (year 2014)[b)]	0.25	0.20	0.25	0.20	1.3÷1.5
Explanations: [a)] = 18°C, [b)] = 20°C, [c)] depending on wall type (with or without openings), [d)] depending on wall type and structure.					

[16] Pogorzelski J. A., Kasperkiewicz K., Geryło R., *Budynki wielkopłytowe – wymagania podstawowe.* File 11 – *Oszczędność energii i izolacyjność cieplna przegród. Stan istniejący budynków wielkopłytowych*. ITB, Warsaw, 2003.

3. DEFINITION OF LOW-ENERGY BUILDINGS

In accordance with Article 39(2)(1) of the Act of 29 August 2014 on Energy Performances of Buildings, the *National Plan* includes, inter alia, the definition of low-energy buildings and their detailed characteristics.

In reference to Article 2(2) of Directive 2010/31/EU, 'nearly zero-energy building' means a building that has a very high energy performance, as determined in accordance with Annex I to this Directive. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

It should be noted that under national legislation, 'nearly zero-energy buildings' are equated with and referred to as 'low-energy buildings' within the meaning of Article 39 of the Act of 29 August 2014 on Energy Performances of Buildings, which implements into national law part of the provisions of Directive 2010/31/EU.

This document includes the Polish definition of low-energy buildings, which is recommended for practical application.

Definition: 'Low-energy building' shall mean a building which complies with energy-saving and thermal insulation requirements included in technical and construction provisions referred to in Article 7(1)(1) of the Act of 7 July 1994 – Construction Law (*Journal of Laws* 2013, item 1409, as amended), i.e. in particular Section X and Annex No 2 to the Regulation of the Minister for Infrastructure of 12 April 2002 on technical conditions to be met by buildings and their location (*Journal of Laws* No 75, item 690, as amended) in force from 1 January 2021, and for buildings occupied or owned by public authorities – from 1 January 2019.

Selected detailed requirements to be satisfied by 'low-energy buildings' under national legal provisions are presented in Annex No 1 to the *National Plan*. It should be noted that the relevant technical and construction provisions lay down the minimum level of requirements, hence it is possible to achieve better parameters in terms of energy efficiency.

The minimum level of requirements set out in Section X and in Annex No 2 to the Regulation of the Minister for Infrastructure of 12 April 2002 on technical conditions to be met by buildings and their location (hereinafter referred to as 'Regulation of 12 April 2002 on technical conditions to be met by buildings and their location') was established on the basis of Commission Delegated Regulation (EU) No 244/2012 of 16 January 2012 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements (OJ L 81, 21.3.2012, p. 18, as amended) and recommended as economically optimal.

Member States calculate the cost-optimal level of minimum energy performance requirements pursuant to Article 5(2) of Directive 2010/31/EU and report to the European Commission on all input data and assumptions used for the calculation of those levels at regular intervals not exceeding five years.

Considering the above, the level of requirements regarding energy-saving and thermal insulation that came into force on 1 January 2014 will have to be verified and updated within the next 5 years in order to ensure the cost-optimal level of minimum energy performance requirements, and the European Commission will be informed of this fact.

Each update of those requirements shall take into account benefits that foster innovation by creating demand for energy-efficient materials and construction technologies. Requirements set for newly constructed buildings shall also maximise savings connected with the use of building throughout its lifetime so that the total investment expenditure during construction, as well as the operating costs to be borne later, are as low as possible.

Given the potential for the development of energy-efficient building construction technologies and the technologies to be applied in those buildings, it is important to constantly encourage research and analyses on innovative solutions and support their application in buildings. Increasing the thermal insulation level of construction materials, the efficiency of heating and air-conditioning appliances and using heat recovery devices in ventilation systems reduces irrecoverable energy losses. Research development, followed by the implementation and application of modern technologies and their dissemination, can shape the lines of progress for the Polish economy and innovativeness, providing a significant impulse for the development of the country.

Chapter 4.5 *Establishing building energy standards* puts emphasis on the most important technical aspects of existing modern solutions that can be applied in buildings in order to improve their energy efficiency.

The issues concerning the use of energy from renewable sources are discussed in detail in Chapter 4.4 of the *National Plan*.

4. ACTIONS AND SUPPORT

Pursuant to Article 39(2)(2) and 39(2)(3) of the Act of 29 August 2014 on Energy Performances of Buildings, the *National Plan* also includes government administration actions taken in order to promote low-energy buildings, including actions with regard to the design, construction and alteration of buildings in a way that ensures their energy efficiency and which is aimed at increasing the use of energy from renewable sources in new and existing buildings, as well as a schedule for implementing the objectives referred to in the context of those actions.

4.1. Objectives and schedule

In accordance with Article 9(3)(b) of Directive 2010/31/EU, the *National Plan* includes, inter alia, intermediate targets for the year 2015 for improving the energy performance of new buildings, laid down with a view to preparing the implementation of the goal that all new buildings should be nearly zero-energy buildings by 31 December 2020 and new buildings occupied and owned by public authorities should be nearly zero-energy buildings after 31 December 2018.

Intermediate targets assume that technical and construction provisions concerning energy-saving should be gradually amended, as discussed in detail in Chapter 5 of the *National Plan* and in Annex No 1 to this document.

The requirements laid down in the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location for new buildings, applicable from 1 January 2014, which determine both the thermal insulation level of building partitions and relevant low-value EP indicator [kWh/m^2/year] can be considered the intermediate target for 2015. Pursuing the level of requirements that will be applicable as from 1 January 2017 is also an intermediate target. A gradual change in the level of requirements shall facilitate a smooth adaptation of the construction market to changing legal provisions. At the same time, those changes are expected to bring about the development of innovative solutions and the application of new energy-efficient construction technologies. Construction is a good example of an industry where environmental issues go hand in hand with economic interests. Actions aimed at increasing building efficiency not only contribute to reduced emissions in the entire economy, but – above all – lead to lower operating costs in buildings.

Changes in the level of energy-saving and thermal insulation requirements, listed in Annex No 1 to the *National Plan,* in force from 1 January 2014 and those that will become applicable from 1 January 2017 and 1 January 2021, constitute a schedule for achieving the objectives mentioned above.

To illustrate this issue, below is a diagram presenting the pursuit of one of the requirements for an external wall of a new building together with a schedule for its implementation (the level of the indicator is compliant with the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location).

Target component: maximum value of thermal transmittance coefficient $U_{C(max)}$ [W/(m^2·K)] for external wall

Schedule	**from 1 January 2014**	**from 1 January 2017**	**from 1 January 2021*)**
Target component	**intermediate**		**main**
External walls:			
a) at $t_i \geq 16°C$	0.25	0.23	0.20
b) at $8°C \leq t_i < 16°C$	0.45	0.45	0.45
c) at $t_i < 8°C$	0.90	0.90	0.90
*) From 1 January 2019 in the case of buildings occupied or owned by public authorities.			

At the same time, Article 40 of the Act of 29 August 2014 on Energy Performances of Buildings provides that the minister competent for construction, local planning, spatial development and housing shall undertake an information campaign to improve the energy performance of buildings.

4.2. Policies and funds

Article 9(3)(c) of Directive 2010/31/EU provides that the national plans shall include: ‘information on the policies and financial or other measures adopted in the context of paragraphs 1 and 2 for the promotion of nearly zero-energy buildings, including details of national requirements and measures concerning the use of energy from renewable sources in new buildings and existing buildings undergoing major renovation in the context of Article 13(4) of Directive 2009/28/EC and Articles 6 and 7 of this Directive’.

4.2.1. Amendments to construction provisions

The promotion and drafting of relevant provisions concerning energy-saving and environmental protection forms part of the national strategy.

The implementation of Directive 2010/31/EU encompasses the modification of existing and the introduction of new provisions aimed at economically viable improvement of buildings' energy performance by reducing energy demand for heating, cooling, hot tap water preparation and lighting, as well as ensuring the proper energy standard of newly constructed buildings and those subject to alteration.

Questions regarding energy savings and thermal insulation in respect of buildings designed, newly constructed, or subject to alteration, or buildings whose intended use is changed, are dealt with in Section X of the **Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.**

The amendment of this Regulation that came into force as from 1 January 2014 altered existing and added new requirements regarding the technical equipment of buildings, parameters influencing their energy saving characteristics and the quality of thermal protection. Those requirements would still apply to the design, construction and alteration of buildings, as well as to the procedure of changing the use of buildings.
In accordance with the amended technical and construction provisions, buildings and their installations: heating, ventilation, air-conditioning, hot water, and, in the case of public utility buildings, collective accommodation buildings, production premises, auxiliary and storage buildings, also incorporated lighting, should be designed and made in such a way as to ensure that the minimum requirements are met.

The minimum requirements shall mean, inter alia:

- ensuring that the value of the EP indicator [kWh/(m^2year)] which determines annual measured demand for non-renewable primary energy to be used for heating, ventilation, cooling, hot tap water preparation, and, in the case of public utility buildings, collective accommodation buildings, production premises, auxiliary and storage buildings, also incorporated lighting, calculated according to the methodology for the calculation of energy performance of buildings, is lower than the limit value specified in the Regulation,
- meeting the requirements for thermal insulation of building partitions and technical equipment as specified in Annex No 2 to the above Regulation.

Minimum requirements are considered to be met for buildings subject to alteration if the envelope and technical equipment which are subject to alteration works satisfy at least the thermal insulation requirements specified in the Regulation mentioned above.

The level of requirements for energy-saving and thermal insulation will be gradually increased until 2021. Such a phased approach shall allow for a smooth adjustment of the construction market to the legal provisions in force.

The system of assessing energy performance of buildings was introduced by the provisions of the **Act of 7 July 1994 – Construction Law** and it functioned under those provisions until 9 March 2015. Since then, the system functions under the provisions of the **Act of 29 August 2014 on Energy Performances of Buildings.** The system covers obligations concerning the process of issuing and submitting energy performance certificates of buildings in certain legal situations and conducting periodic checks on heating and air-conditioning systems in buildings. Starting from 1 July 2012, the list in Article 3 of the Act of 7 July 1994 – Construction Law includes two new definitions: 'renewable energy source (RES)' and 'useful heat from cogeneration'. This amendment ensures a clear understanding of these terms, consistent with the Act of 10 April 1997 – Energy Law (*Journal of Laws* 2012, item 1059, as amended). The terms are used in the Act of 7 July 1994 – Construction Law, in the acts adopted pursuant to this legislation and in the provisions concerning buildings' energy efficiency.

In connection with the amendment to the provisions regarding construction design, the new wording of the **Regulation of the Minister for Transport, Construction and Maritime Economy of 25 April 2012 on the detailed form and scope of a construction design** (*Journal of Laws*, item 462, and 2013, item 762) came into force as from 3 October 2013.

The amendment covered changes in the provisions concerning the technical description included in the construction design and extended the obligation to analyse possibilities to rationally use highly efficient alternative systems to all buildings (until then, this obligation only applied to buildings whose useful floor area exceeded 1 000 m^2), and modified the required scope of the analysis. In accordance with the new wording of Section 11(2)(12) of the Regulation, the technical description of the architectural and construction design should include the analysis of possibilities to rationally use highly efficient alternative energy and heat supply systems, including decentralised energy supply systems based on renewable energy sources, cogeneration, district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources and heat pumps. The use of these systems should be considered during the preparation of the construction design, which is then approved by way of a building permit decision or a decision on the approval of a construction design. The scope of the analysis is also specified. The analysis can be carried out for all buildings of the same use and of similar technical and functional parameters, located within a certain area. These arrangements aim at popularising alternative solutions where economically, technically and environmentally justified.

Another important legal act is the **Regulation of the Minister for Infrastructure and Development of 27 February 2015 on the methods of determining the energy performance of a building or a building part and energy performance certificates** (*Journal of Laws*, item 376). This Regulation addresses the process of determining energy performance (also using the method based on the amount of energy actually consumed), calculations of CO_2 emissions and the share of renewable energy sources in the annual demand for final energy. It also includes a model energy performance certificate. In addition, the energy performance certificate shall include recommendations for available measures to improve the efficiency of energy use. The person preparing the certificate shall be obliged to share their expertise, which will significantly influence the awareness of building owners and users regarding economically viable and energy-efficient improvements of energy performance. In view of the above and mindful of Article 11(5) of Directive 2010/31/EU, it is recommended that public authorities, taking into account the leading role which they should play with regard to energy performance, consider the guidelines included in the certificates when taking actions aimed at improving the energy performance of the buildings they own.

Considering the wide range of energy-efficiency issues to be dealt with, a new regulation was created, i.e. – the Act of 29 August 2014 on Energy Performances of Buildings. Hence, the provisions governing buildings' energy performance, which hitherto were included in the Act of 7 July 1994 – Construction Law, have largely been repealed and included in a separate legal act, i.e. in the **Act of 29 August 2014 on Energy Performances of Buildings**.

The purpose of this Act is the promotion of the improvement of buildings' energy performance and the enhancement of the existing assessment system for buildings' energy performance, taking into account the experience gained so far.

The Act extended the list of persons authorised to draw up energy performance certificates, specified the method of carrying out checks of heating or air-conditioning systems, introduced the verification of existing certificates and reports on checks – ex officio or upon request by a party. Moreover, a central register of energy performance of buildings was created, with lists of:

1) persons authorised to draw up energy performance certificates;
2) persons authorised to carry out checks of heating or air-conditioning systems;
3) energy performance certificates;
4) reports on checks of heating or air-conditioning systems;
5) buildings whose useful floor area occupied by law enforcement authorities, a public prosecutor's office or public administrative authorities exceeds 250 m^2 and where customers are served.

Table 6. Main legal acts governing buildings' energy efficiency in Poland

Document title	Document description
The Act of 7 July 1994 – **Construction Law**(*Journal of Laws* 2013, item 1409, as amended)	Pursuant to the Act, implementing acts were issued, laying down the *detailed scope and form of a construction design*, as well as technical and construction provisions, i.e. *technical conditions to be met by buildings and their location*.
The Act of 29 August 2014 **on Energy Performances of Buildings** (*Journal of Laws*, item 1200, and 2015, item 151)	The Act of 29 August 2014 on Energy Performances of Buildings governs the following issues: – it includes provisions on the system of energy assessment of buildings and sets out requirements in terms of educational attainment for people applying to be entered in the register of persons authorised to draw up energy performance certificates and extends the list of entities that are entitled to apply for an entry in the register of persons authorised to carry out checks of heating or air-conditioning systems; – establishes the obligation concerning checks of heating or air-conditioning systems; – provides for the verification of energy performance certificates and reports on heating (including boilers) and air-conditioning system checks by an independent body; – includes a mandate for the minister competent for construction, local planning, spatial development and housing to prepare the national plan for increasing the number of low-energy buildings; – introduces the obligation of holding a certificate for buildings whose useful floor area occupied by law enforcement authorities, a public prosecutor's office or public administrative authorities exceeds 250 m^2 and where customers are served and the obligation of displaying the certificate in a prominent place; – introduces the obligation of providing information on energy efficiency of buildings or their parts in sales or lease advertisements, if a certificate has already been drawn up for the building or its part; – introduces a central register of energy performance of buildings, including lists of: 1) persons authorised to draw up energy performance certificates; 2) persons authorised to carry out checks of heating or air-conditioning systems; 3) energy performance certificates; 4) reports on checks of heating or air-conditioning systems;

Document title	Document description
	5) buildings whose useful floor area occupied by law enforcement authorities, a public prosecutor's office or public administrative authorities exceeds 250 m^2 and where customers are served.
The Act of 15 April 2011 **on Energy Efficiency** (*Journal of Laws* No 94, item 551, as amended)	This Act establishes, inter alia, the national objective for efficient energy management, the tasks of public sector bodies with regard to energy efficiency and the rules for drawing up energy efficiency audits. Article 10 of the Act details the measures for improving energy efficiency by public sector bodies, also with regard to the buildings they use. Article 17 of the Act provides for a series of undertakings aimed at improving energy efficiency in order to obtain 'white certificates'.
The Act of 21 November 2008 **on supporting thermomodernisation and repairs** (*Journal of Laws* 2014, item 712)	This Act lays down principles governing the use of resources from the Thermomodernisation and Repairs Fund to finance a part of the costs of thermomodernisation and repair projects. The following implementing acts were issued on the basis of this legislation: – Regulation of the Minister for Infrastructure of 17 March 2009 on the detailed method of verifying energy audit and a part of repairs audit and detailed conditions to be met by entities to whom Bank Gospodarstwa Krajowego may commission the verification of audits (*Journal of Laws* No 43, item 347), – Regulation of the Minister for Infrastructure of 17 March 2009 on the detailed scope and form of energy audit and a part of repairs audit, templates of audit sheets, and the algorithm for evaluating the cost-effectiveness of thermomodernisation projects (*Journal of Laws* No 43, item 346).
Regulation of the Minister for Infrastructure of 12 April 2002 **on technical conditions to be met by buildings and their location** (*Journal of Laws* No 75, item 690, as amended)	The Regulation lays down technical conditions with which buildings and related equipment shall comply, as well as the requirements for their location on building plot and the development of plots of land intended for building purposes. The provisions apply to the design, construction and alteration of buildings, as well as to the change of the buildings' use. Section X of the Regulation concerns energy-saving and thermal insulation. The application of those provisions contributes to the reduction of energy consumption in the building sector.
Regulation of the Minister for Transport, Construction and Maritime Economy of 25 April 2012 **on the detailed form and scope of a construction design** (*Journal of Laws*, item 462, as amended)	The Regulation lays down the detailed scope and form of a construction design which constitutes a basis for issuing a building permit decision. The amended version extends the obligation to analyse the application of highly efficient alternative systems using energy from renewable sources, including heat pumps, if available and technically, environmentally and economically feasible. This analysis should be carried out before the start of the construction phase.
Regulation of the Minister for Infrastructure and Development of 27 February 2015 **on the methods of determining the energy performance of a building or a building part and energy performance certificates** (*Journal of Laws*, item 376)	This Regulation specifies: 1) the methodology of calculation of energy performance; 2) rules for drawing up energy performance certificates; 3) model energy performance certificates.

4.2.2. Financial support measures

The aid measures listed below intended for investment projects aimed at improving energy efficiency in buildings are the main, but not the only, source of co-financing of investments supporting the development of an energy efficient construction sector and the use of renewable energy sources.

Correct distribution of available resources among individual beneficiary groups and investment projects is very important. All of the listed programmes support the development of low-energy buildings. Annex No 2 to the *National Plan* presents the availability of funds under each programme described in this chapter, classified by building type and beneficiary groups.

The diagram below (Fig. 10) shows available sources of funding.

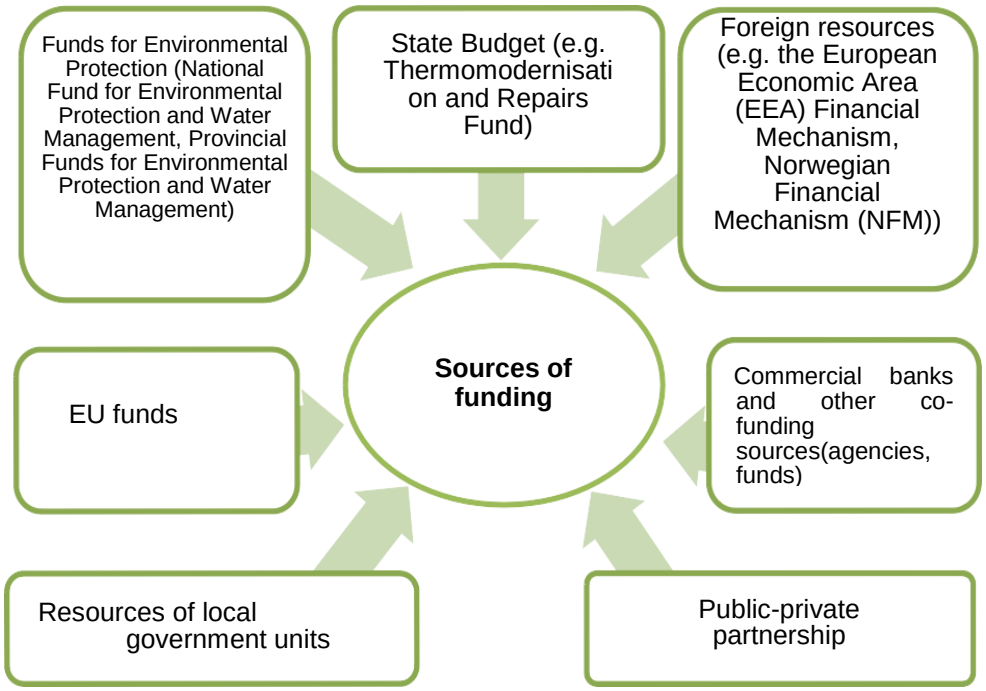

Figure 10. Available sources of funding for investment projects.

National Fund for Environmental Protection and Water Management (NFOŚiGW)[17)]

NFOŚiGW is a source of funding for numerous activities that improve energy efficiency, also in the construction sector.

Domestic funds

Name of the programme	***Subsidies to bank loans for the construction of energy-efficient houses***
Objective	Energy savings and reduction of or avoiding CO_2 emissions by co-financing projects which improve the efficiency of energy use in newly constructed residential buildings.
Budget	Funds disbursed for undertaken and planned commitments in the form of non-reimbursable grants under this programme amount to PLN 300 million. Those funds shall allow for the construction of approx. 12 000 single-family houses and apartments in multi-family residential buildings.
Implementation period	This programme will be implemented between 2013 and 2022. Disbursement of funds until 31 December 2022.
Forms of co-financing	Subsidy for a partial repayment of the bank loan capital made through a bank on the basis of a cooperation agreement concluded with NFOŚiGW.

[17)] Information provided by NFOŚiGW.

Beneficiaries	▪ individuals building new single-family houses; ▪ individuals buying new single-family houses and apartments in multi-family residential buildings from developers (housing associations).
Description	One of the conditions for receiving the support is the achievement of the required usable energy demand by satisfying the requirements included in the guidelines (attached to the Programme), i.e. minimum technical requirements, requirements for the construction design, requirements for the completed project and ensuring proper quality of construction works. NF40 and NF15 standards for residential buildings include a series of requirements developed specially for this funding programme, and which in several respects exceed and extend the requirements following from applicable legal provisions and the definition of a low-energy building.
Effects	▪ Completed construction of 91 single-family houses in NF40 and NF15 standards for the funding in the amount of PLN 2 910 000; ▪ More than one hundred buildings built in NF15 and NF40 standards; ▪ 17 positively verified single-family and multi-family housing estates.

Name of the programme	**LEMUR – Energy Efficient Public Utility Buildings[18)]**
Objective	The objective of the programme is to avoid CO_2 emissions by designing and constructing new energy-saving public utility buildings and collective accommodation buildings.
Budget	Funds disbursed for undertaken and planned commitments in the form of non-reimbursable grants under this programme amount to PLN 300 million.
Implementation period	This programme will be implemented between 2013 and 2020. Funds to be spent until 2020.
Forms of co-financing	▪ subsidy for design documentation – 60 %, 40 % or 20 % depending on the energy-efficiency class of the building (A, B or C); ▪ loans for the construction of new energy-efficient buildings up to PLN 1 200.00 per m^2 for class A, up to PLN 1 000.00 per m^2 for classes B and C, with a possible redemption of 60 %, 40 % or 20 % depending on the energy-efficiency class of the building (A, B or C).
Beneficiaries	▪ entities of the public finance sector, except public budget institutions; ▪ legal persons of the local government, commercial companies in which local government units have 100 % of shares and which are assigned to carry out the statutory tasks of local government units specified in relevant acts; ▪ non-governmental organisations, including foundations and associations; churches and other religious associations entered into the register of churches and other religious associations, church legal persons which carry out public duties on the basis of separate provisions.
Description	The programme covers the design and construction of new buildings: ▪ public utility buildings – intended for public administration, culture, learning, higher education, science and education, ▪ healthcare, social care, welfare, tourism, sport, ▪ collective accommodation buildings – intended for temporary stay (boarding houses, student housing) and permanent stay (orphanages, pensioners' houses).

[18)] The programme will be changed in Q2/Q3 2015.

	Buildings included in the programme shall comply with the technical guidelines which lay down the detailed rules for the form and level of requirements regarding energy standard, which were developed for the purposes of the scheme and which take into account the applicable technical and construction provisions and the provisions concerning the calculation of energy performance of buildings.

Name of the programme	**Prosumer – co-financing intended for the purchase and installation of renewable energy sources micro-plants**
Objective	The objective of the programme is to achieve the environmental effect consisting in reducing or avoiding CO_2 emissions by increasing energy production from renewable sources through the purchase and installation of small- and micro-renewable energy plants.
Budget	The programme has a budget of PLN 800 million.
Implementation	2014–2022, with loan contracts available until 2020.
Forms of co-financing	Credits with subsidies amounting to 100 % of eligible costs, including: ▪ subsidy of 20–40 % of co-financing amount (15 or 30 % after 2015); ▪ loan at 1 % interest rate per annum (loan/credit funding period up to 15 years).
Beneficiaries	▪ individuals who have the right of disposal over a residential building; ▪ housing cooperatives and associations; ▪ local government units and associations thereof.
Description	Installations for the production of electricity or heat and electricity using the following sources are eligible for funding: ▪ heat sources fired with biomass, heat pumps and solar collectors with installed capacity for heat generation of up to 300 kWt; ▪ photovoltaic systems, small wind power stations and micro-cogeneration systems (including micro biogas installations) with installed capacity for electricity generation of up to 40 kWe, for the purposes of single-family or multi-family residential buildings, also under construction. High quality of the installed equipment is required, i.e. the manufacturer's guarantee for main devices of at least 5 years, contractor's warranty of at least 3 years, design and installation performed by people holding relevant licences.

Name of the programme	**BOCIAN – dispersed renewable energy sources**
Objective	Reducing or avoiding CO_2 emissions by increasing the production of energy from plants using renewable energy sources.
Budget	Planned commitments in the form of reimbursable grants under this programme amount to PLN 420 million from NFOŚiGW funds.
Implementation	Implementation period 2014–2022.
Forms of co-financing	Loan

Beneficiaries	▪ economic operators within the meaning of Article 43[1] of the Civil Code undertaking renewable energy source projects in the territory of the Republic of Poland.
Description	The programme covers the construction, extension or alteration of renewable energy installations with capacities falling within certain limits, e.g. wind power stations up to 3 MWe, photovoltaic systems between 200 kWp and 1 MWp, energy from geothermal waters between 5 MWt and 20 MWt, small hydro power plants – 5 MW.

Name of the programme	**Energy saving investments in small and medium-sized enterprises**
Objective	The objective of the programme is to reduce energy consumption through investments in energy efficiency and the use of renewable energy sources in the small and medium-sized enterprises sector. The implementation of the programme will result in reducing CO_2 emissions.
Budget	Planned commitments in the form of non-reimbursable grants amount to PLN 60 million.
Implementation period	Implementation period 2014–2016 with loan contracts available until 2015.
Forms of co-financing	▪ subsidies for partial repayment of credit capital granted within the limit assigned to the bank by NFOŚiGW.
Beneficiaries	Micro, small and medium-sized enterprises registered in Poland (hereinafter referred to as SMEs), i.e. enterprises with less than 250 employees and with an annual turnover not exceeding EUR 50 million or assets worth not more than EUR 43 million, which meet other requirements laid down in the definition of micro, small and medium-sized enterprises included in Annex I to Commission Regulation (EC) No 800/2008 of 6 August 2008 declaring certain categories of aid compatible with the common market in application of Articles 87 and 88 of the Treaty (General block exemption Regulation) (OJ L 214, 9.8.2008, p. 3).
Description	1) LEME investments – projects covering investment activities in respect of: a) improvement of energy efficiency or use of renewable energy sources, b) thermomodernisation of buildings or use of renewable energy sources, carried out by purchasing materials/equipment/technologies included in the LEME List. It applies to projects whose financing in the form of subsidised credit does not exceed EUR 250 000; 2) Aided Investments – projects covering investment activities which are not eligible as LEME investments, concerning: a) improving energy efficiency or renewable energy sources, as a result of which a minimum of 20 % energy savings will be achieved, b) thermomodernisation of buildings or renewable energy sources, as a result of which a minimum of 30 % energy savings will be achieved. It applies to projects whose financing in the form of subsidised credit does not exceed EUR 1 000 000.

Name of the programme	KAWKA – elimination of low emission to promote energy efficiency and development of dispersed renewable energy sources
Objective	Reducing human exposure to air pollution in areas where allowable and target concentration levels of pollutants are significantly exceeded by developing air protection schemes and reducing pollutant emissions, in particular particulates (PM2.5, PM10) and CO_2.
Implementation period	Implementation period 2014–2020.
Forms of co-financing	Resources from Provincial Funds for Environmental Protection and Water Management (WFOŚiGW) intended for subsidies.
Beneficiaries	▪ Provincial Funds for Environmental Protection and Water Management. The final beneficiaries are entities competent for the implementation of undertakings listed in air protection schemes, which plan or carry out projects eligible for co-financing from provincial funds for environmental protection and water management from the resources provided by NFOŚiGW, in compliance with the conditions of the programme.
Description	Co-financing is available for undertakings included in air protection schemes which are valid on the day of announcing the grant competition by WFOŚiGW, specifically for the following projects: 1) projects aimed at reducing low emission sources in connection with improving energy efficiency and using high-efficiency cogeneration systems and renewable energy sources, e.g.: a) elimination of local heat sources, b) using solar collectors to reduce emission, c) thermomodernisation of multi-family buildings in accordance with the scope indicated by the completed energy audit, to accompany the replacement of heat sources; 2) education campaigns (applies to beneficiaries) showing health and social advantages of eliminating low emission sources.

It should also be noted that projects aimed at improving the energy efficiency of buildings are not only implemented from the national resources of the National Fund for Environmental Protection and Water Management, but also from the resources of Provincial Funds for Environmental Protection and Water Management.

Green Investment Scheme GIS

Green Investment Scheme (GIS) is derived from the emissions trading mechanism. The idea and purpose of GIS essentially consist in creating and supporting the pro-environmental effect following from the sales of surplus AAUs (Assigned Amount Units).

Name of the programme	Green Investment Scheme. Energy management in public utility buildings
Objective	Reduction or elimination of carbon dioxide emissions through co-financing of projects improving the efficiency of energy use in public utility buildings.
Budget	Planned commitments in the form of non-reimbursable grants amount to PLN 298 329 000 – from the resources gathered through the sales of Assigned Amount Units (GIS subsidies) or other NFOŚiGW funds.
Implementation period	This programme will be implemented between 2010 and 2017.
Forms of co-financing	▪ subsidy, ▪ loan.

Beneficiaries	▪ local government units and associations thereof; ▪ entities which are not entrepreneurs and which provide public services as part of local government own tasks; ▪ Voluntary Fire Services; ▪ universities within the meaning of the Act of 27 July 2005 – Higher Education Law (*Journal of Laws* 2012, item 572, as amended) and research institutes; ▪ independent public healthcare centres and healthcare establishments operating as enterprises (within the meaning of Article 55^1 of the Civil Code) providing healthcare services; ▪ non-governmental organisations, churches, other religious associations entered in the register of churches and other religious associations and church legal persons.
Description	As a result of co-financing obtained from this programme, it is possible to reduce energy consumption in occupied buildings. The activities cover, inter alia: thermomodernisation of public utility buildings, in particular installing thermal insulation, replacement of windows, replacement of external doors, alterations of the heating system, replacement of ventilation and air-conditioning systems, preparation of technical documentation for the investment, the use of energy management systems in buildings, the use of technologies of renewable energy sources or the replacement of interior lighting with energy-saving lighting (as additional work performed together with facility thermomodernisation). Collective projects can be implemented under the programme.

Foreign funds: Norwegian Financial Mechanism and the European Economic Area Financial Mechanism

Name of the programme	**PL 04 *Energy saving and promoting renewable energy sources***
Objective	The purpose of the programme is the improvement of energy efficiency and the increase in energy production from renewable sources.
Budget	The total value of the programme amounts to EUR 145 525 170, including EUR 67 394 000 for energy efficiency in buildings and increasing energy from renewable sources.
Implementation period	The part of the programme concerning energy efficiency in buildings will be implemented between December 2012 and April 2016.
Forms of co-financing	Projects in the part concerning energy efficiency in buildings will be selected in an open-call procedure, with co-financing amounting to up to 80 % of their eligible costs.
Beneficiaries	The beneficiaries, in the part concerning energy efficiency in buildings, include public entities and private entities performing public tasks.
Description	Among the different programmes implemented in Poland in the 2009–2014 perspective under the Norwegian Financial Mechanism and the European Economic Area Financial Mechanism, the PL 04 *Energy saving and promoting renewable energy sources* programme is intended for projects focusing on energy efficiency in buildings. The PL 04 programme covers the thermomodernisation of public utility buildings intended for public administration, learning, healthcare, social care and welfare, higher education, science and education, tourism and sport. This programme is also aimed at the modernisation or replacement of existing energy sources (together with a possible replacement or renovation of outdated local networks) supplying public utility buildings with modern, energy-efficient and ecological sources of heat or electricity with a total rated capacity of up to 5 MW, including those originating from renewable energy sources or from heat and electricity sources from cogeneration.

	The programme also envisages the installation, modernisation or replacement of local heat distribution centres of a total rated capacity of up to 3 MW, supplying heat to public utility buildings.
Effects	After the first call for proposals concerning energy efficiency, 79 projects were approved for co-financing worth a total of PLN 213 222 755 (approx. EUR 51 476 969). Currently, the process of signing agreements with final beneficiaries is underway. Between 4 July 2014 and 15 September 2014 another call for proposals for projects eligible for co-financing was opened.

Foreign funds: The Swiss-Polish Cooperation Programme

Name of the programme	**The Swiss-Polish Cooperation Programme. Objective 2: *Increasing energy efficiency and reducing emissions, in particular with regard to greenhouse gases and dangerous substances***
Objective	The purpose of the measures is increasing energy efficiency and reducing emissions, in particular with regard to greenhouse gases and dangerous substances.
Budget	The total allocation for the objective of energy efficiency is CHF 115 127 731.
Implementation period	The physical scope of the projects shall be implemented between November 2011 and the end of 2016. New calls for proposals under this programme are not planned.
Forms of co-financing	The support was granted for projects selected in an open call. The co-financing of those projects may amount to a maximum of 85 % of their eligible costs.
Beneficiaries	Aid beneficiaries are public and private sector institutions.
Description	The activities undertaken under the projects intend to improve energy efficiency by introducing renewable energy systems, renovating, repairing and modernising municipal district heating networks in areas where allowable and target air pollutant levels are exceeded, and renovating, repairing and modernising central heating sources and heating systems in public healthcare facilities providing hospital services, as well as in public schools.
Effects	The activities undertaken under the projects intend to improve energy efficiency by introducing renewable energy systems, renovating, repairing and modernising municipal district heating networks in areas where allowable and target air pollutant levels are exceeded, and renovating, repairing and modernising central heating sources and heating systems in public healthcare facilities providing hospital services, as well as in public schools. The installation of 17 023 solar collectors and 15 heat pumps on public utility buildings and private households is planned. At the moment, 4 155 collectors and 9 pumps have already been installed.

Operational Programme Infrastructure and Environment[19)]
(in particular the support for energy efficiency in construction industry)

Name of the programme	*Priority axis I.* Investment priority ***4.III Support for energy efficiency, intelligent energy management and using renewable energy sources in public infrastructure, including public utility buildings and the residential sector***
Objective	Improving energy efficiency in the construction of multi-family housing and public utility buildings.
Budget	EUR 451 721 000 (including EUR 180 700 000 – public utility buildings and EUR 271 021 000 – residential sector), contribution from EU funds (Cohesion Fund).
Implementation period	The duration was specified to be from 1 January 2014 to 31 December 2023.
Beneficiaries	Under the investment priority, support is foreseen for public authorities, including state budget entities, government administration and its subsidiary bodies and organisational units, housing associations and cooperatives, state legal entities and undertakings that provide energy services within the meaning of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1, as amended).
Description	Support for comprehensive energy modernisation of public utility buildings and residential buildings is envisaged, including the replacement of their equipment with energy-saving devices. The activities foreseen include, among other things: ▪ installing thermal insulation, replacement of windows, external doors, and replacing lighting with energy-efficient systems, ▪ alterations of the heating system (including the replacement of the heat source and its connection), ventilation and air-conditioning systems in connection with the use of weather-sensitive automatic temperature controls and of building management systems, ▪ construction or modernisation of internal receiving installations, and the removal of existing heat sources, ▪ installation of micro-generation or micro-trigeneration for own needs, ▪ installation of RES in energy-modernised buildings (if it follows from the energy audit), ▪ installation of cooling systems, also including the use of RES.

Regional Operational Programmes (ROPs)

Regional Operational Programmes (ROPs) provide another source of funding. In accordance with the Partnership Agreement, 60 % of structural funds (the European Regional Development Fund and the European Social Fund) will be allocated for 16 regional programmes between 2014 and 2020. Each province has a certain part of funds available under the programme at its disposal and develops its own Regional Operational Programme. The proposed activities include those aimed at improving energy efficiency in construction industry. Beneficiaries, types of projects and the method of financing are defined individually for each province, although they must be in line with specific thematic objectives and investment priorities.

[19)] In accordance with the Operational Programme Infrastructure and Environment for the period 2014–2020 approved by the European Commission by the Decision of 16 December 2014, which entered into force on 19 December 2014.

Detailed information regarding Regional Operational Programmes for 2014–2020 is presented in Annex No 3 to the *National Plan*. The information covers activities planned under investment priority 4.III (previously used numbering – 4.3) which concerns increasing energy efficiency of public utility buildings and multi-family residential buildings. However, the implementation of projects relating to this issue under a different investment priority cannot be excluded, in particular under 4.II (promoting energy efficiency and the use of renewable energy sources in enterprises) and 4.V (promoting low emission strategies). It should be noted that projects concerning energy efficiency in buildings, which are implemented under those investment priorities, will, in principle, constitute a part of larger undertakings resulting from completed energy audits or low emission strategies, hence providing such detailed information as in the case of 4.III is not possible.

The total amount foreseen for investment priority 4.III is EUR 1 545 941 800. Under this priority, measures consisting in a comprehensive energy modernisation of public utility buildings and residential multi-family buildings will be implemented, including the replacement of their equipment with energy-saving equipment. These activities include, among other things:

- installing thermal insulation, replacement of windows, external doors, and replacing lighting with energy-efficient systems,
- alterations of the heating system (including the replacement of the heat source and its connection), ventilation and air-conditioning systems,
- construction or modernisation of internal receiving installations, and the removal of existing heat sources,
- use of RES technologies in buildings,
- installation of cooling systems, also including the use of RES.

The implemented projects shall follow from energy audits. The projects often include construction or reconstruction of units producing electricity and heat from high-efficiency cogeneration.

Table 7. Availability of programmes under investment priority 4c in ROPs for specific provinces and certain beneficiary groups

Province	Beneficiary groups																						
	Local government units and their associations and societies	Public entities owned or established by local government units	Organisational units of local government units	Housing associations and cooperatives	Social Housing Association (Towarzystwo Budownictwa Społecznego, TBS)	Other public finance sector units	NGOs	Churches, religious associations, church and religious association legal persons	Universities, scientific entities	Emergency services	Public safety and order organisations	Owners/administrators of residential buildings	Entities providing healthcare services	Cultural institutions	The State Forests National Forest Holding and its organisational units	Government administration	Organisational units of local government having legal personality	Enterprises			Energy services providers	Voluntary Fire Services units	Entities operating on a public-private partnership basis
																		small	medium sized	large			
Dolnośląskie	■	■	■	■	■	■																	
Kujawsko-Pomorskie	■		■	■		■	■	■															
Lubelskie	■		■	■	■	■	■		■	■	■						■						
Lubuskie	■	■										■											
Łódzkie	■		■	■	■	■	■	■	■				■	■	■								
Małopolskie	■		■	■			■	■	■				■	■									
Mazowieckie	■	■	■	■	■			■	■		■			■	■	■		■	■		■		
Opolskie	■		■			■	■	■	■									■	■	■			
Podkarpackie	■	■		■	■	■	■						■										
Podlaskie	■	■	■	■	■			■	■														■
Pomorskie	■		■			■	■	■	■	■						■		■	■	■			
Śląskie	■	■		■	■	■	■		■				■										■
Świętokrzyskie	■		■	■	■	■			■		■		■									■	
Warmińsko-Mazurskie	■		■			■							*)					**)	**)	**)			
Wielkopolskie	■			■	■																		■
Zachodniopomorskie	■		■	■	■		■																

*) – operating within the public healthcare system/established by local government unit(s)

**) – only entities which provide public services as part of local government own tasks

■ available programme

Thermomodernisation and Repairs Fund[20)]

The rules for granting co-financing from the Thermomodernisation and Repairs Fund are laid down in the Act of 21 November 2008 on supporting thermomodernisation and repairs (*Journal of Laws* 2014, item 712).
The main objective of the programme is financial aid for investors who implement projects involving thermomodernisation, repairs, and renovation of existing single-family residential buildings, using credits obtained in commercial banks. The aid, called respectively: 'a thermomodernisation grant', 'a repairs and renovation grant', and 'a compensation grant', constitutes a repayment of a part of a credit drawn for the implementation of a project, or for renovation. Figures concerning the Fund, produced by Bank Gospodarstwa Krajowego, are presented below.

Type of grant	Thermomodernisation and Repairs Fund
Objective	The objective of the programme is financial aid for investors who implement projects involving thermomodernisation, repairs, or renovation of single-family residential buildings, using credits obtained in commercial banks (thermomodernisation grant, repairs and renovation grant, compensation grant).
Budget/sources of financing	At 22 December 2014, BGK had a limit of PLN 191 800 000 for the thermomodernisation grant, PLN 46 500 000 for the repairs and renovation grant and PLN 16 100 000 for the compensation grant. Sources of financing: 1) funds transferred from the State budget in the amount determined annually in the Budget Act; 2) interest on the Fund's bank deposits; 3) income from investments of the Fund's resources in securities; 4) donations and legacies; 5) other income.
Implementation period	Start: 2009 End: The Fund is a systemic measure and the provisions in force do not provide for a definite time framework for its operation.
Beneficiaries	The thermomodernisation grant can be awarded to owners or administrators of: ▪ residential buildings; ▪ collective accommodation buildings; ▪ public utility buildings owned by local government units and used by them for public tasks; ▪ local district heating networks; ▪ local heat sources. Investors, regardless of their legal status, may avail of the grants. Investors may be, for example, legal persons (e.g. housing associations and commercial companies), local government units, housing cooperatives, and natural persons, including owners of single-family houses. Entities and plants financed from the State budget are not eligible for the grant.
Description	The detailed method of co-financing for each type of the grant is set out in the Act of 21 November 2008 on supporting thermomodernisation and repairs. The thermomodernisation grant is applicable to projects whose objectives are: ▪ reducing the consumption of energy for heating and water heating in residential buildings, collective accommodation buildings and facilities owned by local government units and used by them for public tasks;

[20)] Data from Bank Gospodarstwa Krajowego.

	▪ reducing the cost of acquiring heat supplied to buildings by building a technical connection to a centralised heat source after the local heat source has been decommissioned; ▪ reducing primary energy losses in local district heating networks and the supplying local heat sources; ▪ a complete or partial change of energy sources to renewable sources, or using high-efficiency cogeneration, on condition that energy savings defined in the Act are achieved.

Effects of the Fund's operation in the years 1999–2013 (data from Bank Gospodarstwa Krajowego)

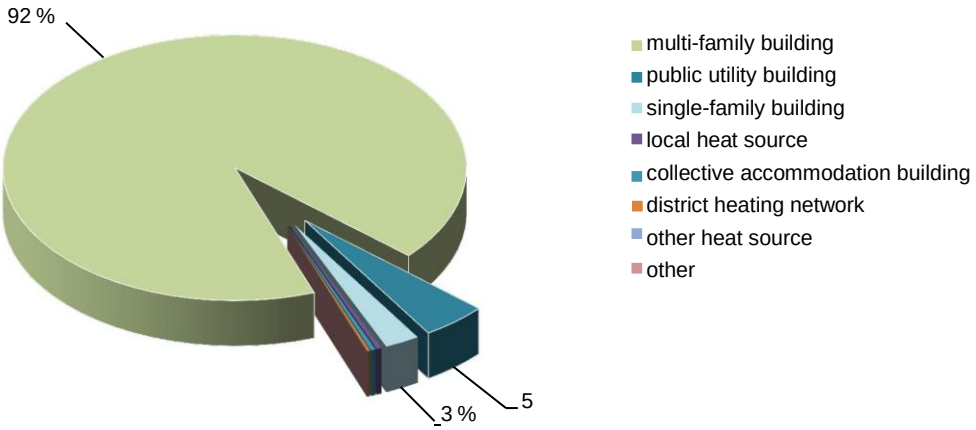

Figure 11. The structure of applications in the period 1999–2013

Between 1999 and 2013 the total number of applications amounted to 28 336, including applications for:

- multi-family buildings – 26 090 pcs.,
- public utility buildings – 1 294 pcs.,
- single-family buildings – 694 pcs.,
- local heat sources – 103 pcs.,
- collective accommodation buildings – 95 pcs.,
- district heating network – 52 pcs.,
- other heat sources – 5 pcs.,
- other projects – 3 pcs.

Thermomodernisation grant can be awarded on condition that one of the following energy-saving targets is accomplished:

- reducing the annual demand for energy delivered for heating and water heating purposes **by at least:**
  - **10 %** in buildings where only the heating system is modernised,
  - **15 %** in buildings where the heating system was modernised after 1984,
  - **25 %** in other buildings;
- reducing annual energy loss **by at least 25 %**;
- reducing annual costs of heat supply **by at least 20 %**

or replacing the energy source with a renewable source, or using high-efficiency cogeneration.

With reference to the sources of financing presented in the following parts of the document, until 31 December 2013 the amount of approximately PLN 1 555 000 000 was allocated to the Thermomodernisation and Repairs Fund.

Public-private partnership (PPP)

Under arrangements concerning public-private partnership, entities from the public and private sector jointly implement projects relating to the construction of public infrastructure, e.g. the thermomodernisation of public utility buildings. The partnership consists in assigning a task of a public nature to a private entity.

The rules of cooperation between the public entity and its private partner under public-private partnership are governed by the Act of 19 December 2008 on public-private partnership (*Journal of Laws* 2015, item 696). Pursuant to this Act, the subject matter of PPP is a joint implementation of a project, based on the division of tasks and risks between the public entity and its private partner. When concluding a public-private partnership agreement, the private partner undertakes to implement the project for remuneration and to cover in whole or in part the expenditures for project implementation. The public entity undertakes to collaborate in order to achieve the objective of the project. PPP does not constitute a transfer of obligations of an administrative body to the private sector.

It is also possible to implement hybrid projects consisting in combining PPP with European Union Funds. A comprehensive thermomodernisation of educational buildings in the municipality of Świdnica is an example of such a project.

Other selected sources of financing, including commercial banks

Support of commercial banks for the improvement of energy efficiency of existing building stocks is mainly based on credits granted for specific actions of different groups of investors. Preferential terms of credit repayments are intended as an incentive. It is also possible to receive financial support with the participation of a project supervisor, i.e. a specialised enterprise performing specific work in the area concerned. This idea combines granting of appropriate technical support with the provision of funds needed to implement the project. Another incentive is a possible repayment of liabilities towards a third party from savings brought about by reducing energy costs resulting from the investment. Detailed rules governing the provision of support are determined by financing institutions.

4.3. Knowledge and development

4.3.1. Information and education activities

NFOŚiGW carried out actions which raised public awareness of renewable energy sources under a programme called *Environmental education*. In 2011 NFOŚiGW was involved in 20, and in 2012 in 23 educational projects regarding the above-mentioned subject.

Furthermore, Article 11 of the Act of 15 April 2011 on energy efficiency provides that the minister competent for the economy, minister competent for transport and the minister competent for construction, local planning, spatial development and housing shall:
1) organise campaigns promoting energy efficiency improvement measures, including the implementation of innovative technologies;
2) carry out information and education activities and trainings concerning available measures to improve energy efficiency.

Also Article 40 of the Act of 29 August 2014 on Energy Performances of Buildings provides that the minister competent for construction, local planning, spatial development and housing shall undertake an information campaign to improve the energy performance of buildings.

One of the examples of actions aimed at promoting energy efficiency in buildings is the campaign organised by the Ministry of the Environment *House that saves for me* and the website *oszczedzam-energie.mos.gov.pl*. Furthermore, a series of advertisements was broadcast to promote good practices for users leading to the reduction of building maintenance costs.

Pursuant to Articles 132 to 134 of the Act of 20 February 2015 on renewable energy sources (*Journal of Laws*, item 478), the minister competent for the economy undertakes information and education activities in relation to the use of renewable energy sources, i.e.:
1) provides information about the costs and advantages of using heating, cooling and electrical equipment and systems that use energy from renewable sources;
2) develops suitable information, guidance or training programmes with the participation of local government units in order to inform citizens of the benefits and practicalities of developing and using energy from renewable sources;
3) provides access to information and guidelines on optimal methods of combing renewable energy installations, highly efficient technologies and heating and cooling systems.

When listing information and education activities, the Operational Programme Knowledge Education Development in the 2014–2020 financial perspective is also worth noting. The purpose of this OP is the reinforcement of selected public policies that implement the objectives of Europe 2020 strategy. Under this programme, the development of a practical information booklet on construction law for investors is planned (with reference to available methods of using measures to improve energy efficiency in buildings, including innovative solutions). A practical information booklet on construction law for investors will be drawn up (part I – website, part II – paper version together with distribution).

Numerous activities are undertaken in order to increase the research potential with regard to environmental technologies. The programme *Education in the contracted faculties* (*Kształcenie na kierunkach zamiawianych*), implemented between 2008 and 2013 is particularly worth noting. The contracted fields of study were, inter alia, civil engineering, environmental engineering, energy industry, environmental protection, etc. At those faculties, universities could expand the field of studies by adding unique topics concerning energy industry, environmental protection, adaptation to climate change. The implementation of the programme led to an increase in the number of students of technical departments. This trend is expected to continue in the coming years.

4.3.2. Demonstration and pilot projects

NFOŚiGW manages a programme of credit subsidies for the construction of energy-efficient houses. The completed projects (62 single-family houses in NF40 and NF15 standards) and more than 100 buildings under construction in NF40 and NF15 standards, as well as 14 approved single-family and multi-family housing estates can be indirectly considered pilot investment projects.

Those projects are only one of the examples among many investments leading to an increased energy efficiency standard of a building.

4.3.3. Scientific research

The National Research and Development Centre carried out a research project called *Integrated system for reducing operating energy intensity of buildings*. Its objective was to develop technical and organisational solutions regarding design, construction, and use of residential buildings and public utility buildings which will result in reduced energy use by them and would increase the use of renewable energy sources in the buildings' energy balance.

The implementation of 7 research tasks under the project started in 2010 and lasted between 12 and 36 months.

Topics of research tasks implemented under the project:

- analysis of possibilities and socio-economic consequences of the increase in energy efficiency in construction industry,
- devising of energy-optimum typical structural, material and installation solutions for buildings,
- increased use of energy from renewable sources in construction industry,
- development of thermal diagnostics for buildings,
- optimisation of electricity consumption in buildings,
- analysis of technical and performance requirements for buildings with energy supplied from centralised heat sources,
- conditions and possibilities of energy savings through urban policy instruments.

4.4. Promoting the use of renewable energy sources

Pursuant to Article 9(3)(c) of Directive 2010/31/EU, Member States in their national plans shall provide the Commission with: 'details of national requirements and measures concerning the use of energy from renewable sources in new buildings and existing buildings undergoing major renovation in the context of Article 13(4) of Directive 2009/28/EC and Articles 6 and 7 of this Directive'.

Article 13(4) of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16, as amended) provides that:

'Member States shall introduce in their building regulations and codes appropriate measures in order to increase the share of all kinds of energy from renewable sources in the building sector.

In establishing such measures or in their regional support schemes, Member States may take into account national measures relating to substantial increases in energy efficiency and relating to cogeneration and to passive, low or zero-energy buildings.

By 31 December 2014, Member States shall, in their building regulations and codes (…), require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation.'.

The basic instrument for the promotion of the use of renewable energy sources is the Act of 20 February 2015 on renewable energy sources ('RES Act'). The purpose of the RES Act is the sustainable development of renewable energy in Poland through the optimisation of the movement of funds for specific RES technologies and their stabilisation in a 15-year perspective. The RES Act is a set of comprehensive solutions providing a structure for the support scheme intended for renewable energy sources, which consists in the following:

1) maintaining the current support scheme for existing RES installations in respect of the acquired rights of all energy generators from RES who operated before the Act entered into force;

2) introducing new possibilities for existing RES installations to optimise the economic output (dedicated auctions);
3) implementing a modern auction system for new and modernised RES installations;
4) adopting guaranteed prices for generators of electricity in micro-installations.

Regarding the promotion of the use of RES, a model of incentives and bonuses was introduced. As mentioned above, the method for establishing the energy performance of a building, laid down in the Regulation of the Minister for Infrastructure and Development of 27 February 2015 on the methods of determining the energy performance of a building or a building part and energy performance certificates foresees the promotion of energy use from renewable sources.

The value of the EP indicator can be reduced to facilitate compliance with the conditions set out in technical and construction provisions by using energy from renewable sources. In addition, the energy performance certificate must include the specification of the share of RES in the final energy U_{res} [%], which serves as a source of information, but also as a form of monitoring. The availability of this data will gradually contribute to the modification of existing legal provisions in order to be able to establish a required percentage for the share of RES in the final energy.

Chapter 4.2.1. of the *National Plan* includes a description of amendments to the provisions governing construction design. The amendment of the Regulation on the detailed scope and form of a construction design entered into force on 3 October 2013. The amendment covered changes in the provisions concerning the technical description included in the construction design and introduced the obligation to analyse possibilities to rationally apply highly efficient alternative systems with the use of RES to all buildings, instead of only those buildings whose useful floor area exceeded 1 000 m^2, as it was until then.

4.5. Shaping of building energy standards

4.5.1. Heating, ventilation and hot tap water systems[21), 22)]

The issues of technical equipment of buildings are governed by Section IV of the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.

In the majority of buildings the shared source of heat makes it necessary to consider central heating and hot tap water systems jointly and in a comprehensive manner and to select the best solution under the given circumstances. The selection of central heating and hot tap water systems, including the selection of the heat source, depends on a number of factors, such as:

- the architectural layout, structure, and the manner in which a building is used,
- requirements for the comfort of use,
- local conditions of heat supply,
- relationships between prices of energy carriers and elements of installations and sources, and trends in their changes,

21) Kasperkiewicz K. (ed.), *Analiza wymagań techniczno budowlanych dotyczących ochrony cieplnej budynków, celem ustalenia minimalnych wymagań w zakresie charakterystyki energetycznej i przedstawienia propozycji zmian zgodnie z dyrektywą Parlamentu Europejskiego i Rady 2010/31/UE z 19 maja 2010 r. w sprawie charakterystyki energetycznej budynków*, ITB, Warsaw, 2012.

22) Mańkowski S., Szczechowiak E. (ed.), 'Rekomendacje w zakresie projektowania i optymalizacji energetycznej rozwiązań instalacyjnych budynków', Research Task No 2, completed under the Strategic Research Project *Integrated System for Reducing Energy Consumption in the Maintenance of Buildings,* ordered by the National Centre for Research and Development, *Opracowanie optymalnych energetycznie typowych rozwiązań strukturalno-materiałowych i instalacyjnych budynków*, Vol. 3, Part A, Poznań University of Technology, 2013.

- ecological requirements,
- requirements and financial capacity of the investor,
- requirements of technical and construction provisions and available programmes supporting energy-efficient and environmentally-friendly solutions.

Heating and hot tap water systems should be arranged in such a way as to provide adequate, possibly high levels of efficiency of both systems. High levels of efficiency of installations can be achieved by using highly efficient heat sources, reducing heat losses in distribution, accumulation, control, and use of heat.

Maximum possible part-efficiencies can be attained through, inter alia:

- the use of condensing boilers and of heat pumps with a high COP value,
- correct layout of networks distributing heating medium (compact installation) and their proper thermal insulation,
- adequate insulation of accumulation and buffer tanks, and charging and discharge controls appropriate for the specificity of their operation and use,
- low-temperature heating systems (panel heating systems, radiators, or mixed),
- selection of adjustment and control techniques ensuring the highest efficiency of control for a given installation structure and a given manner of using the system,
- selection of the method of hot water heating ensuring high efficiency for a particular mode of use,
- use of highly efficient low-power pumps, resulting in low auxiliary energy consumption,
- elimination or maximum reduction of highly efficient circulation systems,
- adequate insulation of hot tap water tanks, and charging and discharge controls appropriate for the specificity of their operation and use.

In order to reduce heat losses in distribution, the installation layout should be compact. Water collection points should be close to each other. In the architectural and construction design it is recommended to locate kitchen areas, sanitary premises (bathroom, WC) and other damp places possibly close to each other and vertically aligned. It allows for a compact design of water supply and sewerage systems (cold water, hot water and sewerage) and exhaust mechanical ventilation, and consequently reduces investment and operating costs for these installations (lower heat losses and lower pressure losses, and therefore lower costs of pumping).

Hot tap water ducts and fittings, e.g. storage tanks, should be placed in heated parts of a building. This reduces heat losses in ducts and in the storage tank and, at the same time, makes it possible to use them for heating the building. In the summer period it reduces internal heat gains, and therefore reduces the risk of overheating premises in summer. In small installations, circulation ducts should be eliminated. Considerable heat losses are a downside of the circulation system. These losses can be reduced by providing proper thermal insulation of hot tap water and circulation ducts. The best solution is to have both ducts laid side by side and to insulate them together, and to put installation ducts inside the insulated building envelope.

Hot tap water systems should be adapted to energy-efficient operation, among other things through the selection of high-quality water-efficient fittings and by allowing for individual metering of water consumption by users.

As regards the selection of the heat sources structure, apart from selecting highly efficient equipment, one should consider the use of renewable energy sources.

The selection of the supply system for hot tap water depends not only on building energy standard, but also on the proportion of energy used for hot water preparation in the total energy consumption in the building. If this share is small, energy for hot tap water systems can be supplied from direct heaters or from flow heat exchangers.

Where the proportion is high, hot tap water installations are supplied from an independent source, which usually uses solar energy.

The selection of hot tap water system and its source of heat always depends on the intended use of the building.

In public utility buildings, hot tap water systems are usually independent, supplied from direct heaters or from local mini-stations supplied from a heat distribution centre, or from another source of heat.

It should be noted that hot tap water systems may be arranged as independent, with the source solar energy being the main source of heat by using solar collectors with a storage tank which plays the role of a long-term energy storage.

Considering the increasing technical expectations for buildings, the key technology which requires further development is the technology of intake-exhaust ventilation with heat recovery. For certain building types, meeting the legally required energy standards will be practically impossible without the installation of a ventilation system with heat recovery. Developing the ventilation system with heat recovery shall increase the efficiency of heat recovery and adjust this method to the requirements of existing buildings, such as multi-family residential blocks made of large-format prefabricated elements.

The implementing acts of the European Commission issued on the basis of Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products shall also be taken into account. The Commission regulations issued so far lay down the minimum ecodesign requirements for specific products or their groups. The Commission regulations in force concern, inter alia:

- light sources and luminaires, and LED – Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps (OJ L 76, 24.3.2009, p. 3, as amended); Commission Regulation (EU) No 347/2010 of 21 April 2010 amending Commission Regulation (EC) No 245/2009 as regards the ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps (OJ L 104, 24.4.2010, p. 20); Commission Regulation (EU) No 1194/2012 of 12 December 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment (OJ L 342, 14.12.2012, p. 1),
- air conditioners and fans – Commission Regulation (EU) No 206/2012 of 6 March 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air conditioners and comfort fans (OJ L 72, 10.3.2012, p. 7),
- space heaters and combination heaters – Commission Regulation (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters (OJ L 239, 6.9.2013, p. 136),

- water heaters and hot water storage tanks – Commission Regulation (EU) No 814/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks (OJ L 239, 6.9.2013, p. 162),
- ventilation units – Commission Regulation (EU) No 1253/2014 of 7 July 2014 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation units (OJ L 337, 25.11.2014, p. 8).

The list of regulations published by the European Commission is available on the website of the Ministry of the Economy:
http://www.mg.gov.pl/Bezpieczenstwo+gospodarcze/Energetyka/Efektywnosc+energetyczna/Ekoprojekt

4.5.2. Air-conditioning system[23)]

It is recommended to eliminate or to considerably reduce cooling systems for air-conditioning using refrigerating units through:

1) reduction of heat gains (reduction of solar gains by using solar protection and by limiting internal heat gains),
2) adjustment of air stream to actual load,
3) use of alternative cooling methods (night-time cooling, use of soil energy, free cooling, passive cooling).

For small facilities, systems with direct evaporation based on individual ‘SPLIT’ or ‘MULTISPLIT’ air conditioners are recommended.

For larger buildings, with many premises, it is recommended to use systems based on cooling water circuits with parameters 15/18°C or 18/21°C, cooperating with cooling ducts or with thermally active floor slab systems and other cooling surfaces with a possibility of using free cooling.

In buildings with a considerable concentration of people, it is worthwhile to install air cooling through a central cooling system which at the same time supplies the necessary fresh air stream. The flow of air and technical parameters should be adjusted to the actual heat and pollution (CO_2) load.

4.5.3. Lighting installations[24)]

For artificial lighting to work properly, and at the same time to reduce energy use for lighting purposes, suitable lighting control must be provided. The main purpose of lighting, which is to provide visual comfort, can be achieved with natural and artificial lighting; preferably the two systems used in combination.

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23) Kasperkiewicz K. (ed.), *Analiza wymagań techniczno budowlanych dotyczących ochrony cieplnej budynków, celem ustalenia minimalnych wymagań w zakresie charakterystyki energetycznej i przedstawienia propozycji zmian zgodnie z dyrektywą Parlamentu Europejskiego i Rady 2010/31/UE z 19 maja 2010 r. w sprawie charakterystyki energetycznej budynków*, ITB, Warsaw, 2012.

24) Kasperkiewicz K. (ed.), *Analiza wymagań techniczno budowlanych dotyczących ochrony cieplnej budynków, celem ustalenia minimalnych wymagań w zakresie charakterystyki energetycznej i przedstawienia propozycji zmian zgodnie z dyrektywą Parlamentu Europejskiego i Rady 2010/31/UE z 19 maja 2010 r. w sprawie charakterystyki energetycznej budynków*, ITB, Warsaw, 2012.

In the case of artificial lighting, illumination of empty spaces should be avoided. This can be done through sensors which detect the presence of people using infrared radiation or microwaves, through light sensors, etc.

The introduction of LED (Light Emitting Diode) lighting provides new possibilities for adjusting not only the intensity but also the colour of light. Another modern solution is a
'dynamic lighting' system which stimulates people's activity by modelling the intensity and colour temperature of light during the day. LEDs have another important feature. They operate on DC voltage, which means that they can be supplied from PV panels, fuel cells, etc. New technologies enable a significant reduction of installed capacity and a considerable reduction of final energy consumption per year, as well as primary energy savings for lighting.

4.5.4. Thermal insulation of the building envelope[25), 26), 27)]

The measure of thermal insulation of building envelope is the value of thermal transmittance coefficient U. The maximum allowable values of this coefficient are specified in Annex No 2 to the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location for buildings within the scope of this regulation. The level of those requirements has been established as economically optimal.

The thermal transmittance coefficient of the envelope depends on the heat resistance of individual construction and insulating materials R, and thus it depends on the thermal conductivity coefficient λ. The lower the material's thermal conductivity coefficient, the higher its thermal insulation factor. In addition, thermal insulation of the building envelope depends on:

1) correct installation of thermal insulation, in particular the reduction of the negative effect of cold bridges;
2) the number of window and door openings and details of their installation at joints with thermal insulation. The role of thermal insulation in a building consists in:

1) reducing heat losses from a building to the environment;
2) maintaining an appropriate temperature of internal surfaces of the envelope, so as not to allow dampness and therefore prevent the development of fungi.

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25) Kasperkiewicz K. (ed.), *Analiza wymagań techniczno budowlanych dotyczących ochrony cieplnej budynków, celem ustalenia minimalnych wymagań w zakresie charakterystyki energetycznej i przedstawienia propozycji zmian zgodnie z dyrektywą Parlamentu Europejskiego i Rady 2010/31/UE z 19 maja 2010 r. w sprawie charakterystyki energetycznej budynków*, ITB, Warsaw, 2012.

26) Mańkowski S., Szczechowiak E. (ed.), 'Rekomendacje w zakresie projektowania i optymalizacji energetycznej rozwiązań instalacyjnych budynków', Research Task No 2, completed under the Strategic Research Project *Integrated System for Reducing Energy Consumption in the Maintenance of Buildings,* ordered by the National Centre for Research and Development, *Opracowanie optymalnych energetycznie typowych rozwiązań strukturalno-materiałowych i instalacyjnych budynków*, Vol. 3, Part B, Poznań University of Technology, 2013.

27) Mańkowski S., Szczechowiak E. (ed.), 'Rekomendacje w zakresie projektowania i optymalizacji energetycznej rozwiązań instalacyjnych budynków', Research Task No 2, completed under the Strategic Research Project *Integrated System for Reducing Energy Consumption in the Maintenance of Buildings,* ordered by the National Centre for Research and Development, *Opracowanie optymalnych energetycznie typowych rozwiązań strukturalno-materiałowych i instalacyjnych budynków*, Vol. 2, Part A, Poznań University of Technology, 2013.

Thermal insulation is one of the main factors affecting the level of energy demand for heating, and consequently the building's operating costs. When the entire building envelope is properly insulated, the value of thermal transmittance coefficient U of the envelope is relatively low. This results in reduced energy losses and lower heating costs. One-off investment in good thermal insulation makes it possible to save on heating during each winter season throughout the entire service life of the building.

The thickness of the thermal insulation layer should comply with the maximum value of the thermal transmittance coefficient as required by technical and construction provisions and, at the same time, it should depend on the type of insulating materials used, material and construction technologies available on the construction market and the cost level acceptable for the investor. To determine the thickness of the insulation layer, one should take into account the impact of cold bridges and mechanical connectors used for fixing.

Transparent elements of the envelope, such as windows, balcony doors, curtain walls or skylights are composed of two principal parts: the transparent part, i.e. a glazing unit, and the opaque part, i.e. window/door frames or the mullions and transoms in light curtain walls. The basic parameter determining the level of heat losses through these elements of the envelope is the thermal transmittance coefficient: U_W windows, U_D doors, U_{CW} curtain walls. The value of the thermal transmittance coefficient is determined by the following components: for glazing U_g, for door and window frames U_f, for mullions and transoms $U_{m/t}$, alongside linear thermal transmittance coefficients characterising the thermal insulation properties of the joints.

The method of installation is also important in view of energy-saving. Cold bridges are minimal when windows and doors are set in the layer of thermal insulation or at the joint between the wall and insulation.

Solar protection systems also affect the management of energy supplied to the building. The purpose of these systems is to:

1) provide protection against excessive sun exposure (insolation) in summer;
2) permit insolation (in winter and transitional periods);
3) improve the comfort of human stay in the protected spaces;
4) let sun rays penetrate the interior;
5) keep the place cool during the summer season.

Sun protection systems can be fixed or movable. Fixed systems: protruding cornices, wider or longer balconies, eaves, canopies, panels. Movable systems: awnings, sliding panels, external blinds, external roller blinds, shutters, perforated canopies.

Due to the fact that new materials and technologies appear on the construction market and get relevant approvals, new solutions are available which allow for even better parameters than those provided for in the legislation. For example, the maximum allowable thermal transmittance coefficient for external walls pursuant to the technical and construction provisions in force is 0.25 W/(m^2·K), whereas there are solutions that make it possible to achieve 0.15 W/(m^2·K) for the same parameter. The final selection shall be made by the designer and investor, who – in line with applicable legislation and the principles of technical knowledge and in consideration of the project's budget – choose specific solutions. The next cycle of amendments to the technical provisions will provide an opportunity to consider tightening of parameters for thermal insulation of external walls in order to propose a new solution that would meet the economic efficiency criterion over the lifetime of the building.

4.5.5. Air-tightness[28)]

Adequate building air-tightness is important from the point of view of energy savings. Air-tightness is measured by the n_{50} factor, which means the air exchange rate for the entire building volume resulting from a pressure difference of 50 Pa between inside and outside.

Building air-tightness is closely related to thermal insulation, but these terms are not equivalent. A well-insulated building may not be sufficiently air-tight, and, at the same time, a sufficiently air-tight building may not have adequate thermal insulation properties of the envelope.

The following factors are important in terms of air-tightness:

1) gaps in a building's envelope as a result of building system penetrations;
2) copings of gable walls where they join structural elements of the roof surface (rafters, wall plates, etc.);
3) roofing elements (tiles, roof plates);
4) penetration of sanitary systems in the basement or in the attic;
5) setting of doors;
6) setting of windows;
7) electrical installations in the roof and close to the surfaces of external walls.

Technical and construction provisions include the following recommendations concerning building air-tightness:

1) building with natural or hybrid ventilation $n_{50} \leq 3.0\ h^{-1}$;
2) building with mechanical ventilation or air-conditioning $n_{50} \leq 1.5\ h^{-1}$.

Recommended materials to ensure air-tightness and detailed solutions:

1) expanding tapes for circumferential sealing when setting windows and doors; after the expansion, they adhere strongly to the surface, eliminating leakages;
2) polyurethane foam which expands and fills in gaps or openings. It is intended for sealing joints of windows or doors, and openings around wiring or other leakages generated during assembly work;
3) wind barrier to be used in a ventilated framing structure, on the thermal insulation layer from the side of the gap. The barrier eliminates heat losses connected with drafts in the insulation layer caused by air movement in the gap.

It is recommended to check the air-tightness of the entire building using non-invasive measurement of air permeability by means of the pressure method, using a fan. Testing procedures and the preparation of results are carried out on the basis of recommendations of Polish Standard PN-EN 13829: 2002 Thermal properties of buildings – Determining building air permeability – Pressure measuring method using a fan.

4.6. Improving energy efficiency of existing buildings

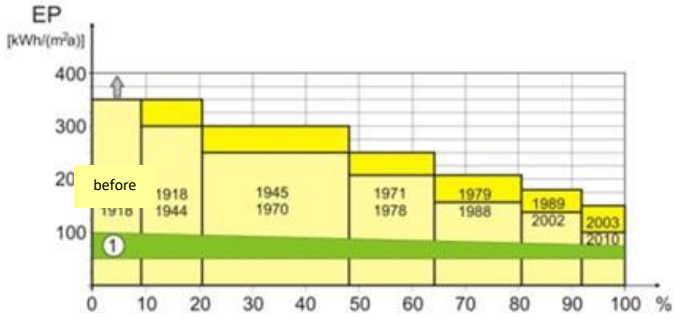
Article 9(2) of Directive 2010/31/EU provides that 'Member States shall furthermore, following the leading example of the public sector, develop policies and take measures such as the setting of targets in order to stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings, and inform the Commission thereof in their national plans'.

28) Mańkowski S., Szczechowiak E. (ed.), 'Rekomendacje w zakresie projektowania i optymalizacji energetycznej rozwiązań instalacyjnych budynków', Research Task No 2, completed under the Strategic Research Project *Integrated System for Reducing Energy Consumption in the Maintenance of Buildings,* ordered by the National Centre for Research and Development, *Opracowanie optymalnych energetycznie typowych rozwiązań strukturalno-materiałowych i instalacyjnych budynków*, Vol. 2, Part A, Poznań University of Technology, 2013.

In the case of buildings undergoing thermal upgrading to which technical and construction provisions are also applicable to a certain extent, the issues of energy-saving are also governed by the provisions presented in Annex No 1 to the *National Plan*, in particular the part concerning thermal insulation properties of the envelope.

It is important to determine energy demand coefficients, adjusted in terms of costs to domestic conditions. With regard to existing building stocks, the optimum level of the coefficient of non-renewable primary energy demand (EP) and final energy demand for heating, ventilation and hot tap water preparation (EK) is as follows (Fig. 12):

- EP = 75–50 kWh/(m^{2}year); EK = 68–45 kWh/(m^{2}year) – for existing buildings constructed after 1970;
- EP = 100–75 kWh/(m^{2}year); EK = 90–65 kWh/(m^{2}year), and in some cases when there is a significant share of RES, the value for the primary energy coefficient can reach EP = 75–50 kWh/(m^{2}year) – for older buildings.



Explanations: 1 – EP demand band after a comprehensive thermal upgrade of existing buildings [EP = 100–50 kWh/(m^{2}year) – subject to the initial condition (age) of the building]

Figure 12. The level of non-renewable primary energy demand (EP) for heating, ventilation and hot tap water preparation in residential buildings in Poland, in relation to their age and energy demand level – economically justified for the potential thermomodernisation[29)]

The forecasts of the requirements presented above should be considered minimum values in the cases of small energy utilisation from renewable sources. Achieving the indicated energy performance parameters requires comprehensive building thermomodernisation.

Pursuant to Article 4 of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1, as amended), hereinafter referred to as 'Directive 2012/27/EU', Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass:

- an overview of the national building stock based, as appropriate, on statistical sampling;
- identification of cost-effective approaches to renovations relevant to the building type and climatic zone;

29) Mańkowski S., Szczechowiak E., 'Uwarunkowania przekształceń w budownictwie', Strategic research project *Integrated system of reducing the operating energy intensity of buildings,* Research Task No 2, Vol. 1, Part A, p. 67.

- policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations;
- a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;
- an evidence-based estimate of expected energy savings and wider benefits.

In accordance with Article 4 of Directive 2012/27/EU, a document entitled *Supporting Investments in Building Renovation* was developed in the Ministry of Infrastructure and Development. This document is an annex to the *National Energy Efficiency Action Plan for Poland 2014*, which was drafted in the Ministry of the Economy in cooperation with the Ministry of Infrastructure and Development. The *National Energy Efficiency Action Plan for Poland 2014* was drawn up in connection with the obligation to communicate to the European Commission reports on the implementation of Directive 2012/27/EU, as well as with the obligation imposed on the Minister for the Economy under Article 6(1) of the Act of 15 April 2011 on energy efficiency. This document includes, inter alia, the description of adopted and planned energy efficiency improvement measures in different sectors of the economy, crucial for achieving the national target for efficient use of energy by 2016, and the review of final energy savings to be attained in 2020.

Considering the above, it should also be noted that actions aimed at reducing energy intensity of existing buildings, while achieving the technical and economic targets, should not deteriorate the historical and architectural qualities of buildings and other facilities, in particular those listed in the register of monuments and covered by other forms of protection.

4.7. Comprehensive approach

The issues dealt with in the *National Plan* follow directly from the implementation of the provisions of Article 9 of Directive 2010/31/EU. However, the thematic scope of low-energy buildings, both for new and existing building stock, is much more extensive.

Appropriate levels of the primary energy demand coefficient can be achieved in many ways. The low value of this parameter can certainly be attained by ensuring good thermal insulation properties of the envelope, joints without cold bridges, using highly efficient building systems and using energy from renewable sources.

These are very important aspects, but not the only ones. The impact of local planning and spatial development is worth pointing out, in particular the location of the building on building plot, proper shaping of the building's volume, location of rooms and the design of building's surroundings, which indirectly influence the energy performance. Actions aimed at taking advantage of local conditions that allow for the use of energy from renewable sources should also be fostered.

Considering energy-saving in buildings in a wider perspective, including the issues of ecology as such, the advantages of using natural materials should be emphasised as they improve the microclimate inside buildings, among other things. Such an approach also affects the environmental quality during the entire lifecycle of a building, from the first idea until the final stage, i.e. its demolition and the disposal of the building material.

Developing best practices and positive social behaviours with regard to energy-saving by measures such as skilful use of electricity for lighting purposes helps enhance the energy balance. The range of available solutions has recently been expanded by increasingly popular automatic smart energy management systems, which often encompass not only a single building, but larger areas – 'smart cities' and 'smart grids'.

Adequate control of water consumption balance, including rain and thaw water, waste water drainage, reuse of waste, as well as transportation and the entire energy sector affect the global energy and climate efficiency and the issues of environmental protection in the context of using buildings, which constitute one of the components of the human environment. It is therefore important to undertake comprehensive measures that encompass as many sectors of the economy as possible.

The Ministry of Infrastructure and Development is working on a draft version of the *National Municipal Policy* (*Krajowa Polityka Miejska, KPM*). This document contains, inter alia, information relating to specific amendments in legislation aimed at facilitating rehabilitation projects by linking them to urban planning processes. Another demand included in KPM is the call for the creation of knowledge centres in order to promote desired solutions and examples of good practices. The draft version of KPM also calls for actions with regard to energy efficiency, considered as a process of urban adjustment to changing conditions of energy demand and the availability of energy sources which are currently used.

At the same time, the Ministry of Infrastructure and Development works on the *National Rehabilitation Plan* (*Narodowy Plan Rewitalizacji, NPR*), which defines rehabilitation as a planned set of actions consisting in an integral renovation of a degraded area and aimed at revitalisation and improving the functional aspects or quality of life in the area. It should be noted that actions taken in buildings located in an area covered by a municipal rehabilitation programme should include comprehensive infrastructural modernisation. Works aimed at, among other things, improving energy efficiency of buildings will in certain cases be subject to technical and construction provisions, as explained in detail in the document *Supporting Investments in Building Renovation.* Funding for rehabilitation projects under Regional and National Operational Programmes will be granted on preferential terms if building thermomodernisation is one of the elements of a wider action taken in order to resolve a crisis situation. Relevant guidelines in this respect are being developed. Provisions governing rehabilitation schemes are now being amended. The new solutions should allow local governments to play a more active role in refurbishment works and building thermomodernisation.

Activities intended to improve energy efficiency in buildings have an effect on the development of low carbon economy. The Ministry of the Economy is drafting the *National Low Carbon Economy Development Programme* (*Narodowy Program Rozwoju Gospodarki Niskoemisyjnej, NPRGN*). The development of NPRGN is needed in order to reduce emissions of greenhouse gases and other air-polluting substances in all sectors of the economy. The reduction effect will be linked to rational expenditures for this purpose. The essence of the Programme is to ensure economic, social and environmental benefits (in line with the principles of sustainable development) following from actions aimed at reducing emissions, through e.g. increasing innovativeness and implementing new technologies, reducing energy intensity, creating new workplaces and consequently enhancing economic competitiveness. The part of the Plan concerning construction industry lists a series of areas related to energy efficiency of buildings.

5. SUMMARY AND CONCLUSIONS

The *National Plan* has been drafted pursuant to Article 39(3) of the Act of 29 August 2014 on Energy Performances of Buildings, which transposes part of the provisions of Directive 2010/31/EU into the Polish legal system. The drafting of this document will help clarify substantive issues and emphasise the need to improve energy efficiency in the building sector.

This document is intended to indirectly help achieve the main objective, which is to ensure that all new buildings should be nearly zero-energy buildings by 31 December 2020, and all new buildings occupied and owned by public authorities are to be nearly zero-energy buildings after 31 December 2018.

In order to achieve the main objective, the definition of a nearly zero-energy building was developed, based on applicable technical and construction provisions and including a numerical coefficient of primary energy consumption expressed in kWh/(m^2·year). At the same time, by applying the methodology for determining the energy performance of a building, the use of energy from renewable sources is indirectly promoted.

An important intermediate target for 2015 for improving the energy performance of new buildings, with a view to paving the way for achieving the main objectives, is the tightening-up of the requirements set for new buildings with regard to energy-saving and thermal insulation. On 1 January 2014, the amended version of the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location entered into force. Furthermore, all actions which facilitate the change in the requirements planned for the coming years should also be considered intermediate targets.

Information about the policies, funds and other measures adopted in the context of the implementation of intermediate provisions and the main objective is discussed in detail in the document. Reference is made to the requirements and support methods for energy consumption from renewable sources in new and existing buildings undergoing thermal upgrading.

The *National Plan* includes extensive information on the improvement of energy efficiency in existing buildings, so as to provide the best possible method to reduce the differences in the standard between new and existing building stock.

The topics dealt with in the document only address part of the complex issue of low-energy buildings. Pursuing the main objective will definitely help improve the quality of building use and their thermal comfort, and have a positive effect on the financial aspect of building maintenance, as well as environmental quality, with reference to the proper development of the climate and energy policy. At the same time, it will boost the construction market and technology. Low-energy construction poses a serious challenge for the State in terms of creating relevant legislation for economically justified improvement of energy performance and increasing public awareness in this respect.

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7. LIST OF TABLES AND FIGURES

ANNEX NO 1

Annex No 1 presents Section X and selected requirements following from Annex No 2 to the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.

The provisions of the Regulation apply to the design, construction and alteration of buildings, and other civil structures on the ground and underground which are used as buildings, as well as to the change of the buildings' use.

Buildings and their installations: heating, ventilation, air-conditioning, hot water, and, in the case of public utility buildings, collective accommodation buildings, production premises, auxiliary and storage buildings, also incorporated lighting, should be designed and made in such a way as to maintain the amount of heat, cold, and electricity necessary in order to use the building in accordance with its intended purpose at a reasonably low level, while ensuring that the following minimum requirements are met:

1) the value of the EP indicator [kWh/(m^2year)] which determines annual measured demand for non-renewable primary energy to be used for heating, ventilation, cooling, hot tap water preparation, and, in the case of public utility buildings, collective accommodation buildings, production premises, auxiliary and storage buildings, also for incorporated lighting, calculated according to the methodology for the calculation of energy performance of buildings, is lower than the value calculated according to the formula referred to in Section 329(1) or (3) of the Regulation, taking into account partial maximum values of the EP indicator referred to in Section 329(2) of the Regulation (Tables 7 to 11 of the *National Plan*);
2) building's envelope and technical equipment are at least in compliance with thermal insulation requirements specified in Annex No 2 to the Regulation.

Minimum requirements set out above are considered to be met for buildings subject to alteration works if the envelope and technical equipment which are subject to those works satisfy at least the thermal insulation requirements specified in Annex No 2 to the Regulation.

Buildings should be designed and made in such a way as to reduce the risk of overheating in summer.

The maximum value of the EP indicator which determines annual measured demand for non-renewable primary energy to be used for heating, ventilation, cooling, hot tap water preparation and lighting should be calculated in accordance with the following formula:

$$EP = EP_{H+W} + \Delta EP_C + \Delta EP_L; [kWh/(m^2 \cdot rok)]$$

where:

$EP = EP_{H+W} + \Delta EP_C + \Delta EP_L; [kWh/(m_2 \cdot rok)]$

EP_{H+W} – partial value of the EP indicator for the purpose of heating, ventilation and hot tap water preparation (specified in the Regulation),

ΔEP_C – partial value of the EP indicator for the purpose of cooling (specified in the Regulation),
ΔEP_L – partial value of the EP indicator for the purpose of lighting (specified in the Regulation).

Table Z.1. 1. Partial values of the indicator of primary energy demand (EP) for the purpose of heating, ventilation and hot tap water preparation

Item	Building type	Partial values of the indicator of primary energy demand EP_{H+W} for the purpose of heating, ventilation and hot tap water preparation [kWh/(m²·year)]		
		from 1 January 2014	from 1 January 2017	from 1 January 2021*)
1	*2*	*3*		
1	Residential building: a) single-family b) multi-family	120 105	95 85	70 65
2	Collective accommodation building:	95	85	75
3	Public utility building: a) healthcare b) other	390 65	290 60	190 45
4	Auxiliary, storage and production building	110	90	70

*) From 1 January 2019 in the case of buildings occupied or owned by public authorities.

Table Z.1. 2. Partial values of the indicator of primary energy demand (EP) for the purpose of cooling

Item	Building type	Partial values of the indicator ΔEP_C for the purpose of cooling [kWh/(m²·year)] *)		
		from 1 January 2014	from 1 January 2017	from 1 January 2021**)
1	*2*	*3*		
1	Residential building: a) single-family b) multi-family	$\Delta EP_C = 10 \cdot A_{f,C}/A_f$	$\Delta EP_C = 10 \cdot A_{f,C}/A_f$	$\Delta EP_C = 5 \cdot A_{f,C}/A_f$
2	Collective accommodation	$\Delta EP_C = 25 \cdot A_{f,C}/A_f$	$\Delta EP_C = 25 \cdot A_{f,C}/A_f$	$\Delta EP_C = 25 \cdot A_{f,C}/A_f$
3	Public utility building: a) healthcare b) other			
4	Auxiliary, storage and production building			

where:
A_f – heated usable area of the building [m²],
$A_{f,c}$ – cooled usable area of the building [m²].
*) If the building is equipped with a cooling system, otherwise: $\Delta EP_C = 0$ kWh/(m²·year).
**) From 1 January 2019 in the case of buildings occupied or owned by public authorities.

Table Z.1. 3. Partial values of the indicator of primary energy demand (EP) for the purpose of lighting

Item	Building type	Partial values of the indicator ΔEP_L for the purpose of lighting [kWh/(m²·year)] in relation to the annual lighting operating time t_0 [h/year] *)		
		from 1 January 2014	from 1 January 2017	from 1 January 2021**)
1	*2*	*3*		
1	Residential building:	$\Delta EP_L = 0$	$\Delta EP_L = 0$	$\Delta EP_L = 0$
	a) single-family			
	b) multi-family			
2	Collective accommodation building	for $t_0 < 2\,500$ $\Delta EP_L = 50$ for $t_0 \geq 2\,500$ $\Delta EP_L = 100$	for $t_0 < 2\,500$ $\Delta EP_L = 50$ for $t_0 \geq 2\,500$ $\Delta EP_L = 100$	for $t_0 < 2\,500$ $\Delta EP_L = 25$ for $t_0 \geq 2\,500$ $\Delta EP_L = 50$
3	Public utility building:			
	a) healthcare			
	b) other			
4	Auxiliary, storage and production building			

*) If built-in lighting should be considered in the building, otherwise $\Delta EP_L = 0$ kWh/(m²·year).

**) From 1 January 2019 in the case of buildings occupied or owned by public authorities.

In accordance with the contents of Annex No 2 to the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location, the values of the thermal transmittance coefficient U_C for walls, roofs, floor slabs and flat roofs in all building types, including adjustments for air gaps in the insulation layer, mechanical connectors passing through the insulation layer and precipitation on inverted roofs, calculated pursuant to the Polish Standards concerning the calculation of heat resistance and thermal transmittance coefficient and heat transfer through the ground, should not exceed the values of $U_{C(max)}$ specified in the table below.

Table Z.1. 4. Values of thermal transmittance coefficient $U_{C(max)}$ for walls, roofs, floor slabs and flat roofs

Item	Type of partition and interior temperature	Thermal transmittance coefficient $U_{C(max)}$ [W/(m²·K)]		
		from 1 January 2014	from 1 January 2017	from 1 January 2021*)
1	*2*	*3*		
1	External walls:			
	a) at $t_i \geq 16°C$	0.25	0.23	0.20
	b) at $8°C \leq t_i < 16°C$	0.45	0.45	0.45
	c) at $t_i < 8°C$	0.90	0.90	0.90
2	Interior walls:			
	a) at $\Delta t_i \geq 8°C$ and partitions between heated spaces and staircases and corridors	1.00	1.00	1.00
	b) at $\Delta t_i < 8°C$	no	no	no
	c) partitions between heated and non-heated spaces	0.30	0.30	0.30
3	Walls adjoining expansion joints of the following width:			

Item	Type of partition and interior temperature	Thermal transmittance coefficient $U_{C(max)}$ [W/(m²·K)]		
		from 1 January 2014	from 1 January 2017	from 1 January 2021*)
1	*2*	*3*		
	a) up to 5 cm, permanently sealed and filled with thermal insulation to the depth of at least 20 cm	1.00	1.00	1.00
	b) more than 5 cm, independent of the adopted sealing and insulation method	0.70	0.70	0.70
4	Walls of unheated underground storeys	no requirements	no requirements	no requirements
5	Roofs, flat roofs and floor slabs underneath unheated attics or above passages:			
	a) at $t_i \geq 16°C$	0.20	0.18	0.15
	b) at $8°C \leq t_i < 16°C$	0.30	0.30	0.30
	c) at $t_i < 8°C$	0.70	0.70	0.70
6	Floor slabs on the ground:			
	a) at $t_i \geq 16°C$	0.30	0.30	0.30
	b) at $8°C \leq t_i < 16°C$	1.20	1.20	1.20
	c) at $t_i < 8°C$	1.50	1.50	1.50
7	Floor slabs above unheated spaces and enclosed floor voids:			
	a) at $t_i \geq 16°C$	0.25	0.25	0.25
	b) at $8°C \leq t_i < 16°C$	0.30	0.30	0.30
	c) at $t_i < 8°C$	1.00	1.00	1.00
8	Floor slabs above heated underground spaces and floor slabs between storeys:			
	a) at $\Delta t_i \geq 8°C$	1.00	1.00	1.00
	b) at $\Delta t_i < 8°C$	no	no	no
	c) partitions between heated and non-heated spaces	0.25	0.25	0.25

Heated space – space where (through the use of a heating system or as a result of the balance of heat gains and losses) temperature is kept at the level specified in Section 134(2) of the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.

t_i – temperature of the heated space as per Section 134(2) of the Regulation.

*) From 1 January 2019 in the case of buildings occupied or owned by public authorities.

The values of the thermal transmittance coefficient U for windows, balcony doors and external doors must not exceed the $U_{(max)}$ values specified in the table below.

Table Z.1. 5. Values of thermal transmittance coefficient $U_{(max)}$ for windows, balcony doors and external doors

Item	Windows, balcony doors and external doors	Thermal transmittance coefficient $U_{(max)}$ [W/(m²·K)]		
		from 1 January 2014	from 1 January 2017	from 1 January 2021*)
1	*2*	*3*		
1	Windows (except roof windows), balcony doors and fixed transparent surfaces:			
	a) at $t_i \geq 16°C$	1.3	1.1	0.9
	b) at $t_i < 16°C$	1.8	1.6	1.4
2	Roof windows:			
	a) at $t_i \geq 16°C$	1.5	1.3	1.1
	b) at $t_i < 16°C$	1.8	1.6	1.4
3	Windows in interior walls:			
	a) at $\Delta t_i \geq 8°C$	1.5	1.3	1.1
	b) at $\Delta t_i < 8°C$	no requirements	no requirements	no requirements
	c) partitions between heated and non-heated spaces	1.5	1.3	1.1
4	Doors in exterior partitions or in partitions between heated and non-heated spaces	1.7	1.5	1.3
5	Windows and external doors in exterior partitions of non-heated spaces	no requirements	no requirements	no requirements

Heated space – space where (through the use of a heating system or as a result of the balance of heat gains and losses) temperature is kept at the level specified in Section 134(2) of the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.

t_i – temperature in a heated space as per Section 134(2) of the Regulation of 12 April 2002 on technical conditions to be met by buildings and their location.

*) From 1 January 2019 in the case of buildings occupied or owned by public authorities.

ANNEX NO 2

The availability of funds under each programme described in Section 3 of the *National Plan* is presented below. *Table Z.2. 1. Distribution of available funds under each programme*

Scheme		Building condition		Building type		Beneficiary groups													
		New building	Existing	Residential	Public utility	Natural persons	Housing cooperatives and associations	Public finance sector units	Local government units and associations thereof	Entities which are not entrepreneurs and which provide public services as part of local government own tasks	Universities, within the meaning of the Higher Education Law Act, and research institutes	Enterprises: small	Enterprises: medium	Enterprises: large	Independent public healthcare centres and healthcare establishments operating as enterprises (within the meaning of Article 55[1] of the Civil Code) providing healthcare services	Non-governmental organisations, churches, other religious associations entered in the register of churches and other religious associations and church legal persons	Provincial Funds for Environmental Protection and Water Management	Economic operators within the meaning of Article 43 of the Civil Code	Voluntary Fire Services
Subsidies for the construction of energy-		■		■		■													
LEMUR		■			■			■	■							■			
Prosumer		■	■	■		■	■												
BOCIAN		■	■		■													■	
Energy saving investments in small and medium-sized enterprises			■									■	■						
KAWKA			■	■													■		
GIS: Energy management in public utility buildings			■		■				■	■	■				■	■			■
PL04 Norwegian funds			■		■							■	■	■				■	
The Swiss-Polish Cooperation Programme.			■	■	■														
OPIE Investment priority 4.3			■	■	■		■		■	■									
Ther mom oder nisati	thermomodernisation		■	■	■	■	■												
	repairs and renovation		■	■		■	■												
	compensation		■	■		■													

■

ANNEX NO 3

Detailed information on energy efficiency support schemes for each province under Regional Operational Programmes is listed below.
Table Z.3. 1. Projects within the framework of specific ROPs

Province	Purpose of intervention in 4.III	Anticipated amounts of support funds (by codes for the intervention in accordance with Annex I to Commission Implementing Regulation (EU) No 215/2014 of 7 March 2014)			Anticipated beneficiary type in 4.III	Main project types in 4.III
		013 Energy efficiency renovation of public infrastructure, demonstration projects and support measures	014 Energy efficiency renovation of existing residential buildings, demonstration projects and support measures	Total 013+014		
Dolnośląskie	Support for energy efficiency, intelligent energy management and using renewable energy sources in public infrastructure, including public buildings and the residential sector	EUR 101 500 000	EUR 50 072 922	**EUR 166 572 922**	Type of beneficiaries: - local government units and associations thereof, - public entities owned or established by local government units, - organisational units of local government units, - housing associations and cooperatives, - social housing associations (TBS), - entities managing financial engineering instruments.	Preference will be given to the following projects: - comprehensive projects encompassing a significant part of a municipality or district, in the form of programmes initiated by local government units, covering prosumer actions intended to limit low emission and increase the share of renewable energy sources in the energy balance, - projects using energy management systems in buildings, - in line with low carbon economy plans, - concerning deep thermomodernisation.

	Introducing low emission strategies (4e)		15 000 000		Type of beneficiaries: - local government units and associations thereof, - organisational units of local government units, - public finance sector units other than those listed above, - economic operators managing infrastructure or providing collective transport services in urban and suburban areas, - NGOs, - The State Forests National Forest Holding and its organisational units, - entity implementing the financial instrument.	Preference will be given to the following projects: - in towns with more than 20 000 inhabitants, - improving the accessibility to population concentration and/or economic activity areas and to the labour market and public services, - multimodal projects combining different low- and zero-emission means of transport, - located in health resorts, - concerning the purchase of alternatively powered rolling stock or fleet (electrical, gas, hydrogen, hybrid), - concerning heating systems based on fuels other than solid fuels, - using RES, - located in health resorts, - using energy management systems in buildings, - whose implementation will bring about CO_2 emission reduction by more than 30 %, - for which support is granted through Energy Saving
Kujawsko-Pomorskie	Increasing energy efficiency of public utility and multi-family residential buildings	EUR 60 476 294	EUR 25 918 411	**EUR 86 394 705**	Type of beneficiaries: - Local government units and associations thereof, local government organisational bodies, - other public finance sector units, - NGOs, - housing associations and cooperatives, - churches and religious associations, and church and religious association legal persons. It is permitted to implement projects on the basis of a long-term agreement concluded between a public entity and a private entity with the purpose to create infrastructure components to allow for the provision of services of a public nature.	Under investment priorities support will be given for measures consisting in a comprehensive thermomodernisation of buildings together with the replacement of their equipment with energy-saving devices. In accordance with the law, the public sector should fulfil an exemplary role with regard to energy efficiency actions, therefore a major part of the investment projects is planned in public buildings. Support for projects consisting in carrying out energy audits, comprehensive thermomodernisation together with the use of RES installations and replacement of heat sources shall significantly reduce heat and electricity consumption. The planned support is necessary to ensure rational and efficient administration in the province, manifested in reasonable and cost-effective management of economic and environmental resources.

Lubelskie	Energy efficiency improvement in public utility buildings and residential sector	EUR 95 143 470	EUR 22 617 544	**EUR 131 531 252**	The beneficiary groups include, inter alia: - local government units and associations thereof, - organisational units of local government units having legal personality, - scientific entities, - universities, - commercial companies in which a majority of shares or stocks is owned by local government units or associations thereof, - NGOs, - public finance sector units having legal personality, - housing associations and cooperatives, - social housing associations (TBS), - emergency and public safety services, - entities managing financial instruments.	The implementation of the energy-saving objective in the public and residential sectors will encompass support for deep thermomodernisation of public facilities, including those owned or managed by local government units (e.g. hospitals, schools) and residential buildings, including replacing their equipment with devices in the highest economically justified energy class (e.g. installing thermal insulation, replacing doors and windows, modernising heating systems and replacing heat sources, modernisation of ventilation and air-conditioning systems). The comprehensive, deep thermomodernisation of buildings will also include aid for distributed generation, i.e. the construction of local, small energy sources producing electricity and heat for local purposes, without the need of long-distance transfer and the improvement of heat generation capacity by replacing heat sources with high-efficiency cogeneration units.
	Promoting low carbon strategies for all areas, in particular urban areas, including support for sustainable multimodal urban mobility and adaptive measures which counteract climate changes (4e)	EUR 13 770 238			The main beneficiary groups for the implementation of sustainable urban mobility projects and low carbon economy plans and/or Integrated Territorial Investment strategies are towns with more than 30 000 inhabitants and their functionally linked areas, as well as the following entities operating within those areas: - local government units and associations thereof, - organisational units of local government units having legal personality, - public finance sector units having legal personality, - entities providing public transport services upon order of local government units and associations thereof in the areas of towns covered by the measure and selected to provide those services in accordance with the public procurement law. Under the projects following from low carbon economy plans for specific area types,	With regard to heat source replacement, support may be granted for investments in installations with maximally low emissions of CO_2, PM10 and other air pollutants. Supported projects must result in CO_2 reduction by at least 30 % as compared with the existing installations. Projects should be economically and socially justified and counteract energy poverty. Support for projects using renewable energy sources will be a priority. Support will be conditional upon the implementation of investments which increase energy efficiency and reduce energy demand in buildings which use energy from devices that receive support. For individual heating devices working on solid fuels.. Investments in urban transport must follow from the plans developed by local authorities and containing references to the issue of switching to more environmentally-friendly and sustainable transport systems in towns and cities. Low carbon economy plans, Integrated Territorial Investment strategies or urban mobility plans may also be used for this purpose.

					the main beneficiary groups include: - local government units and associations thereof, - organisational units of local government units having legal personality, - public finance sector units having legal personality, - commercial companies in which a majority of shares or stocks is owned by local government units or associations thereof, - SMEs, - emergency and public safety services.	
Lubuskie	Improving energy consumption in the public and residential sectors	EUR 27 441 473	EUR 11 760 631	**EUR 39 202 104**	Type of beneficiaries: - local government units and associations thereof, societies and associations and public entities owned or established by local government units, - owners/administrators of residential buildings.	The following projects will be implemented under the programme: - comprehensive thermomodernisation of public utility buildings, - comprehensive thermomodernisation of residential buildings, - use of RES installations in the case of thermomodernisation.
Łódzkie	Improving energy efficiency in the public sector and housing sector	EUR 89 079 306	EUR 32 385 196	**EUR 213 703 958**	- local government units, and associations or societies of local government units, - organisational units of local government units having legal personality, - public finance sector units having legal personality, - scientific entities, - universities, - legal and natural persons governing schools and other educational facilities, - housing associations and cooperatives, social housing associations (TBS), - entities providing healthcare services, - cultural institutions, - churches, religious associations and church and religious association legal persons, - NGOs,	The programme will encompass comprehensive thermomodernisation of public utility buildings or residential buildings (common areas in multi-family residential buildings) together with the replacement of their equipment with energy-efficient devices and materials (e.g. installation of thermal insulation, replacement of windows, external doors and luminaires with energy saving ones, conversion of heating systems including the replacement and connection of the heat source), modernisation of ventilation and air-conditioning systems, RES installations in buildings undergoing thermal upgrading. Under the project, heat sources using conventional fuels can be replaced with heat sources generating energy from renewable sources or with district heating connections. The implemented projects shall follow from energy audits.

					- The State Forests National Forest Holding and its organisational units.	
	Improving air quality (4e)	EUR 34 486 536			Type of beneficiaries: - local government units and associations or societies thereof, - organisational units of local government units having legal personality, - entrepreneurs, - NGOs, - scientific entities, education establishments, universities, - housing associations and cooperatives, social housing associations (TBS).	The following projects will be implemented under the programme: - investments in construction projects with significantly better energy performance, consisting in pilot and demonstration projects for public utility buildings, - investments in the modernisation of heat sources (comprehensive replacement or renovation), extending heat supply systems and connecting heat sources to single-family and multi-family housing and to public utility buildings. Coal-fired boilers will not be subsidised, - investments in street lighting using energy-saving and environmentally-friendly equipment as part of a wider infrastructural project.
	Restoring or providing social and economic functions in degraded areas (9b)	EUR 28 392 321	EUR 29 360 599		Type of beneficiaries: - local government units and associations or societies thereof, - organisational units of local government units having legal personality, - public finance sector units having legal personality, - government administration bodies and their subsidiaries, - NGOs - churches, religious associations, church and religious association legal persons, - cultural institutions, - housing associations and cooperatives, social housing associations (TBS), - Local Action Groups, - universities, - scientific entities, - entrepreneurs.	The following projects will be implemented under the programme: - renovation and adaptation of buildings, facilities, areas and spaces leading to the restoration or provision of new functions, together with the possibility of purchasing equipment and fittings necessary for the achievement of the purpose of the intervention 9b, - rehabilitation of housing stock in common areas of multi-family residential buildings, including thermomodernisation of residential buildings (as part of a wider project). Support will be given to projects following from comprehensive, long-term rehabilitation programmes developed on the basis of national frameworks for rehabilitation actions and local rehabilitation schemes or equivalent documents, such as Integrated Territorial Investment strategies. The following projects will be given priority: - projects complementary to those implemented under the European Social Fund (ESF), - infrastructural projects at a smaller scale, complementing rehabilitation investments within other thematic objectives financed under the ROP for the Łódzkie Province, 2014–2020, - projects contributing to the reduction of energy consumption in facilities undergoing rehabilitation.

Małopolskie	The main objective of the intervention implemented under this investment priority is the increase of energy efficiency and the use of renewable energy sources in the housing and public utility sectors	EUR 70 000 000	EUR 26 000 000	**EUR 96 000 000**	Type of beneficiaries: - local government units and associations thereof, - organisational units of local government units having legal personality, - scientific entities, - universities, - housing associations and cooperatives, - cultural institutions, - entities providing healthcare services operating within the public healthcare system, - NGOs, - churches, religious associations and church and religious association legal persons.	Within the framework of actions aimed at the housing and public utility sectors, the implementation will focus on comprehensive thermomodernisation of buildings using RES installations. The key aspect of the implementation of those projects is the achievement of the ecological objective demonstrated by the amount of energy saved in relation to the planned expenditure. Consequently, the preliminary condition for starting such investments should be the performance of an energy audit, drafting energy-saving schemes and a profitability analysis and then carrying out a comprehensive thermomodernisation which would include, among other things: - installing thermal insulation, replacing windows, external doors and lighting with energy-saving systems, - conversion of heating systems (including the replacement and connection of the heat source), ventilation and air-conditioning systems, installation of weather-sensitive automatic temperature control and of building management systems, - construction or modernisation of internal receiving installations, and the removal of existing heat sources, - installation of micro-generation or micro-trigeneration for own needs, - use of RES technologies in buildings, - installation of cooling systems, also including the use of RES.

Mazowieckie	The main objective of this measure is providing support for interventions intended to increase energy efficiency, also by using renewable energy sources in public utility and residential buildings, as well as for SMEs sector with regard to the reduction of energy, heat and water losses.	EUR 48 731 628	EUR 20 847 340	**EUR 69 578 968**	The beneficiary groups include, inter alia: - local government units and associations thereof, - organisational units of local government units having legal personality, - entities providing public services upon order of local government units, in which a majority of shares or stocks is owned by local authorities, - government administration, - commercial companies in which a majority of shares or stocks is owned by local government units or associations thereof, - entities selected pursuant to the Act of 29 January 2004 – Public Procurement Law (*Journal of Laws* 2013, item 907, as amended) providing public services under a valid agreement for the provision of services from a given field concluded with a local government unit, - small and medium-sized enterprises, - energy services providers, - energy undertakings performing business activity consisting in the production, processing, storage, transmission, distribution of fuels or energy, or trade in them, - The State Forests National Forest Holding and its organisational units, - cultural institutions, - scientific institutions, - universities, - housing associations and cooperatives, social housing associations (TBS), - churches, religious associations and church and religious association legal persons, - NGOs, - entities responsible for the implementation of remedial measures specified in air quality schemes and short-term action plans.	Projects: - comprehensive thermomodernisation of public utility and residential buildings, - reducing energy intensity in small and medium-sized enterprises, - construction or reconstruction of units producing electricity and heat from high-efficiency cogeneration.

Opolskie	Reducing energy intensity of public sector and housing	EUR 17 400 000	EUR 4 100 000	**EUR 21 500 000**	Type of beneficiaries: - local government units and associations or societies thereof, - organisational units of local government units, - public finance sector entities, - scientific entities, - universities, - enterprises, - churches, religious associations and church and religious association legal persons, - NGOs, - financial intermediaries with relevant expertise and administrative potential.	Projects: - comprehensive thermomodernisation of public utility buildings together with the replacement of their equipment with energy-saving devices, - energy audits for the public sector as a part of a comprehensive project, - capital injection for loan funds, - capital injection for other public financial institutions offering repayable financial instruments.
Podkarpackie	Energy efficiency improvement in residential sector and public utility buildings	EUR 64 898 653	EUR 60 667 080	**EUR 143 191 674**	Type of beneficiaries: - local government units and associations thereof, - entities in which a majority of shares or stocks is owned by local government units or associations thereof, - public finance sector entities, - housing associations and cooperatives, social housing associations (TBS), - NGOs, - entities providing healthcare services within the meaning of the Act of 15 April 2011 on healthcare activities (*Journal of Laws* 2015, items 618 and 788).	Projects: - comprehensive thermomodernisation of public utility buildings together with the replacement of their equipment with energy-saving devices, - comprehensive energy modernisation of residential buildings (multi-family residential buildings) together with the replacement of their equipment with energy-saving devices, - introduction of energy management systems (e.g. smart metering) as a complex part of a project.
	Promoting low carbon strategies for all areas, in particular urban areas, including support for sustainable multimodal urban mobility and adaptive measures which counteract climate changes (4e)	EUR 17 625 941			- local government units and associations thereof, - entities in which a majority of shares or stocks is owned by local government units or associations thereof, - public finance sector entities, - enterprises, - NGOs, - housing associations and cooperatives, social housing associations (TBS), - associations of the above-mentioned entities, represented by a leader.	Projects: - replacement or modernisation of heat sources (criterion for support: exceeding the limits of PM10, PM2.5 and benzo(a)pyrene emissions), - reducing energy losses in heat distribution, including from RES, - development of district heating networks, - implementation of integrated strategies for energy sustainability in urban areas, including public lighting systems, - support for projects that may follow from low carbon economy plans / low emission reduction programmes for given urban area types and projects not eligible for support under other investment priorities, e.g. energy-saving measures, investments in passive housing construction.

Podlaskie	Implementation of efficient energy management programmes, including thermomodernisation measures	EUR 22 500 000	EUR 45 000 000	**EUR 67 500 000**	Type of beneficiaries: - housing associations and associations thereof, housing cooperatives, - social housing associations (TBS), - entities managing residential properties. Projects concerning public utility buildings will be implemented by, inter alia: - local government units and associations thereof, - organisational units of local government units having legal personality, - entities in which a majority of shares or stocks is owned by local government units or associations thereof, - entities operating on a public-private partnership basis, - scientific entities, universities, - churches and religious associations.	In order to improve energy efficiency, a comprehensive thermomodernisation of residential and public utility buildings together with the replacement of their equipment with energy-saving devices will be necessary, including the installation of thermal insulation, replacement of windows, external doors and lighting. Investments in the conversion of heating systems together with the replacement of the heat source and its connection, ventilation and air-conditioning systems, water and sewerage systems are planned. In line with the prosumer energy concept, the use of RES installations in buildings undergoing thermal upgrading will be promoted. Installation of cooling systems, also including the use of RES, will be eligible for funding. The use of RES installations must be fully justified by the building's energy needs and only the surplus part of electricity can be sent to the distribution grid.
Pomorskie	Increasing energy efficiency of public utility and residential buildings and of outdoor lighting systems	EUR 110 377 399	EUR 27 943 630	**EUR 152 507 795**	Type of beneficiaries: - local government units and their organisational units, - associations and societies of local government units, - government administration bodies, - other public finance sector units, - scientific entities, - educational institutions, universities, - NGOs, - churches and religious associations, - entrepreneurs, - financial institutions.	Projects increasing the energy efficiency of public utility buildings, including thermomodernisation undertakings, will be supported. Improving energy efficiency of residential buildings will also be possible. Thermomodernisation combined with the use of RES installations and the replacement of heat sources is planned under comprehensive projects. The scope of works must follow from the analysis of possible solutions carried out as part of the energy audit. The selected option must take into account the cost criterion relating to the environmental effect (e.g. the reduction in greenhouse gas emissions) and compared with the financial investments.
	Improved performance of the municipal energy infrastructure (4e)	14 186 766			- Local government units and their organisational units, - associations and societies of local government units, - government administration bodies, - other public finance sector units, - NGOs, - scientific entities, - educational institutions,	For centralised district heating systems (including heat sources), the following projects will be given priority: 1) implemented in municipalities where air quality standards are exceeded, 2) ensuring the largest environmental effect (e.g. the reduction in greenhouse gas emissions) in relation to financial investments, 3) using innovative solutions in terms of the equipment and systems used, e.g. projects which form part of the 'energy islands' or using high-efficiency cogeneration,

					- universities, - entrepreneurs.	4) implemented with private participation, 5) with the largest possible extent of influence, 6) agreed within integrated territorial approaches (ZPT).
Śląskie	Counteracting negative climate changes and the improvement of the competitiveness of regional economy by increasing the share of energy from renewable sources against energy from conventional sources. Reducing energy intensity of public infrastructure and housing sector, Improving air quality in the region.	EUR 91 003 577	EUR 90 834 827	**EUR 231 838 404**	Type of beneficiaries: - local government units and associations thereof, - entities in which a majority of shares or stocks is owned by local government units or associations thereof, - entities considered part of the public finance sector (not listed above), - entities providing healthcare services within the meaning of the Act of 15 April 2011 on healthcare activities, having legal personality or capacity, - universities, - NGOs, - housing associations and cooperatives, - social housing associations (TBS), - associations of the above-mentioned entities, represented by a leader, - entities operating on the basis of a contract/agreement in a public-private partnership ('hybrid projects').	Investment priority 4.3 will cover measures involving comprehensive thermomodernisation of public utility and residential buildings combined with the construction and reconstruction of infrastructure used to generate and distribute energy from renewable sources in buildings undergoing thermal upgrading and/or elimination of 'low emission' by replacing/modernising individual heat sources.
	Increased attractiveness of public transport for passengers (4e)	EUR 50 000 000			Type of beneficiaries: – local government units and associations thereof whose statutory duty is the performance of statutory tasks of local government units with regard to public transport, – entities operating upon order of local government units and associations thereof, performing public transport tasks and selected to provide those services in accordance with the public procurement law, – entities in which a majority of shares or stocks is owned by local government units or associations thereof, performing statutory public tasks with regard to public transport,	Project types • Construction and conversion of public transport infrastructure, either in terms of routes or points (e.g. integrated interchange points, bike lanes, Park&Ride and Bike&Ride facilities, bus lanes). • Implementation of intelligent transport systems (ITS). • Purchase of bus and tram fleet for the purpose of public transport, including the construction of infrastructure. • Construction and conversion of linear tram infrastructure. • Improving energy efficiency of lighting.

					– associations of those entities	
Świętokrzyskie	Support for energy efficiency, intelligent energy management and using renewable energy sources in public infrastructure, including public buildings and housing sector	EUR 54 754 121	EUR 10 279 853	**EUR 87 886 445**	Type of beneficiaries: - local government units, - housing associations and cooperatives, - societies and associations of local government units, social housing associations (TBS), - local government organisational bodies having legal personality, universities, other entities operating in public services area under different organisational forms, having legal personality, e.g. foundations and associations, the police, healthcare establishments providing healthcare services in the Świętokrzyskie Province financed from public funds, - local government legal persons, - voluntary and State Fire Services units.	Comprehensive thermomodernisation projects of public buildings (except entities subordinate to the central administration) and residential buildings forming part of the housing stock of the municipality together with the replacement of equipment of the facilities with energy-efficient ones, including, inter alia: the installation of thermal insulation, replacement of windows and external doors and lighting with energy-saving systems, conversion of heating systems (together with the replacement of the heat source – elimination of boilers firing solid fuel), ventilation and air-conditioning systems, water and sewerage systems, installation of RES in buildings undergoing thermal upgrading, installation of cooling systems, also including the use of RES, installation of state-of-the-art energy-saving devices (e.g. solar collectors).
	Promoting low carbon strategies for all areas, in particular urban areas, including support for sustainable multimodal urban mobility and adaptive measures which counteract climate changes (4e)	EUR 22 852 471			Type of beneficiaries: – local government units, – large, medium-sized, small and micro enterprises providing public services in the Świętokrzyskie Province, – social and economic partners operating in the Świętokrzyskie Province, – NGOs, – local government legal persons, – business environment institutions, – universities, – state budgetary institutions, – cultural institutions.	Subsidies will be granted for projects implementing low carbon economy plans for given areas. Support for projects should follow from low carbon economy plans for given area types and projects not eligible for support under other investment priorities, e.g. 1) replacing street lighting (streets, squares, public areas) with energy-saving systems, 2) construction or modernisation of district heating network, 3) replacement of heat sources, 4) micro-cogeneration, 5) information and promotion measures regarding energy-saving etc., 6) campaigns to promote: - zero-emission construction, - investments in passive housing construction.

Warmińsko-Mazurskie	Improving energy efficiency of residential and public utility buildings	EUR 35 659 567	EUR 15 282 672	**EUR 50 942 239**	Type of beneficiaries: - local government units and associations thereof, - organisational units of local government units, - public finance sector units having legal personality, - independent public healthcare establishments (i.e. operating within the public healthcare system) established by local government unit(s), - enterprises (only entities which provide public services as part of local government own tasks), - housing associations/cooperatives.	Projects: – comprehensive thermomodernisation of public utility buildings/common areas in multi-family residential buildings together with the replacement of equipment of these facilities with energy-efficient ones (e.g. installation of thermal insulation, replacement of windows and external doors and lighting with energy-saving systems), conversion of heating systems (together with the replacement and connection to a heat source), conversion of ventilation and air-conditioning systems, RES installation, installation of cooling systems, also including RES), - energy audits for the housing and public sector (only as part of comprehensive thermomodernisation projects described above), - installation of intelligent energy management systems in public utility and residential buildings, based for example on ICT technologies (only as part of comprehensive thermomodernisation projects described above).
Wielkopolskie	Reducing energy intensity of housing and public sectors	EUR 60 060 000	EUR 30 940 000	**EUR 91 000 000**	Type of beneficiaries: - housing associations and cooperatives, - local government units, associations thereof and organisational units, - entities with legal personality, including entities which provide public services as part of local government own tasks, - entities operating on the basis of a public-private partnership agreement.	Projects: thermomodernisation of buildings and replacement of their equipment with energy-saving systems, modernisation projects for district heating and energy infrastructure in buildings undergoing thermal upgrading, connecting buildings to district heating network, RES installations in buildings undergoing thermal upgrading.
Zachodniopomorskie	Reducing energy intensity in public and residential buildings	EUR 20 576 416	EUR 20 000 000	**EUR 47 576 416**	Type of beneficiaries: for type 1: - local government units and associations thereof, - organisational units of local government units, - legal persons of local government units and partnerships of these entities, for type 2: - local government units and associations thereof, - organisational units of local government units, social housing associations (TBS), - housing associations and cooperatives, - NGOs, - partnerships of these entities.	Projects: - comprehensive thermomodernisation of public utility buildings, which will be implemented on the basis of energy audits completed earlier, - comprehensive thermomodernisation of multi-family residential buildings.

	Promoting low carbon strategies for all areas, in particular urban areas, including support for sustainable multimodal urban mobility and adaptive measures which counteract climate changes (4e)	EUR 7 000 000			Type of beneficiaries: – providers of collective public transport services, – local government units and associations thereof, – organisational units of local government units, – NGOs, – railway infrastructure managers, – state budgetary institutions, – enterprises.	Projects: – construction and reconstruction of integrated public transport system infrastructure facilities/systems in order to reduce traffic in urban centres, – projects raising environmental awareness, – purchase or modernisation of urban transport fleets.

In total		EUR 1 157 919 11 7	EUR 539 010 705	1 696 929 822
		cat. 013	cat. 014	**013+014**